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ÖNSÖZ

Zootekni Federasyonumuzun organize ettiği 10. Uluslararası Zootekni Bilim Kongresi Antalya Sueno Hotelde 25-27 Ekim 2018 tarihleri arasında gerçekleşmiştir. Kongrede Dünyanın ve Ülkemizin farklı yerlerinden katılan bilim adamları tarafından 153 bildiri sunulmuştur.

Kongremizde başlıca;

- Hayvansal üretimde sırasıyla ot üretimi için ülkemiz su kaynaklarının daha etkin kullanılması zorunluluğu ve kırmızı et üretimi için ise daha az yem girdisi ithali için daha kaliteli kaba yem yanında kesif yemi oluşturan yem ham maddelerinin üretiminin arttırılması,
- Hayvan veya hayvansal ürün ithalatından ziyade artan ülke nüfusuna göre gelecekte açık oluşturmayacak şekilde ülke içinde üretimi arttırmaya yönelik savunma sanayii ve otomobil sektöründe olduğu gibi yeni hayvancılık politikalarının devreye sokulması,
- Üniversitelerimiz ile Tarım ve Orman Bakanlığına bağlı araştırma kuruluşlarında üretilen akademik bilgilerin saha ile paylaşılması ve sahada karşılaşılan problemlerin çözümüne yönelik çalışmaların dizayn edilmesi,
- Mera alanlarımızın amacı dışı kullanılan alanların geri kazandırılması,
- Arıcılıkta kovan sayısının arttırılmasından ziyade verimlilik üzerinde durulması ve yöreler uygun damızlık ana arı yetiştiriciliğine ağırlık verilmesi,
- Göçer arıcılığın düzenlenerek bazı bölgelerde aşırı koloni, bazı yörelerde ise koloni azlığına bağlı verim kaybının önüne geçilmesi,
- Kırmızı et üretimimizde açığın kapatılmasında ithalattan ziyade daha fazla süt veren hayvanın yerine mera şartlarına daha uygun, daha az süt veren ve yavrusuna bakabilen sığır ırklarının yetiştirilmesine ağırlık verilmesi ve
- Terör mücadele kapsamında daha güvenli hale getirilen Doğu Anadolu ve Güney Doğu Anadolu Bölgelerimizde mera dayalı hayvancılık faaliyetlerinin arttırılmasında Cumhurbaşkanlığı Sisteminde zooteknist ziraat mühendislerine kırmızı et açığımızın kapatılması hususunda daha fazla imkan tanınması konuları vurgulanmıştır.

Kongre Düzenleme Kurulu adına yukarıda sayılan konuların paydaşlarımız tarafından önemle dikkate alınması temennilerimle, Kongremize gerek maddi destek ve gerekse değerli sunumları ile iştirak eden tüm katılımcılarımıza teşekkür ederek, gelecekte giderek iyileştirilen ve uluslararası katılım oranı giderek artan yeni Kongreler düzenlemek ümidiyle;

Saygılar sunarım.

Prof. Dr. Zafer ULUTAŞ

Kongre Düzenleme Kurulu Başkanı

CONTENTS

SPEAKERS

ORAL PRESENTATIONS

CATTLE PRODUCTION

SMALL RUMINANTS

POULTRY PRODUCTION

BIOMETRY AND GENETICS

ANIMAL NUTRITION

BEEKEPING

ANIMAL PRODUCTION

FISHERY

POSTER PRESENTATION

ABSTRACTS

Animal Scientists role in EU

Andrea ROSATI, General Secretary, European Federation of Animal Science (EAAP), Italy

Genotoxıc and Toxıcopathologıcal Effect of Aflatoxın B1 In Grass Carp (Ctenopharyngodon İdella)

H. Khan, U. Sadique, F. A. Khan, S. Ahmad, F. Ahmad
Department of Animal Health, Faculty of Animal Husbandry and Veterinary Sciences
The University of Agriculture Peshawar- Pakistan

Effect of protected fat and protein on animal performance: Review

Euloge O.A. Olomonchi, Jerry D. Agossou, Ali V. Garipoğlu
Fakulty of Agriculture, Parakou University, Benin

Determination of minimum number of animals in comparing treatment group means by power analysis

O. Koşkan, H. Köknaroğlu, **M.P. Hoffman**
University Department of Animal Science, Ames, Iowa, USA

Prion protein (PRNP) alleles S146 and K222 result in long disease-free periods following scrapie inoculation in goats

M.U. Cinar, **D.A. Schneider** D.F. Waldron, K.I. O'Rourke, S.N. White
United States Department of Agriculture, Agricultural Research Service, Animal Disease Research Unit, 3003 ADBF, WSU, Pullman, WA 99164, USA

Effect of Using Red Ginseng (Panax ginseng) Root Alcoholic Extract on Some Physiological Performance of Japanese Quail Female

D. K. Ibrahim and N. K. Jabr
Animal production Department College of Agriculture University of Baghdad, Baghdad, Iraq

Prevalence and clinico-pathological picture of mycoplasmosis in sheep of Southern Zone, Pakistan

M. Kamal Shah, U. M. Kamal Shah, U. Sadique, A. Rehman, S. Ullah, M. S. Khan, S. A. Shah, A. Shahzad, I. Haq, F. Ahmad
[a]Faculty of Veterinary & Animal Sciences, Gomal University, Dera Ismael Khan, Pakistan

Developing and Implementing A Plan for Marketing Goat Meat in Turkey

N, Koluman, **D.Arsoy**, and S.Göncü
Near East University, Veterinary Medicine Faculty, Department of Animal Science, Nicosia, North Cyprus

Comparative Assessment of Fattening and Meat Sensory Characteristics of Kids and Lambs

D.J. Agossou, A. Koluman, N. Koluman
Fakulty of Agriculture, Parakou University, Benin

Prof. Dr. Zafer ULUTAŞ (Kongre Başkanı):

Yurt içinden ve yurt dışından gelen değerli misafirler,

Çok değerli meslektaşlarım,

Değerli katılımcılar, Değerli basın mensupları 10. su düzenlenen Uluslararası Zootekni Kongremize hoş geldiniz, katılımınızla şeref verdiniz.

Yakın zamana kadar Ziraat Fakültelerimizin Zootekni Bölümleri tarafından organize edilen Bilim Kongremiz, artık uluslararası kimlik alarak, bu yıldan itibaren Zootekni Federasyonu tarafından düzenlenecektir. Federasyon tarafından organize edilecek olan müteakip Kongrenin de yapısal düzenlemesinin nasıl olması gerektiği size dağıtılan anket formlarında belirteceğiniz esaslar doğrultusunda planlanacaktır. Federasyonumuzun ilk kongre etkinliği olan bu Kongremizde eksikliklerimiz olabilir ancak bu eksiklikler ankette vereceğiniz öneriler doğrultusunda giderek iyileştirilecektir.

Kongremize ülkemiz hayvancılığı enine boyuna tartışılacak ve buradan çıkacak sonuçlar rapor halinde de ilgili yerlere ulaştırılacaktır

Bizler Zooteknist ziraat mühendisleri olarak ülkemizin hayvancılığına kayıtsız kalamayız kalmamalıyız. Hem dün hem bugün hem de yarın yapacağımız çalışmalar ve belirteceğimiz düşünceler ile ülke hayvancılığına katkı yapmaya devam edeceğiz.

Özellikle, son yıllarda ülkemiz hayvansal ürünler bakımından özellikle de kırmızı et üretiminin yetersizliği ve bunun çözümü ile ilgili sunulan öneriler açısından sıkıntı yaşanmaktadır. Bu problem gündeme geldiğin de ilk akla gelen çözüm ithalat olarak sunulmaktadır. İthalat lobisinin bunu yapması normaldir, ancak politika yapıcılarının ithalatın çözüm olmadığını anlaması için daha kaç sene geçmelidir. Bugün artan yem fiyatlarından dolayı çiftçi, ürettiği sütünü gerçek fiyattan satamaz hale gelmiştir. Bugün 1 lt süt 1 lt sudan daha ucuz hale gelmiştir. Bırakın kar etmeyi zarar etmemeyi bile kazanç gören çiftçiler, zarar etmeye başlayınca daha doğrusu dayanacak gücü kalmayınca damızlık hayvanlarını kasaplık olarak satmak durumunda bırakılmıştır. Çiftçinin düştüğü bu zor durum aynı zamanda ülkemiz için bir kayıp olarak değerlendirilmeli ve politika yapıcıları durumu yeniden gözden geçirmeli ve hayvan yetiştiricisine bu zor günlerinde destek olmalıdır.

Aksi takdirde damızlıkların kesilmesi devam edecek, azalan hayvan sayısı sonunda takip eden yıllarda kırmızı et açığı daha da büyüyecektir. Bu durumda, geçmişte ve günümüzde sık sık başvurulan ivedi ve kolay çözüm olarak sunulan; azalan damızlık hayvan varlığının ithalatla artırılmasına çalışılmasıdır. Ancak bu yolun sorunları kalıcı olarak çözmediği geçmişte ve günümüzde defalarca kanıtlanmıştır.

Bunda ısrar etmenin yerine milli dinamiklerin hayata geçilmesinde büyük önem vardır. Hâlihazırda sağmal hayvan varlığımız ile elde edilen süt miktarı (250 kg/kişi) yeterli düzeydedir. Bu hayvan varlığının aşağıya ya da yukarıya çıkması süt dengesini bozacağı için fiyat istikrarsızlığına yol açacaktır. Bu bakımdan yetersiz olan et üretimini yeterli düzeye getirmek için alınması gerekli yönetimsel tedbirlerin yanında hayvancılık yapısının değiştirilmesi gerekmektedir. Bunun için, çok süt veren hayvan değil buzağısına yetecek kadar süt veren 4 milyon civarında Et sığırı yetiştiriciliğine ihtiyaç vardır.

Aksi takdirde bu senaryo hep bu şekilde devam edecektir. Ayrıca, çoklu doğum yapan koyun yetiştiriciliği teşvik edilmeli, koyunculuğumuzun sigortası olan mera alanlarımızın amaç dışı kullanımının engellenmesine, erken otlatma ve anız yakmaların önüne geçilmesi ile kırmızı et üretimimize katkı sağlanabilecektir. Ayrıca, kırmızı et maliyet unsurlarından olan yem üretimi artırılmalı, bugünkü fabrikasyon usulü veya fason et üretim sisteminden vaz geçilmelidir.

Son günlerde bilinçli ya da bilinçsiz olarak gündeme gelen ve üreticileri son derece olumsuz etkileyen ve kırmızı et tüketimi üzerinde tehditmiş gibi algılanan şarbon hakkında daha doğru bilgiler tüketicilere sunulmalıdır. Sayın Cumhurbaşkanımızın önem verdiği konulardan biri olan ve yıllarca yerli araba üretimi için aranan babayiğitler bulunuyor ve toplamda 10 milyar dolarlık bir yatırım planlanıyor. Olmalı mı bana göre kesinlikle olmalı. Bugün hayvan ithalatına verdiğimiz yıllık ödeme 4 milyar dolar ve bu her sene yapılıyor. 25 senede yerli araba için yapılacak üretimi geçiyor. İşte asıl bir babayiğit çıkacak ve hayvan ithalatını durdurarak yeni bir planlamaya ihtiyaç olduğunu haykıracaktır. Biz Zooteknistler bu konuda sahip olduğumuz bilgi birikimi ile yardımcı olacağımızı belirtiyoruz.

Son olarak, kongremizin düzenlenmesinde emeği geçen tüm arkadaşlarıma ve bizleri destekleri ile bu kongrede yalnız bırakmayan,

Tüm katılımcılara saygılar sunuyorum.

Prof. Dr. Mesut TÜRKOĞLU (Zootekni Federasyonu Başkanı):

Değerli Meslektaşlarım;

Ülkemizin kalkınmasında hayvansal üretim büyük bir öneme sahiptir. İnsanımızın yeterli ve dengeli beslenmesinde hayvansal gıdaların önemi, inkâr edilemez bir gerçektir. Zootekni faaliyetleri, hayvansal ürünlerin daha fazla ve güvenilir olarak üretimini sağlamak suretiyle ülke kalkınmasına katkıda bulunmayı amaçlamaktadır. Bu bağlamda, Ziraat Fakültesi Zootekni Bölümleri tarafından ilki 1996 yılında yapılmış olan Ulusal Zootekni Bilim Kongrelerinin dokuzuncusu 2015 yılında Selçuk Üniversitesi Ziraat Fakültesi Zootekni Bölümü tarafından gerçekleştirilmiştir. Bu etkinlikler, Zootekni bölümlerimizin fedakâr çalışmaları ile bugüne kadar yürütülmüştür. Nitekim 2017 yılı içerisinde yapılması planlanan, ancak düzenlenemeyen 10. Zootekni Bilim Kongresini, 25-27 Ekim 2018 tarihleri arasında Uluslararası olarak Antalya Side Sueno Beach Otel'de siz değerli katılımcıların iştiraki ile Zootekni Federasyonumuzca düzenlenmiştir.

Kongremizde; zihin ve beden gücü yüksek sağlıklı nesiller yetiştirilmesi bakımından son derece önemli olan hayvancılığımız, üretimden tüketime kadar tüm aşamaları ile ele alınmıştır. Böylece, hayvansal üretimin paydaşları olan bilim insanlarını, sektör profesyonellerini, kamuyu, medya mensuplarını, sivil toplum kuruluşlarını ve aynı zamanda tüketicileri de ortak bir paydada buluşturarak sorunlarının çözümünde ve çalışmalarımızın başarıya ulaşmasında güvenilir ve doğru bilgilerin sunulması amaçlanmıştır.

Hayvancılık sektörü mensupları, Gıda, Tarım ve Hayvancılık Bakanlığı ile diğer Bakanlıkların temsilcileri, sektörümüze hizmet sunanlar ve akademisyenlerimizin bir araya geldiği hayvancılık sektörünün nabzının attığı, sorunlarının tartışılıp, sesinin ilgili kesimlere duyurulduğu organizasyonumuzun bu yılında sektörümüzde yaşanan en son gelişmeler, siz değerli katılımcılarımızla beraber işlenmiştir.

Sesimizin daha güçlü çıkabilmesi, sizlerin katılım ve desteği ile mümkün olacaktır. Siz paydaşlarımızı, kongremizde aramızda görmek, maddi ve manevi desteklerinizle zootekni camiamızı onurlandırmanız bizleri oldukça memnun etmiştir.

Tüm sektör mensuplarının birlikte bir araya geldiği bu geleneksel organizasyonumuza sizlerle birlikte olmaktan memnuniyet duyduğumuzu belirtmek istiyorum.

Saygılarımla,

Dr. Sait Koca (Beyaz Et Sanayicileri ve Damızlıkçıları Birliği Derneği Başkanı)

Saygıdeğer katılımcılar ve değerli akademisyenler

10. Uluslararası Zootekni Bilim Kongresi'nde sizlerle beraber olmaktan mutluluk duyuyorum. Ben de bir zooteknist olarak sektörümüzde çok önemli bir yeri olan bu bilim dalını her zaman destekledim ve desteklemeye de devam edeceğim.
Çok hızlı artan dünya nüfusunun; 2050'de 9,77 milyar, 2100'de ise 11,18 milyar olacağı tahmin edilmektedir. Artan nüfusla beraber kişilerin dengeli ve sağlıklı beslenmesi ise üzerinde önemle durulması, her birey ve kurumun ciddi olarak düşünmesi gereken bir sorundur. Hiç tüketim arttırılmasa bile sadece nüfus artışından dolayı 2050 yılında %60 daha fazla gıdaya ihtiyaç duyulacaktır. Yetersiz beslenmenin dünya ekonomisi üzerinde yıllık 3,5 trilyon dolarlık bir etkisi olmaktadır. Gerekli tedbirlerin alınmaması durumunda, 2050 yılında 2 milyar insanın yetersiz beslenme sorunu yaşayacağı bildirilmektedir. Türkiye'de de nüfus beklenenden hızlı artmaktadır. Ülke nüfusunun 2050 yılında 93,5 milyona ulaşması beklenmektedir. Önümüzdeki yıllarda bizim de ana konularımızdan biri yetersiz ve dengesiz beslenme olacaktır.

Dünyada kanatlı eti üretimi yıllara göre sürekli olarak artış göstermektedir. Domuz eti ve kümes hayvan etleri üretimi, büyük ve küçükbaş etlerine oranla oldukça yüksektir. 2025 yılında kanatlı eti üretiminin domuz eti üretimini geçmesi beklenmekteydi ama bu geçiş 2015 yılında gerçekleşti. Şu an kanatlı eti dünyada en çok üretilen et konumuna ulaşmıştır. Sektörümüz adına dünyadaki bu gelişmeden dolayı mutluyuz. Türkiye'nin hayvansal üretim politikalarını belirlerken mutlaka bu Dünya gerçeğinin de dikkate alınması gerektiğini savunuyoruz.

Türkiye'de de kanatlı eti üretimindeki artış, diğer etlere oranla belirgin şekilde öndedir. 1990 yılında 217 bin ton olan üretim 2017 yılında 2,3 milyon tona çıkmıştır. Kanatlı eti üretiminin% 93,4'ü piliç etidir. Türkiye kişi başı kanatlı eti ve büyükbaş et tüketiminde Dünya ortalamasının üzerindedir ancak toplam et tüketiminde maalesef geride kalmaktadır. Dünyada kişi başı büyükbaş kırmızı eti tüketim miktarı 9,4 kg iken ülkemizde 12,5 kg'dır. Ancak unutulmamalıdır ki; Dünyada ki gelişmiş ülkelerde Türkiye'den farklı olarak kişi başı tüketimin 16 kg olduğu domuz eti mevcuttur. Müslüman ülke olmamız nedeniyle bizim domuz eti tüketimimiz yoktur. Burada önemli olan bu 16 kg'lık açığı nasıl kapatacağımızdır.

Bu eksikliğin beyaz etle sağlanması şarttır. Bu tespitin ardından devletin beyaz et üretimini desteklemesi gerekliliğinin bir kere daha altını çizmek isterim.

Kanatlı eti sektörü aynı zamanda önemli miktarda ihracat da gerçekleştirmektedir. Dünya piliç eti ihracat durumuna baktığımızda, Brezilya ve Amerika Birleşik Devletleri'nin en büyük iki ihracatçı ülke olma özelliklerini sürdürdüklerini görüyoruz. Türkiye ise dünya piliç eti ticaretinde 5. sırada yer almaktadır. 2017 yılında sektör; 443 bin ton gerçekleşen ihracatı ile bir önceki seneye göre yüzde 31 oranında bir artış gerçekleştirmiştir. 75 ülkeye ihracat yapan Türkiye, yeni Pazar olarak Japonya'ya da ihracat yapmaya başlamıştır. Sektörün hedefi ise ABD ve Brezilya'nın ardından üçüncü sıraya yerleşmektir. İhracatta koyduğumuz hedeflere ulaşabilmek için yeni pazarlara ve bazı pazarların geliştirilmesine ihtiyacımız var. İhracatın her sene geliştirilmesi bizim için önemli bir konudur. Tarım ve Orman Bakanlığı desteği ile yeni pazarlar için girişimlerimiz devam edecektir.

M.Ülkü KARAKUŞ (Türkiye Yem Sanayicileri Birliği Yönetim Kurulu Başkanı):

Türkiye Yem Sanayicileri Birliği Yönetim Kurulu adına hepinizi saygıyla selamlıyorum.

Türkiye Cumhuriyeti Devletimizi kuranlar, öncü göreviyle tarımı ön plana almışlar ve Türkiye önce tarımla büyümüştür. 1980 yılından sonra serbest pazar ekonomisine geçişle birlikte, tarım-sanayi-hizmet sektörleri içinde önceliği sanayiye vermek üzere çalışılsa da bu süreçte sanayi sektörü atlanılarak, tarımdan direkt hizmetler sektörüne geçiş yapılmıştır. Şu anda ise, Cumhuriyet kuruluşunun felsefesinde ön planda olan tarım, son planda yer almaktadır. Ülkemizde geçtiğimiz yıl yapılan sistem değişikliği ile Cumhurbaşkanlığı sisteminde Sağlık ve Gıda Politikaları Kurulu adı altında oluşturulan 7 kişilik komitede 6 tane tıp doktoru, 1 tane de gıda mühendisi bulunurken, bu Kurulda ziraat mühendisliği ve veteriner hekimlik mesleğine yer verilmemiştir. Bu konuyla ilgili karar vericilere önerilerimizi iletmemiz gerekmektedir. Dolayısıyla bu durum tarımın son planda olduğuna dair düşüncemi doğrulamaktadır.

Türkiye'de serbest pazarda emek, sermaye, doğal kaynaklar ve girişimci güç olmak üzere 4 tane ana faktör bulunmaktadır. Bu girişimci güç serbest pazar ekonomisinde yatırımcı anlamına gelmektedir. Yani büyükbaş, kanatlı, balık sektörlerinde yatırım yapan özel sektör mensuplarıdır. Bu alanda 1980'lerin başlarında başarıyla özelleştirilen işletmeler olmasına rağmen, kamunun bir türlü çekemediği KİT'ler hala bulunmaktadır. Özellikle son 8-10 yıldır adı konulmamış bir devletçilik uygulaması bulunmaktadır. Bu konuda bir karar vermemiz gerekmektedir.

Toprak Mahsulleri Ofisi, Merkez Bankası kadar önemli bir kuruluştur. Toprak Mahsulleri Ofisi, görevini özel sektöre devretmek üzere lisanslı depoculuk sistemini kurmakta ve pek çok yatırım yapmaktadır. Fakat diğer yandan, 10-15 sene öncesinde sadece arpa buğday alan Toprak Mahsulleri Ofisi, şimdi 8-10 çeşit ürünü de almaya başlamıştır. Yani TMO bir taraftan çekilirken bir taraftan da kamu marifetiyle sistemin içine dahil edilmeye çalışılmaktadır. Benzer şekilde Tarım Kredi Kooperatifleri, Et ve Süt Kurumu'nun da uygulamaları bulunmaktadır. Geçenlerde yapılan açıklama ile et ithalatının 2021'e kadar devam edeceği belirtilmiştir ancak et ithalatının 2021'e kadar devam etmesi, et ve süt varlığımıza çok ciddi zarar verecektir.

Devletimizin ticarette daha aktif rol almaya çalışması, bahsettiğimiz girişimci gücün önünde engel teşkil etmektedir. Yapılan uygulamalar üretimde değil, tüketim noktasında sosyal yardım olarak değerlendirilmektedir fakat bu durum tarım sektöründe üretim yapanları bezdirmekte ve geri çekmektedir.

Bu nedenle yatırım ortamının iyileştirilmesi adına kamunun planlı şekilde piyasalardan çekilmesi ve özel sektörün önünün açılması gerekmektedir.

Türkiye'deki yem sektörünün gelişimine baktığımızda, devletin öncü göreviyle sistemin kurulduğu ve daha sonra örnek bir özelleştirmeyle özel sektöre devredildiği görülmektedir. Son 20 yılda Türkiye'deki hububat üretimi %19, yağlı tohum üretimi %70 oranında artarken, karma yem üretimi %350 artış göstermiştir. Yem üretimindeki bu artışın sebebi, köyden kente göçle birlikte kapalı ortamda yetiştirilmeye başlanılan hayvanların kesif yem tüketiminin artması ve sektörün uzmanlar aracılığıyla çiftçiye yemin üretici için olan karını anlatmasıdır.

Karma yem üretimindeki artışa Türkiye'deki bitkisel üretimin artış hızı yetmemiş, sektör de üretime devam edebilmek için ithalat yapmıştır ve bu ithalat her yıl yarım milyon ton artarak devam etmektedir.

Geçen yıl itibariyle, başta yağlı tohumlar ve enerji kaynakları olmak üzere 3,7 milyar dolar değerinde 12 milyon ton hammadde ithal edilmiştir. Karma yem üretimimiz ise 2017 yılında, kendi yemini yapanlarla birlikte 25 milyon tona ulaşmıştır. Dolayısıyla burada ithalata bağımlılığımız %45'leri bulmaktadır. Bu nedenle, ülkemizin bir süredir içte ve dışta olağan üstü olaylarla mücadele etmesi nedeniyle döviz kurunda görülen dalgalanmalar da maliyetlerimizi doğrudan etkilemektedir.

İthal edilen hammaddelerin %70'i transgeniktir. Onaylı çeşit sayısı bizde 36 iken, Avrupa Birliği'nde bu sayı 102, dünyada ise 497'dir ve bu sayının daha da artması beklenmektedir. Biyoteknoloji, dünyada gelişen bir bilim dalıdır. Biz bu ürünleri Biyogüvenlik Kanunu gereği sadece yemlerimizde kullanıyoruz ama dünyada ve gelişmiş ülkelerde yem ve gıda amaçlı kullanımına izin verilmektedir.

Geleceğe yönelik yapılması gerekenler konusunda "köye dönüş projesi", " genç çiftçi projesi" gibi girişimler olmuştur fakat bu projelerin içi doldurulamamıştır. Kentlere göç eden insanların köylerine geri döndürülebilmesi için rasyonel fikirler üretilmesi, kırsalın özendirilmesi gerekmektedir.

İlkokul çağındaki bir çocuğun 30-35 yaşındaki anne-babası kırsalda tarım alanında çalışabilecek en sağlıklı kesim olmasına rağmen, taşımalı sistemde eğitimin toplulaştırılması ile bu insanlar şehirlere taşınmıştır. Bu uygulamaların hepsi sosyal yardım amaçlı yapılmıştır fakat bu gidişat doğru değildir.

Üniversite-sanayi işbirliği konusu yeterince hayata geçirilememiştir fakat sektör ile üniversiteler arasındaki ilişkinin güçlendirilmesi gerekmektedir.

Sektörümüzün üniversitelerden beklentisi yem konusunda ve daha spesifik konularda iyi eğitim almış, kaliteli mezunlar yetiştirilmesidir.

Daha doğru bilgi paylaşımını sağlamak için, sektörümüzle ilgili açıklamalar yapan sağlık çalışanları ile tarım alanında çalışan akademisyenlerin mutlaka bir araya gelmesi gerekmektedir.

İklim değişikliğine bağlı yağış ve sıcaklık değişimlerini de dikkate alarak, çevreye duyarlı ve kaynakları etkin kullanarak çalışılması gerekmektedir.

Özel sektöre Ar-Ge destekleri verilmesini çok önemsemekte ve bunun için kendi kaynaklarımızı kullanmaktayız. Ziraat Bankası dışında da küçük üreticilerimizi destekleyen kaynakların oluşturulması sektörümüz için önem arz etmektedir.

Zootekni Federasyonu ve benzer konularda çalışan birliklerin kurulması ve geliştirilmesinin sektörümüz açısından fayda sağlayacağına inanmaktayız.

İlginiz için hepinize teşekkür ederim.

Andrea Rosati (EAAP - European Federation for Animal Science)

Animal Scientists role in EU

Studying Animal Science

Animal science involves the study of animals under human control

The courses curriculum have strong focus on science, along with hands-on experience working with animals

This field of study prepares students for careers working with animals (including agribusiness, animal breeding and animal behavior)

Employement of Animal Scientists

- Only 4% of animal scientists are currently unemployed
- It is predicted a 9,8% growth for the next ten years
- Only 9% are self-employed
- Colleges
- Universities
- Professional schools
- Research facilities
- Consulting organizations
- Animal production facilities
- Colleges
- Universities
- Professional schools
- Research facilities
- Consulting organizations
- Animal production facilities
- Colleges
- Universities
- Professional schools
- Research facilities
- Consulting organizations
- Animal production facilities

Specific Role in the Artificial Insemination

USA

- Most AI technicians hold a degree in animal science but high school degree
- is sufficient
- Some are also veterinarians
- There are training programs available to prepare to work in AI
- Courses offered by national breeding associations or private companies

EU

- Veterinarians
- Technicians who had a course (few months) and exams. Most are animal scientists and biologists
- Some country requires a degree to participate to the course

Ethic Commission dealing with activities on Animals – some example

France

Commission composed by:

- A person with competence in the field of the design of experimental procedures about animals
- A person with competence in the field of carrying out experimental procedures about animals
- A person with skills in at least one of the following areas: - animal care; - killing of animals
- A veterinarian
- A person not specialized in matters relating to the use of animals for purposes scientists

Italy

Some examples:

- Persons with competency in the scientific, ethical and legal aspects of animal experimentation
- Persons interested in experimentation activities with some competency in the scientific, ethical and/or legal aspects of animal experimentation

Roles for Veterinarians and Animal Scientists in EU

Veterinary

- Cares for animal health services
- Performs clinical visits to pets and livestock
- Realizes the clinical emergency activity on pets and livestock
- Animal Scientist
- Makes an integrated compound feed
- Processes food rationing plans
- Verifies compliance with the mandatory national food safety rules
- Provides consulting services for breeding farms

Animal Scientist

- Makes an integrated compound feed
- Processes food rationing plans
- Verifies compliance with the mandatory national food safety rules
- ProvCommercialize animal feed at farms
- Public policy program for the development of the livestock sector
- He carries out genetic counseling interventions
- ides consulting services for breeding farms

Doç. Dr. Cengizhan MIZRAK (Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü Tarımal Ekonomi ve Proje Yönetimi Daire Başkanı)

Dünyada ve Türkiye'de artan nüfusun gıda ve dengeli beslenme ihtiyacını karşılamak açısından genel ekonomi ve tarım sektörü içinde önemli bir paya sahip olan hayvancılık, hayvansal kaynaklı protein arzını sağlamasının yanı sıra, istihdama, katma değere ve milli gelire katkı sağlaması ve kırsal kesimde geçim olanaklarını artırması açısından da oldukça önemli bir tarımsal faaliyettir ve gelişen teknoloji ve sanayileşme politikalarına rağmen stratejik önemini korumaktadır.

Hayvansal üretim faaliyetleri bazı bitkisel ve yan ürünlerin değerlendirilmesi, işgücü verimliliğinin artırılması, işletme kârının artması, doğal ve ekonomik koşullardan kaynaklanan risk faktörünün azaltılması vb. faktörlerle de işletmelere olumlu katkılar sağlamaktadır (Vural ve Fidan 2007).

Dünya Bankası verilerine göre, 2017 yılında 3,3 trilyon ABD Doları olan dünya tarımsal üretim değeri içerisinde hayvancılık sektörünün payı %39 düzeyinde gerçekleşmiştir. 2017 yılında 1,5 trilyon ABD Doları olarak gerçekleşen dünya ticaret hacmi içerisinde ise canlı hayvan, et, süt-süt ürünleri, deri, yün ve ipek 307 milyar dolar ile %21'lik bir paya sahip olmuştur. Bu değerler sektörün dünya ticareti içerisindeki yerini vurgulamak açısından önem arz etmektedir (TRADEMAP, 2018).

Türkiye'de ise 2017 yılında 51,7 milyar ABD Doları olarak gerçekleşen tarımsal GSYH içerisinde hayvancılık sektörünün payı yaklaşık olarak %30 civarındadır. Aynı yıl itibariyle Türkiye'de hayvansal üretim değeri 152 milyar TL olarak gerçekleşmiş olup bunun %60'ını canlı hayvan değeri (89,9 milyar TL), %40'ını ise hayvansal ürün üretim değeri (62 milyar TL) oluşturmuştur (TÜİK, 2018). Hayvansal üretim değerinin ise %39'unu (24,3 milyar TL) süt üretimi, %9'unu (5,6 milyar TL) yumurta, %5,5'ini (4,9 milyar TL) kanatlı eti oluşturmuştur. Süt üretim değeri içerisinde inek sütünün payı %85 (20,6 milyar TL) olarak gerçekleşmiştir (TÜİK, 2018).

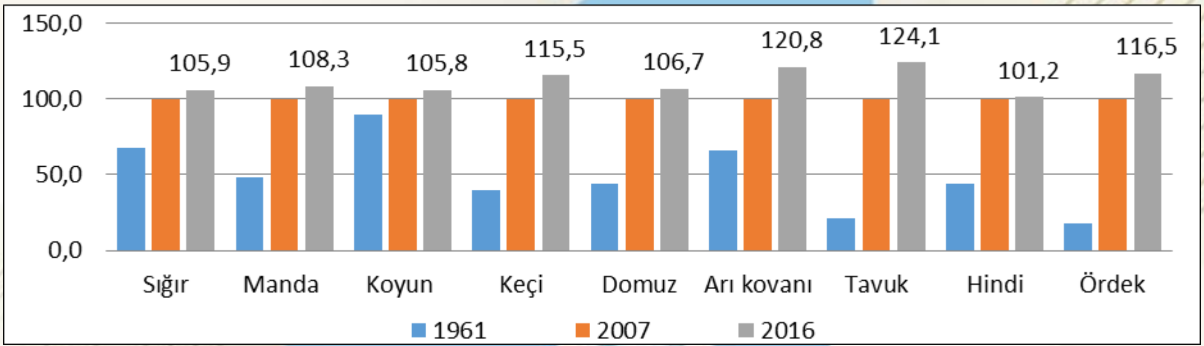
Bu çalışmada, dünya ve Türkiye ekonomisi içerisinde önemli bir büyüklüğe sahip hayvancılık sektörü; hayvan varlığı, üretim, dış ticaret, maliyet ve desteklemeler itibariyle incelenerek sektörün ülkemizdeki yapısı ortaya konulmuştur.

Dünyada ve Türkiye'de Hayvan Varlığı

Dünyada Hayvan Varlığı

Dünya hayvan varlığı son 10 yıllık dönemde (2007-2016) genel olarak artış eğilimi göstermiş olup en fazla artış tavuk sayısı (%24) ve arı kovanı sayısında (%21) görülmüştür (Grafik 1). En az artış ise sığır (%5,9), koyun (%5,8) ve hindi (%1) sayısında gerçekleşmiştir. 2016 yılı itibariyle dünyada toplam 1,5 milyar baş sığır, 199 milyon baş manda, 1 milyar keçi, 1,2 milyar baş koyun, 22 milyar tavuk ve 982 milyon adet domuz bulunmaktadır.

Grafik 1. Dünyada Hayvan Varlığı ve Değişimi (2007=100)



Kaynak: FAO (2017)

Türkiye'de Hayvan Varlığı

Türkiye'de 2000 Genel Tarım Sayımına göre 3.967.000 tarım işletmesi mevcut olup bu işletmelerin %3,6'sı sadece hayvancılık yaparken, %96,4'ü hem bitkisel hem de hayvansal üretimi birlikte yürütmektedirler (Vural ve Fidan 2007).

Türkiye'de 2016 yılı itibariyle büyükbaş hayvan yetiştiriciliği yapan işletmelerin %81'inde 10 baş altı büyükbaş hayvan bulunmaktadır. Küçükbaş hayvan yetiştiren işletmelerde ise 50 baş altı hayvan sayısına sahip olan işletmelerin oranı %71,8, 150 baş altı hayvan sayısına sahip işletmelerin oranı ise %92,9'dur (TÜİK,2016). Bu durum Türkiye'de hayvancılık işletmelerinin ekonomik üretim kapasitesinin altında faaliyette bulunduğunu göstermektedir. Diğer yandan "entansif hayvancılık" yapan ve dolayısıyla düşük maliyetli üretim yapabilen ihtisaslaşmış işletmelerin sayısının oldukça az olması hem sektörü hem de üreticileri olumsuz yönde etkilemektedir. Özellikle üretilen süt ve kırmızı etin yaklaşık %90'ının sağlandığı büyükbaş yetiştiriciliği için bazı yapısal sorunlar devam etmektedir.

Bu durum devletin uygulayacağı her türlü politikanın performansını olumsuz etkilemektedir. Sektör iktisadi açıdan değerlendirildiğinde politikaların optimum işletme büyüklüğü kriterleri dikkate alınarak uygulanması gerekirken, sosyal açıdan değerlendirildiğinde ise konumunu ve statüsünü koruyan bir işletme yapısının sürekliliği dikkate alınmalıdır.

Bununla birlikte, sektörle bağlantılı yatay ve dikey tüm aktörlerin uygulanacak politikalardan beklentisi hayvancılık sektörünün iktisadi açıdan değerlendirilmesi yönündedir. Bu kapsamda devlet politikalarının ve yatırımlarının orta vadede işletme ölçeklerini büyütücü ve işletme sayılarını azaltıcı yönde şekillendirmesi gerekmektedir.

Bununla birlikte hayvansal proteini ucuz, sağlıklı ve kaliteli bir şekilde karşılaması, ıslah ve besleme alanında Ar-Ge çalışmalarına kolaylık sağlaması ve kırsal kalkınmaya katkı sağlaması nedeniyle kanatlı hayvancılık, diğer hayvansal üretim dalları arasında ayrı ve önemli bir yere sahiptir. Türkiye'de kanatlı hayvancılık sektörü, modern entegre tesis yatırımları, uzman üretim, işleme ve pazarlama mekanizması, dış ticarette sahip olduğu yüksek pay ve sağlıklı ürün arzı ile Türkiye için önemli bir sektördür. Yıllık cirosu 6 milyar doları aşan ve yaklaşık 600 bin kişi istihdam eden kanatlı hayvancılık sektörü gıda ve tarım alanında en hızlı gelişen sektörlerden olup zaman içerisinde güçlü sektörlerden biri haline gelmiştir (Koca, 2017). 1990'lı yıllarda sektöre yapılan yatırımlarla modern üretim tesislerinin sayısı ve üretim kapasitesi hızla artarak, 2000'li yıllarda Avrupa standartlarında üretim yaygınlaşmıştır. Günümüzde kanatlı sektörü kendi üretim planlamasını yapabilen ve ülkenin hayvansal protein gereksiniminin büyük bir bölümünü karşılayabilen önemli bir üretim dalıdır.

Türkiye'de hayvancılıkta yaşanan yapısal sorunların varlığına rağmen, son yıllarda tarım sektöründe yaşanan gelişmeler, devletin yatırımları ve desteklemelerinin de etkisiyle hayvan sayılarında, verimlilikte ve dolayısıyla hayvansal üretimde önemli artışlar yaşanmıştır.

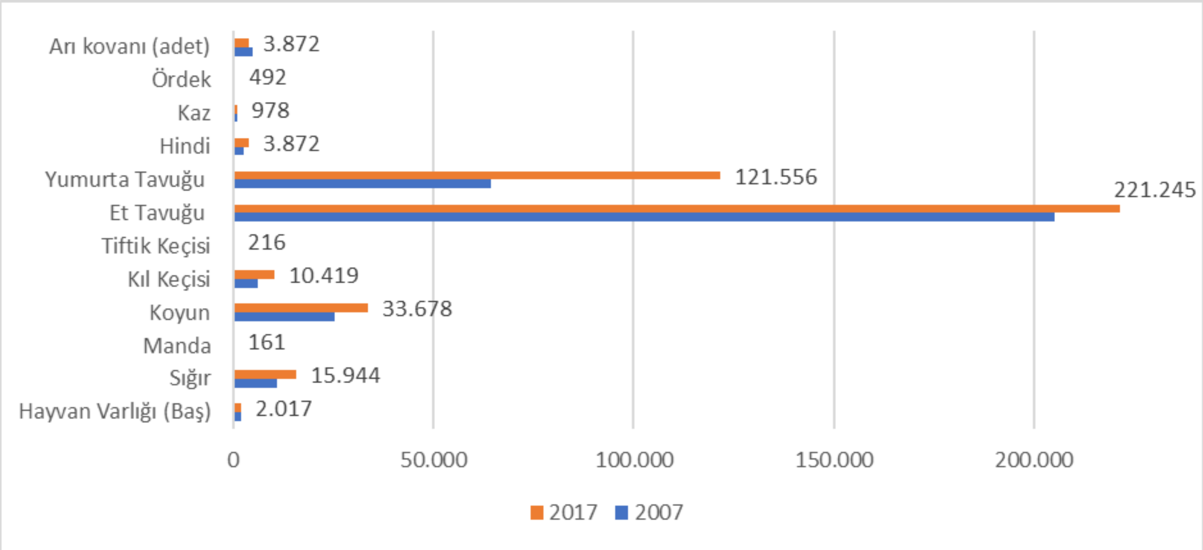
Tablo 1'den izleneceği üzere, Türkiye'de hayvan varlığı yıllar itibariyle çoğu türde artış göstermekle birlikte son 10 yıllık dönemde en çok artış manda (%91), yumurta tavuğu (%89) ve kıl keçisi (%71) sayılarında gerçekleşmiştir. Yine bu dönemde sığır sayısı %45, koyun sayısı %32 artış göstermiştir (TÜİK 2018). AB ve dünyada hayvan varlığı açısından önemli bir yere sahip olan Türkiye 2016 yılı itibariyle AB ülkeleri içinde büyükbaş hayvan sayısı açısından 14,2 milyon baş ile Fransa'dan sonra ikinci sırada yer almıştır.

Tablo 1. Türkiye'de Hayvan Varlığı (Bin baş)

Hayvan Varlığı (Bin Baş)	2007	2017	2007-2017 Değişim %
Sığır	11.037	15.944	44,5
Manda	85	161	90,6
Koyun	25.462	33.678	32,3
Kıl Keçisi	6.095	10.419	70,9
Tiftik Keçisi	191	216	12,9
Et Tavuğu	205.082	221.245	7,88
Yumurta Tavuğu	64286	121556	89,1
Hindi	2.675	3.872	44,70
Kaz	1023	978	-4,3
Ördek	482	492	2
Arı kovanı (adet)	4826	3872	-19,8

Kaynak: TÜİK 2018.

Grafik 2. Türkiye'de Hayvan Varlığı (Bin baş)



Kaynak: TÜİK 2018.

Türkiye'de büyükbaş hayvan sayısı 2003 yılına kadar önemli bir düşüş yaşamış ve 2003 yılından sonra 2010 yılına kadar büyük bir değişiklik olmamış, 2010'dan sonra ise artmaya başlamıştır. Küçükbaş hayvan sayısı da 2009 yılına kadar büyük oranda düşerken, 2009 yılından sonra artmaya başlamıştır.

Kırsal alandan şehirlere göçün artması ve kırsal alanda yaşayan nüfusun yaşlı olması bu düşünün en büyük etkenleridir. Yine girdi maliyetlerinin yüksekliği ve bu yıllarda hayvancılığa destek verilmemesi bu düşüşte etkili olmuştur.

Büyükbaş hayvan sayısı 2017 yılında genel olarak bir önceki yılla kıyaslandığında %13,2 artarak 16,1 milyon baş olmuştur. Büyükbaş hayvan varlığı içerisinde artış ağırlıklı olarak kültür hayvan ırkında (%18) yaşanmış, kültür melezi ve manda sayısı %13 artarken yerli ırk sığır sayısı %7 azalmıştır. Bu rakamlar hayvan sayılarının nicelik olarak arttığını bununla birlikte verimde de bir artış olduğunu göstermektedir.

Türkiye hayvan varlığı açısından AB ülkeleri ile karşılaştırıldığında önemli bir konumdadır. 2016 yılı itibariyle AB ülkelerinde büyükbaş hayvan sayısında ilk sırayı 19 milyon baş ile Fransa alırken, Türkiye 14,2 milyon baş ile Fransa'dan sonra ikinci ülke olmuştur. Diğer yandan 2016 yılında AB ülkeleri içinde 31 milyon koyun sayısı ile Türkiye ilk sırada yer almıştır ve Türkiye'yi sırasıyla; İngiltere, Romanya ve Yunanistan izlemiştir (TÜİK, 2017).

Dünyada ve Türkiye'de Hayvansal Ürün Üretimi

Dünya hayvansal üretim miktarında yıllar itibariyle ürünler bazında önemli artış yaşanmıştır. 2004-2016 yılları arasında en fazla artış kanatlı eti (%57) ve manda sütünde (%46) gerçekleşmiştir. Tavuk yumurtası, bal, keçi eti ve ipek kozası ise yaklaşık %30 artışla diğer önemli ürünler arasında yer almıştır. En az üretim artışı ise %12 ile sığır etinde görülürken, 2016 yılında sığır eti üretim miktarı 66 milyon ton olarak gerçekleşmiştir. Dünyanın pek çok bölgesinde süt hayvancılığının daha modern şartlarda yapılması, daha vasıflı damızlık materyali ile yeterli ve kaliteli yem kullanımının da etkisiyle aynı dönemde hayvan başına süt verimi artmış ve toplam inek sütü üretimi %25 artışla 2016 yılında 659 milyon tona ulaşmıştır. Türkiye büyükbaş karkas etinde verim seviyeleri itibariyle AB seviyelerini yakalamış olmakla birlikte (Türkiye= 280 Kg/Bbaş, AB=290 Kg/Bbaş), büyükbaş süt (Türkiye= 3.090 Kg/Bbaş, AB=6701 Kg/Bbaş) veriminde oldukça gerilerdedir. Benzer şekilde tavuk eti veriminde yakın sevilerde iken yumurta veriminde tavuk başına yumurta adeti olarak (Türkiye= 166,5 Adet/Tavuk, AB=231,7 Adet/Tavuk) oldukça gerilerde kalmaktadır. Bal verimi (Türkiye=12,6 Kg/kovan, AB=18 Kg/kovan) açısından ise hem dünya hem de AB'nin gerisinde yer almaktadır (Tablo 2).

Tablo 2. Karşılaştırmalı Verim Değerleri (2016)

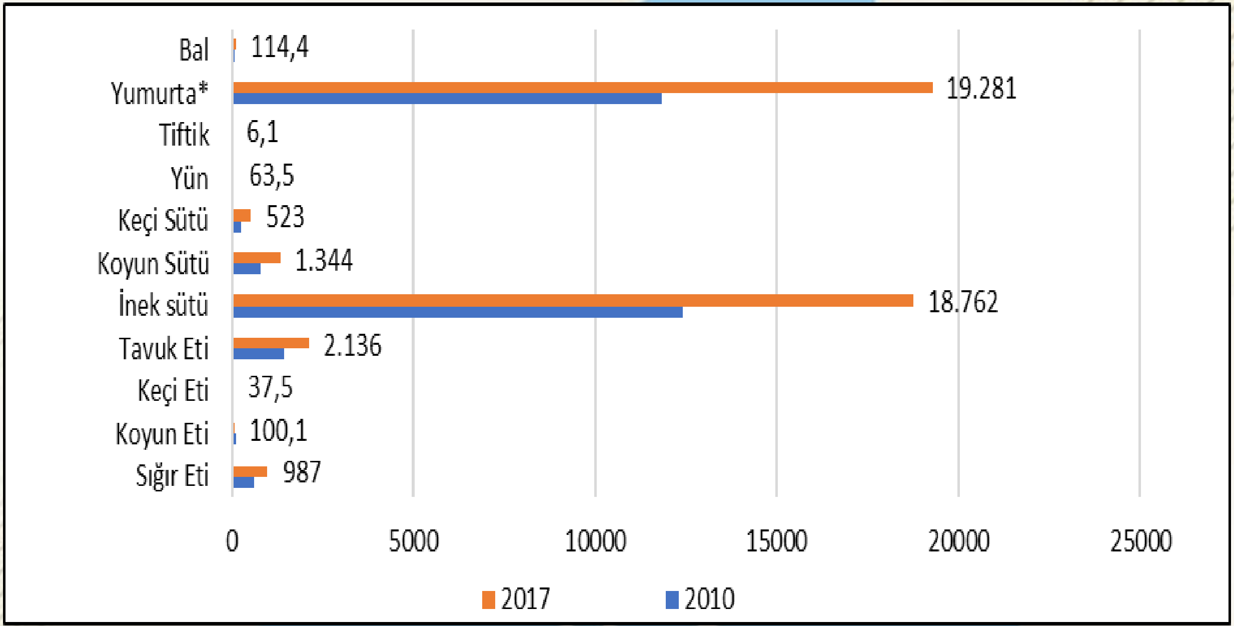
Ürünler	Türkiye	AB	Dünya
Karkas (Kg/B.Baş)	280,0	290,1	218,4
Karkas (Kg/Koyun)	16,1	15,5	16,8
Karkas (Kg/Keçi)	15,4	10,0	12,2
Süt (Kg/B.Baş)	3.090	6.701,5	2.407,6
Süt (kg/Koyun)	59,9	114,4	41,5
Süt (kg/Keçi)	73,4	282,7	75,3
Tavuk Eti (Kg/Tavuk)	1,7	1,6	1,6
Yumurta (Adet/Tavuk)	166,5	231,7	180,8
Bal (Kg/Kovan)	12,6	18,0	19,7

Kaynak: FAO, 2018.

Türkiye'de hayvansal üretim miktarı yıllar itibariyle artış göstermiş olup 2002 yılında 10 milyon ton civarında olan hayvansal üretim miktarı 2017 yılında yaklaşık 25 milyon tona yükselmiştir (TÜİK 2018). Hayvansal ürünler içerisinde üretim değeri en yüksek ürünler inek sütü, kanatlı eti ve sığır etidir. 2017 yılı itibariyle 987 bin ton sığır eti, 2,1 milyon ton tavuk eti, 18,8 milyon ton inek sütü ve 1,3 milyon ton koyun sütü üretimi gerçekleştirilmiştir (Grafik 3).

2010-2017 yılları arasında en çok artış sırasıyla; keçi sütü (%92), inek sütü (%65), koyun sütü (%64), yumurta (%63), keçi eti (%62), sığır eti (%59), tavuk eti (%48) ve bal (%41) üretiminde gerçekleşmiştir. Koyun eti miktarı ise %26 oranında azalmıştır (Grafik 3). Türkiye'de toplam et üretiminde sığır eti %30, tavuk eti %66 pay almaktadır ve süt üretiminin %91'i inek sütüdür.

Grafik 3. Türkiye'de Hayvansal Üretim Miktarı (Bin Ton)



Kaynak: TÜİK 2018.

Canlı Hayvan ve Hayvansal Ürünler Dış Ticareti

Dünyada Dış Ticaret

Dünyada hayvansal ürünler içerisinde ticarete konu olan, canlı hayvan, genetik materyal, et, süt, ham deri, yün ve ipek gibi ürünlerin toplam ticaret değeri 2017 yılı itibariyle 307 milyar ABD doları olarak gerçekleşmiştir. Dünyada hayvancılık sektöründe hayvansal ürün ticaretinin yanı sıra genetik materyal (dondurulmuş sperma (sığır), damızlık canlı hayvan) ve canlı hayvan ticareti de oldukça önemli bir yer tutmaktadır.

Sektörün dış ticaretinde en büyük paya sahip olan hayvansal ürünler ihracatı 2017 yılında 284 milyar ABD Doları olarak gerçekleşmiş olup ABD, Almanya ve Hollanda %25 pay ile önde gelen ilk üç ülkedir. AB üyesi ülkeler hayvansal ürünler ihracatında 123 milyar ABD Doları ile %50'ye yakın paya sahiptir. Sığır eti (45 milyar ABD Doları), domuz eti (30 milyar ABD Doları), peynir (30,6 milyar ABD Doları), süt ve krema (28 milyar ABD Doları) ve kanatlı eti (25,8 milyar ABD Doları) ihracatta en yüksek paya sahip ürünlerdir. İthalatta ise Çin, Almanya ve Japonya %22'lik payla ön sıralarda yer almıştır.

2017 yılında 5 milyar ABD Doları genetik materyal ihracatı gerçekleştirilmiş olup ABD, Hollanda ve İngiltere ilk sırada yer almıştır. Türkiye genetik materyal temininde dışa bağımlı iken, AB üyesi ülkeler 3,3 milyar ABD Doları ihracat değeri ile önemli bir rekabet gücüne sahiptir. Genetik materyal ithalatında ise İngiltere, Rusya, Hollanda ve Türkiye ilk sıralarda yer almıştır. AB ülkeleri ise ithalatın %40'ını gerçekleştirmiştir (TRADEMAP 2018). Damızlık dışındaki canlı hayvan ticareti ise 2017 yılında 18,6 milyar ABD Doları olarak gerçekleşmiştir. İhracat değerinde AB üyesi ülkeler 10,7 milyar ABD Doları ile %50'den fazla paya sahiptir. Canlı hayvan ithalatında ise ABD, Almanya ve İtalya %33'lük payla ön sıralarda yer almaktadır. Türkiye ise özellikle 2012, 2016 ve 2017 yılı rakamları ile önemli ithalatçı ülkeler arasında yer almaktadır (Tablo 3).

Tablo 3. Dünya Canlı Hayvan İthalatı (Damızlık Hariç) (milyon ABD Doları)

	2012	2013	2014	2015	2016	2017
Dünya	19.181	19.325	20.597	18.328	17.804	18.999
ABD	2.606	2.631	3.517	3.220	2.701	2.718
Almanya	2.130	2.302	2.136	1.547	1.757	1.928
İtalya	1.711	1.620	1.591	1.294	1.342	1.480
Hollanda	1.272	1.293	1.163	1.070	1.170	1.303
Türkiye	687	240	63	186	433	956
Suudi Arabistan	769	957	993	1.106	898	761

Kaynak: TRADEMAP (2018).

Türkiye'de Dış Ticaret

Genetik Materyal: Türkiye özellikle sığır ve tavuk genetik materyallerinde önemli bir ithalatçı ülkedir. Türkiye'ye sığır sperması ihracatı yapan başlıca ülkeler Almanya, ABD ve Kanada olup 2017 yılı toplam ithalat değeri 296 milyon ABD Dolarıdır. Türkiye'nin sığır spermasında Kuzey Kıbrıs Türk Cumhuriyeti (KKTC) dışında ihracatı bulunmamaktadır (Anonim, 2017).

Yüksek verimli besilik hayvan için etçi ırk damızlık hayvan ithalatı yapan Türkiye'de 2016 yılında 64 bin baş damızlık sığır ithal edilmiştir. Damızlık sığır ithalatının %45'i Almanya'dan, %19'u Avusturya'dan ve %12'si Çek Cumhuriyeti'nden gerçekleştirilmiştir. Aynı yıl damızlık küçükbaş hayvan ithalatı ise 5.266 baş olup toplam değeri 971 bin ABD Doları'dır. Türkiye'nin bu alanda ihracat yaptığı tek ülke Azerbaycan olup toplam ihracat değeri 29 bin ABD Doları tutarındadır. 2016 yılı toplam damızlık kanatlı ithalatının (damızlık yumurta dahil) tutarı ise 28 milyon ABD Doları olup büyük oranda Almanya (%25,8) ve İngiltere'den (%58,5) temin edilmiştir (Anonim, 2017).

Canlı Hayvan: Son yıllarda hayvancılığa destek verilmesi ve bu desteğin her yıl artması, büyük çaplı yapılan yatırımları artırarak hayvan sayısında yükselişe neden olsa da, kırsal alanda genç nüfusun azlığı ve kente göçün devam etmesi önemli bir sorun olarak varlığını korumaktadır.

Türkiye bu sorunlar nedeniyle kırmızı et ve canlı hayvan ithalatında gümrük vergisini indirerek ithalat yolunu açmış ve Et ve Süt Kurumu aracılığıyla 2016 yılında 430 bin kasaplık ve besilik büyükbaş hayvan ithal etmiştir. 2017 yılında da Bakanlar Kurulu Kararı ile besilik ve kasaplık hayvan ithal edilmesi için Et ve Süt Kurumu'na yetki verilmiştir (Yıldırım, 2018).

Türkiye 2010 yılından 2016 yılına kadar toplam 4 milyon başa yakın canlı hayvan ithal etmiş ve bunun karşılığında 3,6 milyar ABD Doları ödemiştir. 2017 yılında bu değer 957 milyon ABD doları olarak gerçekleşmiştir. Türkiye'nin damızlık dışındaki canlı hayvan ticareti incelendiğinde, ithalatta sığırdan sonra koyun ve kanatlının (damızlık olmayan kuluçkalık yumurta dâhil) geldiği, ihracatta ise, büyük oranda kanatlı hayvanların olduğu görülmektedir. Türkiye kanatlı ihracatında damızlık olmayan kuluçkalık yumurta ile civcivi Orta Doğu ülkelerine pazarlamaktadır ve özellikle son yıllarda Suriye pazarda çok büyük pay almaktadır (Anonim, 2017).

Hayvansal Ürün: Türkiye'nin yüksek maliyetli üretim yapması nedeniyle kırmızı ette küresel rekabet gücü oldukça düşüktür. Nitekim Türkiye, kırmızı et ve canlı hayvan ithal eden ülkeler arasındadır ve kırmızı et üretimi için Et ve Süt Kurumu aracılığıyla besilik ve kasaplık canlı hayvan ithalatı yapmaktadır.

Türkiye 2016 yılında büyük oranda Bosna-Hersek'ten olmak üzere 5 bin 720 ton et ithalatı, buna karşılık 129 ton kırmızı et ihracatı gerçekleştirmiştir (Yıldırım, 2018).

2017 yılında canlı hayvan ve hayvansal ürünler ihracatı 1 milyar 674 milyon, ithalatı ise 873 milyon ABD Doları olarak gerçekleşmiştir. 2017 yılı itibariyle hayvansal ürünler ihracatında etler ve sakatatlar, yumurta, yün ve kıl ile dokumaları ve süt ve süt mamulleri toplam %80'lik pay almıştır. Hayvansal ürünler ihracatında diğer önemli ürünler arasında başta çam balı olmak üzere bal da yer almaktadır. Türkiye'nin başlıca hayvansal ürün ihracat pazarları ise Asya, Orta Doğu, Arap Yarımadası ve Avrupa'dır.

Türkiye'de Hayvancılık Maliyetleri ve Fiyatlar

Türkiye'de hayvancılık sektörünün en büyük sorunu, en önemli iki girdisi olan besi materyali ve yemde ithalata bağımlılık ve maliyetlerin yüksekliğidir. Besi sektöründe maliyetin en büyük kısmını, %62 oran ile besi materyali gideri oluşturmaktadır. Besi materyalinden sonra %27 ile yem gideri ikinci büyük maliyet kalemidir (Tablo 4).

Besi materyalinin temini özellikle büyükbaş hayvancılıkta süt işletmelerinin sürdürülebilirliği ile yakından ilişkilidir. Bu bakımdan, besi materyalini sağlayan damızlık hayvanlara verilen süt prim desteği, buzağı desteği ve süt fiyatlarının dengede tutulması sektör açısından önem arz etmektedir.

Tablo 4. Besicilik Maliyet Hesabı (50 başlık işletme)

Maliyet Kalemleri	%
1 Baş Besi Danası Canlı Alım Maliyeti (250 kg)	62,1
Yem	26,8
Diğer Giderler (veteriner, ilaç, nakliye vb.)	7,4
İşçilik	4,3
Toplam	100,0

Kaynak: TOB, 2016.

Türkiye'de kanatlı hayvancılık sektörü üretim maliyetinin en büyük kısmını, %68 oran ile yem gideri oluşturmaktadır. Yem giderinden sonra %14 ile civciv gideri ikinci büyük maliyet kalemidir (Tablo 5). Sektörün en önemli girdisi olan hammaddelerin fiyatlarının yüksekliği; maliyetleri yükseltmekte, bu durum da sektörün gelişmesini engelleyen başlıca sorun olarak göze çarpmaktadır. Zaman zaman miktarları değişmekle birlikte bu ürünlerin önemli bir kısmı dış piyasalardan ithalat yoluyla karşılanmaktadır. Türkiye'de ise yem hammaddelerinin yüksek maliyetlerle üretilmesi nedeniyle, yem ve kanatlı ürün maliyetleri yükselmektedir. Üretim maliyetlerinin yükselmesi sonucunda da dış piyasada rekabet gücü ve ihracat olanakları azalmaktadır.

Tablo 5. Broiler Civciv ve Piliçlerde Maliyet Hesabı

Maliyet Kalemleri	%
Yem	68,0
Civciv	14,0
Enerji	4,8
İş gücü + bakım, onarım + aşınma payı	4,5
Sağlık + dezenfeksiyon	2,7
Genel idari giderler	3,5
Yakalama-yükleme-altlık	2,5
Toplam	100,0

Kaynak: BESD-BİR, 2017

Hayvancılık sektörünün en büyük ve en önemli diğer girdisi ise yemdir. Sektörde üretim artışına paralel olarak son yıllarda karma yem üretimi artış göstermiş olmasına rağmen halen işletmelerin ihtiyacını karşılayacak düzeyde üretim miktarına ulaşılamamıştır.

Türkiye'de kullanılan kaba yemlerin üretim miktarlarının verildiği Tablo 6'da, toplam üretim içerisinde en büyük paya sahip olan süt yemi üretiminin 2010 yılında 3.466 bin ton iken 2017 yılında 6.254 bin tona, besi yeminin ise 2.170 bin tondan aynı dönemde 5.060 bin tona çıktığı görülmektedir. Toplam üretim ise 2010 yılında 11.168 bin ton iken 2017 yılında 22.418 bin tona ulaşmıştır.

Tablo 6. Türkiye'de Yem Üretimi (Bin Ton)

	2010	2011	2012	2013	2014	2015	2016	2017
Sığır Besi Yemi	2.170	2.687	2.881	2.846	3.387	3.320	3.827	5.060
Sığır Süt Yemi	3.466	3.876	4.365	5.164	5.622	5.385	5.840	6.254
Etlik Piliç Yemi	3.454	4.142	4.224	4.084	3.980	4.780	4.566	4.754
Yumurta Yemi	821	954	1.059	1.602	2.481	3.417	2.958	3.370
Diğer Yemler*	1.257	1.504	1.959	2.266	2.535	3.203	3.210	2.980
Toplam	11.168	13.162	14.489	15.962	18.004	20.105	20.402	22.418

Kaynak: TOB, *küçükbaş, balık, at ve ev-süs hayvanları yemleri.

Girdilerini büyük oranda bitkisel üretimden alan ve üretimi ile hayvancılık sektörünün sürdürülebilirliğine önemli katkılarda bulunan yem sektöründe fiyatlar son dönemde artış eğilimindedir. Sığır karkas/yem pariteleri incelendiğinde, 2015 yılında 1 kg karkas karşılığında 30,3 kg besi yemi, 1 kg inek sütü karşılığında 1,48 kg süt yemi alan üretici, 2017 yılında 1 kg karkas karşılığında 28,7 kg besi yemi, 1 kg inek sütü karşılığında 1,27 kg süt yemi alabilmiştir. 2017 yılında sığır ve kuzu karkas paritesinin düşmesinin sebebi yem fiyatlarının ortalama %15 yükselmesinden kaynaklanmaktadır (Tablo 7).

Tablo 7. Büyükbaş Hayvancılık Yem Pariteleri

YILLAR	Sığır Karkas Fiyatı (TL/kg)	Kuzu Karkas Fiyatı (TL/kg)	Çiğ Süt Fiyatı (TL/kg)	Besi Yemi Fiyatı (TL/kg)	Süt Yemi Fiyatı (TL/kg)	1 kg ürün ile alınabilecek girdi miktarı (kg)	
						Sığır Karkas/Besi Yemi	İnek Sütü/süt Yemi
2014	18,07	19,78	1,04	0,74	0,76	24,29	1,37
2015	22,67	22,22	1,16	0,75	0,78	30,31	1,48
2016	24,22	26,27	1,15	0,80	0,84	30,35	1,37
2017	26,21	27,28	1,24	0,91	0,98	28,71	1,27

Kaynak: Yıldırım, 2018.

Tavuk eti/yem girdi paritesi incelediğinde, 2014 yılında 1 kg tavuk eti ile alınabilecek etlik piliç yemi miktarı 4,20 kg iken, 2017 yılında bu miktar 4,36 kg seviyesine yükselmiştir. Öte yandan, 2014 yılında 10 adet yumurta ile 2,07 kg yem alınabilirken, 2017 yılında 1,97 kg yem alınabildiği görülmektedir (Tablo 8).

Tablo 8. Kanatlı Hayvancılık Yem Pariteleri

YILLAR	Tavuk Eti Fiyatı (TL/kg)	Yumurta Fiyatı (TL/10 adet)	Broiler Yemi Fiyatı (TL/kg)	Yumurta Yemi Fiyatı (TL/kg)	1 kg et ile alınabilecek yem miktarı (kg)	10 adet yumurta ile alınabilecek yem miktarı (kg)
					Tavuk Eti/Broiler Yemi	Yumurta/Yumurta Yemi
2014	5,31	2,1	1,26	1,02	4,20	2,07
2015	5,08	2,3	1,21	1,04	4,22	2,21
2016	5,37	2,2	1,19	1,07	4,51	2,06
2017	6,04	2,4	1,38	1,22	4,36	1,97

Kaynak: TÜİK, YUMBİR, TÜRKİYEM-BİR, 2018.

Türkiye'de Hayvancılık Desteklemeleri

Toplam tarımsal desteklerden hayvancılığa ayrılan pay 2004 yılında %8 iken, 2011 yılında %24,4 olmuştur. 2017 yılında ise toplam tarımsal destekler içinde hayvancılık desteklerinin payı %29,82 olarak gerçekleşmiştir. Hayvancılık desteklemeleri 2008 yılına kadar 2005/8503 sayılı BKK ile yürütülmüş, ardından 15 Nisan 2008 tarihli ve 2008/13489 sayılı Karar ile büyük oranda hayvan başına verilmeye başlanmıştır.

2017 yılında hayvancılık desteklemelerinde önemli değişikliklere gidilmiş ve 30 il yetiştirici bölgesi olarak belirlenmiştir. Bu illerde hayvancılık yapan yetiştiricilere ilave destekler verilmeye başlanmıştır.

“Yetiştirici Bölgesi” olarak belirlenen bu illerde ayrıca 200 başa kadar düve alımına, Bakanlıkça belirlenecek düve bedelinin yüzde 30’u kadar destekleme ödemesi yapılmaktadır.

Tablo 9. Türkiye’de Yıllar İtibariyle Uygulanan Hayvancılık Destekleme Kalemleri (Bin TL)

	2002	2005	2010	2015	2016	2017
Yem Bitkisi Üretim	35.639	106.332	231.606	338.418	344.593	435.218
Alet ve Makine Desteği			2			
Damızlık Büyükbaş	2.806	3.363				
Suni Tohumlama Desteği	1.483	17.576	124			
Suni Tohumlama	35	320				
Buzağı Desteği		10.471	42.126	108.960	127.995	1.477.902
Arıcılık ve Bal Desteği		5.922	21.986	60.743	67.998	68.318
Bombus Arı Desteği			1.775	6.782	8.006	7.071
Su Ürünleri Desteği+		33.071	116.912	120.445	96.490	73.025
Sağım Hijyeni ve Süt		424	0			
Islah Amaç Küçükbaş			137.150	478.938	506.949	519.871
Tiftik Üretimi Desteği			3.297	4.793	4.125	4.408
İpek Böceği Desteği			2.052	3.638	4.387	5.500
Aşı Desteği		1.390	8.737	1.016	923	864
Akredite veteriner hekim			1.904			
Hayvan Kimlik Sistemi		8	0			
Hastalıktan Ari Hayvan		123	26.250	225.983	115.668	155.990
Süt Prim Desteği	43.237	116.027	334.077	580.638	448.723	535.694
Et Desteği		56.730	2.018			
Hayvan Gen Kaynakları		467	4.098	77.616	68.679	116.407
Büyükbaş Hayvan Des.			246.187	640.733	732.530	1
Süt Analizi Desteği				2.758	3.254	5.539
Çiğ Sütün			12.314	118.376	346.227	314.902
Büyükbaş Hayvan Besi				149.040	68.061	75.954
Biyolojik Mücadele				9.217	10.261	13.158
Sürü Yöneticisi İstihdamı				4.093	14.899.	23.176
Küpe Uygulama					680	1.160
Atık Desteği						198
Manda						12.742

Kaynak: TOB, 2018.

Türkiye’de 2002-2017 yılları arasında hayvancılığa yönelik destekleme kalemleri 5’ten 21’e yükselmiştir. 2002 yılı itibariyle ise ödenen toplam hayvancılık desteklerinin %94,8’1 süt desteği (%51,97) ve yem bitkisi üretim desteği (%42,84)’nden oluşurken, 2017 yılı itibariyle ödenen toplam 3,85 milyar TL’lik hayvancılık destekleri içerisinde en büyük paya %38,42 payla buzağı desteği sahip olup, bunu sırasıyla %18,9 ile süt desteği, %13,5 ile ıslah amaçlı küçükbaş hayvan yetiştiriciliği desteği, %11,3 ile yem bitkileri üretim desteği izlemiştir (Tablo 9).

SONUÇ

Hayvancılık sektörü son 10 yıllık dönemde hem dünyada hem de ülkemizde canlı hayvan varlığı, üretim ve ticaret hacmi olarak önemli artışlar yaşamıştır. Dünya'da 2016 yılında toplam 1,5 milyar baş sığır, 199 milyon baş manda, 1 milyar keçi, 1,2 milyar baş koyun, 22 milyar tavuk ve 982 bin adet domuz bulunmaktadır. Türkiye'de hayvan varlığı incelendiğinde 2017 yılı TÜİK verilerine göre çoğu türde artış görülmüştür. Hayvan varlığı olarak ele alındığında ülkemizin AB ve dünyada önemli bir yerde olduğu görülmektedir. 2016 yılı rakamlarına göre Avrupa Birliği ülkelerinde büyükbaş hayvan sayısında ilk sırayı 19 milyon ile Fransa alırken Türkiye 14,2 milyon baş ile Fransa'dan sonra ikinci ülke olmuştur. 2016 yılında dünyada genetik materyal 1,7, damızlıklar dışındaki canlı hayvan 15,7 ve hayvansal ürünler 230 milyar ABD Doları olarak dış ticarete konu olmuştur. Türkiye özellikle sığır ve tavuk genetik materyallerinde ithalatçı konumunu korumuştur. Son yıllarda Türkiye'nin hayvansal ürünler ithalatında azalışlar olmuştur. Verim değerleri karşılaştırıldığında ise kırmızı et, tavuk eti ve balda AB ve dünya sevileri yakalanmışken süt ve yumurta da gerilerde kalınmıştır. Maliyetler bazında ele alındığında sektörün dezavantajlı durumda olduğu ve en büyük sorun olarak en önemli iki girdi olan besi materyali ve yemde ithalata bağımlılık ve maliyetlerin yüksekliği dikkat çekmektedir. Besi sektöründe maliyetin en büyük kısmını, %62 oran ile besi materyali gideri oluşturmaktadır. Besi materyalinden sonra %27 ile yem gideri ikinci büyük maliyet kalemidir. Kanatlı hayvancılık sektöründe ise üretim maliyetinin en büyük kısmını %68 oran ile yem gideri oluşturmaktadır. Bu bağlamda politika yapıcıların bu alandaki kısıtları tespit edip ithalata bağımlılığı azaltacak ve arz güvencesini temin edecek politikalar uygulaması önem arz etmektedir. Toplam tarımsal desteklerden hayvancılığa ayrılan pay 2004 yılında %8 iken, 2017 yılında %29,8 olarak gerçekleşmiştir. Hayvancılık desteklemeleri 2008 yılına kadar 2005/8503 sayılı BKK ile yürütülmüş, ardından 15 Nisan 2008 tarihli ve 2008/13489 sayılı Karar ile büyük oranda hayvan başına verilmeye başlanmıştır.

2017 yılında hayvancılık desteklemelerinde önemli değişikliklere gidilmiş ve 30 il yetiştirici bölgesi olarak belirlenmiştir. Türkiye'de 2002-2017 yılları arasında hayvancılığa yönelik destekleme kalemleri 5'ten 21'e yükselmiştir. Türkiye'de kırmızı et fiyatı artışları, gıda enflasyonu ve ithalat politikalarıyla sürekli gündeme gelmekte olan sektör, ülke ekonomisi ve tarımı için sahip olduğu önemin yanında, uzun yıllardır istenilen değişim dönüşümü sağlayamaması ve devam eden yapısal sorunları ile kamu politikalarının etkin uygulanması tartışmalarında yerini korumuştur.

Tarımsal desteklerin yaklaşık olarak %30'unu alan hayvancılık sektörü, yem ve damızlık materyalde dışa bağımlı olması, işletme ölçeklerinin küçük olması, hayvan varlığı olarak yeterli sayıya ve çeşitliliğe sahip olmaması nedeniyle Türkiye tarımında yapısal dönüşüm sağlanması gereken önemli bir faaliyettir. Hayvancılık sektörü ilişkili sektörleri ile beraber dünya ve Türkiye tarımsal üretimi içerisinde önemli bir paya sahiptir. Hayvansal kaynaklı protein arzını sağlamasının yanında, yarattığı istihdam, ürettiği katma değer, bazı alt kolları itibariyle sağladığı döviz gelirleri, kırsal kesimde geçim olanaklarının arttırılması ve biyolojik zenginliğin sağlanması ve korunmasında önemli bir role sahiptir. Sektöre yönelik politikaların makroekonomik plan ve politikalar yapılırken sektörün konumu ve önemi dikkate alınmalı ve bu kapsamda ülke ekonomisin yapısal dönüşümünde oynayacağı roller doğru ve rasyonel bir şekilde belirlenmelidir.

ORAL PRESENTATIONS

The Effect of Free Cow Traffics on Milking, Concentrate Intake and Mammary Health Parameters in Robotic Milking

A. Önenç[1], Ş. Şimşek[2]

[1]Tekirdağ Namık Kemal University Agriculture Faculty Animal Science Department. Tekirdağ, Turkey

[2]ONET Robotic Dairy Cattle Farm, Balıkesir, Turkey.

Introduction

In the robotic milking systems, cows are kept in a free stall barn with one or several milking units. The cows can not move enough freely in the system to reach the milking units and the feeding or resting areas if the system is not good managed. The cows' activities in the system are called cow traffic. It is defined cow traffic as the number of milkings per cow and day, visits in the feeding area per cow and day and the distribution of milking and feeding visits during the day. Free cow traffic is most natural for the cows and means lower investment costs for the farmer due to the lack of selection gates. However, there have been rather few investigations and publications on commercial farms concentrating on free cow traffice. This study was undertaken on a robotic dairy farms with 4 milking robot in Balıkesir. Milking, concentrate intake, udder health parameters of 30 dairy cows in startup procedure were evaluated and presented to discussion.

Materials and Methods

30 head cow, accustomed to robot were taken to the area B1, walking distance was shortened. The cows introduced passaport information and chip numbers to herd management program were directed to the collection room close to robot in the B1 area in groups of 10 and taken to the milking cabin with the help 180 degrees moving one side shepherd gate. The first milking was carried out after the cow entered the milking cabin and teats were successfully identified by robotic milking arm.

After the first manual definitions, the milking robot was now able to automatically attach milking claw on the next milking. According to the order of entry into the milking cabin, the groups were taken to the collection area with 6 hours interval, entry to the milking robot was encouraged.

On the second day, the list of volunteers and non-volunteers was taken from the herd management program and milking was encouraged for the cows longest time away from the robot. After the third day it was determined that 75% of the cows entered spontaneously into the milking robot, the separating compartment fences were removed.

On the fourth day, only the cows who did not visit the robot for 10 hours were taken to the collection area and the entry to the milking robot was encouraged. When the average number of milking was reached to 2.5 in the system, the cows that were not visiting the robot for 12 hours were taken to the collecting area and the entry to the milking robot was encouraged. After ten days of continuous robotic transit protocol, cow robot performance, concentrate feed consumption and breast health data of 30 head dairy cow were recorded as digital data and analyzed in SPSS (1999) package program and descriptive statistics were calculated.

Results and Discussion

Descriptive statistics related to milking, concentrate consumption and breast health parameters obtained in the study were presented in Tables 1-4. The daily milk yield in dairy cows taken into consideration during the transition period of the robots ranged from 20.80 to 35.70 kg. Cow's preparation period to milking in cabin was between 1-3. The findings were agree with those reported by Hogeven et al. (2001). The average number of milkings for a cow in a robotic farm should be over 2.5 (Anon, 2014).

The average value of the milking number was between 1.90 and 3.70. Refusal value per cow was greater than 1 and failure number was less than 0.1 (Beck, 2014). In the study, values were found very close to the targets in robotic milking transition. On the other hand, the amount of milk harvested in other words the milking speed at the unit time is an important parameter for robot's performance. High milking speed also affects the waiting time in the milking cabin (Bach and Busto, 2005). The average of milk collected per minute in the experimented cows was 2.5 liters and boxing period in the cabin was below 6 minutes. These values showed that cows adapted quickly to free animal traffic. As a matter of fact, the milk / protein ratio between 1.1 and 1.5 indicated that the cows regularly went to the feed alley after milking and consumed regularly their own concentrates in milking cabin. It was desirable that the milk conductivity values in the robot milk are below 90 (Hovinen, 2009). The average value of the conductivity measured at each teat was below the limit value.

Conclusion

This study showed that cows well adapted to robotic milking in a short time with the free cow traffic approach. Investigating and applying different approaches to encourage free cow traffic, instead of forcing, will increase the benefit of robotic milking.

Table 1. Descriptive statistics for milking parameters

	Daily milk production, kg	Preparation period for milking, sec	Milking number	Refusal	Failure	Milk per milking kg/milking	Boxing time,sec	Milk speed, kg/min
Mean	26,56	112.86	2.63	0.78	0.22	9.47	355.20	2.50
Standart error	0.66	4.30	0.11	0.10	0.03	0.41	25.60	0.16
Maximum	35.70	0.48	3.70	1.60	0.60	14.30	924.00	4.10
Minimum	20.80	0.06	1.90	0.20	0.10	5.20	212.00	1.00

Table 2. Decriptive stattics for milk quality parameters

	Fat, %	Protein, %	Lactose, %	Fat/ Protein , %
Mean	4.53	3.30	4.56	1.37
Standart error	0.09	0.02	0.01	0.03
Maximum	4.77	3.37	4.62	1.47
Minimum	3.77	3.24	4.52	1.12

Table 3. Descriptive statistics for concentrate intake in cabin

	Concentrate serving in robot, kg	Rest feed, kg	Consume feed, kg
Mean	5.29	0.74	4.54
Standart error	0.14	0.19	0.27
Maximum	6.30	4.31	7.55
Minimum	4.00	0.05	1.85

Table 4. Descriptive statistics for milk conductivity

	Left fore teat	Right fore teat	Left rear teat	Right rear teat
Mean	72.36	73.79	71.29	70.23
Standart error	1.66	2.98	2.01	2.22
Maximum	86	108	88.00	9300
Minimum	64	62	62.00	61.00

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Relationship Between Some Traits Used As Mastitis Indıcators in Holstein Cows' Milk

M. I., Yeşil, S., Göncü
Çukurova University Department of Animal Science

Introduction

It is known that there isn't any visual symptom to determine subclinical mastitis but it can be determined by analyzing milk. Therefore it is known as latent mastitis or milk thief. The most important symptoms of mastitis are decrease of milk yield, inflamation in udder, decrease of milk quality, even udder loss and death. This study was carried out in order to identify the relations between Somatic cell count (SCC), Electrical conductivity of milk, initial milking temperature, milk pH and milk density in mastitic and non-mastitic cows.

Materials and methods

The animal material of the study was mastitic and non-mastitic Holstein Friesian cows in the Çukurova University Research Implementation Farm in Adana/TURKEY which similar age and lactation number. SCC, electrical conductivity (EC), milk density, pH of milk and milk temperature parameters which changing with mastitis in milk were measured Somatic cell counts higher than 200,000 / ml on the basis of quarter were accepted as indicator of subclinical mastitis, while lower than 200,000 / ml were considered healthy (non-mastitic) (Göncü ve Özkütük 2002. SCC of the mastitic and non-mastitic milk samples were measured via Delaval DCC somatic cell counter. EC and temperature of milks were measured via Adwa AD43 TDS meter, pH of the milk via AZ 86505 pH meter and density of milk via densimeter (pycnometer). The obtained data were subjected by homogeneity test before analysis and it was determined that parameters except the temperature were not normal distribution in healthy group and SCC was not normal distribution in mastitis group. Analyse of variance, Regression and correlation analyses via SPSS package program were performed by applying logarithmic transformation of SCC data which is not normal distrubution (Kayaalp ve Çankaya, 2013).

Results and Discussion

If this study is examined as a whole, it was found that there was a significant difference between the mean values of healthy and mastitic groups statistacally (Table 1.).

It is understood that there is a very important relations in mastitis milks and that the regression coefficients are high while there was not significant relationship between the relevant features in the healthy group statistically (Table 2).

Table 1 Mean and standart deviation of SCC, EC, initial milk temeperature, density and Ph of milks with and without mastititis.

	Mastitic Group				Healthy Group				Overall Mean	Total N	Sig.
	n	min	max	mean	n	min	max	mean			
SCC	113	215	4588	1066.9±83.5	106	6	196	75.7±4.9	571.3±53.9	219	P<0.01*
EC	113	3.9	11.15	7.07±0.1	106	3.97	7.75	5.8±0.1	6.46±0.1	219	P<0.01
Density	113	1.027	1.038	1.030±0.01	106	1.027	1.036	1.032±0.0	1.031±0.001	218	P<0.01
Temperature	106	25.7	37.5	33.5±0.21	106	30.2	37.2	34.4±0.1	33.9±0.1	212	P<0.01
pH	38	6.57	7.24	6.88±0.03	62	6.55	7.03	6.70±0.0	6.77±0.01	100	P<0.01

Difference between means are statistically significant at significance level of 0.01.

*Since SCC values are not show up a normal distribituve, after logarithmic transformation is applied to SCC values, significance is calculated. But min-max and mean values of SCC is calcuated over actual data, not transformed data.

Table 2. Correlations between parameters of mastitic and healthy milks

	SCC		EC		Density		Temperature		pH	
	Healthy	Mastitic	Healthy	Mastitic	Healthy	Mastitic	Healthy	Mastitic	Healthy	Mastitic
SCC	1	1	0,178	,946**	-0,027	-,587**	-,226*	,741**	0,203	,411*
EC	0,178	,946**	1	1	-0,001	-,391**	0,158	,852**	,524**	,352*
Density	-0,027	-,587**	-0,001	-,391**	1	1	0,035	-,325**	-0,159	-0,261
Temperature	-,226*	,741**	0,158	,852**	0,035	-,325**	1	1	-0,179	0,268
pH	0,203	,411*	,524**	,352*	-0,159	-0,261	-0,179	0,268	1	1

**. Significant at 0.01 significance level (2-tailed). *. Significant at 0.05 significance level (2-tailed).

Conclusion

All of the features studied in the current study were found to be statistically significant at the 0.01 level of significance in relation to mastitis disease.It has been understood that the use all together of SCC, electrical conductivity, pH, initial milking temperature and milk density as a mastitis indicator is effective.

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Eleşkirt Celal Oruç Animal Production School, Reproductive Feature of Brown Cattlees Grown in Educational Research and Application Farm

Y., Demir[1], S., Yüca[1]

[1]Eleşkirt Celal Oruç Animal Production High College, University of Ağrı İbrahim Çeçen, Ağrı, Turkey

Introduction

Reproduction is a factor that must be taken into account in order to obtain agood economic result in dairy farm (Yüksel, 2000). The most important indicator of the profitability of intensive dairy cattle farms is annual calves. Therefore, the profitability of intensive dairy cattle farms depends on reproductive performance. Reproductive traits are the most important factors affecting productivity in cattle breeding (Akman et al., 2001). Furthermore, reproductive is the first among the characteristics used to express the ability of animals to adaptation. (Akbulut et al., 1992). The age of the first calving and the prolongation of the calving interval are economically disadventageous. The first giving birth age must be 24 months and the chilling interval must be 12 months (Yüksel A.N., 2000). This study focuses on reproductive performance traits of Brown Swiss Cattles, whose yield records are kept between 2016-2018. It is aimed to compare the results obtained for some reproductive traits of Brown Swiss cattles cultivated in such operating conditions with other studies conducted in our country conditions and to put forward the herd management status of the operators in terms of these characteristics.

Materials and methods

The material of the study is the data from the Brown Swiss Cattles, which was brought in the Altınova State Farm operation at the beginning of 2016 and whose fertility records were kept between 2016 and 2018. As reproductive traits in research, were on emphasized first breeding insemination age (FBA), first calving age (FCA), calving interval (CI), service period (SP), gestation length (GL) and number of services per conception (NSC). Properties showing normal distribution from data on reproductive traits were analyzed in the SPSS 22.0 package program according to the General Linear model.

Results

The results obtained for the reproductive efficiency traits examined are given in table 1. Its was calculated as 534.83 ± 7.649 days, 844.74 ± 16.375 days, 402.83 ± 14.572 days, 116.81 ± 13.481 days and 281.45 ± 2.156 days for first breeding insemination age (FBA), first calving age (FCA), calving interval (CI), service period (SP) and gestation length (GL), respectively.

Table 1. Some reproductive traits belonging to means and standard errors between 2016 and 2018.

Reproductive Traits	N	Lowest (min.)	Highest (max.)	Mean ($\bar{x}$)	Standard Error ($S_{\bar{x}}$)	Standard Deviation (S)
First Breeding İnsemination Age (FBA) (day)	46	450	690	534,83	7,649	51,880
First Calving Age (FCA) (day)	38	582	1115	844,74	16,375	100,941
Calving Interval (CI) (day)	30	241	585	402,83	14,572	79,815
Gestation Length (GL) (day)	64	203	312	281,45	2,156	17,275
Service Period (SP) (day)	36	21	389	116,81	13,481	80,886
Number of Services per Conception (NSC)	107	1	8	1,78	0,123	1,269

Conclusion

The mean values for FBA and FCA were 534.83 ± 7.649 and 844.74 ± 16.375 days respectively. These values were found as follows when working with brunette breed. İnci et all. the firt breeding insemination age reported 614 days. The first calving age is finding; Kopuzlu et al. 1083, Kaygısız and Kösetürkmen 1091, Özkok and Uğur 908, Aktaş and Bakır 875 gün olarak bulmuşlardır. (İnci et al., 2007: İnal et al., 2003: Kopuzlu et al., 2008: Kaygısız and Kösetürkmen, 2007: Özkok and Ugur, 2007: Aktaş and Bakır, 2011). The first articial insemination age; In this study, İnci et all. we have been found it shorter than her study. In this study the value for the calving interval are (402.83±14.475) days. The values found for the calving interval of brunette breed, İnci et all. CI 383, Sabuncuoğlu et all. 397, Kopuzlu et all. 394, Kaygısısz and Kösetürkmen 443, Koçak et al. 460, İnal et al. 383, Zülkadir and Boztepe 397, Aktaş and Bakır 387 days.

Ulutaş et al. Holsteın breed finds the calving interval as 393 in his study cow. (İnci et al., 2007: İnal et al., 2003: Kopuzlu et al., 2008: Koçak et al., 2007: Ulutaş et al., 2004: Aktaş and Bakır, 2011: Kaygısız and Kösetürkmen, 2007: Zülkadir and Boztepe, 2001). The value for calving interval in this study are shorter than the value it finds Kaygısız, Kösetürkmen and Koçak. The value for calving interval in this study are longer than the value found by other researchers. The mean value for pregnancy length (281.45 ± 2.156 days) is in agreement with the values of some studies. The value for pregnancy length are there. İnci et al. 281, Kopuzlu et al. 284, Aktaş and Bakır 284, Kaygısız and Kösetürkmen 281, Zülkadir and Boztepe 285 (İnci et al., 2007: Kopuzlu et al., 2008: Aktaş and Bakır, 2011: Kaygısız and Kösetürkmen, 2007: Zülkadir and Boztepe, 2001). In this study, mean value found for service period was 116.81 ± 13.481 days. The values found in service period are İnci et al. 99 day, Sabuncuoğlu et al. 114 day, Zülkadir and Boztepe 119, İnal et al. 124, Kopuzlu et al. 109, Özkok and Uğur 127, Kaygısız and Kösetürkmen 184.

This result shorter than İnal et al., Özkok et al., Kaygısız et al. This result higher than İnci et al., Kopuzlu et al., Sabuncuoğlu et al. The mean value for number of inseminations per pregnancy 1.78±0,123 number. This value was found to be lower than Aktaş and Copper 'ın findings, higher than Sabuncuoğlu et al., Similar to İnal et al. Number of inseminations per pregnancy were found by Sabuncuoğlu et all 1.54, İnal et all 1.7, Aktaş and Bakır 2.1

As a result; some of the fertility characteristics examined were fairly close to the recommended standard values, while some mean values were found to be remote. The application of a good number of administrations to the cow management, maintenance and feeding conditions should be improved. Especially because SP, BA and GBTS are high, it is thought that the oestrus is not followed well and the artificial insemination cow is not done more carefully.

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Management of dairy farms

S. Yuca[1], Y. Demir[1], Z. Şahinler[1]

[1]Eleşkirt Celal Oruc High School of Animal Production, Ağri Ibrahim Çeçen University, Ağri, Turkey

Introduction

Falling demand for animal food per person with socio-economic development in the community in recent years and it is observed that a large increase in consumption. To meet this demand, animal breeding has become an important industry and the number of large-scale industrial enterprises is increasing day by day. Considering the growers a significant portion of our population lives in rural areas in Turkey is to ensure the livelihood of the farming activities. Dairy cattle are carried out in large scale commercial enterprises, or small family businesses, especially in areas with large populations. Since there is a livestock activity that requires a high level of labor force, employment provides significant contributions, particularly where there are large businesses. Current problems must be addressed in order to increase the contribution of dairy cattle in local, regional and national economies. Once the issues are identified, studies can be undertaken to develop the sector with good management skills and to increase its contribution to the economy at various levels. We will try to address the management of dairy cattle businesses in the compilation.
If we consider the management of dairy cattle businesses in three ways;
1. Staff management 2. Herd management 3. Financial management
1. **Staff Management**: Employees must provide mutual needs and satisfaction with staff who will work to ensure long-term success. Staff management should be done in the form of a mix of the three known forms of administration and should be guided according to the situation. It is authoritarian administration in the first of three forms of administration. In the case of this management, the manager goes to the job ordering order by ordering the manager and it is expected to be done in the form of the orders given. In the second type of management, the employee is also asked to include the question in the process. Although this type of management can be seen as a form of business ownership, it can only cause a negative turn for both sides over time if the management style is continued with the worker-employer boundaries over time.

In the third form of administration, it is irreconcilable to what work and when the worker is to be done, the order is not treated, and the work is left to the initiative of the employee. In the form of this management, work quality and work discipline are often absent.

It should not be a form of government alone. Mixed management style should be applied in farm management. (Luening, 2009)

2. Herd Management

Heads specifically for herd management and health

• **Animal management and** grouping: Dairy cattle businesses have to work by separating their animals into specific groups taking into account their own structures. Whichever feeding system is applied, the application is of great importance in terms of effective feeding of dairy cattle and efficient management of breeder.

Grouping is make according to age, physiological condition and yields in dairy cattle businesses. Businesses must have sufficient infrastructure to group their dairy cattle. The that determine influencing the size of groups; parlor capacity, the situation of the passage places and corridors, herd average age, herd average DIM (average number of days collected), the bulk of the animals, the state of the östrus (Excess, the number of those who will be artificially inseminated, etc.) number of animals in different physiological periods, the situation of equipments to prepare and distribute ratios in different contents (Cabrera, 2009)

• **Management of records:** In businesses where registrations are not held regularly, the business owner or veterinarian does not have the correct knowledge of the general condition of the herd and the economic profitability of and cant make healthy assessments. In dairy enterprises, the animal's personal records, breeding records, milk yield records, health records, Body condition score records, accounting records should be kept. Everything done in business must be recorded.(http://www.hazimgokcen.net/hayvancilik/hayvancilikta-kayit-tutmanin-onemi/)

• **Care and nutrition management:** The greatest cost in dairy farm is the cost of feed and the diseases that occur in the farm are the nutrition diseases in general. For this reason, the management of feeding is important. Feeding should be given by calculating the ration according to age, fertility and physiological period.(Göncü, 2017)

• **Disease management:** Attention should be paid to the prevention and control of diseases. Quarantine and vaccination are important for the prevention of diseases. The disease must be controlled by biologically and economically acceptable treatments to reduce the frequency of the existing disease.

The most important thing is preventing the disease in the herd (Anderson, 2009)

• **Milking Parlor management**: Milking Parlor management is important for dairy cattle farm. It is very important to disinfection in milking parlor and milking parlor system. The system should be washed with acid and alkaline detergents.

Care should be taken to predipping and clean the udder. It is important to post dipping by the last dipping process. Because at the end of the milking, the nipple remains open, so microorganisms enter the udder. The last dipping creates a protective film layer on the nozzle. In addition, at the end of the milking process also prevents the entry of microorganisms. There should not be any noise during the milking. Also pay attention to the vacuum fluctuations in the milking parlor (Fuhrmann, 2002).

• **Fertilizer management:** Criteria that indicate the fertility level in dairy cattle farm; the fist breeding age, time between two births, the time between two ostrus, the rate of conception, the number of inseminations per pregnancy, and the reproductive efficiency. There are a number of reproductiv problems. Oestrus can not be detected, the number of artificial insemination between birth and first insemination is more than 60-80 days, the number of artificial insemination per pregnancy is high, postnatal reproductive period becomes over 125 days (Sheldon, 2004).

• **Biosecurity:** The benefits of improving biosecurity on the farm are numerous. These; the health of animals, the reliability of animal products, the reduction of antibiotic use, the increase of animal welfare.

As a result, market share of animal products is increasing and reliable animal products are exported. The main principles of biosecurity in dairy cattle farm are: The herd should be kept as closed as possible. Quarantine must be applied to the new participating animals, the health status of the animals must be checked, the disease prevention program must be done, the contamination of feed and water resources should be prevented, the employees must be legally adhered and the entrances and exits of the vehicles must be controlled (Brennan, 2012).

3. Financial Management: Some criteria and standards need to be set for the success of the operator. Budgeting arrangements should be made for the future management of the enterprise for future business analysis. Profitability for the continuity of milk enterprises is preliminary. The management of the staff in the dairy establishments is the marketing of the products which are as important as the management of the crab.

If one of the services is 'in need of integrated marketing' in marketing, no results are obtained. In other words, no matter how good quality the product deals with in production, the product will not be successful without marketing it (Kara, 2000).

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The effect of climate on the performance of Holstein and Brown Swiss Cattle in the Western Mediterranean Summer conditions

Y. Bozkurt and C. Dogan
Department of Animal Science, Faculty of Agriculture, Süleyman Demirel University, Isparta, Turkey

Introduction

There are various published reports about the effect of climate on beef performance on different breeds compared under different feeding and management conditions (Mader, 1999; Koçak, 2004; Özdoğan, 2007). The aim of this study was to evaluate the effect of heat and relative humidity on the performance characteristics of Holstein Friesian and Brown Swiss cattle in summer conditions of Isparta Province located in the Western Mediterranean part of Turkey.

Materials and methods

Climate data for June, July and September 2012 included temperature and relative humidity. The data were obtained from Isparta Regional Office of Meteorology. The 92-day liveweight gains of the 19 Holstein Friesian (HF) and 18 Brown Swiss male cattle (BS) were recorded from June to September every 15 days throughout the experiment. General Linear Model procedure was performed for statistical analysis by using MINITAB.

Results

The lowest, highest and mean values of temperature (°C) and relative humidity (%) by the 15-day periods are given in Table 1. The highest average temperature (36.1°C) was measured in the second half of July. The highest and lowest average relative humidity were observed (78.2% and 55.3%) in the first half of June and in the second half of August respectively. The research findings (Table 2) showed that there were statistically significant differences in performance between breeds and periods when all periods were evaluated, the liveweight gains of BS cattle were found higher than HF cattle ($P < 0.05$).

Although there were not statistically significant interaction between periods and breeds, it was found that there was a tendency for BS cattle performance being better than HF cattle (P> 0.05) in all periods except during the first half of June and the second half of August. Although it was not statistically significant (P> 0.05) the liveweight gains of HF cattle were greater than those of BS cattle when the lowest average temperature (27.9°C) and the highest relative humidity (78.2%) was observed during the first 15-day in June.

However, with the increase in average temperature (30.9°C) during the second 15 days in June, BS cattle performed better than HF cattle.

Table 1. Temperature and Relative humitidy values

	Temperature (°C)			Relative humitidy (%)		
	Min.	Max.	Means	Min.	Max.	Means
June first 15 days	23.3	31.8	27.9	68.0	91.0	78.2
June second 15 days	23.0	33.6	30.9	37.0	80.0	61.1
July first 15 days	24.8	33.2	29.9	52.0	69.0	60.9
July second 15 days	32.1	39.2	36.1	49.0	82.0	68.6
August first 15 days	29.2	32.1	30.2	60.0	90.0	74.3
August second 15 days	24.9	35.1	30.0	45.0	68.0	55.3

Table 2. Means of liveweight gain for breeds by periods

	HF	BS	Means
June first 15 days	17.4	16.8	17.1[a]
June second 15 days	12.1	14.7	13.4[b]
July first 15 days	17.1	18.9	18.0[a]
July second 15 days	10.7	14.5	12.6[b]
August first 15 days	16.3	20.2	18.2[a]
August second 15 days	14.5	12.4	13.4[b]
Means	14.7[a]	16.3[b]	

Standard error for HF 1.32 and for BS 1.36 and the means with different super scripts are statistically significant at %5 level.

Conclusion

It can be concluded that the Brown Swiss cattle performed better than the Holstein Friesian cattle in the summer season conditions of Isparta Province in the Western Mediterranean region. In other words, Holsteins seem to be more badly affected by climate than Brown Swiss cattle in summer season.

Furthermore, the results of performance of breeds presented in this study, are not necessarily applicable outside the regions where the same experiments were conducted due to the differences in climate and management conditions.

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Conjugated linoleic acid (CLA) content of Anatolian water buffalo (Bubalus bubalis) milk fat

T.Özsoy, S. Büyükkılıç Beyzi, M. Kaliber, Y. Konca, M.U. Çınar
Department of Animal Science, Faculty of Agriculture, University of Erciyes, Kayseri, Turkey

Introduction

Bovine milk has an important place in human nutrition with its fat and fatty acids content. In water buffalo milk, fat is high (4-15%) and contains Conjugated Linoleic Acid (CLA). CLA have anti-carcinogenic properties (Devery et al., 2001). CLA is one of the essential fatty acids that are not produced by our body. CLA have anti-catabolic (preventing muscle wasting), anti-oxidants (reducing the effects of aging and free radical damage), immune enhancer and cholesterol-lowering capabilities. In addition, CLA increases the transition from the sensitivity by increasing fatty acid against insulin and glucose to fat tissue to muscle tissue and provide a decrease of fat (Belury et al., 2003; MacDonald, 2000).

Materials and methods

This research was conducted to determine the content of CLA in the Anatolian water buffalo milk collected from different provinces prominent presence in Turkey with the water buffalo. For this purpose, a total of 56 milk samples were obtained from Afyonkarahisar (n = 7), Balıkesir (n = 11), Samsun (n = 10), İstanbul (n = 10), Diyarbakir (n = 9) and Kayseri (n = 9). Gerber method was used for the fat milk extraction (James, 1995). In the esterification of fatty acids, the method reported by Fritsche and Steinhart (1998) was used. All the samples taken by the oil extraction and esterification were placed in the autosampler of the Gas Chromatograph (GC) apparatus and the oil acid profile was determined by injecting 1 μl solution GC from each vial. The CLA standard (cat # 16413 Sigma-Aldrich) was used for CLA detection. Analysis was carried out on a Shimadzu GC 2010 Plus using a flame ionization detector (FID) and a capillary column (60 m × 0.25 mm ID × 0.250 μm (cat. # 13199)). Injection: 2.0 μL split (split ratio 200: 1), 4 mm inlet liners (cat # 20814), injection temperature: 225°C, carrier gas: hydrogen, flow rate: 1.2mL / min, oven temperature: 100°C (4 min) to 240°C (10 min) 3°C / min.

Results

Anatolian water buffalo milk fat and CLA contents from different provinces in Turkey were summarised in Table 1. The highest fat percentage was obtained from Balıkesir samples with 9.19% and the lowest was found in samples from Kayseri province with 5.97% ($p = 0.002$). CLA content in the milk was highest obtained from Diyarbakır (1.49 g/100 g) and lowest in the milk obtained from Balıkesir province (0.65 g/100 g).

Table 1. Milk fat and CLA contents of Anatolian buffalo (Bubalus bubalis) in some different provinces

Provinces / Parameters	Afyon karahisar	Balıkesir	İstanbul	Diyarbakır	Kayseri	Samsun	SEM	p
Fat, %	8,14^{ab}	9,19^{a}	7,66^{abc}	6,81^{bc}	5,97^{c}	6,83^{bc}	0.26	0.002
CLA, (g/100 g)	0.87^{bc}	0.65^{c}	1.10^{ab}	1.49^{a}	1.26^{ab}	1.18^{ab}	0.06	0.001
n	7	11	10	9	9	10		

Conclusion

In present study the average fat content is 7.43% in milk samples taken from 6 provinces which are important water buffalo breeders in Turkey. These results are higher than the results of Varricchio et al. (2007) conducted in Mediterranean water buffalo in Italy, but were found to be similar to the results of Şekerden et al. (1999) in Anatolian water buffalo. In the current study the average CLA content was found 1.09 g/100 g in Turkey. These result were found to be similar to the results of studies conducted by Varricchio et al. (2007) in Mediterranean water buffalo. As a conclusion, water buffalo milk fat and CLA levels shows regional differences in Turkey. Further studies are needed to investigate deciphering enviromental and genetic factors that makes differences in Anatolian water buffalo fat related phenotypes.

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Effect of environmental factors on lactation milk yield, lactation length and calving ınterval of Anatolian Buffalo in Istanbul

M. İ. Soysal[1*], S. Genç[2], M. Aksel[3], E. Ozkan Unal[1], E. K. Gürcan[1]

[1]Namık Kemal University, Faculty of Agriculture, Department of Animal Science, 59100, Tekirdag, Turkey

[2]Ahi Evran University, Faculty of Agriculture, Department of Agricultural Biotechnology, 40100, Kırsehir, Turkey

[3]Istanbul Water Buffalo Breeders Association, Istanbul, 34100, Turkey

Introduction

While the number of buffaloes in the world, was 173 million in 2005, it was reported that the number was increased to 200 million in 2013. The population of buffaloes has increased by 87% between 2005-2013. In Turkey, the number of buffaloes was 103000 in 2005, and it was 107000 in 2013. (Anonymous 2014a). In 2014, due to the Project of Nationwide Improvement of Buffalo Breeding in Farm Condition, the number of buffaloes in Turkey, has increased to 107435. The buffaloes being raised in Turkey, are originated from the Mediterranean buffaloes, which is a subgroup of river buffaloes, and they are named as Anatolian Water Buffaloes (Soysal 2009). In Turkey, by the year of 2014, 300 tons meat and 50000 tons milk were produced from buffaloes (Anonymous 2014b).

Anatolian water buffaloes are generally bred in Samsun and Sinop in the seashores of Northern Anatolia; in Çorum, Amasya and Tokat in Middle and Inner North Anatolia; in Afyon and Balıkesir in Inner West Anatolia; in İstanbul in Marmara; in Sivas and Muş in East Anatolia; and in Diyarbakır in Southeast Anatolia (Şekerden 2001).

Moreover, in Anatolian water buffaloes, it is reported that lactation duration is ranging between 180 and 280 days and 305-day yield is ranging between 800 and 1100 kg (Anonymous 2004). Buffalo breeding in Turkey is made for milk (lüle kaymağı, yoghurt, cheese, and ice cream) and meat (sucuk, salami, and pastırma) production (Soysal 2009). However, buffalo breeding is usually practiced by family-run small-scale (83%) and medium-scale (17%) enterprises (Sarıcan 1993). Importance of the buffalo, stems from milk and meat yield, resistance to many infectious diseases, low breeding costs, and being an appropriate livestock for low-income growers. In addition to this, the studies contducted, have indicated that buffalo meat contained 40% less cholesterol, 12% less fat, 55% less calorie, and 11% more protein and mineral than beef (Sarıözkan 2011 and Borghese et al. 2010).

Therefore, buffalo meat is reported to be a good choice of red meat for people with heart and circulatory system diseases (Küçükkebapçı 2005).

The aim of study was to investigate the effects of environmental factors on the lactation milk yield (LMY), lactation length (LL) and calving interval (CI) of the Anatolian buffalo. For this propose 2034 Anatolian buffalos' pedigrees in Istanbul between 2012 to 2017 were used.

Materials and methods

Material of this study consisted of 3843 milk yield records from buffaloes that reared in 4 different province of İstanbul in the framework of Project of Nationwide Improvement of Buffalo Breeding in Farm Condition. On the other hand milking is carried on twice daily, in the morning and evening. Milk controls of buffaloes are collected monthly with a weighing scale with a precision of 10gr/50kg. In this study, The effects of the province, calving year, lactation number, season and age on these characteristics were determined. Also effects of the province, calving year, lactation number, season and age on LMY, LL and CI. were analyzed by Variance Analysis Technique (ANOVA; Least Squares Method). Minitab version 14 was used for statistical analyses and, subsequently, factors that reveal significant effects were compared in Tukey's multiple-range test (Tukey 1953 and Sheskin 2004). The mathematical model that will be used to determine the effect of environmental factors, is given Model:

$Y_{ijklmn}=\mu+a_i+b_j+c_k+d_l+f_m+e_{ijklmn}$

Definitions of symbols are as follows:

Y_{ijklmn} : observation value of the investigated trait (lactation milk yield, lactation length and calving interval of 1. cow, that in i. province, in j. calving year, in k. lactation number, in l. season and in m. calving age)

μ : population average,

a_i : i. amount of effect of province,

b_j : j. amount of effect of calving year,

c_k : k. amount of effect of lactation number

d_l : l. amount of effect of season

f_m : m. amount of effect of calving age

e_{ijklmn} : error

Results

The overall mean and standard error of the LMY, LL and CI were determined as 1223.9 ± 6.83 kg, 230.99 ± 0.89 kg and 417.51 ± 1.73 days respectively.

The effects of the province, calving year, lactation number, season and calving age on these characteristics were determined. Also effects of the province, calving year, lactation number, season and calving age on LMY, effect of province, calving year and season on LL and calving year, lactation number and calving age on CI were statistically significant ($p<0.01$), Phenotypic correlation were calculated between LMY, LL and CI also.

Table 1. Characteristics of Anatolian water buffalo that determined in Istanbul Turkey

Yield Characteristics	n	Min	Max	$\overline{X} \pm S_{\overline{X}}$
Lactation Lenght, day	3843	120	397	230.99 ± 0.89
Lactation Milk Yield, kg	3843	402	3155	1223 ± 6.83
Calving Interval, day	2239	300	700	417 ± 1.73

It is determined that the effects of the province, calving year, lactation number, season and calving age on LMY (1223 kg) were significant ($p\leq0.01$). This value is less than the lactation milk yield reported by other studies (Caddy et al., 1983; Babar et al., 1996; Vasconcellos and Tonhati, 1998; Rosati and Van Vleck, 2002; Malhado et al., 2013) for Nili-Ravi (1702-2064 kg), Brazil Murrah (1493.3-1631.5 kg) and Italian buffaloes (2286.8 kg). This result can be attributed to the differences in breed, feeding and management conditions.

In addition, the lactation milk yield obtained in this study is higher than the values reported by some other studies (Tekerli et al., 2001; Tekerli et al., 2016; Uğurlu et al., 2016) for Anatolian buffalo (894.3, 925.4 and 1000.7 kg respectively) in Afyonkarahisar and Giresun provinces of Turkey. This may be due to advances in feeding and management conditions and the effect of selection in the National Anatolian Water Buffalo Improvement Program.

Table 2. Descriptive statistics and significance test results for values of lactation milk yield (LMY), lactation length (LL) and calving interval (CI) according to the province, calving year, lactation number, season and calving age.

		LMY			LL			CI	
Province	n	$\bar{X}$	$S_{\bar{X}}$	n	$\bar{X}$	$S_{\bar{X}}$	n	$\bar{X}$	$S_{\bar{X}}$
Arnavutköy	1207	1193.3^{b}	12.3	1207	236.42	1.51^{a}	661	421.77	3.39
Çatalca	1481	1194.2^{b}	10.9	1481	227.79	1.45^{b}	987	403.87	2.34
Eyüp	781	1321.5^{a}	13.7	781	234.05	1.96^{b}	409	431.32	4.04
Silivri	374	1236.8^{ab}	24.2	374	219.69	3.04^{c}	182	444.48	6.79
P		**			**			ns	
Calving year									
2012	420	1125.9^{b}	12.6	420	213.72^{c}	1.59	308	407.37^{a}	4.24
2013	542	1277.2^{a}	17.7	542	244.49^{ab}	2.42	351	414.32^{ab}	4.29
2014	591	1279.1^{ab}	16.3	591	235.64^{b}	2.12	341	419.14^{c}	4.33
2015	631	1227.0^{ab}	16.8	631	232.60^{b}	2.30	358	422.75^{c}	3.93
2016	980	1281.3^{a}	15.3	980	244.19^{a}	1.85	522	428.08^{bc}	4.01
2017	679	1108.3^{c}	16.1	679	206.28^{c}	1.94	359	406.94^{c}	4.28
P		**			**			**	
Lactation number									
1^{th}	1516	1155.9^{b}	9.89	1516	229.27	1.42	1107	388.78^{b}	2.14
2^{nd}	1029	1270.3^{a}	13.1	1029	234.20	1.75	636	421.81^{a}	2.96
3^{rd}	625	1258.1^{a}	17.7	625	233.13	2.12	325	454.71^{ab}	4.06
4^{th}	422	1287.8^{a}	22.4	422	232.91	2.65	137	504.95^{a}	6.49
5^{th}	251	1251.8^{a}	30.9	251	219.59	3.52	34	562.1^{ab}	13.4
P		**			ns			**	
Season									
Winter	1332	1316.7^{a}	11.4	1332	244.82^{b}	1.34	775	414.58	2.83
Spring	1587	1163.0^{b}	10.0	1587	220.65^{c}	1.32	921	422.89	2.74
Summer	589	1128.9^{c}	17.3	589	215.80^{d}	2.44	336	418.96	4.60
Autumn	335	1310.6^{a}	25.9	335	251.65^{a}	3.53	207	401.78	5.63
P		**			**			Ns	

Calving age									
4	827	1115.2[c]	13.4	827	231.60	1.98	827	350.15[e]	0.588
5	426	1210.1[bc]	18.7	426	236.21	2.65	426	387.04[d]	0.401
6	465	1230.1[ab]	18.1	465	232.01	2.51	465	426.15[c]	0.734
7	405	1257.3[ab]	22.6	405	228.77	2.63	405	511.75b	2.10
8	407	1234.8[bc]	20.1	407	228.68	2.65	116	645.21[a]	2.53
9	348	1252.7[ab]	24.4	348	230.81	3.01			
10	276	1309.8[ab]	27.5	276	225.65	3.27			
11	204	1357.1[a]	31.7	204	231.69	3.90			
12	485	1252.9[ab]	20.1	485	231.00	2.55			
P		**			ns			**	

[a-e] : The difference between the averages indicated by different letters in the same column are statistically significant. **: P<0.01, ns: non-significant

From another hand it is reported that, mean lactation period of Anatolian water buffaloes was 232 days (112-449 days) and depending on various factors as race, care-nutrition, age, lactation, and length of the dry period, lactation milk yield reported to be 925 kg (Soysal 2009). Similarly to the results of this study, it was reported (Vasconcellos and Tonhati, 1998; Hussain et al., 2006; Marai et al., 2009) that the year, season and age have significant effects on the lactation length.

The mean of the lactation length determined in this study is shorter than those reported in other studies (Babar et al.,1996; Rosati and Van Vleck, 2002; Malhado et al., 2013) involving Nili-Ravi (327.9 days), Murrah (269.4 days), and Italian water buffaloes (270 days) but longer than those reported by some other studies (Tekerli et al., 2016; Uğurlu et al., 2016) for Anatolian buffaloes (229.4 days and 231.9 days).

Generally, in buffaloes, it is stated that the highest milk yield can be seen between the ages of 6 and 7, namely during the 3rd lactation (İzgi and Asker 1988 and Metin 1999). Özenç et al. (2008) have determined that lactation milk yield was changing in the range of 350-1580 kg and that the mean lactation milk yield was 943.2. It is reported that the 1st lactation milk yields of buffaloes reared in Buffalos Research Institute of Afyon, were ranging between 227 and 1443 kg with an average milk yield of 813 kg (İzgi and Asker 1988). It was noted by Kreul and Sarıcan (1993) that lactation milk yield of buffaloes range from 600 to 800 kg in Turkey, although this value was determined as 1200 kg in Europe. The LL average, which is closely related to lactation milk yield, was determined to be 220 days for indigenous water buffaloes, and 225 days for hybrid buffaloes, in Buffalos Research Institute of Afyon.

İlaslan et al. (1983) have defined the mean lactation length as 224 days. In a study conducted in Tokat, according to Vogel method, the highest milk yield was 761.4±16.4 kg; according to Trapez method, the lowest milk yield was 657.7±13.7 kg. In the same study, LL and dMY were 146.55±1.79 days and 5.21±0.096 kg, respectively (Şahin ve Ulutaş 2013). In a study on Anatolian water buffaloes that carried out in Afyon Kocatepe Agricultural Research Institute, average values of 305dMY and LL were determined to be 1070.5±279,9 kg, and 221±44.19 days, respectively (Şekerden 1999).

Garcia et al. (2013) have used 2575 lactation records which belong to 1377 buffaloes, to estimate genetic parameters for the milk yield and LL of buffaloes. Accordingly, they noted the 244-day average milk yield and lactation length as 864 kg and 240 days, respectively.

It is reported that Nili Ravi buffaloes that reared in Pakistan, had a mean lactation period of 317 days and a mean lactation milk yield of 2219 kg.

In the study, during winter and autumn, LMY was highest in comparison to values from summer and spring, on the other hand, during summer, LMY was lower in comparison to spring, summer and autumn. In this case, being at the onset of lactation and good condition of pastures in this season, might have been effective. The lowest milk yield was attained during winter (December to February). Accordingly, this case can be explained by the end of the lactation of animals and pasture effect (Şekerden et al. 1999). It is seen from results that buffaloes which calve in winter and autumn had a higher milk yield than buffaloes which calve in summer and spring.

In order to explain that how buffaloes which calve in winter had higher milk yields in comparison to other seasons, it is possible to think that influence of critical temperatures resulting from seasons, feeding inside, and longer milking durations. So, for the buffaloes consistently grown under intensive conditions in the winter, attention is paid to care and nutrition. In addition to this, longer lactation lengths were seen in buffaloes which calve in winter and autumn than those which calve in summer and spring, respectively. This has been effective in the high milk yield in winter and autumn seasons (Şekerden et al. 1999).

Conclusion

It was concluded that the factors affecting milk production and reproduction must be considered in a selection program. Also, after corrections according to factors deemed significant in terms of milk yield and composition, buffaloes could be selected based on the first lactation milk yield.

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Body Condition Score and NEFA Levels in Primiparous Holstein Cows at Postpartum Period

D. Alic Ural[1], S. Erdogan[2], H. Erdogan[2], K. Ural[2]

[1]University of Adnan Menderes, Faculty of Veterinary Medicine, Faculty Farm, Isikli, Aydin, Turkey

[2]University of Adnan Menderes, Faculty of Veterinary Medicine, Department of Internal Medicine, Isikli, Aydin, Turkey

Introduction

The intensity of the negative energy balance (NEB) depends on milk yield of the animal, milk composition and the feed consumption capacity of the animal. The body reserves of dairy cows are used depending on the NEB. This metabolic load is effective in the deterioration of reproductive performance in animals (Gorgulu et al.,2011). Body condition score (BCS) is used as one of the indirect measures from detecting fat levels of dairy cows and their bodies, and if necessary energy balance (Kellogg, 1914). Furthermore BCS of cows are used as a criterion to obtain information on health, yield and metabolic profiles (Roche et al., 2009).The present study was focused on determining 1) body condition score 2) NEFA levels and 3) the usage of the latter two parameters in primiparous Holstein cows at post-partum period. Another purpose was to establish those parameters as a biomarker for predicting postpartum diseases.

Materials and methods

The material of this study, involving 21 head Holstein cows, aged 2 years, composed of primiparous cows at 1st lactation, raised at a dairy farm in Bozdogan county in Aydin. Primiparous (n=21) cows were subjected to NEFA analysis on calving day. Cows were then analyzed at monthly monitoring. BCS was evaluated on visual observing, flowcharts developed previously (Edmonson et al., 1989). This system is based completely upon visual estimation by use of a 1-5 scale with 0.25 intervals (Edmonson et al., 1989).

Results

During the study period, primiparous cows showed a lower mean BCS at calving, post-partum week 2 and 4, were found as follows 3.25, 3.30, and 3.29. There were no significant alterations regarding BCS values.

On the other hand taking into account mean NEFA values during study period were detected as 0.751, 0.567, and 0,404 mmol/L. Graphs were shown in Figure 1.

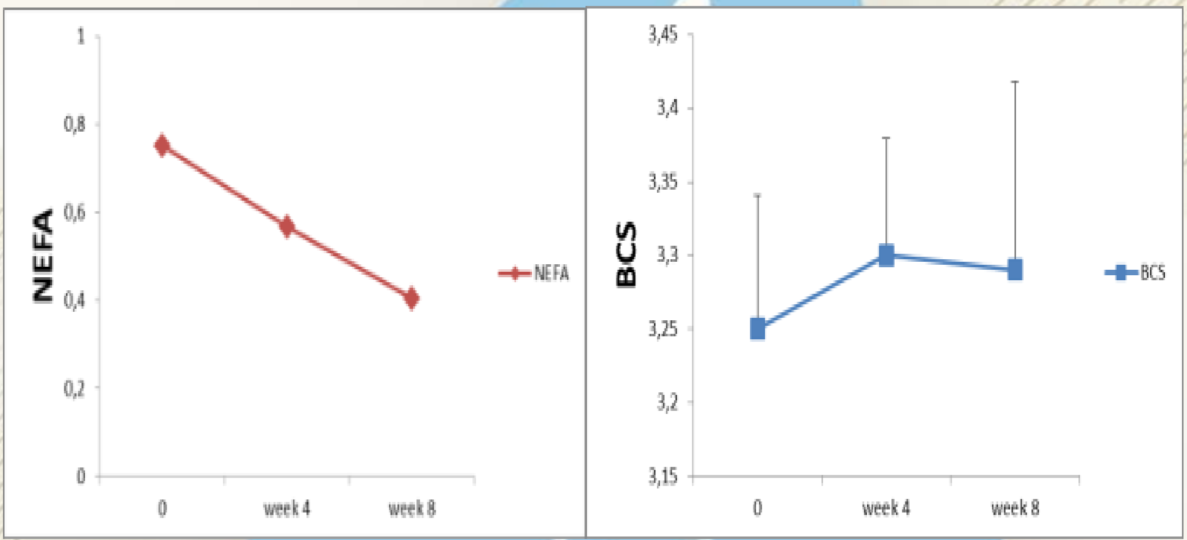

Figure 1. NEFA and BCS alterations in primiparous Holstein cows during study period.

Conclusion

In conclusion, it should not be unwise to draw conclusion that BSC and NEFA values could be used for monitoring health condition among primiparous cows at post-partum period. As a simple, furthermore practical device for interpretation of body energy and fat reserves in dairy cows (Roche et al., 2013). On the other hand some selected literature relevant to BCS in primiparous/multiparous cows are controversial. Primiparous cows presented significantly declined BCS in contrast to multiparous cows during postpartum period (Meikle et al.,2014), whereas some other researchers did not detect any important differences regarding BCS between primiparous and multiparous cows (Sakaguchi, 2009; Tanaka et al., 2008; Wathes et al., 2007).

In another study it was stated that estimating BCS in fat cows might be a powerfull predictor of lameness, whereas thin cows BCS should be combined with thickness of fat over the tuber ischiadicum. Same study group also denoted the interaction between two risk factors for developing chronic lameness in contrast to a single factor exposure BCSxBHBA (Ristevski et al. 2017a, 2017b). In our present study no significant alterations regarding BCS values were detected.

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Relations Between Birth Weight and Some Body Measurements in Anatolian Black Cattle Calf Grown in Breeding Conditions

Ç. M. Sakar[1], U. Zülkadir[2]
[1]International Center For Livestock Research and Training, Lalahan, Mamak, Ankara
[2]Selçuk University, Faculty of Agriculture, Zootechnical Department, Konya

Introduction

Measurement of the birth weight is one of the most important criteria for identification of a breed and the success of selection programs. Birth weight is not only important as a sign of adult weight of the breed, but also important for prediction of the daily weight gain and making the feeding programmes. (Tüzemen and Yanar, 2013). Despite being able to know the birth weight precisely by the help of measuring equipment, these equipments do not exist and it is not attached a particular importance to measure birth weight in the managements based on intensive breeding system such as, Anatolian Black Cattle management system. These disadvantages can be overcome by tape measure in the field works. So that, the body weights of the calfs can be estimated by the measurement of the determined parts of their body. In this study, it was aimed to investigate the relationship between birth weights and body measurements of Anatolian Black cattle and to develop linear regression equations to estimate calf birth weights.

Material and methods

This study was conducted from general directorate of agriculture research and policies, takes place in the scope of "Conservation and Sustainable Use of Pets Genetic Resources Project". The animal material of this study, 108 Anatolian Black Cattle were used which were born in 2018. Those animals came from 21 different farms which are located in Osmansin village, Camlıdere district of Ankara province. Measurements of birth weights (BW), withers height (WH), rump high (RH), chest girth, (CG), chest depth (CD), body length (BL) and fore cannon girth (FCG) were taken. Statistical calculations were done with "Minitab 16" package program.

Results

BW, WH, RH, CG, CD, BL and FCG were obtained in the order of; 14.45±0.397 kg, 57.775±0.347 cm, 59.843±0.382 cm, 53.510±0.517 cm, 24.137±0.281cm, 49.608±0.581 cm, 7.123±0.068 cm has been found, the effect of calf gender was significant only in FCG ($P<0.05$), but not significant in other characteristics. The highest correlation was found between BW and CG (r=0,808) however, the lowest correlation was found between BW and FCG (r=0,467).In addition, the highest correlation between body measurements was found between WH and RH with a value of 0.965. Regression analysis was performed between the chest girth and the live weight measurement, which is the measurement value that gives the highest correlation coefficient so that the live weight estimate can be made with the body weight parameters; BW = - 15.53 + 0.5577 CG (R^2 = 65.3%) formula was obtained.

Discussion

In this study, birth weight of Anatolian Black cattle was found lower than previous studies Demirhan and Tekerli (2008) and Kılıcel and Tepeli (2014), lower value of birth weight could result from maintenance and feeding conditions in the breeder conditions. The effect of gender on birth weight was found to be insignificant ($P> 0.05$) as found by Kılıçel and Tepeli (2014) and by Demirhan and Tekerli (2008) significant ($P<0.05$). Demirhan and Tekerli (2008) and Kılıçel and Tepeli (2014) were found to have significant ($P<0.05$) effect on maternal birth weight, but this study was found to be insignificant. Acording to francis et al. (2002) and Özlütürk et al. (2006) who did similar study with different races, there is a high correlation value between the chest girth and calf birth weight. Recording to the analysis of linear regression model, R^2 value of regression model was found similar with results of Özlütürk et al. (2006) and Mekparyup et al. (2013). Regarding the findings, breeding of the Anatolian Black cattle is need to be improved in terms of genetic, breeding and environmental conditions. The positive and highly significant ($p<0.01$) correlations between birth weight and total body measurements are positive results for selection studies. It is thought that, future studies could consider increasing number of animal material for getting more positive results. As a result, recent study has shown that we can estimate the calving birth weight in breeder conditions where there is no weighing possibilities with high accuracy using chest girth value.

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Relationship Between Udder and Leg Hygiene Scores and Somatic Cell Count

E. Kul, A. Şahin, E. Uğurlutepe, M. Soydaner and R. Erkmen
University of Kırşehir Ahi Evran, Faculty of Agriculture, Department of Animal Science, Kırşehir, Turkey.

Introduction

Somatic cells in milk are predominantly white blood cells or leukocytes which are present as one of the primary protective mechanisms of the mammary gland. Somatic cell count (SCC) is low in normal milk and tends to increase with subclinical mastitis, thus, it can be used to determine intramammary infection (Erdem et al., 2007). Therefore, SCC related to udder helath can be used as indirect selection criteria (Kul and Erdem, 2008). The most important cause of increased SCC is bacterial infection of the mammary gland (De Pinho Manzi et al., 2012). Udder and leg hygiene influences milk quality and is related to occurrence of pathogens, especially environmental ones. It is clear that a poor environment should result in dirtier udders and legs. The maintenance of good hygiene in the environment of animals and of the animals themselves corresponds to lower somatic cell count in milk (Mitev et al., 2013). The dairy farm must provide sanitary housing for cows to prevent udder contamination and produce high quality milk (De Pinho Manzi et al., 2012).

Materials and methods

The objective of this study was to determine the relationship between udder hygiene scores (UHS) and leg hygiene scores (LHS) with somatic cell count (SCC) in Holstein cows. A total of 1024 records of dairy cows raised at a private farm in Kirsehir province were evaluated. UHS and LHS were scored by one person using a 5-point scale ranging from 1 (very clean) to 5 (very dirty). The SCC was determined with the DCC (DeLaval Cell Counter, DeLaval, Tumba, Sweden). The actual SCC were transformed by using a log10 transformation. To evaluate by sampling season, four groups were formed: 1=autumn (September to November); 2= winter (December to February); 3= spring (March to May); 4= summer (June to August). Data were analyzed by using SPSS (17.0) statistical program. The subgroup means were compared with Duncan's multiple range test.

Results

Mean hygiene scores were 2.63 and 3.28 for UHS and LHS, respectively. Effect of sampling season on UHS and LHS were significantly important (P<0.05). UHS and LHS were the lowest in spring and summer compared to autumn and winter seasons. However, the highest logSCC was determined in autumn than other seasons (P<0.05). In this study, effects of UHS and LHS on SCC were not significant. There was no significant correlation between SCC with UHS (r=0.035) and LHS (r=0.040). Correlation between UHS and LHS were positive and significant (r=0.749).

Conclusion

In this study, UHS and LHS were affected by seasons. These findings were confirmed in the studies of Sant'Anna and Paranhos da Costa (2011) who observed that with the highest proportion of clean cows being observed in August and the lowest in January and the very clean cows had the lowest SCC. SCC was not affected by cow hygiene (UHS and LHS) in this herd. A very similar result was presented by Schreiner and Ruegg (2003) who observed that the prevalence of environmental pathogens was not associated with LHS. Contrary to the present finding, Dohmen et al. (2010) and Schreiner and Ruegg (2003) determined that SCC increased as UHS or lower SCC determined in cleaner cows. Correlation between SCC with UHS and LHS were not significant. UHS and were significantly correlated with LHS and similar result determined by Schreiner and Ruegg (2003).

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Some characteristics of immune blood and its relationship with the Lactoferrin of the Holstein calves in Iraq

Natik H. Al-kudsi, Waleed A. Khalid
Department of Animal Production- college of Agriculture / University of Baghdad

Introduction

It is therefore necessary in this short period to feed the calf with sufficient amount of colostrum to gain immunity until it develops its own immune system (Wheeler et al., 2007), Colostrum components also develop the digestive system (Odle et al., 1996; Blum and Hammon, 2000), And the absorptive capacity of the intestines (Rauprich et al., 2000). Lactoferrin (LF) is an important part of the immune globulins, which are found in colostrum and milk in many mammals, firstly humans and cattle. As well as the presence of different concentrations in body fluids and external secretions, but its concentration in colostrum and milk is higher than the another liquids (Masson and Heremans, 1971 and Brock, 1980).

Material and method

This study was carried out at the Al-Salam dairy farm/ at Latifiya, 25 km south of Baghdad) , As well as a laboratory specializing i blood analysis for the period from 3 September 2017 until 11 December 2017, To investigate the effect of adding different levels of Lactoferrin (0, 3 and 6 g Lf / day) to colostrum and milk in immunity and a number of blood traits in 18 Holstein calves from birth to 60 days.

Result:

The results of the study showed significant differences (P <0.05) in the concentration of IgG in calves' blood, With increased Lactoferrin concentration level at age 30 days in calves' blood. IgM and IgA concentrations were not affected by treatment at age 30 days . At the age of 60 days, the differences were significant (P <0.05) in IgG and IgM for the third treatment calves (6 g Lf) then for the second treatment calves (3 g Lf) , while the lowest concentrations for control group . The results of the this study showed significant differences (P <0.05) in the transferrin concentration in the calves blood at 30 and 60 days for the control group (without Lf) compared with the calves of the second treatment groups and the third.

Table 1: Effect of treatments on the concentration of immunoglobulin in the blood of calves at age 30 days

Treatment	Mean ±SE (mg/ml)		
	IgG	IgM	IgA
Control(without Lf)	10.13± 0.52b	0.68 ± 0.02 a	0.089 ±0.001a
Lactoferrin (3gm/day	11.90± 0.72a	0.62 ± 0.04 a	0.081 ±0.002a
Lactoferrin (6gm/day	12.76± o.63a	0.65 ± 0.02 a	0.083 ± 0.001a
	*	NS	NS

Conclusion

We conclude that the transactions that used Lactoferrin protein as a dietary supplement 3 g / day(Lf) and 6 g / day (Lf) may lead to Increase the concentration of IgG in the serum of the calves at 30 days and Increase the concentration of IgG , IgM and Fe in the serum of calves at 60 days of age.

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General Characteristics of Dairy Cattle Farms in Ankara Province

H. Demir[1], A. O. Sen[1], F. Cedden[1]

Ankara University Faculty of Agriculture Department of Animal Science

Introduction

There is 15 943 586 of cattle in Turkey according to data form 2017. Among them, there are 7 804 588 pure dairy cattle (49%), 6 536 073 (41%) crossbreeds, and 1 602 925 (10%) native breeds. There is 5 368 271 milking cows in total of 28 505 539 milking farm animals. Average milk production is about 20 699 894 metric tons yearly. Cow milk production is about 18 762 319 metric tons with 3 143 kg average milk yield per cow (Anonymous 2018).

In Ankara Province, there are 462 250 of cattle which present 2.9 % of Turkish cattle population. Number of pure dairy breeds is 174 863 (38%), crossbreeds 223 633 (48%) and 63 754 native breeds. Number of milking cows is 109 945. Among them, there are 38 814 of pure dairy breeds (35%), 50 314 of crossbreeds (46%) and 20 817 native breeds (19%). Total milk production is 304 682.37 metric tons. Half of milk production is provided by pure dairy breeds. The rest comes from crossbreeds (41%) and native breeds (9%) (Anonymous 2018). Surface of Ankara Province is 25 632 square kilometers. Total agricultural land surface is 205 624 ha for the year 2015. Number of farmers booked in the national farmer registration system (ÇKS) is 45 525 for the year 2016. Total agricultural area within ÇKS is 561 385.2 hectares for the year 2015. Agricultural lands of Ankara Province concern 5% of total agricultural surface of Turkey. Number of livestock has increased about 15 % between the years 1991 and 2017. Large animal number has also increased at the rate of 23 % and reached 462 000 of head during last 20 years in Ankara province. As the share of pure dairy cattle breeds and crossbreeds has increased in the total of milking livestock, the share of native cattle breeds has drastically decreased. The share of total cow milk production has reached 96 % from 1991 to 2017 with 20.6 million metric tons per year in Turkey. Similar tendency is observed in Ankara with 27% of increase at the level of 304 thousand metric tons. However, the share of Ankara Province in the total of cow milk production has decreased consistently until 1.45%.

Material and Method

The research was performed by evaluating the survey on the basis of dairy cattle farm holders which were randomly defined in Ankara Province. A total of 18 dairy cattle farms were concerned.

In the survey, a total of 63 questions were asked under principal titles such as management, reproduction, milking, calf rising, housing, feeding and animal health. Districts were also randomly defined.

These are Bala, Sincan, Kazan, Beypazarı, Gölbaşı, Güdül and Polatlı. The distribution of location of dairy farms is as follows: Bezirhane-Topaklı-Tulumtaş-Ahiboz (Gölbaşı), Anayurt-Osmaniye-İlyakut (Sincan), Uruş (Beypazarı), Yeniköseler (Polatlı), Çağa (Güdül), Ortabereket (Ayaş), Yapracık (Etimesgut), Kılıçlar-İne (Kazan), Küçükboyalık-Kerişli (Bala), Kayadibi (Elmadağ)

Results and Discussion

General Farm Information's

It was determined that 44 % of farms was in a possession of family, whereas 39 % of farms was individual and 17% of the farms were corporate. Educational level of farm holders was as follows: Among them, 22 % primary school, 28% high school, 44% university and 6% post graduate were observed. Farmers age between 19 and 71 average age was 42. The breed distribution of cattle was various but Holstein (51%) was commonly preferred in these farms as culture breed. As a method of keeping records in farms, 50% of the notebook, 28% of the computer, the rest of farms uses both the notebook and the computer method. It was determined that the use of closed, semi-open and open dairy cattle barns were 22%, 44 % and 34%, tie-stall and free stall barns ratios of them were 22% and 78% respectively. In the barn floors, 33% of the material was concrete, 22% rubber, 16% concrete and soil, 11% concrete and rubber, 6% stone, 6% plastic grid and straw, 6% concrete, rubber and soil together. The percentage of the farms which have 1-10 milking cows was 12%, 10-50 milking cows was 53%, while those which have ≥50 animals were 36%.

Reproduction

Most frequently used heat detection method was basically observing heat behavior in the flock. There was about 12% of farms which were using calendar and tiser bull. A small amount of the farms used pedometers, hormone and rectal palpation. About 50% of the farmers choose bull semen according to the veterinarian's recommendation. The Average age for first service of heifers is about 12-13 months and 14-15 months in 22% of farms, separately. However, the age for first service is about 16-18 months in 28 % of the farms. Principal criteria for first insemination are heifer age and live weight respectively, in 39 % of farms. Average AI per live-born calf was as follows: 11% of farm holders reported 2 times, 56 % 3 times, 11% 3-4 times and 22 % 4-5 times.

Milking

Milking is performed twice a day, morning and evening in all of the farms. Cooled daily milk sold to dairy industries from all farms. Milking was made by milkman in 50% of the farms. It was observed that 56% of the farms use mobile milking machine, 39% milking parlor and 5% robot milking. Concentrated feed was given during milking in 44% of farms. Cleaning udder at pre-milking stage is performed in 22% of farms by using towel in 28 % of farms. However, sponge was used in 22% of farms. In all farms, cows were milked until dry period. The average daily milk yield in 44% of farms is 15-20 kg per cow.

Calf rising

In 39% of the farms, calves were housed in individual pens whereas 17% in boxes and 44% in group housing. Calves' milk feeding period was 3 months in 45% of farms, 39% 2 months, 5% 4 months. The beginning of concentrated feed and roughage distribution is about one-week age for calves. However, both type of feed is available since calf birth in 23 % of farms.

Manure management

Principal types of floor for manure stock are as follows: 28% concrete, 23% ground surface and open air. Manure is spread to the field in 50% of farms, but other 50% gives it to cultivators freely.

Feeding

All farms provide concentrated feed from factories. Moreover, dried alfalfas, corn silage, wheat straw, corn silage, vetch, dandruff, dried pasture, cosette, fruit&vegetable residues, barley straw, barley, pellet corn, alfalfa silage as sources of roughage.

It is reported that live yeast and premix is used as feed additives in 11% of farms.

Animal Health

Most common complaint related to the health of flock is foot-hoof disease. Moreover, mastitis appears in 33% of farm beside few case of calving difficulty. Among them, 11% and 6 % of farms has complained about abortion and milk fever, respectively.

All farms utilized preventive vaccination. Brucella, foot and mouth disease, LSD, mastitis, internal-external parasite, IBR, BBD, septicemia vaccines are regularly administered in farms.

Conclusion

Since the survey was done in a short time, more farms could be involved in the province even in other provinces. As a result of the survey, various problems were identified. Some of them are as follows: Technical formation and training should be given to farmers and managers in various terms.

Scarceness of skilled staffs in the sector is one of main constraints for every stage of activity. A job follow-up or a schedule can be prepared for employees for every stage of work. Regular follow-up of milking machines cleanliness should be practiced by milk takers. It has been observed that milk yield records are not kept properly in the farms. Farmers should try to take precautions rather than intervene when the problem occurs in the flock or animal. Zoo-technicians are not present in most farms. There are no long-term targets and policies related to the livestock sector. Moreover, primary problems faced by the farmers are high expenses of feed and raw material of feed beside marketing problems such as low milk price. Insufficiency of technical support from veterinary services is another complaint of farmers.

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A Research on the herd life, productive life and first calving age of Holstein Friesians

A. Koç
Adnan Menderes University, Faculty of Agriculture, Dept. of Animal Sci. 09100 Aydin/Turkey

Introduction

One of the factors affecting profitability in dairy cattle is herd life (HL). Intensive selection for milk yield, particularly in Holstein Friesian (HF), decreased fertility, mastitis resistance and HL, and increased lameness and metabolic diseases (Boichard and Brochard, 2012). HL in HF was measured in the northern part of the USA by the proportion of cow living at 48 months of age (Oltenacu, 2009), and the decrease in the proportion of those still alive at 48 months of age in HF cows from 80% to 60% between 1957 and 2002 has been evaluated as a sign of a significant decrease in HL of dairy cattle (Oltenacu, 2009). In the future, it is stated that the attentions will be given to good health and conformation, long HL, low feed consumption capacity, easy management and low environmental impact in dairy cattle (Berry, 2015).

HL is defined as the period between the date when the animal was born and the date when the animal left the herd for various reasons. Another criterion used to express HL is the "productive life (PL)" defined as the time between the date when a cow gave birth to the first calf and the date when it was removed from the herd (Kumlu and Akman 1999; Kara et al., 2010; Weller and Ezra, 2015). PL can be defined as the number of calving (NC) a cow was given during its lifetime (Kumlu and Akman, 1999). It has been reported that the heritability of PL is low (h2= 0.14) and difficult calving and twin births decrease PL by 4-6 months (Weller and Ezra, 2015).

The reasons for the culling of dairy cattle are divided into voluntary (low production level, surplus of necessity breeding, butchery sales and cash requirement) and compulsory (reproductive failure, disability, udder problem and disease, death, old age and body structure) (Yaylak, 2003; Kara et al., 2010).

It has been reported that the reproductive failure is the problem with the first order of culling of animals from the herd with 20-40%, udder problems and diseases follow it (Işık, 2006, Brickell and Wathes, 2011; Koç, 2017). HL averages for HF, Red Holstein (RH) and Simmental (SIM) reared together in a herd in Aydın were reported 55.82±4.46, 53.81±4.48 and 54.80±3.68 mo (Koç, 2017), respectively.

Kara et al. (2010) found PL as 36.8 mo for HF and Koç (2017) found the means for PL were 29.04±4.00, 25.79±4.02 and 24.68±3.30 mo, respectively for HF, RH and SIM cows. In this study, it was aimed to determine first calving age (FCA), HL, PL and NC, reasons for culling from the herds and factors affecting HL and PL in HF breed in Aydın province.

Material and Methods

The records of 1012 heads culled animals in 25 herds in Aydın Province were used to determine first calving age (FCA), HL, PL, and NC. Before the statistical analysis the herds were grouped. The following statistical model has been used in the analysis of FCA, HL, PL and NC:

$y_{ijklm} = \mu + a_i + b_j + c_k + d_l + e_{ijklm}$

y_{ijklm} : observations of FCA, HL, PL and NC, a_i: herd group effect (i= 1,2,3), b_j: birth year effect (j= ≤2006,…2013), c_k : birth season effect (k=spring, summer, autumn, winter), d_l: reason of culling (l=1 (unknown), 2 (pelvic bone cracking) 3 (reproductive problem) 4 (udder problem) 5 (metabolic problem) 6 (death) 7 (selling), 8 (foot-leg problem), 9 (old age), 10 (slaughtering), 11 (other reasons)), e_{ijklm}: residual random error. For FCA, culling reasons effect was not included into the statistical model. SAS (1999) package program was used for statistical analysis of the data, and comparison of subgroups was done according to Tukey (P <0.05).

Results and Discussion

FCA overall mean was 853.04 ± 5.76 days (28.4 months) (Table 1). The effect of birth year (P <0.01) on FCA was statistically significant, herd group and birth season effects were insignificant (P> 0.05). The lowest FCA was obtained for 2011 (815.06 ± 14.15 days) and the highest for 2007 (928.12 ± 19.37 days). The difference of 113.06 days between these two years is also statistically significant (P <0.05).

The effects of herd group, year of birth and culling reason on HL were determined to be statistically significant (P <0.01), however the effect of birth season was insignificant (P>0.05). The lowest HL was obtained for the third herd group (57.39 ± 1.99 months) while the HL average for the second herd group was found to be 65.13 ± 1.58 months. The difference of about 8 months between these two groups is also statistically significant (P <0.05).

Table 1. LSMEANS and standard errors of first calving age (FCA), herd life (HL), productive life (PL) and no. of calving (NC) for culled cows

Factor	FCA, day		HL, mo		PL, day		NC	
	n	$\bar{X} \pm S_{\bar{X}}$	n	$\bar{X} \pm S_{\bar{X}}$	**n**	$\bar{X} \pm S_{\bar{X}}$	**n**	$\bar{X} \pm S_{\bar{X}}$
Herd group		NS		**		**		**
1	119	846.15±11.13	200	60.18±1.83 ^{ABa}	130	822.25±55.65 ^{Aa}	130	2.37±0.14^{Aa}
2	236	863.25±8.91	436	65.13±1.58 ^{Ab}	249	1005.77±46.45^{Bb}	249	2.68±0.12 ^{Aa}
3	60	885.12±15.96	376	57.39±1.99 ^{Ba}	74	738.56±73.37 ^{Aa}	74	2.02±0.18 ^{Bb}
Birth year		**		**		**		**
≤2006	50	891.48±18.29 ^{Aab}	477	79.64±1.66 ^{Aa}	78	870.17±77.17^{ADb}	78	2.73±0.19^{ABab}
2007	34	928.12±19.37 ^{Aa}	53	78.64±3.14 ^{Aa}	47	1298.97±76.26^{Bb}	47	3.31±0.19 ^{Aa}
2008	38	878.88±18.57 ^{Aabc}	57	72.12±3.10 ^{ABab}	43	1216.29±82.70^{BCbc}	43	2.77±0.21^{ABab}
2009	58	850.14±15.24 ^{ABbc}	80	62.60±2.66 ^{BCbc}	57	938.82±71.53 ^{ACac}	57	2.34±0.18^{BCDbc}
2010	62	857.31±14.86 ^{ABabc}	89	60.46±2.55 ^{BCcd}	67	931.63±68.61 ^{ACa}	67	2.49±0.17 ^{BCb}
2011	102	815.06±14.15 ^{Bc}	138	51.52±2.22 ^{Cd}	110	708.60±65.13^{ADEae}	110	2.08±0.16^{BCDbc}
2012	28	854.06±21.94 ^{ABabc}	37	48.21±3.67 ^{CDd}	27	537.23±96.88^{DEde}	27	1.64±0.24^{CDc}
2013	43	843.66±18.58 ^{ABbc}	81	34.02±2.65 ^{De}	24	342.50±103.04^{Ee}	24	1.48±0.26^{Dc}
Birth season		NS		NS		NS		NS
Spring	113	881.10±11.74	267	63.69±1.72	123	903.00±56.05	123	2.40±0.14
Summer	129	846.29±11.14	298	60.83±1.70	142	917.56±54.32	142	2.47±0.13
Autumn	73	849.87±13.77	217	59.12±1.91	80	827.30±65.61	80	2.28±0.16
Winter	100	882.10±12.08	230	59.96±1.85	108	774.25±59.38	108	2.26±0.15
Culling reason				**		**		**
Unknown	-	-	471	53.80±1.22 ^{ABa}	213	830.62±34.46^{Aa}	213	2.19±0.09 ^{ACa}
Pelvic bone crack	-	-	15	51.63±5.53 ^{ABab}	8	652.31±165.48^{ABab}	8	1.88±0.41 ^{ACac}
Reproductive prob.	-	-	144	55.41±2.05 ^{ABab}	96	693.90±59.16 ^{ABab}	96	1.72±0.15 ^{Aa}
Udder problem	-	-	28	56.63±4.12 ^{ABab}	19	621.30±112.64^{ABab}	19	1.91±0.28 ^{ACa}
Metabolic problem	-	-	13	75.24±5.96 ^{ADbd}	6	1246.79±189.85^{ACa}	6	3.12±0.47 ^{ABCab}
Death	-	-	21	43.45±4.80 ^{Ba}	13	446.19±131.36 ^{ABab}	13	1.36±0.32 ^{Aa}
Selling	-	-	52	47.85±3.22 ^{Ba}	25	421.22±99.77 ^{Bb}	25	1.88±0.25 ^{ACa}
Foot-leg problem	-	-	16	58.52±5.37^{ABDabd}	10	712.07±148.30 ^{ABab}	10	1.62±0.37 ^{ACa}
Old age	-	-	161	101.97±1.11 ^{Cc}	39	1924.1±81.89 ^{Cc}	39	4.44±0.20 ^{Bb}
Slaughtering	-	-	58	76.76±3.00 ^{Dd}	5	1158.31±206.21^{ABCa}	5	3.84±0.51^{BCbc}
Other reasons	-	-	33	48.66±3.89 ^{Ba}	19	703.58±109.47 ^{ABab}	19	1.95±0.27 ^{ACa}

FCA: First calving age, HL: Herd life, PL: Productive life, SN: No. of calving, NS: Not significant, *: Significant for P<0.05, **: Significant for P<0.01; A,B,C,D,E: Different letter shows differences at P<0.01; a,b,c,d,e: Different letter shows differences at P<0.05.

As the year of birth is nearer, HL is expected to decrease, because it is understandable that the HL of animals born in recent years is shorter than the ones born in previous years, as many of the animals that were born in recent years and are now in herds are not yet culled from the herd.

The shortest HL was obtained for mortality (43.45 ± 4.80 months) and the longest for old age (101.97 ± 1.11 months). Old age was followed by slaughtering with 76.76 ± 3.00 months and metabolic problems with 75.24 ± 5.96 months. This long average of about 8.5 years obtained for old age means that the animals are kept in the herd as long as the animal does not have any problems such as fertility, metabolic, etc. The fact that the number of animals removed from the herd is low, due to the low yield is not only satisfactory milk yield of HF, but also for the producers to focus on other characteristics, not on the yield. In other words, as long as there are no problems with fertility or other problems, it can be said that animals with a satisfactory milk yield are kept in the herd for a long time.

As can be seen from Table 2, it was determined that 46.54% of 1012 heads animals who were culled from the herd were not known the reason of culling. This is a fairly high proportion and shows that the producers do not give the necessary attention to record the reasons for the animals to be removed from the herd.

The reason for exclusion is that 10.54% of the 541 head animals known to be culled have been voluntarily removed from the herd, it was determined that the proportion of animals culled due to low productivity was only 0.92%, while the proportion of animals removed for sale was 9.62%. On the other hand, 89.46% of the animals were removed from the herd for compulsory reasons.

For the compulsory reasons, while the highest rate was 29.76% in old age, second, 26.62% of the fertility problem came, slaughtering is in the third with 10.72%, followed by udder problems and other causes with 5.18%, the mortality rate was 3.88%, foot-leg problem was 2.96%, pelvic bone crack was 2.77% and metabolic problems were 2.40%. Similar to other studies (Işık, 2006, Kara et al., 2010; Brickell and Wathes, 2011; Weller and Ezra, 2015; Koç, 2017) in this study, it was found that reproductive failure had a high rate to cull the animal from herd.

Herd group, birth year and culling reason effects on PL and NC were statistically significant ($P<0.05$) but, was not birth season ($P>0.05$). PL means for 1, 2 and 3 herd group were 822.25 ±55.65, 1005.77±46.45 and 738.59±73.37 days, respectively. The means for NC were 2.42±0.14, 2.71±0.12 and 2.08. ±0.18 times, respectively.

Table 2. The proportion of culling reason in HF

Culling reason		Herd Life n	Herd Life %	Productive Life n	Productive Life %
Voluntary		57	10.54	28	11.52
	Selling	52	9.62	25	10.29
	Low yield	5	0.92	3	1.23
Compulsory		484	89.46	215	88.48
	Reproductive Failure	144	26.62	96	39.51
	Pelvic bone crack	15	2.77	8	3.29
	Udder Problem	28	5.18	19	7.82
	Metabolic Problem	13	2.40	6	2.47
	Death	21	3.88	13	5.35
	Foot-leg problem	16	2.96	10	4.12
	Old age	161	29.76	39	16.05
	Slaughtering	58	10.72	5	2.06
	Other	28	5.18	19	7.82
Unknown		471	46.54	210	46.36
Total		1012	100	453	100

The proportion of those who do not know the reasons for culling from the herd for PL is 46.36%. The proportion of those who are voluntarily removed from the herd is 11.52% while the proportion of those who are compulsory to leave is 88.48%. In PL, the highest rate for culling from the herd was reproductive failure with 39.1%, while the old age was in second place with 16.05%, the udder problem was in third place with 7.82%, followed by 7.82% with other reasons, mortality with 5.35%, foot-leg problem with 4.12%, pelvic bone crack with 3.29%, metabolic problems with 2.47% and slaughtering with 2.06%.

Conclusion

Given the significant differences between herd groups as well as the genetic makeup of animals, it has been determined that many factors, such as nutrition, herd management and etc. among the farms, have significant effects on HL and PL. Similar to many other studies it was also found in this study that the problem of fertility was at the top of the list to cull the animal from the herd.

It has been determined that the reason of almost half of the animals removed from the herd is not recorded. This is a fairly high rate and the operators need to be informed about the reason for the culling of animals.

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Structural Characteristics of Dairy Barn in Terms of Work Safety Aplications

S. Göncü, G. Gökçe, G.Türkoğlu
Çukurova University, Agriculture Faculty, Animal Science Department, Adana,01330,Türkiye

Introduction

Cattle accounted for a large proportion of all documented animal realted injuries (Drudi, 2000; Langley and Hunter 2001; Norwood et al., 2000). A casual assessment of any group of farm or ranch workers will often detect missing digits and limbs, impaired mobility, or a wide range of scars from accidents with both animals and machine. In cattle-related accidents, fatalities have been shown to be related to aggressive behavior of the animal (Ornehult et al. 1989). But also many other factors involved in this problem. Many task has injury risk during daily activity at farm. Tagging newborn calves, feeding, trimming, moving animals, milking and herding were the most commonly cited situation in which the injury occurred (Lindsay et al. 2004). For instance, Douphrate et al. (2009) found that cattle-handling injuries in Colorado often occurred when dairy workers were either kicked or stepped on while milking. Similarly, Casey et al. (1997) found that dairy workers in New York State were frequently injured while washing udders or attaching milking equipment. These findings raise the possibility that injuries might be prevented through the redesign of milking equipment and procedures. The risk situations associated with facility design and the handler aproach. The correlations reported significant between specific human-cow interactions and facility characteristics and incidents (Lindahl, 2016). People at greatest risk for these injuries are those whose occupation or livelihood involves large animals (Wiggins et al., 1989; Langley et al. 2001;Nogalski et al., 2007). The circumstances of cattle-related injuries are being more closely evaluated by researchers, and some findings may have important implications for prevention. In this study aimed that the evaluation of structural characteristics of dairy barn in terms of work safety aplications

Materials and methods

The main material of the study is the data which can be obtained by observation and questionnaire in the agricultural establishments in the provinces of Adana dairy farms. The standard questionnaire forms are composed of 3 sections.

In the first part, there are questionnaires about the characteristics of the general characteristics of the housing, the details of the inside of the barn, the characteristics of the workers in the second part and the results of controlling the general behavior of the working animals and having the standards that the enterprises should have in the third part. For this purpose, the structural characteristics of the dairy cattle breeding enterprises, the socio demagorafic structure of the employees and the level of educational knowledge and information related to work experience and work will be the main topics were involved. In addition, the opinions of experts on the subject and the specific statements of employees are also noted and used for interpretation according to their importance. The data of this study constituted the questionnaires applied to the employees of 40 intensive dairy cattle farms. The main material of the study was the data obtained from surveys and questinaries in dairy cattle farming activities. Secondary data related to the subject were obtained from the service providers in the public sector and information about the businesses were obtained from face-to-face interviews with farm owners and farm workers. The data evaluated in a chi-square analysis under a code plan and the correlation evaluations will be evaluated using the SPSS (16.0 Version) statistical program.

Results

Survey study were separated and evaluated sixteen sub-divisions. The results between the enterprises and the importance levels according to the chi square analysis obtained in general, workplace and hygiene issues were given at Table 1 .

It is important to note that the differences between enterprises are statistically significant in terms of the differences between the design issues and the enterprises in terms of general, workplace and hygiene issues, the positions of cleanless of showers where workers can wash their hands, the places of work materials at work places and ergonomics of work areas. 90% of the employees stated that they did not receive any animal husbandry practical work and that they learned from other workers who were more experienced than they were informed about animal husbandry. 90% of the employees have at least one case-based job injury with the animal and it is understood that the group of milkers is the group that has the most casualties. Results reported that cattle related injuries caused by interactions between humans, animals, farm equipment and structures. It has been understood that 25% of injuries to farm workers are the result of impacts on fences, doors, poles and walls.

There are no any worker awereness about work safety and protection procedures for cattle handling. These are employee informations, emergency situations, biological factors, psychosocial factors, transportation, personal protective equipment, general, workplace and hygiene machinery hand tools and auxiliary apparatus, electricity, ergonomics manual handling chemicals.

Table 1. The results between the enterprises and the importance levels according to the chi square analysis obtained in general, workplace and hygiene issues

Questions	Farms	1	2	3	4	5	6	7	8	9	10	Total	Sign.
G1	Yes	5	4	4	4	2	2	2	2	2	1	28	0,459
	No	0	2	2	0	2	0	0	0	0	0	6	
G2	Yes	5	4	5	4	2	2	2	2	2	1	29	0,269
	No	0	2	0	0	2	0	0	0	0	0	4	
G3	Yes	5	5	5	4	2	2	2	2	2	1	30	0,930
	No	0	0	0	0	2	0	0	0	0	0	2	
G4	Yes	5	5	5	4	3	2	2	2	2	1	31	NS
	No	0	0	0	0	0	0	0	0	0	0	0	
G5	Yes	5	5	5	4	3	2	2	2	2	1	31	NS
	No	0	0	0	0	0	0	0	0	0	0	0	
G6	Yes	5	5	4	3	2	2	2	2	2	1	28	0,376
	No	0	0	2	2	2	0	0	0	0	0	6	
G7	Yes	4	5	4	4	2	2	2	2	2	1	28	0,459
	No	2	0	2	0	2	0	0	0	0	0	6	
G8	Yes	4	4	3	4	1	1	2	2	2	1	24	0,169
	No	2	2	4	0	4	2	0	0	0	0	14	
G9	Yes	2	5	3	4	1	1	2	2	2	1	23	0,200
	No	6	0	4	0	4	2	0	0	0	0	16	
G10	Yes	4	4	4	4	3	1	2	2	2	1	27	0,481
	No	2	2	2	0	0	2	0	0	0	0	8	
G11	Yes	2	5	3	2	1	1	1	1	1	0	17	0,282
	No	6	0	4	4	4	2	2	2	2	2	28	
G12	Yes	5	5	5	4	3	2	2	2	2	1	31	NS
	No	0	0	0	0	0	0	0	0	0	0	0	
G13	Yes	5	4	5	4	3	1	2	1	2	1	28	0,750
	No	0	2	0	0	0	2	0	2	0	0	6	
G14	Yes	4	5	4	4	3	1	2	1	2	1	27	0,196
	No	2	0	2	0	0	2	0	2	0	0	8	
G15	Yes	5	5	5	4	3	2	2	1	2	1	30	0,014
	No	0	0	0	0	0	0	0	2	0	0	2	
G16	Yes	5	5	5	4	2	2	2	1	2	1	29	0,043
	No	0	0	0	0	2	0	0	2	0	0		
G17	Yes	5	5	5	4	1	2	1	1	1	0	25	0,004
	No	0	0	0	0	4	0	2	2	2	2	12	
G18	Yes	5	5	5	4	3	2	2	2	2	1	31	NS
	No	0	0	0	0	0	0	0	0	0	0	0	
G19	Yes	4	5	3	3	2	1	2	1	2	1	24	0,374
	No	2	0	4	2	2	2	0	2	0	0	14	
G20	Yes	3	2	1	1	0	0	0	1	2	0	10	0,072
	No	4	6	8	6	6	4	4	2	0	2	42	
G21	Yes	2	2	2	2	1	1	2	1	2	1	16	0,284
	No	6	6	6	4	4	2	0	2	0	0	30	
G22	Yes	2	4	3	2	1	1	1	1	0	0	15	0,632
	No	6	2	4	4	4	2	2	2	4	2	32	

The cattle often detect and perceive their environments quite differently from humans. There are a variety of configurations of structures. Researchers reported that livestock farms tended to be high injury risk increased with increasing number of hours worked on the farm (Elkington 1990; Brison& Pickett 1992; Pratt et al., 1992; Zhou &Roseman, 1994; Nordstrom et al., 1995). The farm environment also main risk factor because of capacity, worker, and high annual production (Zhou &Roseman, 1994; Pickett et al., 1995). The patterns of injury have been fairly consistently reported across these studies, with farm machinery, accidental falls, and animal related injuries being the three major external causes of injury (Brison& Pickett, 1992; Zhou &Roseman, 1994; Nordstrom et al., 1995). The common elements of farm are walking and working surfaces, holes and floor openings, handrails and railings, stairs and fixed ladders and cages structures to plan and identifying hazards on farm. Floor type and material and specifications is very important for slipping of animals and humans. Also opening for water or waste pipe can cause slippery floor. Properly located gates can block off a travel lane and direct the cow into a desire area. Gates may also be used within pens to form a funnel to direct a reluctant cow into a stanchion or other lockup. They can also be part of a smaller confinement area for breeding or rectal examination. Over 75% of the animal-related human injuries are due to insufficient restraining equipment and facilities on most dairy farms.

Proper application and the right choice of restraining equipment and facilities are very important consideration for reducing potential injuries to the dairy farmer. Use a rope halter, squeeze chute, and headgate when you engage in major animal handling activities such as hoof trimming, breeding, and applying medication. Use a squeeze chute with a headgate to protect yourself from the animal’s violent movements. Use a tail holder to prevent eye injuries when milking or examining the animal. Maintain a treatment stall on your farm to reduce the risk of injuries to yourself as well as the veterinarian during activities such as pregnancy examination, vaccination, medication, deworming, and artificial insemination.

Eliminate obstacles that may be in a milker's way such as unwound hoses or extra buckets. Falls can cause injuries and substantial loss of productivity. Milking parlors, upright silos, gravity flow feed bins, grain storage bins, and pump reception pits are a few agricultural structures that have fixed ladders, cages and landing platforms. There are special requirements for agricultural structure related to grain bins and external wall ladders and chute ladders for silos. An additional hazard within animal handling structures involves crowd gates.

Ensure that crowd gates have the appropriate stop measures installed. Install the gate to allow a gap between the furthest wall to prevent a person from becoming entrapped or crushed. Ensure there is a gap large enough from the bottom of the gate to the floor to prevent a person from being crushed or tangled.

Dairy cattle are commonly restrained in squeeze chutes for various procedures. Cows will remain calmer in chutes that have covered sides that prevent the animal from seeing human movement. Close the chute slowly and steadily to apply even pressure to the animal. Barn environment has specifik micro climate such as air quality, light intensity, voices and air velocity. The proper design, construction and operation of a cattle handling facility is important to ensure safe working conditions for animals and humans. Understanding the inherent behavior of cattle, plus working them slowly and quietly, will reduce injuries and help make an operation run more smoothly and efficiently (Hubert et al., 2012).If barn and facilitiesdesigned as well as possibletosmooththemovement of cattlehandling is gettingeasier and safe.

Conclusion

The statsitical results showed big differences between farms aspect of farm animal equipments designs. It has been determined that there are significant structural differences between. The present research makes several important contributions to the dairy farm work safety. First, the research supports an increased emphasis on the development of safer farm equipment designs. For occupational health and safety in dairy cattle farms,

1. Identifying the hazard and risk factors for each enterprises,
3. Continuous monitoring of risks and determining risks levels,
4. Taking necessary precautions and warnings against risk factors
5. Involved the measures to be taken and the control for more convenient working conditions

Finaly this research suggests a need for additional study of determining for each farm precautions and warning system for risk factors.

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Structural Traits of Dairy Farming in Yenice District of Çanakkale Province

F. Uğur, H.İ. Ünal

Çanakkale Onsekiz Mart University, Faculty of Agriculture, Department of Animal Sciences, Çanakkale

Introduction

Yenice District of Çanakkale has a great husbandry potential as compared to other Districts. Number of cattle, sheep and goat in Çanakkale are 1.40%, 1.50% and 2.20% of the total number of animals in Turkey, respectively. The share of Çanakkale province in case of cattle, sheep and goat milk production of Turkey are recorded as 1.78%, 1.57% and 3.02%, respectively (TÜİK, 2018). Biga and Yenice Districts have the biggest cattle population and number of enterprises in Çanakkale (Anonymous, 2017). Therefore, cattle breeding in Yenice is very important for Çanakkale, and evaluation about cattle directly affects the Animal Husbandry in Çanakkale. This research aims to investigate the general condition of dairy cattle of Yenice District of Çanakkale, and this is the first study in this context. A survey has been conducted for this purpose and the breeders have been interviewed face-to-face. In this research, the obtained results from survey and related literature have been analyzed together and then evaluated.

Materials and methods

This research has been conducted in 5 different villages of Yenice District namely; Araovacık, Çal, Davutköy, Haydaroba and Pazarköy. Cattles are intensively being reared in the above mentioned villages. In this research, a survey has been conducted with 80 farmers they were selected by using Simple Random Sampling from a total of 332 farmers with a cattle number above 10. The surveyed number of enterprises have been calculated by using Yamane’s (1967) method. Numeral and percentile data have been determined according to the answers given by the interviewed cattle breeders collected in the survey.

Results

According to the results of this research work, 67% of the farmers were primary/secondary school graduates but there was no any farmer who has been graduated from any university participated in the survey. The majority of breeders preferred Holstein Friesian breed cattle, Simmental follows Holstein Friesian in 2nd place. According to total cattle numbers, enterprise sizes are; 46% of farms had 10-20 unit, 25% of farms 21-30 unit, 9% of farms e 31-40 unit, 8% of farms 41-50 unit, 6% of farms 51-60 unit and 6% of farms had 51-60 unit cattle. The average numbers of cattle and cow in enterprises were determined as 28.9 and 13.3, respectively. The experience duration of the farmers was recorded as 16.5 years. After calving, first insemination time in the cows have been determined as 51-74 days in 69% and 75-90 days in 22%. 68% of breeders, inseminate the cows at the end of estrus period where they have estrus symptoms. 24% of breeders inseminate the cows in the middle of estrus period. According to survey, 95% artificial insemination has been used. Dry period length are 50-60 days with 52%, 61-75 days with %44, 76-90 days with %4. Among 74% of breeders the daily milk consumption for calves is over 4 kg. Weaning length of calves was determined as 50-74 days with 77% and no milk weaning length was observed with the duration of less than 50 days. The average daily milk production of the cows has been recorded as 17.6 kg. 50% of barns were found as closed barn, 5% of barns have been reported as open barn, while 45% of the barns have been recorded as semi open barns in those 5 different villages. 30% of the barn systems were noted as free-stall, 56% found as tie-stall, while 14% recorded as free. The permanent working staff members of the farms were found as 42% women and 58% men. While the workers of the milk processing unit were 18% of females, 36% of males and 46% were from both genders working together. 34% of the breeders were not aware and they didn't have proper information about the selection for breeding. Nonetheless, 64% of them have had partial knowledge in this regard.

Conclusion

Almost half of the farmers didn't have knowledge of the dairy cattle's feeding during the lactation periods. According to results, average of daily milk production determined less than the literature findings (Uğur, 2013). More than 50% of the breeders were found feeding dairy cattle with inordinate level concentrate feed. The knowledge of farmers regarding calf rearing was not found satisfactory.

But the work experience of the breeders were found sufficient. For the above mentioned reasons, there was sufficient accumulation in terms of dairy cattle breeding in the region and sustainability must be ensured. It was found that there were problems about the proper sheltering and resting places of cattle. According to the overall results of this research, the technical information of farmers about cattle breeding and selection was not adequate.

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Effect of Oregano aromatic water supplementation to rumen fluid on in vitro digestion of starter in calves.

S. Özkaya[1], K. Kara[2]

[1]Isparta Applied Sciences University, Agricultural Sciences Faculty, Department of Animal Science, Isparta, Turkey

[2]Erciyes University, Department of Animal Nutrition and Nutritional Diseases, Kayseri, Turkey

Introduction

The use of antibiotics as animal feed additives causes the emergence of resistant organisms, for this reason the use of antibiotics in European Union contries is prohibited (Anadon, 2006). Concumers' awareness about the use of antibiotics has led to the need for a natural and safe feed additives (Jayasena and Jo, 2013). In recent years, there has been a trend towards the use of natural feed additives in animal feeding. Numerious plant species include antimicrobial effect, antiinflammatory effect, antioxidant effect, immunostimulatory function and appetite/digestion stimulating factor (Benchaar et al., 2008; Patra and Saxena, 2010; Patra, 2011; Bodas et al., 2012). Plants containig secondary metabolites responsible for some biological effects. These plants can be use as feed additives to control methanogenesis without affecting microorganism in the rumen (Calsamiglia et al., 2007; Kamra et al., 2012). Laboratory studies have shown that methanogenesis, which causes economic loss in ruminant livestock, can be prevented by inclusion plant and plant extracts into the substrate (Geraci et al., 2012; Kamra et al., 2012; Aby et al., 2013). The purpose of this study is to investigate the effect of pregano aromatic water supplementation to rumen fluid on in vitro digestion of starter feed in calves.

Materials and methods

The chemical analysis of concentrated mix feed

The starter was milled through a 1 mm sieve (IKA MF10.1, Germany) for use in chemical analysis and in vitro gas production. Dry matter (DM) (method 14.081), crude ash (method 942.05), crude protein (CP) (method 954.01), diethyl ether extract (EE) (method 920.39), and crude fibre (CF) (methods 7.066-7.070) compositions of the diet were analysed using the AOAC methods (AOAC, 1990).

The neutral detergent fibre (NDF) and acid detergent fibre (ADF) contents were analysed by using a fibre analyser (Velp FIWE3, Italy) according to the methods reported by Van Soest et al. (1991). The NDF was determined using sodium sulphite and thermo stable α-amylase (Megazyme, Ireland). Neither NDF nor ADF was inclusive of residual ash. Non fibrous carbohydrate (NFC) levels were calculated using the following formula (NRC, 2001): NFC % = 100 – (NDF % + CP % + EE % + Ash %). The chemical composition of the starter is presented in Table 1.

Table 1. Chemical composition of the starter

Ingredients, %	
CP	19.67
NFC	52.42
NDF	18.84
ADF	7.87
CF	5.80
EE	3.11
Ash	5.96

In vitro gas production technique

The technique was performed using different doses of oregano aromatic water supplementation to calf starter. In the control group was no added oregano aromatic water and in the treatment groups there was 40, 60 and 80 mL/kg oregano aromatic water supplementation.

Rumen fluid, which is necessary for in vitro fermentation, was obtained from two Holstein calf fed with a starter. Rumen fluid was collected into a thermos including water at 39 °C under CO_2 gas, and filtered with four layers of cheesecloth in the laboratory. The technique was carried out according to the procedures of Menke et al. (1979). The plant samples were incubated in rumen fluid and buffer mixture in 100 ml glass syringes (Model Fortuna, Germany). Dried samples (200±10 mg) and thirty millilitres of the rumen fluid + buffer mixture at a 1:2 (v/v) ratio were incubated into syringes as triplicate. In addition, three blank syringes (no template; rumen fluid + buffer mixture) were used to calculate the total gas production. The clips of syringes were closed, the initial volume recorded and the syringes were incubated in a water bath at 39 °C for up to 96 h.

Determination of total gas and methane production

In incubation, the total gas volume was recorded from the calibrated scale on the syringe for 24 h. After measuring the total gas volume at 24 h, the tubing of the plastic syringe outlet was inserted into the inlet of the methane analyser (Sensor, Europe GmbH, Erkrath, Germany) and the piston was pushed to insert the accumulated gas into the analyzer. The methane as a percent (%) of the total gas was displayed on a PC (Kara 2015; Kara et al., 2015).

Estimation of metabolic energy (ME) and organic matter digestibility (OMD) levels

The ME and OMD values of feeds were calculated using the equations for concentrate feed of Menke and Steingass (1987).

ME (MJ/kg DM) = 0.157 * GP + 0.0084 * CP + 0.022 * EE - 0.0081 * CA + 1.06

OMD % = 0.9991 * GP + 0.0595 * CP + 0.0181* CA + 9

where GP is 24-h net gas production (ml/200 mg DM), and CP, EE, CA are crude protein, ether extract, crude ash (g/kg DM), respectively

Results

In the study, the effect of oregano aromatic water supplementation on the rumen fluid obtained from calves (fed for 60 days) on the in vitro digestion was investigated by in vitro gas production technique. The results showed that oregano aromatic water used in 40, 60 and 80 ml/L rumen fluid dosage was not on affect on in vitro gas production, in vitro methane production, organic matter digestion and in vitro metabolic energy level ($p > 0.05$). However, it was found that the oregano aromatic water used in starter at a dose of 40 ml/L increased in vitro gas production ($p=0.133$), metabolic energy ($p=0.134$) and organic matter digestion ($p=0.133$)($p > 0.05$).

Conclusion

Using herbs and spices increase in the effectiveness of digestion and metabolism of nutrients, prevent of energy loss through the undesirable process of methanogenesis and overall increase in the productivity of the animals. The effect of plant and spices varies depending on the dosage used.

High doses may be toxic to animals when small doses are not effective (Goodrich et al., 1984; Ipharraguerre and Clark, 2003; Frankic et al., 2009). In vitro study, Rezaei and Pour (2012) reported that the addition in ratio of thyme reduced gas production. Benchaar et al. (2007) reported that the dose of essential oils and essential oils components in study did not have any beneficial effect. In conclusion, many studies that has been carried on the use of herbs extract on rumen fermentation using gas production technique, have shown that herb extracts can be used in rumen manipulation. However, further research is needed to determine the optimal dose for livestock.

Table 2. Effect of thyme supplementation to rumen fluid on in vitro digestion of starter concentrate feed in calves

	Thyme supplementation, ml/L rumen fluid					Contrasts		
	0	40	60	80	SEM	L	Q	C
Total Gas Production	51.87	53.91	51.76	52.08	0.46	0.712	0.362	0.133
ME	11.06	11.37	11.04	11.09	0.07	0.703	0.367	0.134
OMD	73.61	75.65	73.50	73.82	0.46	0.713	0.361	0.133
methane production, %	12.15	11.75	11.60	12.10	0.14	0.822	0.157	0.764
methane production, ml	6.30	6.33	6.00	6.30	0.07	0.617	0.381	0.157

SEM: Std. Error of means, L:Linear contrast, Q: Quadratic contrast, C: Cubic contrast

Total Gas Production: is produced by 0.2 g DM at 24h of incubation.

ME: metabolic energy as MJ/kg DM

OMD: Organic matter digestibility as % DM

methane production, %: methane production, % in total gas produced

methane production, ml : methane production, ml/0.2 g DM

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How to Minimize the Calving Interval?

A. O. Sen[1], N. Akman[1]

Ankara University Faculty of Agriculture Department of Animal Science

Introduction

Reproductive performance is one of the largest factors affecting dairy farm profitability because of its direct relationship to milk production, genetic progress and also given the replacement of animals or culling decisions. Therefore, management strategies that will maximize the profit contribution of milk production and reproduction, which are the two main components of income. Today, at least in terms of reproduction efficiency, the target is getting a calf per cow/year. This means that the service period or open days should be 85 days. In other words, healthy cows must be precisely pregnant 75-95 days after the calving. If this occurs, the dry period is 45-60 days, and lactation period is 10 months, calving interval (CI) will be one year. However, this theoretical goal is not only dependent on the management skill, but also on the productivity level of cattle and the uncontrolled environmental conditions. Also, it should be known that if the management skill is low, these goals will never be achieved. Management the reproduction depends on estrus detection, the success of insemination, dry period management, and feeding etc. Today, even in the best conditions in the dairy cattle herd to ensure pregnancy, the average 1.7-2.0 inseminations are performed. This insemination number exceeds 3 in some herds in Turkey. Increasing the number of insemination per pregnancy does not mean that only the cost of getting calf increases also waiting more 21 days. You can see in below equation; if one heat missed, the open days can be calculated as: [49+21*(Accuracy of Heat Detection Rate(%)*Conception Rate(%))]. Every missing heat leading to economic loss extended calving interval as well as milk loss too.

Results and Discussion

As mentioned before, reproductive performance is a key determinant of dairy herds profitability. Calves are important sources of income for the farm. But a variety of expenses are being made to get a calf. The skill and experience of AI operator's success or failure affects the cost of getting the calf.

As the insemination success increases, the number of insemination per pregnancy decreases and consequently the cost of insemination per calf decreases. In summary, the cost of AI success depends on AI operator's skill and heat detection accuracy in cows.

If the follow-up of heat is not performed correctly taking into consideration of timing, the insemination will be done in following heat.

Briefly, the lack of accurate detection of heat or low success of the insemination will increase both the calf cost and the calving interval. Several parameters affect reproductive performance, such as voluntary waiting period (VWP), accuracy of heat detection rate (AHDR), conception rate (CR). This can be seen in Table 1.

Table 1. Different accuracy of heat detection rates (%) and conception rates (%) effects on calving intervals (Voluntary Waiting Period 70 days were accepted)

Accuracy of Heat Detection Rate, %(AHDR)	Conception Rate, % (CR)						
	30	40	50	60	70	80	90
	CI, Day						
40	505	461	435	418	405	396	388
50	470	435	414	400	390	383	377
60	447	418	400	388	380	374	369
70	430	405	390	380	373	368	363
80	418	396	383	374	368	363	359
90	408	388	377	369	363	359	356
CI=(260+VWP)+21/(AHDR*CR)							
VWP= Voluntary Waiting Period							

A high accuracy heat detection rate is important to maintain reproductive performance in dairy herds. As the accuracy of heat detection rate and the success of insemination increases, the calving interval will be affected positively, therefore CI decreases. When the rate of heat detection is 90% and the rate of conception becomes 70%, and the calving interval is 363 days (12 months) as seen in Table 1. AHDR 40% and the CR is 30% CI is 505 days, this means the herd's open days will be 225 days (Table 1). Briefly, if AHDR and CR are bigger than 70%, the CI would be less than 13 months. But, aging, high milk production, and environmental factors such as housing systems, feeding, temperature etc. can also negatively affect length and intensity of heat expression and detection.

The low calving rate related to low accuracy of heat detection cause reduced reproductive performance as well low milk production in dairy herd. So heat detection requires the accurate observation of physiological and social behavior patterns of cows.

Therefore, there are several devices can be used for accurately detection of heat, such as pedometers, neck-mounted collars to measure physical activity, and various monitoring pressure sensing devices to measure standing estrus. Calving interval not only effects profitability and also the productive life of cows. As the calving interval increases, the number of calves and lactations per cow decreases. For example, if the average productive life of cows is 52 months, the cow would calve on 24.th, 36.th and 48.th months assuming the calving interval is 12 months. If the calving interval is 16 months, the cow will be calving 24.th and 40. months as a result 1 calf per cow would be missed the life span of cows.

Conclusion

A 12-13 month of calving interval is the most profitable way for dairy herd management. Shortening CI has a key role for dairy cattle herds, in order to improve calf and milk production.

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Change of daily milk yield during estrous period in Holstein cattle

S. Duru, S.C. Baycan

Uludağ University, Faculty of Agriculture, Department of Animal Science, 16059, Görükle, Bursa, Turkey

Introduction

Milk production and breeding performance in dairy cattle are the two of the most important determinants of profitability. Longevity, health and fertility factors have increasingly more economic importance compared to milk yield in dairy cows (Firk et al. 2002). It has been revealed that there is a correlation between the milk yield and the duration of the estrus. Increased activity due to the effect of estrogen during estrus can adversely affect short-term milk production (Bormann et al. 2002; Steensels et al. 2012). This study was conducted to determine the effect of estrus on the daily milk yield in Holstein cows and to investigate the chance of using the possible milk yield changes in determining the estrus.

Materials and methods

During the three-year period of the study, 103 dairy cows were observed four days before and four days after daily milk yield of 240 estruses and a total of 2174 daily milk yields were evaluated. Variance analysis was used to determine the factors affecting the daily milk yield, and the LSD test was used for multiple comparisons. The factors used in the model are: random effect of cow, fixed effects of artificial insemination year (2014, 2015, 2016), artificial insemination season (winter, spring, summer, autumn), lactation number (1., 2+), daily milk yield group (low, high), DIM period (1-100, 101-200, 201-300 days), estrus day (-4, -3, -2, -1, 0, +1, +2, +3, +4), and also some interactions. Variance analysis was used to determine whether the effects of ED and other factors of the model were significant or not, and the difference between groups was determined by LSD test. Statistical analyzes were performed in Minitab 17.0 with the ANOVA GLM procedure and the ANOVA COMPARISION option in the multiple comparison test (Minitab, 2015).

Results

Insemination year, insemination season, number of lactation, milk yield group, daily milk yield of lactation period was found to be significant (P<0.01). On the other hand, the effect of oestrus days on milk yield was insignificant. In the days of oestrus, the least squares mean of milk yield is 31.0 kg, while the lowest and highest milk yields are 10.2 kg and 62.9 kg.

The daily milk yield in the estruses decreased by an average of 300 g, which decreased to 400 g by continuing one day after the estruses. The next day, however, it increased rapidly by 600 gr, and then dropped again, probably due to the effect of metaestrus. At the end of the analyses, it was determined that being in estrus did not decrease the milk yield of all cows, some of the cows decreased the milk yield whereas others increased (Table 1). It was found that, among all estruses, 31.3% of cows decreased their milk yield whereas 26.5% of cows increased their milk yield. However, 42.2% of cows both decreased and increased their milk yield in different estruses. Interval between birth and the first insemination after, were found to be longer (97.5 days and 92.9 days) at high milk yielding cows compared to the low milk-yielding cows.

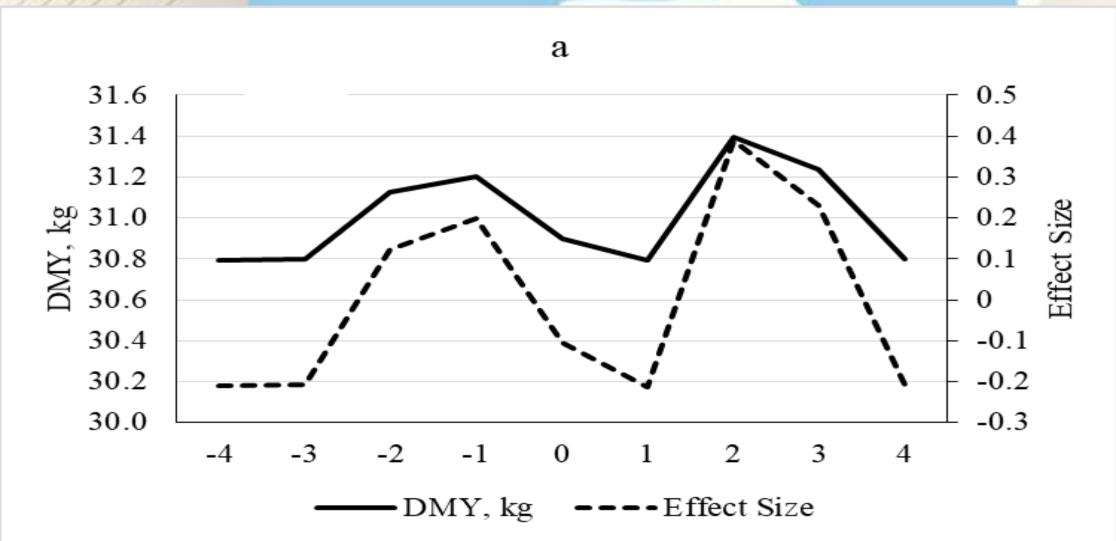

Figure 1. Changes in daily milk yield before and after estrus, according to the estrus days

Table 1. The changes in milk yield on the day of oestrus according to the day before (kg)

Milk yield	Number of cows	Number of estrus	Mean change	Standard error	Minimal change	Maximal change
Decreasing	32	112	3.0	0.2	0.1	9.0
Increasing	27	128	2.5	0.2	0.1	9.9

Conclusion

According to the results of this study, fluctuations and differences were found between daily milk yields on preestrus, estrus and postestrus days although those were not statistically significant. In addition, some cows decreased their milk yield in estrus wheras some of them increased. There are differences between the reported results in the literature.

In several researches, a negative correlation between estrus duration and milk yield have been reported (Harrison et al. 1989; Harrison et al. 1990; Esslemont et al. 1993; Lopez et al. 2004). Conversely, there are studies reporting no relationship between milk yield and estrus (Fonseca et al. 1983; Van Eerdenburg et al. 2002; Delbecchi and Lacasse 2006; LeBlanc 2013). The possible inverse relationship between milk yield and fertility is attributed to different physiological demands and to different genetic selection criteria (LeBlanc 2013). For these reasons, it is difficult for the farmers to accept a sudden decrease in milk yield alone as an estrus indicator, especially without equipments like pedometers and etc. In these farms, it is recommended to evaluate the estrus with the calving and insemination records and careful visual observation together.

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The relations between post partum body condition milk yield, reproductive traits and profitability in Holstein Friesian cows

I. Tapki, Ş. Tüfenk, N. Tapki, M.H. Selvi
Agriculture Faculty, University of Mustafa Kemal, 31060 Antakya, Hatay, Turkey

Introduction

Body condition scoring is the visual assessment of the amount of fat in the body, regardless of the live weights and body measurements of lactating or dry cows, by touching them manually (Hady ve ark. 1994; Gallo ve ark. 1996). With this method, it is possible to improve milk and reproductive performances by providing optimum feeding of cows during periods when energy needs such as dry period, birth, insemination and lactation are changing (Butler, 1989).

Materials and methods

A total of 55 cows were used in this study. The cows were allocated to two groups as BCS≥3.0 and BCS<3.0 on the 7th day of the lactation period. The cows were assessed for body condition on 1., 5., and 7. months of lactation period. The cows were assessed for body condition scores according to Edmonson ve ark. (1989). In this method, a scale of 5 is used (1: emeciated; 2: weak; 3: normal; 4: fat and 5: obese). Differences between body condition and milk, and reproductive characteristics were analysed with REPEATED MEASURE (GLM) (Windows version of SPSS, release 16.00).

Results

Milk and reproductive traits of cows are summarised in Table 1. The second group of cows are more advantageous in terms of their traits and profitability.

Conclusion

The results show that second group cows that body condition score (BCS≥3.0) have more advantages than the first group cows. Similar results were reported by Jilek et al. (2008) and Santos et al. (2009).

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Table 1. Milk and reproductive traits of cows

	First Group BCS<3.0	Second Group BCS≥3.0	P
Dry period	4,16±0,11	4,05±0,77	0,377
Body condition scoring in 1. month	3,36±0,11	2,82±0,94	0,000
Body condition scoring in 5. month	3,57±0,12	3,21±0,08	0,012
Body condition scoring in 7. month	4,00±0,11	3,75±0,07	0,070
Daily milk yield of cows (kg)	22,35±0,50	25,98±0,50	0,000
Laktation milk yield of cows (kg)	5572,96±750,10	6435,18±1008,62	0,000
Lactation period (d)	278,15±25,14	306,68±32,05	0,000
First oestrus after calving(d)	43,55±1,54	38,30±1,20	0,012
Open days (d)	88,83±3,05	77,31±3,51	0,016
Number of inseminations per gestation (count)	2,21±0,16	1,73±0,15	0,037
Annual expenditure per cow (US$)	2005±125	2325±157	0,045
Annual profit per cow (US$)	756±78	978±69	0,034

BCS: Body condition score

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The effect of use essential oil (Origanum onites) on growth performance of drinking milk Holstein Friesian calves

I. Tapki, H.B. Özalpaydin
Enstitute of Science, University of Mustafa Kemal, 31060 Antakya, Hatay, Turkey

Introduction

When the harmful effect of antibiotics on human and animal health is understood, the use of antibiotics is prohibited as a growth factor in animal husbandry. Subsequently, essential oils were started to be used as an alternative to antibiotics to reduce calf deaths (Webster, 1986). One of the most important essential oils is thyme oil. Thyme oil is widely used today because of the prevents the development of harmful microorganisms, improves feed conversion ratio, facilitates digestion, increases feed consumption and prevents diarrhea (Morrill ve ark., 1995).

Materials and methods

The study was conducted on a total of 28 head calves. Calves were allocated to three groups. The first group was given only whole milk; the second group of whole milk each 1 liter 100 mg thyme oil added and the three group of whole milk each 1 liter 150 mg thyme oil added. The daily amount of milk consumed by the calves was calculated as 10% of the live weights that week. The calves were weaned from the milk when they consumed 900 grams of concentrated feed per day for 3 days. General Linear Models “REPEATED MEASURES” and UNIVARIATE of SPSS (Windows version of SPSS, release 16.00) and means were compared by using the Duncan Multiple Range Test in the same software were used in statistical analyzes.

Results

Growth performance traits of calves are summarised in Table 1. The second group of calves are more advantageous in terms of behaviours mostly.

Conclusion

The results show that second group calves that whole milk each 1 liter 100 mg thyme oil added have more advantages than first and third group calves regarding average weaning live weight, daily live weight gain, weaning age, daily hay intake, daily concentrate intake, totally milk intake, feed conversion ratio, initial hay cosuming age, initial concentrate consuming age and diarrhae score. Similar results were reported by Kyriakis et al. (1998) and Mohammed et al. (2013).

Table 1. Growth performance traits of calves.

Growth Characteristcs	First Group	Second Group	Third Group	P
Weaning weight (kg)	59.4±8.51	61.6±9.28	60.3±7.63	0.165
Totally live weight gain (kg)	20.6±2.48[a]	23.9±3.01[b]	21.2±2.89[c]	0.021
Daily live weight gain (g)	340±19.0[a]	448±16.9[b]	385±17.7[c]	0.002
Totally milk intake (kg)	252.5±10.1[a]	225.5±9.1[b]	232.3±8.2[c]	0.001
Weaning age (d)	60.6±6.8[a]	53.4±7.2[b]	55.1±6.5[c]	0.004
Daily hay consumption (g)	101.7±17.5[a]	116.8±19.0[b]	111.6±11.3[c]	0.023
Initally hay consumption age (d)	13.6±1.1[a]	10.7±1.5[b]	12.0±1.2[c]	0.038
Feed conversion ratio	1.80±0.5[a]	1.47±0.8[b]	1.64±0.4[c]	0.032
Totally concentrate consumption (g)	30946±2735[a]	28914±2530[b]	28704±2471[b]	0.001
Daily concentrate consumption (g)	510.7±59.8[a]	541.5±71.2[b]	521.0±90.1[c]	0.024
Initially concentrate consumption age (d)	11.0±2.4[a]	9.1±3.0[b]	10.3±3.2[c]	0.042
Average faeces score	2.85±0.79[a]	1.08±0.31[b]	2.15±0.53[c]	0.002

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The effects of using thyme oil on the some behavioral characteristics and rearing costs of Holstein freisan calves in Hatay climate conditions

M. H. Selvi, I. Tapkı and N. Tapki
Agriculture Faculty, Mustafa Kemal University, 31060 Antakya, Hatay, Turkey

Introduction

Temperature is the main constraint in animal breeding in regions with tropical and dry climatic conditions (Tapkı, 2012). Therefore, heat stress has an adverse effect on animal breeding especially in animals with superior yield characteristics (Kadzere et al., 2002; Ghorbani et al., 2009; Tapkı, 2012). They have different behaviors according to nutrition, adaptation to environment and health status (Tüzemen and Yanar, 2013). Exhibited this behavior, it gives us information about the health and welfare of calves. In this study, some behavioral characteristics of Holstein Freisan calves were investigated during the milk replacer fed period in summer.

Material and method

This research was carried out in a private dairy cattle farm in Hatay province. A total of 44 Holstein Freisan calves were used in the study. All of the calves were housed in individual hutchs within the first 3 hours after birth. While the first group (control group) only milk replacer was given, in the second group 1 ml (893mg) of thyme oil was given in addition to the milk replacer. The birth weights were determined on the individual hutch and the colostrum was given for 3 days. The calves are weighed weekly and the amount of milk replacer they drank daily is set to be 10% of their weekly live weight. The calves which consumed 800 grams of concentrated feed for three days consecutive were weaned. Behaviours were observed in twice a week by using Scan Sampling method. Behavioral data were analysed by using General Linear Model (SPSS for Windows, release 22.0, 2014).

Results

Behaviours of calves are summarised in Table 1. The second group of calves are more advantageous in terms of drinking, resting, rumination and feaces behaviour.

Conclusion

Although thyme oil which participated in the study did not have a negative effect on the food intake from the calf behavior, it was found out that the use of thyme oil is important and positive in terms of calf welfare, growth and cost due to the positive effect on the performance parameters. Similar results were reported by Simitzis et al. (2008) and Polat and El Sabry (2014).

Table 1. The results of variance analysis of calf behaviour according to treatment groups.

Behavioural patterns	First Group	Second Group	P
Feeding	2,77±0,68	1,59±0,58	0,042
Drink water	0,09±0,02	0,11±0,05	0,862
Scream	0,27±0,13	0,30±0,09	0,922
Resting	13,36±2,64	14,74±3,10	0,175
Standing	9,00±1,89	6,88±1,23	0,122
Resting with rumination	1,05±0,72	2,73±0,87	0,101
Standing with rumination	0,09±0,03	0,04±0,01	0,440
Urination	0,14±0,01	0,22±0,10	0,497
Fecal	0,27±0,10	0,07±0,03	0,051
Total variable cost per calf (US$)	210±65	151±89	0,027

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Race preference and affecting factors on dairy cattle farms in Muş province

G. Bakir, M. Kibar
Faculty of Agriculture, University of Siirt, Siirt, 56100, Turkey

Introduction

It is also important to choose the breed that suits the existing conditions as well as other factors such as nutrition for a sustainable dairy cattle breeding. Therefore, many studies were done to determine farmers' race preference traits in different regions of Turkey (Tutkun, 1999; Tugay and Bakır 2010; Şeker et al., 2012; Çoban et al., 2013; Özyürek et al., 2014). The aim of this study was to determine the race preference and affecting factors on dairy cattle farms in Muş province.

Material and Methods

A cross-sectional questionnaire was applied to 346 farms using the random sampling method. The obtained data were cross-tabulated using SPSS package program and the relationships between factor-properties was determined by chi-square analysis.
Results The position, number of animals, type of farms and the effect of the race were found to be significant in farms. In general, 4% of the farms preferred native breeds, 26.9% preferred crossbreeds and 69.1% preferred culture breeds. In the preference of cultured breeds, Simental was in the first place with 74,9%, followed by Brownswiss with 15%. On the basis of location, Hasköy and Korkut districts prefer cultured breeds the most, whereas the Central, Bulanık and Varto districts prefer crossbreeds. While the breeding period with less than 10 years and the younger farmers prefer culture breed with 80.4%, this rate decreases to 59.8% in 21-30 group farms. The largest number of native races were identified in the 31+ time group of farms. While farms with an animal number of <9 do not prefer native breed, the preference rate of culture breed was found to be 71.6%. Farms with 41 and above animals preferred mostly crossbreeds. While the number of animal increases in a farm, the preference for culture breeds decreases and the preference for crossbreed increases.
Culture breed preference of the non-illiterate farmers were the lowest at 52%, while their crossbreed preference was highest at 36%. As the level of education increased, the preference of Simental in culture breed decreased while the preference of Brown swiss increased.

In the case of milk type enterprises, the preference rate of cultured breeds was 73.2%, whereas it was found as 65.2% in combined type enterprises. The native race is preferred only in combined type enterprises. The preferences of the enterprises who are satisfied with animal husbandry and want to continue their business are mostly cultures and crossbreeds, whereas highest culture breed preference rate was 76.4%. While only 40.7% of local enterprises with native breeds prefer culture breed, the crossbreed is the most preferred. It is noteworthy that the farms with culture breeds also prefer culture breeds at 81.8%. It is thought that the farms with crossbreed also prefer crossbreed at 30.6% of the time, because of the satisfaction and operating conditions.

Conclusion

Position of dairy farms, number of animals, type of farms affected race preference traits of farmers. Mostly, culture breeds, crossbreeds and native breeds are preferenced in Muş province, respectively.

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The Meat Quality Traits of Anatolian Buffaloes

A. Şahin[1], Y. Aksoy,[2] Z. Ulutaş[3], E. Uğurlutepe[1]

[1]Department of Animal Science, Faculty of Agriculture, Kırsehir Ahi Evran University, Kırşehir, Turkey

[2]Department of Animal Science, Faculty of Agriculture, Osmangazi University, Eskişehir, Turkey

[3]Department of Animal Production and Technologies, Ayhan Şahenk Faculty of Agricultural Sciences and Technologies, Omer Halis Demir University, Niğde, Turkey

Introduction

According to the latest statistical information, 161.439 buffalo are reared in Turkey (Anonymous, 2017). One of the most important animal foods obtained from buffaloes are red meat. There are no study of meat quality in Anatolian buffaloes in Turkey. Therefore, in this study are investigated meat quality characteristics of Anatolian buffaloes slaughtered at different slaughter weights (SWs).

Materials and methods

This research was done in a private farm in Tokat province in Turkey .Male Anatolian buffalo calves with an average live-weight of 100 kg were considered for the animal material of the study. Buffalo calves were randomly assigned to one of four following SWs: 200 (n=5), 250 (n=5), 300 (n=5); and 350 (n=5) kg of live weight. They were slaughtered following standard commercial slaughter procedures (TSI, 1987), when reached the target live weight. The meat quality characteristics of Anatolian buffalo calves were determined using m. longissimus dorsi (MLD) muscles. All statistical analiysis were done using the SPSS statistical program. The Duncan (1955) test was used to compare the subgroup averages.

Results

The goal of this investigation was to determine meat quality traits of Anatolian buffaloes at different SWs. For this purpose, 20 Anatolian male calves weighing approximately 100 kg live weight were fed. When the Anatolian buffaloes reached 200, 250, 300 and 350 kg, five buffaloes were cut from each group.

The highest final pH (pH_{24}) value was detected in the muscles of MLD at 300 kg (5,35) SW group. In each SW group, intramuscular fat contents were determined as %1,79, 2,74, 2,92 ve 3,01, respectively (P<0,01). The differences between water-holding capacity (WHC) of the SW groups were found to be significant (P<0,001). Increasing drip loss (on 3 day after slaughter) (P <0,001) and hardness values (P> 0,05) were observed with increasing SW. In this study, with regard to unsaturated fatty acids, only C18: 1 (oleic acid) and C18: 3 (n-3) (linolenic acid) fatty acids were significant differences determined between groups of SW (P<0,05). Total saturated fatty acids (ΣSFA) and polyunsaturated fatty acids (ΣPUFA) ratios and cholesterol content were decreased with increasing of SW (P>0,05).

Conclusion

Results of the current study, Anatolian buffaloes can be slaughtered when they reach 350 kg live weight. Because, in the 350 kg weight group, the meat quality characteristics of the Anatolian buffaloes was found better than the other groups. The further work is made required in this field.

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Determination of the fattening performance and slaughtering characteristics of Morkaraman and Romanov x Morkaraman crossbreed lambs

D. Turkyilmaz[1], S., Ozyurek[2], U., Dagdelen[1], N., Esenbuga[1], M., Yaprak[1]
[1]Dep. of Animal Science, Fac. of Agriculture, Atatürk University, Erzurum
[2]Çayırlı Voc. School, Erzincan University, Erzincan

Introduction

Animal husbandry and meat production plays a significant role in Turkey. Low producing indigenous breeds which are the results of natural selection in hundreds of years constitutes 97% of the sheep population in Turkey. The rapid population growth and increase in the standard of living are promoting the demand for products of animal origin, including lamb and sheep meat. The meat from sheep is an important source of daily food consumption for humans. Higher live weight gain of lambs is among the factors affecting economical sheep meat production. Identifying which breeds have high growth rates and fattening performance and improved carcass and meat quality in intensive management conditions is essential as breed choice has great importance for a productive and sustainable breeding program. (Kopuzlu et al., 2009; Ekiz et al., 2009). Morkaraman is a fat-tailed breed reared extensively in northeastern part of Turkey. The main product of Morkaraman sheep is meat. Crossbreeding with Romanov sheep has been practiced in several countries of the Mediterranean basin to take advantage of high lamb productivity and rapid growth rates (Esenbuga et al. 2011; Kutluca Korkmaz and Emsen, 2016).

This study aims to compare the fattening performance, slaughtering and carcass characteristics of Morkaraman and Romanov x Morkaraman (RM) crossbreed male lambs.

Materials and methods

This study was conducted at Food and Livestock Application and Research Center of Atatürk University, Erzurum (39°55′ N, 41°17′ E and 1,820 m above sea level). Morkaraman (n=10) and Romanov x Morkaraman (RM) crossbreed (n=10) lambs were raised under same environmental conditions which is intensive system. Fattening period was begun on the lambs approximately 8 months of age and they were fed in an open-shed barn for 3 months. They were adapted to concentrate to reduce the incidence of rumen acidosis for 2 weeks before study.

After adaptation period, the lambs were fed a diet consisting of concentrate mixture offered ad libitum and 300 g of grass hay per lamb per day during fattening period. Amounts of feed offered to the lambs were determined according to live weights obtained periodically. Chemical contents of roughage and concentrate mixture on dry matter basis are shown in Table 1. Body weight of lambs was determined biweekly. Average daily weight gain was calculated by subtracting initial weight from final weight and dividing by days on feed. According to average weights of lambs, 4 heads were selected for slaughtering from both Morkaraman and RM crossbreeds.

At the time of slaughter, head, skin, leg, and innards were removed from the carcass, and hot carcass and cold carcass weights were recorded. After the slaughtering, the carcasses of lambs were chilled at 4 °C for 24 hours. The carcass length, back-loin length, inner leg length, leg width, leg depth, chest circumference, chest depth were measured after cutting left side. The all data were statistically analyzed by using GLM procedure of SPSS 20. Initial body weight was added covariate factor when the fattening performance analyzed.

Table 1. Chemical contents of roughage and concentrate feeds used in the study (%)

Feed	Dry Matter	Crude Protein	Crude Cellulose	Crude Ash	M.E. kcal/kg(*)
Fattening Feed	88.0	12.6	7.8	6.0	2800
Barley	89.0	10.3	5.6	2.7	2671
Oat	89.0	10.3	12.4	3.6	2414
Dry Alfalfa	89.0	14.2	29.0	1.8	1870

*: Included from Feed Composition Tables (Haşimoğlu and Aksoy, 1977).

Results

Fattening performance of Morkaraman and Romanov x Morkaraman (RM) crossbreed lambs were given on Table 2. The means of values of initial body weight, final body weight and average daily gain were 29.70±0.908, 48.073±1.106 and 0.194±0.012 on Morkaraman; 26.69±0.908, 41.637±1.106 and 0.125±0.012 on RM crossbreed lambs, respectively. The initial body weight and average daily gain during the fattening period were observed significantly difference ($p<0.05$) between Morkaraman and RM lambs. The difference of final body weight means were highly significant between breeds considering initial weights.

The obtained results of fattening performance were lower than the reported by Güney and Özcan (1983), Şahin and Boztepe (2010), Rodriguez et al. (2011), Souza et al. (2013); similar to reported by Özdoğan et al. (2011), SoltaniNezhad et al. (2016); higher than reported by Kumar et al. (2008), Majdoup et al. (2013).

Table 2. Fattening performance of Morkaraman and Romanov x Morkaraman (RM) lambs.

Breed	N	IBW	FBW	ADG
		*	*	*
Morkaraman	10	29.70±0.908	48.073±1.106	0.194±0.012
RM	10	26.69±0.908	41.637±1.106	0.125±0.012

*: Significant ($p < 0.05$); **: Highly Significant ($p < 0.01$); ns: Non-Significant

Slaughtering performance of Morkaraman and RM crossbreed lambs were given on Table 3. The means of values of slaughtering weight, hot carcass weight, cold carcass weight, loss by cooling, weights of leg, head, testicle, skin and innards were 48.073±1.106, 22.785±1.251, 22.228±1.236, 0.557±0.016, 1.042±0.046, 2.767±0.082, 0.279±0.024, 9.475±1.420 and 1.724±0.045 on Morkaraman; 41.637±1.106, 16.600±0.659, 16.072±0.659, 0.528±0.031, 0.843±0.024, 2.290±0.141, 0.311±0.029, 5.185±0.271 and 1.271±0.420 on RM crossbreed lambs, respectively. According to slaughtering weight, head weight, skin weight ($p<0.05$), hot carcass weight, cold carcass weight and leg weight ($p<0.01$) of Morkaraman lambs were higher than RM crossbreeds. The means of carcass length, back-loin length, inner leg length, leg width, leg depth, chest circumference and chest depth were 67.25±2.21, 41.75±0.63, 31.00±1.06, 20.00±1.00, 18.25±0.95, 40.13±0.97 and 20.88±0.97 on Morkaraman; 64.25±1.16, 43.25±2.72, 31.13±0.52, 19.25±1.25, 16.38±0.38, 36.25±0.60 and 18.75±0.52 on RM crossbreed lambs, respectively. Despite all these results of slaughter characteristics, measurements of carcass were observed similar except for leg depth of carcass.

Conclusion

According to fattening performance, slaughtering and most of carcass characteristics, Morkaraman lambs were superior to RM crossbreed lambs. Considering geographical location and climatic structure of Eastern Anatolia Region, it can be deduce from the result of this study that Morkaraman lambs, which are native breed, are more convenient than Romanov crossbreed.

Table 3. Slaughtering performance of Morkaraman and Romanov x Morkaraman (RM) lambs

	Morkaraman n=4	RM n=4	
Slaughtering characteristics (kg)			
Slaughtering weight	48.073±1.106	41.637±1.106	*
Hot carcass weight	22.785±1.251	16.600±0.659	**
Cold carcass weight	22.228±1.236	16.072±0.659	**
Loss by cooling	0.557±0.016	0.528±0.031	ns
Leg	1.042±0.046	0.843±0.024	**
Head	2.767±0.082	2.290±0.141	*
Testicle	0.279±0.024	0.311±0.029	ns
Skin	9.475±1.420	5.185±0.271	*
Innards	1.724±0.045	1.271±0.420	ns
Carcass measurement (cm)			
Carcass length	67.25±2.21	64.25±1.16	ns
Back-loin length	41.75±0.63	43.25±2.72	ns
Inner leg length	31.00±1.06	31.13±0.52	ns
Leg width	20.00±1.00	19.25±1.25	ns
Leg depth	18.25±0.95	16.38±0.38	*
Chest circumference	40.13±0.97	36.25±0.60	ns
Chest depth	20.88±0.97	18.75±0.52	ns

*: Significant ($p < 0.05$); **: Highly Significant ($p < 0.01$); ns: Non-Significant

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Investigating relationship between placental traits and birth related factors in Morkaraman sheep

S. Ozyurek[1], D. Turkyilmaz[2]

[1]Department of Veterinary Erzincan Binali Yildirim University Erzincan, Turkey

[2]Animal Science Atatturk University Erzurum, Turkey

Introduction

The placenta is a temporary tissue that develops only for the development of the offspring between the chorionic and uterine mucosa of the offspring and is shaped only in the pregnancy. The task of the placenta is to feed the embryo, to develop it, to provide respiration and discharge, to carry out the metabolic residues and gas exchange, to perform the immunological barrier and to release the hormone within the pregnancy (Şen et al. 2013). The aim of this study was to examine the effect of parity, birth type and sex on placental traits and birth weight in Morkaraman.

Materials and methods

The data was collected from 101 Morkaraman sheep in 2018 lambing season. After lambing placentas were collected immediately and weighed on digital scales. Birth weight (BW), placental weight (PW) and cotyledon number (CN) were measured and recorded. Cotyledon length, depth and width were measured with an electronic digital compass selecting twenty cotyledons from each placenta at the same ratio. Placental efficiency (PE), cotyledon density (CD), cotyledon efficiency (CE) and average cotyledon surface area (ACSA) were calculated according to literature knowledge (Molteni et al., 1978; Wilson and Ford, 2001; Ocak et al., 2015; Şen and Önder 2016). General linear model was used to determine the effects of parity, birth type and sex factors on treatment.

Results

The results of the study demonstrated that there were positive correlations between birth weight (BW) and placental efficiency (PE) (r=0,553 p<0,01), average cotyledon surface area (ACSA) (r=0,505 p<0,01) and cotyledon efficiency (CE) (r=0,291 p<0,05) but there were negative correlations between placental weight (PW) and placental efficiency (PE) (r=-0,642 p<0,01), cotyledon density (CD) (r=-0,656 p<0,01). Average BW, placental weight (PW), cotyledon number (CN), PE and CD were 3,882±0,12kg, 606,81±2,65g, 60,1±2,65, 9,68±0,49 and 0,11±0,00 respectively. First-parity ewes had lower PW, CN, CD, CE and cotyledon width (p<0,05). While birth type effected PW (p<0,01), CN and ACSA (p<0,05), sex effected only BW (p<0,05).

Table 1. Descriptive statistics of sex for placental traits (X ± SD)

Parity	BW (g)	PW (g)	CN	PE	CD	CE	ACSA (cm^2)
	Ns	ns	*	ns	*	*	*
1-3	4,118±,15	413,4±21,4	59,78±3,0^b	10,63±,5	0,155±,01^c	9,77±,55^a	7,29±,31^a
4	4,356±,11	475,5±15,6	54,74±2,2^b	9,33±,4	0,119±,00^b	9,90±,40^a	8,38±,23^b
5-6	4,051±,21	457,4±30,2	45,51±4,32^a	8,99±,83	0,103±,11^a	12,31±,77^b	7,77±,45^a

a,b data bearing different superscript letters were significant at P < 0.05; ns=not significant, BW=birth weight, PW=placental weight, CN=cotyledon number, PE=placental efficiency, CD=cotyledon density, CE=cotyledon efficiency, ACSA= average cotyledon surface area

Conclusion

In this study ACSA parameter was used first time for ewe placental traits. The most important finding of this study was the positive correlation between the birth weight and the average cotyledon surface area. Further it should study for increasing birth weight by placental traits.

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Determining factors effect for preweaning mortality on Turkish Saanen Kids

F. E. Ataç*, Ç. Takma*, Y. Gevrekçi*, H. Üstüner**, M. Çevik*

*Ege University, Faculty of Agriculture, Department of Animal Science 35100 Bornova-İzmir Turkey

**Uludağ University, Faculty of Veterinary, Department of Zootechnics 16059 Görükle-Bursa Turkey

Introduction

Goat kidding deaths are an important problem in Turkey. Genetic and environmental factors affect goat productions dramatically. Among these factors. preweaning mortality rate of young kids is the essential problem for the breeders. Management mistakes generally are the main cause of the deaths preweaning mortality of young kids (Al-Najjar, 2010). Maternal age of goat. season of birth. birth type and sex etc. are also effect on preweaning mortality. The objective of this study was to investigate the effects of preweaning mortality in Saanen kids.

Materials and methods

Preweaning mortality records were obtained from 2508 Saanen kids that raised at 10 different herds. Binary logistic regression model was applied for determining the effects of factors because of discrete structure of dependent variable (Antonogeorgos et al., 2009; Çokluk et al., 2010). Therefore, preweaning mortality records considered as dependent variable. sex; male (1195) and female (1313). birth type; single (670) and multiple (1838) of goat considered as fixed effects. On the other hand, kidding age and birth weight considered as covariates. In the analyses, preweaning mortality incidence was introduced as codes: zero for healthy kids and one for death from birth to weaning time.

The logistic regression analysis uses maximum likelihood method rather than the least squares. The values of the estimated parameters are adjusted iteratively until the maximum likelihood value for the estimated parameters is obtained. That is. maximum likelihood approaches try to find estimates of parameters that make the data actually observed most likely (Hair et al., 2006). Moreover, the probability of logistic regression analysis is based on the odds ratio and logarithm of the odds.

Odds ratio is defined as the ratio of the probability that an event will not occur (Mertler and Vannatta, 2005). All analyses were done by IBM SPSS Statistics version 21.0.

Results

Incidence of preweaning mortality was estimated as 11.6%. Preweaning mortality was significantly affected by sex and birth type (P<0.05).

Table 1. Frequciences of Survival Rate for birth type and sex

		Frequency	Percent
Sex	Male	1195	47.6
	Female	1313	52.4
	Total	2508	100.0
Birth Type	Single	670	26.7
	Multiple	1838	73.3
	Total	2508	100.0

The incidence of preweaning mortality for Saanen kids by different levels of sex and birth type were shown in Table 1. The overall preweaning mortality rates for male and female kids were 47.6% and 52.4%. respectively.

Table 2. The final binomial logistic regression results of risk factors for preweaning mortality of kids

Variable	B	Standard Error of Mean	Wald	Degrees of freedom	Probability	Odds Ratio Exp(B)
Male	-	-	-	-	-	Reference
Female	.113	.131	.753	1	.386	1.120
Single	-	-	-	-	-	Reference
Multiple	.419	.146	8.244	1	.004	1.521
Kidding age	-.012	.003	13.065	1	.000	.988
Birth weight	-1.253	.109	132.392	1	.000	.286
Constant	2.292	.375	37.445	1	.000	9.897

As seen in Table 2, the P-values of the variable effects were found significant except sex effect. Therefore, birth type was assumed to be risk factor and it must have included in the binomial logistic regression model. Moreover, compared to the reference category (male kids), the preweaning mortality of female kids was 1.12 times higher than male kids

In addition multiple type births had 1.52 times higher for preweaning mortality risk than single birth type (Table 2). The results of Hosmer and Lemeshow test statistic and its probability are given in Table 3. From these results it can be said that the logistic regression model provided a good fit for our data set (Table 3).

Table 3. Chi-Square value and probability of Hosmer-Lemeshow test statistic

Chi-square	Degrees of freedom	Probability
22.677	8	.004

Conclusion

There are different periods that can affect the mortality of the kids (Rattner et al., 1994; Ataç et al., 2010). In addition, several environmental and genetic factors influence the death of the kids (Awemu et al., 1999). The deaths are expected to be more frequent in the birth and following first days of the kids (Ayağ and Konyalı, 2009; Ataç et al., 2010).

However, in our country, generally post-weaning mortality are also high in rearing extensive systems. It is necessary to reduce the number of kid mortalities in order to increase the profitability on the farms. It is imperative that the traditional way of thinking about this issue be changed and the conditions of manegament must be improved.

The risk factors can be minimized by collecting detailed records of the mortality of the kids. Reducing preweaning mortality by breeding programs will increase productivity and at the same time benefit the farmer economy.

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Growth Traits of Seannen Goat Raised in Institute Conditions

O. Öçalan[1], A. Özdemir[1], T. Sezenler[1], E. Şengül[1], S. Koncagül[2]
[1]Sheep Breeding Research Institute. Bandırma/Balıkesir, Turkey
[2]Ankara University, Faculty of Agriculture, Department of Animal Science, Ankara, Turkey

Introduction

The goats have long been used by human being as food. These animals, spreaded over a very wide area, are also an important food resource in Turkey. It is possible to say that our country has sufficient conditions for the development of milk goat breeding (Sönmez and Kaymakçı, 1973). In this study, a research was made on the early growth characteristics of Saanen goats raised in the Institute conditions.

Materials and Methods

The animal material was composed of 60 rootstock-goats and 120 kids raised at the Bandırma Sheep Research Institute Goat Breeding Unit. Kids were identified by ear number within the first 24 hours after birth. In the first 15-day, they kept with their mothers, then were taken to the enlargement sections. The kids enlargement section is the area where the kid can enter and which is connected to the compartment where the mother is located. Kids suckled and fed concentrate and rough feed until weaning (average 120 day-old). Both birth and weaning weights were taken with 100 g sensitive weighbridge.

Results

Descriptive statistics are given in Table 1.

Table 1. Descriptive statistics of early growth traits of Seannen goat at institute condition

Variable	N	Mean	StdError	Minimum	Maximum	Coeff of Var. %
Birth Weight	120	3.48	0.055	2.17	4.95	17.41
Weaning Weight	118	22.19	0.386	11.50	32.76	18.89
Daily Weight Gain	118	0.156	0.003	0.068	0.243	21.11

Least square means of birth weight, weaning weight and daily weight gain of Seanen kids are given in Table 2.

Table 2. Least square means (±SE) of birth weight (BWT)(kg), weaning weight (WWT)(kg) and average daily weight gain (ADWG)(g) of seannen kids

Factors İnvestigated	n	BWT ($\bar{\bar{X}} \pm SE$)	n	WWT ($\bar{\bar{X}} \pm SE$)	ADWG($\bar{\bar{X}} \pm SE$)
Age of Dam		N.S.		N.S.	N.S.
3	72	3.40±0.093	72	22.71±0.612	0.160±0.0051
4	24	3.55±0.138	24	23.36±0.913	0.166±0.0076
5	24	3.66±0.141	22	22.28±0.941	0.157±0.0078
Type of Birth		N.S.		N.S.	N.S.
Single	7	3.76±0.218	7	23.69±1.449	0.169±0.0121
Twin	92	3.57±0.071	91	21.92±0.454	0.154±0.0038
Multiple	21	3.28±0.128	20	22.73±0.848	0.161±0.0071
Sex		*		*	*
Male	63	3.78 ± 0.106^{a}	62	23.70 ± 0.697^{a}	0.169 ± 0.0058^{a}
Female	57	3.29 ± 0.106^{b}	56	21.86 ± 0.672^{b}	0.153 ± 0.0056^{b}
Month of Birth		*		*	*
February	61	3.66 ± 0.098^{a}	59	23.61 ± 0.666^{a}	0.167 ± 0.0056^{a}
March	59	3.41 ± 0.110^{b}	59	21.95 ± 0.729^{b}	0.154 ± 0.0061^{b}
β_{BWT}	---	---	---	$2.38 \pm 0.598^{**}$	$0.012 \pm 0.005^{*}$
Overall	120	3.48±0.055	118	22.19±0.386	0.156±0.0030

a,b**:** The differences between the means of groups carrying various letters in the same column are significant ***** P<0.05; ****** P<0.01; NS: P>0.05

Birth weight, weaning weight and daily weight gain were found as 3.48 kg, 22.19 kg ve 0.156 g, respectively in Table 2. All traits under study were sihnıficantly affected by gender and the month of birth (P <0.05). It was also observed that a 1 kg increase in birth weight resulted in 2.38 ± 0.598 kg increase in weaning weight and 0.012 ± 0.005 kg increase in average daily weight gain (P<0.01 and P<0.05, respectively).

Conclusion

The results obtained from this study indicate that the birth weight, weaning weight and daily live weight gain of Seannen kids, under intensive conditions of South Marmara, were observed quite sufficient. In this sense, it can be said that it is adaptive to the regional conditions and can be easily breed in intensive conditions.

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Milk yield and beginning, average and end of milking of milk component traits of Alpine x Hair crossbred, Saanen x Hair crossbred and Hair goats under extensive conditions in Konya

H. Erduran[1] B. Dağ[2]

[1]Bahri Dağdaş İnternational Agricultural Research

[2]Selçuk University, Faculty of Agricultural, Department of Animal Science, Konya, Turkey

Introduction

Hair goat, indigenous breed of Turkey, is the most common goat breed in Turkey. Alpine and Saanen goats have been largely spreaded all over the World in forms of pure or crossbreeding by indigeneous breeds (Erduran, 2017). This study was carried out investigation of the milk yield and component (beginning, average and end of milking) traits in Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats under extensive conditions that raised in a special farm in Selcuklu province, Konya City of Turkey. The material of the study was collected from a total of 30 goats that were between 1. and 5. parity during the lactation period.

Materials and methods

The goats were fed completely on natural pasture, including scrubland, with no extra feed. The birth of kids started at the end of February and lasted through March. Kids were weaned at approximately three months of age. The flock was pastured on rangelands and in forests from early in the morning until noon, when the animals were left to rest in the shade before returning to graze after the heat of the sun had subsided. Milk samples of each goats were taken at the beginning of the milking, at the average of the milking and at the end of the milking at every 28 days. Milk yield was used by the Fleischmann method (ICAR, 2009). All data obtained were analysed using a General Linear Model procedure. Statistical analysis was performed with the JMP 11 computer program (SAS 2013).

Results

Average lactation milk yields, daily milk yields and lactation lengths of Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats were 198.7, 201.3 and 151.3 kg; 968, 991 and 773 g; 205, 203, 195 days respectively. Also general means of goats were showed beginning, average and end of milking component traits.

Table 1 Least squares and standard errors of milk production traits of Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats

Traits	n	Milk Yield in Lactation Period (kg)	Lactation Length (day)	Daily Average milk yield (g)
		Mean S	Mean S	Mean S
Genotype				
Alpine x Hair	10	198,7 ± 7,83 [a]	205 ± 2,5 [A]	968 ± 37,7 [a]
Saanen x Hair	10	201,3 ± 7,83 [a]	203 ± 2,5 [AB]	992 ± 37,7 [a]
Hair	10	151,3 ± 7,83 [b]	195 ± 2,5 [B]	774 ± 37,7 [b]
Parity				
1	6	153,4 ± 10,10 [b]	190 ± 3,2 [b]	799 ± 48,6 [b]
2	6	166,3 ± 10,10 [ab]	197 ± 3,2 [ab]	844 ± 48,6 [b]
3	6	192,9 ± 10,10 [ab]	206 ± 3,2 [a]	935 ± 48,6 [ab]
4	6	188,0 ± 10,10 [ab]	205 ± 3,2 [a]	918 ± 48,6 [ab]
5	6	218,1 ± 10,10 [a]	205 ± 3,2 [a]	1060 ± 48,6 [a]
Overall mean	30	183,8 ± 4,52	201 ± 1,4	911 ± 21,8

* Means in the same column with different superscripts differ significantly at: small letters - ($P<0.01$); capitals - ($P<0.05$), S: standard errors.

Table 2 Least squares means and standard errors of beginning, average and end of milking of milk component traits of general mean Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats

Traits	n	Fat (%)	Protein (%)	Lactose (%)	Solids-non-fat (%)	Density (kg/m3)	pH	Conductivity (µS/cm)	Freezing Point (°C)
Beginning of the milking	10	3.33±0,01	3.91±0,03	5.66±0,05	10.31±0,09	1036±0,28	6,67±0,04	5,64±0,08	-0.660±5,18
Average of the milking	10	4.49±0,07	3.82±0,03	5.52±0,04	10.10±0,08	1034±0,24	6,65±0,04	5,44±0,06	-0,651±4,65
End of the milking	10	6.67±0,07	3.69±0,02	5.32±0,03	9.69±0,06	1032±0,20	6,64±0,02	5,19±0,03	-0.646±3,49

The effect of genotype and parity on lactation milk yield, daily milk yield and lactation period (P<0.01, P<0.05) were significant.

The effect of genotype and parity on beginning, average and end of milking of fat was significant (P<0.01) while the effect of genotype and parity on beginning, average and end of milking of solids-non-fat, protein, lactose, density, freezing point, conductivity and pH were varied among levels P<0.01, P<0.05 and insignificant. Fat content range from 3.3% to 6.7% (Table 2).

When this lactation milk yields, lactation period and daily milk yield of Alpine x Hair crossbred goats and Saanen x Hair crossbred goats had values almost higher than values reported in some other experiments conducted in Turkey (İbrahimağaoğlu, 1997, Ulutaş et al., 2010; Erduran ve Yaman, 2013; Erduran and Dağ, 2015).

While, the lactation milk yields, lactation period and daily milk yield values previously reported in Damascus and İmproved German Fawn x Hair crossbreds (G_1) (Keskin et al., 2004), Turkish Saanen and Malta (Tölü et al., 2010), Saanen (Erduran and Dağ, 2015) goats were lower than the results obtained in the current study. Also the lactation milk yields, lactation period and daily milk yield values were slightly similar to those of Atay et al., 2013 reported that Alpine x Hair (F_1) crossbred goats and Saanen x Hair crossbred (F_1) goats.

In this study, fat and freezing point were the highest for end milking of milk component traits, while end milking of milk component traits were the lowest protein, lactose, solids-non-fat, density, conductivity and pH performance in terms of lactation. Fat content were range from 3.3% to 6.7% (Table 2). Beginning, average and end of milking fat, protein, lactose and solids-non-fat were determined the highest Hair goats and in almost Alpine x Hair crossbred goats and Saanen x Hair crossbred goats values were similar (Table 3-5).

A number of studies have reported that range from 2.55% to 5.74% for fat, 2.6% to 4.0% for protein, %4.2 to % 5.4 for lactose of local breeds, and crosses of local goats in Turkey (Keskin et al., 2004; Gül, 2008; Tölü, 2010; Erduran, 2014; Erduran and Dağ, 2015), purebred and crossbreds dairy goats in other countries (Sung et al., 1999; Das and Sing 2000; Menéndez-Buxadera et al., 2010; Brito et al., 2011; Bagnicka et al., 2015).

These results show that the fat, protein and lactose of Alpine x Hair crossbred goats Saanen x Hair crossbred goats and Hair, goats were generally within the range of the native and crossbreed does that were being genotype in Turkey and in other countries.

Table 3 Least squares means* and standard errors of beginning milking of milk component traits of Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats

Traits	n	Fat (%)	Protein (%)	Lactose (%)	SNF (%)	Density (kg/m3)	pH	Conductiviy (µS/cm)	Freezing Point (°C)
		Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S
Genotype				NS			NS	NS	
Alpine x Hair	10	3,17±0,17^{AB}	3,90±0,06^{AB}	5,67±0,09	9,92±0,15^{b}	1037±0,49^{a}	6,66±0,07	5,76±0,14	-0,674±9^{A}
Saanen x Hair	10	3,11±0,17^{B}	3,81±0,06^{B}	5,51±0,09	10,34±0,15^{ab}	1034±0,49^{b}	6,67±0,07	5,55±0,14	-0,639±9^{B}
Hair	10	3,72±0,17^{A}	4,02±0,06^{A}	5,80±0,09	10,68±0,15^{a}	1036±0,49^{a}	6,69±0,07	5,61±0,14	-0,668±9^{AB}
Parity		NS			NS	NS	NS	NS	
1	6	3,76±0,22	4,12±0,07^{A}	5,98±0,11^{A}	10,79±0,2	1036±0,63	6,7±0,09	5,59±0,19	-0,685±11,6^{a}
2	6	3,36±0,22	3,83±0,07^{AB}	5,55±0,11^{AB}	10,29±0,2	1034±0,63	6,72±0,09	5,99±0,19	-0,630±11,6^{b}
3	6	3,17±0,22	3,9±0,07 ^{AB}	5,62±0,11^{AB}	10,26±0,2	1036±0,63	6,61±0,09	5,45±0,19	-0,663±11,6^{ab}
4	6	3,28±0,22	3,82±0,07^{B}	5,50±0,11^{B}	10,13±0,2	1035±0,63	6,48±0,09	5,34±0,19	-0,641±11,6^{ab}
5	6	3,1±0,22	3,87±0,07 ^{AB}	5,66±0,11^{AB}	10,10±0,2	1036±0,63	6,85±0,09	5,84±0,19	-0,682±11,6^{a}

* Means in the same column with different superscripts differ significantly at: small letters - ($P<0.01$); capitals - ($P<0.05$), NS: non-significant, S: standard errors.

Table 4 Least squares means* and standard errors of average milking of milk component traits of Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats

Traits		Fat (%)	Protein (%)	Lactose (%)	SNF (%)	Density (kg/m3)	pH	Conductiviy (µS/cm)	Freezing Point (°C)
	n	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S
Geonotype			NS	NS			NS	NS	NS
Alpine x Hair	10	4,37±0,11[b]	3,82±0,05	5,56±0,07	9,91±0,14[A]	1035±0,41[a]	6,65±0,07	5,58±0,11	-0,663±8,0
Saanen x Hair	10	4,09±0,11[b]	3,75±0,05	5,40±0,07	10,11±0,14[AB]	1032±0,41[c]	6,68±0,07	5,35±0,11	-0,648±8,0
Hair	10	5,04±0,11[a]	3,90±0,05	5,61±0,07	10,40±0,14[B]	1034±0,41[b]	6,62±0,07	5,38±0,11	-0,641±8,0
Parity			NS	NS	NS	NS	NS	NS	NS
1	6	4,95±0,15[a]	3,91±0,06	5,63±0,09	10,54±0,18	1033±0,54	6,67±0,09	5,44±0,14	-0,646±10,4
2	6	4,78±0,15[a]	3,88±0,06	5,63±0,09	9,87±0,18	1034±0,54	6,69±0,09	5,41±0,14	-0,660±10,4
3	6	4,15±0,15[b]	3,75±0,06	5,41±0,09	10,08±0,18	1034±0,54	6,52±0,09	5,35±0,14	-0,636±10,4
4	6	4,52±0,15[ab]	3,75±0,06	5,44±0,09	10,10±0,18	1033±0,54	6,67±0,09	5,51±0,14	-0,646±10,4
5	6	4,09±0,15[b]	3,81±0,06	5,51±0,09	10,11±0,18	1034±0,54	6,73±0,09	5,48±0,14	-0,668±10,4

* Means in the same column with different superscripts differ significantly at: small letters - (P<0.01); capitals - (P<0.05), NS: non-significant, S: standard errors.

Table 5 Least squares means* and standard errors of end milking of milk component traits of Alpine x Hair crossbred goats, Saanen x Hair crossbred goats and Hair goats									
Traits		Fat (%)	Protein (%)	Lactose (%)	SNF (%)	Density (kg/m3)	pH	Conductiviy (µS/cm)	Freezing Point (°C)
	N	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S	Mean S
Geonotype			NS	NS			NS		
Alpine x Hair	10	6,30±0,13[b]	3,64±0,04	5,32±0,06	9,26±0,1[b]	1033±0,35[a]	6,61±0,03	5,37±0,04[a]	-0,661±6[A]
Saanen x Hair	10	6,62±0,13[ab]	3,69±0,04	5,30±0,06	9,82±0,1[a]	1030±0,35[b]	6,67±0,03	5,00±0,04[c]	-0,643±6[AB]
Hair	10	7,05±0,13[a]	3,74±0,04	5,38±0,06	9,98±0,1[a]	1032±0,35[c]	6,65±0,03	5,20±0,04[b]	-0,636±6[B]
Parity				NS			NS		NS
1	6	7,58±0,17[a]	3,82±0,05[A]	5,48±0,07	10,11±0,12[a]	1031±0,45 [AB]	6,75±0,04[a]	5,27±0,06	-0,647±7,8
2	6	6,55±0,17[b]	3,65±0,05[AB]	5,29±0,07	9,63±0,12 [ab]	1031±0,45[AB]	6,54±0,04[b]	5,17±0,06	-0,646±7,8
3	6	6,44±0,17[b]	3,74±0,05[AB]	5,39±0,07	9,75±0,12 [ab]	1033±0,45[A]	6,62±0,04[ab]	5,07±0,06	-0,634±7,8
4	6	6,49±0,17[b]	3,64±0,05[Aab]	5,22±0,07	9,64±0,12 [ab]	1031±0,45[B]	6,65±0,04[ab]	5,22±0,06	-0,646±7,8
5	6	6,22±0,17[b]	3,61±0,05[b]	5,27±0,07	9,32±0,12[b]	1032±0,45[AB]	6,66±0,04[ab]	5,21±0,06	-0,659±7,8

* Means in the same column with different superscripts differ significantly at: small letters - (P<0.01); capitals - (P<0.05), NS: non-significant, S: standard errors.

Milk yield and compound values showed differences among genotype and parity may have resulted from the variations in environment, digestive potential and advancement of the mammary glands, rumen fermentation products, care and management.

Conclusion

As a result of this study crossbreeding increased milk yield traits. Solids-non-fat, protein, lactose, density, pH and conductivity of beginning milking components were highest for all milk components values while end of milking components had highest fat and freezing point. This result, milk of goat can be used to converted into a product.

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Genetic relations between pied head and some growth traits in Chios lambs

G. Çetkin[1], S. G. Yetişti[2], T. Savaş[1]

[1]Department of Animal Science, Faculty of Agriculture, Çanakkale Onsekiz Mart University, Campus of Terzioğlu, 17100 Çanakkale, Turkey

[2]Çanakkale Sheep and Goat Breeder Assosciation

Introduction

It is known that coat color and fitness of an organism are related. Anderson (1963) found ocular squamous cell carcinoma higher frequently in cattle breeds with white heads. Gulyas and Iväncsics (2001) reported significant relations between udder pigmentations and udder health. These relationships with coat color and fitness seem to be indirect. However, for example, the merle coat color in dogs and deafness are apparently of direct importance (Starin et al., 2009). On the other hand, it seems that there is also a relationship between coat color and performance. Becerill et al (1991) reported from a positive relationship between white percentage and milk yield in Holstein Frisian cattle. Furthermore, Gratten et al. (2008) found Sardinian sheep with darker coat color heavier as with light coat color. Chios are sheep with white fleece and pied colored legs, abdomen and head. Occasionally rams with black horns were occur. In this study we investigated the quantitative genetics and genetic relations of black percentage of head and birth weight, weaning weight and daily live weight gain in Chios lambs.

Materials and methods

Faces of 764 lambs, born from 34 sires and 501 dams, were photographed and black percentage of total face area (BPF) was determined via image processing. Pedigree, as well as birth (BW) and weaning weight at age of 90th day (WW) were obtained from the records of the subproject “Genetic Breeding of Chios Sheep in Çanakkale” of the “National Sheep and Goat Breeding Project of Turkey”. A genetic model with only animal as random effect was used for BPF. On the other hand, a statistical mathematical model with direct and maternal genetic effects as well as year, flock, gender and birth type as fixed effects were used for BW, WW and live weight gain (LWG). Moreover, for weaning weight and live weight gain included the weaning age as linear covariant in the model. The data were processed with the program package SAS (1999) and genetic analyses were used with MTDFREML (Boldman et al., 1995).

Results

High phenotipic variations were found for BPF (62.7%) and LWG (53.2%). On the other hand, the phenotipic variation for BW was low (14.3), and medium for WW (23.2%). High medium heritability was estimated for BPF, but the heritabilities for BW, WW and LWG were low medium (Table). The correlation between direct and maternal genetic effects were 1.00 ±0.264, -0.73±0,430, 0.00±1.870 for BW, WW and LWG, respectively. No genetic relation found between BPF and BW. Although the genetic correlations between BPF and WW were medium-high, however with a relatively high standard error. On the other hand, a remarkable negative genetic correlation coefficient between BPF and LWG was estimated.

Table: Phenotipic means ($\bar{x}$), standard errors of means (SE), heritabilities and its standard errors as well as genetic correlation coefficients (SE_{rg})

Trait	$\bar{x}$	SE	h^2	SE_h2	h^2_m	SE_{h^2m}	Black percentage of face r_g	Black percentage of face SE_{rg}
Black percentage of face, %	42.2	0.98	0.45	0,111	-	-	-	-
Birth weight, kg	4.0	0.02	0.17	0.054	0.45	0.111	0.00	0.254
Weaning weight, kg	20.2	0.17	0.21	0.136	0.48	0.192	0.59	0.336
Live weight gain, g/day	210.5	4.16	0.24	0.154	0.02	0.150	-0.83	0.208

h^2: Direct heritability; SE_h2: Standard error of direct heritability: h^2_m: Maternal heritability; SE_{h^2m}: Standard error of maternal heritability; r_g: Genetic correlation coefficient; SE_{rg}: Standard error of correlation coefficient

Conclusion

The heritability show use, that BPF has a polygenic background. Because no environmental impact is expected, the rest of the propportion on the total variation for BPF must be also from genetic origin. While the genetic correlation between BPF and WW is positive, the genetic correlation between BPF and LGW is negative. This indicates a complex genetic relationship between growth and BPF. Indeed, the maternal heritabilities of WW and LWG point out this fact. On the other hand, the negative high correlation coefficient between BPF and LWG may also be due to earlier crosses of heavier foreign breeds with white heads.

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The Use of Colostrometers In Determination of Colostrum Quality In Saanen Goats

D. Öğüt, Ç.Kandemir, T. Taşkın, N. Koşum
Ege University Faculty of Agriculture Department of Animal Science, Bornova-Izmir, Turkey

Introduction

After birth, the first milk is called the colostrum. The colostrum contains more dry matter and immunoglobulin than normal. It is reported that normal goat milk has an average dry matter content of 14%, whereas this ratio is about 22% in goat colostrum. The cause of the dry matter disturbance is largely due to immunoglobulins. Immunoglobulins are in protein structure. The resistance of the goat kids to diseases is largely achieved by immunoglobulins. Immunoglobulins are collected in the serum gamma globulin fraction. The quality of the goat colostrum can be determined by the total gamma globulin concentration. A colostrometer is used to determine the quality of the field conditions. The colostrometer measures the specific density. The specific density is the hydrometer which converts it to the Ig concentration. Colostrum components other than Ig affect specific density. For this reason, the ability of the method to accurately estimate Ig concentration changes slightly. The best use of colostrometer is to distinguish quality colostrum from poor quality.

Materials and methods

This study was carried out to determine colostrum quality in Saanen goats. The animal material of the work was 52 goat-goats who were raised in the Ege University, Faculty of Agriculture Department of Animal Science and who gave birth in 2018. Colostrum samples were taken 15 minutes after the birth of the goats. Colostrum samples were analyzed at 22 °C.

Results

In the study, the effects of lactation rank and the numbers of kids born on colostrum quality were investigated. The mean specific gravity in Saanen goats colostrum was 1049.40 ± 1.16 g / ml. The effect of lactation rank on colostrum quality was statistically significant (P <0.05).

The mean specific gravity of goats from the first lactation to the fifth lactation were respectively; 1044.39 ± 1.52, 1047.54 ± 2.09, 1054.13 ± 1.86, 1056.67 ± 0.88, 1056.67 ± 7.26 g/ml.

Table 1. Specific gravity values according to lactation rank (mg / ml)

Lactation Rank	n	Specific Gravity
1	18	1044.39[a] ± 1.52
2	13	1047.54[a] ± 2.09
3	15	1054.13[b] ± 1.86
4	3	1056.67[b] ± 0.88
5	3	1056.67[b] ± 7.26
Mean	52	1049.40 ± 1.16

The effects on th numbers of kids born at colostrum quality was statistically significant (P <0.05). The specific gravity averages in the Saanen goats who gave single and multiple births were;1046.71 ± 1.76 g/ml ve 1052.46 ± 1.65 g/ml.

Table 2. Specific gravity values according to the numbers of kids born (mg / ml)

The Numbers of Kids Born	n	Specific Gravity
1	22	1046.71[a] ± 1,76
2	26	1052.46[b] ± 1.65
3 ve 3<	5	1044.80[a] ± 1.02
Mean	52	1049.40 ± 1,16

Conclusion

Goat kids are born with a passive immune system. The goat kids provide active immunity with immunoglobulins in the colostrum. For this reason, it is necessary for the goat kids to take colostrum immediately after birth. If the colostrum is not taken at the time and at an adequate level, goat kid deaths are seen at high rates. Colostrum quality is important in reducing goat kid deaths and colostrometer has been determined to be a practical method of quality assesmentColostrum quality is differentiated according to lactation rank and the numbers of kids born. In this context, it would be useful to study similar genotypes and sample sizes of similar investigations.

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Determination of slaughter and flaying defects in sheep and goat skins obtained from Van province slaughterhouses

A. Kabay, F. Karakuş
Van Yuzuncu Yil University, Faculty of Agriculture, Department of Animal Science, Van, Turkey

Introduction

Since leather is the most economically important by-product of the meat industry, high quality skins should be obtained from sheep and goats. Van province has an important place in the production of sheep-goat meat with its current small ruminant potential (2 658 215 heads, (TÜİK, 2018)). Despite its high meat production capacity, the contribution of Van to the country's leather production is not enough due to the pre- and post-slaughter defects. The aim of this study was to determine slaughter and flaying defects affecting the quality of skin in the raw skin of sheep and goats obtained from the Van province slaughterhouses.

Materials and methods

In the study, 300 sheep and 300 goat skins were examined. The raw sheep and goat skins were weighed. The dermis layer of the skins that were laid on a flat surface was examined individually according to the evaluation form given in Table 1 in terms of slaughter and flaying defects (Artan and Dağlıoğlu, 1983). In addition, the raw skins were photographed with a digital camera.

Results

The average raw skin weight was determined as 4.53 kg and 3.89 kg in sheep and goat skin, respectively. In the study, it was determined that there were generally mild scores in sheep and goat skins. No cut defects were detected in 59.0% of the sheepskins and 70.99% of the goat skins. On the other hand, no hole defects were found in 46.67% of the sheepskins and 53.67% of the goat skins. The vein appearance was determined in 82.67% and 94.67% of sheep and goat skins, respectively. It was determined that 16.0% had flesh, 65.67% had fat residue, 10.67% had tail tissue residue, 62.33% had blood, and 2.33% had manure in total of the sheepskins.

It was determined that 25.33% had flesh, 36.33% had fat residue, 2.67% had udder tissue residue, 5.33% had tail tissue residue, 76.0% had blood, and 5.67% had manure in total of the goat skins.

Table 1. Criteria taken into consideration in determination of slaughter and flaying defects in the raw sheep and goat skins

No		
Raw skin weight		
Species	Sheep ☐	Goat ☐
Age	Young ☐	Adult ☐
Gender	Female ☐	Male ☐
Slaughter and flaying defects		
The number of light score		
The number of deep score		
The number of cut		
The number of hole		
Skin pattern	Correct	Faulty
Veiny	Yes	No
Wool-Hair	Yes	No
Flesh residue	Yes	No
Fat residue	Yes	No
Udder tissue residue	Yes	No
Tail tissue residue	Yes	No
Blood	Yes	No
Manure	Yes	No

Conclusion

As a result, slaughter and flaying defects affecting negatively the quality of sheep and goat skins obtained from Van province slaughterhouses were determined. In order to avoid defect and mistakes during slaughter and flaying due to inattention and ignorance, slaughter and flaying of small ruminants should be carried out carefully by competent personnel using appropriate equipment.

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Monthly Change of Sexual Hormones in Saanen Bucks

Kandemir, Ç., Koşum, N., T. Taşkın
Ege University Faculty of Agriculture Department of Animal Science, Bornova-Izmir, Turkey

Introduction

Testosterone plays an important role in spermatogenesis with hormone FSH and LH secreted from the brain. Androgen inceptive proteins secretion occurs when FSH influences sertoli cells. Meanwhile, LH affects the leydig cells in the testes to produce testosterone. While the testosterone and LH hormone secretion must be continuous for spermatogenesis, FSH is only involved in the initiation. In this research, monthly changes of testosterone, luteinizing hormone (LH) and follicle stimulating hormone (FSH) were investigated on Saanen bucks.

Materials and methods

The animal material of the work was 6 Saanen bucks who were raised in the Ege University, Faculty of Agriculture Department of Animal Science and who two years old. To determine hormones level, blood samples were taken from jugular vein of each goat in every month for a year. The blood samples were centrifuged at 4000 per/min for 5 min. and serum was stored at -20°C until analyses time. Hormone analysis in the serum were performed with immino analysis test using chemiluminescence technology (Beckman Coulter, UniCel DxI 800).

Results

In the study, in order to determine any possible differences in the observed hormone concentrations with respect to months, repeated measures ANOVA analysis was performed. As a result of statistical analysis, significant differences ($p<0.01$) were found among the months for all hormonal parameters (Table 1).

Conclusion

According the results of this study, could be concluded that reproductive hormones was seasonally dependent and this releases were significantly influenced by climatic factors such as photoperiod in Saanen bucks (Figure 1).

Table 1. FSH, LH and Testosterone Levels in Saanen Bucks Monthly Average Values

Mount	FSH mIU/mL (X̄±Sx̄)	LH mIU/mL (X̄±Sx̄)	Testesteron ng/ml (X̄±Sx̄)
January	173,01±0,71^{a}	9,06±0,47^{ab}	0,62±0,11^{a}
February	176,58±1,34^{a}	8,51±0,61^{ab}	0,93±0,34^{a}
March.	176,47±1,40^{a}	9,74±0,36^{b}	3,03±0,72^{ab}
April	173,37±1,58^{a}	8,80±0,54^{ab}	1,73±0,46^{ab}
May	180,50±0,71^{a}	8,02±0,40^{a}	1,55±0,46^{ab}
June	182,74±0,74^{a}	8,82±0,53^{ab}	0,98±0,21^{a}
July	193,73±1,08^{b}	13,12±0,34^{c}	1,23±0,26^{a}
August	411,65±7,12^{e}	34,24±0,20^{g}	14,85±0,91^{e}
September	282,41±5,45^{d}	25,78±0,38^{f}	10,71±2,03^{d}
October	278,77±7,99^{d}	20,70±0,81^{e}	11,89±0,90^{d}
November	274,34±4,23^{d}	18,33±0,40^{d}	7,08±0,70^{c}
December	239,98±1,99^{c}	12,00±0,36^{c}	3,99±1,31^{b}
Average	228,63±8,33*	14,76±0,96*	4,88±0,61*

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Some Reproductive Traits and Lambs Growth Performance of Akkaraman Sheep Raised in Nigde Province

A. Ceyhan, A. Şekeroğlu, M. Duman
Niğde Ömer Halisdemir University, Türkiye

Introduction

The number of sheep increased by 8.7% and became 33 million 678 thousand heads in Turkey (TUİK, 2017). Yimaz et al., (2013) notice that sheep comprise a rich array of fat-tailed and thin-tailed native breeds and crosses of these with animals of exotic origin. The structure of agriculture is such that most farms are predominantly subsistence oriented, of small size, keep few animals and provide only minimal inputs. Native breeds have evolved to meet these conditions and are generally well adapted to the natural environment, inadequate and unbalanced feeding regime and disease stress. In Turkey, lack of information on the distribution of domestic sheep and goat breeds/genotypes and their morphological and physiological characteristics is at a level that can not be underestimated. The knowledge about geographical distribution areas, genetical changing processes, breeding conditions and structural characteristics as a production feature is quite superficial. In brief, it is almost impossible to transfer the research and development activities at target populations that should be improved (Karaca et al., 2012).

Material and Methods

A total of 6.300 Akkarman Sheep (6000 ewes and 300 rams) housed in 34 different farms s in Nigde province was evaluated between 2012-2016 in this study. Birth weight of 30162 lambs, body weight of 29514 lambs aged 90 days old and some fertility parameters of 30.000 ewes were used as data of this study. Lambs were weighed by digital steelyard at first 24 hours following parturition and designated with ear tags. The data of ear tags, birth weight, birth date, birth type, sex of lambs and ear tags of mother were recorded. Reproductive parameters was calculated by formulas which Özcan (1989) reported. Growing performance of lambs analysed by using procedure of general linear model (GLM) and significance of differencies between average of groups was determined by Duncan multiple comparision test and survival rate of lambs were tested by chi square (X2).

Results and Discussion

The avarege birth weight of Akkaraman lambs born in 2012, 2013, 2014, 2015 and 2016 was 4.19, 4.14, 4.04, 4.51 and 4.28 kg, whereas avarege body weight detected at 90th day was 20.06, 20.49, 23.17, 23.03 and 24.87 kg, respectively.

The effect of year, sex, birth type on the birth body weight and body weight detected on 90th day of lambs was statistically significant (P<0,01). The survival rate detected on 90th day of lambs in 2012, 2013, 2014, 2015 and 2016 was 98.8; 100; 97.4; 97.3 and 96.4 % respectively. The effect of year birth type, sex and dam age on surival rate of lambs was found statistically significant (P<0.01). In this study, it was determined that overall lambing rate was 90.1%. This value was higher than those detected by Özbey and Akçan (2006) as 85.0% and Ünal (2002) as 86.96-80.77% for Akkaraman breed, and lower than detected by Akçapınar et al.. (2000) as 94.00% for Akkaraman breed.

On the other hand it was similar to results that was reported by Çolakoğlu and Özbeyaz (1999) as 89.7; 90.5; 91.6 and 89.4 % for same sheep breed.

Conclusion

As a result; fertility, lamb growth performance and survival characteristics of Akkaraman sheep breed, which is housed in rural extansive conditions, were generally found higher than previous studies. We believe that the study was done with a long period of time and with a large number of materials is important in terms of providing resources for further studies as well as providing support for existing literature.

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Effect of milk feeding and creep feeding on 90th day weaning weight of male lambs of Akkaraman, Kivircik x Akkaraman B_1 sheep

[1]H.H. Şenyüz, [2]S. Erat

[1]International Center for Livestock Research and Training

[2]Kirikkale University, Faculty of Veterinary Medicine, Department of Animal Breeding and Husbandry

Introduction

The aim of this study was to investigate the effect of feeding types on 90th day weaning weight of male lambs of Akkaraman and Kivircik x Akkaraman B_1 (1, 2) sheep.

Materials and methods

Animal materials of the study were milk fed male lambs in 2016 (n=88) (MF) and creep fed male lambs in 2017 (n=78) (CF) in International Center for Livestock Research and Training in Mamak, Ankara. All male lambs in both years were in same location and had same management and environmental conditions so that it was assumed that the year had no effect on the weaning weight of the lambs. The MF lambs had only suckled their mothers while the CF lambs had only suckled their mothers for first 15 days and they were also allowed to access creep feed via help of the iron bars where the lambs can only get through until weaning. Both MF and CF lambs had also grazed on same pasture with their mothers after the 60th day. General linear model included breed (Akkaraman and Kivircik x Akkaraman B_1 genotype), birth type (single and twin born lambs), feeding type (milk fed and creep fed), and all two and three-way interactions.

Results

Least square means and standard errors for 90th day weaning weights were respectively 29.26 ± 0.80 and 26.46 ± 0.59 kg for Akkaraman and Kivircik x Akkaraman B_1 genotype; 31.21 ± 0.56 and 24.51 ± 0.82 kg for single and twin born lambs; 26.17 ± 0.66 and 29.55 ± 0.74 kg for MF and CF lambs. Breed ($p=0.005$), birth type ($p<0.0001$) and feeding type ($p=0.001$) had significantly affected 90th weaning weight of the lambs. All two and three-way interactions were insignificant ($p>0.2$) (3, 4).

Conclusion

Even though this study showed an advantage of CF on the 90th day weaning weight of the lambs, a further study should be conducted with two feeding systems in same year and the year effect should also be considered in order to better understand the effect of both feeding systems.

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Preference of sheep and goats for rubber, slatted wooden, concrete and straw floors in summer and winter

C. Tölü, T. Savaş
Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

Type of flooring and bedding management are two important arrangements to be considered in intensive production systems. Type of flooring may directly affect animal health, performance and welfare (Elmore et al., 2010). Housing floor should not cause injuries and dirt on udders and body of animals. The flooring will allow for important resting behaviors such as lying in livestock. In this study, proper seasonal floorings were tried to be identified through observation of behavioral characteristics of dairy sheep and dairy goats.

Materials and methods

In this study, concrete, rubber, wood slatted (5 cm wide and 2 cm apart) and straw flooring preferences were compared. A total of 30-day experimental periods for winter and summer seasons. Experiments were conducted in 4 pens each of having 5.50 x 6.00 m dimensions. Four different floorings were installed over 33.00 m^2 of the pen. Each flooring was installed in 2.75 m x 3.00 m dimensions. Five animals were placed in each pen and these groups of 10 sheep and goats were gone through entire trials in 15-day intervals. In other words, observations were made with 5 animals in 15-day intervals in 2 replications. Behavioral observations were started to be performed with a camera from the 3rd day of experiments and 24-hour observations were made in 6, 9, 12, 13, 14 and 15th days. Day-time observations were interrupted between the hours 18:00-08:00. Animals were numbered from 1 to 5 in each pen with different color sprays for easy recognition in camera records. The behavioral characteristics were observed lying (lateral or vertical, type of position and side), standing, locomotion, interaction. Behavioral characteristics were observed in time sampling method with 10-minute intervals. Behaviors of each animals were recorded as “1” demonstrated and “0” non-demonstrated. The type of flooring over which the behaviors are exhibited was also recorded.

During the morning hours, each flooring was scored for dirtiness. Dirtiness scores were between 1-4 (1: clean, 2: slightly dirty, 3: dirty, 4: highly dirty). Generalized estimating equation (GEE) appraoch for possion distribution-based repeated measures were used for data analysis. In statistical models created for each behaviorial characteristics of each animal species, season (summer, winter) and type for flooring (1, 2, 3,4) were included as fixed factors and quintette pen groups (1, …,4) were included as randomized factor. WALD chi-square test was used in post hoc analysis.

Results

The goats have more lying behavior in winter than summer (Table 1). Goats demonstrated significantly lying behaviour on the straw and rubber floor than on the concrete and slatted wooden floor (P≤0.05). Goats preferred for lying the lowest level and standing the bigest level of slatted wooden in the floors (P≤0.05). The slatted wooden floor has been significantly different from other floors with lower lying and higher standing in sheep (P≤0.05).

Table 1. Estimated (b), standard error (SE), odds ratio (Ψ) and P values for lying and standing behaviors based on season and flooring.

Factor		Goat				Sheep			
		Lying							
		b	SE	Ψ	P	b	SE	Ψ	P
Season	Winter	0.22	0.10	1.24	0.0890	-0.10	0.10	0.90	0.3728
Floor	Rubber	-0.60	0.26	0.54^{ac}	0.1063	0.02	0.15	1.02^{a}	0.0593
	Slatted	-1.85	0.32	0.15^{b}		-1.78	0.24	0.16^{b}	
	Concrete	-0.68	0.23	0.50^{a}		-0.11	0.14	0.89^{a}	
	Straw	0.00	0.00	1.00^{c}		0.00	0.00	1.00^{a}	
		Standing							
Season	Winter	-0.13	0.04	0.87	0.1141	-0.46	0.03	0.63	0.0618
Floor	Rubber	0.49	0.05	1.63^{c}	0.0779	0.50	0.04	1.64^{a}	0.0616
	Slatted	1.37	0.05	3.93^{b}		1.34	0.04	3.81^{b}	
	Concrete	-0.04	0.07	0.96^{a}		0.17	0.05	1.18^{a}	
	Straw	0.00	0.00	1.00^{a}		0.00	0.00	1.00^{a}	

For summer b=0.00 and Ψ=1.00. Differences between odds ratios (Ψ) indicated with different letters in same column for each factors are significant (P≤0.05).

Conclusion

Goats and sheep preferred to lying at the lowest level of slatted wooden. While the straw was the most preferred floor for goats and sheep, the straw floor was followed by rubber floors and concrete floors, respectively. Goats and sheep prefer to slatted wooden floor for standing. Considering the pollution, it can be said that concrete floors can be used in sheep and goat shelters especially on hot days.

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A study on awareness of climate changes of small ruminants breeders

A. Unalan*, A. Ceyhan, E. Akyol, M. Gunesdogdu
*Nigde Omer Halisdemir University, Medicine Faculty, Biostatistics Department, Nigde, Turkey

Introduction

Globally, climatic change represents a critical challenge to humanity in the 21th century. Reports have indicated that developing countries are more vulnerable to the effects of climate chance due to their high reliance on natural resources, very limited capacity to adapt institutionally and financially and high poverty levels (Sejian, 2013). Increasing world population, increasing demand of energy, uncontrolled industrialization and consuming behaviour are a mong the reasons for increase in environmental problems (Aksan and Celikler, 2013).

Materials and methods

Data in this study were collected from 51 small ruminant (28 sheep and 23 goat) breeders in Nigde and Antakya provinces in Turkey. The structered survey (face to face) was used for obtaining the sheep and goat breeders' views about the climatical changes. The survey consisted of demographical and questions (as 5 point Likert scale: 1: strongly disagree, 2: disagree, 3: undecided, 4: agree, 5: strongly agree) related to climatical changes. Descriptive statistics and Chi-square test of data which was analysed using by SPSS program (SPSS, 2009).

Results

Mean age of breeders was 44.14 years (range 19-68 years old); education status of the breeders were 15.7% literate, 60.0% primary school, 19.6% high school and 3.9% university graduated; duration of small ruminant breeding were 37.3% during 0-10 years, 25.5% during 11-20 years and 37.3% during 21+ years. Chi- square test results according to age groups (under the 40 years old and 40+ years old), education status (under the high school and high school and upper), and breeding types (sheep and goat) were given in Table 1.

Table 1. Chi-square test results for some demographical factors and climate change

	Ratio of Likert Scores for all breeders					P Values (Chi-square)		
Questions	1	2	3	4	5	Age Group	Education Status	Breeding Types
Everyone can do something to reduce the effects of climate change	9.8	5.9	0.0	39.2	45.1	NS	NS	NS
Climate change is inevitable because of modern society	3.9	3.9	23.5	35.3	33.3	NS	NS	NS
People should consume less energy to prevent climate change	7.8	23.5	21.6	31.4	9.8	NS	NS	NS
Climate change will improve Turkey's weather	35.3	23.5	7.8	13.7	17.6	NS	NS	**
Climate change is only a fluctuation in world temperature	17.6	11.8	47.1	15.7	0.0	NS	NS	NS
If everyone does, I do my duties on climate change	11.8	3.9	5.9	27.5	47.1	NS	NS	NS
State authorities should encourage people to take good care of the environment	11.8	9.8	13.7	17.6	43.1	NS	NS	NS
It's too late to prevent climate change	25.5	25.5	39.2	3.9	3.9	NS	NS	NS
There is no effect of people's daily actions on climate change	19.6	27.5	39.2	3.9	5.9	NS	NS	**
Climate change is a situation that scares me	13.7	11.8	11.8	43.1	15.7	NS	NS	*
Developing countries is the main responsibility on climate change	3.9	29.4	29.4	17.6	15.7	NS	NS	**
I'm not sure climate change is real	17.6	23.5	33.3	13.7	7.8	NS	NS	NS
There must be radical changes in the society to combat climate change	3.9	31.4	25.5	13.7	21.6	NS	NS	NS
People are self-centered in dealing with climate change	5.9	11.8	41.2	15.7	23.5	NS	NS	NS
Evidences related to climate change are not reliable	13.7	13.7	54.9	11.8	2.0	NS	NS	NS
Claims that human activities change climate are exaggerated	9.8	33.3	37.3	9.8	3.9	NS	NS	NS
There is a lot of conflicting evidence that there is climate change	11.8	13.7	39.2	15.7	17.6	NS	NS	NS
Leaving the electricity in the house influences the climate change	11.8	13.7	21.6	25.5	23.5	NS	NS	*
Climate change is a result of modern life	7.8	7.8	23.5	29.4	27.5	NS	*	NS
The effects of climate change are probably the cause of the catastrophe	7.8	23.5	17.6	29.4	17.6	NS	NS	**
Things I do not affect climate change	17.6	27.5	27.5	17.6	7.8	NS	NS	NS
Industrial pollution is the main cause of climate change	5.9	7.8	11.8	43.1	29.4	NS	NS	NS
The flood is a result of climate change	11.8	7.8	25.5	27.5	25.5	NS	NS	NS
It is too early now to say climate change	13.7	31.4	27.5	13.7	9.8	NS	NS	NS
There is no point in me doing it because nobody has done anything about the climate change	17.6	31.4	25.5	19.6	3.9	NS	NS	NS
Experts have the same idea that climate change is a major problem	9.8	23.5	27.5	33.3	2.0	NS	NS	NS
Industry and the private sector have to do more to combat climate change	11.8	5.9	15.7	35.3	27.5	NS	NS	NS
Government wants to reduce climate change	7.8	13.7	9.8	39.2	25.5	NS	NS	NS
I think climate change is a real problem	17.6	13.5	29.5	15.7	11.8	NS	NS	NS

I feel responsible for doing something about climate change	9.8	19.6	15.7	45.1	9.8	NS	NS	*
I can spend more time and money protecting the environment	17.6	3.9	37.3	33.3	5.9	NS	NS	NS
I think the measures taken to prevent global warming are insufficient	5.9	7.8	21.6	29.4	33.3	NS	NS	NS
Developed countries should do more to prevent global warming	7.8	13.7	5.9	35.3	33.3	NS	NS	NS
Global warming is mostly the result of human activities	7.8	11.8	23.5	25.5	33.3	NS	NS	NS

*P<0.05, **P<0.01, NS: Non-Significant, Chi-square

Conclusion

Chi-square analysis showed that age groups was not effective factor on breeders' view of climatic changes. But education type and breeding type were statistically significant effect on opinion about climate change of small ruminant breeders in Nigde and Antakya regions.

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Breeding Farm Animals for Prion Diseases Resistance as Preventive Medicine

S. Erkunt[1], Y. Yaman[2], C. Ün[1]

[1] Ege University Faculty of Science Department of Biolog, 35100, Bornova/Izmir

[2] Sheep Research Station, Department of Biometry and Genetics, Bandırma/Balıkesir

Introduction

Prion diseases are infectious and neurodegenerative diseases that affect both humans and animals. They cause death by influencing central nervous system (Prusiner, 1982). In sheep, prion disease is called scrapie where in cattle it is known as Bovine Spongiform Encephalopathy (BSE) (Yaman and Un, 2017). The disease comes into existence by the transformation of cellular prion protein (PrP^{C}) which is encoded by prion protein coding gene (PRNP) into a misfolded protein form (PrP^{Sc}) and the accumulation of this isoform (Hornlimann et al., 2006). The disease is contagious among animals as well as infecting humans with the introduction of defected animals into the chain of human consumption. Studies of the molecular diagnosis of prion diseases have shown that genetic resistance and susceptibility to disease are associated with polymorphisms on the gene that encode the prion protein (Tongue et al., 2004). Since prion diseases have no definitive treatment today, deaths occur as a result of symptoms which arise after long incubation periods. Under these circumstances, the only precaution against prion diseases in order to preserve both human health and animal health is to conduct genotyping studies for selecting resistant animals (Yaman and Un, 2017). The decision taken by the European Commission in 2003 on the 'breeding program of animals that are resistant to prion diseases' has been proving the importance of genotyping the prion protein coding gene (European Commission, 2003). For this reason, genotyping studies are performed in many countries, especially in Europe, and breeding studies with genetically resistant animals are carried out. In this context, the aim of this study is genotyping the PRNP in sheep and cattle breeds of Turkey for the application of animal breeding as preventive medicine.

Materials and Methods

In this study, 109 sheep chosen from Kivircik, Sakiz (also known as Chios), Imroz breeds and 93 rams chosen from Karacabey Merinos breed were investigatd. Also 150 cattle chosen from South Anatolian red, East Anatolian red and Turkish gray breeds were examined. Genomic DNA was isolated from blood samples, PCR amplified and PCR products were sequenced.

Sequences were analysed by using MEGA6 program for determining the polymorphisms of PRNP at codons 136, 154 and 171 in sheep. Gel electrophoresis was used to find out indel polymorphisms at promoter region and intron 1 in cattle.

Results

The polymorphisms determined in sheep prion protein coding gene consist of ARR, ARQ, AHQ, VRQ, TRQ, ARH alleles and ARR/ARR, ARR/TRQ, ARR/ARQ, ARQ/AHQ, ARH/TRQ, TRQ/TRQ, ARQ/TRQ, ARQ/ARQ, ARQ/ARH, ARH/ARH, ARR/VRQ and ARQ/VRQ genotypes.

The data indicated the variability of PRNP of the investigated sheep and also the most of the genotypes belong to risk group 1 and 2. In rams ARR, ARQ, VRQ alleles and ARR/ARR, ARR/ARQ, ARQ/ARQ, ARR/VRQ, ARQ/VRQ genotypes were detected. The most resistant allele ARR is found with a frequency 28% and the most susceptible allele VRQ is found only 4.3%. These results are compatible with others obtained from Kivircik, Imroz and Sakiz sheep breeds. The insertion allele in 12 bp indel that is related with low susceptibility to BSE in cattle represented a high frequency for all analysed breeds. In addition, 23-bp indel associated with low-susceptibility to BSE was determined with a frequency of 0.80 in Turkish gray.

Conclusion

As prion diseases are infectious diseases affecting both humans and animals, and there is no definitive treatment, genotyping of animals is crucial in order to provide protection against disease. Accordingly, our group has made researches on genotyping the sheep and cattle breeds in Turkey. Studies in sheep breeds demonstrated that there are not 100% resistant animals against disease.

Therefore, Turkey is known to be at risk of a possible scrapie infection and needs to select resistant sheep for precaution. On the other hand, in studies conducted with cattle represented that the Turkish Gray breed is highly resistant to prion diseases. However, due to the low yield of this breed, the breeding is being abandoned and the breed faces the danger of extinction.

For human and animal health the breeding of Turkish Gray cattle needs to be increased. As a result, in order to be able to protect humans and animals, breeding of resistant animal breeds should be selected.

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Comparative Assessment of Fattening and Meat Sensory Characteristics of Kids and Lambs

D.J. Agossou[1]* A. Koluman[2], N. Koluman[1]
[1]Department of Animal Science, Çukurova University, 01330 Adana, Turkey
[2]Department Biomedical Engineering, Pamukkale University, Denizli, Turkey

Introduction

Sheep and goat meat has a dietary important place in nutrition of Turkish population and play a capital role in the economy of the country. Sheep and goats' meat is estimated to account for 22% and 6% of the national meat consumed (Ogun et al, 2016). This level of meat consumption is yearly increasing with the number of consumers who are increasingly demanding in terms of high quality. Usually, consumers prefer tender and juicy meat. As large share of consumers are becoming more concerned about the quality of red meat notably lamb and chevon. This study aims to compare the quality with focus on the sensory assessment of kid and lamb meat.

Materials and methods

This research study was carried out at the Dairy Goat Research Farm of Çukurova University located in the province of Adana (37° North parallel and 35° East longitude). Trials were conducted from June to July 2016 on two group of kids and lambs Group 1 (n= 10) Assaf lamb (3/4 Ost-friz + 1/4 İvesi) and Group 2 (n= 10) Boer kids. Throughout the experimental period, all animals were fed on alfalfa hay and concentrate feed (12% crude protein and 2300 kcal/kg energy). At the end of fattening period, 4 animals with similar live weight were selected from every single group of kids and lambs for slaughter and cutting. Some samples were collected and cooked for sensory and organoleptic analysis. The quality of raw meat, fried and boiled meat were evaluated by trained panellists. The collected were aalyszed following the one-way ANOVA procedure in SPSS Statistics 20. Difference between groups were tested with t-test at the level of P= 0.05.

Results

The results of the qualitative and sensory characterization of different types of meat are given in the foolowing table. The raw meat colour did not significantly differ between meat of lambs and chevon in terms of raw meat colour and odour. The results of this study showed that lamb meat had higher values in terms of marbling ($p < 0.05$). The comparison of fat deposit demonstrated that the kids' meat was more fatty than lamb meat. There was no significant difference in fried meat between the two groups ($P > 0.05$) for the flavour and tenderness of meat. However, it was found that fried meat of kids is more succulent that lamb meat.

Table 2. Sensory tests of kid and lamb meat.

Meat Traits	Mean ± SE		Sig.
	Kid	Lamb	
Uncooked meat colour	4.25 ± 0.25	4.25 ± 0.25	ns
Uncooked meat odour	5.00 ± 0.00	3.75 ± 0.00	ns
Uncooked marble	2.75 ± 0.25^{b}	4.00 ± 0.00^{a}	*
Fried meat flavour	5.00 ± 0.00	5.00 ± 0.00	ns
Fried meat taste	5.00 ± 0.00	4.25 ± 0.25	ns
Fried meat tenderness	4.50 ± 0.28	4.50 ± 0.28	ns
Boiled meat flavour	5.00 ± 0.00^{a}	$3{,}75 \pm 0.00^{b}$	*
Boiled meat taste	4.00 ± 0.25	4.50 ± 0.28	ns
Boiled meat tenderness	3.75 ± 0.31^{b}	4.50 ± 0.18^{a}	*

*Significantly different at $P < 0.05$; ns: non significant at $P = 0.05$

Conclusion

This study revealed that kids and lamb meat presented similar meat qualities. However, it has been shown that chevon is slightly advantageous than lamb meat in terms of quality and quantity. As emphasized earlier, the kid has unique cooking patterns. For this reason, preparation of special recipes for kid's consumption will increase consumption.

Acknowledgements

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Developing and Implementing A Plan for Marketing Goat Meat in Turkey

N. Koluman[1] D.Arsoy[2] and S.Göncü[1]

[1]Çukurova University, Agriculture Faculty, Animal Science Department, Adana,01330,Türkiye

[2]Near East University, Veterinary Medicine Faculty, Department of Animal Science, Nicosia, North Cyprus

Introduction

Goat production in Turkey has traditionally been carried out in marginal rural areas with small breeders raising goats as a source of meat and immediate cash income from fernier style of cheese and yogurt production (TUIK, 2016). In contrast to other high goat meat consuming nations the price paid for goat meat is considerably lower. Whilst the price paid for beef or lamb is considerably higher. This anomaly is purely a marketing deficiency and poor genetics. Meat production as a byproduct of dairy genetics is obviously an unproductive process. The type of red meat consumption in Turkey varies at least 10% from year to year impacted by the rate of imported slaughter cattle and sheep mainly around the Haj period where high quantities of animals are slaughtered for religious and cultural purposes. At present Turkey consumes approximately 71% beef, 22% mutton or lamb, 6% goat and 1% other red meat.

Materials and methods

In this review importance of the goat meat production and implementation a plan for improving industrial goat meat marketing will be determined.

Results

As indicated by Knipscheer et al, (1987), the main market outlets for farmers are the village collectors and the local markets. In isolated areas, farmers generally have access to at least one village collector. Farmers rely on village markets to sell animals, hence the main determinants of marketing efficiency are the road condition, availability of transport and distance from local markets. The location of the local market depends largely on the geographic distribution of animals in a given region. Large ruminants and small ruminants follow almost the same marketing channels.

There seems to be a growing trend of recent toward red meat being a healtier option to chicken meat due to use of growth enhancers in broilers. As such there appears to be an opportunity for the goat farmer to appeal to the health-conscious consumer who may be looking for the low-fat, low-cholesterol sources of red meat. The capretto, chevon and small goods made from goat meat may well be the answer to this market demand. The other trend in Europe which Turkey is also slowly becoming party to is the environmental issues related to red meat production (Koluman, 2014). Sustainable ecological breeding and marketing necessary to establish the consumer presentation within the scope of healthy and natural product first under the ECOmeat and ECOmilk branding, taking into consideration the situation of the meadows in Turkey, the small ruminant breeding and the consumer habits. For the products obtained from the production of goat, it is necessary to transform the healthy and natural product perception to consumers by using all communication methods.

At the same time, in the context of gastronomy, introducing both local dishes and new food designs from the ecologically produced products to the media will increase the demand for products. In addition, restaurants should be evaluated within the scope of special meals or healthy menus. This will increase the value of meat and milk for consumers by bringing a new, healthy and environment-friendly dimension to the concept of meat and milk which is a standard and trust problem and it will allow gaining confidence. The model can be summarised as Ecological breeding of sheep and goat + Slow Food approach + Traceability + Geographical marketing + Local and new food designs in gastronomy = Holistic Management Strategy = ECOmeat, ECOmilk. (Arsoy,2007).

Conclusion

Differentiation of product by value-adding required to create new marketing opportunities in Turkey. Producers need to take out the numerous middlemen from the supply chain. Producer needs better access to market.

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Some Reproductive Traits and Kid Growth Performance in Hair Goats Raised in Extensive Conditions

A. Ceyhan[a], M. Cinar[a], U. Serbester[b]
[a]Niğde Ömer Halisdemir University, Türkiye, [b]Çukurova University

Introduction

Goat breeding is one of the most important units of animal husbandry due to high quality of meat and milk, providing employment in country economy by manufacturing trade branch, providing an opportunity for utilization of unfavourable lands in high capacity as well as increasing goat products demand (Ceyhan, 2016). Goat commonly breeds in Turkey and it has economic importance. Living conditions and plant production is strictly limited in areas in which goat breeding is extensive (Kaymakçı, 2006, Güney 2010). A total of 10.634.672 heads goats are still breeding in Turkey and 46.67% (4.963.201 heads) of them are dairy goats which produces 523.395 tons of milk. Average milk yield is 105.4 per lactation. Moreover, 37.525 tons of meat are produced from 19.45% (2.068.443 heads) of goat population. In Turkey, total milk and meat productions per year are 20.699.894 and 1.126.403 tons, respectively, whilst goats correspond 2.5% of milk and 3.3% of meat production (TUIK, 2017)

Material and Methods

A total of 6.288 Hair goats (5.998 does and 290 buck) housed 30 farms located in 10 villages into Ulukısla county in Nigde province was evaluated between 2013-2017 in the study. The data of birth weight of 28.768 kids, body weight of 27.541 kids aged 90 days old and some fertility parameters of 26.693 does were used. Reproductive parameters was calculated by formulas which Özcan (1989) reported. Growing performance of lambs analysed by using procedure of general linear model (GLM) and significance of differencies between average of groups was determined by Duncan multiple comparision test and survival rate of lambs were tested by chi square (X^2).

Results and Discussion

Birth body weight of Hair goat kids born in 2013, 2014, 2015, 2016 and 2017 was 2.36, 2.46, 2.56, 2.61 and 2.61 kg, whereas body weight detected on 90th day was 15.20, 12.73, 12.82, 13.10 and 14.51 kg, respectively. The effect of year, sex, birth type and age of dam on the birth body weight and body weight detected on 90th day of kids was statistically significant (P<0,01). Body weight detected on 90th day of kids selected for breeding was 16.01, 16.32, 16.69, 17.40 and 17.94 kg in male kids and 16.03, 14.17, 15.32, 15.71 and 17.06 kg in female kids in 2013, 2014, 2015, 2016 and 2017, respectively. It was determined that year, sex and the interaction of year*sex were effective on body weight detected on 90th day of kids (P<0.01). The survival rate detected on 90th day of kids was 100%; 98.7%; 94.5%; 93.9% and 91.8% in 2013, 2014, 2015, 2016 and 2017, respectively.

The effect of year on survival rate of kids was found statistically significant (P<0.01). Those results obtained in this study was consistent with the value of Native Animal Breed Registry Notification (Anonimus, 2004) in which the viability rate was 100-94.0% until weaning. However, Tekin ve Öğeç (2017) reported that the survival rate of kids was 80.67% that was lower than those detected in this study. The study revealed that the overall parturition rate obtained from five year (2013, 2014, 2015, 2016 ve 2017) data was 91.9%, whereas inferitity rate was 8.1% in hair goats. Twin pregnancy rate was 3.5%; 5.7%; 9.5%; 12.4% and 6.5% in 2013, 2014, 2015, 2016 and 2017, respectively. The overall twin pregnancy rate was 7.5%. Erten ve Yılmaz (2013) reported that parturition and twin pregnancy rate were 85.89%, 17.91%, respectively

Conclusion

This study conducted in Nigde province was firstly provided collection of herd data by hair goat breeders. In doing so, fertility parameters, birth body weight, growing performance and viability properties were firstly demonstrated. Moreover, the importance of selecting of breeding goats have been experienced to the breeders for selecting breeding goat and selecting of breeding goat was firstly performed using phenotype properties following the improvement of some environmental factors. In conclusion, it was found that the data of fertility, viability and growing performance obtained in hair goats housed in rural extansive conditions showed similarty with other reports.

However, it is believed that the number of samples and duration of experiment is able to give comprehensive results for veterinary literature.

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Reproductive performance of sheep and goats supplemented with corn grain and corn flake during breeding season

H.I. Akbağ, C. Tölü, T. Savaş, A. Konyalı, B. Coşkun and İ.Y. Yurtman
Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

It's well known that concentrate supplementation to small ruminants during breeding season enhance reproductive performance, body condition and live weight. The structural characteristics as well as their ruminal degradability and glucose support directly to the animal of feeds are affected ovulation rate (Landau et al., 1995). The present study was to evaluate the effects of using corn grain and flake form corn in the flushing rations during breeding season on reproductive performance of ewes and goats.

Materials and methods

The experiment was comprised a total of 45 day in breeding season in group conditions. Experiments were conducted by 48 heads (n=16) of sheep and 60 heads (n=20) of goats. The study carried out in three groups, control group (fed only forages not supplemented with concentrate), corn group (fed forages and corn grain) and flake groups (fed forages and flake corn). Sheep and goats fed with alfalfa hay, corn silage and corn grain or flake corn. The sheep rations calculated 1,3 fold of energy requirement of maintenance for control group and 1,8 fold for corn and flake groups. In goats 1.1 fold of energy requirement of maintenance for control group and 1,4 fold for corn and flake groups according to the NRC (2007). The concentrate was offered to the animals individually while milked in a stall. In present study feed consumption recorded daily, live weight were recorded 15 day intervals. The body condition scores were recorded at the beginning of the experiment, day of rams/bucks released in the flock and end of the study. The flushing nutrition was performed 15 day before rams and bucks released in the flock and 30 days during mating. The statistical analyzes were done separately for each animal species. A general linear model including groups, age, animal and interactions was utilized in the variance analyses for ram/buck introduction to the first estrus, duration of pregnancy and birth weight.

Generalized estimating equation (GEE) appraoch for binomial distribution-based measures were used for data analysis of litter size in birth.

Results

As it seen from the Table 1. in sheep the gestation rate at first estrus and rate of birth per ewe were found similar among the gorups (Flake 100 %, in Corn 93,7 %, in Control 85,7 %). Gestation rate at first estrus and rate of birth per goat were found similar between the gorups (Flake 89,5 %, in Corn 85 %, in Control 67,3 %)

Table 1. Reproductive performance of sheep, means±standard errors and P values

Traits	Groups				Age	Age x Group
	Flake	Corn	Control	P	P	P
Ram introduction to fist estrus, day	11.2±2.11	11.8±2.03	5.1±2.86	0.1699	0.3902	0.3394
Numbers of lamb per ewe in birth, n	1.62±0.08	1.70±0.09	1.41±0.10	0.3691	0.8582	0.5301
Birth weight, kg	4.51±0.20	4.27±0.20	4.46±0.29	0.7029	0.5165	0.9270

Table 2. Reproductive performance of goat, means±standard errors and P values

Traits	Groups				Age	Age x Group
	Flake	Corn	Control	P	P	P
Buck introduction to fist estrus, day	29.6±2.56	24.5±2.39	28.1±2.46	0.3300	0.7877	0.5834
Numbers of kid per goat in birth, n	1.38±0.14	1.40±0.13	1.56±0.18	0.9514	0.3533	0.4832
Birth weight, kg	3.91±0.19	3.13±0.24	3.63±0.18	0.0572	0.3724	0.1716

Conclusion

The nutritional treatments were not affected the reproductive performance of either sheep nor goats in recent study (P>0,05). The number of lamb per ewe given at birth was numerically higher in corn group than the other in seeps. However the number of kids given birth was numarically highest in the control group. In conclusion, using corn grain or flake corn supplementation in flushing period was not effective on reproductive performance of sheep and goats.

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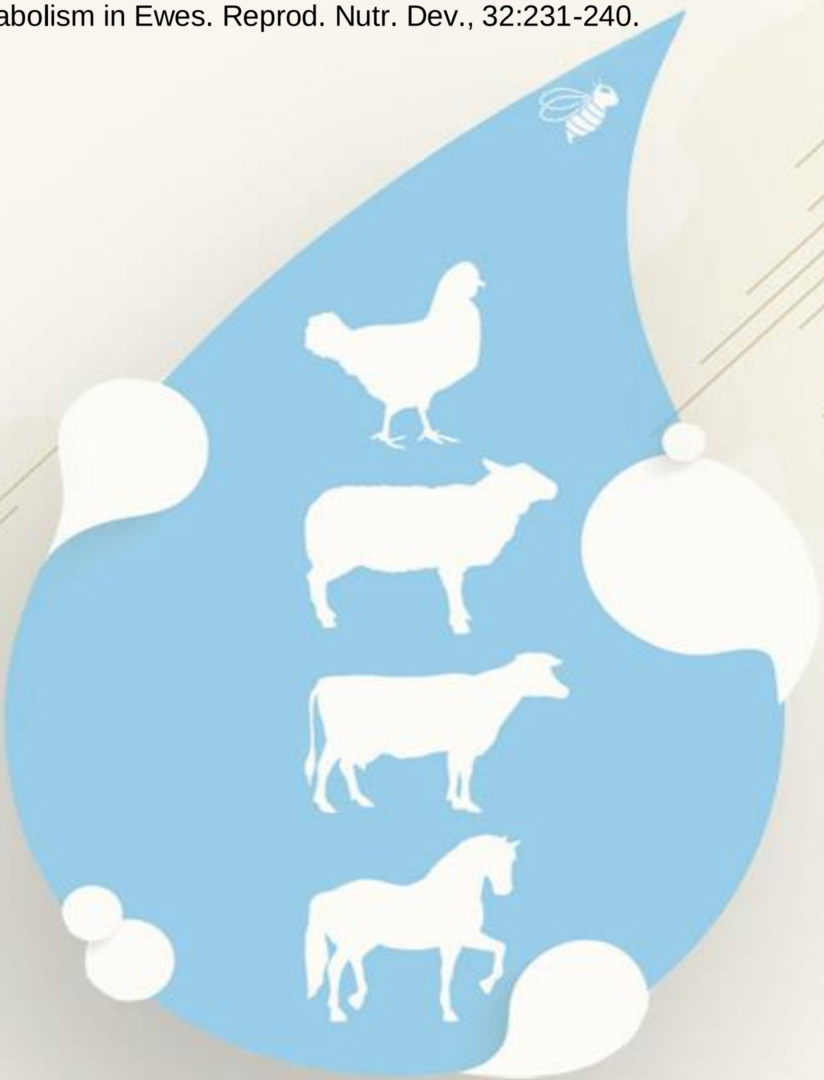

Prevalence and clinico-pathological picture of mycoplasmosis in sheep of Southern Zone, Pakistan

M. Kamal Shah[a]*, U. Sadique[b], A. Rehman[b], S. Ullah[a], M. S. Khan[a], S. A. Shah[b], A. Shahzad[a], I. Haq[a], F. Ahmad[b]

[a]Faculty of Veterinary & Animal Sciences, Gomal University, Dera Ismael Khan, Pakistan

[b]Department of Animal Health, Faculty of Animal Husbandry & Veterinary Sciences, the University of Agriculture, Peshawar, Pakistan

Introduction

Ruminant mycoplasmosis is significant contagious infection of small ruminants causing respiratory complication and multi-systemic expression. Several pathogenic members of Mm cluster are mainly responsible for this fetal infection with severe pathological consequences (Sadique et al., 2012: Laura et al., 2006). Some other non- cluster species like M. ovipneumoniae, M. putrefaciens (Mp), M. agalactiae have been reported in mixed type of condition involving different body system (Mondal et al., 2004;Thiaucourt and Bolske, 1996). Mycoplasma putrefaciens was isolated from sheep population with prevalence rate of 5 to 6.7% in Baluchistan, Pakistan (Banaras et al., 2016). The present study was aimed to find out occurrence and clinico-pathological picture of mycoplasmosis in sheep of southern zone Khyber Pakhtunkhwa, Pakistan.

Material and methods

In the present study, a total of 900 infected animals were surveyed for recording of the clinico-pathological picture of this fetal infection in naturally infected sheep. For isolation of the causative agent a total of 300 samples comprising of nasal discharge (n= 200), tracheal swab (n=70) and milk (n=30) were collected from diseased animals (Al-Momani et al., 2006). For isolation PPLO broth media was used followed by specie confirmation by PCR. In the same way, 90 dead animals were inspected on postmortem examination for recording of gross lesions (Wesonga et al., 2004).

Results

The overall occurrence of confirmed isolates were 23.2% with specie distribution of 14 and 9.2% for Mycoplasma mycoides subsp. capri and Mycoplasma putrefaciens respectively. The PCR confirmed isolates recovered from different source of samples are presented in Fig. 1. Out of total inspected animals, pneumonia was noted in (57.8%) followed by pyrexia (54.5%) and coughing (52.5%) Table-1. Pathomorphological study revealed multi-systemic involvement with lesions distribution comprising of pneumonic lungs (51%), tracheaitis (33.3%), hepatitis (17.7%), nephritis (16.33%) and pericarditis (7.7%) in examined animals (Fig. 2).

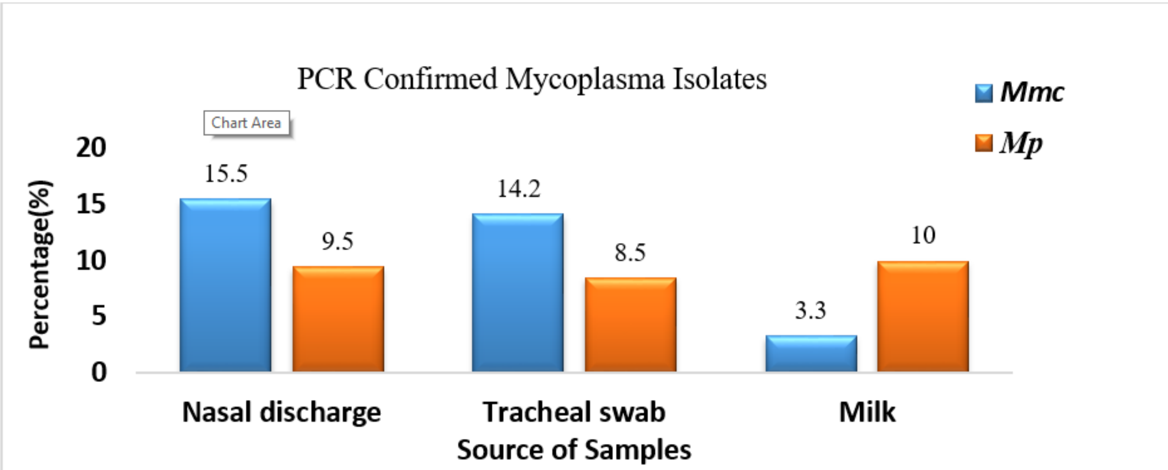

Fig. 1. PCR confirmed *Mycoplasma* isolates recovered from different source of samples from sheep.

Table-1 Occurrence (%age) of clinical signs in infected sheep suffering from respiratory distress.

S.No	Clinical signs (n=900)	Showed signs	Signs (%)
1	Pyrexia	491	54.5
2	Cough	473	52.5
3	Pneumonia	521	57.8
4	watery nasal discharge	435	48.3
5	Mucopurulent nasal discharge	189	21
6	Lacrimation	337	37.4
7	Conjunctivitis	231	25.6
8	Corneal opacity	64	7
9	Dysponea	302	33.5
10	Diarrhoea	131	14.5
11	Mastitis	27	3
12	Pyuria	33	3.6
13	Weight loss	181	20
14	Arthritis	24	2.6
15	Nervous signs	12	1.3
16	Abortion	9	1
17	Mortalities	142	15.7

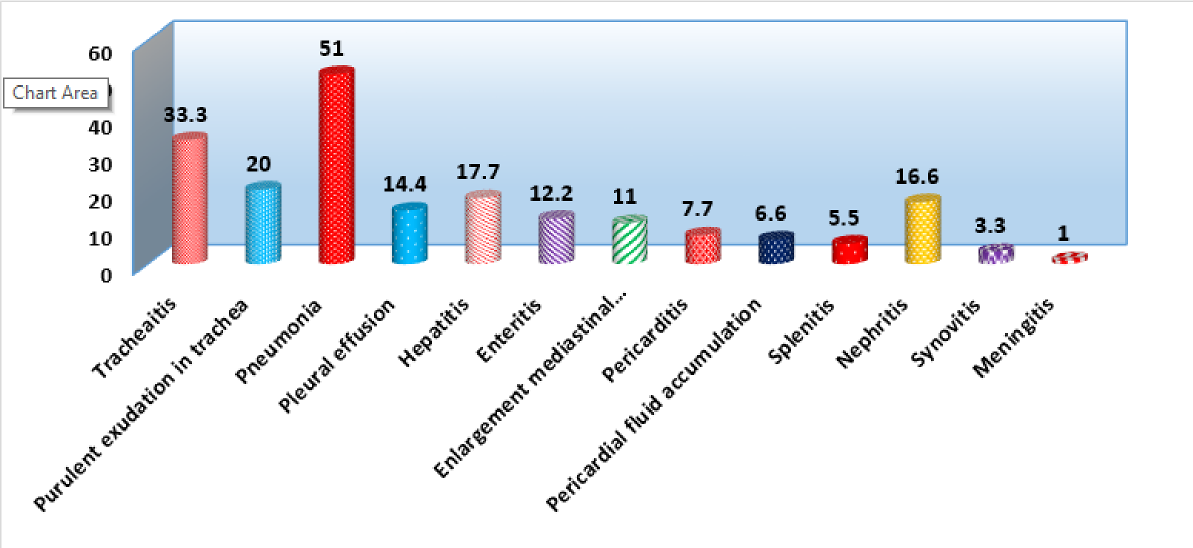

Fig. 2. Distribution of gross lesions in various body tissue of naturally infected animals.

Discussion and Conclusion

In the present study the overall occurrence of disease was 23.2% consisted of 14 and 9.2% for mmc and m. putrefaciens respectively. The findings are supported by the fact that mmc and mp is the most prevalent specie that responsible for mycoplasmosis throughout the world (banaras et al., 2016; sadique et al., 2012). The mycoplasmosis is categorized by fever, productive coughing, dysponea, nasal discharge, tracheaitis, lacrimation and in last stage lateral recumbancy (sadique et al., 2012; thiaucourt and bolske, 1996). The findings of present study revealed that the predominant lesions were recorded in respiratory system followed by abdominal cavity. The findings of the study reflecting that majority of examined animals showed hemorrhages, consolidation and pleural adhesion of lungs, focal abscessation in liver and congested kidneys. These results were supported by the findings of several researchers who described that in mycoplasmosis main lesion were noted in respiratory system (sadique et al., 2012). It was concluded from the findings that two pathogenic species mmc and m. putrefaciens were isolated from sheep reflecting mixed infection with severe clinico-pathological manifestation.

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Improving milk yield characteristics of Awassi sheep population

K. Kırk
University of Yüzüncü Yıl, Faculty of Agriculture Department of Animal Science Campus-Tuşba Van, Turkey

Objective

The present study was conducted to run a progeny test by artifical insemination to improve milk yield of Awassi population. Artificial insemination of the progeny test strains, the breeding values of each breeder rams were determined 27 head daughters according to milk yield in lactation. Breeder values of breeder rams and daughters according to milk yields were determined as 42 months (3.5 years) on average.

Material and Methods

The progeny test of the study, total 3932 sheep (26 heads rams aging 20-22 months, 60 heads Awassi teaser rams, 68 heads female yearling) were used in Ceylanpınar TIM (Gürsoy at all., 2001). Heat detection was made by the teaser rams used in a ratio of 1/60, sperm collection was performed by the method of artificial vagina (IV) (Donovan at all, 2004), sperm qualities for macro and micro characteristics were made light microscope, ewes on heat were inseminated by artificially using the servical method (AI). In the progeny test programme covering 3850 head female yearling, nominated rams' sperms were used for AI using 0.3 ml/head fresh without dilution in a ratio of 26X1/148 head/male/female. Data obtained in the study were analysed using SAS 2007 and ICAR 2003 (SAS, 2007; ICAR 2003).

Results

The resuls obtained in the experiment are summarised in Table 1. 3458 lambs were obtained from 3850 female yearling inseminated artificially with 89.82% lambing ratio (Donovan 2004; Gürsoy at all, 1997). Their reproduction characteristics were as follows; 3458 (89.95%) ewes had single births, 382 (11.05%) ewes had twins. Totally 422 lams were obtained. Of single births 1685 (48.73%) were male, 1775 (51.27%) were female (Gürsoy at all., 1998; Kırk and Gürsoy 1998).

Of twins, 401 (% 52,49) were female, 363 (47.51%) were female. Of 3850 inseminated artificially, 281 heads (%7.3%) were infertile, 111 heads wre injured or death under free range condition. Using milk yield of 27 female progenies of each nominated ram for 42 months (3.5 years), breeding values were calculated. Except the milk sucked by the lambs, according to 90 days lactation milk production breeding values were fluctuated 64-167 kg/head and the mean breeding value was calculated 115.5 kg (Davis at all., 1980; Gürsoy at all., 2001; Oravcová, at all., 2005).

Conclusion

Calculated breeding value using milk yield of female progenies of 26 nominated rams for 42 months (3.5 years) was variated between 64-167 kg. High variation in breeding value could be of benefit in improving milk yield of Awassi. Rams owing breeding value of 110-167 kg/head milk could be used for sheep produced high milk could be used. Rams owing breeding value of less than 110 kg/head milk could be used for sheep kept in production.

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Breeding local dairy sheep in Van Province

K. Kırk
University of Yüzüncü Yıl, Faculty of Agriculture Department of Animal Science Campus-Tuşba Van, Turkey

Objectives

In the present study, use of Norduz for developing sheep production for milk under extensive condition was examined in terms of milking season in the range, lactation milk yield, mating season, artificial insemination and breeding characteristics (Fisher,2004; Hassen at all, 2002; Kırk, 2002; Mukasa-Mugerwa at all,1994)

Material and Methods

In the present study total 770 heads Norduz sheep (453 heads Norduz artificially inseminated ewe aging 2.5-6.0 years, 216 head ewes on lactation aging various years, 3 heads rams aging 3.0-4.0 years, 8 heads teaser rams, 68 heads female yearling and 22 heads male yearling) were used. The examined flocks were mated freely in the previous season, milk yield was determined by milk control, which was performed once a month according to the Dutch Method (Gürsoy at all, 1996; Kırk ve Gürsoy, 1998). Heat detection was made by teaser rams used in a ratio of 1/57, sperm collection was performed by the method of artificial vagina (IV), sperm qualities for macro and micro characteristics were made light microscope, ewes on heat were inseminated by artificially using the servical method (AI) and the data obtained in the study were analysed using SAS 2007 (Ploumi and Emmanouilidis, 1999; SAS, 2007).

Results

Mean milk yield of 216 lactated ewes for 91 days May-July in range was 58.6 kg/head, except the milk sucked by the lambs. It seems that the milk yield of Norduz as a dairy bred could not be satisfactory economical and sustainable. First yearling ages of female and male yearlings were 29-30 months old (Cappelletti at all, 2005; Kırk, 2005; Pollott at all, 1998).

The average live weight of 68 female yearlings and 22 male yearlings were found to be 51.0 kg/head and 63 kg/head, respectively (Gürsoy at all, 200; Wulster Radeliffe at all., 2004). 346 ewes of 453 of AI programme detected on heat were inseminated. Their reproduction characteristics were as follows; 265 (76.6%) ewes had single births, 33 (9.5%) ewes had twins. Totally 298 ewes had lambs meaning 86.1% lambing ratio. 48 ewes had no pregnancy, meaning that infertility rate was 13.9% (Berkyürek and İzgür,1992; Ochoa-Cordero at all, 2002).

Conclusion

The results obtained in the present study suggest that the first yearling age of Norduz is found to be so low but the live weight at this age is found to be in accordance to the weight given in the literature. Breeding values of Norduz flock determined to improve milk yield in the present study. For this purpose Awassi could contribute by increasing gen intensity by artificial insemination (Gürsoy at all, 2001; Ugarte at all, 2001; Riva at all, 2004**).**

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Effect of Individual Inbreeding on birth and weaning weight of Karacabey Merino Sheep

S. Koncagül[1] , T. Sezenler[2], A.T. Önaldı[2] , A. Özdemir[2] , E. Şengül[2] ,O. Öçalan[2]
[1]University of Ankara, Faculty of Agricultural, Department of Animal Science, Ankara, Turkey
[2]Sheep Breeding Research Institute, Bandırma, Balıkesir, Turkey

Introduction

Mating related individuals in closed populations results in inbreeding that has adverse effect on both additive genetic and phenotypic values (Falconer and Mackay, 1996). In small sized sheep populations, it requires more attention because homozigozity increases in favor of heterozigozity essipecially with intense BLUP selection, which decreases selection response in economic traits such as weaning weight. In this study, individual inbreeding was fitted as covariate using a serious of animal models in order to assess the effect of individual inbreeding on birth (BWT) and weaning weight at 90th-day (WWT) of Karacabey Merino Sheep (KMS).

Materials and Methods

Weight data and pedigree information used in this study consisted of records of the KMS collected from 1992–2018, a period spanning 26 years. The traits of interests were BWT (n=21305) and WWT (n=13026). For both traits the final model included fixed effects of type of birth (single or multiple), birth year-season, sex and age of dam of lambs. Individual inbreeding coefficient was calculated using RelaX2 (Stranden and Vuori, 2006) pedigree analysis program, then a serious of animal models using MTDFREML (Boldman et al., 1996) was applied. Random effects and covariate (individual inbreeding coefficient) fitted to six different single trait animal models incorporating all available pedigree information were:
Model 1: animals' additive genetic effect as the only random factor,
Model 2: model 1 + maternal additive genetic effect ($r_{am} = 0$),
Model 3: model 1 + maternal additive genetic effect ($r_{am} \neq 0$),
Model 4: model 1 + permanent environmental effect of dam,
Model 5: model 4 + maternal additive genetic effect ($r_{am} = 0$),
Model 6: model 4 + maternal additive genetic effect ($r_{am} \neq 0$),

Results

Estimates of regression coefficients of BWT and WWT on individual inbreeding and -2LogL values of related models are summarised in Table 1. For BWT, the model 5, with random effects of both additive genetic and permanent environmental effects of mother with zero genetic correlation between direct and maternal additive genetic effects, is the most comprehensive model with the lowest -2LogL.

On the other hand, for WWT, the model 6, with random effects of both additive genetic and permanent environmental effects of mother with nonzero genetic correlation between direct and maternal additive genetic effects, is the most comprehensive model with the lowest -2LogL. The results show that 1% increase in individual inbreeding leads to -0.851 kg and -7.106 kg decreases in BWT and WWT, respectively.

Table 1. Regression coefficients of BWT and WWT on individual inbreedings and -2LogL values of six models fitted

Model	$\beta_{BWT,ibr}$	-2logL		$\beta_{WWT,ibr}$	-2logL
Model 1	-0.935	5711.4724		-6.825	54067.8202
Model 2	-0.828	4915.4196		-6.830	53917.8409
Model 3	-0.828	4915.1786		-6.976	53917.3521
Model 4	-0.938	5009.7222		-6.815	53971.5446
Model 5*	-0.851	4875.9110		-6.917	53963.8892
Model 6**	-0.851	4875.8873		-7.106	53890.9236

$\beta_{BWT,ibr}$: regression coefficient of BWT on individual inbreeding

$\beta_{WWT,ibr}$: regression coefficient of WWT on individual inbreeding

*The best fitted model for BWT based on smallest -2LogL value

** The best fitted model for WWT based on smallest -2LogL value

Conclusion

Based on the results obtained in this study and -2LogL values of the fitted models, both maternal additive genetic effect and permanent environmental effect of dam as well as direct additive genetic effect of animal should be considered when both birth weight (BWT) and weaning weight (WWT) traits are in question, although additive genetic correlation between direct and maternal additive genetic effects can be ignored for BWT of KMS.

Moreover, to minimize inbreeding in order to avoid from inbreeding depression for the early growth traits of Karacabey Merino Sheep breed, it is crucial to set up a mating design before mating season.

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The effect of creep feeding on growth performance and survival rate of Akkaraman lambs

A. Ceyhan[1], E. Akyol[2], A. Ünalan[3]

[1]Niğde Ömer Halisdemir University, Bor Vocational School, Department of Veterinary, Bor, Turkey

[2]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Animal Production and Technologies, Turkey

[3]Niğde Ömer Halisdemir University, Faculty of Medicine, Turkey

Introduction

Sheep breeding has vital important role in animal production in Turkey. Sheep have the ability to transform poor grasslands, which are widespread in Turkey, into valuable products like meat, milk, wool and skin. Akkaraman sheep is the most widespread sheep breed in Turkey being used as multipurpose. One of the most important aspects of starting lambs feeding is providing a place where they can reach the feed and ewes cannot. This technique is known as creep feeding lambs and can be sophisticated and complex, or a simple wooden design. For some, lamb feeding will begin with nibbling at a young age (7-10 days) and they typically enjoy alfalfa hay. Lambs should have access to creep feed as soon as they come out of the lambing pen. By the time lambs are a week old, they can be found chewing on a stem of bedding straw or stem of the ewes' hay. This area should be dry, well-bedded, and protected from wind drafts.

Materials and Methods

Forty Akkaraman lambs, twins and singles, half male and half female, were used. The animals were divided into two groups: which are creep feeding and control. The experiment began when lambs were first weeks old and finished at weaning at 2 months of age the lambs received hay and concentrate diet ad libitum via creep feeding and were weighed every 14 days. Data were analyzed using independent two sample t-test whith SPSS program for the effect of groups, gender of lamb, type of birth on weights, and survival rates by survival analysis using life lables.

Results and Discussion

There was no significant difference between groups or gender for birth weight, initial weight, 14, 28, 42 and 56th days weights (P<0.05) except for gender for initial weight. There was no significant difference between the two groups receiving creep feeding and control in terms of growth and final weight. Type of lambing was found significant for investigated periods. Survival rate was not affected by gender and lambing type. However, survival rate of lamb was affected by groups, but the animals that died had grown more slowly than those who survived, and males and single born animals grew faster than females and twins. Creep feeding group weaning weight (20.23 kg) was higher than control group (18.33 kg) weaning weight.

Table 1. Weight and survival rate for Akkaraman lambs

Factors	Birth Weight $\overline{X}\pm S_{\overline{X}}$	Initial Weight $\overline{X}\pm S_{\overline{X}}$	14. Day $\overline{X}\pm S_{\overline{X}}$	28. Day $\overline{X}\pm S_{\overline{X}}$	42. Day $\overline{X}\pm S_{\overline{X}}$	56. Day $\overline{X}\pm S_{\overline{X}}$	Survival Rate (%)
Groups							
Creep Feeding	4.97±0.204	6.95±0.260	9.64±0.386	12.99±0.549	16.93±0.720	20.23±0.805	100.0
Control	4.78±0.204	6.94±0.296	9.37±0.296	12.72±0.474	15.68±0.543	18.52±0.146	80.0
P Value	NS	NS	NS	NS	NS	NS	*
Gender							
Female	4.77±0.173	6.62±0.195	9.13±0.277	12.46±0.426	15.64±0.578	18.59±0.644	85.7
Male	5.10±0.221	7.26±0.235	9.87±0.380	13.42±0.562	16.98±0.686	20.15±0.912	94.7
P Value	NS	*	NS	NS	NS	NS	NS
Type of lambing							
Twining	4.30±0.149	6.40±0.203	8.45±0.257	11.00±0.301	14.24±0.452	17.00±0.601	85.0
Single	5.37±0.148	7.32±0.193	10.22±0.259	14.12±0.322	17.73±0.489	21.00±0.635	95.0
P Value	**	**	**	**	**	**	NS
Overall	4.94±0.141	6.95±0.161	9.50±0.241	12.85±0.458	16.31±0.458	19.37±0.567	90.0

* P<0.05, ** P<0.01: significant, NS: nonsinifcant

In this study, it was determined that overall birth weight of kids was 4.94 kg. This value was higher than those detected by Özmen et al. (2015) 3.74 kg, Özbey and Akçan (2001) 3.569 kg, Esen and Yıldız (2000) 3.73 kg. In this study, it was determined that average live weight of lambs on 56th day was 19.37 kg.

Those values detected in this study were similar Özbey ve Akçan (2001)'ın 95th day (20.726 kg) and lower than those determined by Esen and Yıldız (2000) 16.51 kg and Özmen et al. (2015) 17.27 kg. Our birth survival rate results obtained in this study was consistent with the value of 89.52% (Özmen et al. 2015) and 91.78% (Akaçapınar et al. 2000); whereas, it was lower results (90.90%) that was reported by Çolakoğlu and Özbeyaz (1999).

Conclusion

The period from birth to weaning is important for the growth and survival of lambs. Creep feeding can improve production rates and decrease mortality rate before weaning period in suckling lambs.

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The behavior of Karacabey Merino sheep freely grazed on different pasture types throughout the year

C. Tölü[1], H. Hanoğlu Oral[2], F. Alatürk[3], C. Atalay[1], B. Alaca[3], A. Özaslan Parlak[3] , A. Gökkuş[3]
[1]Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey
[2]Central Research Institute of Food and Feed Control, 16100 Bursa, Turkey
[3]Department of Crop Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

The main philosophy of animal husbandry is the transformation of organic material into animal products, which is not directly assessed by the beliefs. If it can be utilized year round, it reduces the cost of animal products seriously (Tölü et al., 2017). The pasture is produced in both cheap and green periods. In this study, grazing behaviours of sheep were investigated grazing year-round in different pasture types.

Materials and methods

The research has been carried out between 2015 and 2017 in Bandirma Sheep Research Institute. The sheep were grazed in the early spring on triticale and oat grass, in summer on sorghum-sudan grass and wheat stubble, in the autumn again on triticale and oat grass and in winter on natural winter pastures, and in remaining times in natural pastures. 12 sheep (4 sheep x 3 replications) in each pasture type and 24 sheep (12 sheep x 2 application) in total were grazed in pasture types. The first behavioural observations were performed 15 days after placing the sheep in 6 pasture plots. In the following period, their behaviour has been observed with the interval of 3 weeks according to weather conditions. Observations have been done by 4 observers using direct observation of the sheep throughout the day from dawn till dusk. Animals were numbered from 1 to 5 in each pen using different spray colors for recognition easily in records. The behavioral characteristics like grazing, lying, standing, rumination, locomotion and interaction were observed.

The above mentioned characteristics were observed by using time sampling method with 10-minutes of intervals. Behaviors of each animal were recorded as demonstrated and non-demonstrated by indicating “1” and “0”, respectively. Generalized estimating equation (GEE) appraoch for binomial distribution-based repeated measures were used for data analysis. In statistical models created for each behaviorial characteristics, pasture type, year (1, 2, 3) and interaction of pasture x year were included as fixed factors and animal were included as randomized factor. WALD chi-square test has been applied in post hoc analysis.

Results

Grazing the behavior of Karacabey Merino sheep showed statistically significant differences in the plots of natural pasture in spring, while sorghum-sudan grass and wheat stubble pastures1 in summer ($P \le 0.05$). The sheep had a higher grazing frequency in wheat stubble and nasturel pasture2 (Figure 1). According to grazing observations, the lowest grazing behavior (27%) has been noted in natural pasture in spring while the highest grazing behavior (88%) has been recorded in natural pasture in autumn.

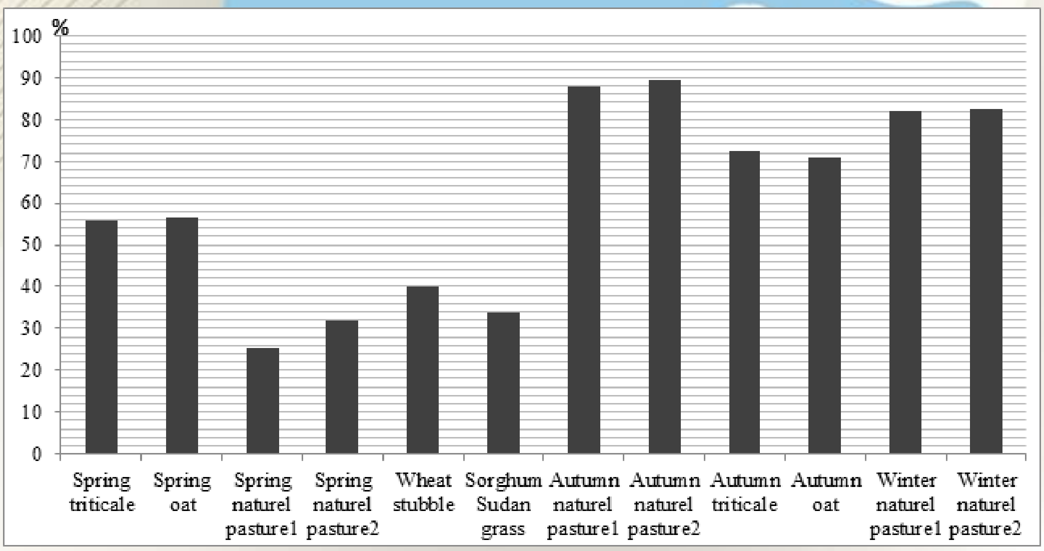

Figure 1. Grazing behavior of Karacabey Merino sheep in pasture types during the year

Conclusion

The Karacabey Merino sheep were found to graze in morning and evening hours, while the rest of the day spent by resting in summer when air temperature highly increased in day hours. So, it is concluded that sheep prefered to take rest instead of lying in its resting seasons when the animals relaxed and then they found minimized their grazing behaviour when the ground of pasture was found damp in rainy season.

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The occupational health and safety for berivans and shepherds in the nomadic small ruminant husbandry

T. Aygün[1], C. Erkan[1], K. Karakuş[2], H. Çelikyürek[2]
[1]Faculty of Agriculture, University of Van Yüzüncü Yıl, Tuşba, Van, 65080, Turkey
[2]Gevaş Vocational High School, University of Van Yüzüncü Yıl, Gevaş, Van, 65700, Turkey

Introduction

The small ruminants husbandry is indispensable and an important source of income for indigenous people of the nomadic life in Eastern Anatolia. In small ruminant husbandry, the settlement system, highland sheep farming, and migrating sheep farming are among the most common breeding systems. The husbandry of sheep and goat in Eastern Anatolia has been adapted to regional differences, and has been characterized by the prominence of different applications. In the highland sheep husbandry, sheep flocks are removed to the highlands with cool and plenty of grassy plains by pressing hot and dry towards the end of spring. For a period of 3-5 months, sheep remain in control by shepherds in the highland. Sheep herds usually consist of 300 to 500 heads. Each sheep is composed of lots of different people with a lot of expenses, depending on the number of animals contributes. Sheep herds are taken away the summer ranges by grazing or by road transport. After the weather cools down, animals go back to the villages or the farms in the plain. The berivans play the most important role together with the shepherds during the birth and lactation period (Aygün and Demir, 2015; Aygün, 2017).

The risk factors that the livestock workers faced vary according to the sector. In sheep-goat breeding, the most important task in the care-feeding and management of animals falls into berivans and shepherds.

It is true that more occupational health and safety intervention research focusing on preventing illness and injury needs to be conducted. It should be an integral part of a large-scale research agenda that uses a variety of intervention types and conducts research in various industries and occupations. Conducting this type of research is difficult and time-consuming; however, without increasing the number and methodological rigor of these studies, it will be difficult to identify effective intervention methods and confidently encourage their use (Goldenhar and Schulte, 1996). Livestock production is associated with a variety of occupational illnesses and injuries.

This review concludes that more education about musculoskeletal disorders, general problems, zoonotic deseases and prevention is needed, and authorities serving rural communities are a critical link in providing this information. In order for authorities to address the educational gap, we recommend greater collaboration with zootechnical engineer schooled in occupational health and safety of berivans and shepherds, and animal production.

In this article, it has been discussed issues related to the berivans' and the shepherds' the occupational health and safety in nomadic small ruminant husbandry. The occupational diseases and the work-related accidents encountered those in the plateau have also been emphasized.

This information has been prepared based on the personal observations and the experiences directly in the local area.

What is nomadic life? Nomadism is a lifestyle that prevents tribal members from exploiting innovations and opportunities in areas such as education, health, technology, and communication. In short, nomadic is a traditional group which is;

-in a fixed land and not connected to the land,

-only livestock breeding,

-to find better pastures for the animals from the green grass to the steppe and from the steppe to the green grass according to the season and vegetation,

-living with tent life,

-who has a very or slightly closed economy,

- closely related to the kinship,

-who chooses to connect to a chef, and

-lower literacy rate.

The agriculture from Turkey's various economic sectors is one of the most important. Livestock activities in agriculture occupies an important place in the economic long time. One of these livestock activities is small ruminant husbandry. Sheep and goat production systems in Turkey depend on factors such as the natural and socio-economic conditions of the regions, the availability of feed resources, the connection to plant production, and the consumption habits of the population.

These are systems of the stock breeding, the highland sheep husbandry, and nomadic or semi-nomadic livestock breeding (Aygün and Demir, 2015).

In the highland sheep husbandry, sheep flocks are removed to the highlands with cool and plenty of grassy plains by pressing hot and dry towards the end of spring. In order to get more abundant the products such as milk, cheese, wool and so on, the people of the region have to go to the highlands with the arrival of spring animals to find better grazing and water areas. With the arrival of spring to the first zone in the region is exited. With the start of the cold days of autumn return to the settlements again (Aygün, 2017). The migrant or nomadic population in rural areas is generally divided into two groups: the first is the family units that travel frequently and have a number of needs. The second group is composed of families who live in residence and migrate seasonally compared to other immigrant groups.

The importance of a berivan and a shepherd in nomadic life Berivan and shepherd workers are inseparable parts of each other. They are the most important workers of highland and nomadic animal husbandry. Their ages may range from 10 to 70. Berivan is called as women milking the ewe and the nannie. Milking in migrant small ruminant breeding systems is done by berivans. Berivans are not the only ones who are responsible for sheep milking. They are laboring at all stages of the processing of the obtained plumbing. Berivans and shepherds have many challenges for in nomadic small ruminant husbandry (Aygün, 2017).

Berivans and shepherds are one of the most underserved and understudied populations in the Turkey. One characteristic of the traditional nomadic lifestyle group is that berivans and shepherds themselves are certain fixed tents that they find themselves under dangerous conditions and for long hours.

Livestock workers perform strenuous tasks and are exposed to a wide variety of occupational risks and hazards. Low socioeconomic status and poor access to health care also contribute to existing health problems in this population. Potential farm work-related health problems include accidents, pesticide-related illnesses, musculoskeletal and soft tissue disorders, dermatitis, noninfectious respiratory conditions, reproductive health problems, health problems of children of farm workers, climate-caused illnesses, communicable diseases, bladder and kidney disorders, and eye and ear problems. Few epidemiologic studies exist of these occupational health problems.

Although the migratory nature of this population makes long-term studies difficult, the development of standardized data collection instruments for health consequences and scientific assessment of farm work exposures and working conditions are vital to characterize and reduce the occupational health risks in farm workers.

Small ruminant husbandry is a major industrial sector in the Eastern Anatolia of Turkey and relies heavily on migrant and nomadic farm life.

The occupational health and safety for berivans and shepherds As with various professional groups in the agricultural areas of occupational health and safety is of vital importance. Occupational safety and accident risk factors of revealing awareness of breeders are not yet fully come to avoid. For employees in the livestock farming and the practical fields, to do risk analysis in advance for taking necessary measures is very important for occupational health and safety.

The work related practically to crop and livestock production to ensure safety and to prevent accidents at work is important to take necessary precautions. Working in such an environment and in a certain direction breeders who want to generate income by producing work-related accidents are often unavoidable health problems and even death can occur. In addition, animal husbandry that may arise in the future should be noted that the risk of contracting an occupational disease. Therefore, the elimination of all kinds of risks which can lead to the accidents at work and the occupational diseases is extremely important for the future of employees' material and moral (Aygün, 2015).

Occupational diseases and accidents that can be encountered by berivans and shepherds have caused the losses of very serious economic and the qualify persons in nomadic husbandry. In addition, the sustainability of this life culture is negatively affected. Therefore, the precautions related to the occupational health and safety must be taken for the berivans and shepherds at the nomadic small ruminant husbandry and the field. In Turkey, it is not possible to say that the preventive measures on the occupational health and safety in livestock husbandry are still sufficient.

The hazards and the risks for berivans and shepherds The hazard is anything that has the potential to harm. Hazard can affect the person, the material and the process. Also, hazards can cause accidents, diseases, loss of product, and machine damage etc. The occupational risk refers to the combination of the likelihood and severity of an injury or illness resulting from exposure to a hazard. Workers who are away from social habitats and who work in the hills may be exposed to allergies or poisoning caused by the attack of various wild animals, such as bee or insect bites, as well as plants grown in the spring, pollen of fungi or various flowers. Employees are camels exposed to the sun because the work area is mostly open space. Therefore, excessive exposure to sunlight can cause dermatological problems.

Zoonosis is naturally called vertebrate animals to humans, and humans to animals to diseases or infections. Other health and safety risks include skin problems, hearing loss, stress, and mental well-being issues particular to farming and the rural way of life. Occupational skin disorders are common in livestock workers. The effects of sun exposure are an important cause of morbidity in berivans and shepherds group.

Since livestock workers spend a great deal of time outdoors, they are at risk for physical stress from excessively cold and excessively hot environments. The magnitude of heat and cold stress problems in agriculture is not well documented. Tolerance to such environments varies among individuals and may be difficult to predict. Livestock workers should be provided the means to compensate for extremes of temperature. For example, adequate water supplies while working outdoors in hot climates are essential.

Berivans and shepherds' lung is one of many forms of hypersensitivity pneumonitis. This problem is becoming rare, which is likely due to the reduction of exposure to organic dust from the increasing mechanization of agriculture and the effect of livestock health and safety programs (Von Essen and McCurdy, 1998).

Another danger for berivans and shepherds is the waste of animals. Animal wastes are frequently stored underground and are a source of toxic gases. Entering confined spaces used for manure storage can lead to fatalities, which are often caused by hydrogen sulfide exposures (Von Essen and McCurdy, 1998).

Data on work injuries are not as readily available for berivans and shepherds in the nomadic small ruminant husbandry as for workers in other industries. Because it is difficult to keep such statistics. The number of farmers in the Turkey affected by pesticides is unknown. Little is known about the extent or magnitude of chronic health problems related to occupational exposure to pesticides. Although difficult, it is important to carry out further studies on the adverse health effects associated with pesticides among farm workers.

Migrant farm workers have exposure to other hazards that may increase their risk of health problems: climate-dependent problems, such as heat stroke or cold shock, and occupationally caused infections such as anthrax, ascariasis, encephalitis, leptospirosis, rabies, salmonellosis, tetanus, and coccidioidomycosis.

Sensory problems are common: eye problems, caused by irritation, infection, or injury from the wind, sun, dust or soil, agricultural chemicals, debris ejected from farm machinery, and allergic reactions to plants, and hearing problems due to noise from farm machinery and cannery work.

Some suggestions and possible precautions It is extremely important that the breeders and the organizations engaged in animal husbandry have knowledge of occupational health and safety. The nature of nomadic small ruminant husbandry requires organization that is its own appropriate in accordance with local conditions for the occupational health and safety. These organizations should be units that are tried to be prevented by determining at the source of the danger. For this aim, the risks at work should firstly be determined. Then, solution suggestions should be presented to remove or minimize these risks.

Zoonotic diseases are one of the most important problems of berivans and shepherds in nomadic animal husbandry. Workers (berivans and shepherds) and animals must be vaccinated against various zoonotic diseases.

The rules of order and hygiene must be take into accounted during the milking and the shearing of the animals. Improved water supply should be combined with improved sanitation, special needs of berivans, and a separate toilet in each household to facilitate personal hygiene.

These approaches are necessary to obtain the cooperation of nomadic workers and their employers so that occupational exposures and protection as well as health consequences are accurately and completely ascertained. In addition, information about health effects should be obtained in a way that is not only culturally sensitive but also meaningful to study participants and yet comparable to that obtained through standardized instruments. Undertaking studies of occupational health risks in this population with these considerations will not only contribute to the understanding of such risks but can also further preventive efforts and lead to better health in this high-risk population. Effective prevention can reduce suffering and death and contribute to enhanced productivity in the workplace. In this way, both the employers and the employees gain.

Taking precautions for occupational health and safety are very difficult, costly and time consuming. Among the difficulties is the varied nature of agriculture, the many ethnic groups engaged in the activities, the traditionalist view of farming families, and rapidly changing technology. Also, not all agricultural activities carry the same risk, and, as noted above, there are many special populations that must be considered.

Conclusion

There are many factors which limit the economic efficiency for production. One of them is production losses due to the workplace accidents and the occupational illness. The issue of occupational health and safety in animal production is very important as it is in many other areas. Occupational diseases and accidents that can be encountered by livestock workers at business have caused the losses of very serious economic and the qualify person in animal production (Aygün, 2015). In addition, the sustainability of production is negatively affected. The most common hazards at the animal production in Turkey are the zoonotic diseases, the ergonomics, the noise, the air conditioning, the chemicals, the animal attacks, the bites, the injuries, the accidents in transport, the psychological stress and, the skin-borne diseases etc. Especially, the animal hitting and the zoonotic diseases are very important in livestock husbandry. Therefore, the precautions related to the occupational health and safety must be taken for the workers at the livestock enterprises, the field, and the factories such as the feed, the skin, and the meat (Aygün et al., 2018). There are a number of characteristics of Turkish agriculture that need to be acknowledged for an effective occupational health and safety response to the farm injury or illness problem. In Turkey, preventive measures have started to be taken on occupational health and safety in livestock production.

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The false perceptions of slaughtering and halal certification in chicken meat production in Turkey

M. Sarıca, U.S. Yamak, K. Erensoy, M. Noibandiguim, E. Cilavdaroğlu
Faculty of Agriculture, Department of Animal Science, University of Samsun, Turkey

1. Introduction

Today, the poultry sector has been the most developed part of agricultural production, with the effects of its related fields. Genetics, breeding, food industry, slaughterhouses, and advanced processing equipment industry, eggs and egg products industry, incubators, healthcare, pharmaceutical and vaccine industry, marketing, improvements in housing and husbandry systems has created a fast-growing production (Sarica et al., 2014).

Advances in breeding, feeding, breeding techniques and disease control have caused the increases in yield. Hybrids have been developed which reached to 2-2.5 kg slaughter weight in 6 weeks with feed conversion ratio of 1.6-1.8. Increase in poultry meat production between 1970 and 2018 has been more than beef, pork and sheep meat in the world. Poultry meat production continued with a growth trend, despite the economic developments and problems occurred in chicken health, there has not been a change in output growth. It is thought that this trend will continue in the future (Fernandez-Lopez, et al., 2010; Sarica et al., 2014, Sarica et al., 2017).

Turkey has been in the 22 ranks in 1970 and 1980, in the 18 ranks in 2000 and 22 again in 2005 and 20 in 2012. Serious production increases occurred and have been in the ranks of 8-10 between 2012 and 2018 (Anonymous, 2018; Besd-Bir, 2018).

The high investment cost of slaughterhouse requires integration in the chicken meat production system. This makes a healing effect on product standards. However, animal welfare directives, consumer demand, social pressures, the impact of alternative production systems, demands for compliance with the belief in the sector can influence the consumption of chicken meat. Criticism with false information about products without restriction in the media could negatively affect the consumption of chicken meat which is prohibited by any religion and belief system (Avec, 2007). Broiler production which has a 95% share in total chicken production is mainly affected by this negativeness. In this paper, false perceptions of pre-slaughter practices, stunning, slaughtering and plucking were given and evaluated in terms of halal standards.

2. Stages of slaughter in meat chicken production

Pre-slaughter, slaughter, and post-slaughter processes are similar with some minor differences in most countries (Sarica and Erensayın, 2014; Sarica and Yamak, 2015).

1. Pre-slaughter process

    -Fasting period

    -Collecting chickens

    -placing to cages in transport vehicles

    -transport

2. Process in slaughterhouse

    -holding

    -placing to slaughter line

    -stunning

    -slaughtering or bleeding

    -pre-plucking

    a. scalding

    b. softening of feathers with steam

    -plucking

    -chilling and maturing

    -removing head

    -removing respiratory tract

    -removing non-edible inner organs and cleaning

    -removing edible inner organs, dressing of gizzard

    -washing and cleaning

    -removing feet

    -chilling

    -degrading, picking, packing

    a. whole carcass packing

    b. carcass parts packing

    -transport to markets

    -Freezing

    -Shocking

    -long period storage

It is important all stages of slaughter to be hygienic, plucking of all feathers and chopping carcass parts without diminishing (Barbut, 2002; Becker, 2002).

There are significant differences between slaughter houses in these rules. But, there are high standards in slaughter house of chicken production in international trade. In some slaughter houses, it is possible to slaughter 6000- 40000 chickens per hour in a slaughter line.

3. Process of chicken slaughtering stages, questions, and false senses

3.1. Fasting period: Feed has to be removed 8-12 hours before slaughter or 1-3 before collecting chickens according to transport duration. By this way, chickens arrive at slaughter house 12 hours after the last feeding. Thus digestive tracts of the chickens become empty and, the carcass is protected to merge with feces. Increasing fasting period causes mucosa losses in intestines and slaughter losses to increase. Water has to be given until collecting

Fasting period longer than 24 hours does not apply in terms of animal welfare. This is controlled by regulations. Inadequate fasting period means feed to be in digestive tracts and become waste. Digestive tract has to be empty for slaughter hygiene and gizzard dressing. There is not a complaint about this stage except drawback of animal right activists about fasting period.

3.2. Placing to transport vehicles and transport: chickens have to be placed carefully to cages without throwing and dropping. According to distance, transport has to be done at nights or in the early morning. Transport has to be done by trucks with two open-sided. Transport could be done by trucks which have a watering system with reducing temperature and humidity, according to regulations. Transport losses could change according to temperature, transport duration, chicken weight and stocking density in transport cages. 1-3% transport losses are in acceptable limits.

No problems occur if procedures apply to collecting chickens. Thirst during transport adds to the fasting period. Weight loss, stress and welfare problems related to transport vehicles could be seen. These could be controllrd by regulations. There is not a complaint about this stage except animal right activists.

3.3. Holding in slaughter-house and placing to slaughter line: holding areas could have enough capacity and ventilation. If chickens could be placed to slaughter line directly, no problem occurs. These could be controlled by regulations. There is not a complaint about this stage except animal rights activists (long holding period, accumulation, congestion, mortality etc.)

3.4 Stunning: Stunning of chickens before slaughter grounds on two reasons. Firstly, it causes relaxation of muscles, increase in bleeding and easing remove of feathers. Second is to prevent flapping, making slaughter painless by decreasing mobility and human dimension. It is easy to cut blood vessels and respiratory tract of stunned chickens (Alvarado et al., 2007). Stunning levels of the chickens is formed by a regulation in EU countries (1993/119/EC). Electrical current, gas and mechanical stunning could be used in stunning (Fletcher, 1999; Barbut, 2004). Electrical stunning is more common than the others because mortality is higher in the other two methods.

The technology of this practice has been standardized (Bilgili, 1999). Electrical current used in stunning allows standardization of work, easy slaughtering and an increase in bleeding. It is easy to use, responsible and cheap (Bilgili 1992; Fletcher, 1993; Bilgili, 1999). Current causes temporary coma and chickens return to normal for a while. If the current is low and the duration is short, chickens could feel pain during slaughter (Fletcher, 1993; Heath and ark., 1994). If the heart stops during stunning, these chickens could not be food anymore.

Dry and wet systems are used in stunning. In a dry system, chickens hit the wire which has current. In a wet system, the current has given to water pool and the beak of the chickens drip to pool. If the duration of stunning or current increases, wings could break, skin becomes redder, bones could break, feathers could not easily remove and bleeding decreases (Gregory and Wilkins, 1989). Different currents used in poultry species in EU are given below:

Table 1. Different current levels and duration used in EU for poultry species

Species	Water pool	Steam tunnel/Dry system
Chickens	100 mA	240 mA
Turkeys	150mA	400mA
Minimum duration	4 seconds	3 seconds

Some groups refuse stunning because of causing mortality and not being a halal slaughtering method. But it is reported electrical current of chicken slaughtering in halal standards to be between 0.25-0.50 A (250-500 mA). No mortality, no decrease in bleeding are the other points in this standarts.

3.5. Slaughter or bleeding: Stunned chickens which are hanged on a line are individually slaughtered by automatically or manually. Cerebral death occurs after 2 minutes (Stevenson, 2001). The blood ratio of chickens is higher than other species and is around 10% of body weight. 40-60% of blood flow during slaughter.

This flowing occurs around 60-90 in electrical stunning and increases to 2-2.5 minutes in gas stunning (Hoen ve Lankhaar, 1999). All tissues and vessels on the neck to the spinal cord are cut in slaughter, bleeding increases by this way. Chickens hold on line by 2-3 minutes and 35-50% of blood flows in this duration. The carcass appearance becomes red after plucking if the bleeding shortens. There are different opinions on the properties of the person who slaughters the chickens. Halal standards require him to be Muslim and basmala. There are also some opinions except Halal standard that needs good fearing which is impossible to evaluate. Also, there is an opinion which does not accept automatic slaughtering. In halal standard, automatically slaughtering is accepted if the person starts the systems is Muslim and is on business. In our country, all of the slaughter is performed manually. Bleeding duration is 180 seconds in Halal standards. Slaughter houses have a halal certificate in Turkey.

3.6. Pre-plucking scalding/wet plucking: After bleeding, bodies are waited in hot water for a while for easy plucking. There are two ways of in scalding. One is passing chickens through hot water and the other is spraying hot water on chickens. This is called scalding, and marketing problems occurred in Turkey because it is thought that chickens are cooked before evisceration. This practice is to plucking bodies to hot water at the temperatures of 50-60°C (53°C in common practice) for 60-90 seconds. Circulation of hot water is applied to change the water inside and decayed wastes are removed from the system. A temperature of water is automatically controlled. Recommended water temperatures for easy plucking are given in Table 2.

Table 2. Water temperatures for pre-plucking scalding.

Practice	Water temperature (ºC)	Duration (s)	species
Hot scalding	>60	45-90	waterfowl
Medium scalding	54-58	60-120	mature chickens
Lower scalding	50-53	60-180	Broiler and young turkeys

If the water temperature and duration increases plucking could be easier. But deformation on skin, breaking of bones could be seen. On the other hand, yellow color of skin could be missing.

Also, increasing water temperature causes high costs (Cason et al., 2001). Therefore, it is recommended water temperature to be lower in broiler scalding.

3.7. Softening of feathers before plucking/ dry plucking (Aeroscalder system): The feathers of the chickens soften by passing through hot steam (70-80°C) tunnel.

Cross contamination does not see because chickens are not plugged into the water. Studies showed that lower bacteria seen in steam softening than scalding (Patrick et al., 1972). Natural color of skin does not miss. Water is also saved.

Scalding and passing through the hot steam tunnel are both aimed the same thing. There is no difference between plucking methods. In both systems, feathers are removed by spiral plastic fingers. While scalding process, most of the bacteria which cannot resist hot water die during plunging to hot water, on the other hand, resistant ones infect to all carcasses (Sarıca and Sarıçiçek, 1993; Dickens et al., 1999).

Scalding with hot water before plucking is a subject that some idea defends that carcasses plucked by this way are not suitable for consumption. There is an opinion that scalding with hot water before evisceration contaminates carcass with intestine content. The water temperature has to be 99-100 °C for boiling. İt is impossible for tissue to continue its own appearance at this temperature and skin and meat tissue is damaged. Also, it is a fact that intestines are empty because of the fasting period.

Alternative practice, softening with a steam tunnel is similar to scalding practice. The only advantage is to protect wastes on feathers to contaminate other birds. An only problem in this system is to constant the temperature in the steam tunnel. Both methods are suitable for halal slaughtering standards.

It is important not to confuse pre-plucking methods and plucking. Older chickens could be sold with high prices with dry or wet plucking method differences.

4. Result

Slaughtering stages like evisceration, degrading, packing etc. are not negatively considered by any country or religion. Also, it is not a problem by Muslims. The rate of Muslims in Turkey is around 99 to 99.5%. Slaughter of chickens is performed by Islamic senses the same today as it was yesterday. All slaughter houses are controlled by the Halal standard system. These rules are originated from the countries Malaysia and Indonesia and the notification of “General Guidelines on Halal Food, 2011” of Organization of Islamic Conference and formed in Turkish Standards TS OIC/SMIIC 1 in December 2011.

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Difficulties of taking supports and ethical committee approval in animal science studies

M. Sarıca, U.S. Yamak, K. Erensoy

Faculty of Agriculture, Department of Animal Science, University of Samsun, Turkey

1. Introduction

Even though relative increases in the sources allocated for researches, the rate of utilization differs for every field. The share of animal science research resources in total agricultural resources decreases with various reasons. As well as resource lack, some applications which started with sympathy for improving research projects have now been a handicap for the projects. The most important one of these is ethical committee approval and unfortunately, there are differences between the central ethical committee and local ethical committee implementations for getting this approval. It is seen that all fields, except animal rights and welfare, of the projects were investigated and difficulties were raised against profession fanaticism even in production studies. Same committees are investigating all projects which contain the animal, this increases the workload density of the committees and causes prolonged the duration of the projects.

Except for private sectors and international supports, projects are mainly supported by Ministry of Development, development agencies, Ministry of Food, Agriculture and Livestock (Tagem), Scientific and Technological Research Council of Turkey (Tubitak), provincial special administrations, some municipalities and most universities. When considered the limited supports of universities, Tubitak is seen as the most important public enterprise which gives support to the projects. Serious difficulties have been in recent years in the assessment process of animal science projects for using this resource. In spite of the arguments that panel system is the most proper for the assessment of projects, fully enclosed assessment process causes the assessment reports to be interrogated. In this system, some wrong assessments could occur without giving the right of defense to the project coordinator.

In this paper, it is tried to make scientific consideration of the subjects which causes to decrease the will to work for the researchers who spend lots of time and labor to prepare projects.

2. Taking of ethical committee approval and problems

Ethical committee and certification haves been requested within the last 10 years in our country in the researches related to animal science studies.

This issue which is important in terms of animal welfare and various applications to animals (surgical procedures, blood collection, sampling from the digestive tract, giving toxic substances or drugs and using animals as test material for human and animal health) making the project difficult.

Projects have been started to be evaluated with the units established in the universities, which are generally given to the local ethical committees in provinces. In the beginning, the ethical committee documents for preparing very detailed preliminary projects are demanding a lot of unnecessary documents while being partially simplified. Some of these;

- An obligation to receive a certificate of animal science studies for researchers,

- Regulation of courses for these certifications to focus on surgical researches and intensify on areas of animal health,

- Challenging researchers to submit projects because the courses are not repeated at frequent intervals,

- An ethical committee report is also requested for the researches related to the processes that the producers have carried out such as management (production), feeding, breeding researches. In addition, restrictions may be imposed on the number of animals in these studies and in some cases, even economic analyzes may be required.

In order to overcome these problems, it is possible that the ethical committees are divided into sub-groups, standard management and feeding studies cannot carry the conditions required for surgical applications. In this respect, there are huge differences in terms of local ethical committees. In some provinces, results can be obtained immediately with an official writing, while some of the applications and results can be obtained in 2-3 months.

Another difficulty is the request for an ethical committee approval, which is recommended for research by the institutions receiving the research application. There are no ethical committees at many universities or provinces. Research support institutions that require this requirement also have differences from time to time to comply with this standard.

In order to overcome the problems, the certification courses for animal science studies must be opened separately surgical applications, toxicity tests and management, and the process of certification of researchers should be accelerated every year. Three separate units should be established under local ethical committees. These should be surgical research, toxicology trials and management commissions.

Projects with standard management applications should be separated from others in this way and project applications submitted to the ethical committee should be limited to the material-method only. The provinces/research institutions that do not have an ethical committee in their own right should apply to the nearest ethical committee and accept documents and research supporting units.

3. International project applications and problems

International project applications are not widely used because of the preparation phase or a large number of procedures. In order to disseminate the use of these resources, TUBITAK and other institutions are involved. However, it still has not been possible to obtain outsourcing at the desired levels. It is not possible to say that these projects have been used effectively, especially with the use of EU projects in making joint projects. The effective use of these resources depends on promotional and informative practices.

4. Private sector supports and problems

The private sector mostly supports the project to solve a problem in its own field. The share allocated to private sector AR-GE investments in our country is extremely inadequate. Even if it contributes to research projects, support based on more utilization of public resources is being used. Nevertheless, the contribution of government resources to research and production has added more to the private sector in recent years. Projects in animal management field in particular issues (parent material production, health protection, product quality, etc.) may be more involved with private sector workers. Encouraging AR-GE investments for this will also be effective.

5. TUBITAK supports and problems

TUBITAK projects are the most effective source of animal science studies during the project in terms of ease of implementation, the speed of making expenditures and quality of research. Although most applications are under different titles, the most preferred are research projects with 1001 code.

Despite the positive aspects of the panel system, which has been applied for a long time in TUBITAK projects, there are many negations. In particular, the rules that are applied in inviting the panel and the commission that is generated according to panel managers can work to reject the project. Projects focus on basic issues such as original value, feasibility, and widespread impact level. A project that is not original in one period can be accepted in another period. This brings about the acceptance of the incoming project depending on the chance in the panel.

In some panels, even the standard professional information is questioned and the project is rejected, which removes the desire to make a project. In some panelists, the project maker/organization gives up the application altogether because of the professionalism, jealousy and misrepresentation of the project. The answers to the objections are the ones that mean "we are always right" that do not pass a few sentences.

The simplest way to do this is to listen to the project proposers after the panel results. Loss of time due to the misunderstanding of some subjects and strict attitudes of panelists can be prevented. On the other hand, it is a matter to consider when calling to the panel who has never been involved in the project.

6. Support of other public institutions and problems

The Ministry of Development, the Ministry of Agriculture and Forestry and some other indirect institutions provide direct or indirect support to animal science studies. In particular, the Ministry of Agriculture and Forestry is giving priority to public rehabilitation work and support for applied researches under the support of TAGEM. Of these project supports, the budget for AR-GE support projects has been greatly increased in 2018, but it has been imperative to conduct with the private sector. The most important problem in the implementation of the projects is that the expenditures are made in advance and the payments are carried out twice a year. This situation raises the prices of the inputs used for the project and causes great difficulties in purchasing. These projects will be given to the related institutions as well as the TUBITAK implementations and it will be more accurate in terms of the effective use of the budget and the researchers.

7. University supports

Project support and research infrastructural support programs under different titles at universities are carried out in Scientific Research Projects (BAP) unit. In these supports, it is not possible for serious research to be carried out because the support of the post-graduate studies is usually very low budget.

More resources are being provided to the units provided by the BAP resources, infrastructure support and other scientific activities are also being sourced from this area.

Another problem is that BAP projects are not accepted in academic performance indicators. This situation directly denies the University itself. Instead of removing some of the negativity, a wholesale approach can reveal an academic structure that is increasingly disconnected from research activities.

8. Results

Ethical committee approval problems in the projects, difficulties in finding resources for the project, and difficulties in running the research infrastructure are gradually reducing the zootechnical researches. Long-term studies such as cattle, sheep and poultry breeding are negligible at universities. Short-term livestock studies, broiler feeding studies, quail studies conducted in small units and animal product studies are increasing. Biotechnological studies and bio-statistical evaluations based on laboratory results by taking blood from animals and using some molecular methods lead to loss of labor and resources in research infrastructure and non-continuity of animal material. This situation deteriorates the quality of the research and also prevents the establishment of a sustainable research infrastructure.

9. References

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www.omu.edu.tr, BAP projeleri destekleme ilkeleri

Some behaviour traits of geese naturally and artificially hatched and reared in free-range and intensive systems

M.A. Boz[1], M. Sarıca[2], U.S. Yamak[2], E., Cilavdaroğlu[2]

[1]Agricultural Faculty, Bozok University, Yozgat, Turkey, [2]Agricultural Faculty, Ondokuz Mayis University, Samsun, Turkey

Introduction

Behaviours of animals are the indicators of animal welfare. They are also one of the cruces of sustainable animal production. Environmental differences in poultry production could affect some behavioral and production traits (Sarica et al., 2007). To understand behavior, it is necessary to consider both causes and effects, by investigating its function, evolution, development, and control (Gonyou, 1994).

According to incubation type (natural or artificial), transport of poultry, particularly chicks to brooding machines, could be determined as the first contact to human and the fear they felt during this transport could be the reason for them to be fearful in their rest of lives (Jones, 1987). The first contact to mother in natural incubation could decrease this fear.

Comfort movements such as preening, dust and water bathing, wing flapping and feather ruffling are important to keep the plumage in good condition. The incidence of these behaviors is influenced by the availability of space and substrates. They decrease with crowding and are much less frequent in cages (Appleby et al.,1992). Preening and other comfort behaviors, such as wing flapping, feather ruffling and stretching, are important for keeping the plumage well groomed in both natural and artificial conditions. During preening, for example, the feathers are oiled with lipids from the uropygial gland, which helps to maintain good feather condition, and birds will also dislodge and consume parasites living on their skin, such as ticks while preening (Ostfeld and Lewis, 1999).

Materials and methods

A total of 216 goslings were used in the study (114 artificially hatched and 102 naturally hatched). In two production systems, naturally and artificially hatched goslings were reared in 4 replicates.

Goslings were fed ad libitum with the egg-type chicken feed (190 g crude protein/kg and 11.72 MJ ME, 53.9 g crude cellulose/ kg, 10.0 g lysine, 4.0 g methionine, 11.0 g Ca, 7.0 g P, 120 mg Mn, 15 mg Cu, 100 mg Zn, 3.3 mg retinol, 0.1 mg cholecalciferol/kg) up until 6 weeks and with egg-type chicken growth feed (180 g crude protein/kg and 11.30 MJ ME, 59.3 g crude cellulose, 8.0 g lysine, 4.0 g methionine, 11.0 g Ca, 7.0 g P, 120 mg Mn, 15 mg Cu, 100 mg Zn, 3.3 mg retinol, 0.1 mg cholecalciferol/kg) from 6 weeks to slaughter. Behavioral traits were determined by the same person at each age periods 4 times at 9:30, 11:30 and 15:30. Using outdoor, running, pecking, feed, and water searching, lying and stretching, priding, preening and distribution was determined as behavioral traits. All data analyses were performed using the SPSS software program (Version 20.0)

Results

Naturally hatched geese had significantly higher feed-water searching and lying behavior. Similarly pecking and priding was higher in naturally hatched geese. (Figure 1).

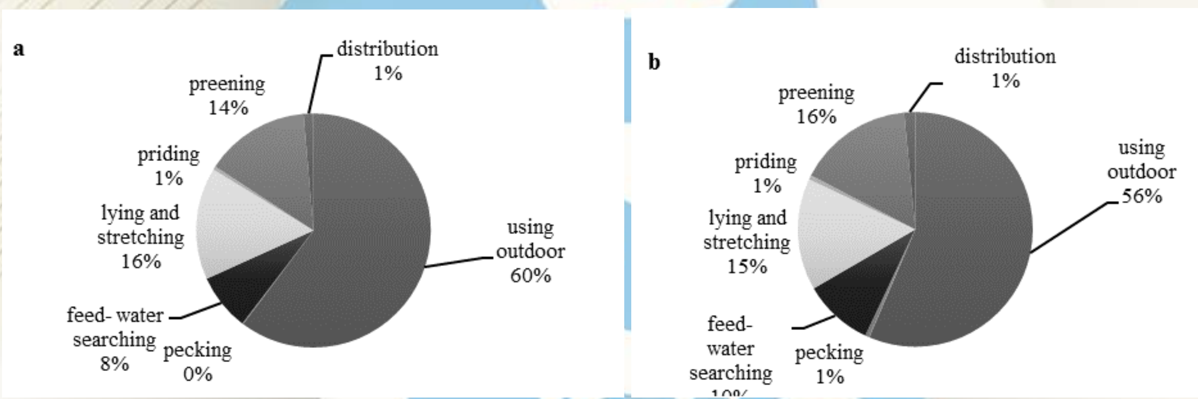

Fig 1. The behavior of geese hatched (a) artificially and naturally (b)

Distribution was better for naturally hatched geese. Feed-water searching, pecking, and preening behavior were observed higher in the intensive system while lying and priding was higher in the free-range system (Figure 2). Collectively, these findings strongly support distribution was more uniform in the intensive system especially at 18 weeks.

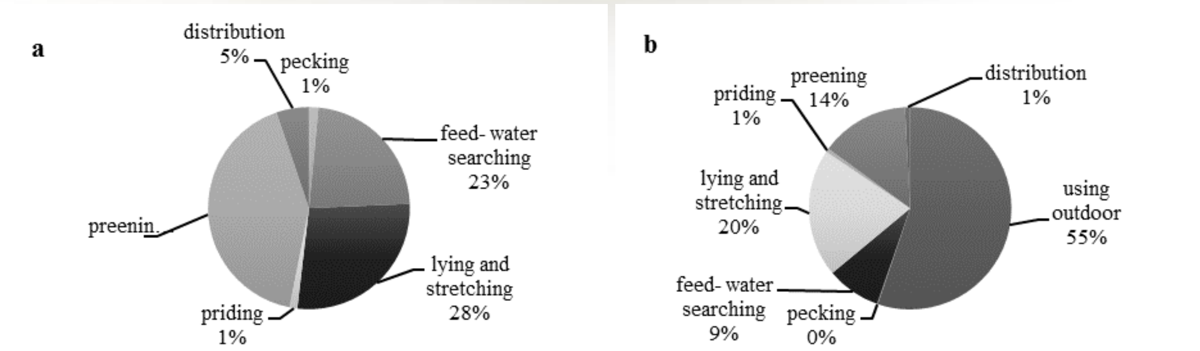

Fig 2. The Behaviour of geese in intensive (a) and free-range (b)systems

Using outdoor, pecking, feed-water searching, priding and preening was significantly affected by age. Using outdoor was higher in the morning (9:30 am), while feed and water searching was higher in the afternoon (03:30 pm).

Fig 3. Diurnal changing in time spent using outdoor and feed- water searching.

Discussion

Use of outdoor was found higher in the morning similar to the findings of Sarica et al., (2007) who found that turkeys used outdoors more than the rest of the day. This could be related to environmental conditions. Factors such as temperature, humidity, and sun could cause stress and they are the indicators of environmental quality (Barbosa Filho et al., 2005). Comfort and activity needed behavioral showed differences similar to other studies (Schütz and Jensen, 2001; Weeks and Nicol, 2006).

Results showed that naturally hatched geese had better welfare indicators but they had higher pecking behavior. Geese reared in intensive systems which had better feed-water searching and preening, however, it had higher pecking behaviour in this systems.

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The Effect of Chicken GnRH (cGnRH-I) on Serum Testosterone Concentration and Fertility in Japanese Quail

H.B. Çiftci[1], S. Aktan[2], V.C. Başkar[2], I. Yıldırım[1], A. Aygün[1]

[1]Department of Animal Science, School of Agriculture, Selçuk University, 42075 Selçuklu, Konya, Turkey

[2]Department of Animal Science, School of Agriculture, Süleyman Demirel University, 3200, Çünür, Isparta, Turkey.

Introduction

It was firstly proposed that a factor from the hypothalamus is released into the anterior pituitary gland to stimulate gonadotropin secretion by Geoffrey Harris, John Everett, and Charles Sawyer between 1930-1940 (Terasawa et al. 2010).This hypothalamic factor was initially named as Luteinizing Hormone Releasing Hormone (LHRH) because of its preferential positive effect on luteinizing hormone (LH) secretion rather than the secretion of Follicle Stimulating Hormone (FSH) (McCann et al. 1960). However, injection of a specific LHRH antagonist suppressed both LH and FSH secretion. Therefore, it was named as gonadotropin releasing hormone (GnRH). It was firstly purified from pig, ovine and bovine hypothalamus (Kochman and Domański, 1969; Schally et al. 1971) and its molecular structure, as a decapeptide, was first explained by Andrew Schally and his team in 1971 (Schally et al. 1971). This GnRH is accepted as mammalian GnRH and designated as GnRH-I. The discovery of GnRH-I led to extensive research in this field and it is still an active area of research. Empirical studies on different protokohordata and vertebrata species have shown the presence of two distinct varieties of GnRH identified in chicken Brain (named as chicken GnRH-I and II). Chicken GnRH-I (cGnRH-I) rather than chicken GnRH-II (cGnRH-II) is considered to be the biologically active neuropeptide controlling gonadotropin secretion (Sharp et al., 1990; Sharp and ciccone, 2005). In addition to these, more than 30 different varieties of GnRH have been identified (Lescheid et al. 1997; White et al. 1998; Latimer et al. 2001). In-situ Hybridisation, Northern transfer, Inmmunehistochemichal and western blotting techniques have shown that hypothalamus and pituitary are not only the places where GnRH and GnRH receptors are expressed, they are also expressed in extra hypothalamic sites such as in Leydic cells, seminiferous tubules, Certoli cells, and in developing germ cells (Bahk et al., 1995; Bull et al., 2000; Ramakrishnappa et al., 2005; Anjum et al., 2012).

The decrease in fertility of aged males results with decreased hatching rate and this lead to the removal of the males from the flock. But, poultry industry is toughly suffering from the shortage of supplying the breeder males. Thus, keeping the genetically superior breeder males within the flock longer, without any decrease in fertility, is economically important. Also, the physiology of mammalian GnRH-I is well known, but there is scarce knowledge about the physiology of chicken GnRH (cGnRH-I). Therefore the objective of this study is measure the effect of cGnRH-I on quail serum concentration of testosterone and fertility.

Materials and methods

Twenty weeks old male (n=64) and female (n=256) Japanse quail (Coturnix japonica), reared from the same hatch at Animal Research and Exploration Centre, Süleyman Demirel University (Eastern campüs, 32260, Isparta-Turkey). During the course of the study, birds were kept in 60 x 35 x 97 cm scattered cages (Cimuka BYK-03-4K, 1214. street, 21/3 Ostim, Ankara-Turkey) under 16L : 8D light–dark cycle and fed ad libitum with a diet supplying 16 % Crude Protein (CP) and 2750 kcal/kg metabolic energy (ME). Birds were randomly divided into 4 groups as Phosphate Buffered Saline (PBS) group, 5 µg cGnRH group, 20µg cGnRH group and group received no injectin (Naturel group, N group). Ecah gorup was consist of 8 replication and each repication made up randomly selected 8 females and 2 males. After a one week adaptation period, only male birds (n=2, from each replication) were subcutaneously injected, once a week (Tuesday at 10:00) for three weeks with PBS (Cat; P4417-100AB, Sigma-Aldrich Co.,3050 Spruce street, St. Louis, MO 63103 USA), PBS containing 5µg cGnRH (Cat; LHRH-012A, CPC Scientific, 1245 Ream wood Avenue Sunnyvale, CA 94089, USA)), PBS containing 20µg cGnRH (Cat; LHRH-012A, CPC Scientific) and a groıp reciven no injection (Natural group, N). One week after the last injection, eggs from each group were weekly collected and incubated in an incubator (Cat; 44194949, Cimuka Hb700c, 1214. street, 21/3 Ostim, Ankara-Turkey) for 11 days. Incubated eggs were broken on day 12 and the numbers of fertilized and unfertilized eggs were determined by looking at the development of embryos. Three hours after the last injection, male quails were individually taken into the abattoir behind the poultry yard and blood samples (about 3 ml) were obtained by cutting the jugular vein with a scalpel blade and poured into 5ml tubes (BD-Belliver Industrial Estate, Cat: 367955, Plymouth U.K.) containing gel and clot activator at room temperature.

Then the birds were decapitated by cutting the neck. Serum was extracted from the clotted blood by centrifuging at 4000 RPM for 10 minutes at room temperature by using a centrifuge (Nüve, NF 200, Serial no: 02.12766, Akyurt- Ankara, Turkey). Separated serum was kept at -30 ºC in a deep freezer and One week after the blood collection, serum samples (n=64) were taken out from the -30ºC deep freezer (Raypa ACH 284, Galileo Equipments, S.L., 28108 Madrid, Spain). Total serum testosterone levels were measured by competitive immunochemistry with chemiluminescence technology (ADVIA Centaur TSTO Ready Pack; Siemens Healthcare Diagnostics Inc. 511 Benedict Avenue Tarrytown, NY 10591-5005, USA). Data were analysed by one-way analyse of variance by using Minitab 15.

Results

Injection of 5µg cGnRH increased serum testosterone concentration over PBS injected group (P=0,036) other differences were not statistically different (P=0,117) (Figure 1). Injection of cGnRH did not caused major changes (P>0.05) in fertility rates (Figure 2). Not important differences were found in fertility rate in first (P=0.574), second (P=0.25) and third week (P=0,387) after the second injection (Figure 2).

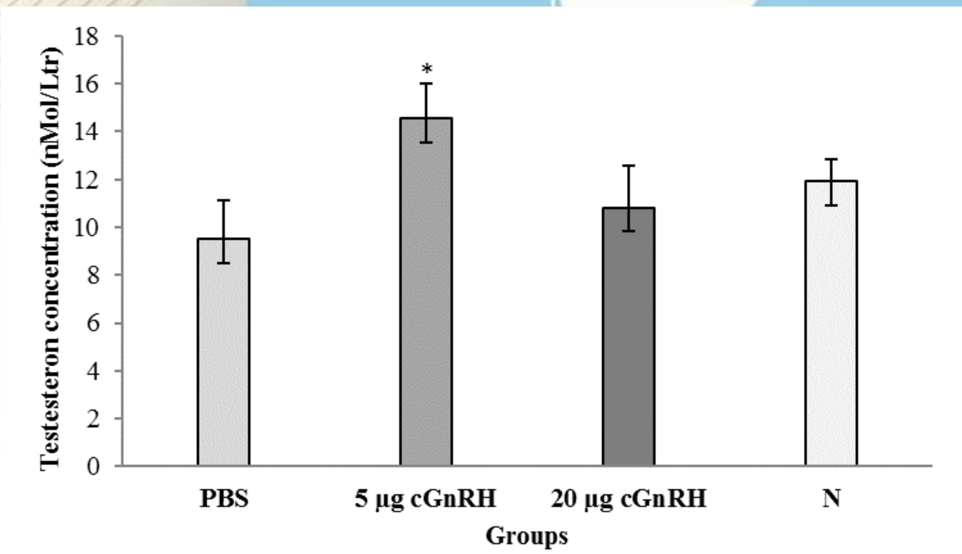

Figure 1. Serum Testosterone concentration of Japanese quails 3h after the injections. Star (*) indicates that the difference is significant (P= 0,036) as compared with Phosphate Buffered Saline (PBS) injected group. Other differences were not significant (P=0,117).

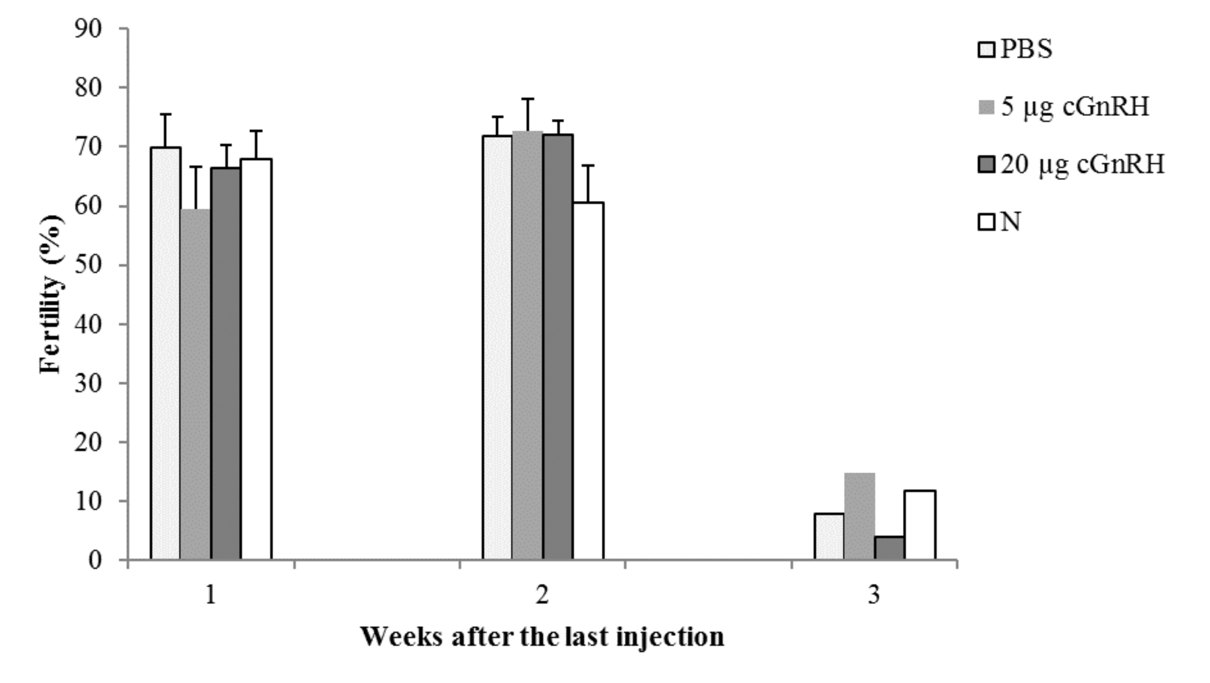

Figure 2. The fertility rates in 1st, 2nd and 3rd weeks after the last injection. Differences were not statistically significant ($P>0.05$).

Conclusion

Injection of 5µg cGnRH significantly increased serum concetrration of testosterone over PBS injectede group ($P<0.05$). Even there is age and dose difference, the simillar result was obtained in 15 to 100 d ay old male quail chicks after the injection of 10 µg cGnRH-I. Injection of cGnRH-1 increased plasma LH and testosterone concentration over the PBS injected control (Qasimi et al., 2018). Here, when the injection dose of GnRH increased to 20 µg serum concentrations of testosterone were non-significantly decreased as compared with 5 µg cGnRH-I and natural goup (N). It is more likely that the testosterone secretion response to cGnRH depends on the dose applied. Low dose (5 µg) has positive effect on serum testosterone concentration, while high dose (20 µg) has negative effect. Figure 2 shows that two weeks after the last incetion of cGnRH, there is a non-significant increaeses in overal fertlity rate as compared to the fertility rate one week before.

Male birds were culled just after the third injection and the absence of males dermatically dicreased the fertlity rate in third week.

In this area, the data are scarce and therefore it is difficult to camapre the present result with the results optained from preliminary sudies. Because, this is the first study assesing the impact of cGnRH on serum testesterone concenetratin and fertlity rate in quail.

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The Liveability and Growth Characteristics of Lindovskaya (Linda) Geese Reared under Local Breeder Conditions

M. Sari[a], A.A. Akbas[b], K.E. Bugdayci[c], M. Saatci[d]

[a]Kirsehir Ahi Evran University, Agriculture Faculty, Department of Animal Science, Kırşehir, Turkey

[b]Mehmet Akif Ersoy University, Veterinary Medicine Faculty, Department of Animal Science, Burdur, Turkey

[c]Mehmet Akif Ersoy University, Veterinary Medicine Faculty, Department of Animal Nutrition and Nutritional Disease, Burdur, Turkey

[d]Muğla Sıtkı Koçman University, Agriculture Faculty, Department of Animal Science, Muğla, Turkey

Introduction

As the effect of livestock supports, different breeds of goose have been introduced to poultry sector of Turkey every passing day. These are mainly Emden and Toulouse from broiler breeds and Chinese goose from laying breeds. One of these breeds is Lindovskaya geese. The liveability and growth characteristics of Lindovskaya geese has not been any research in Turkey. This study is the first study that has been conducted to determine the liveability and growth characteristics in Lindovskaya geese.

Materials and methods

The study was conducted in a private farm in Kibritli village of Ağlasun disctrict in the city of Burdur. Two hundred thirty seven 1-day-old unsexed Lindovskaya goose chicks were used in this study. The study lasted for 12 weeks. Under semi-intensive conditions, the vegetation that they found by searching in the area where they herded and that has feed value was evaluated. The animals were also periodically given starter feed, triticale, lamb feed, corn by product and sugar beet. Nutrient content of forage consisting of industrial residues that was given to the geese during growing period was determined according to the method reported by AOAC (1990). Metabolizable energy level of the feed was calculated using the equation reported by Titus and Fritz (1971). Food and water were offered ad libitum. Live weights of geese were recorded biweekly. The absolute data of weights of body at 2nd and 12nd weeks were calculated by the interpolation method.

Descriptive statistic was used for the data analysis. The results are given as the average ± standard error ($X \pm S_x$). Minitab 17.0 statistical package was employed for the analyses.

Results

The average liveability and live weight of Lindovskaya geese were presentes in Table 1. The liveability of geese 2, 4, 6, 8, 10 and 12 weeks were 92.83, 91.98, 89.87, 86.08, 85.65 and 85.23% respectively. The average live weight and standard errors of Lindovskaya geese were summarised in Table 2. The liveweight of geese hatching, 2, 4, 6, 8, 10 and 12 weeks were 84.16, 313.02, 664.80, 1146.50, 1709.90, 2349.30 and 3030.60 g respectively.

Table 1. The liveability and live weight of Lindovskaya geese

Week	n	Liveability, %	Live weight, ($X \pm S_x$)
Hatching	237	100.00	84.16±0.54
2	220	92.83	313.02±5.17
4	218	91.98	664.80±11.30
6	213	89.87	1146.50±17.70
8	204	86.08	1709.90±21.90
10	203	85.65	2349.30±29.00
12	202	85.23	3030.60±35.70

Conclusion

The 10-week liveability values determined in this study were found to be lower than the values determined by Soloviev Yu (2014) between 94.3-95.3% at 9 weeks of age in Lindovskaya geese. The most important cause of this difference is the origin of the geese, the care and feeding conditions. In this study, the hatching weight, 2, 4, 6, 8 and 10 weeks live weights were found to be lower than the values reported by Imambaeva (2017) as 102.8, 647.2, 1829.1, 2942.4, 3798.3 and 4093.6 g in Lindovskaya geese.

No research has been conducted to demonstrate on the liveability and growth characteristics of Lindovskaya breed in Turkey. This research Lindovskaya with the aim of determining the liveability and growth of the geese is the first study in Turkey.

In this research, live weight values obtained from research (Tilki et al. 2011) conducted in the native geese reared in Turkey were found to be lower than the value of live weight. In order to obtain more accurate results, it is necessary to research Lindovskaya geese under controlled conditions.

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The Effects on Feed Performance and Carcass Features of Chick Quality and Pre-Starter Feed Application in Broiler Chicks

M. Durmuş[1], H. Cinli[1], İ.P. Açık[1], M. K. Tufan[1], H. R. Kutlu[1]

[1] Agricultural Faculty, Department of Animal Science, Çukurova University, Adana,

Introduction

With the increase of the population, it has become inevitable to increase the production of poultry meat and to increase the quality of poultry meat production in order to meet the increasing demand for animal food and to ensure that people are fed on a balanced basis. There are many factors affecting the economy, quantity and quality in poultry meat production (genetic factors, herd age, hatching egg quality, egg collection time, egg storage, hatching temperature, chick quality etc.).

These factors include a long period of time from the feeding of breeding animals to the cutting of chickens. Depending on the effects of all these factors, chicks are produced in different qualities. Among these factors, chick quality is the most essential for high efficiency as it is a combination of all other parameters. Because the quality of daily chicks is very important for a good start and cutting performance in production (Meijerhof, 2009). The present study was conducted to determine parameters to be used in chicks quality classification after incubation and investigate the effects of pre-starter feeding in the first five days on fattening period lasting 35-40 days for chicks classified low and high quality.

Materials and Methods

Experimental chicks after hatching, were divided according to their gender and then divided into two treatment groups as high quality and low quality. Each treatment group was then divided into 2 feeding -groups, which received control and pre-starter feed (promoting the development of the digestive system during the first 5 days, special feed given a total of 100 gr per chick) thus is created from receiving chick four treatment -groups. In the experiment, total 800 chicken were used, which consisted of 5 replicates of each treatment group and consisted of 40 chicks (20 male, 20 female) of each replicates. Feed and water were given to the chicks as ad libitum. The chicks were subjected to weekly weighing to calculate living weight gain, feed consumption and feed conversion rate.

Result

The results of the study showed that live weight in the initial experiment is effect by chick quality ($P<0.05$). However, pre-initiation feeding and chick quality haven't significant effect on live weight gain, feed consumption, feed conversion rate and mortality rate according to findings obtained at the end of the experiment ($P>0.05$). However, the amount and proportion of fat in the abdomen is high in only low quality female chicks ($P<0.05$).

Suggestion

If the accuracy of the methods used to distinguish between high and low quality is supported by new studies to be carried out, machines based on high technology can be produced for hatcheries, to make the job practical and repeatable because it is difficult to determine of quality parameters with manpower, since it is change from person to person and because it is a time consuming job. Prestarter fed group showed higher FCR, and body weight gain particularly in 3rd and 4th weeks. however, this effect was not reflected in the weight of the slaughter. Therefore if the production model is considered to be short-term, it is determined with this study that prestarter feeding system can increase the carcass yield and profitability.

Acknowledgment

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Effect of Using Red Ginseng (Panax ginseng) Root Alcoholic Extract on Some Physiological Performance of Japanese Quail Female

D. K. Ibrahim and N. K. Jabr

Animal production Department College of Agriculture University of Baghdad, Baghdad, Iraq

Introudation

Experimental studies have confirmed the adaptogenic properties, antioxidant of red ginseng and the effects are apparently a function of the ginsenoside saponin glycosides contained in the root (Deng and Zahang,1991; Nocerino, et.al.,2000; Tian and Geng, 2005). This experiment was carried out to asses the effects of red ginseng roots (Panax ginseng) alcoholic extract on some physiological characters of Japanese Quail Female.

Materials and methods

A total of 180 female, 6 weeks old were used, birds were randomly distributed to four treatments with three replicates (15 birds/replicate). The birds were reared in four floor batteries each floor 75X80X49 cm dimension and lighting system 16h light,8h dark, environmental temperature 24° C food and water provide ad-libitum The birds were fed on a standard diet (20% crude protein and 2903 Kcal /Kg metabolizable energy). The experimental treatments were as follows: 0, 50, 75, 100 mg alcoholic extract / L drinking water For T1,T2,T3 and T4 respectively, alcoholic extract was done by using 70% alcohol and the yield of extraction was 1.5%. Packet cell volume (PCV%), lymphocytes(L%), heterophyls(H%), H/L%, protein, glucose, cholesterol, glutathione (GSH), superoxide dismutase (SOD) and malondialdehyde (MDA) in blood serum, liver and heart% weight, the number of Escherichia coli (EC) bacteria in the ileum and colon were calculation.

Results

Chemical analysis of plant roots alcohol extract indicated the existence of phytochemical compounds, Saponins, Flavonoids, Alkaloids, Terpens also chromatographic investigation showed the existence 7 type of the main active compound Ginsenosides Rg1,Ra,Rf,Rb1,Rc,Rb2,Rd,(1.75,2.85,4.07,4.94,5.75,7.23,8.34 mg/ml) respectively.

The results of the study indicated that there was no significant difference in PCV% ,while there was significant reduction (P≤0.05) in T2 and T3 compared to T1 and T4 in H/L% T2,T3,T4 recorded significant decrease in serum glucose, cholesterol, protein compared with T1 .T2 ,T3,T4 showed significant decrease in GSH,SOD,MDA compared to T1.

No significant difference in liver, heart weight % while bacterial numder (EC) in colon and ileum decreased significantly in T2, T3, T4 compared with control T1.

Table 1 effect of adding gensing root alcoholic extract on bacteria number in colon and ileum, oxidation enzyme GSH, SOD, MDA

Treatment	Mean ±S.E. ×107 Number of EC		GSH um/L serum	SOD um/L serum	MDA um/L serum
	colon	ileum			
T1	2.10±0.08 a	1.00±0.04 b	4.50±2.28 b	625.1±14.4a	13.4±0.23 a
T2	1.45±0.05 b	1.40±0.04 a	5.70±0.17 a	277.0± 3.5d	7.00±0.11 c
T3	0.30±0.01 c	0.24±0.01 c	2.16±0.09 c	306.1±3.5c	8.50±0.28 d
T4	0.30±0.01 c	0.45±0.02 c	1.10±0.05 d	554.3±0,1b	11.50±0.28b
T1 control,T2,T3,T4, adding 50,75,100 mg alcoholic extract /l drinking water Means having different letters in the same colomun are significantly different (P≤0.05).					

Conclution

In general we can concluded that adding red gensing 50, 75 mg as alcoholic extract gave the best results and have a benefit effect as adaptogenic and antioxidant in japanes quail female.

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The effects of in ovo injected natural extracts and l-carnitine on antioxidants concentration in residual yolk sac of broiler chicks at an early post-hatch stage

E. Babacanoğlu[1], M. R. Karageçili[1], F. Karadaş[1], H. C. Güler[1]

[1]Department of Animal Science, Faculty of Agriculture, University of Van Yuzuncu Yil, 65080, Van, Turkey.

Indroduction.

Embriyo development and hatchability were increased by in ovo application (Foye et al., 2006) and it were identified that improvement of intestinal absorption, reduction of disease and mortality inthe early post-hatch period, improvement of immunological response to enteric antigens, prevention of skeletal development disorders and increasing muscle development with provided nutritional support (Uni, 2003). The study aimed to evaluate the effects of in ovo (IO) injection of natural extracts and l-carnitine to egg of broiler breeders on residual yolk sac (RYS) antioxidants concentrations of male broiler chicks at an early post-hatch stage.

Materials and Methods

Total 300 hatching eggs obtained from Ross genotype were used. The experiment was conducted with total 5 experimental groups and 4 replications for each; control (no pure water and no added antioxidant), and 4 different injected groups: pure water added group, grape seed extract group, olive leaf extract group, and l-carnitine group on d of 17.5th of incubation. By using IO method was injected to amniotic sac as 0.25 ml solution/egg (pure water 0.25 ml pure water/egg; L-carnitine 2.5 mg/0.25 ml pure water/egg and extracts 25 µl/0.25 ml pure water/egg. After hatching, reared male chicks were selected randomly from groups (10 chicks/group) at day 3 of chick age.

Results

Dissected residual yolk sac of male chicks at 72nd hour-old were analysed for concentrations of retinol, α-, γ- and δ-tocopherols and α-tocotrienol, vitamin E and total carotenoids. The correlations between analysed antioxidants were determined.

The RYS' δ-tocopherol and α-tocotrienol concentrations increased in the IO injection groups compared to control group. IO did not affect on the concentrations of retinol, α- and γ-tocopherols, vitamin E and total carotenoids in the RYS of broiler male chicks at 3 day-old.

Conclusion

The results indicated that the δ-tocopherol and α-tocotrienol concentrations depending on relationship of these two antioxidants with other antioxidants can be more sensitive to IO injected natural extracts and l-carnitine than other lipid-soluble antioxidants.

Conclusion

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Can animal behaviors be used as an indicator for the control of poultry red mite?

C. Konyali[1], H. Erdem[2] and T. Savas[2]

[1]Department of Chemistry and Chemical Process Technology, Lapseki Vocational School, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

[2]Department of Animal Science, Faculty of Agriculture, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

Introduction

The use of chemical products against ectoparasites is serious residual problem. After fipronil scandals in Europe, the consumers are skeptical about poultry products. The one of the most important reasons to use these chemicals is the control of poultry red mite (Dermanyssus gallinae, De Geer, 1778) seeing widely in hen houses. But the control of PRM seems quiet complicated because of its biology, morphology, ecology and due to the life cycle. These properties, which are possessed by them, cause it to develop of chemical resistance used for treatment against that mite. Consumer awareness and demand for pesticide-free produce are also driving a move away from synthetics; this is true in many production sectors (Moser et al, 2011). The first step of the developing alternative control measures is the finding of tools of monitoring. Early detection of D. gallinae can make possible to manage control strategies. For this purpose, some detection methods have used in the barns. Varios trap types are used for the purpose of detection (Kirkwood 1963; Nordenfors et al. 1999; Mul et al. 2015; Konyali 2016). On the other hand, it is foreseen that the development of other monitoring methods may lead to the creation of new control strategies. Behavior is used to answer the questions about whether the animal is physically healthy and the animal has what it wants (Dawkins, 2003). Stress is very important output of poor welfare conditions and in this context animal behaviors are useful tool to assess stress conditions. The aim of this study was to discuss whether the host behaviors can be used to decide the optimal treatment time against to Dermanyssus gallinae with respect to in obtained results of 6 trials.

Materials and methods

This study consists of 6 trials that we have already cunducted by a total of six genotypes, 1 broiler (Cobb 500; 80 birds) 4 layers (Super Nick, 96 chicks; Atabey, 40 chicks; Atak, 40 chicks and Atak-S, 40 chicks) and 1 quail trials (80 chicks).

Chicks from each genotype were divided in two groups as control and infested groups. Birds in all groups were housed in similar conditions. But animals of infested groups were infested with D. gallinae by using traps (Konyali, 2016). Behaviors of the birds were observed during 30 minutes in the morning and afternoon one day once a week.
The observed behaviors were locomotion and preening/itching. Locomotion was any behavior other than resting and eating behavior. Preening/itching was any scratching behavior realized by beak or foot. The observation methods were, for preening/itching continuous sampling and for locomotion sampling by five minutes' intervals. Statistical analyzes were performed with the sum of each observation period per animal and behavior. After calculated of observed behavior per animals, the data were analyzed with Generalized Linear Model procedure by using Poisson Regression in Log-Linear Model.

Results

The results of trials are summarised in Table 1. The infested animals of Atak-S and Atabey genotypes were statistically more active respect of control group ($P<0.05$). The locomotion of Atak-S chicks were 1.60 times higher in the infested birds when compared with their uninfested controls. Locomotion behavior of broiler chicks no were statistically differed between groups ($P=0.1028$), but obtained results were showed that infested animals were 2.5 times more active compared with control broiler chicks. The results of quail trial have shown that infested quails were 1.37 times more active ($P=0.0068$). Preening and itching behaviors of all genotypes were higher in mite-infested animals. Atak and Atak-S mite-infested chicks were 3.50 times and 3.74 times, respectively, more scratched compared with their control groups. Mite-infested broiler chicks had 3.36 times more preening and itching behavior ($P=0.0904$). Infested quails were statistically behaved preening and itching compared with unifested quails ($P=0.0002$).

Conclusion

The first of the most important problems on the control of D. gallinae is early detection of that parasite. The early detection of D. gallinae can be difficult, because of it is relatively small ectoparasite and for the spending most of the time hidden in cracks and crevices.

Generally, that ectoparasite is only on host to feed for short periods during the night. Because of the mouth structure and feeding behavior of D. gallinae, mite feeding can cause significant changes in the behavior of the host. According to results of our trials, mite infested animals showed higher activation. It was seen that higher activation of infested animals especially during the afternoon more disturbed the animals in the resting period. The activation of an animal approximately twice as much in the rhythm of daily behavior is a remarkable case. In addition to locomotion, mite infested animals were performed between 2.26 and 3.74 times more preening and itching behavior. These enormous differences between infested and uninfested animals showed clearly effect of D. gallinae and particularly these behaviors could be effective parameters in evaluating of poultry red mite infrestation.

In accordance with our findings, Kilpinen et al. (2005) reported that the mite-infected hens showed higher self-grooming and head scratching both during the day and night. The deviation of normal behavior repertoire and the increase of frequency of some behaviors are indicated to stressful conditions of animals. Preening is a comfort behavior of birds if it is realized at a certain frequency. The change in the frequency of preening/itching and locomotion behaviors can be useful parameter if it observed correctly. Currently, computer-assisted programs are beginning to be used successfully in many areas.

Table 1. The estimate, standard error, odds ratio (OR) and P values of observed parameters regarding to infested groups on different hen genotypes and quails

	Locomotion				Preening/Itching			
	b	SE	OR	P value	b	SE	OR	P value
Atak	0.33	0.08	1.39	0.0729	1.25	0.19	3.50	0.0545
Atak-S	0.47	0.04	1.60	0.0486	1.32	0.05	3.74	0.0468
Atabey	0.28	0.02	1.32	0.0483	1.23	0.11	3.42	0.0480
Super Nick	0.25	0.02	1.28	0.0862	1.00	0.02	2.73	0.0834
Cobb 500	0.91	0.13	2.50	0.1028	1.21	0.10	3.36	0.0904
Quail Trial	0.31	0.13	1.37	0.0068	0.82	0.26	2.26	0.0002

b estimate values and odds ratios are 0.00 and 1.00, respectively, for control groups.

The accurate interpretation of animal behaviors may provide the basis for future monitoring tools. Similarly, Dawkins (2003) has been remarked that new technology such as automatic video recording or computer recognition of specific behavior patterns is opening up possibilities for using behavior in welfare assessment.

After from this point, it is necessary to develop automatic recording software specialized these behaviors of hens. But it should not to be reckoned without, it is need the attention of the observation and interpretation of behaviors and besides that D. gallinae infestation makes it more complicated.

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Turkey's ornamental poultry

K. Kurşun, M. Baylan
Faculty of Agriculture, Department of Animal Science, University of Çukurova, Adana, Sarıçam, 01330, Turkey

Introduction

There are a variety of ornamental peacock breeds both in the world and in our country. Today, there are more than 200 chicken breeds in the world that differ in terms of color, shape, size, yield direction, and some other characteristics. The first efforts on the breed of chickens and the initial aims of the development of new breeds have been for the purpose of demonstration and appearance, but the subsequent aims have changed in order to increase the yield (Türkoğlu ve Sarıca, 2014). Today, when it comes to chicken breeding or poultry farming, the first thing that comes to mind is undoubtedly egg chicken and broiler breeding. Egg and chicken meat; are animal products obtained from hen breeds and meat breeds. And because they are important protein sources in human nutrition, they are both valuable and economic aspects of productivity. Chickens are grown not only for meat or eggs, but also because of their beautiful and ornate images, beautiful crows, and visual beauty (Anonymous, 2018a). Some of them are distinguished from other races by differences such as crayfish, wing and foot structure, form, patterns, feather and eye color.

Ornamental peach farming is not common in our country but has been common in Europe since the 19th century. In recent years, Turkey has begun to take interest in farming ornamental fowl. Especially in America, Europe and Australia, ornamental peach enthusiasts are working to develop new breeds and different color varieties of these breeds. For this purpose, they have set standards and provided organizations by establishing associations, clubs, federations and confederations. They pointed out the books and catalogs they prepared and the characteristics of a race. How they should have the characteristics of a race, with the books and catalogs they prepared (Anonymous, 2018e).

Ornamental poultry is different from free poultry farming, cage poultry, organic poultry. There are over 2000 chicken breeds, mostly western countries, which are fed under the name of ornamental chicken. Turkey has also evolved in recent years ornamental hobby chicken farming, a federation of 40 associations under the scope of that, it is known that the number of members exceeds 5 thousand of these associations (Anonymous, 2018i).

In our country, Ornamental Poultry legislation is not available yet and it is not defined by law. Since there is no regulation for foreign trade in ornamental poultry, export or import cannot be made (Anonymous, 2018i). Today, in neighboring Middle East countries, especially Iran, Iraq, Kuwait, Saudi Arabia are all interested in ornamental chicken.

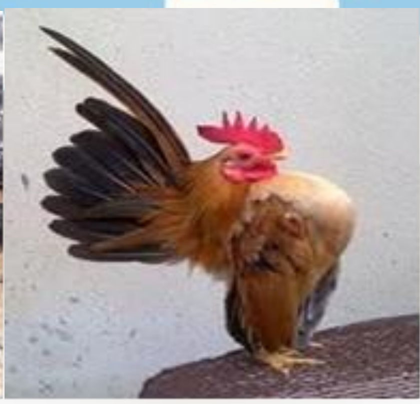
However, Middle Eastern countries are importing millions of ornamental animals from European countries because of they can not provide for ornamental animals from Turkey (Anonymous, 2018b). It is necessary to develop and spread ornamental poultry in order to contribute to the country's economy, to create a new business line and to create employment.

In the past, the term "ornamental chickens" in our country came to mind only in China, Spain or Fizan. Today, there are many breed and race in our countries. The choice of ornamental chickens varies according to the personality and pleasure. The ease of maintenance and reproduction of these chickens, different appearance is attractive to growers. In addition, they have different characteristics to attract animal lovers. (Anonymous, 2018a). Mainly known ornamental chickens are Brahma, Maran, Ligorin, Dev Wyandotte, Dev Cochin, Barbu D' Anvers, Araucanas (Yeşil yumurtacı), Orpington, Sultan, Sablepoot, Fizan, Friesian, Braekel, Habeş, Japonez, Sussex, Rhinelanders, Zibrit, Yokohama, Rosecomb, Serama, Brahma Bantam, Ayam Cemani.

Some ornamental chicken breeds and their characteristics

Bantam

Serama



Japonez

Bantam: Bantam chickens were formed by the celestial bodily structures as a result of mutations (Türkoğlu ve Sarıca, 2014). Chickens carrying dwarf genetics (dW) have shorter legs and body weights 25-30% lower than normal.

This decrease in live weight due to the effect of the dwarf gene significantly reduces feed consumption (Akbay, 1982) (İpek ve ark., 1999). It is known that feed consumption is 1/3 less than normal chickens. Bantam chickens are mostly grown as ornamental chickens because of their appearance, not for production. Many bantam such as Java, French, English, Beijing, Nanjing have been taken to the standards. At the same time, most of the breeds have bantam, which are only small body structures. For example, Rhode Island Red, Ancona, Maran, Light susex are commercially produced tapes. (Türkoğlu ve Sarıca, 2014).

Serama: The Serama genus is of Malaysian origin and is one of the world's smallest chickens. These races are attracted by their military stance and their close temperament (Anonymous, 2018f). Standing like a penguin upright and breasts puffing. This race, which is very difficult to raise and cultivate, has a small number in our country; It is difficult to supply. The characteristic of the serama is that they have a military posture and a small body. The most sought after feature is the military posture and small body. The average live weight is 250-350 grams for males and 200-300 grams for females. In recent years hybridization studies have been obtained with American and European rivals, but the actual race is Malaysian (Malaysia) breed. The annual average egg yield is 50 eggs (Anonymous, 2018g).

Japonez: Japonez chickens are one of the oldest Japanese breeds, with various color varieties such as white-black-yellow-black tail. In particular, the long upturned tail of the roosters creates a beautiful appearance, with only a small part of their legs visible as their wings cover their short legs. Roosters have vertical and large combs, chickens have small combs. The Japonez are active chickens. The annual average egg yield is 100-160 eggs and the egg color is cream. The average live weight between 510-610 grams for males and 400-510 grams for females (Anonymous, 2018a).

Sablepoot

Fizan

Araucanas

Sablepoot: It is known as Booted Bantam (Çizmeli Bodur Tavuk) or Sablepoot. The name comes from the feathers of the feet. Booted Bantam is a genuine bantam (squat, miniature) breed, because there is no chicken similar to itself. The average live weight is 850 grams for males and 750 grams for females. American standards set the ideal size as 740 grams for male and 625 grams for female (Anonymous, 2018ı). Sablepoot chickens are originated in the Netherlands. They are a kind of chicken with very different color varieties such as Millefeur, Buff, Limon. If they are fed in very narrow coop, the feather can be broken with the reason of their large legs. They are pretty docile animals. The annual average egg yield is 90-100 eggs and the egg color is cream (Anonymous, 2018h).

Fizan: Fizan chickens, mostly grown on farms, in large parks and in zoo gardens, were raised for their eggs in the past. The origin of the Fizan chickens is Europe, Poland. Fizan chickens are especially known for their combs and fluffy feathers. The comb in the head of the Fizan chickens are big enough to cover all of their heads. Fizan chickens color are gold, silver, white, gray, black and white.. The annual average egg yield is 130-180 eggs and the egg color is White. Spawning periods are March, April, May, June, July and August. Fizan chicken can be used as a breeder in the age of 5.5-6 months. Live weight is 1000-2600 gr for males and 900-2200 g for females. There are feathers on the tops of the Fizan chickens and these feathers give a very different appearance to the Fizan (Anonymous, 2018d).

Araucanas: The most important feature of this chicken is the color of the egg shell. Especially, it is intensively breeding in America. It has recently become one of the most popular races of our country. The color of egg shell is between green and blue. This feature is an important feature that differentiates this chicken. This chick has emerged as a contrast to natural and wild colors when its colors are examined; There are two types, medium and small size. The annual average egg yield is 170 eggs. The average live weight between 2000 grams for males and 1600 grams for females.

The cocks and chickens of this breed are very similar to each other. This type is bearded and fairly hairy. It can have many different colors as color (Anonymous, 2018c).

Ayam Cemani: Orjini is the Java island of Indonesia. Java is widely cultivated in the islands of Madura and Sumatra. Ayam Cemani, who has an extraordinary structure, is a rare chicken race. In addition to being completely black with all of the hair, eyes, skin, legs, toenails, beak, tongue, butt, beard and even the internal organs are black, even the muscle tissue and bones are black in color. The black color in chickens is a result of excessive pigmentation of the tissues due to a genetic mutation known as fibromelanosis.

In chickens having a tame structure, the body is narrow and tight, the tail is long and smooth, the legs are long, spurs are sharp. Average body weight is 1.2-2 kg in chickens and 1.8-2.5 kg in cocks. The average annual egg yield is 80-90, and the egg weight is about 45 g. The color varies from white to black. The color of the meat is black as it is in all its organs. In chickens having a tame structure, the body is narrow and tight, the tail is long and smooth, the legs are long, spurs are sharp. Average body weight is 1.2-2 kg in chickens and 1.8-2.5 kg in cocks. The average annual egg yield is 80-90, and the egg weight is about 45 g. The color varies from white to black. The color of the meat is black as it is in all its organs. Chicken protein ratio is higher than other chicken breeds. Chicken protein ratio is higher than other chicken breeds (Uruk ve Yenilmez, 2016).

Ayam Cemani	Barbu D' Anvers	Yokohama Chicken
		

Barbu D' Anvers: Belgian origin is one of the smallest chicken breeds in the world. Miniature chicken farm. It has white, black, gray and yellow varieties. With their posture, the front body gives a more severe look and the beard hair under the chin creates a beautiful image. The average annual egg yield is 90-100 pieces. Average body weight is 570-680 grams in females and 600-700 grams in males. There are no feather feathers and no leg hair. The spike shape is a rose (Anonymous, 2018a).

Yokohama Chicken: As the name suggests, it is a chicken race of Japanese origin. It was brought from Japan to Japan by Hugo du Roi in 1880 and spread to Europe after that date. The most important feature of this race is its long and flashy tails. There are 2 main colors in red and white. It is especially fed for its long and glamorous tails and is widely held all over the world. The average of these breeds is 2-2.5 kilograms and their chickens are about 1.5-2 kilograms. The rim, the eye and the beak are red in color. It is a race of intense kind. Leg areas are glabrous. Annual average egg yield is 80 pieces. The egg shell color is brown. Although it is easy to maintain, it is a bit aggressive and belligerent (Anonymous, 2018e).

Braekel	Sultan	Denizli Rooster
		

Braekel: The Brakel chicken breed is a very old race of Belgian origin and is very rare nowadays. In the past, the Brakel chicken breed was found in many different colors, while it is found only in gray and brownish brown colors. Today, the Brakel chicken breed is raised in many countries of the world, but has not survived as a rare race. It has black, brown, gray and white colors. The area around the ram, the eye and the beak is red. There is rounded whiteness under the eye. It has a strong and big beak structure. The wings are strong, the tail is short but densely pubescent race. The live weight is 2 - 2,9 kg in males and 1,9 - 2,5 kg in females. The annual egg yield is 160-180 and the egg color is white. Meat is a very delicious race. It is a breed that cannot be seized in natural way, therefore artificial insemination is required. Their flying ability is quite good. 5- In a period of 6 months, pups reach sexual maturity (Anonymous, 2018l).

Sultan: Sultan Chicken; It is one of the only accepted chicken breeds. The Ottoman palace known as ornamental chick is a delicate ornamental chicken. It is a white-colored race that was brought to England 170 years ago and reproduced and exhibited. Black and blue colored and dwarf types were also obtained by crossbreeding (Scrivener, 2006, Kaya and Yıldız, 2014). Sultan chickens were always grown as ornamental chickens. The sultans are plentiful with their fluffy long top and beak hair, long tail and plenty of foot feathers. Feet are 5 fingers, as in the brood (Silkie) chickens. The small V-shaped spine appears hard due to its long hill hairs. The Gaga six worms are also small and disappear between long feathers. The average weight is 2.7 kilos in the cock and 2 kilos in the chickens. It is a relatively small species of other chickens. There is also a genus of dwarf derived in the US. There are black, blue and white varieties. The white ones are the most well-known variety. Not very resistant to cold. Since they have the ability to fly, they can fly higher than two meters.

So there are those who cut their wings with scissors. 70 years on average; they make small white eggs at slightly longer intervals. Natural hatching is very rare (Anonymous, 2018b). **Denizli Rooster:** The race, which has become the symbol of the province of Denizli, is a domestic rooster race that has made a name for the most distant regions in Denizli with its long and beautiful singing in harmony with the color and body structure. The eyes of Denizli Rooster are black and should last. Legs are dark gray or purple, wobbly ax in the form of a hoof, earbuds are red or red with a white speckled general color, black dirty white is in a joint mixture. Sometimes there are brown colors on the wing feathers. In al roosters, black-red is in a mixture. Live weight average 3-3.5 kg. It is around. It is reported that Denizli breed chickens have a layered body shape, their egg yields are not known precisely, their flesh is delicious and strong, and that there are long ears until they count 120 (Karaesmen, 1944, Kaya and Yıldız, 2014). In Denizli chickens, it is stated that the age of genus maturity is about 8 months, Denizli roosters come to the first signal for 6-7 months, and the duration of the cocking of adult cocks takes 15-16 seconds (Şekeroğlu, 1994, Kaya and Yıldız, 2014).

Habeş Chicken

Zibrit Chicken

Brahma

Habeş Chicken: This race is a race that was produced in China in the 13th century. According to another view, it was found in the Himalayas by the Mongols 4000 years ago and brought to the north of China. It is also known as shrivel. It was accepted by American standards in 1874 as a separate chicken breed. There are sub-types such as black shrug, white shrinkage, yellow shrug and blue shrug. The fact that they are long and bearded, and that their hills are large and showy, make them quite interesting and make them one of the most sought-after chickens. Poultry roosters have an average of 1300 grams and their chickens are about 900 grams. It has an average of 120 to 180 eggs per year. This race is also divided into beard and beardless. This race also has a walnut and a small beak (Anonymous, 2018e). There are two main types: the beak under the beak, namely the Bearded Hogweed and the non-feather under the beak, ie the Beardless Habeş Tavuğudur (Anonymous, 2018h).

Zibrit Chicken: This species was first discovered by Sir Jhon Seabright in 1810. By American standards; In 1874 it was adopted as a separate breed. This species is among the species of miniature chickens, and is a very popular type of ornamental chicken. According to the general characteristics; The tails are slightly raised upwards and the breasts are raised forwards. The ends of the bumps are like a pointed arrow and are dark red. Their body is covered with lace-like feathers and has a very active structure. The main colors are gold, silver and yellow. The average weight of the roosters is 675 grams and the hens are 575 grams. Age of onset is 4 months. Annual egg production is a low race. The average annual egg yield is 70 eggs. This species is a species that has already been produced completely for ornament. When appropriate heat and light are provided, they can grow all year round. The incubation period is 19-20 days (Anonymous, 2018e).

Brahma: Brahma; It is an Asian race which was obtained by crossing the Malay and Cochin races. It is a type of chicken belonging to India's '' Brahmaputra '' (Anonymous, 2018g).

Light and dark varieties were obtained by the breeders in the USA on these breeds and in 1874 these varieties were added to the standards. The yellow variety was introduced to American standards in 1923. The average live weight is 5.4 kg in the open rooster and 4.3 kg in the chicken. The other two varieties are slightly lighter. The leather colors are yellow, the eggshell is brown. The Brahmas are beautiful and flamboyant animals. It has a typical Asian breed with its small beak and beard, very hairy legs and long legs, large and calm appearance. These properties are an important factor to withstand hot and cold climatic conditions. Although they are a heavy breed, their growth rates are slow and their age of maturity is long and long, and this is an obstacle for the Brahmans to enter into commercial herds as carnivores. Annual egg yield is 100-120 pcs (Anonymous, 2018b).

Conclusion

In our country, there are farms and breeders who produce pure raisins in indoor poultry, although they are not particularly controlled for hobbies. However, most of this production is in the form of village poultry. The biggest problem with this kind of production is the disappearance of race characteristics of pure breed because of uncontrolled breeding. The ornamental chickens that lost their race attribute are both economic loss and race, gene loss. These ornamental races must be preserved and the necessary breeding activities and properties should be further improved.

Thus, poultry gene diversity will increase in our country. In Turkey, ornamental poultry production should be expanded and controlled. Competitions and fairs should be held for the promotion of ornamental animals. Breeders should participate in fairs held abroad, should be supported with project. In addition, literature is lacking in the field of ornamental poultry and it is necessary to prepare written and visual publications in order to make this shortcoming. In order to contribute to the economy of the country as well as to create a new line of work and to create employment, ornamental poultry farming needs to be developed and expanded.

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Determination of Animal Waste Biogas Potential and Most Suitable Facility Centers in Kayseri Province

H. Eleroğlu[1], H. Bircan[2], R. Arslan[2]

[1]Cumhuriyet University, Şarkışla Aşık Veysel Vocatıonal School, Sivas/Turkey

[2]Cumhuriyet University, Faculty of Economics and Administrative Sciences, Business, Sivas/Turkey

Introduction

The livestock industry, which grows with an increasing human population, causes high levels of animal waste, which create environmental problems in both developed and developing countries. In Turkey, especially animal wastes arising from livestock in recent years, is among the most important and most serious environmental problems. Therefore, environmental problems caused by faces in livestock sector gain importance (Koç, 2002; Eleroğlu et al., 2012). The most important feature of the livestock sector is that when edible or non-renewable by-products are recovered, it does not harm the environment and contributes to the economy of the country. If not evaluated as waste, the environment creates great destruction. Biomass is an energy source that has a biologically obtainable energy potential. Biomass has a very important value in that it is formed in every situation and is an inexhaustible source of energy. Since biomass is involved in the energy potential renewable energy status, there is no risk of exhaustion of this energy. (Şenol et al., 2017). The aim of this study is to determine the potential of biogas in the Kayseri region and to determine the economic biogas centres which can be established for the evaluation of animal waste potential.

Materials and methods

In this study, the data obtained from the Kayseri Directorate of Provincial Agriculture and Forestry were used. Livestock farms are ranked according to the capacity of the animal. In Kayseri province, 1272 farms with a capacity of 50 cattle and above, latitude and longitude are determined. These coordinates were subjected to K-Means clustering analysis to determine the location of the most suitable biogas plant in terms of distance and total number of animals. In determining biogas production centres, a minimum of 3000 cattle in the 15 km focal length were taken into account.

The resulting sets were visualized using the coordinates. The coordinates of each set are the point density map of facility centres using MS Excel program.

Results

According to K-Means analysis results; average distances of designated biogas centres to livestock farms, animal numbers, coordinates and electric energy production capacities are given in Table 1.

Table 1. Biogas centres in Kayseri province, their capacities, investments and revenues (Million USD)

Cluster	Average Distance (Km)	Number of animals	Latitude	Longitude	Electric MW / Hour	Capacity MW	Investment (USD)	Income USD/Year
1	8.37	11.471	38.892258	35.584209	7.84	8	28.39	16.69
2	6.51	3.162	38.757767	36.457821	2.16	2	7.69	4.60
3	3.42	9.593	38.388653	35.492817	6.56	7	24.94	13.96
4	11.38	7.089	38.586216	35.137878	4.85	5	18.04	10.32
5	7.17	18.524	38.715687	35.536575	12.66	13	45.64	26.95
6	8.04	3.142	38.949520	35.248516	2.15	2	7.69	4.57
7	7.24	19.161	38.824509	35.450260	13.10	13	45.64	27.88
8	7.26	6.788	38.950000	35.847000	4.64	5	18.04	9.88
9	6.57	3.236	38.424000	35.295000	2.21	2	7.69	4.71
10	1.25	3.815	38.360687	35.089050	2.61	2	7.69	5.55
11	6.31	6.162	38.246000	35.426000	4.21	4	14.59	8.97
				Total	62.98	63	226.02	134.08

Conclusion

In Kayseri province, 11 biogas plant sites with a total investment amount of 226.02 million dollars and a revenue amount of 134.08 million dollars / year, which can produce 63 MW / hour electricity in total, have been determined. The data obtained in this study were analysed using the K-Means clustering method, tried to determine the most optimal plant location and point density diagram on the map to provide the most efficient information to investors and related institutions.

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The Effect of Socio-Economic Conditions on Chicken Meat Consumption in TR72 Region

H. Eleroğlu[1], H. Bircan[2], R. Arslan[2]

[1]Cumhuriyet University, Şarkışla Aşık Veysel Vocatıonal School, Sivas/Turkey

[2]Cumhuriyet University, Faculty of Economics and Administrative Sciences, Business, Sivas/Turkey

Introduction

Many studies have been conducted to determine the impact of socio-economic conditions on chicken meat consumption (Karakaya and İnci, 2014; İskender et al., 2015; Topçu et al. 2015, Bircan et al., 2017; Eleroğlu et al., 2018a, 2018b). Socio-economic conditions, regions and urban-rural settlements are reported as environmental factors affecting adequate and balanced nutrition status (Demir and Armağan, 2013). Demand, habit, quality, price and hygiene characteristics, socioeconomic characteristics such as income level, consumer education level, gender, occupation can be effective on chicken meat consumption (Cevger et al., 2008; Dölekoğlu and Yurdakul, 2004; Terin et al., 2014; Tümer et al., 2016). This study was carried out to determine the effect of socio-economic conditions on chicken meat consumption in TR72 Region (Kayseri, Sivas and Yozgat).

Materials and methods

A total of 1350 (Kayseri 500, Sivas 450, Yozgat 400) sample face-to-face surveys were conducted on three provinces in Kayseri, Sivas and Yozgat provinces (TR 72 Region). In the study, the sample volume was determined by simple one-pass random sampling method based on the population ratios. The surveys were carried out in 2016. In the study, the sample volume was determined by the simple non-clustered single-stage simple random probability sampling method based on the main mass ratios (Collins, 1986; Churchill and Iacobucci, 2002; Çakıcı, 2009). The data were analysed according to the variance analysis method. Duncan test was used to compare significant differences. In addition, Kruskal-Wallis test and paired comparisons were made by Mann- Whitney U test.

Results and Conclusion

Regional differences were found to be significant in terms of consumption amounts of whole chicken meat and shredded products (P<0.01). The data obtained are summarized in Table 1.

In terms of whole chicken consumption, all three provinces are different from each other and the highest consumption is 1.5-2 Kg in Kayseri. Whole chicken consumption was low in Sivas compared to other provinces.

Similar results are seen in the consumption of beef. In terms of breast meat consumption, Sivas and Yozgat show similar results and consumption is around 1 Kg and the consumption of this product in Kayseri province is above 1 Kg and there is a significant difference (P<0.01) from other provinces. Kayseri and Yozgat are similar in terms of the consumption of flesh and neck meat.

Table 1. Amount of chicken meat consumed per month (kg)

Product	Provinces	N	Average	F	P
Whole chicken	Sivas	461	2.7^a	70.244	0.000
	Yozgat	400	3.2^b		
	Kayseri	508	3.7^c		
Beef	Sivas	461	2.3^a	60.423	0.000
	Yozgat	400	2.7^b		
	Kayseri	508	3.2^c		
Breast	Sivas	461	2.4^a	46.286	0.000
	Yozgat	400	2.5^a		
	Kayseri	508	3.2^b		
Wing	Sivas	461	2.1^a	6.071	0.002
	Yozgat	400	2.3^b		
	Kayseri	508	2.3^b		
Neck	Sivas	461	1.2^a	20.883	0.000
	Yozgat	400	1.5^b		
	Kayseri	508	1.5^b		

Scale 1: 0 kg, 2: <1 Kg, 3: 1-1,5 Kg, 4: 1,5-2 Kg, 5: 2 Kg+, Different letters in the same column are statistically significant (P <0.01)

In terms of the amount of whole chicken meat consumed per month, significant differences (P<0.01) were determined between the levels of education outside the breast meat (Table 2). While there was no difference between primary, secondary and high school levels in all whole chicken consumption, but higher education was separated from the others with 2.8 scale value.

Although the highest scale value in the consumption of beef in the high school and high education, the lowest preference was determined in the first school graduates. The wings (2.3) and neck consumption (1.5) were low.

According to occupational groups, there were significant differences in monthly consumption amounts of other products except whole chicken consumption (P<0.01). The results are given in Table 3.

Although the highest value in beef consumption was in the Officer, Student and group, high and low breast meat consumption was realized in the group of Students and Workers, respectively. Wings and neck consumption was low.

Table 2. Monthly consumption of chicken meat according to education level (kg)

Product	Provinces	N	Average	F	P
Whole chicken	Primary education	250	3.2^{b}	5.684	0.001
	Secondary education	238	3.2^{b}		
	High school	686	3.3^{b}		
	High education	195	2.8^{a}		
Beef	Primary education	250	2.5^{a}	3.844	0.009
	Secondary education	238	2.7^{ab}		
	High school	686	2.8^{c}		
	High education	195	2.8^{c}		
Breast	Primary education	250	2.6	1.973	0.116
	Secondary education	238	2.7		
	High school	686	2.7		
	High education	195	2.9		
Wing	Primary education	250	2.1^{a}	4.012	0.007
	Secondary education	238	2.1^{a}		
	High school	686	2.3^{c}		
	High education	195	2.3^{ab}		
Neck	Primary education	250	1.4^{ab}	3.628	0.013
	Secondary education	238	1.4^{ab}		
	High school	686	1.5^{c}		
	High education	195	1.3^{a}		

Scale 1: 0 kg, 2: <1 Kg, 3: 1-1,5 Kg, 4: 1,5-2 Kg, 5: 2 Kg+, Different letters in the same column are statistically significant (P <0.01)

The results and analyzes of the monthly poultry meet consumption by income groups are given in Table 4. The difference between the income groups was found to be significant in terms of the shredded products except the whole chicken consumption (P <0,01; P <0,05). Whole chicken consumption per month was limited to 1-1.5 kg in all income groups.

Beef and breast consumption is approaching this value. Wing is less than 1 kg and neck consumption is lower.

Table 3. Amount of chicken meat monthly consumed according to occupational status (kg)

Product	Provinces	N	Average	F	P
Whole chicken	Worker	281	3.2	0.348	0.932
	Officer	172	3.3		
	Self-employment	67	3.0		
	Retired	116	3.3		
	Unemployed	50	3.1		
	Housewife	332	3.2		
	Student	116	3.1		
Beef	Worker	281	2.6^{a}	3.599	0.001
	Officer	172	3.0^{ab}		
	Self-employment	67	2.7^{ab}		
	Retired	116	2.6^{ab}		
	Unemployed	50	2.6^{a}		
	Housewife	332	2.7^{ab}		
	Student	116	3.0^{a}		
Breast	Worker	281	2.5^{a}	3.357	0.001
	Officer	172	2.8^{ab}		
	Self-employment	67	2.8^{ab}		
	Retired	116	2.6^{a}		
	Unemployed	50	2.8^{ab}		
	Housewife	332	2.6^{a}		
	Student	116	3.1^{a}		
Wing	Worker	281	2.4^{ab}	4.257	0.000
	Officer	172	2.3^{a}		
	Self-employment	67	2.7^{a}		
	Retired	116	2.0^{a}		
	Unemployed	50	2.4^{ab}		
	Housewife	332	2.0^{a}		
	Student	116	2.3^{a}		
Neck	Worker	281	1.3^{a}	2.070	0.044
	Officer	172	1.5^{ab}		
	Self-employment	67	1.6^{a}		
	Retired	116	1.3^{a}		
	Unemployed	50	1.5^{ab}		
	Housewife	332	1.3^{a}		
	Student	116	1.4^{ab}		

Scale 1: 0 kg, 2: <1 Kg, 3: 1-1,5 Kg, 4: 1,5-2 Kg, 5: 2 Kg+, Different letters in the same column are statistically significant (P <0.01)

Table 4 Amount of chicken meat consumed per month (kg) according to income groups

Product	Provinces	N	Average	F	P
Whole chicken	Minimum income level or less	163	3.1	1.109	0.354
	1301-2500	445	3.1		
	2501-3500	374	3.3		
	3501-4500	178	3.4		
	4501-5500	89	3.3		
	5500+	120	3.1		
Beef	Minimum income level or less	163	2.3^{a}	4.238	0.001
	1301-2500	445	2.8^{b}		
	2501-3500	374	2.9^{b}		
	3501-4500	178	2.8^{b}		
	4501-5500	89	2.8^{b}		
	5500+	120	2.7^{b}		
Breast	Minimum income level or less	163	2.4^{a}	3.570	0.003
	1301-2500	445	2.7_{b}^{c}		
	2501-3500	374	2.9^{a}		
	3501-4500	178	2.8^{bc}		
	4501-5500	89	2.8^{bc}		
	5500+	120	2.6^{ab}		
Wing	Minimum income level or less	163	2.0^{a}	2.335	0.040
	1301-2500	445	2.3^{ab}		
	2501-3500	374	2.3^{ab}		
	3501-4500	178	2.1^{a}		
	4501-5500	89	2.4^{a}		
	5500+	120	2.3^{ab}		
Neck	Minimum income level or less	163	1.3^{ab}	2.266	0.046
	1301-2500	445	1.4^{c}		
	2501-3500	374	1.5^{c}		
	3501-4500	178	1.4^{ab}		
	4501-5500	89	1.5^{c}		
	5500+	120	1.2^{a}		

Scale 1: 0 kg, 2: <1 Kg, 3: 1-1,5 Kg, 4: 1,5-2 Kg, 5: 2 Kg+, Different letters in the same column are statistically significant (P <0.01)

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A comparison of growth performance in three turkey genetic groups under intensive management conditions

S. Özlü, N. Akman, O. Elibol, M. Türkoğlu and M. Çördük
Department of Animal Science, University of Ankara, Ankara, Turkey

Introduction

In the past two decades, turkey meat consumption has accumulated the last month of the year in Turkey, the people can reach it any time of year at especially big cities nowadays. Moreover, turkey meat has found a place in the meat industry. Over a long period of time native American Bronze (AB) turkeys were used for meat production in Turkey. However, during the last 20 years, high demands for poultry meat in Turkey made the use of foreign genotypes necessary. Therefore, hybrid genotypes, especially hybrid large white turkeys, replaced the traditional use of American Bronze turkeys. The objective of this study was to compare and assess the growth performances of the foreign hybrid large white turkey (Hybrid Converter) and two improved turkey genetic groups, under intensive management conditions.

Materials and methods

The study was carried out at the Faculty of Agriculture, Department of Animal Science, Ankara Univerisity, Ankara, Turkey. Animal material of the study were Large White (LW), Male Line (ML), and the cross between ML toms and Female Line (FL) hen (Crossbreed Line; CL). Males and Females from two genetically related lines, a line selected 3 generations from the base population (Large White x American Bronze) for increased body weight at 18 wk of age (ML) and a line selected 3 generations from the base population (Large White x American Bronze) for increased egg production at 52 wk of age (FL), were reased through 230 days of age. Artificial insemination used to obtain hatching eggs for ML and CL lines. Eggs were collected two times daily and stored for maximum 10 d at 18°C and 60% RH in a storage cabin. Hatching eggs of LW were purchased from commercial producer and were stored for 5 d and eggs of all groups were set into the incubator at the same time. A total of 360 poults were used in the research with 120 turkeys for each genetic group was randomly divided into four groups of 30 poults as replicate.

After sexing at the end of the week 10, for each sex group four replicates and in total eight replicates were formed of each genetic group. Poults were offered feed ad libitum using two tube feeder with 12 kg capacity per pen, and water was offered by two bell-type frinkers per pen.

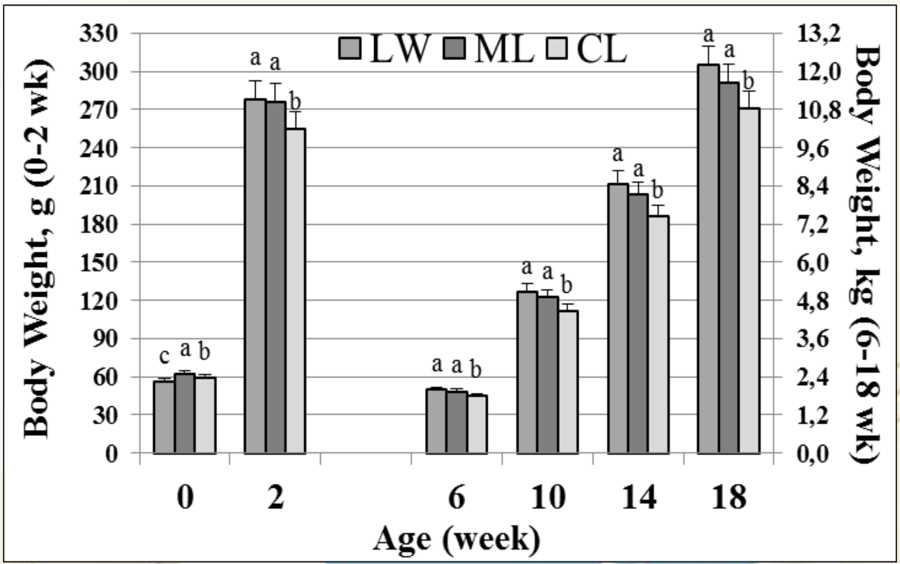
Poults body weight were recorded at 0, 2, 6, 10, 14, and 18 wk of age individually. Feed conversion ratio (FCR) was calculated by dividing average feed intake by average weight gain (g/g) and determined for six different peiods (0-2, 3-6, 7-10, 11-14, and 15-18) per group. Dead and culled birds were recorded as they occurred. Livability was calculated from daily mortality record data and expressed as percentage of initial number of poults in each period.

Two-way analysis of variance (ANOVA) was performed to determine the effects of sex and genotype and their interactions on body weight and FCR data for periods in which sex was determined (10 to 18 wk). Duncan's multiple range test procedure (SAS, 1999) was used to compare differences between means of genotypes at 5% level of significance. Statistical analysis for livability was carried out using Minitab 14.0 packet program incorporating 2P application. Z-Test was employed to determine the existence of differences between two proportional values for the genetic groups.

Results

Mean body weight values for all the genetic groups reared under intensive management condition at different age periods are presented in Figure 1. Average body weight (BW) differences among the genetic groups were significant at the beginning ($P<0.05$), and ML genotype was the highest. LW and ML genotype exhibited greather BW than CL genotype after placement time ($P<0.05$).

Figure 1. Average body weight of genotypes for different fattening periods.



There were no significant differences between genotypes in FCR at all rearing periods. Additionally, it was observed that livability for the period 0 to 18 weeks did not differ significantly between genetic groups.

Conclusion

The results obtained showed that LW had the highest body weight followed by ML and CL genotype (lowest). To compansate foreign genotype demands, ML genotype may be an alternative to commercial breeders for rearing under intensive management conditions. Because its BW slightly lower than LW with similar FCR and livability for rearing period.

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The effect of age, sex and live weight on the color and pH of the breast meat in quails

T. Şengül, B. Söğüt, H. İnci, Ş. Çelik, A. Y. Şengül
Bingöl University Faculty of Agriculture Dept. of Animal Science-Bingöl

Introduction

Quail meat has excellent flavor and diet properties (Rutkowski, 1995). It is darker in color than chicken meat and lighter than goose meat. Quails have almost no fat tissue in their chest and thigh muscles. The muscle fibers are separated by a thin connective tissue that gives the characteristic taste of the meat (Hejnowska et al., 1999). Thin and soft muscle fibers in the quail meat is the reason for this meat being preferred more. However, the composition of the carcass can vary individually between the same species of birds, due to factors such as age, sex and nutrition.

Meat color, age, sex, genotype, feed, intramuscular fat distribution, the water content of meat in poultry are influenced by pre-slaughtering conditions and processing techniques. The color of the meat depends to a large extent on the concentration of myoglobin and partly on the presence of pigments such as hemoglobin in the medium. When combined with oxygen, myoglobin transforms into oxy-myoglobin and takes the red color. The color change of the meat can be associated with the amount of these pigments contained in the meat. The chemical structure of pigments and eventually meat's light reflection rate changes (Northcutt, 2007). The color of poultry meat may vary from bluish-white to yellow depending on breed, exercise, age and diet. Young poultry has less fat tissue under the skin, resulting in bluish appearance.

It has been reported that the characters associated with the meat color in quails are usually moderately and highly hereditary, and sex-linked genes may play a role in this. It has been suggested that genetics has a predominant role in controlling meat quality characteristics such as color and pH. Selection studies carried out to increase live weight have also affected the quality characteristics of meat. As the live weight increases, the water and protein levels in the carcass are reduced, whereas carcass oil, number of muscle fibers, muscle fiber length and skeletal muscle proliferation rate increase. In Japanese quails, the degree of inheritance for some meat quality characters was estimated as brightness (L*)=0.23; red color (a*)=0.45; yellow color (b*)=0.22 (Oğuz et al., 2004). Some investigators have identified generally positive and moderate to high genetic correlations among meat characteristics (Toelle et al., 1991).

Many studies have been conducted on the effects of different applications and diets on the L*, a* and b* values in quails' breast meat and the pH of meat.

Sex has been reported to be effective on many parameters of meat quality in chickens (Mehaffey et al., 2006; Jaturasitha et al., 2008). Lopez et al. (2011) reported a significant relationship between sex and the pH of the breast meat 24 hours after chickens are slaughtered, and that female chicks have a lower pH value than males. They stated that this difference in pH may be due to the amount of glycogen in the muscles.

Tougan et al., (2013) reported that with the decrease in slaughtering age in poultry, meat flavors were reduced, whereas the juiciness and softness of meat were increased. Berri et al., (2005) reported that the amount of glycogen in the chest muscle decreased in poultry depending on the age of the animals. It has been reported that body weight is effective on the quality of meat and carcass composition in poultry even if the animals are of the same age. In their study, Bilal and Bostan (1996) reported that the age of the quail was effective on the carcass composition and that age predominantly affecting the chemical composition of meat, whereas sex was effective on carcass yield. Caron et al., (1990), in a study investigating the effects of age and sex on carcass characteristics and chemical composition of quails, found that the effect of sex on the chemical composition of meat was insignificant. Lepore and Marks (1971), reported that the effect of age on carcass composition was important in quails.

Narinç et al., (2013), reported the final pH, L*, a* and b* color values as 5.94, 43.09, 19.24 and 7.74, respectively, in breast meat quality characteristics of 35-day old broilers. Researchers reported a high and negative correlation between pH and body weight, and a lower and positive correlation between L* and these characteristics. Remignon et al., (1998), in a study investigating the effect of stress on meat quality in quails, reported that long-term stress increased the pH of breast meat and did not affect L*, a* and b* color values. Genchev et al., (2008) determined L*, a* and b* values of breast meat of 35 day-old quails as 43.22, 8.02, 11.04; 40.81, 10.16, 9.55; 45.67, 11.68, 14.48, respectively, 30 minutes, 24 hours and 7 days after they were slaughtered. Color parameters (L*, a* and b*) in the meat of young and old quails were found as 58.93, 12.86, 20.86, 61.54, 6.84, 19.81, respectively (Boni et. al., 2010). Nasirifar et al., (2016), determined the L*, a* and b* color values of 42-day-old quails as 37.8, 37.9; 11.9, 13.1, 12.8 and 14.5 for male and female quails, respectively.

The aim of this study was to investigate the effects of sex, age and live weight on breast meat brightness (L*), red (a*), yellow (b*) color values and the pH of the breast meat by taking the body weight of male and female quails of 6 and 10 weeks of age into account.

Material and Method

The animal material of the study consisted of days old 168 Japanese quails. Quails were housed in ground compartments during the period of the experiment.

The study was carried out for 10 weeks. The experiment was designed as 8 groups, 3 replications and as 7 quails in each replication. Quails were fed with feed containing 23% crude protein and 3100 kcal/kg ME in the first week and 20% crude protein and 3250 kcal/kg ME in the subsequent period. The mean live weight of the experiment groups for 6-week old quails was determined as 146.8 and 189.3 g in males (light and heavy groups), 179.3 and 205.1 g in females, respectively, and 165.3 and 200.3 g in males, 183.4 and 235.1 g in females for 10-week old quails.

At the end of the fattening period (at the 6^{th} and 10^{th} weeks), 4 animals were slaughtered from each group and brightness in breast meat (skinless) (L*), red color (a*), yellow color (b*) and pH were measured. In the measurement of meat color, Lovibond (RT SERIES for Model SP60) and in pH measurement Testo 205 were used.

In the statistical analysis of the obtained data, ANOVA test was used (Winer, 1971). In order to determine whether breast color values in quails differ according to age (6th and 10th weeks), sex (male and female) and body weight (light and heavy) factors, three-factor variance analysis was applied in randomized plot design (Düzgüneş et al., 1987). According to the 2x2x2 factorial experimental plan, the following mathematical model was used in the analysis of variance (Mendeş, 2013).

$$Y_{ijkl} = \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\beta\gamma)_{jk} + (\alpha\beta\gamma)_{ijk} + \varepsilon_{ijkl}$$

α_i: Age effects, β_j: Sex effects γ_k: Effect of live Weight, $(\alpha\beta)_{ij}$: Age x sex interaction, $(\alpha\gamma)_{ik}$: Interaction of age x live weight, $(\beta\gamma)_{jk}$: Live weight x sex interactions, $(\alpha\beta\gamma)_{ijk}$: Live weight x sex x age interactions, ε_{ijkl}: are the effect of error.

The data was analyzed using SPSS 23.0 statistical package software.

Results

The averages of L*, a* and b* color values of the breast meat in quails are calculated as 41.667, 18.016 and 11.521, respectively. The differences among the groups were found to be significant in terms of breast color (P<0.01). According to the results of multiple comparisons, the differences among all colors were significant (P<0.01).

The effects of age, sex, live weight, age x sex, age x live weight, sex x live weight, sex x live weight, x age interaction were found to be statistically insignificant. The effects of live weight and age x live weight interaction on the a* value of breast meat were significant (P<0.01). In the quails of 10 weeks, the effect of those with a high live weight on the value of breast meat was higher (P<0.01).

Similarly, the effect of age x weight interaction on the b* value of breast meat was significant (P<0.01). In the 10-week old quails, the effect of those who had higher body weight on the breast meat b* value was higher (P<0.01). In terms of age, sex and body weight, pH values did not have a significant effect on the color of the quail breast meat and did not have any significant effect on all interactions. That is, no significant differences were observed among the effects of these factors on pH. The results of analysis of variance of the factors affecting the breast meat color in quails are presented in Table 1.

Discussion

Many researchers have reported that age, sex and body weight in poultry have an impact on carcass characteristics and meat quality in poultry (Tougan et al., 2013; Caron et al., 1990); Lepore and Marks, 1971; Bilal and Bostan, 1971; Lopez et al., 2011; Mehaffey et al., 2006). Values such as L *, a *, b * and pH, which are the meat quality characteristics, may also vary with these factors. In this study, age, body weight and sex did not have an effect on the L* value of breast meat. The results were similar to the findings of Remignon et al., (1998), Genchev et al., (2008), Genchev et al., (2010) and Nasirifar et al., (2016).

Differences among the averages of the experimental groups in terms of the a* value of the breast meat were significant (P<0.01). While there was no significant difference in the 6th week, sex and live weight were influential in the 10th week. Light male and female groups at the 10th week showed lower values than the other groups. The results were similar to those reported by Boni et al., (2010), Ribarski and Genchev (2013), Tougan et al., (2013) and Narinç et al., (2013).

Table 1. Analysis of variance of the factors affecting the color of breast meat in quails.

	L*				
Source of variation	Sum of square	df	Mean of square	F	P
Age	16.719	1	16.719	1.246	0.275
Sex	4.674	1	4.674	0.348	0.561
Live weight	0.039	1	0.039	0.003	0.958
Age x sex x live weight	13.248	1	13.248	0.987	0.330
Age x sex	4.212	1	4.212	0.314	0.580
Sex x live weight	9.084	1	9.084	0.677	0.419
Age x live weight	0.67	1	0.67	0.05	0.825
Error	321.999	24	13.417		
General	370.646	31			
	a*				
Source of variation	Sum of square	df	Mean of square	F	P
Age	8.642	1	8.642	1.630	0.214
Sex	0.265	1	0.265	0.050	0.825
Live weight	57.058	1	57.058	10.760	0.003
Age x sex x live weight	8.374	1	8.374	1.579	0.221
Age x sex	12.313	1	12.313	2.322	0.141
Sex x live weight	2.616	1	2.616	0.493	0.489
Age x live weight	101.353	1	101.353	19.114	0.001
Error	127.261	24	5.303		
General	317.883	31			
	b*				
Source of variation	Sum of square	df	Mean of square	F	P
Age	1.345	1	1.345	0.436	0.515
Sex	2.268	1	2.268	0.736	0.400
Live weight	9.968	1	9.968	3.233	0.085
Age x sex x live weight	0.060	1	0.060	0.019	0.891
Age x sex	5.662	1	5.662	1.836	0.188
Sex x live weight	0.832	1	0.832	0.270	0.608
Age x live weight	39.516	1	39.516	12.815	0.002
Error	74.003	24	3.083		
General	133.654	31			
	pH				
Source of variation	Sum of square	df	Mean of square	F	P
Age	0.125	1	0.125	4.034	0.056
Sex	0.054	1	0.054	1.757	0.197
Live weight	0.023	1	0.023	0.746	0.396
Age x sex x live weight	0.082	1	0.082	2.647	0.117
Age x sex	0.015	1	0.015	0.494	0.489
Sex x live weight	0.048	1	0.048	1.551	0.225
Age x live weight	0.006	1	0.006	0.195	0.663
Error	0.744	24	0.031		
General	1.098	31			

df: Degrees of freedom.

In terms of the b* value of the breast meat, the differences among the averages of the experimental groups were significant (P<0.01). Similar to a* value, light male and females at 10th week had lower values compared to the other groups. The findings of this study and the findings of Genchev et al., (2008), Genchev et al., (2010) and Nasr et al., (2017) are consistent with each other. The results of all experimental groups were similar in terms of the pH value of the breast, and no statistically significant differences were observed among the averages. In other words, the pH of the meat was not affected by age, sex and body weight. The reported values for the pH of quail breast meat range from 5.30 to 6.58. Values obtained from this study are among the reported results. Some researchers reported that breed and genotype may affect pH in quails (Zerehdaran et al., 2012; Narinc et al., 2013). Table 2 shows the averages and standard errors for the effect of age, body weight and sex on breast meat color and pH values in quails.

Table 2. The effect of different ages, live weights and sex on the color and pH of breast meat in quails.

Age (week)	Live weight	Sex	L	a*	b*	pH
6	Light	Male	42.66±1.79 a	18.23±1.59 a	11.71±0.57 a	6.32±0.17 a
6	Heavy	Male	42.08±4.32 a	17.79±2.56 a	10.37±2.70 a	6.06±0.32 a
6	Light	Female	42.48±2.19 a	19.74±1.14 a	12.85±0.51 a	6.27±0.15 a
6	Heavy	Female	42.34±5.96 a	18.39±3.42 a	11.98±2.61 a	6.36±0.15 a
10	Light	Male	38.91±2.69 a	15.89±2.09 b	10.01±0.37 b	6.36±0.07 a
10	Heavy	Male	41.48±1.96 a	20.53±2.88 a	12.94±0.14 a	6.36±0.11 a
10	Light	Female	42.76±3.67 a	12.87±1.81 b	9.29±1.15 b	6.42±0.18 a
10	Heavy	Female	40.62±4.54 a	20.69±2.09 a	13.04±2.92 a	6.37±0.15 a

a, b: Differences among the averages indicated in different letters in the same column are important. (P<0.05).

Conclusion

In general, there were significant differences between the a* and b* values of quail breast meat. In terms of a* and b* values of the breast meat, there was no significant difference in the 6-week quails, while in the 10-week age group, significant differences were found. The effects of age, live weight, sex and all interactions on the L* value of breast meat were insignificant. The effects of age, live weight and sex on pH values were found to be insignificant.

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Effects of Using Various Oil Sources in Poultry Nutrition

A. Şimşek[1], B. Kılıç[2*]

[1]Food Processing Department, Egirdir Vocational School, Applied Sciences University of Isparta, Isparta, Turkey

[2]Department of Food Engineering, Engineering Faculty, Suleyman Demirel University, Isparta, Turkey

Introduction

A various of feed additives are used to protect poultry health, and to increase yields and quality of poultry products. It is mentioned in many studies that the additives used in poultry nutrition affect the meat composition (Zollitsch et al., 1997; Baião and Lara, 2005; Pisulewski, 2005; Ravindran et al., 2016). It is reported that probiotics, prebiotics, organic acids, essential oils, vegetable oils, plant extracts with antimicrobial and antioxidant effects have been shown to have effects on meat quality (Kutlu and Şahin, 2017). The addition of oils into the feed has a vital role to meet the high energy requirements of poultry (Tüzün, 2013). Poultry often get their energy needs from basic organic nutrients such as carbohydrates, oils and proteins. Since the energy of oils is higher compared to other energy sources, plant oils are utilized better to give higher energy compared to protein and carbohydrates in equal amounts (Lewis and Hill, 1983). High-quality and qualitative energy are preferred in fast-growing hybrid feeds in poultry production. The utilization of oils in the preparation of high-energy composite feeds facilitates the balancing the energy in feed mix. There are various types of fats and oils which are used as energy source in poultry mixed feeds such as vegetable oils and animal fats, acidulated soapstocks (by-products of vegetable oil refining), by-products of oil industry, rendering by-products (e.g. lard, tallow, mutton fat and poultry fat) and waste frying oils from restaurants (Ravidran et al., 2016). Although the oils contain high energy, there are many factors affecting utilization of the energy of the oils. These factors are; free fatty acids content, chain lengths and number of double bonds of the fatty acids in the structure, mixed feed structure in which the oil is added and the level of oil addition, and animal age (Tüzün, 2013). Soybean, sunflower, cotton, rapeseed and flaxseed oil are widely used vegetable oil sources for mixed feeds. Cattle, sheep, poultry and pork fats are also used as animal sources (Baião and Lara, 2005).

The oils added into the mixed feeds have positive effects on the metabolic reactions in the organism, in addition, they also offer many advantages such as providing a better homogeneity in feed mix, preventing dust, improving flavor, and facilitating pellet construction (Tüzün, 2013). This review study aimed to give information about the effects of the use of different fat and oil sources in poultry nutrition on the nutrition performance and meat composition.

Use of fats and oils in poultry nutrition Poultry fat, lard and tallow are widely used in poultry feeding as animal fats, while the widely used vegetable oil sources are soybean oil, sunflower oil, flaxseed oil, rapeseed oil and palm oil, and acidulated soapstocks (Baião and Lara, 2005).

Many previous studies indicated that fatty acid profiles of oils used in poultry feeds affect the fatty acid profiles in poultry muscle tissues. Almost all of the vegetable oils are in liquid form and rich in terms of unsaturated fatty acids whereas most of the animal fats are in solid form and rich with the saturated fatty acids. Since the absorption of the saturated fatty acids from the digestive system is difficult, unsaturated fatty acids provide more energy than the saturated fatty acids (Ravidran et al., 2016). Zollitsch et al. (1997) reported that vegetable oils lower energy losses, thus they produce higher metabolizable energy value than animal fats. Many studies have been carried out to examine the effects of supplemental fats and oils on the carcass characteristics, particularly fat deposition and carcass fatty acid composition of poultry. Sim et al. (1973) conducted an experiment in which broilers were supplemented with 1, 2, 4 and 8% of sunflower oil, soybean oil and rapeseed oil respectively for four weeks. Researchers indicated that vegetable oils were very effective for improving unsaturated fatty acid composition in egg yolk, liver and other tissues. The researchers found that the rate of saturation and unsaturation of oil added into diet reflected positive correlation in the product. Thus chicken fed with animal fats has higher saturated fatty acids whereas chicken fed with sunflower and soybean oil had linoleic acid. Furthermore, it was indicated that the use of rapeseed oil enhance the accumulation of erucic acid in chicken muscle tissue. Balevi (1996) stated that there is a great resemblance between the fatty acid composition of oil used and body fat. Accordingly, poultry fed with saturated fatty acid-rich feeds provides product rich in saturated fatty acids, while the use of feeds rich in unsaturated fatty acids results in product rich in unsaturated fatty acids. Sanz et al. (2000) reported that animals fed with tallow, pork fat and sunflower oil resulted in more fat accumulation in broiler carcasses.

Crespo and Esteve (2001) found that dietary fatty acid profile of different broiler chickens diets containing tallow, olive oil, sunflower oil and linseed oil resulted in the similar fatty acid profile in the chicken muscle. It was determined that saturated fatty acid addition cause higher abdominal fat accumulation compared to polyunsaturated fatty acids. Bickel et al. (2001) reported that polyunsaturated fatty acids rich broiler diet increases the concentration of polyunsaturated fatty acids (PUFAs) in various tissues, although it decreases carcass performance of animal. Tapiero (2002) and Calder (2006) recommended that consumption of a diet enriched with n-3 PUFAs, especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), provides cardioprotective effect and cancer treatment benefits. Mierlita et al. (2007) indicated that the vegetable oil sources provide lower body weight and body weight gain than animal fat sources, while they reduce abdominal fat ratio. Guven et al. (2015) reported that the use of sunflower oil, olive oil, fish oil, flax seed oil and nettle oil can be an effective strategy for modifying fatty acid composition, total iron and myoglobin content and susceptibility to oxidation of quail meat when incorporated in quail diet at the level of 2%.

Conclusion

The use of oils is an important factor for supplying the energy needs and increasing feed consumption rates in poultry diet. On the other hand, the studies showed that the oil type used is very effective on the meat composition. For this reason, the use of alternative fat or oil sources in poultry nutrition can be enable the production of healthier meat products.

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The effect of diet fiber content on fear, feather pecking and comfort behaviors of laying hens

T. Shah[1], S. Özkan[1], S. Yalçın[1], M. Bozkurt[2], B. Koçer[3], G. Ege[3]
[1]Ege University Faculty of Agriculture Department of Animal Science, Bornova, İzmir, Turkey
[2]Adnan Menderes University, Faculty of Agriculture, Department of Animal Science, Aydın
[3] Erbeyli Research Institute, Aydın.

Introduction

Feather pecking is a serious threat to the egg industry and welfare of laying hens. It has become a more important issue after the considerations of future ban for conventional cages. Feather pecking results in damaged feathers and in some cases hens pluck out feathers of conspecifics and eat them. Loss of feathers negatively affect insulation value of feather coat under cool temperatures and due to barren areas of skin, severe feather pecking can be followed by cannibalism. Severe feather pecking is a complex behavioral problem and development of damaging pecking seems be related with feeding and foraging activities. It has been suggested that absence of exploratory material in the environment may be one of the reason why increasing feather packing. Because, birds consider their pen mates as exploratory stimuli, leading to feather pecking towards conspecifics (van Krimpen et al., 2009).

Feather pecking is directly affected by the physical and social environment of the bird. However, all the individuals do not express the same behavior. FP behavior can be driven by individual genetics and neurobiological characteristics (Brunberd et al., 2016). Hetland et al (2004) suggested that feather pecking may partly be driven by a need for gizzard stimulation as because, insoluble fiber is necessary to stimulate gizzard functions. It has been reported that birds from a selection line for high feather pecking showed higher motivation for eating loose feather under the experimental conditions (Harlander-Matauschek and Hausler, 2009). Feathers also had a positive effect on gut motility (Harlander- Matauschek et al., 2006; 2007) as is similar to insoluble fibers, such as non-starch polysaccharides (NSP's) have a satiety effect. It has been suggested that hens may eat feathers to increase satiety.

Although ultimate solution would probably be genetic selection for reduced feather pecking; in commercial conditions, feeding mash form diets and increasing range use (Lambton at al., 2010), increased opportunity to forage behavior by providing high-fibre diets and suitable litter to birds, lowering stress and well management by caretakers are all important factors to prevent or control feather pecking in laying hens (Rodenburg et al., 2013). Therefore, management and diet related approaches to control feather pecking are widely used; such as providing diets with high fiber content besides controlling fear and stress. Hartini et al. (2002) reported that diets with high insoluble fiber were effective in reducing cannibalism.

Presented study aimed to investigate the effects of variable fiber contents in the diet on feather pecking and comfort behaviors, and emotional (fear) response of laying hens in a novel object test (NOT) in enriched cage conditions.

Material and methods

A total of 600 infrared beak treated chicks (Nick Chick) were reared in conventional cages (25 bird/cage) during growing period and moved to enriched layer cages at the end of 16th week (21 bird/cage). A total area of 750 cm^2 was provided per bird during laying period. Enriched cages consisted of 8 nipple drinkers, a nesting area (60x33 cm), scratching mat (32x32 cm), and perch (15 cm/bird) and feeding space (12 cm/bird).

There were three groups of diet differing in fiber content (low, medium, and high). A standard corn- wheat-soybean meal based diet (low fiber) was prepared according to NRC (1994) and sunflower meal was used to increase fiber content. Cellulose content (analyzed) in low, medium, and high fiber diets were 2.80%, 3.80% and 4.80%, respectively. A randomized design of three dietary treatments with 8 replicate cages were used. Behavior of laying hens was observed on 29th and 42nd week of age at cage level. All occurrences of feather pecking (gentle, severe, aggressive, and environment), preening, and dustbathing were recorded during the sessions of 10 minutes observation times in the morning, noon and afternoon. The frequencies were presented as act /bird (averaged per cage). Novel object test which was modified from the method described in Uitdehaag et al. (2008) were applied at the same ages. Two experimenters were stand still for 10 s in front of the cage and a plastic bottle covered with colored strips was placed in the feed through. The number of birds displaying escape, approach, and passive (immobile) behaviors for 30 seconds were recorded. Behavior data were analyzed with GLM procedure of JMP with a model including treatment, age, observation time, and replication (cage) effects and interactions.

A non-parametric test (Kuskall Wallis) was used for data from NOT. Means were separated using t-test when the effect was found to be significant (P≤0.05).

Results and Discussion

Frequency of any feather pecking type did not differ with diet (Table 1). One could be expected that birds fed with more fiber might have accumulated fiber in the gizzard resulting in reduced passage rate of the digesta through the gizzard, which may increase the feeling of satiety in the bird (Van Krimpen et al., 2011). But, it was not the case. Preening and dustbathing activities were observed to be significantly higher in birds fed with high fiber diet with respect to low and medium fiber diet groups (P≤0.05). Observation time had a significant effect on total number of severe and aggressive pecking, preening, dustbathing, environmental pecking and performance of those behaviors were lowest in the morning but highest in the afternoon as consistent with the natural rhythm of these behaviors. Kjaer (2000) reported that feather pecking shows a diurnal rhythm and it rises over the day.

There was a significant interaction effect between diet × observation time for environmental pecking and dustbathing being similar in the morning in either group (Table 2).

However, significantly lower environment pecking was observed in the afternoon in the high fiber group as compared with the others (Table 2). Dust bathing activity was significantly increased in the high fiber fed group in the afternoon (Table 2).These findings may indicate that birds fed with high fiber are more satiated and not motivated to peck their surroundings to search for food but performed more dustbathing as comfort behavior in the afternoon.

Gentle feather pecking, environmental pecking and preening decreased with the increase in age from 29^{th} to 42^{nd} week (P≤0.05). However, feeding and pacing activities increased with increase in age (P≤0.05). No age effect was observed for both aggressive and total severe and aggressive feather pecking, and dustbathing.

The percentage of birds responding to NOT by escaping was affected by dietary treatment (P≤0.05) being lowest (26.62%) in high fiber group, the highest (43.89%) in low fiber group (Table 3). Percentage of passive and approaching birds did not differ with the dietary treatment. Lower percentage of escaped birds in high fiber group may indicate lower fear response of these birds (Uitdehaag et al. 2008).

Table 1. Effect of dietary fiber content on the behavior of birds (act/bird/10 minutes)

	Gentle peck	Aggressive peck	Total severe and aggressive pecks	Environmental pecking	Preening	Dust-bathing	Pacing
			Age				
Week 29	0.033^{a}±0.003	0.0085±0.001	0.010^{a}±0.001	0.020^{a}±0.001	0.105^{a}±0.002	0.017±0.001	0.007^{b}±0.001
Week 42	0.013^{b}±0.005	0.0052±0.001	0.006^{b}±0.001	0.008^{b}±0.002	0.095^{b}±0.003	0.018±0.002	0.019^{a}±0.002
			Treatment				
High fiber	0.027±0.005	0.007±0.001	0.008±0.002	0.014±0.002	0.115^{a}±0.004	0.025^{a}±0.002	0.012±0.002
Medium fiber	0.020±0.005	0.006±0.001	0.008±0.002	0.016±0.002	0.086^{c}±0.004	0.014^{b}±0.002	0.016±0.002
Low fiber	0.023±0.005	0.007±0.001	0.008±0.002	0.012±0.002	0.099^{b}±0.004	0.014^{b}±0.002	0.011±0.002
			Time				
Afternoon	0.022±0.005	0.007^{b}±0.001	0.009^{a}±0.001	0.019^{a}±0.002	0.116^{a}±0.004	0.029^{a}±0.002	0.006±0.002
Noon	0.027±0.005	0.011^{a}±0.001	0.012^{a}±0.001	0.011^{b}±0.002	0.099^{b}±0.004	0.020^{b}±0.002	0.015±0.002
Morning	0.021±0.005	0.002^{c}±0.001	0.003^{b}±0.001	0.011^{b}±0.002	0.084^{c}±0.004	0.004^{c}±0.002	0.019±0.002
			P-values				
Age	0.001	0.055	0.066	<.0001	0.020	0.436	<.0001
Treatment	0.602	0.812	0.988	0.319	<.0001	<.0001	0.0554
Time	0.569	0.0002	<.0001	0.001	<.0001	<.0001	<.0001
Treatment × Age	0.268	0.102	0.1734	0.606	0.1082	0.2521	<.0001
Treatment × Time	0.100	0.614	0.605	0.007	0.394	0.017	0.017
Rep(Treat×Time)	0.001	0.0018	<.0001	<.0001	<.0001	<.0001	<.0001

a,b,c: Within each variation source, means in the columns bearing different letters are significantly different (P≤0.05).

Table 2. Treatment × Time interaction effect on environmental pecking dustbathing and pacing

	Environmental pecking			Dust-bathing			Pacing		
t	High fiber	Low fiber	Medium fiber	High fiber	Low fiber	Medium fiber	High fiber	Low fiber	Medium fiber
Afternoon	0.018^{b}±0.003	0.027^{a}±0.003	0.013^{bc}±0.003	0.039^{a}±0.003	0.027^{abc}±0.003	0.021^{bc}±0.003	0.008^{bc}±0.003	0.007^{bc}±0.003	0.003^{c}±0.003
Noon	0.010^{bc}±0.003	0.013^{bc}±0.003	0.011^{bc}±0.003	0.029^{ab}±0.003	0.015^{cd}±0.003	0.016^{cd}±0.003	0.008^{bc}±0.003	0.021^{a}±0.003	0.016^{ab}±0.003
Morning	0.014^{bc}±0.003	0.007^{c}±0.003	0.013^{bc}±0.003	0.005^{de}±0.003	0.001^{e}±0.003	0.006^{de}±0.003	0.020^{a}±0.003	0.021^{a}±0.003	0.015^{ab}±0.003

a,b,c: Means in the columns bearing different letters are significantly different (P≤0.05).

Table 3. The effect of dietary fiber content on the response of birds (%) to Novel Object Test

	Escaped	Immobile/ passive	Approached
High fiber	26.62[b]±2.67	9.68±2.74	2.68±1.15
Medium fiber	35.04[ab]±3.19	16.24±3.96	2.99±1.14
Low fiber	43.89[a]±4.94	11.24±3.10	1.83±0.96
P-value	0.007	0.528	0.761
Chi-square	10.025	1.274	0.546

a,b,c: Means in the columns bearing different letters are significantly different ($P \leq 0.05$).

Conclusion

It can be concluded that increasing fiber content of diet with sunflower meal did not affect feather pecking activity. However increased comfort behaviors and reduced fear may contribute to the welfare of hens under the experimental conditions.

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Effects of Free-Range Access on Serum Total Antioxidant Status (TAS), Total Oxidant Status (TOS) and Some Serum Metabolites of Slow Growing Free-Range Broilers

Z. Kiyma[a], A. Akdağ[b], Y. Altay[a], S. Avcı[c]
[a]Department of Animal Science, Faculty of Agriculture, Eskisehir Osmangazi University, Eskisehir, Turkey
[b]Department of Animal Science, Faculty of Agriculture, Ondokuz Mayıs University, Samsun, Turkey
[c]Department of Field Crops, Faculty of Agriculture, Eskisehir Osmangazi University, Eskisehir, Turkey

Introduction

Due to consumer demands for mostly better quality and taste, nonconventional products has gained importance and alternative poultry production systems have been studied to increase product quality and quantity. In free range sytems availability of high quality vegetation in the range area is considered to be an attractive and efficacy factor and type of plant is important concerning durability and nutritional value of plant and preference and consumption by the free range birds. In the free range broiler breeding, the most important factor that can affect the performance and meat quality of animals is the vegetation covering the field. Number of scientific studies on the effects of different plants is very limited. Amount of consumables by broiler chickens from the field is unknown and it is thought that consumed plants will provide a great advantages in the production of chickens. Chicory (Castellini et al, 2007), purslane (Tuncay and Eşiyok, 2006) and white clover (Küçükyılmaz et al, 2013) with distinct vegetative characteristics have important properties to be candidates for planting in the fields. Beside several other stress factors, diets and exercise as accessing to a range area may affect oxidative stress. Total antioxidant status (TAS) and total oxidant status (TOS) are two oxidative strees parameters. In this study, effects of different plants in grazing area on serum TAS, TOS glucose, total protein, total cholesterol, triglycerides, and blood pH were investigated.

Materials and methods

Slow growing broiler chicks (n=500, Hubbard-Red-JA) with similar weights were feather sexed and allocated randomly into four experimental groups, which were control (without access to free range area) and free range groups accessed free-range area covered with chicory, white clover, or purslane.

Each group had 4 replicates of 35 chicks (exept the control group had 20 chicks per replicate due to restricted space).

Corn-soybean based feed and water were provided ad libitum. Starter (0-28d), grower (28-63d) and finisher (63-72d) feeds were formulated to contain 19.5, 16.5 and 15 % crude protein, respectively and all three formula had 3000 kcal kg-1 metabolic energy. Chickens were allowed to access to the free-range area at the end of the 4th week towards the end of the trial. On day 72, 16 birds from each group representing the average body weight of each group were weighted and slaughtered.

Blood samples were collected to determine pH and serum samples were obtained to determine TAS, TOS, glucose, total protein, total cholesterol and triglyceride levels. Serum TAS and TOS levels were measured using commercially available kits (Relassay, Turkey). The method for TAS is based on the bleaching of characteristic color of a more stable ABTS (2,2 ′ - Azino-bis (3-ethylbenzothiazoline -6-sulfonic acid)) radical cation by antioxidants (Erel, 2004). To measure serum TOS level, oxidants present in the sample oxidized the ferrous ion-o-dianisidine complex to ferric ion that produces a color which could be measured spectrophotometrically, and related to the total amount of oxidant molecules present in the sample (Erel, 2005). Serum glucose, total protein, total cholesterol and triglyceride levels were determined by the autoanalyzer and accompanying kits. Data showed normal distribution and were analysed by ANOVA using the GLM procedure of SAS 9.3 (SAS Institute, 2011)

Results

The treatments did not have a significant effect on serum TAS, TOS and the serum metabolites. Total protein (p=0.12) and total cholesterol (p=0.11) levels of free-ranged chickens aimed to be higher than those of confined chickens (Table 1).

Conclusion

This study was conducted to determine affects of three different plants on grazing field on serum TAS and TOS and some other metabolites. Diets can affect oxidative status of serum through its antioxidant content that may reduce oxidatif status. On the other hand intense stress conditions may result in lipid peroxidation of the cell membranes and reactive oxygen species are formed, causing tissue damage (Kovacs, 1996). In this study non of the parameters that has been examined were statistically different among the groups.
However, some of the parameters were numerically aimed to be different between kontrol and free-range groups.

Table 1. Serum Total Antioxidant Status (TAS) and Total Oxidant Status (TOS) and Serum Metabolites and Blood pH of slow growing broilers grazed on pasture covered chicory, white clover or purslane. Values are mean ± standard error of mean (SEM)

	Control	Chicory	Purslane	White Clover	P value
TAS (mmol/l)	1.25±0.07	1.40±0.18	1.37±0.10	1.14±0.10	0.433
TOS (µmol/l)	6.71±0.52	7.74±0.60	7.63±0.27	7.92±0.55	0.364
Glucose (mg/dl)	218.00±5.45	210.19±2.28	213.25±4.65	219.38±5.76	0.514
Total Protein (g/dl)	2.83±0.08	3.11±0.08	3.06±0.07	3.00±0.06	0.110
Total Cholesterol (mg/dl)	92.75±7.97	109,69±3.49	108.88±2.08	107.56±5.46	0.124
Triglycerides (mg/dl)	20.50±1.50	22.00±2.40	25.50±2.31	24.81±1.97	0.324
Blood pH	7.63±0.02	7.67±0.04	7.61±0.02	7.71±0.01	0.088

The lack of difference among treatments could be attributed to the low level of stocking density and amount of consumed forage that may not be enough to produce a significat difference among the groups. Because it is observed that birds were out of the confinement building only during cool times of the day. It was also observed that heat stress clearly restricted vegatation consumption. More studies should be conducted to increase forage consumtion to be able to see effects of free ranging on the serum parameters, and metobolites.

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Hemogram and full carcass nutrient contents in quails infested with Dermanyssus gallinae

H. Erdem[1], C. Konyalı[2], H. I. Akbağ[1], T. Savaş[1]

[1] Department of Animal Science, Faculty of Agriculture, Canakkale Onsekiz Mart University, Canakkale,Turkey

[2]Lapseki Vocational School, Canakkale Onsekiz Mart University, Canakkale, Turkey

Introduction

The ectoparasite Dermanyssus gallinae (De Geer, 1778) causes anemia, reduced egg laying and at high infestation the birds even may die (Chauve, 1998). Infested joung birds show stagnant growth. This effect affected performance and health in later periods. Adverse environmental conditions during the period of growth and development can cause acute and chronic effects. For example, in a study conducted on snow geese (Chen caerulescens caerulescens), helminths were observed to cause changes in body nutrient content (Shutler ve ark., 2012). In this study the effects of D. gallinae on carcass nutrient content and some blood parameters were investigated in Japanes quails.

Materials and methods

The study was conducted with 80 Japanese quails (Coturnix coturnix japonica) at 1 day of age. At an age of 1 week, the test birds were divided into 40 controls and 40 infested groups and kept in two rooms under same conditions. The birds in one room infested artificially with D. gallinae. The experiment was terminated at 5th weeks of infestation due to sudden deaths from the 4th weeks after intensive infestation. At the end of the experiment, blood samples were taken during sllautering of the birds and erythrocyte, leukocyte, hematocrit and hemoglobin values were determined. In addition, smear preparations were prepared and leucocyte forms in total leukocytes were examined by gram staining method. The carcasses were chopped and from samples of carcasses macronutrient analyzes were used. The observed traits were analyzed by variance analysis with an linear model included group and gender as fixed factors.

Results

Hematocrit, erythrocyte and hemoglobin values were significantly lower in the infested group than in the control group (Table 1). In total leucocytes is no significant difference between control and infested groups, but lymphocyte, monocyte and eosinophil ratios are decreased significantly in the infested group. Live weight is higher in control group than infested group at the end of the experiment (P=0.0001).

In Table 2 are seen that control group has a higher dry matter content than the infested group. Fat, ash and crude protein ratios are not significant different between groups. In other hand cold carcass, hot carcass and cooling loss show significant differences between the groups (Table 2). The infested group have lower liver, gizzard and heart weights than the control group. However, while the heart and gizzard weights are not significant (P=0.2235; P=0.6952), the liver weight show significance (P=0.0078).

Table 1: Least square means ($\bar{X}$), their standard errors (SE) and, P values of some blood parameters of experimental groups.

	Control		Infested		P		Control		Infested		P
	$\bar{X}$	SE	$\bar{X}$	SE			$\bar{X}$	SE	$\bar{X}$	SE	
Hematocrit (%)	44.0	2.0	30.0	2.0	0.0001	Heterophil(%)	18.0	2.0	20.0	2.0	0.3803
Erythrocyte ($x10^6/1mm^3$)	3.8	1.7	2.0	2.1	0.0001	Lymphocyte(%)	77.0	2.0	71.0	2.0	0.0347
Leucocyte ($/1mm^3$)	1328.9	342.1	871.4	385.3	0.3817	Monocyte (%)	2.0	0.3	0.5	0.4	0.0257
Hemoglobin (g/dl)	11.2	0.4	5.9	0.5	0.0001	Eosinophil (%)	2.8	0.7	8.2	0.9	0.0001
						Basophil (%)	0.5	0.2	0.3	0.3	0.4912

Conclusion

In the infested group hematocrit, erythrocyte and hemoglobin values are below the normal values (Nirmaland and Robinson, 1971) This indicated on anemia. As is known, leukocytes are cells of the immune system that recognize and neutralize antigens entering the body. Many allergic reactions, infectious diseases and parasitic infections cause an increase in eosinophil ratio (Nutman, 2007; Simon et al. 2010). According to Szabó et al. (2002), the heterophile is destroying various pathogens as well as dead tissue cells through phagocytosis.

Table 2: Least square means ($\bar{X}$), their standard errors (SE) and P values of full-carcass macronutrient contents and, some carcass characteristics.

	Control		Infested		P		Control		Infested		P
	$\bar{X}$	SE	$\bar{X}$	SE			$\bar{X}$	SE	$\bar{X}$	SE	
Live Weight (g)	240.25	4.49	205.06	5.06	0.0001	Cold Carcass (g)	164.63	4.10	141.13	4.52	0.0004
DM %	37.06	0.76	32.97	0.79	0.0006	Hot Carcass (g)	166.06	4.18	142.93	4.60	0.0006
Fat %	12.63	0.98	13.63	1.03	0.4890	Cooling Loss (g)	0.85	0.11	1.24	0.12	0.0233
Ash %	2.78	0.17	2.87	0.19	0.7285	Spleen (g)	0.14	0.01	0.14	0.01	0.9440
CP %	22.77	0.68	21.75	0.75	0.3160	Liver (g)	6.25	0.25	5.22	0.27	0.0078
						Gizzard (g)	4.86	0.15	4.77	0.16	0.6952
						Heart (g)	2.38	0.18	2.06	0.19	0.2235

Furthernmore the authors have emphasized that mites may cause an increase in the number of heterophiles caused by an immunologic response of the saliva secretion of the parasites during bites. Probably similar reasons lead to increase of the number of eosinophils. There is no significant differences between the groups in terms of fat, ash and protein content, but the drymatter content is lower in the infested group than in control group. That indicates probably of higher water contents in infested bird carcasses. The reason of this fact could be an edema caused by poultry red mite infection.

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Effects of Transportation Distances to Hatcheries and Storage Durations on Hatching Outcomes of Quail Hatching Eggs

G. Çopur Akpınar[1], A. Günenç[2]

[1] Department of Animal Sicence, Faculty of Agricultural Science, Mustafa Kemal University, Hatay, Turkey

[2] Provincial Directorate of Food, Agriculture and Livestock, Edirne, Turkey

Correspondences: gulsenankara@gmail.com

Introduction

Hatching egg quality of quail is greatly influenced by breeder age and egg storage durations (Nowaczewski et al. 2010a). With the prolonged storage time, hatching performance and hatching power decrease (Sreenivasaiah and Ramappa, 1985; Seker et al. 2005; Romao et al. 2008; Dereli-Fidan et al. 2012; Othman et al. 2014), early, mid and late embryonic mortalities increase significantly (Seker et al. 2005; Dereli-Fidan et al. 2012). Egg weight loss ratios also increase throughout the storage period (Petek and Dikmen, 2004; Lacin et al. 2008; Dudusola, 2009; Baylan et al. 2011). It was reported that quail eggs could preserve desired quality attributes throughout the storage periods shorter than 4 days (Dudusola, 2009).

Breeder farms are usually designed far away from the hatcheries. The transportation distances of hatching eggs together with the other factors may result in significant losses in yields and productivity levels.

Although airline transportation of hatching eggs from breeder farms to hatcheries is increasing, road transport is still common. Hatching eggs are subjected serious quality losses in airline transport because of delays or custom processes (Anonymous 2016).

Embryos and hatched chicks have undeveloped locomotive and sensual organs as compared to developed individuals of the later stages. Therefore, they are quite prone to hazardous and variable conditions (Mukai et al. 2014). Embryo, a living material of the hatching egg (at gastrula stage with 20.000-40.000 cells), is highly sensitive to vibrations and excess temperatures (Butcher and Nilipour, 2016). High quality and perfect hatching eggs free of any defects are the primary target of breeders. However, transportation over rough roads with inexperienced and unmotivated drivers, poor suspension and ventilation of the transportation vehicles also result in serious economic losses (Butcher and Nilipour, 2016). Thus, various transportation factors have negative impacts on poultry production.

These factors include temperature, humidity, ventilation, gas exchange, transportation intensity, road conditions, characteristics of transporter vehicles, driver performance and mechanic vibrations (Mitchell and Kettlewell, 1998; Scharzkopf et al. 2012).

It was reported in previous studies investigating the effects of transportation and other mechanical factors on commercial egg production that even the smallest vibrations during the transportation of the eggs may result in serious damages on eggs (Carter, 1970; Walker et al. 1972). Racin (2013) indicated that vibration of the eggs, reversing and exposure to toxic impacts increased malformation ratios (pre-mature chicks).

According to Singh (1991) and Pierce et al. (1992), egg quality is significantly influenced by vibrations through the transportation of the eggs, road quality, distance, driving speed, amount of load transported, suspension system and number of axles of the vehicle. Vibration is the primary reason of damages on fertile eggs and stress in day-old chicks and broiler hens.

Mechanical vibrations cause stress and losses especially in hatching outcomes and ultimately in productions. However, transportation of hatching eggs or chicks is an essential process of poultry operations. Since it is hard to control the roads and transportation vehicles, road and vehicle-induced vibrations may be harmful for developing embryo (Mohammadzadeh et al. 2015). According to Tullet (2009), hatching eggs subjected to excessive coarse processes or vibrations during collection and/or transportation had quite higher malformation ratios (extra legs or wing in embryos). According to Torma and Kovascne (2012), such factors resulted in various malformations like an extra leg, face duplication.

There are several studies investigating the effects of transportation and the other mechanical impacts on commercial egg quality. However, effects of such factors on hatching eggs were investigated in limited number of studies. This study was conducted to investigate the effects of transportation distances and different storage durations on hatching outcomes of quail eggs.

Material and Methods

Hatching eggs of 24-week old quails of a commercial breeding farm in Adana constituted the experimental material of the present study. Eggs were collected in 3 days. Hatching eggs were individually numbered and weighted before the storage. Then, the eggs were randomly distributed to 7 and 14-day storage groups. Each storage period had 5 replications with 100 eggs in each replicate (5x100x2; 2**:** 7 and 14-day storage periods, 5: replications/tray, 100**:** number of eggs in each replicate). Each storage period had 1000 eggs, thus 2000 eggs were used in experiments.

Following the storage durations (7 and 14 days), half of the eggs (1000 eggs) were subjected to incubation after 200 km transportation over a secondary road. The other half were not subjected to a transportation and directly subjected to incubation after storage.

For incubations, setter and hatcher machines with 1280 poultry-egg capacity (Çimuka) was used. Temperature and relative humidity were in the setter 37.6 °C and 60-65 %. In the hatcher machine, the temperature and humidity were adjusted to 37.2 ^{0}C and 65-70 %.

Following the incubation period, hatched marketable healthy and discarded chicks (with leg problems) were recorded. Unhatched eggs were broken and subjected to macroscopic assessments to determine fertile eggs. Embryonic mortalities were classified in accordance with Aygun et al. (2012) as of mortality at the first period (1-9th days of incubation: black eye visible and embryo without feathers), the second period (10-17th days of incubation: embryo with feathers and embryo with yolk out) and the third period (17-18th days of incubation: full grown embryo dead and with yolk subtracted). Healthy marketable chicks were weighted individually to determine the effects of storage durations and transportation distance on the proportion of the chick weight to the eggs weight (chick weight/egg weight).

The experiment was designed in 2x2 factorial design (storage duration and transportation distance). All data were analyzed using the GLM. Duncan’s multiple range test was used to compare treatment means. Arcsine transformation was applied to embryonic mortality data to obtain a normal distribution; however, actual means were presented. All statistical analyses were carried out by using SPSS, 20.

Results

The differences in relative weight loss of treatment groups throughout the storage periods were found to be highly significant (P<0.001) (Table 1). This trait varied with the storage period, but did not change with transportation distances. The interaction between storage period and transportation distance was not found to be significant.

Hatchability of fertile eggs

Hatchability of fertile eggs values are provided in Table 3. The greatest hatchability of fertile eggs (69.30%) was obtained from 7-day storage duration and non-transported group. It was followed respectively by 14-day stored and 200 km transported group with 59.59 %, 7-day stored and 200 km transported group with 57.52% and 14-day stored non-transported group with 52.38 %.

Table 1. Weight loss ratios throughout the storage periods of the experimental groups (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	1.27±0.02 a
	200	5	1.23±0.01 a
14	0	5	2.68±0.09 b
	200	5	2.77±0.05 b

a,b the differences in means in the same column indicated with different letters are significant (P<0.05)

Chick weights were monitored and associated with initial egg weights to express hatchling formation ratios (Table 2). This trait did not vary with the treatment groups. Storage duration x transportation distance interaction was not found to be significant. Average proportion of the chick weight to egg weight ratios (Table 2) were within the values reported by Wilson (1991) for chickens (62-78 %).

Table 2. The chick weight/egg weight of the treatment groups (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	65.50±1.17
	200	5	64.82±1.31
14	0	5	66.00±0.71
	200	5	66.22±0.89

Storage duration x transportation distance interaction was found to be significant (P<0.05). As compared to 7-day stored non-transported group, 200 km transportation after 7-day storage had negative influences on hatchability of fertile eggs.

However, hatchability of fertile eggs of 14-day stored and transported group was greater than hatchability of fertile eggs of non-transported group of the same storage duration. Such a case indicated that exposure to vibrations after long-duration storages might positively influence embryonic development throughout the incubation process. Thusly, discarded chicks ratio of 14-day stored and 200 km transported eggs was quite lower than the discarded egg ratio of 7-day stored non-transported eggs.

Table 3. Hatchability of fertile eggs of treatment groups (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	($\overline{X} \pm S\overline{x}$)
7	0	5	69.30±6.08 a
	200	5	57.52±3.47ab
14	0	5	52.38±2.91b
	200	5	59.59±1.96 ab

a, b the differences in means in the same column indicated with different letters are significant (P<0.05)

Table 4. The first period (1-9th day) embryonic mortality in treatment groups (%).

Treatments Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	7.18±0.86 a
	200	5	8.36±1.64 a
14	0	5	23.23±2.01 b
	200	5	20.96±1.46 b

a,b the differences in means in the same column indicated with different letters are significant (P<0.05)

The differences in the first period embryonic mortality (covering the 1-9th day of embryonic development) of the treatment groups were highly significant (P<0.001) (Table 4). The first period embryonic mortality of 14-day storage group was greater than the embryonic mortality of 7-day storage group.

The value was observed as 7.18 % for non-transported group of 7-day storage period and as 8.36 % in 200 km transported 7-day storage group, but the differences between these two groups were not significant. The second period embryonic mortality ratios (covering 10-17th days of embryonic development) varied with the experimental treatments (P<0.01) (Table 5).

Table 5. Second period embryonic mortality of treatment groups (10-17th days) (%)

Treatments Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	2.68±0.52 a
	200	5	2.13±0.98 a
14	0	5	7.39±0.66 b
	200	5	4.13±1.09 a

a,b the differences in means in the same column indicated with different letters are significant (P<0.05).

With regard to the second period embryonic mortalities, storage duration x transportation distance interaction was not found to be significant. The differences in the second period embryonic mortality of non-transported and 200 km transported 7-day stored eggs and 200 km transported 14-day stored eggs were also insignificant. However, 14-day stored non-transported group was significantly different from the other treatments (P<0.01).

The differences in the third period embryonic mortality (covering the 17-18th days of embryonic development) (Table 6) were not found to be significant. Storage duration x transportation distance interaction was also insignificant for this trait.

The chicks completed hatching, but not able to stand up were classified as discarded hatchlings. Discarded chicks were composed only of the chicks not able to stand up fully since any other types of discarded chicks (not fully closed umbilical, exposed brain, cross beak, malformation and etc.) were not encountered. The effects of treatments and storage duration x transportation distance interaction were found to be highly significant (P<0.001) (Table 7). With regard to discarded hatching chick ratio, short term stored (7 days) and 200 km transported group (27.57 %) was significantly different from the other groups (P<0.001). The greatest value (27.57 %) was obtained from 7-day stored transported group, the lowest value (7.13%) was obtained from 14-day stored transported group.

Such a difference was because vibrations during the transportation may provide better ambient to the embryo of 14-day stored eggs than 7-day stored ones.

Table 6. Third period embryonic mortality of treatment groups (17-18th days) (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\bar{x}$
7	0	5	7.98±2. 98
	200	5	4.41±1.33
14	0	5	5.82±1.54
	200	5	8.19±0.54

Table 7. Effects of storage duration and transportation distance on discarded hatched chicks ratio (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	9.42±1.94 a
	200	5	27.57±3.06 b
14	0	5	9.28±1.64 a
	200	5	7.13±1.25 a

a,b the differences in means in the same column indicated with different letters are significant (P<0.05)

Thusly, after storage transportations applied to eggs at the same time and in the same way, but the positive impacts on 14-day stored eggs were not observed on 7-day stored eggs.

Weight loss throughout the incubation directly influence hatch outcomes. Variations in relative weight losses of the experimental groups during the embryonic development (0-14th day) period are provided in Table 8.

Table 8. Weight loss rate of the experimental treatments during embryonic development (%)

Treatments			
Storage Duration (day)	Transportation Distance (km)	N (Replicate/Tray)	$\overline{X} \pm S\overline{x}$
7	0	5	14.43±0.39 b
	200	5	13.98±1.13 ab
14	0	5	12.36±0.19 a
	200	5	12.15±0.21 a

a,b the differences in means in the same column indicated with different letters are significant (P<0.05)

The differences in relative weight losses of the experimental groups were significant (P<0.05). The storage duration x transportation distance was not significant.

Table 8. Weight loss rate of the experimental treatments during embryonic development (%)

Discussion

Lacin et al. (2008) reported weight losses for 3, 8 and 14-day storage durations respectively as 1.44, 1.99 and 2.56%. Dudusola (2009) investigated the effects of different storage methods and durations on quality of quail eggs and reported weight loss ratios for 4, 7, 14 and 21-day storage durations respectively as 1.2 %, 2.8 %, 3.9 % and 5.4 %. The weight loss ratios reported for 7 and 14-day storage durations were greater than the present findings. Baylan et al. (2011) investigated the effects of selenium supplementation to quail rations, storage durations (15, 30 and 45 days) and temperatures (4 and 20 ^{0}C) on egg quality and reported increasing weight loss ratios with increasing storage durations. Present findings comply with those earlier ones. Present weight loss ratios for 7 and 14-day storage durations were also similar with the findings of Aygun and Sert (2013) reported for 7 (1.72 %) and 14 (2.73 %) day storage durations.

Roriz et al (2016) investigated the effects of different storage durations (1-10 day) on weight loss and hatch outcomes and reported weight loss ratio as 0.97 % for 1-day storage, 2.8 % for 7-day storage and 3.26 % for 10-day storage duration. Fidan (2012) reported weight loss ratios of quail eggs for 5, 10 and 15-day storage durations respectively as 0.34 %, 0.85 % and 1.45 %.

Uddin et al. (1994) reported the chick weight/egg weight ratios of egg weight groups (light: 8.59 g, medium: 9.52 g and heavy: 10.56 g) respectively as 68.77 %, 70.28 % and 69.64 %. Present findings were lower than those earlier ones. The chick weight/egg weight ratio was reported as 69.90 % by Moraes et al. (2008), as 70.84 % by Genchev (2009), respectively as 76.40 %, 74.80 % and 70.50 % for egg weight groups of 14.19 g, 12.02 g and 10.20 g by Sadeghi et al. (2013). Those values were greater than the present findings. On the other hand, İslam et al. (2014) reported lower chick weight/egg weight ratios than the present study for japanese, white, black and brown Japanese quail genotypes respectively as 62.68 %, 62.85 %, 58.23 % and 46.35 %. This trait was reported as 66.9 % by Dere et al. (2005), respectively as 64.54 %, 62.83 % and 66.37 % for light (8.91 g), medium (9.80 g) and heavy (10.76 g) egg weight groups by Adeyanju et al. (2014) and finally as 69.37 % by Alasahan et al. (2016).

Seker et al. (2005) reported hatchability of fertile eggs for 1-3, 4-6, 7-9, 10-12 and 13-15-day storage durations respectively as 90.39 %, 88.74 %, 67.96 %, 72.45 % and 50.31 %. hatchability of fertile eggs was reported as 71.52 % by Daikwo et al. (2011), respectively as 96.05 % and 95.74 % for 22-week old light (7.5-9.5 g) and heavy (9.6-12.0g) egg groups and respectively as 78.65 % and 66.67 % for the same weight groups of 36-week old ages by Dudusola (2013). Premavalli et al. (2016) reported hatchability of fertile eggs as 74.66 % for non-stored eggs and as 62.32 % for 7-day stored eggs.

The present hatching power for 7-day storage duration (63.41 %) (Table 3) was lower than the value reported by Premavalli et al. (2016).

Torma and Kovacsne (2012) indicated about 15% decrease in hatchability of fertile eggs of the eggs exposed to intensive vibrations. Researchers reported hatchability of fertile eggs of control (without any vibrations) and vibrated eggs subjected to vibrations of between 10-30 Hz respectively as 61.78 % and 54.47 %. In the same study, hatchability of fertile eggs of 20 Hz and 30 Hz vibrated eggs for 10 minutes and non-vibrated control group were reported respectively as 76.80 %, 64.89 % and 80.75 %. Researchers indicated that hatchability of fertile eggs of control group without any vibrations was greater that the hatchability of fertile eggs of vibrated eggs at different levels, but the differences between treatment groups were not significant. Present findings were different from the findings of Donofre et al. (2017) indicating negative influences of excessive vibrations on hatching outcome and chick quality of hatchability eggs.

Such a difference can be explained by the difference in vibration levels experimentally applied by Donofre et al. (2017) and vibration levels applied through transportation of the eggs in this study. Donofre et al. (2017) artificially applied different mechanical certain vibration levels for certain durations. Researcher reported hatchability of fertile eggs of low vibrations for short durations, low vibrations for long durations, high vibrations for short durations, high vibrations for long durations and control treatments respectively as 93.73 %, 94.43 %, 92.12 %, 88.92 % and 94.47 %.

Present findings clearly indicated that the first period embryonic mortality were greater in long storage durations than short storage durations. Previous studies investigating the effects of storage durations on hatching parameters also support the present findings. Seker et al. (2005) reported early-period embryonic death ratios of Japanese quail (Coturnıx coturnıx japonıca) for 1-3, 7-9 and 13-15-day storage periods respectively as 5.09 %, 19.475 % and 19.52 %.

In another study carried out with quail, Lacin et al. (2008) reported early-period embryonic mortality for 3, 8 and 14-day storage periods respectively as 15.40 %, 20.00 % and 40.00 % and these values were quite higher than the values reported in present study for 7 (7.70 %) and 14 (22.09 %) day storage durations. On the other hand, the first period embryonic mortalities of the present study were quite higher than the values reported by Aygun and Sert (2013) for 7 and 14-day storage durations of quail (Coturnix coturnix japonica) eggs (respectively as 2.17% and 3.76 %). The differences in embryonic mortality ratios were mainly resulted from the differences in genotypes, ages and processes applied to hatching eggs.

Torma and Kovacsne (2012) reported early embryonic mortalities of hatching eggs subjected to vibrations between 10-30 Hz and the control eggs without any vibrations respectively as 23.56 % and 18.80 %. This trait was observed as 11.15 %, 19.52 % and 9.66 % for the eggs subjected to 20 Hz and 30 Hz vibration levels for 10 minutes and control eggs without any vibrations. While the differences between non-vibrated group and 20 Hz vibration group were not significant, the 30 Hz vibration group was significant different from the other treatment groups. In present study, non-transported and 200 km transported groups were not significantly different and such a finding partially support the findings of Torma and Kovacsne (2012), but quite different from the findings of Shannon et al. (1994) indicating 32 % increase in embryonic mortality with 5-50 Hz vibration levels.

Present second period embryonic mortalities for 7 and 14-day storage groups (2.41 % and 5.76 %, respectively) were lower than the values reported by Seker et al. (2005) for 1-3, 7-9 and 13-15-day storage durations (1.70 %, 4.135 and 10.47 %, respectively).

Such differences may be resulted from period coverage since the second period embryonic mortality of the present study covered 10-17th days, but covered 8-16th days in the other studies.

The present second period embryonic death ratios of 7 (2.4 %) and 14 (5.76 %) day storage durations were greater than the value reported by Aygün and Sert (2013) for 7 (2.18 %) and 14 (2.79 %) day storage durations. On the other hand, these findings were lower than the values reported by Alasahan et al. (2016) investigating the effects of different color and spot sizes on hatch outcomes of quail eggs (5.6-10.8 %). Average second period embryonic mortality was 4.08 % in present study and this value was quite lower than the value of Copur Akpinar et al. (2017) reported for hatching eggs of Yellow Japanese quail (12.27 %).

The second period embryonic mortality ratios of transported and non-transported eggs were different. Torma and Kovacsne (2012) reported second period embryonic death ratios of vibrated group (subjected to 10-30 Hz vibration for 10 minutes) and control group (without any vibrations) respectively as 1.34 % and 0.59 %. In the same study, eggs were subjected to 10-30 Hz vibrations for 10 minutes, then stored for 3 days and the second period embryonic mortality rates of these eggs and control eggs were respectively reported as 0.96 % and 0.61 %. The embryonic mortalities of 20 and 30 Hz constant vibration and control groups were respectively reported as 0.39 %, 1.68 % and 0.56 %. While the differences between the treatments were not significant in the first two trials, the differences between low vibration and control group were not significant in third trials, but the high vibration group was significantly different from the others. Significant effects of transportation distance on the second period embryonic mortality of the present study comply with the findings of Torma and Kovacsne (2012).

Present findings on the third period embryonic mortality ratios for different storage periods were different from the values of Aygun and Sert (2013) reported for the same storage durations (respectively as 1.39 % and 2.195) and from the findings of Alasahan et al. (2016) investigating the effects of different egg shell color and spot sizes on hatching parameters (1.9 % and 2.9 %). Present third period embryonic mortalities were quite lower than the values of Copur Akpinar et al. (2017) (11.85 %) and the values of Lacin et al. (2008) reported for 3, 8 and 14-day storage durations respectively as 19.205, 31.30 % and 47.50 %. Present findings were also lower than the late embryonic mortality ratios of Seker et al. (2005) reported for 7-9 (8.43 %) and 13-15 day (19.69 %) storage duration of Japanese quail (Coturnıx coturnıx japonica) eggs.

Torma and Kovacsne (2012) reported that the late embryonic mortality ratios did not change in the eggs subjected to varying vibration levels between 10-30 Hz and stored for 3 days, the eggs subjected to 10-30 Hz vibration levels but non-stored and the eggs subjected to 20 and 30 Hz constant vibration levels. Present insignificant effects transportation after 7 and 14-day storage durations support the findings of Torma and Kovacsne (2012).

Present discarded hatched chick ratios were quite different from the finding of previous studies. In a study investigating the effects of egg weight and shape index on hatching outcomes, Copur et al. (2010) reported discarded hatched chick ratio of <13 g, 13-14 g and >14 g eggs respectively as 0.78 %, 0.43 % and 1.85 %.

The results were quite different from the present ones since the effects of vibrations were investigated and only leg problems were considered in this study. Romao et al. (2008) reported weight losses in meat and egg-type quail eggs during the incubation period respectively as 8.27 % and 9.31 %. Genchev et al. (2009) reported the value as 9.72 % for meat-type Prag quail. Nowaczewski et al. (2010) reported egg weight losses of different weight groups (light: 10.5 g, medium: 10.51-11.50 g, heavy: 11.51-12.50 g and XL: 12.51 g) during the incubation period (0-15 day) respectively as 11.0 %, 10.4 %, 9.9 % and 9.5 %.

Present weight loss ratios were quite higher than the values of Nowaczewski et al. (2012) reported for top (9.07 %), medium (8.94 %) and bottom (8.98 %) egg trays of an setter. The differences may come from the processes applied to eggs since they were placed into setter without any prior storage period. Aygun and Sert (2013) reported egg weight loss ratios of 7 and 14-day stored eggs during 0-14 day incubation period respectively as 9.72 % and 9.77 %. Adeyanju et al. (2014) reported weight loss ratios for light (8.91 g), medium (9.80 g) and heavy (10.76 g) eggs respectively as 29.98 %, 20.44 % and 22.69 %.

In another study considering the egg shell colors, Farghly et al. (2015) reported weight loss ratio as 15.70 % for white shells, 15.42 % for brown dotted shells and 14.04% for doted violet shells. Present weight loss ratios were greater than the values of Romao et al. (2008), Genchev (2009), Nowaczewski et al. (2010), Nowaczewski et al. (2012) and Aygun and Sert (2013), but lower than the values of Farghly et al. (2015).

Donofre (2017) reported weight loss ratios of low vibrations for short durations, low vibrations for long durations, high vibrations for short durations, high vibrations for long durations and control treatments respectively as 6.5 %, 6.5 %, 10.0 %, 14.75 % and 6.0 %.

Conclusion

As compared to non-transported egg group with the same storage duration, 200 km transportation after 7-day storage negatively influenced hatchability of fertile eggs; on the other hand, 200 km transportation after long-term storage had greater hatchability of fertile eggs than the non-transported eggs with the same storage durations. Such findings revealed that the vibrations through 200 km transportation over the secondary road after long-term storage durations positively influenced embryonic development of hatching eggs.

Thusly, lower discarded chick ratios of the long-term stored and long-distance transported egg group than the short-term storage but long-distance transported egg group proved the greater hatchability of fertile eggs.

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The Determination of Consumers' Perception, Attitude and Behavior about the Influence of Nutrition on Chicken Meat Quality

K. Karasu, E. Ozturk

Department of Animal Science, Faculty of Agriculture, University of Ondokuz Mayis 55139, Samsun, Turkey

Introduction

Production and consumption of poultry meat shows a rapid increase both in the world and in our country. In Turkey, the consumption of chicken meat per capita increased from 8.5 kg in 2001 to 21.8 kg in 2016. Within the same period, chicken meat production increased from 592,567 tons to 1,951,000 tons. Despite the rapid development in the sector, the per capita white meat consumption level in our country is below the world average. In recent years, one of the most important factors affecting the development of the poultry industry is the make lots of news, the use of products obtained from genetically modified plants (transgenic and GMO) as feedstuffs in feeding animal, in relation to the use of hormones and antibiotics in poultry nutritions, It lacks scientific grounds and makes news far from the realty. Due to the development of communication speed, the change of perception models that develop in the society cause the perception of food to change more rapidly. Especially the disclosure of social media, written or visual media by non-specialists causes information pollution in society (Topçu et al., 2015). In this study, it was aimed to determine the sector effects by measuring the perception, attitudes and behaviors of GM feeds, hormones and antibiotics usage and product quality in mixed feeds with the content of the feeds used in the feeding of the broiler chickens of consumers in İstanbul province.

Materials and Methods

The research was conducted with face to face interviews with 384 people who were randomly selected from different education and income levels among adult people aged 18 and over living in 39 provinces of Istanbul. It is also consistent with the study by Gegez (2007) that the main mass reported is ≥10,000,000 and n = 384 in 95% confidence interval studies. In the analysis of the data obtained, descriptive analysis and chi-square tests were used. All statistical calculations was performed in the SPSS 21.0 V, statistical package program.

Results and Discussion

According to the results of the research, consumers prefer the meat, brand, packaging and all / part features, in order to buy, respectively (Figure 1). Dokuzlu et al. (2013) emphasized that brand was one of the most important factor in general for households in the consumption of poultry meat. Karakaya et al. (2014) conducted a research in the province of Bingöl, 89% of consumers stated that they choose well-known brands for buying chicken meat. Our research in this direction is similar to the findings of both studies.

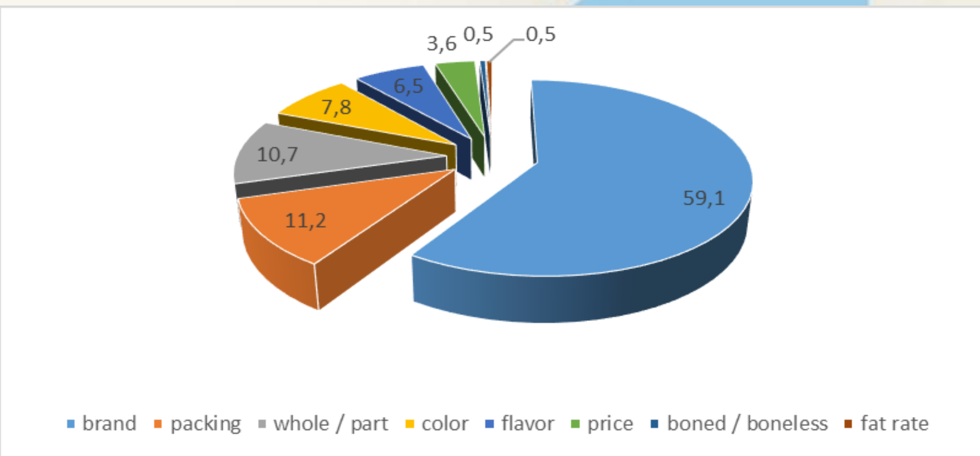

Figure 1. Considerations about the characteristics that the consumers pay attention when buying chicken meat

Seventy percent of consumers explained they did not know how the chicks they bought were fed, 75% reported that they do not know the contents of mixed feeds consumed by broilers. Also, 77% of the consumers did not think that broiler chickens were healthy. Eighty seven of the consumers reported that they think used hormones in the feeding of broiler chickens and 91.9% stated that they think that antibiotics were used as an accelerator to grow (figure 2).

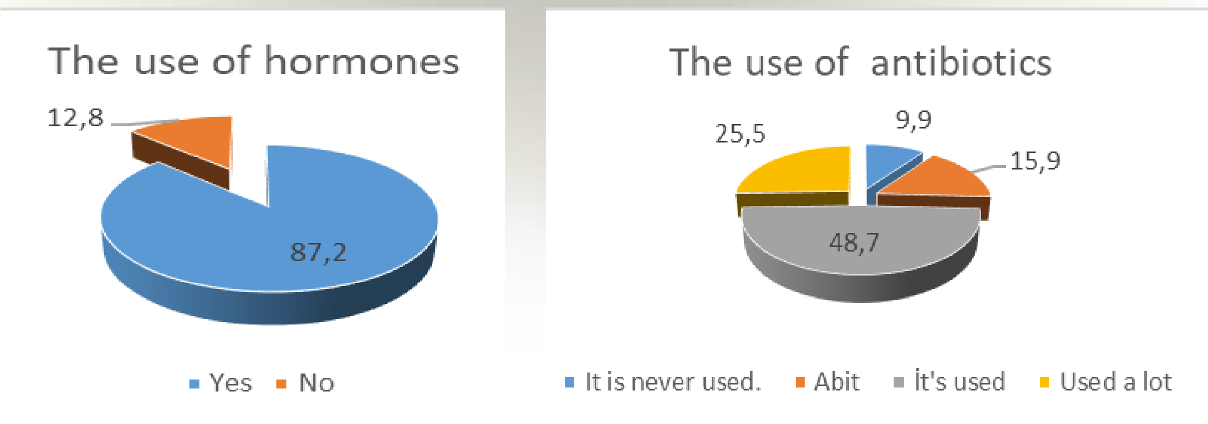

Figure 2. Consumers' thoughts on the use of hormones and antibiotics in broilers feed

In a study conducted by Bekar (2013) in the province of Muğla, the percentage of those who are often or very worried about the presence of hormones and antibiotics in poultry was determined as 71.7%. Yang et al. (2017) reported that 57% of consumers thought that hormones were used in the production of chicken meat in a study conducted in the United States. The results of these two studies are parallel to our research results and it clearly shows that consumers do not have enough information about the mixed feeds and contents used in chicken meat production and they are prejudiced about chicken meat production.

Conclusion

Findings from the research show that a large majority of consumers have misinformed about mixed feed contents used in feeding of broilers. Considering that the use of antibiotics and hormones has been banned in European countries and our country since 2006, it is understood that the vast majority of consumers do not know sector facts.

For decades, misinformation sources and consumer perception of chicken meat as an unhealthy, risky and hormone food (Dokuzlu et al., 2013) it is anticipated that this situation will create a negative pressure on chicken meat consumption if not corrected by appropriate methods. Istanbul, with its social and economic structure, is the most representative city of Turkey. Therefore, it is also thought that results obtained from this study to better represent Turkey in guiding due to the broiler sector will play an important role.

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The Effects of Demographic Structure and Mass Media on the Chicken Meat Sold in the Market*

K. Karasu, E. Ozturk

Department of Animal Science, Faculty of Agriculture, University of Ondokuz Mayis 55139, Samsun, Turkey

Introduction

Poultry meat sector of the food industry in Turkey has been identified as one of the few sub-sectors that can compete with the EU. Creating a large labor force and employment in the sector is one of the most well-organized food sub-sector reveals the importance of this sector to Turkey (Nine et al., 2013). Despite the increase in production and consumption, there are important problems in the sector. The first of these problems comes from a large number of non-scientific reports on the vast majority of products derived from genetically modified plants (transgenic or GMOs), hormones and antibiotics used in animal feeding. Due to the development of communication speed, the change of the perception models developing in the society causes the perception of food to be higher. Chicken meat, which is essential for healthy, adequate and balanced nutrition of people, often becomes a center of criticism directly or indirectly through unfounded news in the written and visual media and is rapidly spreading in the social media. Chicken meat is often referred to as unhealthy, risky and hormone food by misdirection of non-specialists and this information pollution in the society is seriously harmful to the sector (Topçu et al., 2015). In this study, it was aimed to clarify the concept of confidence in poultry meat by examining the process that leads to decision process of chicken meat purchase, quality and reliability, and the process of directing consumers with mass media.

Materials and Methods

The survey was conducted with face to face interviews with 384 people who were randomly selected from different education and income levels among adult people aged 18 and over living in the provincial centers of Istanbul. Gegez (2007) also agrees with the study that the main mass reported is ≥10.000.000 and n = 384 should be used when working at 95% confidence interval.

In the analysis of the obtained data, descriptive analysis and chi-square tests were used. All statistical calculations was done in the statistical package program (SPSS 21.0 V).

Results and Discussion

Do you think chicken meat sold in the market is safe and healthy? the question was asked to the consumers who participated in the survey. According to the results of the research, the 42.7%, 8.1% and 0.8% of the consumers participated in present survey considered chicken meat as very unhealthy, healthy and very healthy, respectively. The 48.4% of the participants had no decision (Figure 1).

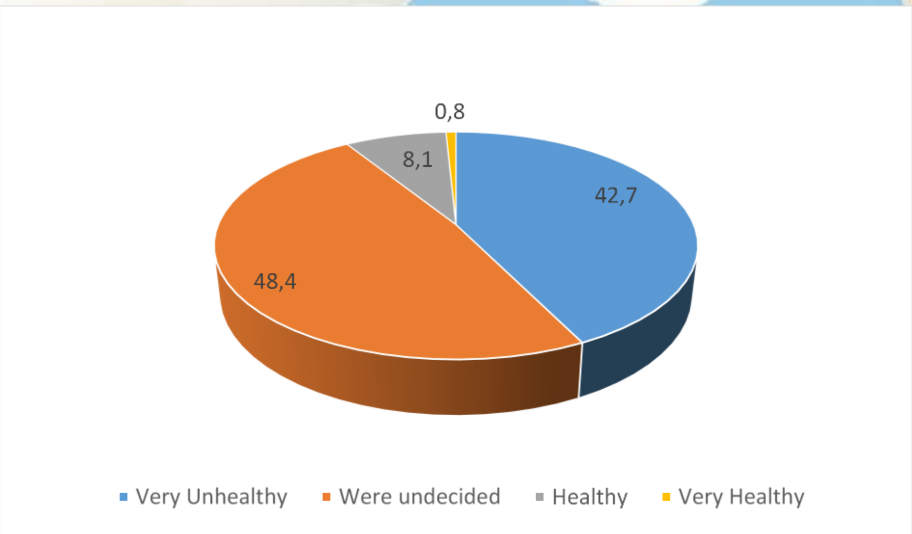

Figure 1. The answers by the consumers about whether chicken meat sold in the market is safe

Who should be consulted about the quality and safety of chicken meat? the question was asked. In Figure 2, according to the results of the survey, 89.1% of consumers surveyed stated that they should be relied on specialists responsible for care and nutrition of animals, 6.3% needed to be trusted by medical doctors, 2.9% were confident in social media news, 1.8% were confident in written and visual media reported. A study by Dokuzlu et al. (2013) found that consumers are most concerned with "confidence" in purchasing chicken and poultry products.

According to Bekar (2013), consumers have reduced the consumption of certain foods by the reasons of insecurity; they also stated that they could consume these foods if approved by the Ministry of Food, Agriculture and Livestock of Turkey. Öztürk (2016), in his study of egg and chicken meat quality, stated that "the desire for improvement in the demand for safe food for both consumer and animal welfare in recent years has been manipulated by non-specialists". According to the findings of our research, 89.1% of the consumers were confident to the experts on the news about chicken meat, and the findings in the social media and in the printed media were not reliable. According to the results of the research, significant relationships were determined on gender, age and number of family members and consumers' knowledge on the quality and reliability of chicken meat, and it was found that individuals aged 18-45 were more confident to the experts of the subject and that social media and press / visual media is also seen to increase. it has been determined that there is no meaningful effect of education and income situation on consumer's knowledge of chicken meat quality and reliability.

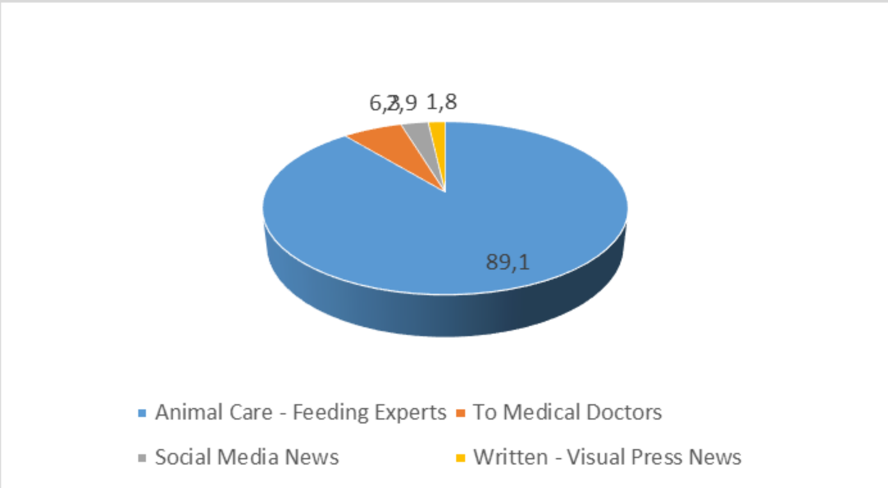

Figure 2. Answers to question about the quality and safety of chicken meat

Conclusion

According to research findings, consumers do not trust chicken meat sold on the market. 89.1% of the consumers do not confident the quality of chicken meat. It has been understood that the messages of the audiovisual media are more influential in the formation of these perceptions. The poultry sector has more tasks for researchers and experts to solve these problems. The poultry sector should be prevented from being influenced by speculative statements that are far from scientific evidence.

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Determination of some molecular marker polymorphisms affecting production traits in Holstein Cattle

M. Ozdemir, Z. Sonmez, V. Aksakal

Department of Animal Science, Faculty of Agriculture, Ataturk University, 25240 Erzurum, Turkey

Kelkit Aydin Dogan Vocational School, Gumushane University, Kelkit, Gumushane, Turkey

Introduction

Scientists have been trying to develop new genetic markers that can be used in indirect selection to increase the yield of livestock in terms of quality and quantity. The HRM represents the easiest method of genotyping and mutation detection since it is performed in the same tube and just after the PCR procedure (Montgomery et al., 2007). In the present study, it was aimed to determine novel molecular marker polymorphisms by HRMA method in GDF-5 (Growth Differentiation Factor 5 (CDMP-1)) and EPS8 (Epidermal Growth Factor Receptor Substrate 8).

Material and Methods

Blood samples of 72 Holstein cows reared in the Kelkit region of Gümüşhane in Turkey were used as material. Genomic DNA was extracted from the whole blood samples using a Purgene kit (Gentra Systems, Plymouth, MN, USA). Three pairs of primers were designed for the GDF5 (NCBI Reference Sequence: AC_000170.1) and EPS8 (NCBI Reference Sequence: AC_000162.1) genes that were used in the present study using Primer 3 Software (Rozen and Skaletsky, 2000). PCR was performed to replicate the related gene region of the obtained DNA, the qualitative and quantitative controls of the analysis results were carried out by 2% agarose gel electrophoresis. Amplifications were performed on the Rotor gene Q Real-time PCR. The amplification program consisted of an initial denaturation of 94°C for 5 min followed by 40 cycles of 94°C, 58°C, and 72°C (25 s each) and a final extension for 5 min at 72°C. After amplification, the melting analysis was immediately performed.

Based on the normalized Tm curves, the samples were clustered according to the Principal Component Analysis (Reja et al., 2010) in the unsupervised mode using the Rotor-Gene ScreenClust HRM Software program in order to determine differences between the samples.
A total of 72 PCR samples were separated into clusters by the HRM method, and randomly 4 samples from each cluster were selected for the DNA sequence analysis and sent to the company that performs commercial DNA sequencing to obtain a DNA base sequence of each sample. Subsequently, the genotype differences of the samples according to the DNA sequence results were compared with the help of Mega 7.0 (Kumar et al., 2016) and BioEdit 7.2.6 (Hall, 2005) programs.

Results

As a result of the clustering analysis of the 72 DNA samples of Holstein cattle, of which HRM-PCR analysis was performed, they were clustered according to their melting curve differences. The data evaluated on the ScreenClust HRM software were collected in different clusters for each region according to the three-dimensional principal component analysis (PCA). As a result of the HRM-PCR analyses, in the 72 samples belonging to Holstein cattle, the number of different clusters formed was 8 for the EPS8 gene 1st exon 1st region and 9 for the 2nd region, 9 for the EPS8 2nd exon, 7 for the GDF5 gene 1st exon region and 8 for the 2nd exon region, and 6 for the 2nd intron region. Sequence analyses were obtained by randomly taking 4-6 samples from each of these clusters with more than 5 samples, and taking all samples from the clusters with less than 5 samples. DNA sequence analysis results were evaluated to identify the regions showing polymorphism in the EPS8 and GDF5 gene regions in Holstein cattle, and the results are presented in images and graphs. Alleles of the polymorphic regions, amino acid substitutions and genotype frequencies are presented in Table 1.

Table 1. Polymorphic regions and marker positions in the EPS8 and GDF5 genes, the amino acid substitution and genotype frequencies

Region	Marker Position	Amino acid substitution	Genotype Counts (AA:AB:BB)*
EPS8 exon 1	g.94554132 C>T	Pro51Ser	29:2:6
	g.94554252 C>G	Pro91Ala	35:2:0
	g.94554348 T>G	Ser123Ala	30:6:0
	g.94554354 C>G	Pro125Ala	31:5:0
	g.94554372 C>G	Gln131Glu	29:5:0
	g.94554389 A>G	Val136Val	29:5:0
	g.94554392 C>G	Tyr137Stop	29:5:0
	g.94554399 A>G	Asn140Asp	30:4:0
	g.94554439 C>G	Pro153Arg	30:4:0
EPS8 exon 2	g.94555920 T>G	Ser132Ala	26:13:0
GDF5 exon 1	g.65340723 G>A	Val198Ile	16:4:1
	g.65340727 T>C	Leu199Pro	18:1:2
GDF5 exon 2	g.65340902 A>G	Gly257Gly	15:14:1

(*Note: Genotype counts were calculated based only on the DNA sequencing results, the symbols here are representative).

Conclusion

In the study, in order to determine new molecular marker polymorphisms on the GDF-5 ((CDMP-1); growth differentiation factor 5) and EPS8 (Epidermal Growth Factor Receptor Substrate 8, EGF receptor pathway substrate 8) genes, the RT-PCR and HRM analyses were performed, and new polymorphisms in the genes and gene regions determined by DNA sequence analyses were investigated. As a result of the analyses, a total of 13 polymorphic regions were identified, including 9 different polymorphic regions for the EPS8 gene 1st exon 1st region and 1 for 1st exon 2nd region, and 2 for the GDF5 gene 1st exon region and 1 for the 2nd exon region.

The g.94554348 T>G, g.94554354 C>G, g.94554372 C>G, g.94554389 A>G, g.94554392 C>G, g.94554399 A>G, g.94554439 C>G polymorphic regions for the EPS8 gene 1st exon 1st region, g.94555920 T>G polymorphic region for the EPS8 gene 2nd exon region, and g.65340723 G>A and g.65340727 T>C polymorphic regions (SNPs) for the GDF5 gene 2nd exon region were identified for the first time in this study. The HRM analysis described in this report provides an alternative approach to traditional genotyping for SNPs/polymorphism in the improvement of bovine production traits, and it has many advantages, including speed, expense, and accuracy. This method can also be very useful in assessing the efficiency of nuclear transfer as well as in studies of nuclear-cytoplasm interactions and maternal effects on cloned embryos.

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Prion protein (PRNP) alleles S146 and K222 result in long disease-free periods following scrapie inoculation in goats

M.U. Cinar[ab], D.A. Schneider[ac], D.F. Waldron[d], K.I. O'Rourke[ac], S.N. White[ace]

[a]Department of Veterinary Microbiology and Pathology, Washington State University, 3003 ADBF, WSU, Pullman, WA 99164, USA

[b]Erciyes University, Faculty of Agriculture, Department of Animal Science, Kayseri 38039, Turkey

[c]United States Department of Agriculture, Agricultural Research Service, Animal Disease Research Unit, 3003 ADBF, WSU, Pullman, WA 99164, USA

[d]Texas AgriLife Research, San Angelo, TX 76901, USA

[e]Center for Reproductive Biology, Washington State University, 3003 ADBF, WSU, Pullman, WA 99164, USA

Introduction

Scrapie, an invariably fatal disease of sheep and goats, is a transmissible spongiform encephalopathy (TSE). The putative infectious agent is the host-encoded prion protein, PrP. The development of scrapie is closely linked to polymorphisms in the host PrP gene. The pathogenesis of most TSEs involves conversion of normal, cellular PrP into a protease-resistant, pathogenic isoform called PrPSc (Baylis and Goldmann, 2004).

Materials and methods

We used a total of 21 Toggenburg, Alpine-Boer, and Spanish-Boer goats in three genotype groups with defined PRNP haplotypes. One control genotype group and two experimental genotype groups (S146 and K222) were compared to the common control as previously described (White et al., 2012). Briefly, the control group consisted of five homozygotes for P240, encoded on the most common goat PRNP haplotype in the U.S. (White et al., 2008). Each experimental genotype consisted of a single copy of the common P240 haplotype paired with a single copy of the allele of interest: either S146 or K222 (White et al., 2008). Goat kids in the experiment were born in 2008–2009 and were given an oral inoculation of classical scrapie homogenate within 24 h of birth, orally administered as a frozen lozenge which was immediately followed by brief milk feeding to minimize potential losses.

Results

A summary of the current status of recipient goats are provided in Table 1. In all wildtype recipient goats, accumulation of PrP^{Sc} in rectoanal mucosa-associated lymphoid follicles (RAMALT) was detected as early as 363 days–779 days post-inoculation.

Among these, 4/5 were detected antemortem and the remaining animal had a positive postmortem sample. All wildtype recipients went on to develop clinical signs consistent with scrapie infection, were euthanased between 720 days and 1020 days post-inoculation.

In contrast, the progressive clinical signs commonly associated with scrapie have not been observed in any recipient goats of the NS146 and QK222 genotype groups, nor have PrP^{Sc}accumulations been detected in ante-mortem biopsy samples of the rectal mucosa.

Table 1. Current scrapie status of goats by genotype.

Genotype	n	Biopsy positive	Clinical scrapie	Alive today	Mean survival time without clinical scrapie (days)	Age range (days)
Control (NN/QQ)	5	4	5	0	719.0	607–810
NS146	8	0	0	5	2733.8[a]	1493–3149
QK222	8	0	0	2	2450.4[a]	908–3409

a Significantly extended survival time without clinical scrapie compared to control ($P < 0.001$).

Conclusion

Our data on NS146 heterozygotes confirm strong resistance to classical scrapie conferred by the S146 allele and indicate a mean disease-free survival of 2733.8 days (approximately 7.5 years), with a range of 1493–3149 days in NS146 heterozygotes (Table 1) (Cinar et al. 2018). Our data on QK222 heterozygotes confirm strong resistance to classical scrapie conferred by the K222 allele and indicate a mean disease-free survival time of 2450.4 days post-inoculation (approximately 6.7 years), with a range of 908–3409 days in QK222 heterozygotes (Table 1).

The results suggest goats with these genotypes will not show clinical signs of scrapie during the productive lifetimes of most commercial goats.

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Fuzzy expert system design for determination of the weekly average live weight increases in broilers

N. Mikail[1], İ. Keskin[2], Y. Cufadar[2] and Y. Bahtiyarca[2]

[1] Animal Science Department, Faculty of Agriculture, Siirt University, 56100, Turkey

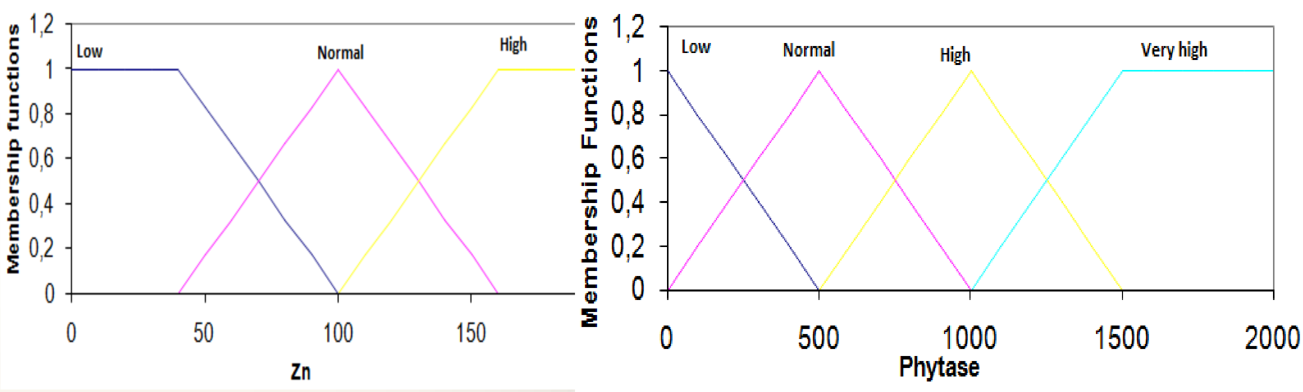
[2] Animal Science Department, Faculty of Agriculture, Selçuk University, 42250, Turkey

Introduction

A fuzzy system is formed of output and input variables. For each variable, fuzzy sets that characterize those variables are formulated, and for each fuzzy set a membership function is built. After that, the rules that relate the output and input variables to their respective fuzzy sets are defined. The computational evaluation of a fuzzy system is formed of fuzzification, inference and defuzzification. The fuzzy reasoning can be implemented by a direct method or indirect method (Ferreira et al, 2012). Application areas of fuzzy logic extend beyond control systems, and developed applications demonstrate that fuzzy logic can be used to model every field system where uncertainty and complexity exist, whether in engineering, biology or other areas. The aim of this study is to design the Fuzzy Control System for the estimation of the effect of addition inorganic Zn and phytase enzymes to low zinc broiler rations on the 6th week live weight increases. The basic information about fuzzy expert systems (FES) was given and a sample FES was prepared in the frame of this information.

Materials and methods

A total of 960 everyday chicks (Ross 308) were used in the experiment. Chicks were purchased from a commercial company. The basal diets in which relatively low Zn were accomplished by adding a Zn-free trace mineral mix to the diets were supplemented with 0, 60 and 120 mg Zn/kg as zinc oxide or with 0, 500, 1000 and 1500 U of phytase/kg diet derived from Aspergillus niger (Natuphos® 500 G, Kartal Kimya A.S.). Three levels of Zn and four levels of phytase were arranged in factorial manner and the treatments were replicated four times with 20 birds allocated to each replicate (3 Zn x 4 phytase x 4 replicate x 20 birds per pen = total 960 birds) (Cufadar and Bahtiyarca, 2004). Fuzzy logic Toolbox MATLAB Software was used for FES design. Fuzzy sets and membership functions for Zn and Phytase were given in Figure 1 (a, b).



a) b)

Figure 1. Membership functions for input variables

The Mamdani method was used as inference method. Based on Mamdani max - min method, the result of each rule was as follows:

$\alpha 1$ = min {low(x),low(y)}

$\alpha 2$ = min {low(x),normal(y)}

$\alpha 3$ = min {low(x),high(y)} ...

Here, if two or more rules are fired at the same time, the inference will be found by taking their max.

α1,2,…,n =max(α1, α2,…, αn) n=1..12

Results

Correlation coefficient between observed and estimated by FES 5th and 6th week average live weight increases was found as 91.4% and 92%, respectively. This results shows that the FES can predict average live weight increases for different doses with the high precision.

Conclusion

This study has shown that FES can be succesfully used in ration preparation for broiler chickens.

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Analysing Mid-Winter Waterfowl Counts Using Zero Inflated Regression Models

E. Çelik[1] R. Kara[2*] A. Durmuş[1] A. Yeşilova[2]

[1]Yüzüncü Yıl Üniversitesi Fen Fakültesi Biyoloji Bölümü, 65080 Van

[2]Yüzüncü Yıl University Faculty of Agriculture Department of Animal Science 65080 Van

[*]ridvankara65@hotmail.com

Introduction

Van Lake Basin is very rich in terms of ornithology in all four seasons. Birds that find alternate habitats in the basin outside the winter season are common in some areas during winter months. In this study, species and population sizes of water birds in Erçek Lake, Dönemeç and Bendimahi Deltas and Yaylıyaka and Göründü reeds were investigated in winter. The study was carried out between January 15 and February 15 every year covering the years 2014-2018. Point and transect observation methods were used in the counts. As is known, Poisson regression is used in modeling the dependent variable obtained by counting (Ridout, 1998). An important characteristic of the Poisson distribution is that the mean and the variance are equal (Yesilova, 2010). Overdispersion is defined as variance is greater than mean and the opposite situation is defined as underdispersion. (Banik ve Kibria, 2008). It is more appropriate to use negative binomial (NB) considering overdispersion and generalized Poisson (GP) regressions considering underdispersion (Sileshi, 2008). However, data sets may contain a large number of zero observations. In the analysis of zero-inflated count data, it is suggested to apply zero-inflated regression models considering the effect of zero values (Khoshgoftaar, 2005; Tin, 2008). In this study, the data obtained from the bird counts were categorized according to the area and years, and the change in the number of species and population sizes was evaluated statistically using zero-inflated regression models.

Materials and methods

Winter waterfowl counts were carried out in Ercek Lake, Dönemeç and Bendimahi deltas (Durmuş and Çelik, 2017) and Yaylıyaka and Göründü reeds, which are located in different positions in the Van Lake Basin and provide fresh water entrances to the birds in the winter season (Figure 1) The study was conducted during the winter months covering 2014-2018.

Winter waterfowl counts have been carried out at a time when migratory and displaced movements of waterfowl are at least or not at all and when waterfowls are clustered in wetlands (Onmus, 2008).

The counts were made between January 15 and February 15, with the clusters being over-active and the activity being less active. At the determined dates for each year, 5 days per land; so 25 days were observed. A total of 125 days of land work was carried out in 5 years. The counts were mostly made at points recorded in the previous winter waterfowl counts. Point counts and Transect observation methods were used (Bibby and Burgess, 1992). Counts were continued between 07:30 and 12:00 in the morning and until 14:00 in the afternoon and until evening hours when optical instruments did not receive enough images.

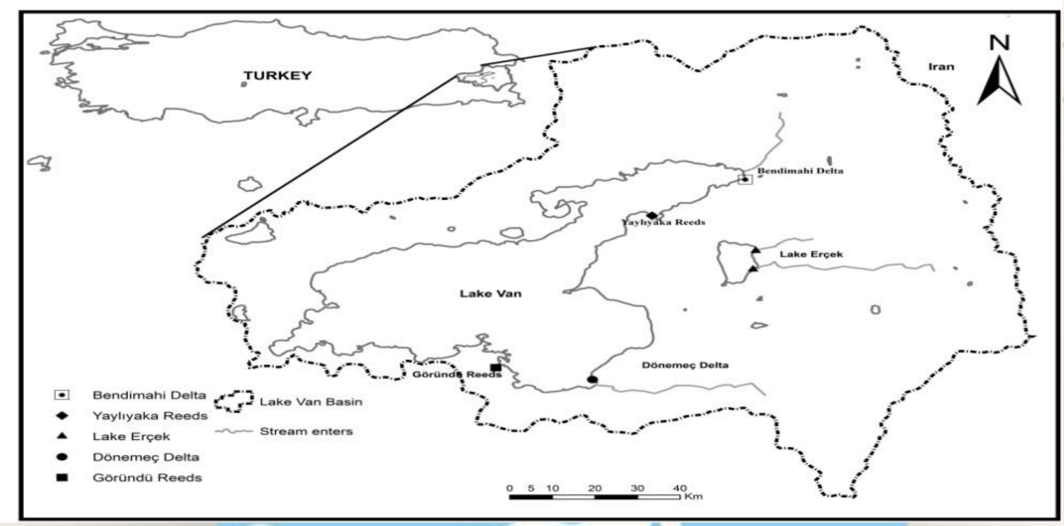

Figure 1: Count Points

As is known, Poisson regression is used in the modeling of the dependent variable obtained by counting. However, data sets may contain excess zero. In the analysis of excess zero data, it is suggested to apply zero-inflated regression models considering the effect of zero values (Khoshgoftaar, 2005; Tin, 2008). The most suitable model was determined by using 6 different models for data set (Poisson, Zero Inflated Poisson, Zero Inflated Negative Binom, Hurdle Poisson, Hurdle Negative Binom). 360 (40%) from the 901 datas were determined as zero value (Figure 2) Because of this feature of the dataset, using Poisson and Negative Binom Regression models leads to biased parameter estimates. For this reason, Zero inflated models are used(Zero Inflated Poisson, Zero Inflated Negative Binom, Zero Inflated Hurdle Models). Akaiki values (AIC) and Vuong test results indicate that the most suitable model is Hurdle Negative Binom (Table 1, Table 2). Therefore, the parameter estimates are based on the Hurdle Negative Binom Regression model.

Table 1: The values of akaike information criterion

NO	TEST	AIC
1	Poisson	18576
2	NegativeBinom	5691.8
3	Zero inflatedpoisson	5469.495
4	Zero inflatednegative binom	5469.495
5	Hurdlepoisson	15676
6	Hurdlenegativebinom	5219.123

Table 2: Vuong statistics of used regression models

MODEL 2	MODEL 1					
	PR	NB	ZIP	ZINB	HURDLE-P	HURDLE-NB
PR						
NB	model2 > model1 p= 2.22e-16					
ZIP	model2 > model1 p=2.22e-16	model1 > model2 p=1.2546e-14				
ZINB	model2 > model1 p= 2.22e-16	model2 > model1 p=2.7196e-10				
HURDLE-P	model2 > model1 p=1.8656e-15	model1 > model2 p=5.0404e-14	model2 > model1 p= 2.22e-16	model1 > model2 p=8.9928e-15		
HURDLE-NB	model2 >model1 p=2.22e-16	model2 > model1 p=2.22e-16	model2 > model1 p=2.22e-16	model2 > model1 p=2.22e-16	model2 > model1 p=2.1431e-15	

(PR: Poisson Regression, NB: Negative Binom, ZIP: Zero Inflated Poisson, ZINB: Zero Inflated Negative Binom, HURDLE-P: Hurdle Poisson, HURDLE-NB:Hurdle Negative Binom)

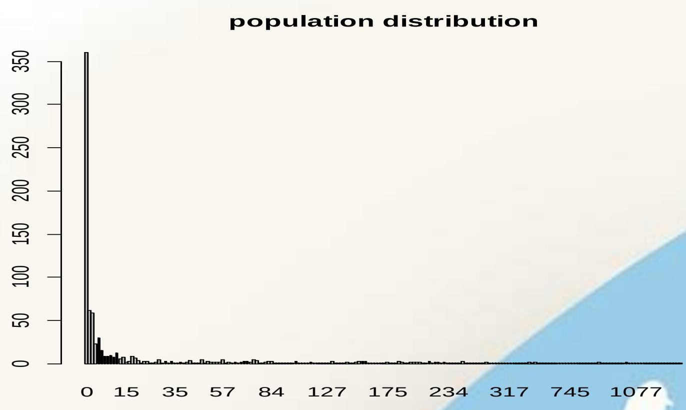

Figure 2: Distribution of bird population

Results

When the Bendimahi Delta was taken as a reference, the population in the Göründü Reeds decreased by about 8% ($p < 0.01$). No significant change was observed in other areas. Among the 36 different species of birds, the population of Armenian Gull(Larus armenicus) was 7.3 times higher than Little Grebe (Tachybaptus ruficollis)($p < 0.001$). Northern Shoveler (Spatula clypeata) 49% and Mallard (Anas platyrhynchos) increased by 46% ($p < 0.05$). According to the same reference group; Little Egret (Egretta garzetta) 71%, Flamingo (Phoenicopterus roseus) 94%, Garganey (Spatula querquedula) 93% and Whooper Swan (Thrush Cygnus cygnus) 71% decreased ($p < 0.001$). No statistically significant changes were observed in the populations of Ruddy Shelduck (Tadorna ferruginea Common Pochard (Aythya ferina), Great Cormorant (Phalacrocorax carbo) and Great Crested Grebe (Podiceps cristatus) bird species. Bird populations did not show any significant change over the years when the year 2014 was taken as a reference.

Conclusion

The Van Lake Basin is very rich in ornithological direction during all four seasons. In spring and summer, birds have many alternative areas to maintain their vital activities. However, with the arrival of the winter season, the habitats of waterfowl are gradually narrowing**.** Therefore, water birds go to the shallow areas where the water does not freeze and the fresh water intake is present, so that both feeding and resting activities are performed.

The water sources feeding the Dönemeç and Bendimahi Deltas and the Erçek Lake, where the freshwater entrance to Van Lake is located, do not freeze in winter. This situation contributes to the continuity of the vital activities of the species which are both food transport and water dependent. At the same time, where there are frequent reeds in areas where fresh water intake is present, it helps to preserve and protect species. Other areas that are alternative to water birds are Göründü and Yaylıyaka reeds. Yaylıyaka reeds are home to many wildlife, especially birds, mainly because of the different types of habitats they have. The reeds are mostly in the form of a thin line along the lake (Adızel et al., 2010). This situation brings the lake coast to a closed state, causing the species to be stored and protected. Göründü reeds are one of the most important areas for waterfowl in the winter season as well as in the spring and summer seasons. Along with the local species in the region, the species of Whooper Swan (Cygnus cygnus), which is an important winter visitor for the region, is regularly seen every year.

When the year 2014 was taken as a reference, the population changes between years were not found significant. Because of species such as Mallard (Anas platyrhynchos), Northern Shoveler (Anas clypeata), Little Grebe (Tachybaptus ruficollis), Great Crested Grebe(Podiceps cristatus), Common Coot (Fulica atra) and Armenian Gull (Larus armenicus), which make a significant contribution to the population density. It was found that the decrease in bird populations of Göründü reed birds was significant (p <0.01), while no significant change was observed between the bird populations of Bendimahi Delta, Erçek Lake, Yaylıyaka reeds and Dönemeç Delta, which were taken as reference parameters from the fields.

If we were to interpret the results; Erçek Lake, Bendimahi and Dönemec Deltas have freshwater inflows that remove birds nutrient finding problems. This raises a similar kind of composition in all three arenas and balances population density. The commonality of the species in Yaylıyaka reeds and Bendimahi Delta explains the balance of population density. Environmental factors, the amount of water feeding the fields, the distance to the settlements, the intensity of the reeds and the anthropogenic effects are thought to be the main reasons for the decrease in Göründü reeds. Van-Tatvan highway traffic, which runs alongside Göründü reeds, is affecting birds. There ara illegal huntings every season in the area. Bedimahi is an isolated area surrounded by marsh areas and far away from the settlements where the species feed and stay.

Although environmental pressures are on the other areas, the environmental pressures on Göründü reeds are much higher than in other areas.

According to Little Grebe (Tachybaptus ruficollis), which is taken as a reference from species, population densities of the Armenian Gull (Larus armenicus), Mallard (Anas platyrhynchos) and Northern Shoveler (Anas clypeata) species increased. Armenian Gull (Larus armenicus) 's wide feeding areas explain the population density is high.

The main reason for the population differences between species is considered as habitat preferences that differ from species to species. The main reason for the reduction of Whooper Swan (Cygnus cygnus) and Flamingo (Phoenicopterus roseus) compared to the reference parameters is that these species prefer specific habitats.

Flamingo (Phoenicopterus roseus) is regularly observed in Ercek Lake every year, while Little Grebe (Tachybaptus ruficollis) is observed in high numbers in each area. Whooper Swan (Cygnus cygnus) is regularly observed in Yaylıyaka and Göründü reeds every year. However, the density of populations that can not be observed every year in other areas is not stable.

If the data sets obtained by counting are zero-inflated, subtracting these zero values from the data set or ignoring them leads to biased parameter estimates. Zero inflated regression methods are used in such cases. The Akaiki Information Criteria and Vuong tests can be used when the most appropriate method is selected. In the study, Hurdle Negative Binom model was chosen as the most suitable model and parameter estimations were made according to this model.

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Live weight estimation in rabbits using interpolation method

Ş. Çelik, T. Şengül, B. Söğüt, M.R. Taysı, A.Y. Şengül, H. İnci
Bingöl University Faculty of Agriculture Department of Animal Science-Bingöl

Introduction

Rabbits are grown for both their meat, fur, wool and for experimental purposes. The fact that rabbits have a high reproductive rate and reach their reproductive age in a short period of time makes them more advantageous in many ways compared to other animals. Considering the economic efficiency and profitability being the primary target in animal production, high fertility rates of rabbits and their ability to convert the feed to yield at the highest level gain importance.

Although rabbit breeding is widely practiced in many countries, especially France, it is still far behind the desired level in our country (Anonymous, 2018). There are many different rabbit breeds known in the world. The most common of these is the White New Zealand rabbit, which is a very large (4-5 kg) and carnivorous breed among rabbit breeds (Tekin, 1998). New Zealand Rabbit (Oryctolagus cuniculus L.) belongs to the Craniata group of the Chordatas, Lagomorpha order and laporidae family (Demirsoy, 1992). This breed has four different color variations, red, white, black and hybrid, which were developed especially for meat production (Anonymous, 2014). Ongun and Poyraz (2002) found the survival rate of White New Zealand rabbits as 43.18% and their live weight as 1237-1680 g, and reported that this breed was affected the environmental temperature.

Interpolation is a method used to calculate the unknown values of a function in this range, based on the present values of that function (Bayram, 2002). Interpolation can also be defined as the calculation of unknown intermediate values from the values known as intermediate values. Interpolation is performed within the range covered by the data and it has different methods such as linear, Newton, Lagrange, Aitken, Reverse interpolation and Spline interpolations (Tapramaz, 2002; Türker, 1997; Akın, 1998).

This study was conducted using the Lagrange interpolation method in order to estimate the live weight of 25-week-old male and female rabbits by weeks and to obtain the interpolation formula.

Materials and Methods

In the study, White New Zealand rabbits (Oryctolagus cuniculus L.), (6 males and 14 females) with the same nutrition and care conditions were used.

The animals were housed in individual cages (95*50*40 cm) and fed twice a day. They were kept in rooms at 23ºC on average and in 12-hour light-dark cycle. Live weight measurements were made every 5 weeks from birth to 25th week, and Lagrange interpolation formula was formed with the data obtained (Öztürk, 2007). Using the equation given below, live weight estimation was performed for the other weeks.

$$P_n(x) = \sum_{i=0}^{n} L_i(x) f(x_i) = \sum_{i=0}^{n} \left(\prod_{\substack{j=0 \\ j \neq i}}^{n} \frac{(x - x_j)}{(x_i - x_j)} \right) f(x_i)$$

MATLAB package software was used for live weight estimation.

Results and Discussion

Lagrange interpolation polynomial for male rabbits, was obtained as

$$f(x) = -0.0031x^5 + 0.198x^4 - 4.658x^3 + 47.11x^2 - 26.3333x + 47$$

Determination coefficient (R^2) for this interpolation was calculated as 0.99953. Live weights of male rabbits were estimated to be 624.67, 1154.1, 1784.5, 2331.9, 2856.5 and 3082.2 g for 4th, 8th, 12th, 16th, 20th and 24th weeks, respectively.

Lagrange interpolation polynomial for female rabbits

$$f(x) = -0.0029x^5 + 0.1838x^4 - 4.2913x^3 + 43.2369x^2 - 19.7938x + 40.74$$

was obtained as. Determination coefficient (R^2) for this interpolation was calculated as 0.99948. The live weights of female rabbits were estimated at 481.9, 1091.4, 1693.3, 2228.3, 2753.7 and 2978.2 g for the 4th, 8th, 12th, 16th, 20th and 24th weeks, respectively.

Lagrange interpolation polynomial for all rabbits was

$$f(x) = -0.0029x^5 + 0.187x^4 - 4.3769x^3 + 44.2243x^2 - 21.3462x + 42.59$$

obtained as. Determination coefficient (R^2) for this interpolation was calculated as 0.99949. The live weights of all rabbits were estimated at 490.1, 1110.2, 1720.7, 2259.4, 2784.6 and 3009.4 g for the 4th, 8th, 12th, 16th, 20th and 24th weeks, respectively. Estimated live weights of male, female and all rabbits in certain weeks are given in Table 1.

As seen in Table 1, could also be performed for the ages at which the rabbits were not measured. The live weight values estimated and obtained in the measured weeks were found to be almost equal to each other. The observed and estimated values in other weeks were also very close to each other.

Table 1. Live weight estimation of the male, female and all rabbits by weeks (g).

	Male		Female		Total	
Week	Observed	Predict	Observed	Predict	Observed	Predict
0	46.91	46.91	40.74	40.74	42.59	42.59
1	119.73	162.50	108.20	151.00	111.66	154.50
2	185.95	278.00	171.24	261.30	175.65	266.40
3	283.74	393.60	260.50	371.60	267.48	378.20
4	398.81	509.10	369.62	481.90	378.38	490.10
5	624.67	624.70	592.16	592.20	601.91	602.00
6	782.91	801.10	736.94	758.60	750.73	771.40
7	1012.22	977.60	959.69	925.00	975.45	940.80
8	1239.62	1154.1	1180.65	1091.40	1198.34	1110.20
9	1385.32	1330.5	1314.60	1257.80	1335.82	1279.70
10	1507.02	1507	1424.23	1424.23	1449.07	1449.07
11	1651.10	1645.80	1567.39	1558.80	1592.50	1584.90
12	1789.40	1784.50	1698.98	1693.30	1726.10	1720.70
13	1930.32	1923.30	1834.66	1827.80	1863.36	1856.50
14	2061.45	2062	1964.17	1962.40	1993.36	1992.30
15	2200.78	2200.80	2096.91	2096.91	2128.07	2128.07
16	2335.22	2331.90	2230.44	2228.30	2261.88	2259.40
17	2466.08	2463.10	2362.21	2359.60	2393.37	2390.70
18	2611.58	2594.20	2509.15	2491.00	2539.88	2522.00
19	2750.33	2725.40	2645.24	2622.40	2676.76	2653.30
20	2856.52	2856.50	2753.72	2753.72	2784.56	2784.56
21	2936.64	2912.90	2832.27	2809.80	2863.58	2840.80
22	3001.68	2969.40	2897.93	2865.90	2929.06	2897.00
23	3057.84	3025.80	2953.46	2922.10	2984.78	2953.20
24	3101.60	3082.20	3000.30	2978.20	3030.69	3009.40
25	3138.64	3138.60	3034.27	3034.30	3065.58	3065.58

In addition, since R^2 values are very high, it can be said that the Lanrange interpolation method is a good method for determining intermediate values. The graphs of the live weight values of male, female and all rabbits, estimated by weeks, are shown in Figures 1, 2 and 3.

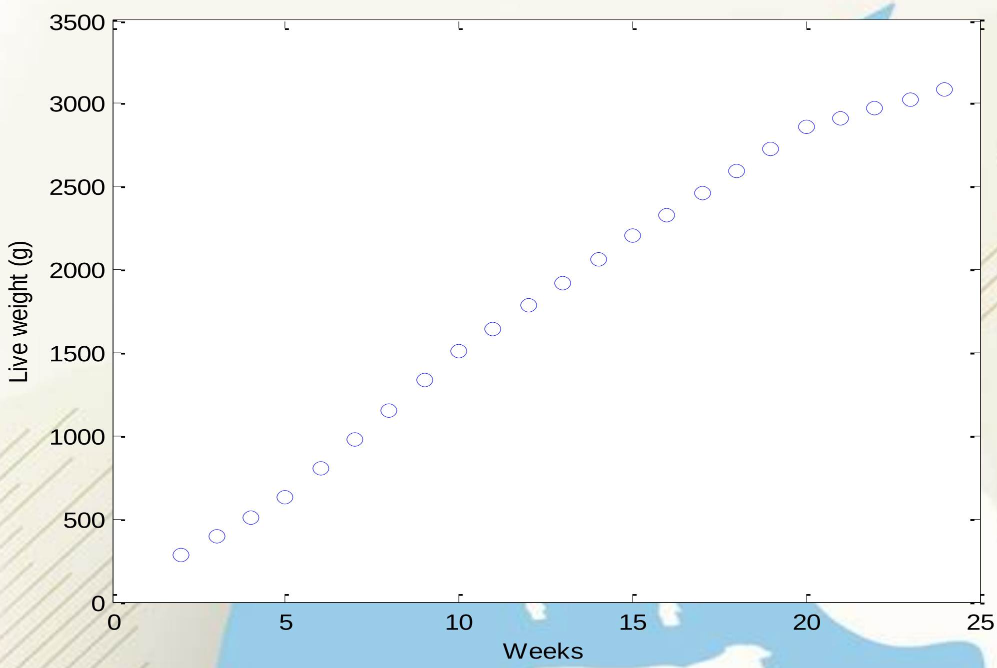

Figure 1. Estimated live weights of male rabbits in weeks

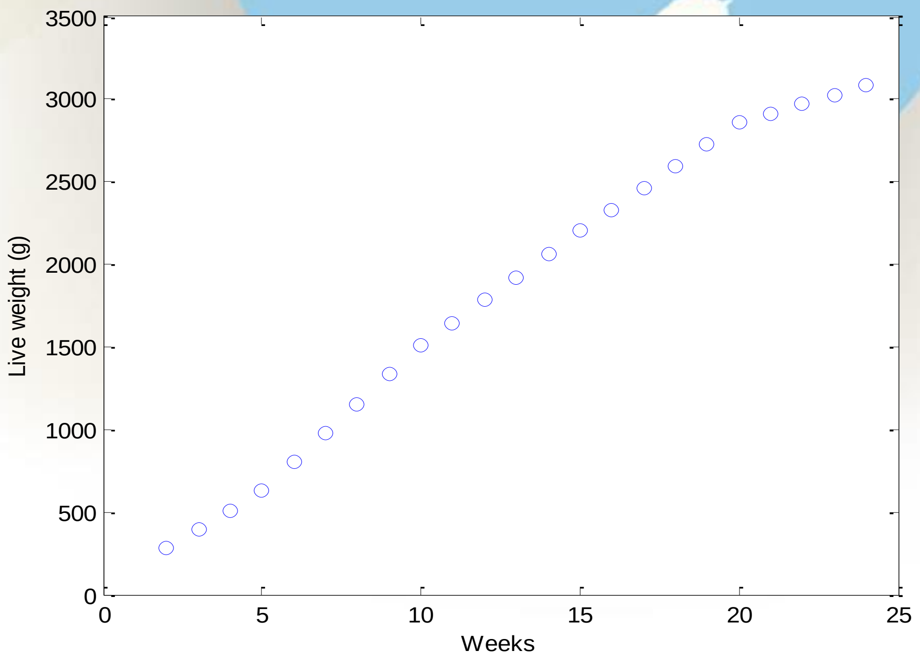

Figure 2. Estimated live weights of female rabbits in weeks

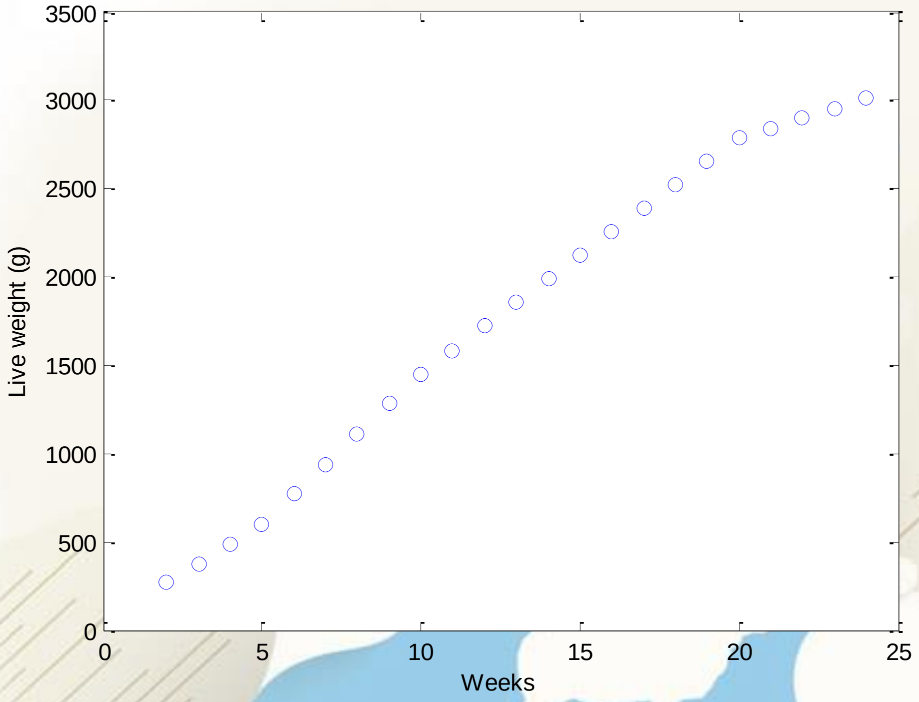

Figure 3. Estimated live weights of all rabbits in weeks

Live weight averages of rabbits are higher than the reported values of Kolb (1994), Papa et al., (2013) and Setiaji et al., (2013), and it can be said that these values are influenced by factors such as breeds, variety, location and eating patterns.

Conclusion

In this study, Lagrange interpolation polynomials were obtained and evaluated for male, female and all rabbits using live weights measured from birth to 25 weeks of age in White New Zealand rabbits. The results showed that the interpolation method is an important tool in estimating intermediate values and in generating formulas in animal research, as in many other areas.

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Using of artificial neural network for 305-day milk yield

Y. Gevrekçi*, Ç. Takma*, F. E. Ataç*, E.D. Yeğenoğlu**, M. Çevik*, M. Şahin***

*Ege University, Faculty of Agriculture, Department of Animal Science 35100 Bornova-İzmir Turkey

**Department of Plant and Animal Production, Alaşehir Vocational School, University of Manisa Celal Bayar,

45400, Alaşehir, Manisa-Turkey

***Kahramanmaras Sutcu Imam University, Faculty of Agriculture, Department of Animal Science, Kahramanmaras, Turkey

Introduction

Artificial neural networks (ANNs) is a powerful tool for system modeling. In this research, 305-d milk yield was predicted by ANN with some environmental factors such as dry period, calving interval and lactation period. With the help of developing computer technology, solving problems that are difficult and complex to solve has been achieved quickly. With this developing technology, ANN has been used for a wide range of applications in recent years (biology (Park et al., 2005), genetics (Ruanet et al., 2001; La Rocca and Perna, 2005), econometric evaluation with econometric estimates (Kuan and White, 1994; Kaashoek and van Dijk, 2000, Poldaru and Roots, 2005) and agriculture (Yang et al., 2003; Kaul et al., 2005; Uno et al., 2005). The ANN was designed using JMP.

Materials and methods

The data on 12854 fortnightly test day milk yields records of first lactation pertaining to 957 Holstein Friesian cows maintained at Ceylanpınar Agricultural Enterprises, between a period of 11 years (2003–2013) were used to predict first lactation 305-day milk yield. A multilayer perceptron (MLP) ANN model was used with back propagation algorithm which is developed for feed-forward neural network learning. ANN model was used with back propagation algorithm which is developed for feed-forward neural network learning. A back propagation algorithm seeks to minimize the error term between actual values and output of neural network. The error term is calculated by comparing the output with the desired output and is then fedback through the network, causing the synaptic weights to be changed in an effort to minimize error (Görgülü, 2012).

Neural Network parameters such as learning rate (0.01) and error goal (0) were used as the default setting of the algorithms. Most of the time it was observed that algorithms were truly converged which means that performance/error goal was achieved.

Results

The quality of ANN was measured by coefficient of determination (R^2) and root mean square error (RMSE) as 0.57 and 0.65, respectively. Lower RMSE value was obtained. The best ANN model developed here are graphically depicted in Figure 1 and Figure 2, respectively.

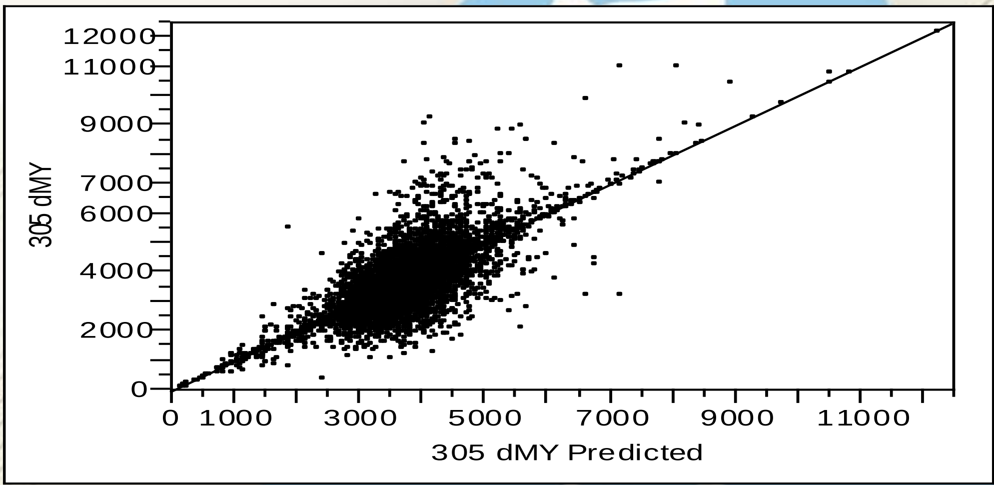

Figure 1. Actual versus the best ANN model predicted 305-day milk yield (kg).

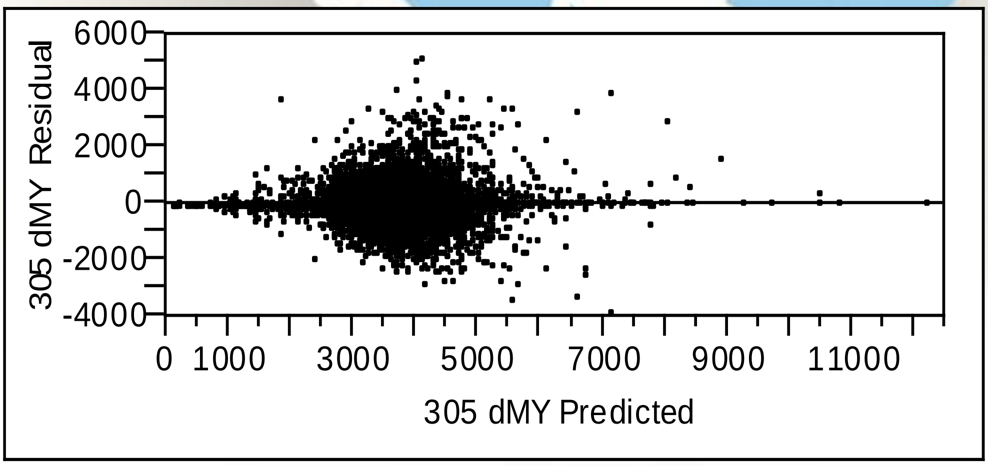

Figure 2. Residual versus the best ANN model predicted 305-day milk yield (kg).

Conclusion

The neural network model may be alternative method of predicting these traits. ANNs also have an important role because it does not need large data sets to design a quite reliable neural network. In this study estimated R^2 and RMSE by ANN methods were similar with the findings of Joshi et al. (1996) and Dongre et al. (2012). These results prove that the proposed ANN can be used successfully for the prediction of 305-day lactation and monthly milk yields. After this results, the artificial neural networks proposed for estimation economic important traits. he ANN method, which has started in recent years in our country, will be widely used in animal breeding in the future.

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Determination of Feed Consumption Choices in Livestock Enterprises of Mucur District in Kırşehir

M.E. Yazici[1], V. Karadavut[2], U. Karadavut[3], S. Akçam[3]
[1]CTE General Directorate, Sincan/Ankara
[2]A.E.Ü. Mucur Vocational Heigh School, Mucur/Kırşehir
[3]A.E.Ü. Agricultural Faculty, Deparment of Animal Science, Kırşehir

Introduction

The Mucur district, which is 25 km away from Kırşehir province, is a small Anatolian district with a population of around 15 thousand. However, the reason for the high level of education is separated from other provinces by their opinions. Livestock investments have increased in Mucur as well as in the whole of Kırşehir. Along with the increase in animal husbandry investments, there are serious changes in feed consumption and feed preference. The main objective is to obtain quality products in livestock enterprises. For this reason, the quality of animals as well as the quality of the food is desired. In order to be able to produce livestock, it is necessary to use roughage sources effectively. Because of the food is 55-60% of the total cost. Although it is so important to say that feed is given enough attention is not possible. The differences in the practices of animal husbandry enterprises in feed are very large. Differences in nutrition cause different forms of yield from animals in the same race. In order to make efficient livestock breeding throughout our country, it is necessary to support quality roughage production. Livestock breeders should raise at least two-thirds of their rough feed. It should not be preferred as the cost of outsourced products will increase very much. The product quality directly affects consumer preferences. For this, producers should pay attention to animal food preferences. In this study, it was aimed to determine the feed preferences of animal husbandry enterprises in Mucur, which is an important area in animal husbandry.

Materials and Methods

This study was carried out to determine the types of feed used in the cattle breeding establishments in Mucur district of Kırşehir province. As materials, Mucur agriculture directorate from the records determined by using, data obtained were 77 animal investments. Interviewing was done these investments.

The obtained data were ordered and comparative analyzes were made according to the size of the enterprises. Enterprises have been examined in two parts according to animal numbers and land sizes.

While grouping according to the number of animals, it is collected in four groups of 0-50, 51-100, 101-150 and 151 and over, while the land size is 0-50, 51-100, 101-150 and 151 decare and above were collected in four groups. The analysis of the data obtained from the questionnaires was done by applying Chi-square analysis in SPSS 23 program.

Results

It was determined that 67.2% of the enterprises were small, 21.3% were medium and the remaining 11.5% were large enterprises in Mucur. 44,2% of land size is 0-50 decare, 26,7% is 51-100 decare, 18,2% is 101-150 decare and the remaining 10,9% is 151 decare and bigger It has become.

The average number of animals per plant is 8,12. 14% of these animals were heifer, 19.4% were calves and 6.0% were heifers. They stated that they supplied the bull from the outside. Therefore, no bull was found. In terms of distribution of cattle in terms of race; It was determined that 21.6% were native, 68.4% were hybrids and the remaining 10% were culture races. When the land assets of the enterprises are examined, the average size of the enterprises in the district is 65.2 decare. An average of 78.2 parts of the land owned by the enterprises is composed of dry agricultural areas. The remaining 21.8% consists of irrigated agricultural land. There are on average 28.3 acres per farm land suitable for planting. In terms of fodder crop cultivation, it is seen that the biggest ratio is in the barley plant with 26.8%. The fact that most of the land is a dry agricultural area has been effective. Yonca ranked second with 21.1% and corn plant with 14.6%. This was followed by vetch with 12.9%, sainfoin with 10.5% and rye with 4.6%.

The following results have been obtained regarding the removal of animals to the pasture in agricultural enterprises; while 76,24 of the enterprises raised their animals to the pasture, the remaining 23,76% stated that they did not remove their animals to the pasture. As for the question miş Why don't you remove the pasture “, they stated that animals could not be fed enough since there were not enough plants in the pastures.

This answer actually shows that the pastures are now deviated from the purpose seriously and began to move away from the food source. In terms of enterprise size, the removal rates of small enterprises are seen as high as 92.5%, while in large enterprises this ratio decreases to 28.2%. Large enterprises generally grow fodder plants and use commercial bait. When asked about when the animals were raised to the pasture, 38% of the enterprises gave their answers in March and 40% in April. The remaining 22% was in May.

In June, the pasture is not the animal to remove. Of course, due to climatic conditions, precipitation is not enough in June. It is seen that some enterprises in March. These enterprises are generally small businesses.

Considering the duration of stay in the pasture, approximately half of the animals (48.7%) remain in the pasture for 3 months. 29.0% is 4 months and the remaining 22.3% is 5 months. After the pasture, the animals are directed to the harvested fields for stubble grazing. It is observed that small farms generally do grazing in the stubble. It has been observed that large enterprises avoid as much as possible. Medium-sized enterprises indicate that they vary according to the opportunities they have.

When the feed types used in the enterprises are examined, 68.2% of the enterprises are straw, 27.42% are corn grass, 30.6% is clover, 34.0% is fig, 2.5% is sainfoin and 8.0% is stated that they have benefited from slaughter. Accordingly, mainly the need for food is met from the needles.

When the size of the enterprise is considered, it is observed that the straw is mostly used in small enterprises (89.3%), alfalfa, corn hay and slab are mostly used in large enterprises.

The enterprises also make some combinations depending on the feed raw material. 67% of the enterprises make a combination of clover + fig + straw triple. This combination is believed to be more nutritious. After this combination, corn + straw, corn + straw + sainfoin or corn + straw + fig mixture is used. In some enterprises only fig + straw mixture is used. It was observed that small enterprises were used more. It was observed that the large enterprises preferred clover + fig + straw and corn + straw + sainfoin mixtures. Of course this is related to the possibilities of the business. Kırşehir province in general has a dry climate and less irrigation facilities may have enabled the straw to be at the forefront.

In this study, it was determined that 91.4% of the enterprises did not apply a special pre-treatment and feeding program for the animals who had a pregnancy or lactation period. It has been seen that only some of the large scale enterprises have implemented special programs.

The lack of special care and feeding program or lack of such a program is an obstacle for quality production. It was determined that 56% of the enterprises cut the calves when they were 2 months or less. They cut 38% to 2.5-4 months. The remaining 6% is weaned in 4.5 and more months. Early calcification of calves reduces their growth and development performance significantly. As a result, there was a high positive correlation between the average size of the farms and the number of animals (r=0.482**).

However, there were insignificantly relationship found between the number of animals and the variety of feeds on the negative side (r=-0.281).

They concentrated that 43% of the enterprises on corn, 23% enterprises on barley, 17% enterprises on alfalfa, 11% enterprises on vetch and 6% enterprises on sainfoin plant.

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Determination of the some environmental factors affecting milk yield in Anatolian buffaloes by regression tree analysis

A. Şahin[1] , Z. Ulutaş[2], A. Yıldırım[3], Y. Aksoy[4], E. Kul[1]

[1]Department of Animal Science, Faculty of Agriculture, Kırşehir Ahi Evran University, Kırşehir, Turkey

[2]Department of Animal Production and Technologies, Ayhan Sahenk Faculty of Agricultural Sciences and Technologies, Omer Halis Demir University, Niğde, Turkey

[3]Department of Animal Science, Faculty of Agriculture, Tokat Gaziosmanpasa University, Tokat, Turkey

[4]Department of Agricultural Biotechnology, Faculty of Agriculture, Osmangazi University, Eskişehir, Turkey

Introduction

Nowadays, the number of Anatolian buffalo is reared 161 439 in Turkey, and 0.335% of the total milk production is obtained from the Anatolian buffalo (Anonymous, 2018). The Anatolian buffaloes of Kızılırmak, Yeşilırmak and Kelkit rivers are dominant in the Black sea region. It is constantly needed to enhance productivity of a dairy animal and to develop an understanding of the factors affecting its milk production. However, there is no published information on application of regression tree method to milk yield of Anatolian buffaloes in Black sea region. Hence the aim of this study was to determine the effects of some factors (lactation number, calving season and year of calving) on milk yield by using regression tree analysis.

Materials and methods

The goal of the present investigation was to determine some environmental factors on actual milk yield of Anatolian buffaloes by using regression tree analysis. For this purpose, born in 2012 and 2015 years, 1676 records obtained from Anatolian buffaloes were used. In analysis were used with SPSS statiscal program.

Results

In regression tree analysis, all the independent variables which could be effective on the milk yield were included in the model and analyzed. The minimum data amounts in parent nodes were arranged as 100:50. The root node (nod 0) had divided into three subgroups by the effective variable year of calving.

The first subgroup, which is called Node 1, is occur in year 2012 and milk is estimated to be 744 kg on average. This node is constituted 25% (n: 433) of the total record. Node 2, the second subgroup is composed from year of 2013.

This subgroup consists of 341 lactations (20%). The milk yield has found as 812 kg in this group. Regression diagram is presented Figure 1.

Table 1. Descriptive statistics for terminal nodes

Node	N	Percent	Mean
6	179	10.7%	1188.34
7	723	43.1%	1034.78
4	61	3.6%	866.61
2	341	20.3%	812.89
5	372	22.2%	724.53

Risk:2.762E5±1.357E5(mean± Standart Error)

Node 3, the third subgroup; It contains 2014 and 2015 years. The third subgroup is consists of 902 lactations (53%). The average milk yield of the third row had been determined as 1065 kg. Then the first subgroup, node 1, is divided into two subgroups (Nodes 4 and 5) according to the season variable. The fourth sub-group, which is called Node 4, covers the winter season and the milk yield average for the winter season had estimated at 866 kg. This node had constituted 3.6% (n = 61) of the total data. The fifth sub-group, which is called Node 5, includes the season of spring, autumn and summer and the milk yield average for these seasons had estimated at 724 kg. This node have included 22.2% (n = 372) of the total data. Then the third subgroup, node 3, had divided into two subgroups (nodes 6 and 7) according to the lactation number variable. Node 6, the sixth subgroup was consisted of 179 records (10.7%).

The average milk yield of these node was determined at 1188 kg. This group was consist of 1 and 2 lactation number. The seventh node is composed of 3, 4 and 5 lactation numbers. This node had included for 53.8% (n = 902) of the total number of data.
The mean milk yields of these seasons are determined as 1034 kg.

Conclusion

The risk ratio of the regression tree obtained as a result of analysis is find high. The high risk ratio can be caused by too many variations in the milk yield

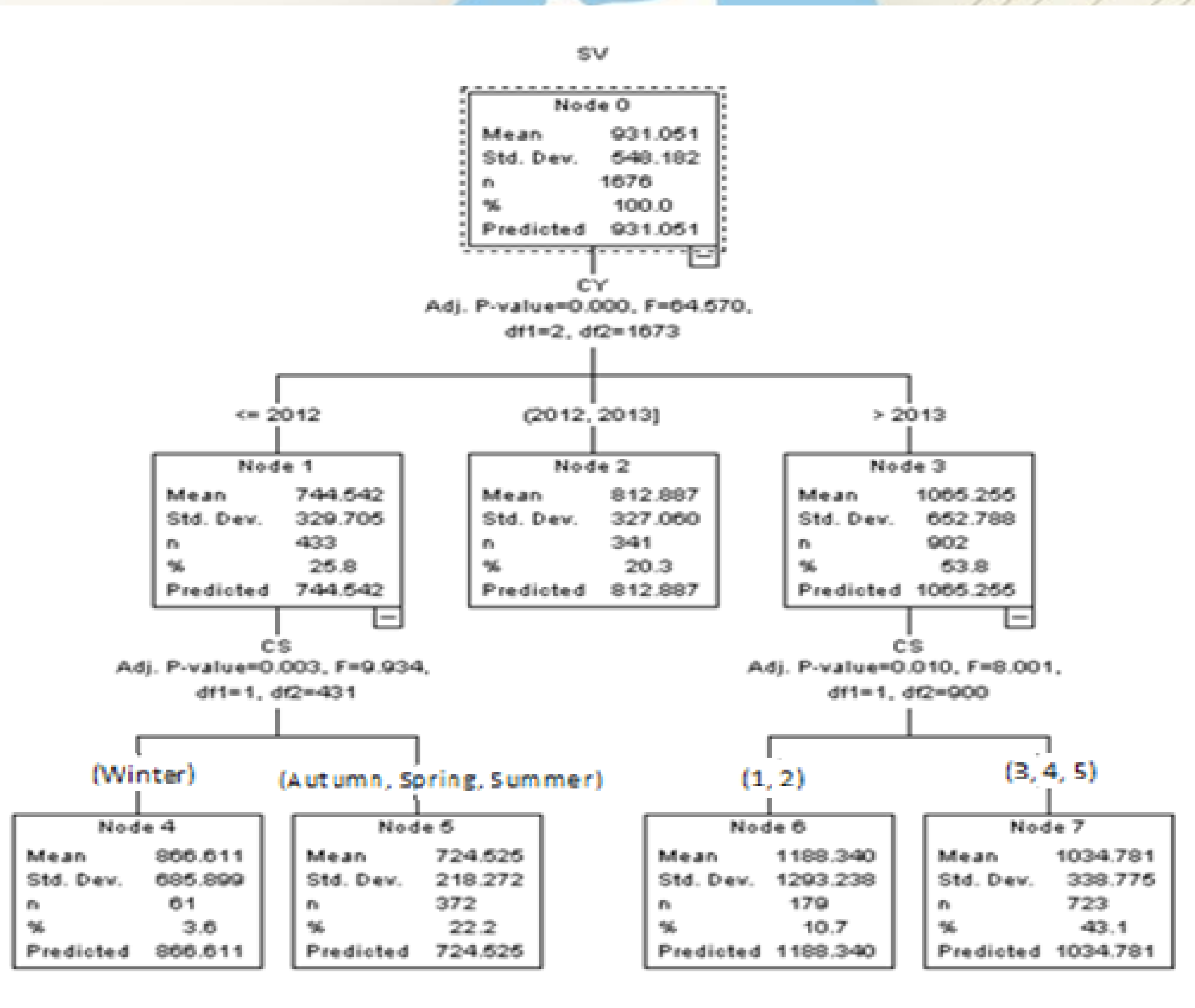

Figure 1. Regression diagram.

Acknowledgements

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Use of Multivariate Adaptive Regressıon Splines For Predicting Racıng Time of Racehorses

A. Kaygısız[1], E. Eyduran[2], S.S. Işık Taçyıldız[1]

[1]Department of Animal Science, Faculty of Agriculture, Kahramanmaraş Sütçü İmam Üniv, Kahramanmaraş, Turkey

[2]Department of Business Administration, Faculty of Economics and Administrative Sciences, Iğdır Univ., Iğdır, Turkey

Introduction

For racing industry, racing performance traits are of great importance for revealing genetic superiority of the studied horse breeds (Velie et al., 2015). Bakhtiari and Kashan (2009) estimated genetic parameters of racing time of thoroughbred horses in Iran. Like in other quantitative traits, racing time is also influenced by genetic and non-genetic factors. There is growing interest on enviromental factors affecting racing time of the animals (Mota and Abrahão, 2004). In a review study by Paksoy and Unal (2009), the factors influencing racing performance in horses were mentioned. Kocak and Ekiz (2005) determined the influence of environmental factors i.e. track type, age and sex on racing time of thoroughbred horses for racing distances of 1200m, 1400m, 1600m, 1900m, 2100m and 2400m in Turkey within the scope of general linear models. For Thoroughbred horses in Hong Kong, Velie et al. (2015) estimated a high heritability of 0.52 for the racing win time at 1600m, and significant effects of several factors i.e. age, trainer, jockey, track, track surface, track condition, number of starters, barrier position and weight carried on racing time for racing distances of 1000m, 1200m, 1400m, 1600m and 1650m. For racing distances of 1000m, 1400m and +1600m, Bakhtiari and Kashan (2009) examined the effect of sex, age and hippodrome factors on racing time in Iranian Thoroughbred horses. Thiruvenkadan et al. (2009) studied racing traits of Thoroughbred horses. Koseman and Ozbeyaz (2009) estimated phenotypic and genetic parameters on racing performance of Arabian horses.

In literature, use of the most sophistical statistical techniques is needed to predict quantitative traits and to reveal the effect of influential factors on the traits. In other words, accurately describing factors affecting racing time in racehorses depends on choosing influential factors and using powerful statistical techniques i.e. CHAID (Chi-Square Automatic Interaction Detector), CART (Classification and Regression Tree), MLP (Multilayer Perceptron), RBF (Radial Basis Function) and MARS data mining algorithms, which were used in various fields of agricultural sciences (Akin et al., 2017a,b,c; Akin et al., 2018; Eyduran et al., 2017; Aytekin et al., 2018). Among those, MARS has been used in animal science, recently (Grzesiak and Zaborski, 2012; Eyduran et al., 2017; Aytekin et al., 2018). However, to our best knowledge, using the MARS for the description of the influent factors on racing time of racehorses is scanty in literature. Hence, the purpose of this study was to develop a convenient model in order to predict racing time of racehorses in Turkey and to define the factors which influence racing time through MARS algorithm.

Materials and Methods

In this study, the data on racing year (1996-2017), province (Adana, Ankara, Bursa, İstanbul and Izmir), horse's sex (male and female), horse's age (3 to 9), mother's age (4 to 22), racing distance, racing track (sand and turf), racing type (open and group) and racing time were collected and exposed to Multivariate Adaptive Regression Splines (MARS) algorithm, as a non-parametric regression technique, with a cross validation of 10. To prevent overfitting problem in the MARS algorithm for regression type problems, penalty was set at 2 in R software. For MARS algorithm, the earth package of R software developed by Milborrow (2011, 2018) was used.
MARS algorithm is an effective statistical tool which indicates the relationship between a response trait (racing time) and predictors. There is no need of distributional assumption on the studied variables.
MARS predictive model can be written as follows:

$$\hat{y} = \beta_0 + \sum_{m=1}^{M} \beta_m \prod_{k=1}^{K_m} h_{km}(X_{v(k,m)}) \qquad [1]$$

Where

$\hat{y}$ is the predicted value of the response variable (racing time), β_0 is an intercept, $h_{km}(X_{v(k,m)})$ is the basis function, where $v(k,m)$ is an index of the predictor for the *m*th component of the *k*th product, K_m is the parameter controlling the order of interaction.

After constructing the most complex MARS model, the basis functions that did not contribute much to the model fitting performance were removed in the pruning process with the following generalized cross-validation error (GCV) (Aytekin et al., 2018)

$$GCV(\lambda) = \frac{\sum_{i=1}^{n}\left(y_i - y_{ip}\right)^2}{\left[1 - \frac{M(\lambda)}{n}\right]^2} \qquad [2]$$

Where:

n is the number of training cases, y_i is the measured value of a response variable (racing time), y_{ip} is the predicted value of a response variable (racing time), $M(\lambda)$ is a penalty function for the complexity of the model with λ terms.

Predictive accuracy of the MARS algorithm was measured by the following goodness of fit criteria:

1. Pearson correlation coefficient (r) between the real and predicted racing time values,
2. Root-mean-square error (RMSE) expressed by the following formula:

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(y_i - y_{ip}\right)^2} \qquad (5)$$

3. Mean error (ME) described by the following equation:

$$ME = \frac{1}{n}\sum_{i=1}^{n}\left(y_i - y_{ip}\right) \qquad (6)$$

4. Mean absolute deviation (MAD):

$$MAD = \frac{1}{n}\sum_{i=1}^{n}\left|y_i - y_{ip}\right| \qquad (7)$$

5. Standard deviation ratio (SD_{ratio}):

$$SD_{ratio} = \frac{s_m}{s_d} \quad (8)$$

6. Global relative approximation error (RAE):

$$RAE = \sqrt{\frac{\sum_{i=1}^{n}\left(y_i - y_{ip}\right)^2}{\sum_{i=1}^{n} y_i^2}} \quad (9)$$

8. Mean absolute percentage error (MAPE):

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left|\frac{y_i - y_{ip}}{y_i}\right| \cdot 100 \quad (10)$$

Where: n – the number of animals in a set, k – the number of model parameters (number of selected terms), y_i – the real value of a response variable (racing time), y_{ip} – the predicted value of an output variable (racing time), s_m – the standard deviation of model errors, s_d – the standard deviation of an output variable.

To measure predictive accuracy of MARS, several goodness of fit criteria were computed by means of the R codes written in R software (R Core Team, 2014).

Results and Discussion

The MARS prediction equation with no interaction effect for horse racing time was obtained as: Racing Time= 143.63+5.16*Racingtrack_Sand – 3.44*Racingtype_Group – 0.08*max(0, 2000–Racingdistance) + 0.08* max(0, Racingdistance–2000). For a horse racing in sand track, racing time would be expected to increase by 5.16 seconds. For a racing distance longer than 2000m, the MARS prediction equation converted into the following equation:

Racing Time= 143.63+5.16*Racingtrack_Sand – 3.44*Racingtype_Group + 0.08* max(0, Racingdistance–2000).

For only open racing type and turf racing track, the MARS equation converted into the following one:

Racing Time= 143.63– 0.08*max(0, 2000–Racingdistance) + 0.08* max(0, Racingdistance–2000). Where sand racing track and group racing track are equal to zero in this condition. However, insignificant predictors i.e. racing year, province, horse's sex, horse's age, mother's age were excluded from MARS predictive model. Similarly, Koseman and Ozbeyaz (2009) also reported that racing track had a significant effect on racing time.

However, no significant effect of sex factor on racing time was found in the present study, which was in disagreement with those recorded by Ozbeyaz and Akcapinar (2003). Kocak and Ekiz (2005) reported the significant effect of track type x age interaction on racing time for racing distances of 1200m, 1400m, 1600m, 1900m, 2100m and 2400m ($P<0.05$), the significant influence of track type x sex interaction for only racing distance of 1900m and the significant impact of age x sex interaction on it for other distances except for 2100 and 2400m. Koseman and Ozbeyaz (2009) found that racing year, racing distance, racing group, racing track significantly affected racing time of Arabian horses ($P<0.001$), but horse's age and mother's age effects were non-significant. As well-known, genotype had a significant effect on racing time of the horses. In this context, English horse had better performance in racing time than Arabian horses (Aksuyek and Arpacik, 1990). In agreement with the present study, Koseman and Ozbeyaz (2009) mentioned that mother's age had an insignificant effect on racing performance of Arabian horses.

Goodness of fit criteria used for measuring predictive performance of the constructed model were r=0.986 ($P<2.2e-16$), coefficient of determination 0.972 R^2, cross validation coefficient of determination 0.972 CVR^2, adjusted coefficient of determination 0.972 $Adj.R^2$, standard deviation ratio 0.168 SD_{RATIO}, root of mean square error 4.079 RMSE, mean error 0 ME, global relative approximation error 0.033 RAE, mean absolute deviation 3.029 MAD, mean absolute percentage error 2.510 MAPE. R^2, Adj. R^2 and CVR^2 estimates (0.972) were found similar, which confirmed the predictive superiority of MARS. Nearly all of the variability in racing time of the horses was accounted for by MARS predictive model. The present results were almost in agreement with those reported by Aytekin et al. (2018) but higher than those given in Eyduran et al. (2017).

When the data were evaluated for 1400m and 1600m, MARS prediction equation with the selected 14 terms was obtained based on the interaction order of 3. All the obtained coefficients were significant ($P<0.01$). R script file written for MARS solution is presented in Appendix section.

The obtained MARS equation can be written as follows

```
Racingtime = 99.1

 -  1.34 * PROVINCEizmir
 +  15.5 * DISTANCE1600
 -   4.87 * TRACKturf
 +  4.38 * RACINGTYPEopen
 +  1.17 * max(0,  4 - AGE)
 -   1.44 * YEAR1997 * DISTANCE1600
 -   2.08 * YEAR1998 * TRACKturf
```

- 7.43 * YEAR2012 * RACINGTYPEopen
- 5.38 * YEAR2014 * RACINGTYPEopen
+ 3.22 * PROVINCEizmir * TRACKturf
- 1.12 * TRACKturf * RACINGTYPEopen
+ 4.00 * YEAR1997 * max(0, 4 - AGE)
+ 3.18 * YEAR1998* PROVINCEbursa* TRACKturf

Goodness of fit criteria for predictive accuracy of the constructed last model were found r=0.925 (P<2.2e-16), coefficient of determination 0.855 R^2, cross validation coefficient of determination 0.972 CVR^2, adjusted coefficient of determination 0.853 Adj.R^2, standard deviation ratio 0.38 SD_{RATIO}, root of mean square error 3.165 RMSE, mean error 0 ME, global relative approximation error 0.03 RAE, mean absolute deviation 2.371 MAD, mean absolute percentage error 2.234 MAPE. For the only a distance of 1400 m, the MARS equation converted into the following one:

Racingtime = 99.1

- 1.34 * PROVINCEizmir
- 4.87 * TRACKturf
+ 4.38 * RACINGTYPEopen
+ 1.17 * max(0, 4 - AGE)
- 2.08 * YEAR1998 * TRACKturf
- 7.43 * YEAR2012 * RACINGTYPEopen
- 5.38 * YEAR2014 * RACINGTYPEopen
+ 3.22 * PROVINCEizmir * TRACKturf
- 1.12 * TRACKturf * RACINGTYPEopen
+ 4.00 * YEAR1997 * max(0, 4 - AGE)
+ 3.18 * YEAR1998* PROVINCEbursa* TRACKturf

The contribution of Bursa province to racing time was 3.18 seconds for in only the year 1998 and turf track. In other words, province effect was based on year and track type. For horses with 4 or older, the effect of the terms 4 and 10, "+ 1.17 * max(0, 4 - AGE)" and "+ 4.00 * YEAR1997 * max(0, 4 - AGE)", on racing time was masked. The effect of racing type open on racing time could vary based on year, track type and province factors. Racing type open can affect racing time if track=turf, year=2012 and 2014.

For example, the only year=2015, other years=0

The reduced equation was written as follows:

Racingtime = 99.1

- 1.34 * PROVINCEizmir
+ 15.5 * DISTANCE1600
- 4.87 * TRACKturf
+ 4.38 * RACINGTYPEopen

+ 1.17 * max(0, 4 - AGE)
+ 3.22 * PROVINCEizmir * TRACKturf
- 1.12 * TRACKturf * RACINGTYPEopen

For example, the only year=2015 and province=İzmir, other years and provinces=0 and then the equation was:

Racingtime = 97.76
+ 15.5 * DISTANCE1600
- 4.87 * TRACKturf
+ 4.38 * RACINGTYPEopen
+ 1.17 * max(0, 4 - AGE)
+ 3.22 * TRACKturf
- 1.12 * TRACKturf * RACINGTYPEopen

The wide variation in literature may be attributed to genetic and non-genetic factors as well as different statistical techniques specified in the earlier studies.

Conclusion

With this study, a new prediction model with very high accuracy of nearly 100% was developed to predict racing time from influential factors in horses. The new information obtained here is of great importance and easily recommendable in practice. Also, MARS algorithm can be used to predict breeding value from racing performance in horses.

Consequently, use of MARS algorithm will be worthwhile for scientists who will conduct similar studies for next time.

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Appendix

R script file regarding MARS can be written as follows:

```
####################################################################
## MULTIVARIATE ADAPTIVE REGRESSION SPLINES          ##
## PREDICTION OF RACING TIME IN HORSE                ##
####################################################################
mydata=read.table("C:/ali1416.txt", header=T)
str(mydata)
mydata3<-mydata[-c(9)]
str(mydata3)
library(earth)
m5=earth(TIME~., data=mydata3, penalty=2, degree=3, pmethod="backward", nk=300,
        nfold=10, keepxy=T)
summary(m5, digits=3, style = "max")
evimp(m5)
n<-length(mydata3$TIME)
n ## sample size
k= length(m5$selected.terms)
k ## number of terms in the MARS predictive model
bx<-model.matrix(m5)
a.lm<-lm(mydata3$TIME~bx[,-1])
summary(a.lm)
cor.test(mydata3$TIME, predict(m5))
Pearsoncorr=round(cor(mydata3$TIME, predict(m5)), digits = 3)
Pearsoncorr ## Correlation coefficient
error=mydata3$TIME-predict(m5)
sdratio=round(sd(error)/sd(mydata3$TIME), digits=3)
sdratio
Coefofvariation=round(sd(error)*100/mean(mydata3$TIME), digits=2)
Coefofvariation
RMSE=round(sqrt(mean(error^2)), digits=3)
RMSE
ME=round(mean(error), digits=3)
ME
RAE=round(sqrt(sum(error^2)/sum(mydata3$TIME^2)), digits=3)
RAE
MAPE=round(mean(abs(error/mydata3$TIME))*100, digits=4)
MAPE
MAD=round(mean(abs(error)), digits = 3)
MAD
Rsq=round(1-(sum(error^2)/(var(mydata3$TIME)*(n-1))), digits = 3)
Rsq
AdjRsq=round(1-((1- Rsq)*(n-1)/(n-k-1)), digits=3)
AdjRsq
plot(mydata3$TIME, predict(m5))
plot(m5)
plotmo(m5)
shapiro.test(error)
```

Comparative Assessments of Nonlinear Fuzzy Regression Methods for Milk Prediction

A. Akilli[a], O. Gorgulu[b]

[a]Department of Animal Science, Faculty of Agriculture, Ahi Evran University, Kirsehir, Turkey.

[b]Department of Biostatistics and Medical Informatics, Faculty of Medicine, Ahi Evran University, Kirsehir, Turkey.

Introduction

Fuzzy regression analysis is one of the methods that developed by adapting fuzzy logic to classical regression analysis. It is a new prediction approach for the modelling of fuzzy data when the system structure or variables have uncertainty and the assumptions of classical regression analysis cannot be met. Nonetheless, it is a fairly new method in animal husbandry. In the nonlinear fuzzy regression analysis, more advanced and versatile methods are needed than the parameter estimation methods, which are used in fuzzy linear regression analysis in obtaining fuzzy outputs. In this context, researchers prefer artificial intelligence methods such as artificial neural networks and support vector machines in nonlinear fuzzy regression analysis processes. In this study, fuzzy nonlinear regression methods and Gamma function were analysed comparatively in order to identify the functional relation between milk production and variables. Fuzzy nonlinear regression analysis has been integrated into artificial neural networks (NN) and least squares support vector machines (LSSVM) to obtain fuzzy outputs. In this context, a large number of intelligent systems with fuzzy characters in different combinations of algorithms and parameters are designed.

Materials and methods

The material of the study consists of information of the milk yield records of Jersey dairy cattle. The records of dairy cattle up to the fifth lactation were used in the analyses. Information on the first four lactation periods was used to construct the model and information on the last lactation period was used to investigate the model validation. Model inputs for nonlinear fuzzy regression analysis were determined as lactation number, calving season, days in milk and number of milked cow. The model output is the average daily herd milk yield.

The analyses were performed with the MATLAB (R2016a). The accuracy of the models was calculated using the Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE) and Average Absolute Error (AAE).

Gamma model

The Gamma function which is developed by Wood (1967) is one of the most reliable models used in the modelling of milk yield. The mathematical notation for the Gamma function is given in Equation 1.

$$Y_t = a.t^b.e^{(-c.t)} \quad [1]$$

In Equation 1, t: Time, y: The egg performance value over time t, a parameter: Initial production value, parameters b and c: indicate the factors related to the order of the curve increasing and decreasing slope, and e is the natural logarithm base. The parameters were estimated using the Levenberg-Marquardt technique.

Fuzzy nonlinear regression analysis based on artificial neural networks Within the scope of the study, analyses were carried out within the framework of the method proposed by Xu and Khoshgoftaar, (2001). Equation 2 is obtained when the symmetric triangular membership functions are applied to nonlinear fuzzy regression, where $\tilde{Y}(x_i)$ is a fuzzy number that is an estimate of the dependent variable y_i.

$$\tilde{Y}(x_i) = (f^c(x_i), f^w(x_i)) \quad [2]$$

The h-level set of $\tilde{Y}(x_i)$, ($h\epsilon(0,1]$), is calculated by using Equation 3.

$$[\tilde{Y}(x_i)]_h = [f^c(x_i) - (1-h)f^w(x_i), f^c(x_i) + (1-h)f^w(x_i)] \quad [3]$$

In Equation 3, $f^c(x_i)$ is the center of $\tilde{Y}(x_i)$; $f^w(x_i)$ is the spread of $\tilde{Y}(x_i)$. In the nonlinear fuzzy regression analysis, a multilayer perceptron model was used in the context of artificial neural networks in order to calculate the prediction interval. In the fuzzy regression analysis, input and output variable are analysed as crisp and fuzzy number, respectively. After obtaining the upper and lower bounds for the prediction interval, the h levels were determined as five different values of 0.1, 0.3, 0.5, 0.7 and 0.9 for derive fuzzy model.

Accordingly, h-level sets of predicted values of the dependent variable were established. In the training phase of artificial neural networks, the activation functions were determined as hyperbolic tangent-sigmoid and log-sigmoid. In the study, 10 different back propagation algorithms were used in the training process of the multilayer perceptron.

These are Bayesian Regularization, Levenberg-Marquardt and Scaled Conjugate Gradient, Gradient Descent, Gradient Descent with Momentum, Gradient Descent Adaptive with Momentum, Fletcher-Reeves Algorithm CGF), Powell-Beale CG Algorithm (CGB), Brayde Fletcher Gold Farlo Shamo Algortihm (BFG) and One Step Secant Algorithm (OSS).

Fuzzy nonlinear regression analysis based on least squares support vector machines

Least squares support vector machines were used to derive convex optimization problem for fuzzy regression models designed with fuzzy input and fuzzy output (Hong ve Hwang, 2003; Hong ve Hwang, 2006). In the study, the method proposed by Hong and Hwang (2006) was used to perform nonlinear fuzzy regression analysis based on least squares support vector machines. The nonlinear estimation value for the dependent variable ($Y(X_q)$) is obtained by the Equation 4 with independent variable (X_q). The mathematical notation of this situation is given in Equation 4.

$$\hat{Y}(X_q) = \left(\langle w^{*}, (m_{X_q}) \rangle + m_B, \langle |w^{*}|, \alpha^{*}_{X_q} \rangle + \alpha_B, \langle |w^{*}|, \beta^{*}_{X_q} \rangle + \beta_B \right) \quad [4]$$

In the analysis with least squares support vector machines, three different kernel functions are used. These are Radial Basis Function (RBF), Polynomial Kernel function and Linear Kernel function. Analyses were performed on different parameter combinations to determine the optimal values of the model parameters. The Kernel functions are given in Table 1.

Table 1 Kernel functions

Kernel Functions	Equaitons	Descriptions
Radial Basis Function (RBF)	$K(x_i, x_j) = e^{-\frac{\|x_i - x_j\|^2}{\sigma^2}}$	σ^2: Variance.
Polynomial Kernel Function	$K(x_i, x_j) = (x_i^T x_j + t)^d,\ t \geq 0$	t: Intercept. d: Polynomial degree.
Linear Kernel Function	$K(x_i, x_j) = x_i^T x_j$	-

In the nonlinear fuzzy regression analysis, the center values were compared with the actual observation values using the statistical error criteria in Table 2. In this context, the mean squared error (MSE), mean absolute percentage error (MAPE) and average absolute error (AAE) criteria are used.

Table 2. Statistical error criteria

Statistical Error Criteria	Equations
Mean squared error (MSE)	$MSE = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$
Mean absolute percentage error (MAPE)	$MAPE = (\frac{100}{n})\sum_{i=1}^{n}\left\lvert\frac{(y_i - \hat{y}_i)}{y_i}\right\rvert$
Average absolute error (AAE)	$AAE^* = \frac{1}{n}\sum_{i=1}^{n}\lvert y_i - [\hat{y}(x_i)]_h^*\rvert$ $AAE^W = \frac{2}{n}\sum_{i=1}^{n}\lvert f^W(x_i)\rvert$

*Upper bound (+), lower bound(-) and centre (c).

Results

The results of nonlinear regressions were compared with Gamma function, which is one of the classical regression methods. Analysis results show that the most successful estimates are obtained by fuzzy nonlinear regression analysis based on neural networks; and fuzzy regression analysis calculates more successful and effective results than the Gamma function.

Table 3. Gamma Function's MSE and MAPE results

Model	Parameter	Parameter Estimation Value	Standard Error	Error Criteria MSE	MAPE
Gamma	a	20.762	0.812	4.7552	28.5736
	b	0.086	0.12		
	c	0.003	0.00001		

Table 4. Nonlinear fuzzy regression analysis based on neural networks' MSE and MAPE

Backpropagation Algorithms	Activation Functions	MSE		MAPE	
		Test Set	Validation Set	Test Set	Validation Set
Bayesian Regularization (BR)	TanSig	1.0603	0.8270	4.1725	3.7852
	LogSig	1.1160	0.8653	4.4504	4.1031
Levenberg-Marquardt (LM)	TanSig	1.3225	1.0503	4.8942	4.6019
	LogSig	1.1529	0.9074	4.5911	4.2380
Scaled Conjugate Gradient (SCG)	TanSig	1.3889	1.1218	4.9937	4.7167
	LogSig	1.0878	0.8488	4.3571	4.1622
Gradient Descent (GD)	TanSig	1.1364	0.8794	4.2649	4.1503
	LogSig	2.6210	2.2446	7.1928	6.6913
Gradient Descent with Momentum (GDM)	TanSig	1.7421	1.5658	5.7228	5.4889
	LogSig	1.8522	1.5733	5.9523	5.4619
Gradient Descent Adaptif a with Momentum (GDX)	TanSig	1.2451	1.0404	4.7418	4.4370
	LogSig	1.4748	1.3560	5.0805	4.8464
Fletcher-Reeves Algorithm (CGF)	TanSig	1.7025	1.4908	5.7169	5.1653
	LogSig	1.1882	0.9494	4.5762	4.3175
Powell-Beale CG Algorithm (CGB)	TanSig	1.3408	1.0855	4.9399	4.6149
	LogSig	1.0834	0.8324	4.2385	3.8388
Brayde Fletcher Gold Farlo Shamo Algortihm (BFG)	TanSig	1.2645	1.0354	4.9177	4.6244
	LogSig	1.1132	0.9236	4.4363	4.0876
One Step Secant Algorithm (OSS)	TanSig	1.1814	0.9868	4.6765	4.3326
	LogSig	1.4854	1.3116	5.2478	4.9011

Table 5. Nonlinear fuzzy regression analysis based on neural networks' AAE

Data Set	h-level	AAE^+	AAE^-	AAE^c	AAE^w
Test Set	0.1	38.311	37.631	0.7829	84.381
	0.3	10.184	9.5046	0.7829	28.127
	0.5	4.5589	3.8869	0.7829	16.876
	0.7	2.1523	1.5699	0.7829	12.054
	0.9	0.9792	0.7722	0.7829	9.3757
Validation Set	0.1	38.321	37.729	0.7404	84.501
	0.3	10.154	9.5622	0.7404	28.167
	0.5	4.5213	3.9322	0.7404	16.900
	0.7	2.1111	1.5584	0.7404	12.071
	0.9	0.9495	0.7252	0.7404	9.3890

Table 6. Nonlinear fuzzy regression analysis based on LSSVM's MSE and MAPE

	MSE		MAPE	
Kernel Functions	Test Set	Validation Set	Test Set	Validation Set
RBF Kernel	1.5811	1.3482	6.9939	6.4192
Polynomial Kernel	2.6605	2.3123	5.9002	5,7289
Linear Kernel	3.6323	3.5633	8.7402	8.6346

Table 7. Nonlinear fuzzy regression analysis based on LSSVM's AAE

RBF Kernel	h-level	AAE^+	AAE^-	AAE^c	AAE^w
Test Set	0.1	36.650	37.050	1.6119	81.890
	0.3	9.3539	9.7539	1.6119	27.296
	0.5	3.9009	4.3009	1.6119	16.378
	0.7	1.9848	2.2278	1.6119	11.698
	0.9	1.6105	1.6767	1.6119	9.0989
Validation Set	0.1	36.599	37.102	1.6051	81.890
	0.3	9.3023	9.8055	1.6051	27.296
	0.5	3.8496	4.3508	1.6051	16.378
	0.7	1.9483	2.2453	1.6051	11.698
	0.9	1.5969	1.6747	1.6051	9.0989

Conclusion

In this study, nonlinear fuzzy regression methods and Gamma function were evaluated comparatively for average daily herd milk yield prediction. Results have showed that nonlinear fuzzy regression methods included in the scope of the study are very successful in modelling daily milk yield and can be used as an alternative tool for the Gamma function. In this study, a new prediction model has been developed for the animal husbandry. It is aimed that the results of the study would contribute to the individuals who are working in animal husbandry sector and scientific researchers.

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Prediction of carcass weights of Karakaş lambs using elastic net method

S. Akkol[1] M. N. Çiftsüren[2]

[1]Van Yuzuncu Yil University, Faculty of Agriculture, Department of Animal Science, Biometry and Genetic Unit, Van-Turkey

[2] Van Yuzuncu Yil University, Graduate School of Science Institute, Department of Animal Science, Van-Turkey

Introduction

The elastic net which is a regularization and variable selection method was developed by Zou and Hastie (2005). The method performs better than Least Absolute Shrinkage and Selection Operator (LASSO) which introduced by Tibshirani (1996). The elastic net is useful when the predictor or independent variables correlated strongly and when the number of observations is smaller than the number of predictors. A penalized least squares method using a novel elastic net penalty is called naïve elastic net. Because it does not perform satisfactorily unless it is very close to either ridge regression or the lasso it was called it naive by Zou and Hastie (2005). Akkol (2014) summed some shrinkage methods which are ridge, LASSO and elastic net. Çiftsüren and Akkol (2018) in their study compare these methods with each other and revealed that LASSO was the best model for their data. In this study using the naïve elastic net and elastic net methods we predicted the hot carcass and the empty carcass weights from some body measurements at the various periods.

Materials and Methods

Materials: Animal material of the study which carried out at a Research and Application Farm of Van Yuzuncu Yil University consisted of 22 heads Karakaş lambs. The body measurements of lambs were recorded at 14 days intervals from birth to 170 days of age.
Independent variables were the age of mother (ANAYAS), live weight of mother (ANAAG), the live weight at the birth of lambs (DOGAG), the live weight at the beginning of the fattening (BBCA) and some body measurements which were withers height (CY), body length (VU), chest width (KAGG), chest depth (GD), chest girth (GC), haunch girth (BC). In this study dependent variables were hot carcass and empty carcass weight.

Methods: The coefficients of β's are estimated using the ordinary least square (OLS) method in the multiple linear regression analysis. For this, the residual sum of squares (RSS) is minimizing as shown below.

$$RSS(\hat{\beta}) = \sum_{i=1}^{n} e_i^2 = \sum_{i=1}^{n}\left(Y_i - \hat{\beta}_0 - \sum_{j=1}^{k}\hat{\beta}_j X_{ij}\right)^2 \tag{1}$$

The another equivalent form is,

$$\hat{\beta} = \arg\min_{\beta} RSS(\hat{\beta}) = \arg\min_{\beta} \sum_{i=1}^{n}\left(y_i - \beta_0 - \sum_{j=1}^{k} x_{ij}\beta_j\right)^2 \tag{2}$$

In ridge regression,

$$\hat{\beta}_{ridge} = \arg\min_{\beta} RSS(\beta) = \arg\min_{\beta}\left\{\sum_{i=1}^{n}(y_i - \beta_0 - \sum_{j=1}^{k} x_{ij}\beta_j)^2 + (\lambda_2\sum_{j=1}^{k}\beta_j^2)\right\} \tag{3}$$

Here λ_2 is regularization parameter for ridge regression and controls the amount of shrinkage. $\sum_{j=1}^{p}\beta_j^2$ is known as ℓ_2 norm.

In the LASSO regression,

$$\hat{\beta}_{lasso} = \arg\min_{\beta}\left\{\sum_{i=1}^{n}\left(y_i - \beta_0 - \sum_{j=1}^{p} x_{ij}\beta_j\right)^2 + \lambda_1\sum_{j=1}^{p}\left|\beta_j\right|\right\} \tag{4}$$

In the equation (4), and λ_1 is regularization parameter, controls the amount of shrinkage and makes the solutions nonlinear. LASSO penalty, $\sum_{j=1}^{p}|\beta_j|$ is called ℓ_1.

Statistical analyses were performed by using naïve elastic net and elastic net methods in SAS program (SAS, 2014). Both naïve elastic net and elastic net methods use a mixture of the d Lasso (ℓ_1) and Ridge (ℓ_2) penalties (Friedman et al., 2010). The elastic net can be formulated as (Hastie et al., 2005):

$$\hat{\beta}_{naiveelasticnet} = \left(1 + \frac{\lambda_2}{n}\right)\left\{\arg\min_{\beta}\left(\sum_{i=1}^{n}\left(y_i - \beta_0 - \sum_{j=1}^{k} x_{ij}\beta_j\right)^2 + \lambda_2\sum_{j=1}^{k}\beta_j^2 + \lambda_1\sum_{j=1}^{k}\left|\beta_j\right|\right)\right\} \tag{5}$$

In the case of an orthogonal design naïve elastic net solution is, (Zou and Hastie, 2005)

$$\hat{\beta}_{i(naiveelasticnet)} = \frac{\left(\left|\hat{\beta}_{i(OLS)}\right| - \lambda_1/2\right)}{1+\lambda_2} sign\{\hat{\beta}_{i(OLS)}\}, \tag{6}$$

$$\hat{\beta}_{(naiveelasticnet)} = \{1/\sqrt{(1+\lambda_2)}\}\hat{\beta}^* \tag{7}$$

where

$$\hat{\beta}^{*} = \arg\min\left|y^{*} - X^{*}\beta^{*}\right|^{2} + \frac{\lambda_1}{\sqrt{(1+\lambda_2)}}\left|\beta^{*}\right|_1 .$$

The elastic net which is corrected estimates are,

$$\hat{\beta}_{(elasticnet)} = \sqrt{(1+\lambda_2)}\hat{\beta}^{*} . \quad (8)$$

The coefficient of determination (R^2), the adjusted coefficient of determination (R_d^2), BIC and ASE were used as cohesion criteria to compare the naïve elastic net and the elastic net methods.

Results

The goodness of fit measurements for both hot carcass and empty carcass weights were represented in Table 1 and the coefficients of significant variables to predict both hot carcass and empty carcass weights were represented in Table 2. In Table 1 it was seen that elastic net estimated better than naïve elastic net method for all models.

Table 1. The goodness of fit measurements for both hot carcass and empty carcass weights

Models	Goodness of fit	Hot carcass weight		Empty carcass weight	
		Naïve elastic net	Elastic net	Naïve elastic net	Elastic net
Model I(BB)	No. of variables	4	2	5	2
	R^2	0.7685	0.8678	0.8340	0.8456
	R_d^2	0.7106	0.8531	0.7786	0.8284
	BIC	49.33003	37.21101	39.83127	31.36544
	ASE	6.08463	3.47569	3.01156	2.80053
Model II (14. day)	No. of variables	6	2	4	3
	R^2	0.8849	0.8827	0.8530	0.8843
	R_d^2	0.8356	0.8696	0.8163	0.8639
	BIC	52.43272	35.79818	38.15260	31.87052
	ASE	3.02524	3.08370	2.66596	2.09810
Model III (42. day)	No. of variables	5	3	5	3
	R^2	0.8460	0.9258	0.8021	0.9013
	R_d^2	0.7947	0.9127	0.7361	0.8838
	BIC	46.66738	31.81977	41.60997	28.73799
	ASE	4.04803	1.95051	3.58969	1.79077
Model IV(70.day)	No. of variables	5	2	5	2
	R^2	0.7252	0.8442	0.8336	0.8752
	R_d^2	0.6336	0.8268	0.7781	0.8613
	BIC	56.41031	41.38102	36.47424	26.55027
	ASE	7.22219	4.09631	3.01865	2.26379

BB: Beginning of the fattening, R^2 :the coefficient of determination; R_d^2 : the adjusted coefficient determination; BIC: Bayesian information criteria; ASE: Average square error.

Conclusion

When Table 1 is examined, the elastic net had fewer predictors, all goodness of fit measurements were smaller than the naïve elastic net for both hot carcass and empty carcass weights. The results revealed that the elastic net achieved good prediction accuracy for both hot carcass and empty carcass weights.

BBCA was significant predictor in all models to predict the hot carcass and the empty carcass weights. This result has been consistent the working of Şahin and Boztepe (2011).

Table 2. The important variables, standardized coefficients and coefficients for all models using to predict hot carcass and empty carcass weights

	Hot carcass weight			Empty carcass weight		
Models	Variables	Std. Coefficient	Coefficient	Variables	St. Coefficient	Coefficient
Model I (BB)						
	GC	0.165021	0.144711	BC	0.368248	0.340371
	BBCA	0.600197	0.519537	BBCA	0.385506	0.277189
Model II (14.day)						
	BC	0.145362	0.152190	KAGG	0.155003	0.308357
	BBCA	0.695533	0.602061	BC	0.447484	0.389165
				BBCA	0.505243	0.363283
Model III (42. day)						
	CY	0.144590	0.202707	VU	0.108848	0.104690
	GC	0.256915	0.204471	KAGG2	0.341019	0.700290
	BBCA	0.527062	0.456231	BBCA	0.560140	0.402756
Model IV (70.day)						
	CY	0.256841	0.357394	GC	0.771972	0.447592
	BBCA	0.425084	0.367957	BBCA	0.478757	0.344239

BB: Beginning of the fattening; Std.: standardized.

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Modelling Lactation Curve in Dairy Cows by Time Series Model

E. Berberoğlu
Faculty of Agriculture, University of Gaziosmanpaşa, Tokat, Turkey

Introduction

Milk yield beginning from birth increases to the maximum level by growing for a certain duration (2-6 weeks). The maximum production level continues for a period of time (1 month on average). Later, milk yield decreases at a lower rate than the initial increase and the lactation ends when the cow dries off. The change in milk yield, which starts with calving and ends with the dry off period, under the influence genetic and environmental factors is referred to as the cours6.e of lactation or lactation curve (Kaygısız, 1999).

In addition to lactation or 305-day milk yield, the shape of the lactation curve, are significant factors in the evaluation of the milk yield of cows (Kaygısız, 1999; Keskin and Tozluca, 2004). The low slope recorded in the lactation curve part after the maximum yield is an indicator of the good milk yield persistency of a cow (Kaygısız, 1999). In fact, Kaygısız (1999) and Keskin and Tozluca (2004) reported that a cow which did not show much change in milk yield during lactation should be preferred over a cow which yields a large amount of the milk at the beginning of the lactation and a small amount of the milk in a later period.

In animal husbandry, the expression of yields via models allows for the estimation of the yields that animals will achieve in a given yield period and during their lifetime (Keskin and Tozluca, 2004). In this context, the lactation curve can also be depicted via various models. It was reported that the first mathematical model for describing lactation curves ($Y_{(n)}=ae^{-cn}$) was proposed by Brody et al. (1923). Apart from this model, parabolic exponential function, inverse polynomial model, widely used Gamma model, the modified version of the Gamma model, quadratic model, and the models proposed by Schaeffer and Glasbel are available (Keskin and Tozluca, 2004; Orman and Ertuğrul, 1999).

Time series models are also in use as an alternative to the models used to predict the lactation curve. Some researchers (Deluyker et al., 1990; Lark et al., 1999; Macciotta et al., 2000) easily applied the autoregressive–moving-average (ARMA) model to the series demonstrating test day records. Thus, the time series model was used to predict the current lactation of each cow with a few test day records (Macciotta et al., 2002). The variable of interest in time series, for example the milk yield, is a variable and takes different values over time for various reasons.

Therefore, time series refers to the set of varying values of the relevant feature put in time order (Kutay, 1989). The time intervals may be different in each series. It is possible to create time series with different values obtained according to hourly, daily, weekly, monthly, quarterly, yearly or different time intervals (Chatfield, 1989). In a time-series, t represents the time circuit, and Y_t indicates the observance value of the variable in t time (Biçen, 2006).

In this study, AR, MA, ARMA and ARIMA methods which are commonly used in time series in the field of economics were utilized, and an experiment was carried out on milk yield change in cows depending on time. Since lactation milk yields are not stationary, lactation curve was modelled using the ARIMA method. The estimated ARIMA model and the Gamma model, one of the most commonly used lactation models, were compared. Mean absolute percentage errors were calculated to determine the effectiveness of the models and to compare the two models.

Material and Method

Material

Test day milk yield records of 41058 Holstein cattle that had calves during 2000-2001 years in 38022 enterprises registered to Cattle Breeders' Association in Turkey. Chart 1 presents the distribution of enterprise and the lactation numbers according to lactation orders.

Chart 1. The number of animals in enterprises and lactating animals according to the lactation order

Lactation Order	Number of Enterprises	Number of Lactation
1	3097	12596
2	3083	10308
3	2680	7126
4	2094	4612
5	1716	3380
Total		38022

In the data set, test day records were kept on a monthly basis. The difference between the date of the test day and calving was computed. It was calculated on which day of cow lactation control records were kept. All individuals were evaluated together based on the lactation order rather than on an individual basis in order to better demonstrate the fitting of the models to be examined to the lactation curve and to work with more test days.

For this purpose, a lactation with daily milk yield records at the population level was obtained by calculating the average of the test day milk yields for each lactation day through the cows pertaining to that lactation for each lactation order.

The records of cows with a milk yield of fewer than three kilograms and giving birth before 23 months of age were excluded from the data set. The fifth-day milk yield was also accepted as the milk yield for the first four days since it is essential not to perform milk yield tests for the first four days as a standard.

Since the standard lactation time was 305 days, the records after 305 days were not included in the modelling.

Method

While modelling the lactation curves with time series methods, it was examined whether the series were stationary, which is the first condition of the time series. To this end, the time path graph and the correlogram of the series were drawn. It was tested whether the autocorrelation function (ACF) values were within or out of the confidence interval in the correlogram. If the values were not within this range, it was concluded that the series was not stationary.

The procedure of calculating the autocorrelation value for any k delay value in a time series is the calculation of the correlation value between the original series and the new series obtained by moving as much as original series k value (Biçen, 2006).

The obtained autocorrelation coefficients are called autocorrelation function (ACF) and show the power of a linear relationship of a value of the process with the past periods (Biçen, 2006).

ACF takes a value between $-1 \leq \rho_k \leq +1$ (Sevüktekin and Nargeleçenler, 2005). A high absolute value pertaining to this coefficient demonstrates that the variable is dependent on the past values and a low absolute value pertaining to this coefficient demonstrates that the variable is coincidental (Gürsakal, 2005).

The sample is called ACF correlogram. If the number of observations in the series is too high, the estimated autocorrelation function will be close to the population ACF (Gürsakal, 2005).

The autocorrelation coefficient for the k delay is calculated as follows:

$$\rho_k = \frac{E\left[(Y_t - \mu)(Y -_{t-k} - \mu)\right]}{\sqrt{E\left[(Y_t - \mu)^2 (Y_{t-k} - \mu)^2\right]}} = \frac{E\left[(Y_t - \mu)(Y_{t-k} - \mu)\right]}{\sigma_y \sigma_{y-k}}$$

Since the variance in the t period is the same with the variance in the t-k period, the autocorrelation coefficient is:

$$\rho_k = \frac{E\left[(Y_t - \mu)(Y_{t-k} - \mu)\right]}{\sigma_y^2}.$$

Thus, the autocorrelation for k delay is depicted with the equation below:

$$\rho_k = \frac{\gamma_k}{\gamma_o}$$

The difference in the series was computed until non-stationary series became stationary. In order to do this, a new series was created by subtracting the previous observation value from the total observation values ($\Delta Y_t = Y_t - Y_{t-1}$).

As the series became stationary after the first difference was computed, the model determination phase was initiated. Akaike Information Criterion (AIC) was used to determine the appropriate model.

Because the lactation milk yield is not stationary, from among Box-Jenkins models, the Autoregressive-AR, Moving Average-MA, and Autoregressive Moving Average-ARMA method analyses were not conducted, whereas Autoregressive Integrated Moving Average-ARIMA model was used. For this purpose, ten ARIMA (p,1,0), ten ARIMA (0,1,q) and one hundred ARIMA (p,1,q) models were estimated as p=1,2,….,10 and q=1,2,…..,10 for each lactation. The model with the smallest AIC value among 120 models obtained was considered as the best model and this model was used in the estimation of the lactation curve.

Akaike Information Criterion (AIC) (Akaike, 1970,1973) is a tool that measures the fitting level of the model by putting a limit on the increase emerged due to the variables added to the model by taking into account the number of terms in the model (Ucal, 2006; Sevüktekin, and Nargeleçekenler, 2005). AIC is often used as a selection criterion for the model that fits between multivariate alternative models and can also be used to describe the degree of the appropriate model for ARIMA models.

$$AIC = -2\log(L) + 2m$$

In the equation, m demonstrates the number of parameters including the fixed term and n demonstrates the number of observations, and L represents the likelihood.

The AIC with the minimum value is considered to be the value of the m. In other words, the model that gives the smallest AIC value is preferred over the alternative models.

Autoregressive Integrated Moving Average Model (ARIMA)

Time series are made stationary by differencing the series in varying degrees. If a time series tends to be linear, the first difference series ensures stationarity. If a time series has a curvilinear tendency, the difference of the differences is computed once more and the second series difference is made stationary, which is termed as the model ARIMA (p, d, q). Here, d is the parameter that shows how many times the difference is computed for making the series stationary (Hamzaçebi and Kutay, 2004).

The general expression of the ARIMA (p, d, q) model is

$w_t = \Phi_1 w_{t-1} + \Phi_2 w_{t-2} + \ldots + \Phi_p w_{t-p} + e_t + \theta_1 e_{t-1} + \theta_2 e_{t-2} + \ldots\ldots + \theta_q e_{t-q}$

In this equation, instead of the observation values y_t , y_{t-1} y_{t-}, observation values the difference of which were computed (w_t , w_{t-1},.....,w_{t-p}) and residual terms (e_t, e_{t-1}, e_{t-2}, ... e_{t-q}) are used.

Estimation of Lactation Curves by the Gamma Model

Lactations were examined with time series, as well as with the Gamma model developed by Wood, which is most common of the lactation curve estimation model (Wood, 1967).

Gamma function is an exponential function as:

$Y_t=A.t^b.e^{-ct}$

In the equation;

Y_t represents the milk yield of the lactation on day t.

A: represents the point at which the curve intersects the y-axis (lactation initial yield),

b represents the coefficient demonstrating the increase level of the yield at the beginning of lactation,

c represents the coefficient indicating the level of decline in the yield after peak,

e represents the natural logarithm base.

Since the gamma function is an exponential function, the natural logarithm of both sides of the equation was computed and the equation was converted to the $Ln(Y_t) = Ln(A)+b.Ln(t)-ct$ linear function. LnA, b and c coefficients were calculated by the multiple regression analysis (Kaygısız et al., 2003). SPSS for Windows 17 (Norusis, 1993) was used for parameter estimations and GRETL for Windows Ver1.8.0 (Gnu Regression, Econometrics and Time-series Library) was used to calculate the ARIMA model.

After estimating the Gamma and ARIMA models, the estimated milk yield values of these models were found.

The mean absolute percentage error (MAPE) measure was applied in order to determine the accuracy of the estimated models and to compare the Gamma model with the model obtained by the time series method. The mathematical expression of MAPE statistics is given below.

$$MAPE = \sum_{t=1}^{n} \frac{|y_t - \hat{y}_t|}{n} \times 100$$

y_t : the value achieved in the t period

$\hat{y}_t$: the value estimated with the model for t period

n : Total number of observations

Since MAPE is expressed as a percentage, it is considered as superior to similar methods (Çuhadar et al., 2009). Witt and Witt (1992) and Lewis (1982) classified models with MAPE values less than 10% as "very good", models that are between 10% and 20% as "good", models between 20% and 50% as "acceptable", and the models with more than 50% as accepted as "faulty" (Çuhadar, 2009).

Results

As the lactation milk yields were not stationary, the first-degree difference was computed. After the differencing, the ACF values remained within the confidence interval, and the Q values of the ACF were found to be statistically non-significant (P> 0.05) and the series was made stationary. Macciotto et al. (2000) revealed that the test-day milk yields showed non-stationary characteristics. On the other hand, there are studies reporting that milk yields are stationary on the test day (Macciotta et al., 2002). This may be due to the fact that the peak period of lactation was not found in the test day records because they were taken on an average of 42 days.

The model giving the smallest AIC value from each of the 120 models established for each lactation was used to estimate lactation milk yields. The difference between the series estimated according to the model after determining the model and the actual series, in other words, the residual value, shows a distribution around zero mean.

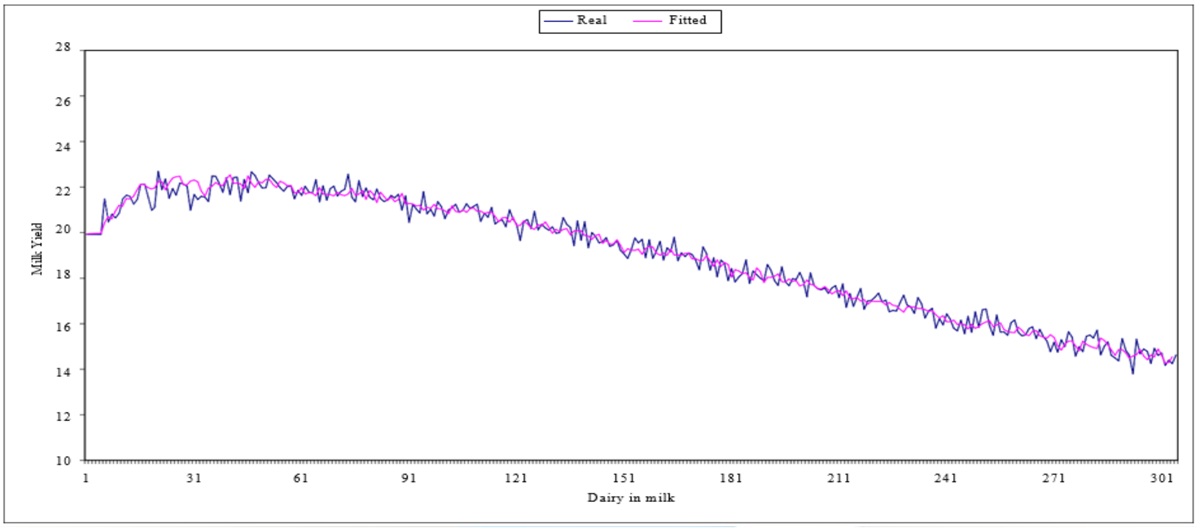
In the ADF test applied to the residuals, τ value was found to be statistically significant (P <0.01); thus, it was observed that the residuals did not have a unit root. Thus, it is understood that the estimation errors of the model created for five lactation milk yields are randomly distributed and the models are suitable for estimating lactation milk yields.

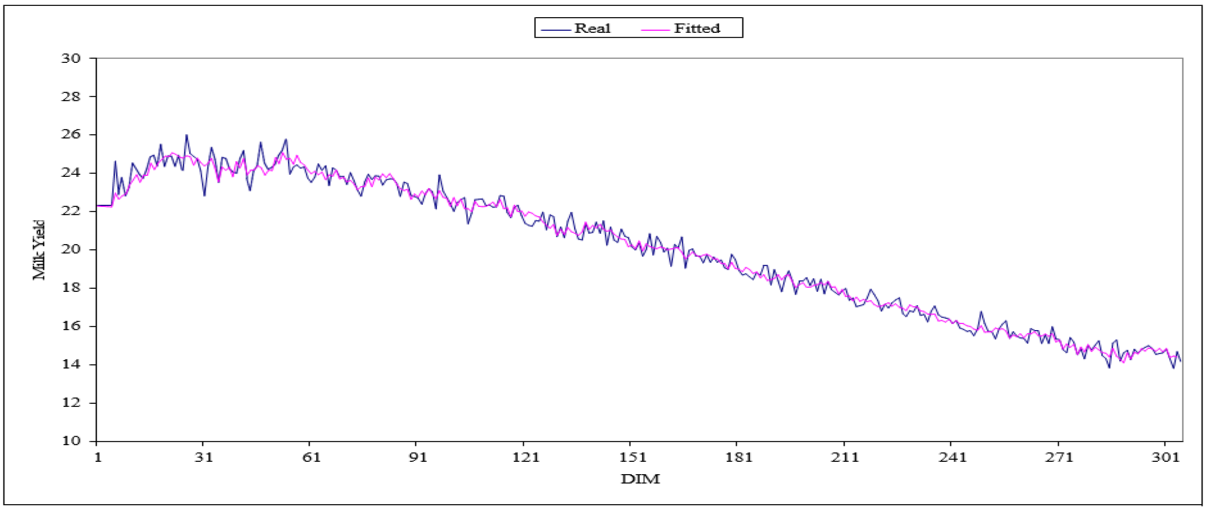
As a result of the analyses, it is presented in Table 2 that ARIMA models estimate with less deviation than Gamma models and therefore have smaller MAPE values.

The MAPE values calculated for both estimation methods were found to be below 10% classified as "very good" (Witt and Witt, 1992; Lewis, 1982). For this reason, the ARIMA model made an estimation closer to actual lactation milk yields than the Gamma model.

Table 2. MAPE values of ARIMA and Gamma models and difference of estimated lactations from actual lactation in terms of 305-day yield.

Lactation order	MAPE (%)		Milk yield difference (kg)	
	ARIMA model	Gamma model	ARIMA model	Gamma model
1	1.53	4.35	-10	220
2	1.75	4.22	-21	-212
3	1.95	2.78	-14	-114
4	2.14	2.59	-25	-68
5	2.98	4.33	-25	-186





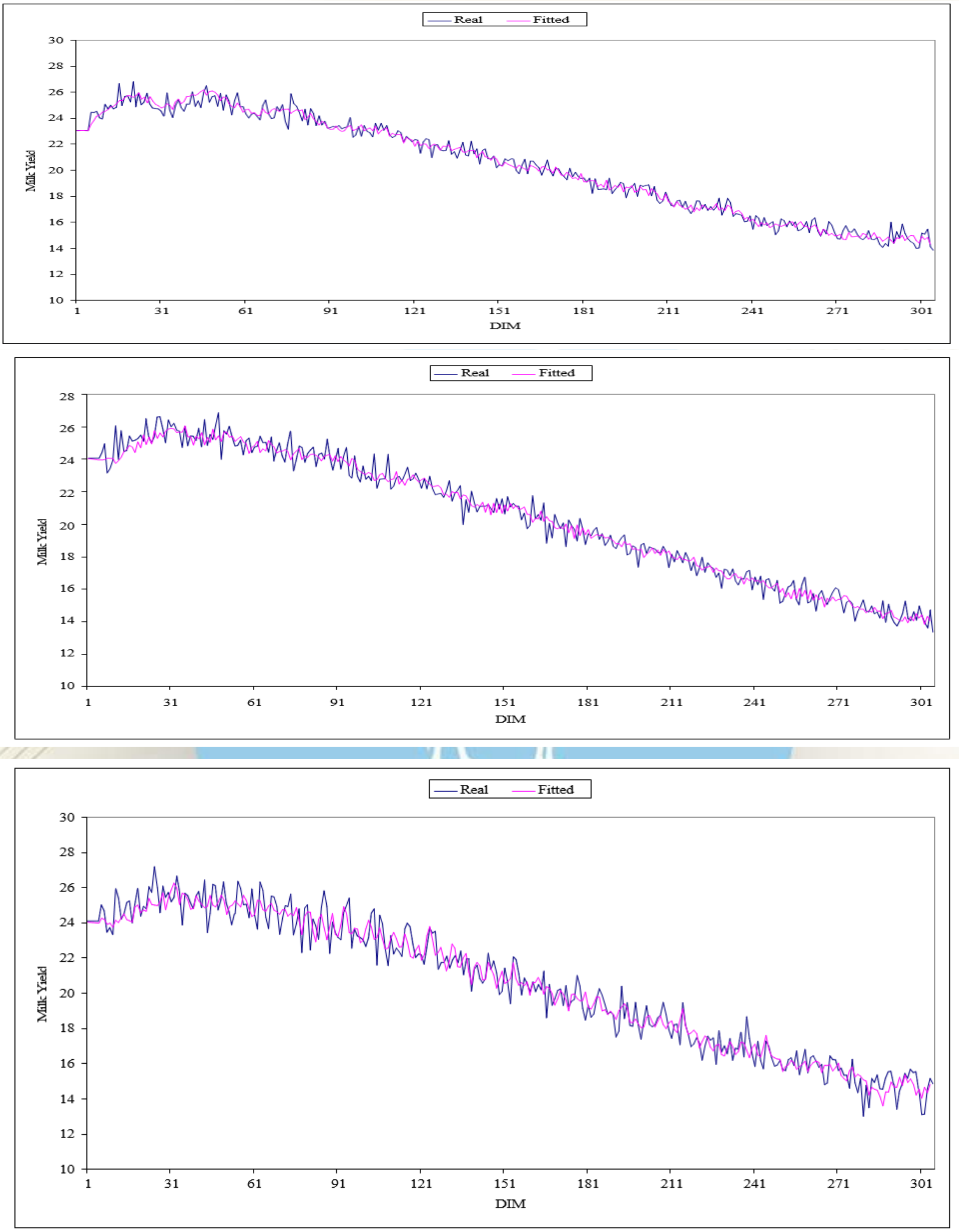
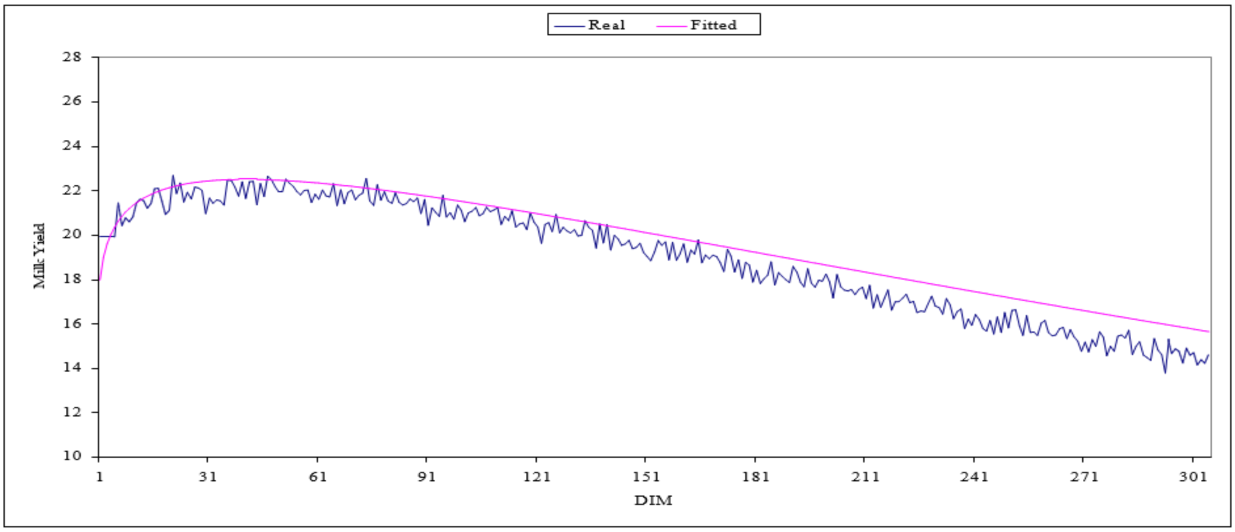
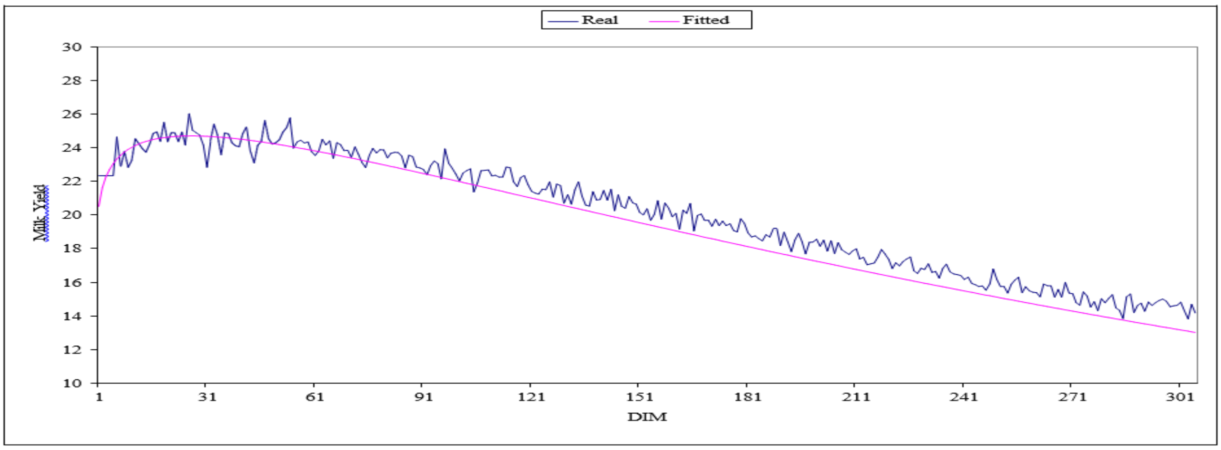


Figure 1. Actual lactation curves of the 1-5 lactations milk yields and lactation curves estimated by ARIMA model

Actual milk yield can show daily fluctuations. While the model was determined with the ARIMA model, past observation values are used as an independent variable. Therefore, the daily milk yields estimated by the ARIMA model have similar fluctuations similar to the actual yields (see Figure 1). In the Gamma model, on the other hand, time and the logarithm of time are used as independent variables. As shown in the graphs which illustrate the lactation milk yields estimated with the actual and Gamma models together, the yields are modelled as very close to each other, and in the form of a uniform curve, unlike in the actual series (see Figure 2).





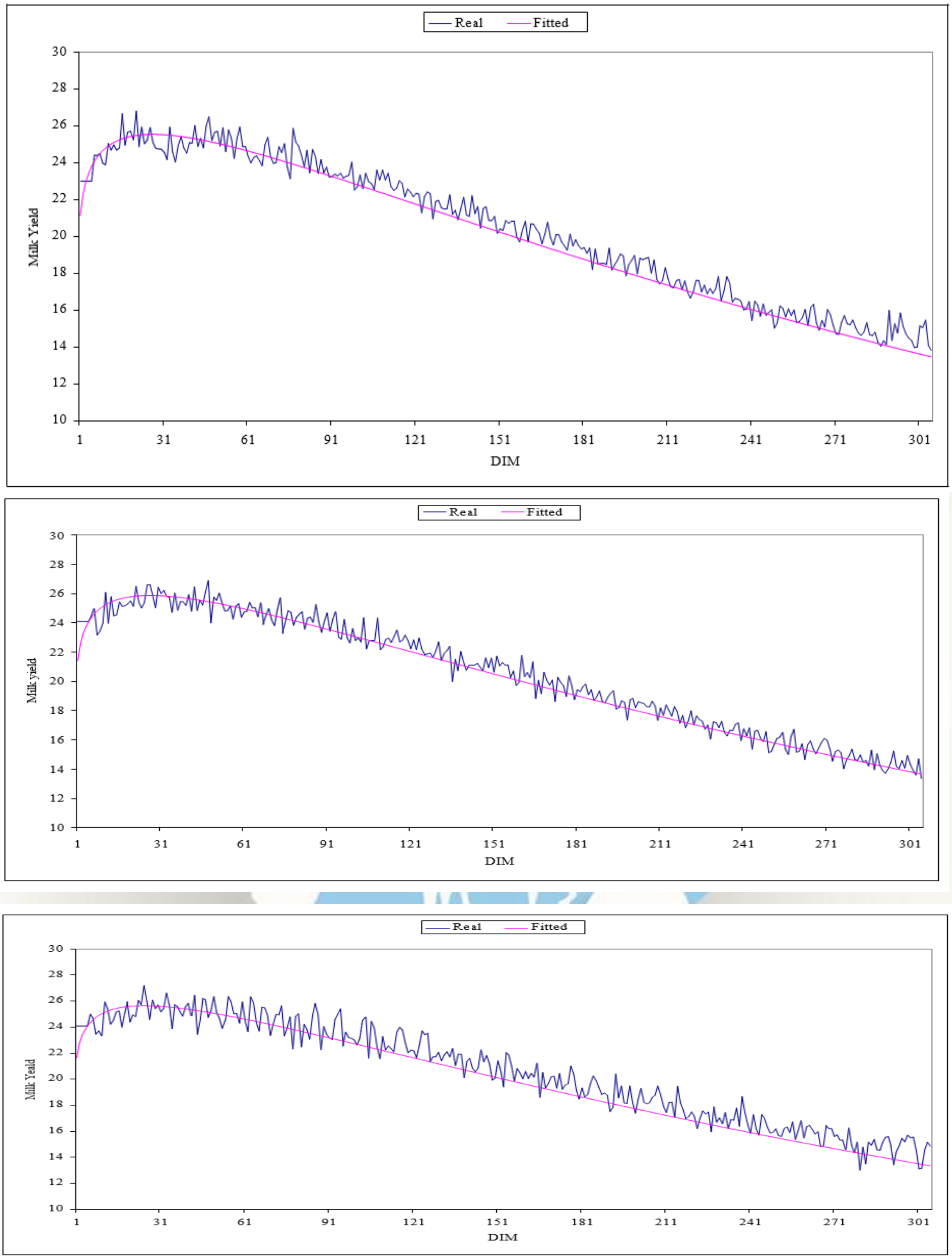


Figure 2. Actual lactation curves of the 1-5 lactations milk yields and lactation curves estimated by the Gamma function

Table 3 shows that the time to reach the maximum milk yield level is more varying in the series estimated by the actual milk yield and ARIMA model, while the Gamma model made estimations very close to each other.

In the Gamma model, that the time to reach the maximum level is close to each other can be attributed to the fact that these parameters are calculated from the estimated parameters of the Gamma model and that the parameters of the milk yield model estimated for five lactations are very close to each other. This situation in the Gamma model (Orman and Ertuğrul. 1999; Kaygısız et al., 2003) is not consistent with the findings of some previous studies.

Table 3. Maximum daily milk yields and time to reach maximum level for actual and estimated lactations

Lactation order	Actual yield values		ARIMA model		Gamma model	
	Y_{max} (kg)	T_{max} (day)	Y_{max} (kg)	T_{max} (day)	Y_{max} (kg)	T_{max} (day)
1	22.69	21	22.53	41	22.52	41
2	26.02	26	25.08	53	24.70	27
3	26.82	21	26.19	46	25.56	27
4	26.89	48	26.07	36	25.87	27
5	27.20	25	26.27	32	25.65	25

Conclusion

As a result, if the lactation curve has been determined by time series methods, the amount of milk that the animal yields starting from the short term milk yield until the end of the lactation period and the shape of the lactation curve can be estimated close to the actual yields. In the light of information, it can be established which animal will be kept in the herd in line with the milk yields. In addition, considering that time series models estimate milk yield way closer to the actual values compared to the Gamma model, it is understood that time series model is a good alternative to the classical lactation curve methods in lactation curve modelling.

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Determination of minimum number of animals in comparing treatment group means by power analysis.

O. Koşkan[1], H. Köknaroğlu[1], M.P. Hoffman[2]

[1]Süleyman Demirel University Department of Animal Science, Isparta, Turkey [2]Iowa State University Department of Animal Science, Ames, Iowa.

Introduction

Power, in statistics, is the ratio to reject H_0 hypothesis when H_1 is correct and the probability to find a difference when a real difference exists in population. Type II error is the probability of not finding a difference even though there is a difference. Thus power is defined as 1-type II error (Newman and Kohn, 2009). When there are significant differences among groups, power is the probability of this difference to be real (Goodwin, 2010). The power of a study is determined by three factors: the sample size, the alpha level, and the effect size (Cohen, 1992). Since animal purchase price and feeding are high in animal science experiments, it is important to determine minimum number of animals used in trials. Thus purpose of this study was to determine minimum number of animals in group comparisons by power analysis.

Materials and methods

Average daily gain of feedlot cattle experiments conducted at Iowa State University totaling 1283 steers were used to determine difference of means in terms of standard deviation. In the study, minimum number of animals were determined by conducting power analysis. For this purpose combinations of two power rate (95 and 90 percent), number of treatment groups (2, 3, 4, 5, 6, 7), difference of means in terms of standard deviation (0.25, 0.5, 0.75, 1.0, 1.5, 2.0, 2.5, 3.0, 5.0) were used.

Results

When the analysis was conducted, it was found that minimum number of animals in each treatment group was 417 when power was 95 percent, difference of means in terms of standard deviation was 0.25 and number of treatment group was 2.

When the analysis was conducted, it was found that minimum number of animals in each treatment group was 13 when power was 95 percent, difference of means in terms of standard deviation was 1.5 and number of treatment group was 3.

When the analysis was conducted it was found that minimum number of animals in each treatment group was 3 when power was 95 percent, difference of means in terms of standard deviation was 5 and number of treatment group was 2.

When the analysis was conducted it was found that minimum number of animals in each group was 559 when power was 90 percent, difference of means in terms of standard deviation was 0.25 and number of treatment group was 7.

When the analysis was conducted it was found that minimum number of animals in each group was 30 when power was 90 percent, difference of means in terms of standard deviation was 1.0 and number of treatment group was 4. When the analysis was conducted it was found that minimum number of animals in each group was 3 when power was 90 percent, difference of means in terms of standard deviation was 5 and number of treatment group was 7.

Conclusion

Results showed that when other variables were similar, minimum number of animals increased as number of treatment group increased, minimum number of animals decreased as difference of means in terms of standard deviation increased and minimum number of animals decreased as power rate increased. Similar results to this study were found by Ellis (2010).

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What are the maternal effects?

A. Yiğit, A. N. Özsoy
Applied Sciences University of Isparta, Faculty of Agriculture, Department of Animal Science, Isparta, Turkey

Introduction

Mousseau and Fox (1998) defined maternal effects as epigenetic modifications of the offspring phenotype, caused by maternal circulation throughout the development process. Otherwise, Hohenboken (1985) described the maternal effect as an influence, as any contribution outside of the genes that a mother directly transfers on the offspring. Willham (1972) also described the maternal effect as the phenotypic value of a mother which can only be measured as part of the phenotypic value of her offspring. The maternal effect on the offspring phenotype can be due to genetic or environmental differences between the mothers or a combination of genetic and environmental differences. For this reason, maternal effects include genetic features such as genetic correlations between related traits, heritability and repeatability in animal breeding (Grosso et al., 2010). The maternal effect has been described by quantitative geneticists (Dickerson, 1947; Willham, 1963, 1972; Legates, 1972; Cheverud, 1984) as the influence of the maternally provided environment on the offspring phenotype (Wolf and Wade 2009). Researchers have also indicated that this definition of maternal effects leads to the development of various quantitative genetic models of phenotypic formation involving maternal effects (Dickerson, 1947; Willham, 1972; Cheverud, 1984; Kirkpatrick and Lande 1989). It has been expressed that maternal effects are generally reported as maternal permanent genetic effects (covariance between maternal genetic effects and direct genetic effects) and maternal permanent environmental effects (Szwaczkowski, 2003).

The parents affect their offspring in two ways. The province of these is realized through inheritance. Additional factors often contribute to heredity, assuming that the similarity between parents and offsprings occasionally results from Mendelian (monogenic) genetics. The heredity, which is not Mendelian, can be transmitted in different forms of parental care, learning and through the cytoplasm.

Other forms of influence of parents are expressed as direct effects on the traits of their offspring. In many populations, an individual attribute depends on the parent phenotype of the individual, such as the amount of nutrient supplied to the offspring as well as the phenotype of the individual (Kirkpatrick and Lande, 1989). The similarity between the mother and the offspring for measured characteristics is expressed as "maternal inheritance" while the direct effect on the offspring's trait as a result of maternal activities is defined as "maternal selection". Maternal effects include both maternal inheritance and maternal selection (Kirkpatrick and Lande, 1989). Kirkpatrick and Lande (1989) also pointed out that many mechanisms such as many types of RNA copies, cytoplasmic factors stored throughout the oogenesis, and mitochondria directly transferring to the offspring are responsible for maternal heredity. Barbato and Vasilatos-Younken (1991) stated that the other factors that may influence maternal effects include incubation conditions (environment), egg composition, passive maternal antibodies or pathogens, and cytoplasmic or mitochondrial inheritance. Odeh et al. (2003) reported that these effects, as well as maternal effects, may include sex-related effects, Powell and Bowman (1964) also reported that imitation behaviors and interactions with their mothers directly or indirectly in their mothers under certain conditions may also be involved in maternal effects.

Wolf and Wade (2009), on the other hand, pointed out that there is some confusion about exactly what traits are defined as maternal effects, more importantly how they are defined in evolutionary biology. Researchers have expressed the majority of this confusion as the misinterpretation of maternal effects such as being seen as synonymous with maternal heritage (Kirkpatrick and Lande, 1989). In addition, the same researchers have mentioned, for example, that in human genetics, the phenotypic effects of mitochondria are interpreted as a maternal effect. Similarly, the simple description of maternal effects has been broadened to include a variety of other related phenomena (kinship effects, genomic imprinting, single allele extrachromosomal inheritance, etc.). Wolf and Wade (2009) argued that maternal cytoplasmic inheritance and genomic impression cannot be included in maternal effects, nor are influenced independently of the offspring genotype.

The sex-linked and maternal effects are expressed as the main source of the difference between reciprocal hybridization of the two lines, and it is noted that these effects are important for determining reciprocal hybrid performance (Bernon and Chambers, 1985).

Reinhold (2002) also notes that differences between reciprocal crosses are often attributed only to maternal effects, given the many traits. Barbato and Vasilatos-Younken (1991) reported that significant maternal effects were observed between 4 and 7 days of age after hatching from the egg (Barbato et al., 1983; Katanbaf et al. 1988). Barbato and Vasilatos-Younken (1991) reported that maternal efficacy decreased after laying, heterotopic and maternal influences especially affecting performance in certain hybrids, but these effects were occasionally seen and lagged behind sex-related effects which study they were investigating sex-linked and maternal effects using three different chicken lines (commercial purebred line, broiler chicken line selected for fertility and pure Jersey Giant).

Bernon and Chambers (1985) reported that sex-related effects on meat-type chickens had an effect on live weight and feed conversion traits (Thomas et al., 1958; Pym, 1968), while egg weight had maternal effects on live weight (Pym, 1968; Proudfoot et al, 1982; Walsburn, 1983). Merritt (1966) reported that sex-linked genes and maternal effects were the cause of possible differences in estimates of heritability between sexes for live weight and conformational measurements.

Saatci et al. (2006) reported that many researchers have investigated maternal effects for mammals (Meyer, 1992; Snyman et al., 1995; Saatci et al., 1999; Ap Dewi et al., 2002), and some researchers have also been working on maternal effects in birds (Catterall and Pollott, 1996; Saatci and Ap Dewi, 2004). It is emphasized that the subject of some research was the magnitude of the maternal effects on the 42-day-old live weight in economically viable broiler lines (Jahanian and Goudarzi, 2010).

Maternal effects can be temporary, but they can also continue throughout life and they are brought to the scene by a variety of biological mechanisms (Grosso vd., 2010). Cundiff (1972) and Legates (1972) reported that the maternal effects were reduced with the increase in offspring age. Hartmann et al. (2003) reported that in their study of using White Leghorn as animal material, the hatching weight was largely influenced by maternal additive genetic effects. Jahanian and Goudarzi (2010) estimated the maternal heritability (m2) for hatching weight as 0.351 and for six weeks old age weight as 0.022 much lower than hatching weight in their study which all the way through 14 generations of commercial broiler chickens. Koerhuis and Thompson (1997) and Navarro et al. (2006) estimated that the maternal heritability (m2) for the 42-day-old weights of broiler chickens was small but unignorable (0.01 and 0.04).

Wild birds and some species, even if domesticated such as pigeons and parrots have hatching and feeding behaviors which the maternal effects are mentioned after the hatching. It has been reported that these care-feeding behaviors may also be related to the parental age. In this sense, the term aging of maternal influence is used in the literature (Moorad and Nussey, 2016).

Moorad and Nussey (2016) noted that the mother-offspring interaction and the mortality rate of offspring with maternal age was different at different ages, contrary to the evolutionary theory that as the mother's age increases, the number of offspring, the size of the offspring and the number of surviving offspring (progeny continuity and reproduction) decreases.

In female birds, it has been reported that the effect of maternal age on egg production (size and content) may cause differences in incubation, chick growth and reproduction performance (Bogdanova et al., 2006). It has been stated that maternal effects of reproductive aging can take place in two forms in species that have been carried out parental care after hatching: first of these was by determining the quality of the eggs with the contents of the eggs, and the second was provided through the care to the chicks after hatching. It has been reported that the phenotypic variation of offspring originating from the maternal phenotype is known as the maternal effect rather than the offspring genotype (Mousseau and Fox 1998). The most important nutrients such as protein, lipid and water in different amounts (Williams, 1994), mRNA, transcription factors, immunity factors, antioxidants, hormones (Dao, 2008; Schwabl, 1997), and differences in post-hatching care have been reported to affect survival of offspring (Mousseau ve Fox, 1998).

In addition, it has been stated that chick quality and ability to survive can be affected by the quality of the germline DNA of both males and females (Tarin et al. 2000; Velando et al. 2008). It was reported that mother age affected both maternal effects before and after laying eggs (Bogdanova et al., 2006). For example, in long-term parental care species, different age females may be able to adjust their offspring care behavior (Cameron et al. 2000; Clark et al. 2002). Because of this plasticity of behavior, it has been reported that behavior is improved as maternal age is increased, or that the decline in maternal effects after laying can be increased (Lock et al., 2007; Beamonte-Barrientos et al., 2010). Groothuis et al. (2005) reported that mothers may prefer some offspring to other offspring and change the offspring phenotype according to prevailing environmental conditions.

Komdeur and Pen (2002) and Wild and West (2007) indicated that maternal effects may be similar on all offspring, or on different feasibility on female and male offspring. Marta (2014) reported that females can adjust gender development depending on the time of laying and (Saino et al., 2003) stated that the accumulation of maternal compounds may provide sex-dependent differences in embryo development. On the other hand, Yair et al. (2017) attributed genetic differences between female and male as well as egg size and content to maternal effects. Nager et al., (2006) reported maternal effects on egg weight. Hartmann et al. (2003) specified that maternal gene, which determines egg weight as well as yellow weight, albumin weight and dry matter percentage of albumin, significantly affect the hatching weight. Powell and Bowman (1964) also reported maternal effects on eggshell thickness (Lerner and Taylor, 1939 and 1943) and the percentage of solid albumin in the eggs (Lorenz and Taylor, 1940). Goodwin et al. (1964) indicated that maternal effects on yield index (Düzgünes and Yao, 1956), early survival ability (Morris, 1959), gender maturity age and albumin quality (King, 1961).

Despite the presence of dominance and epistatic effects on egg production, maternal effects have been reported to be insignificant (Fairfull and Growe, 1986). Beck and Baker (1961) stated that there was no difference between different herds for chicken-day egg production. However, it has been reported that maternal effects on characteristics such as growth rate, survival ability, and resistance to diseases (Szwaczkowski, 2003), especially chick live weight (Fairfull and Growe, 1986). Jeffers et al. (1970), found heterotic effects in five and maternal effects in the four of the nine hybrids in their study of 15 egg-type chicken lines with a large variation in viability between lines for resistance to Eimeria tenella.

For mixed linear models for maternally effect traits, the phenotype is usually divided into the following parts; additive genetic influences originating from father and mother are often referred to as direct genetic effects, additive genetic abilities are often referred to as indirect or maternal effects to provide appropriate environmental conditions of the mother, permanent environmental effects include persistent environmental effects in maternal ability and maternal non-additive genetic effects and other random environmental effects are often expressed as error effects (Mrode, 2005).

Diop et al. (1999) reported that animal models for which maternal effects are predicted often take into account the direct genetic, maternal genetic and covariance between maternal permanent environmental effects and genetic effects. Direct and maternal genetic effects have been reported to be genetically related (rAM) (Grosso et al., 2010).

Environmental variance, such as genetic variance, can also be separated into maternal components due to direct, permanent and temporary (error) components. In addition, in the case of repetitive measurements of animals, the maternal permanent environmental variance and the direct permanent environmental variance are a proportion of the total variance, denoted by c2 and p, respectively (Szwaczkowski, 2003).

Conclusion

There are maternal effects on a phenotype if the organism has its environment and genotype as well as the mothers' environment and genotype. The explanation of phenotypic variance components and genetic parameters is important in animal breeding. In traditional breeding strategies, the ignoring of maternal effects leads to an incorrect estimation of (co)variance components, greater prediction of the direct heritability, deviations in breeding values, and consequently decrease in the selection bias. Therefore, it is essential to determine whether there are maternal effects on the traits.

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Comparison of segregation and genomic analyses of body weight in mice

B. Karacaören, I. Moslem

Section of Biometry and Genetics, Department of Animal Science, Faculty of Agriculture, Akdeniz University, Antalya, 07059, Turkey

Introduction

The infinitesimal model in quantitative genetics assume that a phenotype is determined by large number of loci with every locus has small effect (Barton et al., 2017). However genomic studies showed that in addition to small effects sourced from the polygenes there might be also major genes effecting the quantitative trait (Flint and Mackay, 2009). The main aim of this study was to compare results of segregation analyses with the genome wide association analyses.

Materials and methods

An F2 population (n=661) was created by crossing M16 (F0; n=12) and ICR (F0; n=12) mouse lines for growth related traits at 8 weeks of age. The M16 line was formed by selecting for rapid weight gain while the ICR line was used as random control. Genotypes were collected for 1813 SNPs for each animal. A complex segregation model (Janss, 2008) incorporating both polygenic and major gene components was used for detecting major gene.

Results

The results of segregation analyses of body weight are given in Figure 1. Polygenic variance was found to be smaller than the major gene variance. Effect of the major gene for body weight is detected by the 95% HPDR not including zero (Figure 1). Dominance effect was found to be smaller than the additive effect. Since 95% HPDR is not included Mendelian transmission probabilities of 1, 0.5 and 0 it was concluded that mode of inheritance of body weight is not Mendelian. Previous genomic studies detected number of genes in association with the body weight (Karacaören, 2014).

Conclusion

Our results showed that both genomic analyses with DNA information and segregation analyses lead to the same conclusion. Underlying genetic basis of body weight could be manipulated by polygenic and a major gene.

However mod of inheritance of the body weight showed significance departure from mendelian transmission probabilities. Neverthless these results imply that segregation analyses could be used for selecting animals when DNA information is not available due to economical reasons.

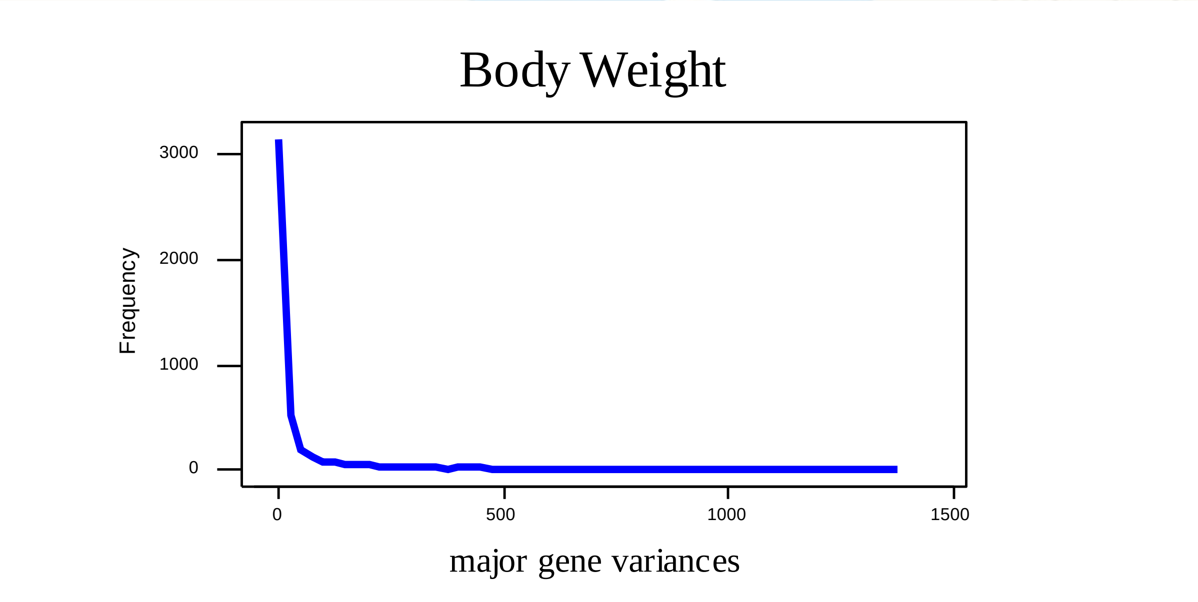

Figure 1: Density plot for Major gene variance

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Comparison of growth curves in applied different nurture in Morkaraman male lambs by using Non-Linear Models

Y. Demir[1], Z. Şahinler[1]

[1]Eleşkirt Celal Oruç Animal Production Vocational College, Ağrı İbrahim Çeçen University, Eleşkirt, Ağrı, Turkey

Introduction

With 33.7 million head of sheep in the presence of livestock activities in Turkey has an important place. Numerically 55.5% of the livestock are brought to the market, while 8.88% of the red meat production is provided from the sheep. The average carcass weight per sheared sheep is 19 kg (Anonymous, 2017). In Turkey in sheep farming yield that takes into account more than one genotypic patterns as the revenues obtained from a significant portion of the revenues slaughtered lamb husbandry. The main source of extensive sheep farming is often the butcher lamb production in Turkey. In spring and summer, the lambs grazed together with their mothers together with their mothers are regarded as butcheries when they reach 25-30 kg live weight. However, when the lambs are cut from the milk, they are taken with the sources of coarse and coarse feed, and when they reach 35-40 kg live weight, the lamb production is done by cutting. But, due to socio-economic reasons, growers may have to resort to early lamb cuts from time to time.

Growth occurring at certain time intervals in accordance with the genus of the animal in the number and size of the cells, which is shaped by the genetic makeup of the living and the interaction of the environmental conditions, is expressed as growth. Development is the change in physiological and morphologic differentiation and body parts proportions that occur when new biological functions become functional in living organisms (Akbaş, 1995; Bayram and Akbulut, 2009). Growth and development occur in two phases, prenatal and postnatal. The change that any feature examined shows in a particular period is defined as the growth curve. This change shows differences in species, race and line, especially in the characteristics examined (Akbaş et al., 1999).

The change that the creatures have shown in their age-related growth is called the growth curve (Goonewardene et al., 1981; Kocabas et al., 1997). The growth curve is a mathematical expression of growth that is shaped by the influence of genetic and environmental factors. In other words, the growth curve shows the mathematical relationship between the weight and age of the animal (Bethard, 1997).

Growth models have biological parameters that explain the physiological mechanism of growth, up to the turning point reached by adult growth (Menchaca et al., 1996; Behr et al., 2001). Through these parameters, it is possible to understand the growth process with complex structure and to determine the factors that are effective to grow in this process (Brown et al., 1976).

The most important benefit of growth curve models is biologically interpretation of information that is difficult to interpret and obtained at different points depending on age (Akbaş, 1995). This study was carried out to determine the best growth curve model to explain changes in live weight of male lambs of different feeding type, Morkaraman butchered, during the feeding period.

Materials and methods

In the study, animal material was formed in a business under the scope of "Country-Based Small Animal Breeding National Project" initiated in 2013 in Ağrı province, on April 13-15, 2017, 45 single Morkaraman male lambs were born. The lambs were nursed as ad-libitum, housed together with their parents for three days after birth. Then the lambs separated from their ancestors were fed with the milk of their ancestors twice a day, morning and evening until about 75 daily age. From the age of 10 daily, clover and lamb were found in front of the starling lambs. In 75 daily age, (weaning cut age) the lambs are randomly divided into 3 groups of 15 heads. Group 1: After 75 daily age, they were fed in the form of grazing near the ad-libitum reserve, morning and evening. Group 2: 75 daily age were cut from the milk, and the lambs fed ad libitum with lamb raising meal and clover. Group 3: After 75 daily age, they were cut from the milk and fed only by grazing. All three groups were given three meals water a day. The lambs in all three groups were referred for sale at the end of 135 days of age. The birth weights of the lambs were taken with a digital gauge sensitive to 10 g which was recorded in memory within one hour of birth. Then all the lambs were weighed for 2 weeks and their live weights were determined. In this way, the weight-age data of 45 lambs weighed with 15-day intervals until birth and 135 days of age were analyzed individually. For the determination of the contents of the feeds used for the lambs, analysis was carried out in the Feed Analysis Laboratory of the Faculty of Agriculture, Atatürk University. The contents of the feeds used are given in table 1.

Table 1. Contents of feeds used in lamb feeding (%).

Baits	Dry matter	Raw protein	Raw fat	Raw ash	ADF	NDF
Lamb Enrichment Feed	91,29	13,29	2,10	9,32	21,43	40,38
Clover	92,83	19,20	1,74	11,12	18,53	30,99
Grassland	93,67	10,80	2,30	9,68	32,47	52,36

ADF: Acid Detergent Fiber, NDF: Neutral Detergent Fiber

The nonlinear models specified in table 2 are used for the determination of the best model. In the nonlinear models, the model fitting was performed with the estimates of A, B, k and m parameters and it was obtained by Levenberg-Marquardt iterations with the generalized least square method. When Iteration was performed, 1.0E-8 was used as the convergence criterion (Akbaş ve ark., 1999; Akbaş ve ark., 2001). The Duncan test was used to compare the mean values of the parameters and SPSS package program was used in all statistical analyzes (SPSS, 2016).

Table 2. Nonlinear growth curve models used in the research.

Models	Mathematical Equation	Number of Parameters
Brody	$W_t = A[1 - B*exp(-k*t)]$	3
Bertalanffy	$W_t = A[1 - B*exp(-k*t)]^3$	3
Gompertz	$W_t = A*exp[- B*exp(-k*t)]$	3
Logistic	$W_t = A[1 + B*exp(-k*t)]^{-1}$	3
Richards[1]	$W_t = A[1 \pm B*exp(-k*t)]^m$	4

[1] In the Richards model, m <1 is positive, in other cases negative. Exp: The natural logarithm base.

In models, parameters from the different functions can be interpreted as follows: W(t) is observed weight at age t. The parameter A is weight at maturity, that is, asymptotic limit of the weight when age (t) approaches infinity. The parameter B is a constant of integration that adjusts for the situation in which W(0) (initial W) or t0 (time of origin) is different from zero, which indicates the proportion of the asymptotic mature weight to be gained after birth. As can be observed in the equations, when W(0) = t = 0 then B = 1. The parameter k is a constant that express the rate at which a logarithmic function of W, specific for each of the nonlinear equations, changes linearly in time. It can be interpreted biologically as a maturing index, establishing the rate with which weight approaches A, the asymptote. The parameter m is the shape parameter defining the inflection point, which occurs where the estimated growth rate changes from an increasing to a decreasing function.

In Bertalanffy, Logistic and Gompertz models, the change point constant (m = 3, -1, ∞) is changed, and in the Richards model, the m parameter is changed. In comparison of the models, R^2 (determination coefficient) indicating the part of the model explained in the total variation and MSE (mean squares error) indicating the difference between the predicted growth curve of the model and the points of the real growth curve are used.

Results

45 The results obtained from the analysis of the individual weights of the Morkaraman male lambs by the nonlinear 5 growth curve model are given in Table 3.

Table 3. Parameters obtained after individual analysis of non-linear models of weights of Morkaraman male lambs

Models		A	B	k	m	MSE	R^2
		$\bar{X}\pm S_{\bar{x}}$	$\bar{X}\pm S_{\bar{x}}$	$\bar{X}\pm S_{\bar{x}}$	$\bar{X}\pm S_{\bar{x}}$		
	OVERALL (N=45)						
Brody		69,72±4,630	0,95±0,004	0,006±0,0005		2,61±0,329	0,994±0,0007
Bertalanffy		55,84±4,364	0,58±0,010	0,013±0,0008		1,00±0,117	0,998±0,0003
Logistik		46,62±2,902	2,42±0,058	0,018±0,0009		0,83±0,090	0,998±0,0002
Gompertz		36,63±1,313	7,15±0,330	0,037±0,0050		0,73±0,087	0,998±0,0002
Richards		40,10±1,690	2,22±0,419	0,024±0,0011	-,998±0,1936	0,84±0,089	0,998±0,0002
BETWEEN GROUPS (N = 15)							
Brody	Group1	70,43±6,275^{b}	0,95±0,007^{a}	0,006±0,0009^{a}		2,11±0,491	0,995±0,0011
	Group2	94,70±7,738^{c}	0,97±0,005^{b}	0,004±0,0005^{a}		3,44±0,654	0,992±0,0014
	Group3	44,01±3,323^{a}	0,94±0,008^{a}	0,008±0,0006^{b}		2,28±0,524	0,994±0,0010
		**	**	**		ns	ns
Bertalanffy	Group1	55,08±4,698^{b}	0,56±0,014^{a}	0,012±0,0014^{b}		1,17±0,157^{b}	0,997±0,0004^{a}
	Group2	80,19±8,589^{c}	0,62±0,015^{b}	0,009±0,0010^{a}		0,61±0,144^{a}	0,999±0,0004^{b}
	Group3	32,25±1,493^{a}	0,56±0,017^{a}	0,018±0,0010^{c}		1,21±0,259^{b}	0,997±0,0006^{a}
		**	**	**		*	**
Logistik	Group1	38,29±1,455^{b}	6,41±0,503	0,045±0,0147		1,31±0,160^{b}	0,997±0,0003^{a}
	Group2	43,78±1,873^{c}	8,18±0,523	0,027±0,0012		0,41±0,060^{a}	0,999±0,0002^{b}
	Group3	27,81±1,102^{a}	6,85±0,614	0,039±0,0014		0,49±0,085^{a}	0,999±0,0003^{b}
		**	ns	ns		**	**
Gompertz	Group1	47,75±3,650^{b}	2,30±0,087^{a}	0,016±0,0014^{a}		1,14±0,125^{b}	0,997±0,0003^{a}
	Group2	61,79±5,373^{c}	2,64±0,091^{b}	0,013±0,0010^{a}		0,47±0,111^{a}	0,999±0,0003^{b}
	Group3	30,31±1,288^{a}	2,32±0,103^{a}	0,023±0,0009^{b}		0,89±0,178^{b}	0,997±0,0004^{a}
		**	**	**		**	**
Richards	Group1	41,86±2,013^{b}	2,29±1,690	0,022±0,0063^{a}	-3,359±0,3704	1,33±0,152^{b}	0,997±0,0003^{a}
	Group2	49,50±2,477^{c}	2,40±0,555	0,020±0,0013^{a}	-2,904±0,3745	0,46±0,104^{a}	0,999±0,0003^{b}
	Group3	28,95±1,160^{a}	1,98±0,608	0,030±0,0016^{b}	-2,733±0,2468	0,74±0,140^{a}	0,998±0,0004^{a}
		**	ns	**	ns	**	**

**: (P<0.01) Very significant, *: (P<0,05) Significant, ns: Not significant. a, b, c: The differences between the averages indicated by the same letter are statistically insignificant.

For the selection of the best model, variance analysis was applied to the R^2 and MSE statistics obtained from the models and the obtained results are given in Table 4. In the non-linear models, the effect of R^2 and MSE models was significant (P <0.01).

Table 4. Variance analysis results of R^2 and MSE values obtained from models.

Variation Source	FD	Determination Coefficient (R^2) Squares Average	Determination Coefficient (R^2) F	Mean Squares Error (MSE) Squares Average	Mean Squares Error (MSE) F
Nonlinear Models					
Models	4	0,000163	25,962**	28,223	21,491**
Error	220	0,000006		1,313	

**: (P<0.01) Very significant

The Duncan multiple comparison test was applied to the R^2 and MSE values and the best model was selected analytically and the results obtained are given in Table 5. According to Duncan's multiple comparison test, Brody model gave the lowest fit in R^2 and MSE values in nonlinear models. The other four models have entered the same classification. The Brody model showed approximately 0.5% lower conformity with respect to the R^2 value.

Table 5. Least squares averages of R^2 and MSE statistics for nonlinear models, standard errors and multiple comparison test results.

Variation Source	R^2 $\bar{X} \pm S_{\bar{x}}$	MSE $\bar{X} \pm S_{\bar{x}}$
Nonlinear Models	F = 25,962**	F = 21,491**
Brody	0,993±0,0007[a]	2,61±0,329[b]
Bertalanffy	0,998±0,0003[b]	1,00±0,117[a]
Logistik	0,998±0,0002[b]	0,83±0,090[a]
Gompertz	0,998±0,0002[b]	0,73±0,087[a]
Richards	0,998±0,0002[b]	0,84±0,089[a]

**: (P<0.01) Very significant, a, b,: The differences between the averages indicated by the same letter are statistically insignificant.

Conclusion

Early growth in animals usually shows a linear increase. However, made studies have shown that this is not always enough alone. (Bilgin and Esenbuğa, 2003: Topal et al., 2004: Bayram and Akbulut, 2009: Daşkıran et al., 2010). Therefore, in this study, five nonlinear growth models were used to explain the change over time of growth for Morkaman male lambs, taking into account the different feeding factors.

Individual analyzes of weights belonging to Morkaraman male lambs resulted in far-reaching parameters. In terms of MSE and R^2 statistics, values close to each other were obtained. In individual analyzes, the effectiveness of models in describing the weight-age change has been between 97.9% and 99.9%. In terms of MSE value, there were also large differences in the values obtained by group analysis of the models. With the Brody, Bertalanffy and Gompertz models, the differences between the B and k parameters were found to be very important (p <0.01). In addition, the difference between the mean A parameter and the mean A and k parameters in the Logistic model and the Richards model was significant (p <0,01). The difference between the Richards model and the estimated m-parameter groups is insignificant (p> 0,10). When all Morkaraman male lambs were evaluated together without group discrimination, Logistic and Richards models were found to have the lowest deviation squared sum. The lowest MSE and highest R^2 values in the intergroup growth models were obtained in group 2 with Bertalanffy, Logistic, Gompertz and Richards models and in group 1 in Brody model.

From studies carried out in small animals, Bilgin et al. (2003), Akbaş et al. (1999) and Balan et al. (2017) Brody model, Dashkiran et al. (2010), Şireli veErtuğrul (2004) Logistic model, Kopuzlu et al. (2014) Richards model, Akkol et al. (2011) Bertalanffy model, Topal et al. (2004) Bertalanffy and Gompertz models, Lambe et al. (2006) reported that the Richards and Gompertz models were the best fit for the growth curves of the animals in question.

In the study, the mature live weight (A) of morkaraman male lambs with no group distinction was the highest for the Brody model and the Gompertz model was the least predictive model. The difference between these two models is 33 kg. The adult live weight estimated for the intergroup models was obtained with the Brody model in group 2. The lowest adult weight was estimated in group 3 with the Lotgistic model. Rate of infarction (k); shows how rapidly the body weight at age t approaches the adult live weight (A). In some studies on growth curves (Brown et al., 1976: DeNise and Brinks, 1985: Krieter et al., 1987), it has been reported that there is a very high and negative correlation between mature live weight (A) and the rate of adultization (k). This relationship was interpreted as having a higher mature live weight in animals with higher adultization rate and a lower adult body weight in animals with lower adultization rate. In this study, the Gompertz model, which predicts the lowest mature live weight, has the highest rate of adultization, while the Brody model predicts the highest mature live weight.

In the growth curve models, the B parameter shows the ratio of live weight after birth to adult live weight. However, in the Bertalanffy, Logistic and Gompertz models where the change point (m) is constant, and in the Richards model where the B parameter has a completely variable change point, this parameter has partially lost its biological significance (Brown et al., 1976). According to this result, Brody model which predicts B parameter best.

m is a parameter that gives information about the shape of the curve and indicates the point of inflection when the change in the estimated growth rate has decreased from the increaseIn the case of m <1, it is reported that the change point is undefined (Brown et al., 1976: Nadarajah et al., 1984: Perotto et al., 1992: Beltran et al., 1992). In other words, it shows that the point of change does not come to fruition.

In this study, parameters of A, B, k, R^2 and MSE obtained in the logistic model, which shows the best adaptation in the birth to 135 daily age growth of Morkarman male lambs, were 46.62, 2.42, 0.018, 0.998 and 0.83 respectively. In the Brody model with the lowest compliance, the parameters A, B, k, R^2 and MSE were estimated to be 69.72, 0.95, 0.006, 0.994 and 2.61, respectively. Bilgin et al. (2003) The A, B, k and MSE parameters estimated by Brody model and this model are 51.8614, 0.9211, 0.1370 (0.0045 / day) and 0.47, respectively, in the study conducted in Morkarman lambs. In another study (Topal et al., 2004), the best models of Morkaraman lambs were Gompertz and Bertalanffy models. A, B, k, R^2 and MSE parameters of the Gompertz model are estimated to be 41.4, 2.06, 0.012, 0.98 and 3.0 respectively, and the A, B, k, R^2 and MSE parameters of the Bertalanffy model are estimated to be 42.5, 0.52, 0.010, 0.98 and 3.0 respectively they have.

As a result, the changes in weight-age (birth-135 days age) of Morkaraman male lambs fed different nutrients best explain the Richards and Logistic models. In terms of R^2 and MSE istatistics obtained from models, similar values were observed in four other models except Brody. The adaptation of the parameters of the cutting age of Morkaraman male lambs with the different feeding application was obtained in group 2 with the Logistic model. In some periods during the growth process, monitoring the growth and development of the lambs will be of great benefit in terms of herd management, care and nutritional regulation. Particularly in the period from birth to birth, from birth to slaughter, from milk cutting to adult frozen, monitoring of some of the characteristics of lambs (live weight) makes strategic decisions suitable for breeders (breeding, butchery)) will contribute to their purchases.

In the post-milking periods, the lambs' intensive and coarse feeding will achieve the desired live weight at the age of slaughter. Particularly, it is possible to change the mature live weight of the crawl as desired by using the relation between adult live weight and maturation rate.

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Analysis of some body measurements of Anatolian Buffalo grown in Erzurum with linear models

Y. Demir[1], Ö. Akbulut[2]

[1]Celal Oruç Animal Production College, University of Ağrı İbrahim Çeçen, Ağrı, Turkey

[2]Faculty of Agriculture, Department of Animal Science, University of Atatürk, Erzurum, Turkey

Introduction

Growth is a consequence of the interaction between genetic capability and environmental factors in terms of any aspect of the organism. Growth over time; body weight, body measurements, number of cells and the size of an organ (Akbas, 1995). The change in weight and body measurements of a living thing that occurs during a certain period of time is generally explained by the growth curve models. The shape of growth curves; it differs according to the living species, race, environmental conditions and the structure of the measured character (Efe, 1990). The variation of living weight or any body size with age can be defined using linear and nonlinear models. Linear models are used more in terms of features that are more interested in early life.

The parameters associated with the model to be used in determining growth curves should be biologically expressible. This situation; it depends on the understandability of the genetic and environmental interaction of the animal on its specificity. The structure of the data to be used in the analyzes and the purpose of the analysis are among the important criteria to be taken into consideration when determining the models or models to be used in estimating the growth curves. As in other animal species, the Anatolian Buffaloes also requires a lot of time and labor to determine the relationships between age and body measurements. Using the non-linear growth curve models, some researchers in various buffalo races (Kirmani et al., 1985; Fundora et al., 2006; Gupta et al., 2011; Araújo et al., 2012; Sahin et al., 2014) although there have been some studies on modeling of growth curves, there is no study on the growth curves of the Anatolian Buffaloes with linear models of body measurements in the literatüre. In this study, it is aimed to show the changes of various body measurements in the Anatolian Buffaloes with linear models and to determine the model that shows the best fit.

Materials and methods

The material of the research consisted of data belonging to 104 buffalo calves which were born and grown on the same terms in Pasinler District of Erzurum Province in betwen 2012 and 2015 19.03.1998 - 14.07.1998 period. The material of the research was composed of various body mesure data (height at withers, body length, chest girth, chest depth, chest width and shin girth) belonging a total of 104 buffalo calves which born and grown on the same conditions in Pasinler District of Erzurum Province in between 2012-2015 period. At the birth of the buffalo calves (0-3 daily age), the dates and genders of each buffalo calve were determined by going to the farmers. Every born buffalo calve was nailed and various body measurements were recorded. Several months intervals by going enterprises, various body measurements of buffalo calves at different ages were saved. Also, at the next birth times, when all the enterprises were visited all of the existing buffalo calves data were obtained as of that day. Thus, various body measurements were recorded at 0-795 days of age for buffalo calves. Six different body measurements taken from animals were taken with the help of a measuring stick, a measuring peg and a measuring tape. Wither Height: Vertical height from the highest point to the slope. Body Length: The length between the shoulder (Articulus humus) and the tuber ichii. Chest Girth: The size of the circumference of the chest bone from the back of the 4th finger (right behind Scapula) from the highest point of Wither. Chest Width: Distance between two shoulder tips (Tuberculum macus). Chest Depth: The distance from the highest point of the crown to the chest bone behind the shoulder blade. Front Thin Girth: Created the environmental measurements taken in the thinnest place of the pores (Metacarpus). (Kök, 1996). In linear regression applications where body measurements are dependent and age is taken as an independent variable, Linear (Yt = a + b1*t1), Quadratic (Yt = a + b1*t1 + b2*t12) and Cubic (Yt = a + b1*t1 + b2*t12 + b3*t13) models are used. In the models; Yt: body size observed at tth age (day), t: age of buffalo calves (days) at times when body size is taken, a: initial value of y-axis in terms of the examined characteristic and b1, b2 and b3 represent regression coefficients of the model. In this study, the averages of the body measurements and the parameters of the used models were obtained using StatSoft STATISTICA 12.5.192.7 packet program. In the comparison of the models, the R2 showing the part of the model explained in the total variation and the MSE indicating the difference between the predicted growth curve of the model and the points of the real growth curve are used.

Results

The mean values and standard errors calculated for body measurements (0-3 daily age) are given in table 1. In addition, the received data were analyzed together with linear models (linear, quadratic and cubic) and the parameters obtained are given in table 2 and in table 3, the determination coefficients (R2) and the mean square error (MSE).

When table 1 is examined; 0-3 daily age, the average height at withers was found to be 72.30, 72.05 and 72.47 cm, respectively, in all, male and female buffalo calves. Similarly, the mean body lengths were 63.76, 64.21 and 63.45 cm, respectively; mean chest girth was 77.33, 76.12 and 78.15 cm, respectively; mean chest width was 16.61, 16.55 and 16.65 cm, respectively; mean chest depth was 30.05, 29.60 and 30.35 cm respectively; the mean front thin girth was calculated as 12.87, 13.00 and 12.77 cm, respectively.

Table 1. Means of Anadolu Buffalo calves's various body measurements at birth.

Various Body Features (cm)	All		Male		Female	
	n	$\bar{x} \pm S_{\bar{x}}$	n	$\bar{x} \pm S_{\bar{x}}$	n	$\bar{x} \pm S_{\bar{x}}$
Wither Height	104	72,30±0,704	42	72,05±1.177	62	72,47±0,879
Body Length	104	63,76±0,884	42	64,21±1,643	62	63,45±0,990
Chest Girth	104	77,33±0,823	42	76,12±1,229	62	78,15±1,097
Chest Width	104	16,61±0,180	42	16,55±0,271	62	16,65±0,241
Chest Depth	104	30,05±0,369	42	29,60±0,562	62	30,35±0,488
Front Thin Girth	104	12,87±0,100	42	13,00±0,167	62	12,77±0,127

When table 1 is examined; the highest R^2 for various body measurements and the lowest MSE were obtained in the cubic model. With cubic model for wither heigth; a parameter, R^2 and MSE were found to be 72.49 cm, 99.53 and 41.86 for males and 72.78 cm, 99.57 and 37.28 for females, respectively. For body length, the males were 64.11 cm, 99.21 and 57.96, respectively, and the females were 63.72 cm, 99.26 and 52.58 in the same order, and for chest girth 76.75 cm, 99.38 and 75.34 in the males respectively, and 78.68 cm, 99.47 and 67.19 in the females It was estimated.

When Table 3 is examined; cubic model with a parameter R^2 and MSE were estimated to be for chest depth 29.53 cm, 99.39 and 10.96 males and 30.36 cm, 98.78 and 22.73 females respectively, for chest width 16.37 cm, 99.04 and 4.42 males and 17.00 cm 94.86 and 26.43 females, respectively, and for front thin girth 12.82 cm, 99.53 and 1.14 males and 12.63 cm, 99.43 and 1.31 females, respectively.

Table 2. Estimated parameters for various body measurements in buffalo calves according to linear models.

Various Body Features	Linear Models	Parameters					
		$a \pm S_{\bar{X}}$	$b_1 \pm S_{\bar{X}}$	$b_2 \pm S_{\bar{X}}$	$b_3 \pm S_{\bar{X}}$	MSE	R^2
Wither Height (cm)		All buffalo calves					
	Linear	76,68±0,379	0,061±0,0011			48,63	99,44
	Quadratic	73,60±0,425	0,099±0,0033	$-5,6*10^{-5}±1*10^{-6}$		40,22	99,54
	Cubic	72,67±0476	0,127±0,0074	$-1,6*10^{-4}±2,6*10^{-5}$	$0,1*10^{-8}±1*10^{-9}$	39,30	99,56
		Male buffalo calves					
	Linear	76,61±0,603	0,063±0,0017			51,12	99,42
	Quadratic	73,56±0,687	0,101±0,0053	$-6,1*10^{-5}±0,1*10^{-6}$		43,08	99,51
	Cubic	72,49±0,769	0,132±0,0118	$-1,8*10^{-4}±4,2*10^{-5}$	$1,2*10^{-8}±1*10^{-9}$	41,86	99,53
		Female buffalo calves					
	Linear	76,73±0,485	0,595±0,0014			46,79	99,46
	Quadratic	73,63±0,538	0,098±0,0041	$-5,7*10^{-5}±1,1*10^{-6}$		38,07	99,56
	Cubic	72,78±0,603	0,124±0,0094	$-0,3*10^{-4}±0,1*10^{-5}$	$1,1*10^{-8}±1*10^{-9}$	37,28	99,57
Body Length (cm)		All buffalo calves					
	Linear	67,52±0,432	0,614±0,0018			63,25	99,13
	Quadratic	64,60±0,499	0,098±0,0039	$-5,2*10^{-5}±1,2*10^{-6}$		55,70	99,22
	Cubic	63,92±0,564	0,119±0,0087	$-1,3*10^{-4}±3,1*10^{-5}$	$1,2*10^{-8}±1*10^{-9}$	55,18	99,24
		Male buffalo calves					
	Linear	67,51±0,679	0,639±0,0019			64,92	99,11
	Quadratic	64,75±0,801	0,099±0,0054	$-5,1*10^{-5}±1,3*10^{-6}$		58,39	99,20
	Cubic	64,11±0,905	0,117±0,0139	$-1,2*10^{-4}±4,6*10^{-5}$	$1,1*10^{-8}±1*10^{-9}$	57,96	99,21
		Female buffalo calves					
	Linear	67,52±0,556	0,059±0,0016			61,57	99,14
	Quadratic	64,49±0,636	0,097±0,0049	$-6,1*10^{-5}±1,4*10^{-6}$		53,24	99,25
	Cubic	63,72±0,716	0,121±0,0111	$-1,5*10^{-4}±4,1*10^{-5}$	$1,4*10^{-8}±1*10^{-9}$	52,58	99,26
Chest Girth (cm)		All buffalo calves					
	Linear	81,97±0,491	0,099±0,0014			81,93	99,33
	Quadratic	78,45±0,564	0,144±0,0043	$-6,1*10^{-5}±1,2*10^{-6}$		70,92	99,42
	Cubic	77,89±0,638	0,160±0,0099	$-1,3*10^{-4}±3,5*10^{-5}$	$1,2*10^{-8}±1*10^{-9}$	70,60	99,42
		Male buffalo calves					
	Linear	81,13±0,787	0,102±0,0023			87,07	99,29
	Quadratic	77,55±0,913	0,147±0,0071	$-7,2*10^{-5}±1,4*10^{-6}$		76,02	99,38
	Cubic	76,75±1,032	0,170±0,0158	$-1,6*10^{-4}±5,6*10^{-6}$	$1,3*10^{8}±1*10^{9}$	75,34	99,38
		Female buffalo calves					
	Linear	82,57±0,627	0,098±0,0018			78,40	99,36
	Quadratic	79,08±0,715	0,141±0,0055	$-6,4*10^{-5}±1,3*10^{-6}$		67,37	99,45
	Cubic	78,68±0,809	0,153±0,0126	$-1,1*10^{-4}±4,5*10^{-5}$	$1,1*10^{-8}±1*10^{-9}$	67,19	99,47

Table 3. Estimated parameters for various body measurements in buffalo calves according to linear models.

Various Body Features	Linear Models	Parameters					
		$a \pm S_{\bar{x}}$	$b_1 \pm S_{\bar{x}}$	$b_2 \pm S_{\bar{x}}$	$b_3 \pm S_{\bar{x}}$	MSE	R^2
Chest Depth (cm)		All buffalo calves					
	Linear	31,36±0,239	0,040±0,0007			19,37	98,95
	Quadratic	30,13±0,284	0,056±0,0022	$-2{,}1*10^{-5}\pm0{,}5*10^{-6}$		18,02	99,02
	Cubic	30,02±0,322	0,059±0,0049	$-0{,}3*10^{-4}\pm1{,}8*10^{-5}$	$1{,}2*10^{-8}\pm1*10^{-9}$	18,01	99,02
		Male buffalo calves					
	Linear	30,85±0,295	0,040±0,0011			12,21	99,32
	Quadratic	29,65±0,347	0,055±0,0027	$-2{,}2*10^{-5}\pm0{,}4*10^{-6}$		10,97	99,39
	Cubic	29,53±0,393	0,059±0,0061	$0{,}4*10^{-4}\pm2{,}1*10^{-5}$	$1{,}1*10^{-8}\pm1*10^{-9}$	10,96	99,39
		Female buffalo calves					
	Linear	31,72±0,348	0,040±0,0010			24,17	98,72
	Quadratic	30,46±0,416	0,056±0,0032	$-2{,}1*10^{-5}\pm0{,}1*10^{-6}$		22,74	98,79
	Cubic	30,36±0,471	0,059±0,0073	$-0{,}3*10^{-4}\pm2{,}6*10^{-5}$	$1{,}3*10^{-8}\pm1*10^{-9}$	22,73	98,78
Chest Width (cm)		All buffalo calves					
	Linear	17,29±0,228	0,017±0,0012			17,64	96,50
	Quadratic	17,02±0,281	0,021±0,0022	$-1{,}3*10^{-5}\pm0{,}5*10^{-6}$		17,57	96,50
	Cubic	16,75±0,317	0,029±0,0049	$-0{,}4*10^{-4}\pm1{,}7*10^{-5}$	$1{,}1*10^{-8}\pm1*10^{-9}$	17,50	96,52
		Male buffalo calves					
	Linear	16,71±0,183	0,019±0,0005			4,68	99,04
	Quadratic	16,46±0,225	0,022±0,0018	$-1{,}1*10^{-5}\pm0{,}9*10^{-6}$		4,63	99,05
	Cubic	16,37±0,255	0,024±0,0039	$-0{,}1*10^{-4}\pm1{,}4*10^{-5}$	$1{,}3*10^{-8}\pm1*10^{-9}$	4,42	99,04
		Female buffalo calves					
	Linear	17,70±0,366	0,016±0,0011			26,69	94,84
	Quadratic	17,41±0,449	0,019±0,0031	$-1{,}2*10^{-5}\pm0{,}8*10^{-6}$		26,62	94,83
	Cubic	17,00±0,508	0,032±0,0079	$-0{,}5*10^{-4}\pm2{,}8*10^{5}$	$1{,}4*10^{-8}\pm1*10^{-9}$	26,43	94,86
Front Thin Girth (cm)		All buffalo calves					
	Linear	13,09±0,629	0,008±0,0002			1,34	99,43
	Quadratic	12,92±0,077	0,010±0,0006	$-3{,}3*10^{-5}\pm1{,}8*10^{-6}$		1,31	99,45
	Cubic	12,71±0,085	0,016±0,0013	$-0{,}3*10^{-4}\pm1{,}1*10^{-6}$	$2{,}1*10^{*8}\pm1*10^{-9}$	1,27	99,46
		Male buffalo calves					
	Linear	13,23±0,093	0,008±0,0003			1,22	99,49
	Quadratic	13,05±0,114	0,011±0,0009	$-1{,}6*10^{-5}\pm1{,}2*10^{-6}$		1,19	99,51
	Cubic	12,82±0,127	0,017±0,0019	$-0{,}3*10^{-4}\pm1{,}2*10^{-5}$	$2{,}2*10^{-8}\pm1*10^{-9}$	1,14	99,53
		Female buffalo calves					
	Linear	13,01±0,083	0,008±0,0002			1,37	99,41
	Quadratic	12,82±0,101	0,010±0,0008	$-0{,}3*10^{-5}\pm0{,}9*10^{-6}$		1,35	99,42
	Cubic	12,63±0,113	0,016±0,0018	$-0{,}3*10^{-4}\pm1{,}1*10^{-6}$	$1{,}9*10^{-8}\pm1*10^{-9}$	1,31	99,43

Conclusion

Body measurements give important information about the morphological structure, growth and development of animals. The body measurements can be used in assessing the suitability of animals for race characteristics. On the other hand, can found be correlations between various yield characteristics and body measurements (Kelgökmen and Ünal, 2015). In all linear models a the parameter represents the dot at which the of line or of curve y-axis cut, ie, the initial value in terms of the feature being shown. When Tables 2 and 3 are examined, it can be seen that the a values of the linear model are higher and those of the cubic model are lower.

One of the criteria used to determine models' compliance is the MSE value obtained from the relevant models. Another measure is the R2 statistic. There is a negative relationship between R2 and MSE. The R2 value increases as the MSE value decreases (Efe 1990).

When table 2 and 3 are examined, it is found that cubic model is the best model for all, male and female buffalo calves with respect to the highest R^2 and lowest MSR statistics. The parameters of the cubic model appear to be about the same size and the same sign (+, -, +) in both genders. This situation, that the subject model explains the various body measurements shows the height at withers of both genders by a similar growth curve. There are no studies in the literature that compare the body measurements of the Anatolian Buffalo with age by comparison with linear models. However, several studies (Akbas et al., 2001; Bayram and Akbulut, 2009) about weight-age variation in Brown and Holstein cattle have reported that the best results in linear models are obtained with the cubic model. In the same way Romanov (Yaldızbas, 2016), Ivesi and Morkaraman (Koyceğiz, 2003) at the lambs emphasized that the cubic model gives the best adaptation to studies on the linear modeling of growth curves for different body measurements.

Wither height, body length, chest girth, chest width, chest depth and front thin girth were calculated as 72.05 and 72.47, 64.2 and 63.45, 76.12 and 78.15, 16.55 and 16.65, 29.60 and 30.35, 13.00 and 12.77 cm respectively in males and females. The values (a parameter) calculated with the cubic model are 72.49 and 72.78, 64.11 and 63.72, 76.75 and 78.68, 29.53 and 30.36, 16.37 and 17.00, 12.82 and 12.63 cm, respectively. The actual values observed and the values predicted by the cubic model were close to each other. This suggests that the cubic model predicts better the various body measurements within the linear models studied. The R2 statistic and MSE with regard to calculated for various body measurements did not show much difference between the quadratic and cubic models.

The estimated a parameter for the feature investigated was found to be very high in the linear model.

In the case of wither height according to the linear model between genders, the greatest determinant coefficient is estimated in female bufffalo calves. The lowest detection coefficient was obtained at female breast, at chest width. The largest MSE was found in male buffalo calves at chest girth, and the lowest MSE was found in male buffalo calves in the front thin girth. As a result; When the R2 and MSE values used as the criterion for comparison of the models are evaluated together, it is determined that the best cubic model explains the various body measurements in male and female buffalo calves. This model is followed by the quadratic model. The lowest model was found as linear model.

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Determination of conservation priorities of six brown layer pure lines based on microsatellite markers

T. Karslı, M.S. Balcıoğlu

Department of Animal Science, Faculty of Agriculture, University of Akdeniz, 07070 Antalya, Turkey

Introduction

Genetic diversity of the world's livestock populations is decreasing with various reasons. This situation has become even more dramatic in poultry breeding and the number of poultry breeds used in production has decreased to a great extent due to the breeding system employed in commercial poultry production. Today, there are three dominant genotypes in layers and four dominant genotypes in broilers around the world. While White Leghorn is the predominant breed used to obtained white layer, genetic basis of brown layers are Rhode Island Red, New Hampshire, Plymouth Rock and Australorp breeds (Hillel et al., 2003). In Turkey's poultry sector, studies on production of breeding materials are carried out only by Ankara Poultry Research Institute. There are six brown layer pure chicken lines and five white layer pure chicken lines in the institution. Brown layer pure chicken lines are (Rhode Island Red-(RIRI and RIRII); Barred Rock – (BARI and BARII); Colombian Rock-(COL) and Line 54-(L-54) were imported from Canada in 1995. These populations have been made subject to selection on the basis of various characteristics by institution since then. L-54 is synthetic chicken line obtained in 1974 year and it has approximately 15 percent Leghorn blood. Therefore body weight is lower than other lines and the egg shell color is quite light brown (Karslı and Balcıoglu 2018). The aimed of this study to determine the conservation priorities by using information obtained from molecular genetic methods in these populations that have been bred as closed populations and made subject to selection for a long period of time.

Material and methods

Totally 180 samples were used from to be 30 samples each line. Blood samples were taken from the wing vein to tubes containing K3 EDTA (approximately 1 ml) and stored at -20 °C until DNA extraction. Genomic DNA isolation was conducted in line with the protocol reported by Miller et al. (1988).

Table1. The descriptive informations belonging to microsatellite loci

Locus	Chr.	Primer sequences (5'→3')	Anneling Temp. (ºC)	Genbank acc. number	References
ADL0112	10	F: GGCTTAAGCTGACCCATTAT R: ATCTCAAATGTAATGCGTGC	58	G01725	FAO 2011
ADL0145	4	F:CGTGGTGTTGTGTATCATTT R: CTCTTTTGCAGTCCTCCTAC	58	-	Zhou and Lamont (1999)
ADL0268	1	F: CTCCACCCCTCTCAGAACTA R: CAACTTCCCATCTACCTACT	60	G01688	FAO 2011
LEI0094	4	F: GATCTCACCAGTATGAGCTGC R: TCTCACACTGTAACACAGTGC	60	X83246	FAO 2011
LEI0166	3	F: CTCCTGCCCTTAGCTACGCA R: TATCCCCTGGCTGGGAGTTT	60	X85531	FAO 2011
LEI0192	6	F: TGCCAGAGCTTCAGTCTGT R: GTCATTACTGTTATGTTTATTGC	60	Z83797	FAO 2011
LEI0196	-	F: ACCCATGAATGTTTCCTATGC R: GATCCCTTCCTAATACATAGTC	58	-	Tadano et al. 2007a
LEI0228	-	F: GCTGGGTTATTTCAATATGTGG R: AGCGTACCTGATAATGATGAGC	58	-	Tadano et al. 2007a
LEI0234	2	F: ATGCATCAGATTGGTATTCAA R: CGTGGCTGTGAACAAATATG	60	Z94837	FAO 2011
MCW0020	1	F: TCTTCTTTGACATGAATTGGCA R: GCAAGGAAGATTTTGTACAAAATC	60	-	FAO 2011
MCW0037	3	F: ACCGGTGCCATCAATTACCTATTA R: GAAAGCTCACATGACACTGCGAAA	64	-	FAO 2011
MCW0067	10	F: GCACTACTGTGTGCTGCAGTTT R: GAGATGTAGTTGCCACATTCCGAC	60	G31945	FAO 2011
MCW0069	E60C0 4W23	F: GCACTCGAGAAAACTTCCTGCG R: ATTGCTTCAGCAAGCATGGGAGGA	60	-	FAO 2011
MCW0078	5	F: CCACACGGAGAGGAGAAGGTCT R: TAGCATATGAGTGTACTGAGCTTC	60	-	FAO 2011
MCW0081	5	F: GTTGCTGAGAGCCTGGTGCAG R: CCTGTATGTGGAATTACTTCTC	60	-	FAO 2011
MCW0111	1	F: GCTCCATGTGAAGTGGTTTA R: ATGTCCACTTGTCAATGATG	60	L48909	FAO 2011
MCW0123	14	F: CCACTAGAAAAGAACATCCTC R: GGCTGATGTAAGAAGGGATGA	60	-	FAO 2011
MCW0183	7	F: ATCCCAGTGTCGAGTATCCGA R: TGAGATTTACTGGAGCCTGCC	58	G31974	FAO 2011
MCW0248	1	F: GTTGTTCAAAAGAAGATGCATG R: TTGCATTAACTGGGCACTTTC	60	G32016	FAO 2011
MCW0287	-	F: GCCGTGTGACATCAGTGCTC R:TTGCACCAGCGCTGCAAACTG	58	-	Tadano et al. 2007b
MCW0301	-	F: GGAGAGGAGACAACTGTATTC R: AGGGTGAGAGGTAACAAGTGC	58	-	Tadano et al. 2007b
MCW0330	17	F: TGGACCTCATCAGTCTGACAG R: AATGTTCTCATAGAGTTCCTGC	60	G32085	FAO 2011

22 microsatellite loci were used in assessment of conservation priorities in six brown pure chicken lines [RIRI, RIRII; BARI, BARII; COL and L-54]. The descriptive informations belonging to microsatellite loci are given Table 1.

PCR process was performed as follows, initial denaturation at 94°C for 5 min, followed by 30 cycles consisting of denaturation at 94°C for 45 sec, annealing (temperatures for each primer pair are shown in Table 1) for 30 sec, extension at 72°C for 45 sec, with final extension 72°C for 5 min. 96 automated capillary electrophoresis (Advanced Analytical Technologies-AATI, Iowa, USA) was used for determine the sizes of the PCR products.

Assessment of conservation priorities in the lines, were made according to the methods described by Petit et al (1998) and Caballero and Toro (2002) by using MolKin program (Gutierrez et al. 2005).

Results

The contribution to genetic diversity of each line is shown in Table 2. According to the methods described by Cabellaro and Toro (2002) the highest contribution to genetic diversity was made by L-54 (-2.666), while the lowest contribution was made by the BARII line (-0.166). According to Petit et al. (1998), RIRI (8.341) line made highest and BARII line (0.140) made lowest contribution to genetic diversity.

Table 2. Contribution to genetic diversity of six brown layers pure lines

	According to Cabellaro and Toro			According to Petit et al.		
	Total (%)	Within pop. (%)	Between pop. (%)	Total (%)	Within pop. (%)	Between pop. (%)
RIRI	-1.813	-1.696	-0.117	8.341	3.629	4.711
RIRII	-0.188	1.479	-1.667	1.916	-0.418	2.334
BARI	-0.388	-0.208	-0.180	1.837	0.064	1.773
BARII	-0.166	-0.175	0.009	0.140	-1.670	1.810
L-54	-2.666	-0.164	-2.502	7.818	-0.128	7.946
COL	-0.769	0.764	-1.533	1.970	-1.477	3.447

Conclusion

The conservation priorities values obtained in the Barred Plymouth Rock lines [BARI (-0.388) and BARII (-0.166) in this study are lower than reported by Tadano et al. (2013) for four Plymouth Rock lines [PR-1(-1.16), PR-2 (-1.14), PR-3 (-1.24) and PR-5 (-3.44)]. On the contrary, these figures are higher than values other three lines [PR-4 (+0.65), PR-6 (+0.47) and PR-7 (+0.33) in same study. Karslı and Balcıoğlu (2018) reported that the observed heterozygosity to be in the range between 0.31 (RIRII) and 0.50 (BARII); and FIS values in the varied from 0.16 (L-54) and 0.46 (RIRII) in same six brown layer pure lines.

The results obtained in this study support the results of the study by Karslı and Balcıoğlu (2018) in which genetic diversity parameters is determined on the same lines. Consequently, the findings obtained from the study indicate conservation priorities should be given to RIRI, BARI and L-54 lines in Rhode Island Red, Barred Plymouth Rock and Colombian Plymouth Rock pure lines, respectively.

Acknowledgements

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Goat Milk Quality Assessment Based on Artificial Neural Network and Cluster Analysis

F. Coskun, A. Akilli

[a]Department of Animal Science, Faculty of Agriculture, Ahi Evran University, Kirsehir, Turkey.

Department of Animal Science, Faculty of Agriculture, Ahi Evran University, Kirsehir, Turkey.

Introduction

Clustering analysis is one of the multivariate methods of analysis commonly used for classification in applied sciences. In clustering analysis, grouped data are classified according to their similarities using the measured values of the variables included in the study. Especially in studies carried out in the field of livestock; obtaining the quality classes of animal products, grouping animals on an individual basis, obtaining summarizing information about the data structure, cluster based evaluation of data, and finding outliers. In recent years, artificial intelligence methods have been used as an alternative to clustering analysis. One of these methods is artificial neural networks. Artificial neural networks widely are used in the field of livestock, and this method is the subject of many successful applications. This method, which is designed in a manner similar to that of the human brain, is an information source for researchers in the field of livestock especially in the important economical aspects such as milk yield estimation, various classification studies, disease diagnosis, animal breeding and oestrus detection.

Materials and methods

The material of the study consists of milk quality records of Malta Goats. Model inputs for analysis were determined as somatic cell count, pH, fat, fat-free dry matter, protein, lactose, density, freezing point and min. The analyses were performed with the MATLAB (R2016a). Descriptive statistics for the data set used in the study are given in Table 1.

Table 1. Descriptive statistics of variables

	$\bar{X} \pm s_{\bar{x}}$	Minimum	Maximum
SCC (10^3)	771.24±76.356	2.97	6390
pH	6.5596±0.0101	6.13	7.41
Fat	5.7805±0.1589	2.1	15.44
Fat-free dry matter	10.091±0.0686	8.33	16.13
Protein	4.3793±0.0317	3.54	7.13
Lactose	4.6897±0.0392	1.0299	7.6
Density	1.0335±0.0002	1.0272	1.0575
Freezing Point	-0.591±0.0026	-0.792	-0.456
Mineral	1.0152±0.0074	0.42	1.22
Month[1]	2.9304±0.0965	1	5

[1]Analysis period

In this study, cluster analysis and artificial neural network were analysed comparatively in order to obtain quality class using milk quality parameters of Maltese Goats. Thus, critical assessments were evaluated on milk quality parameters and quality classes were established.

In k-means analysis, optimal cluster number was determined by hierarchical cluster analysis-Ward method and squared Euclidean was used as a distance metric. In dendogram reviews, the appropriate number of clusters was determined as four and also scaled data according to z score were used (Z=(x-μ)/σ). K-means aims at minimizing an objective function $W_n = \frac{1}{n}\sum_{i=1}^{n} \min_{1 \le j \le k} \left\| x_i - a_{jn} \right\|^2$ (Tatlıdil, 1996).

In clustering analysis, it is aimed that the units with different number of properties are collected in clusters where homogeneous structures are formed according to their similarities. Cluster analysis is one of the multivariate statistical methods and is applied successfully in different disciplines.

Artificial neural networks is an artificial intelligence method that emerged according to the working principles of the human brain. Neural networks are quite popular in prediction and classification studies in animal science (Hassan et al., 2009; Salehi et al., 2000; Yang et al. 2000; Shahinfar et al. 2012). In addition, it can perform important functions such as pattern recognition and image processing. Three different learning strategies are used in the training of the network. These are supervised learning, unsupervised learning and reinforcement learning method. Learning rules used frequently in literature: Hebbian rule, Hopfield rule, Delta and Kohenon rule is known as. There are numerous models of neural networks suitable for different problem structures in the literature (Haykin, 2009).

In this study, multilayer perceptron model is used. In neural network analysis, a large number of neural network structures with different combinations of algorithms and parameters are designed. In the analyses performed with artificial neural networks, the activation function was determined as hyperbolic tangent-sigmoid and log-sigmoid in the training phase. 10 different back propagation algorithms were used in the training process of the multilayer perceptron. These are Bayesian Regularization, Levenberg-Marquardt and Scaled Conjugate Gradient, Gradient Descent, Gradient Descent with Momentum, Gradient Descent Adaptive with Momentum, Fletcher-Reeves Algorithm CGF), Powell-Beale CG Algorithm (CGB), Brayde Fletcher Gold Farlo Shamo Algortihm (BFG) and One Step Secant Algorithm (OSS).

The learning rate, momentum constant and maximum iterations were determined as 0.01, 0.95 and 100000, respectively. The learning process of the connection weights was completed when the error squares average reached the lowest level.

The accuracy of the models was calculated using the Mean Square Error (MSE), Mean Absolute Percentage Error (MAPE) and Mean Absolute Deviation (MAD). Statistical error criteria is given in Table 2.

Table 2 Statistical error criteria

Statistical Error Criteria	Equations
Mean squared error (MSE)	$\mathrm{MSE} = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$
Mean absolute percentage error (MAPE)	$\mathrm{MAPE} = (\frac{100}{n})\sum_{i=1}^{n}\left\|\frac{(y_i - \hat{y}_i)}{y_i}\right\|$
Mean Absolute Deviation (MAD)	$MAD = \frac{1}{n}\sum_{i=1}^{n}\|Y_i - \hat{Y}_i\|$

Where for the i[th] record, $\hat{y}_i$: predicted value, y_i: actual value, n: number of records.

Results

The results of neural networks were compared with cluster analysis. Analysis results show that neural networks obtained the most successful and effective estimates. The results of the k-means method are given in Table 3. As can be seen in the Table 3; MSE, MAPE and MAD values were obtained as 1.5898, 32.2130 and 0.8881, respectively.

Table 3 K-Means Results.

Methods	MSE	MAPE	MAD
K-Means	1.5898	32.2130	0.8881

The error criteria for prediction values which are obtained with Tan-Sig activation function are given in Table 4. Accordingly, BFG algorithm has lower error values than other algorithms. In the BFG algorithm, MSE, MAPE and MAD was calculated as 0.1823, 13.861 and 0.3868 respectively. The error criteria for prediction values which are obtained with Log-Sig activation function are given in Table 5. The results show that GDA algorithm is more successful than other algorithms.

In the GDA algorithm, MSE, MAPE and MAD was calculated as 0.2076, 15.144 and 0.4209 respectively. The results of the study showed that neural networks with Tan-Sig activation function is more successful than k-means cluster analysis. Figure 1 and Figure 2 show that K-means results and neural network results with Tan-Sig and Log-Sig activation function, respectively.

Table 4 Artificial Neural Network Results with Tan-Sig Activation Function

Methods	MSE	MAPE	MAD
BR	0.2799	18.001	0.4999
LM	0.2320	16.120	0.4480
SCG	0.2649	17.238	0.4800
GD	0.2623	16.843	0.4705
GDM	0.7457	30.053	0.8369
GDA	0.2535	16.675	0.4638
CGF	0.2522	16.514	0.4607
CGB	0.2574	16.879	0.4711
BFG	0.1823	13.861	0.3868
OSS	0.2543	16.623	0.4651

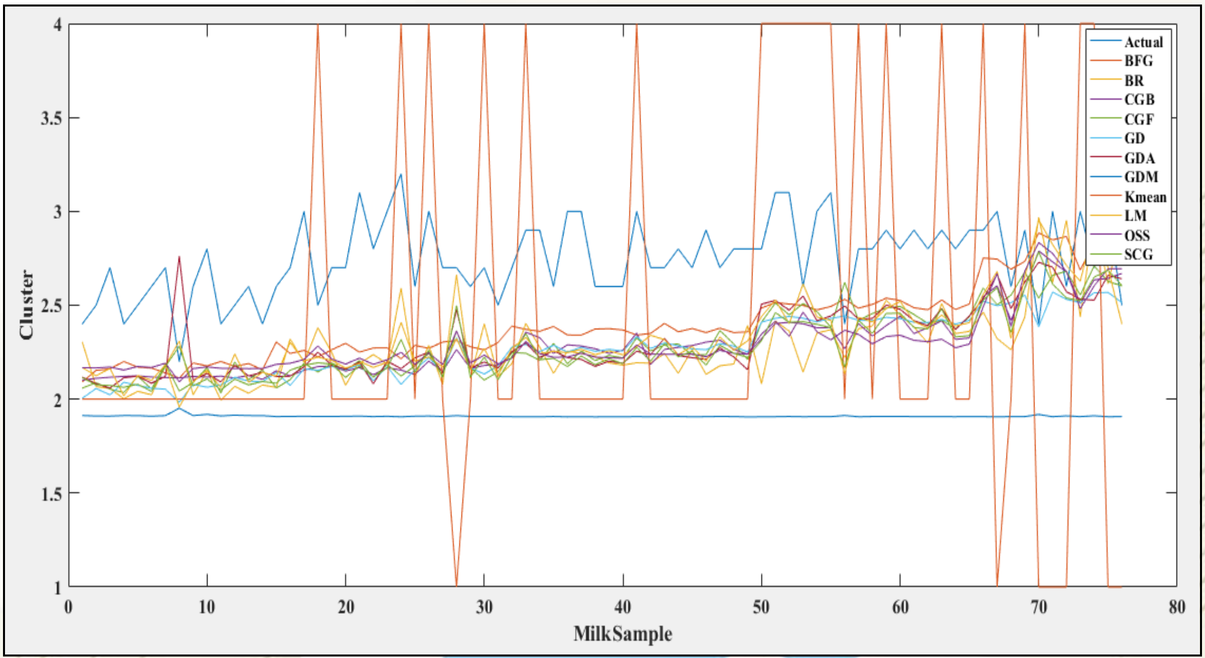

Figure 1 Artificial Neural Network Results with Tan-Sig Activation Function and K-means Results

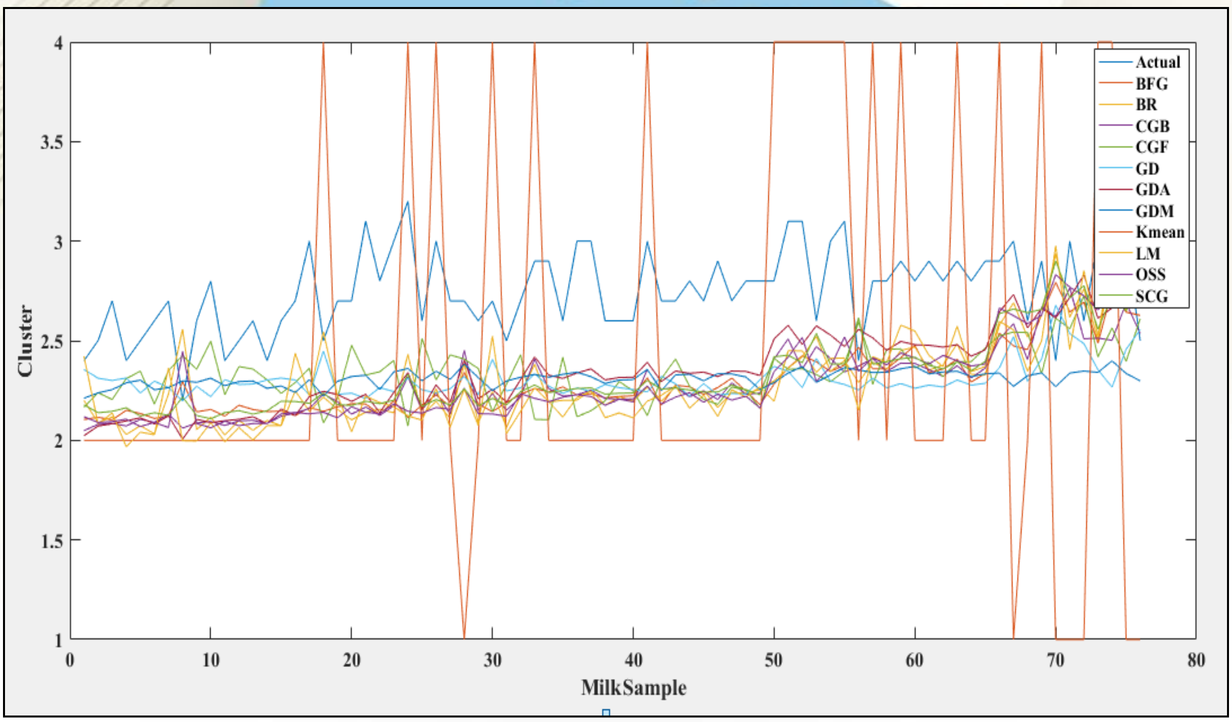

Figure 2 Artificial Neural Network Results with Log-Sig Activation Function and K-means Results

Table 5 Artificial Neural Network Results with Log-Sig Activation Function

Methods	MSE	MAPE	MAD
BR	0.2710	17.573	0.4879
LM	0.2819	17.877	0.4965
SCG	0.2461	16.395	0.4578
GD	0.2489	15.926	0.4503
GDM	0.2259	15.499	0.4372
GDA	0.2076	15.144	0.4209
CGF	0.2347	15.179	0.4285
CGB	0.2580	16.883	0.4709
BFG	0.2658	17.030	0.4762
OSS	0.2738	17.423	0.4846

Conclusion

In this study, neural networks and cluster analysis were evaluated comparatively for classification of goat milk quality. Results have showed that neural network is very successful in modelling milk quality and can be used as an alternative tool for cluster analysis. It is seen that artificial neural networks in clustering goat milk according to content components shows much more successful results than k-means method.

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Association of GH, STAT5A, MYF5 gene polymorphisms with milk somatic cell counts, electrical conductivity and pH

J.M. Kıyıcı[1], B. Akyüz[2], M. Kaliber[1], K. Arslan[2], E.G. Aksel[2], M.U. Çınar[1]
[1]Faculty of Agriculture, Department of Animal Science, Erciyes University, Kayseri, Turkey,
[2]Faculty of Veterinary Medicine, Department of Genetics, Erciyes University, Kayseri, Turkey

Introduction

Mastitis is a mammal inflammation causing serious losses for dairy farmers because of high treatment costs and destruction of infected animals (Wojdak-Maksymıec et al., 2006). Milk somatic cell count (MSCC) is a significant indicator for early diagnosis of both acute and sub-clinical mastitis forms (Green et al., 2004). Analyses on cattle QTL data-base revealed that 2237 quantitative trait loci were related to milk composition and 1582 loci were related to mastitis (Hu et al. 2016). In this study, interactions of GH, STAT5A, MYF5 gene polymorphisms with MSCC, electrical conductivity (EC) and pH were investigated.

Materials and methods

A total of 1660 milk samples from 166 Holstein dairy cattle were used in this study. MSCC measurements were made with DeLaval CC (DeLaval, Stockholm -Swedish), EC and pH measurements were made with Milkana (MILKANA MULTI - TEST milk analyzer, DeLaval, Stockholm-Swedish) devices. The GH, STAT5A and MYF5 gene polymorphisms were genotyped by using PCR-RFLP. Since MSCC data were not normally distributed, data were subjected to Log_{10} transformation. Phenotypic traits data were analyzed with a mixed model using the MIXED procedure of SAS v9.0.

Results

The MSCC, EC and pH traits of the genotypes with GH, STAT5A, MYF5 genes are summarized in Table 1. While the differences in MSCC values of the genotypes with GH gene were found to be significant at $P<0.05$ level, the differences in EC values of the genotypes with both GH and STAT5A genes were found to be significant at $P<0.01$ level.

There were significant positive correlations between MSCC and EC (r=0.196) and between MSCC and pH (r=0.111) and there were positive correlations between EC and pH (r=0.085) (P<0.01).

Table 1. The least squares means and standard errors for MSCC, EC and pH of the genotypes with GH, STAT5A, MYF5 genes.

		Traits					
Gene		MSCC (Log_{10}MSCC)	P value	EC (mS/cm)	P values	pH	P value
GH	LL	5.15±0.39^{a}		5.01±0.03^{a}		6.89±0.01	
	LV	5.02±0.06^{b}	0.0385	5.11±0.04^{b}	0.0061	6.88±0.01	0.5850
	VV	5.22±0.22^{ab}		5.21±0.15^{ab}		6.85±0.48	
STAT5A	CC	5.11±0.04		5.00±0.03^{a}		6.89±0.01	
	CT	5.18±0.05	0.1182	5.08±0.04^{b}	0.0077	6.88±0.01	0.4690
	TT	5.27±0.13		5.13±0.09^{b}		6.88±0.03	
MYF5	AA	5.19±0.07		5.05±0.05		6.91±0.01	
	AG	5.14±0.04	0.2886	5.02±0.03	0.8365	6.89±0.01	0.1604
	GG	5.09±0.05		5.02±0.04		6.89±0.01	

$^{a-b}$: Means in the same column with different letters are significantly different.

Conclusion

The differences in milk traits of the genotypes with GH and STAT5A genes were significant, but the differences in milk traits of the genotypes with MYF5 gene were not significant. Sing et al., (2014) also stated that GH and STAT5A genes were related to milk yield and composition. Ogorevc et al., (2009) also indicated that 26 genes including GH and STAT5A were related to phenotypic characteristics of the udders (milk and mastitis characteristics). Present positive correlations among MSCC, EC and pH (P<0.01) comply with the positive correlations among MSCC, EC and pH (P<0.05) reported by Panchal et al., (2016) and Sahu et al., (2017).

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DGAT1 Polymorphism in Holstein, Jersey and Turkish Indigenous Cattle Breeds

E.K. Gürcan[1], Ö. Çobanoğlu[2], E. Kul*[3], H.S. Abacı[4], S. Çankaya[5]

[1]Department of Animal Science, Faculty of Agriculture, Namik Kemal University, Tekirdag/Turkey

[2]Department of Genetics, Faculty of Veterinary Medicine, Uludag University, Bursa/Turkey

[3]Department of Animal Science, Faculty of Agriculture, Kırşehir Ahi Evran University, Kırşehir/Turkey

[4]Department of Animal Science, Faculty of Agriculture, Ondokuz Mayis University, Samsun/Turkey

[5]Department of Sport Management, Yasar Dogu Sports Science Faculty, Ondokuz Mayis University, Samsun/Turkey

Introduction

The candidate gene selected as the molecular marker in the study is the Acyl-coA: diacylglycerol acyltransferase 1 (DGAT1) gene, which is known to have an effect on milk yield and milk components in dairy cattle. So, the fundamental issue of candidate gene analyses is to have an idea about the biological mechanism by analyzing the relationship between the genotypes and the phenotypes of related traits (Kwon and Goate, 2000). Although many polymorphism studies were conducted using indigenous breeds of Turkey, due to unavailability of sufficient yield trait data, it was not possible to accurately reveal the relationships between genotype and economically important traits and, consequently, to the failure to perform a successful selection application based on molecular marker information (Devrim and Kaya, 2006). Therefore, it was aimed to determine genetic polymorphism and genetic diversity for DGAT1 gene in Holstein and Jersey breeds and the indigenous cattle breeds of Turkey in this study.

Materials and methods

A total of 985 cattle were used in the study. The animals belonging to the dairy cattle breeds (743 animals) comprised 276 Jersey cattle and 161 Holstein cow raised in Samsun, and 306 Holstein cow raised in Bursa. On the other hand, 242 cows belonging to the indigenous breeds were consisted 92 Grey Steppe from Balikesir, 80 Native Black cattle from Ankara, and 70 East Anatolian Red cattle from Ardahan from Eastern Anatolian Region. DNA samples were evaluated using NanoDrop Spectrophotometer in terms of the quality and quantity of samples.

Isolated and quantified DNA samples were amplified by using an appropriate primer through PCR method. The method of gel electrophoresis was employed to detect the presence of the PCR products and to determine the digested fragments by the PCR-RFLP reaction. The allelic and genotypic frequencies were calculated according to the direct gene counting method. The chi-square test was also employed whether the distributions of observed and expected genotypic frequencies in concordant with the Hardy-Weinberg Genetic Equilibrium (Nei, 1987). F-statistics are used to determine the genetic variability of populations. The F-statistics for the populations were calculated by POPGENE statistical package program (Yeh, 2000).

Results

The frequencies of K allele for the DGAT1 gene were calculated as 0.59, 0.54, 0.53, 0.62, 0.52, and 0.54 for Jersey, Holstein (Black Sea Region), Holstein (Marmara Region), and Grey Steppe, East Anatolian Red, and Native Black breeds, respectively. Overall KA genotypic frequency was much higher than the genotypic frequency of homozygotes in all populations. The FIS values of the populations for the DGAT1 gene were detected all negative values. In overall population, FIS values were found as 76%. The expected deviations from the Hardy-Weinberg Equilibrium in terms of the DGAT1 locus were found significant in these six different populations ($P<0.01$). The genetic distance values among the populations were calculated between 0.0001 and 0.0089.

Conclusion

The genetic polymorphism of DGAT1 gene were detected among dairy and indigenous Turkish cattle breeds by using PCR-RFLP methods in this study. KA genotypic frequency was much higher than the genotypic frequency of homozygotes in all populations. Also, the genetic relationship among these breeds were revealed based on the F-statistics analysis.

The closest genetic distance was shown between Holstein and Native Black populations, while the genetic distance between Jersey and East Anatolian Red was detected much farther. Based on the cluster analysis, Holstein, Native Black and East Anatolian Red were located in close cluster, however Jersey and Grey Steppe were grouped in different cluster group. But, a further study will also be needed to determine a genetic polymorphism by using different economically important genes in various breeds.

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Determination of genetic diversity in Anatolian Black Cattle raised in Turkey using Microsatellite Marker Method

E. Demir, M.S. Balcioğlu

Department of Animal Science, Faculty of Agriculture, Akdeniz University, Antalya, TR

Introduction

Healty and balaced diet for societies depends on animal production as well as plant production. Cattles have a great important to meet meat and milk necessities of our country. Anatolian Black cattle which is raised in different regions of central anatolian and has the highest number of indiviuals of native cattle breeds in Turkey, is one of the important animal genetic resources. Unfortunately, in the past 30 years, population size have greatly reduced by breeders who prefer high yield cattle breeds than Turkish native cattle breeds. It is tought that this situation causes decreasing in genetic diversity too. In this study, it is aimed to evaluate the genetic diversity and population structure of Anatolian Black cattle using microsatellite markers.

Materials and methods

Blood samples were collected from 30 individuals selected from Anatolian Black cattle raised in Eskişehir and Antalya provinces. Genomic DNA was isolated from blood samples using the procedure described by Miller (1988). In this study 20 microsatellite loci recommended by FAO for cattle genetic characterization studies, were used. 20 different microsatellite loci were amplified using PCR method and checked using agarose gel method. Otomatic capillar fragment analysis device (Advanced Analytical Technologies-AATI, Iowa, USA) was used in order to determine the size of PCR fragments amplified successfully and obtained datas were saved in electronic media in order to be used for stastistical programs.

Results

In this study, parameters such as number of alleles (Na), number of effective number of alleles, observed heterozygosity (Ho), expected heterozygosity and inbreeding coefficient were calculated. A total of 170 alleles were detected across 20 microsatellite loci in Anatolian Black cattle. The number of alleles per locus ranged from 5 (TGLA227) to 14 (ETH185), with a mean of 8.450. The number of effective allels per locus ranged from 2.639 (TGLA227) to 9.324 (ETH185), with a mean of 4.876.

The observed heterozygosity across loci varied from 0.300 (DRBP1 and ILSTS005) to 1.000 (BM6444, ILSTS011, ILSTS087, SPS113 and TGLA227), while the expected heterozygosity across loci varied from 0.583 (DRBP1) to 0.910 (ETH185).

The average observed and expected heterozygosity were calculated as 0.680 and 0.778, respectively. The inbreeding coeeficient across loci ranged from -0.599 (TGLA227) to 0.569 (ILSTS005), with a mean of 0.128.

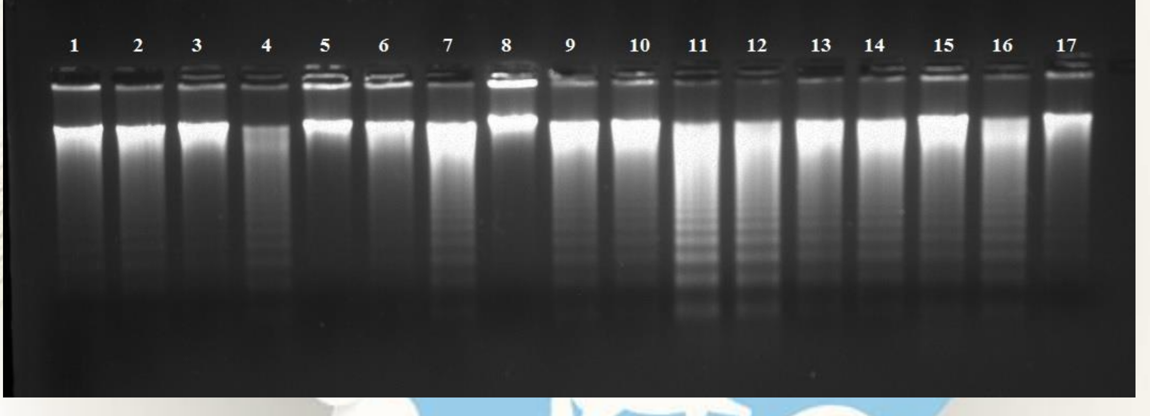

Figure 1: Result of DNA isolation from blood cells

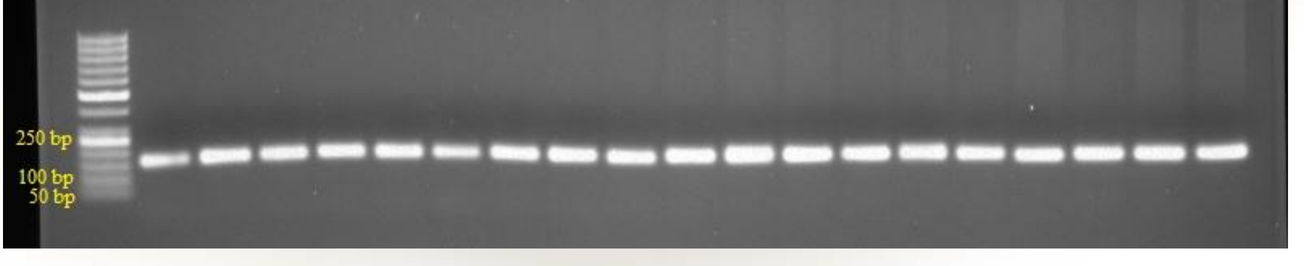

Figure 2: Result of PCR fragments of BM6444 locus on agarose gel

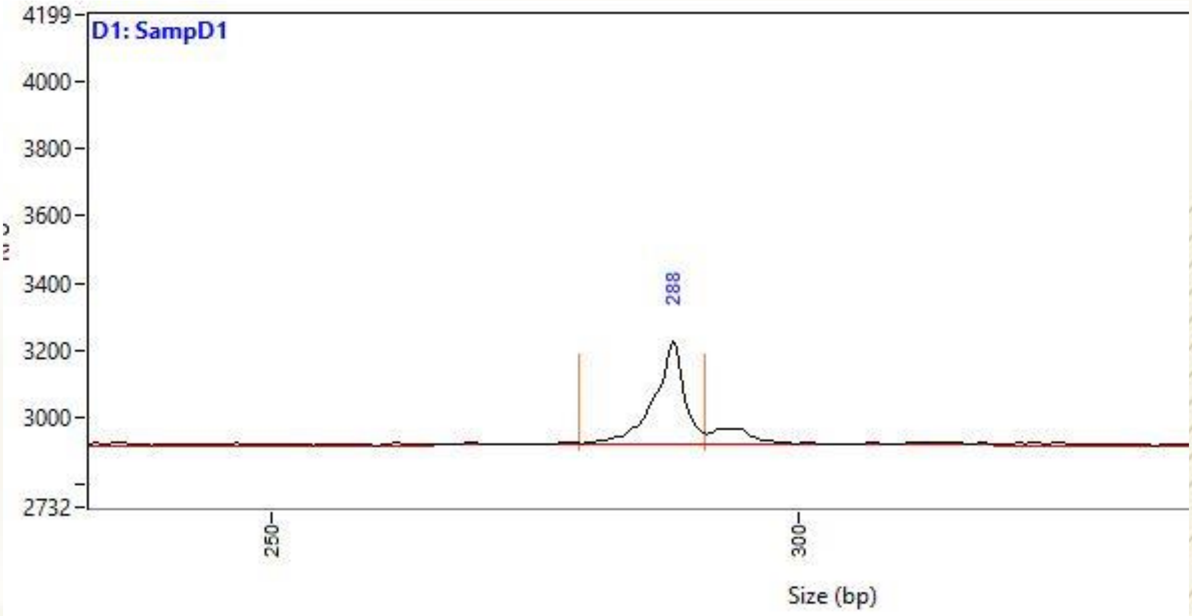

Figure 3: Result of ILSTS006 microsatellite locus on fragment analysis

Table 1: Allele number and size, Observed and expected heterozygosity, Within population inbreeding estimates in Anatolian Black cattle population

Locus	Observed alleles (n_a)	Effective number of alleles (n_e)	Allele size	Heterozygosity		F_{IS}
				H_o	H_e	
BM6444	10	5.488	144-162	1.000	0.832	-0.207
CSRM60	11	6.040	88-112	0.867	0.849	-0.022
CSSM66	9	5.444	174-190	0.679	0.831	0.186
DRBP1	5	2.341	226-234	0.300	0.583	0.489
ETH3	8	4.946	108-126	0.357	0.812	0.565
ETH185	14	9.324	204-236	0.539	0.910	0.413
HAUT24	8	4.663	108-128	0.567	0.799	0.294
HEL1	7	4.712	108-120	0.933	0.801	-0.168
ILSTS005	6	3.103	178-192	0.300	0.689	0.569
ILSTS006	7	4.678	282-296	0.615	0.802	0.236
ILSTS011	10	8.036	264-282	1.000	0.890	-0.125
ILSTS087	7	3.358	119-137	1.000	0.714	-0.410
INRA032	9	5.114	174-204	0.900	0.818	-0.102
INRA037	8	5.189	116-136	0.370	0.823	0.554
INRA063	9	5.769	173-189	0.733	0.841	0.130
INRABERN172	7	2.442	236-250	0.433	0.601	0.282
MM12	8	3.799	114-132	0.440	0.752	0.420
SPS113	12	7.143	140-164	1.000	0.875	-0.146
SPS115	9	3.303	242-258	0.567	0.709	0.204
TGLA227	5	2.639	44-68	1.000	0.632	-0.599
Mean	8.450	4.876	-	0.680	0.778	0.128

Conclusion

Özkan (2005) and Özşensoy (2011) reported mean number of alleles per locus 10.286-10.600, respectively in Anatolian Black cattle. Observed and expected heterozygosity was found 0.735-0.811, respectively by Özkan (2005) and 0.761-0.803, respectively by Özşensoy. Mean of inbreeding coefficient in Anatolian Black cattle was found 0.095 by Özkan (2005) and 0.063 by Özzşensoy (2011).

In this study, low genetic diversity and high inbreeding coefficient were detected in Anatolian Black compared to other two studies. These findings could be attributed to decreasing in population size of Anatolian Black cattle day by day.

Acknowledgements

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Determination of genetic diversity in Turkish Grey Steppe Cattle raised in Turkey using Microsatellite Marker Method

E. Demir, M.S. Balcioğlu
Department of Animal Science, Faculty of Agriculture, Akdeniz University, Antalya, TR

Introduction

Cattle, an animal species which could be raised almost everywhere in the world, have an important role for communities to supply with beef and milk. Cattle breeding has a great important for Turkey as other countries in the world. In Turkey, cattle breeds such as Holstein and Simmental which have high yield capacity are raised for beef and milk production. It is known that Turkish native cattle breeds are resistant to climate and diseases of the region even thouhg their contribution to beef and milk production are less. Turkish Grey Steppe cattle which is raised in Aegean and Marmara regions of Turkey makes a contriution to world animal genetic resources. In the past 30 years, it has seen a dramatic decrease in the population size of native cattle breeds due to preferring high yield cattle breeds than native cattle breeds by breeders. As a result, some of native cattle breeds of Turkey have extincted while rest of them are under risk of extinction (Ertuğrul vd. 2015). It is tough that decreasing in population size of Turkish Grey Steppe cattle causes decreasing in genetic diversity too. In this study, it is aimed to evaluate the genetic diversity and population structure of Turkish Grey Steppe cattle using microsatellite markers.

Materials and methods

Blood samples were collected from 30 individuals selected from Turkish Grey Steppe cattle raised in Dursunbey and Burhaniye districts of Balıkesir province. Genomic DNA was isolated from blood samples using the procedure described by Miller (1988). In this study 20 microsatellite loci recommended by FAO for cattle genetic characterization studies, were used. 20 different microsatellite loci were amplified using PCR method and checked using agarose gel method. Otomatic capillar fragment analysis device (Advanced Analytical Technologies-AATI, Iowa, USA) was used in order to determine the size of PCR fragments amplified successfully and obtained datas were saved in electronic media in order to be used for stastistical programs.

Results

In this study, parameters such as number of alleles (n_a), number of effective number of alleles (n_e), observed heterozygosity (H_o), expected heterozygosity (H_e) and inbreeding coefficient (F_{IS}) were calculated. A total of 159 alleles were detected across 20 microsatellite loci in Turkish Grey Steppe cattle.

The number of alleles per locus ranged from 4 (INRA037 and TGLA227) to 13 (INRA032 and SPS113), with a mean of 7.950. The number of effective allels per locus ranged from 2.149 (ETH3) to 8.182 (SPS113), with a mean of 4.904. The observed heterozygosity across loci varied from 0.143 (INRA037) to 1.000 (TGLA227), while the expected heterozygosity across loci varied from 0.549 (ETH3) to 0.893 (SPS113). The average observed and expected heterozygosity were calculated as 0.613 and 0.733, respectively. The inbreeding coeeficient across loci ranged from -0.491 (TGLA227) to 0.781 (INRA037), with a mean of 0.216.

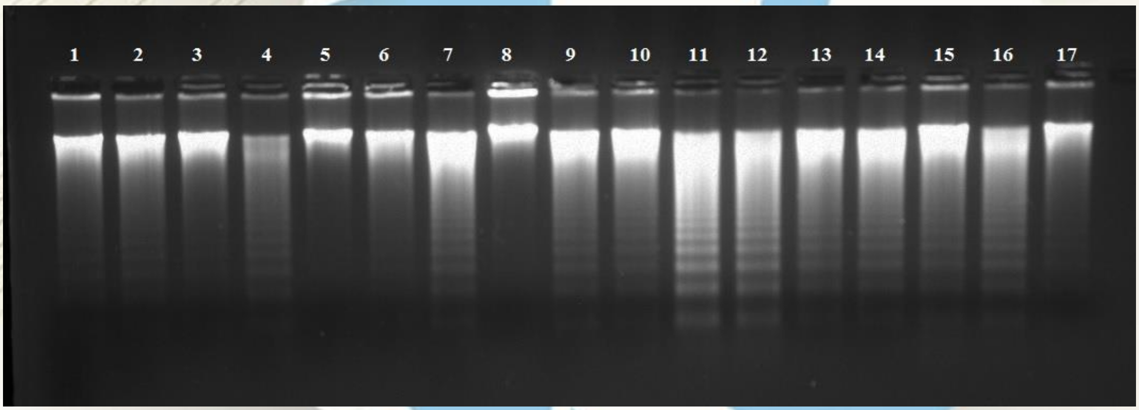

Figure 1: Result of DNA isolation from blood cells

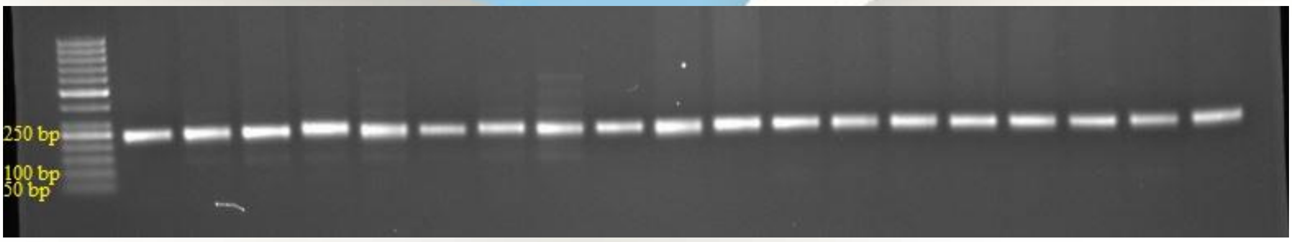

Figure 2: Result of PCR fragments of ETH185 microsatellite locus on agarose gel

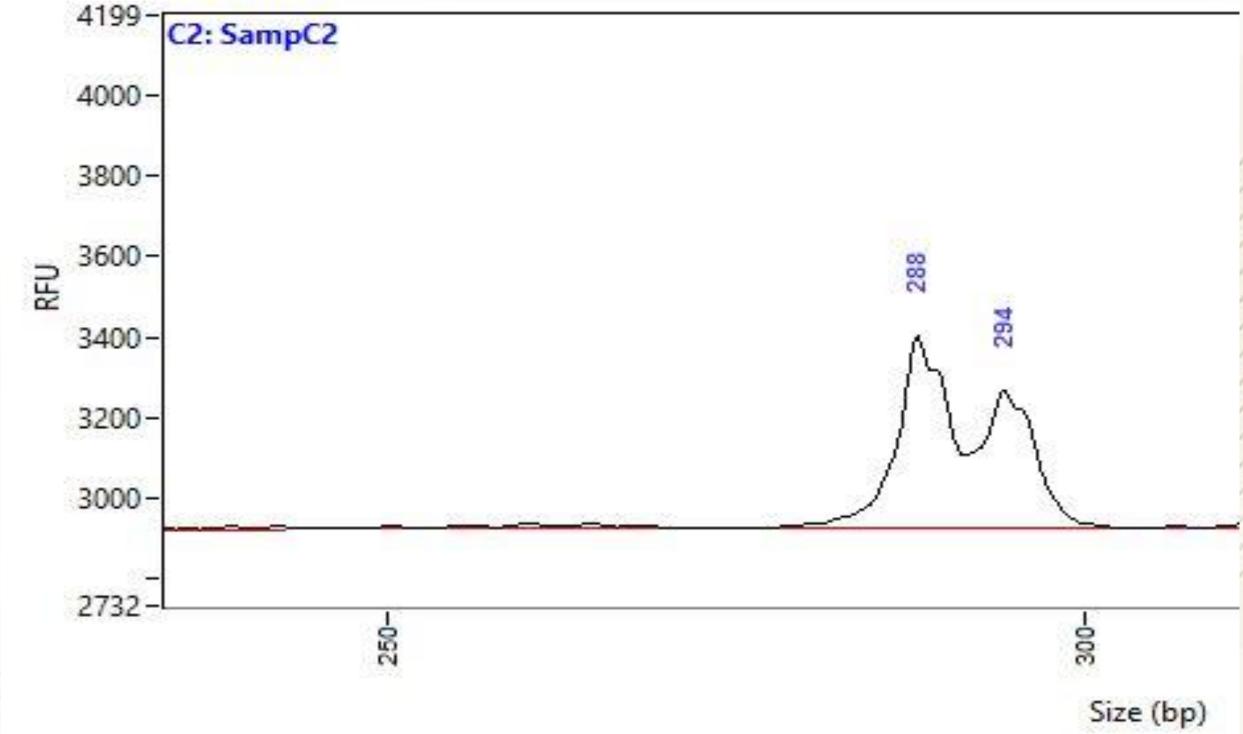

Figure 3: Result of ILSTS006 microsatellite locus on fragment analysis

Table 1: Allele number and size, Observed and expected heterozygosity, Within population inbreeding estimates in Turkish Grey Steppe cattle population

Locus	Observed alleles (n_a)	Effective number of alleles (n_e)	Allele size	Heterozygosity		F_{IS}
				H_o	H_e	
BM6444	8	2.908	144-158	0.867	0.667	-0.355
CSRM60	8	6.072	90-104	0.483	0.850	0.436
CSSM66	9	6.025	174-190	0.482	0.850	0.438
DRBP1	5	3.696	226-334	0.567	0.742	0.239
ETH3	6	2.149	104-122	0.421	0.549	0.238
ETH185	11	6.701	206-240	0.429	0.866	0.510
HAUT24	8	5.597	110-128	0.579	0.844	0.320
HEL1	8	5.069	108-122	0.810	0.822	0.016
ILSTS005	7	4.760	176-192	0.625	0.807	0.229
ILSTS006	9	5.851	282-298	0.500	0.844	0.412
ILSTS011	9	7.200	266-282	0.933	0.876	-0.067
ILSTS087	8	3.214	119-135	0.800	0.701	-0.145
INRA032	13	8.055	160-204	0.963	0.892	-0.081
INRA037	4	2.562	122-128	0.143	0.632	0.781
INRA063	8	4.724	175-189	0.667	0.802	0.171
INRABERN172	6	3.468	236-250	0.500	0.724	0.313
MM12	5	2.947	116-130	0.214	0.685	0.695
SPS113	13	8.182	140-166	0.633	0.893	0.294
SPS115	10	5.923	240-258	0.655	0.846	0.228
TGLA227	4	2.985	48-68	1.000	0.676	-0.491
Mean	7.950	4.904	-	0.613	0.778	0.216

Conclusion

Özkan (2005) and Özşensoy (2011) reported mean number of alleles per locus 10.286-9.90, respectively in Turkish Grey Steppe cattle. Observed and expected heterozygosity was found 0.682-0.775, respectively by Özkan (2005) and 0.691-0.767, respectively by Özşensoy. Mean of inbreeding coefficient in Turkish Grey Steppe cattle was found 0.119 by Özkan (2005) and 0.110 by Özzşensoy (2011).

In this study, low genetic diversity and high inbreeding coefficient were detected in Turkish Grey Steppe compared to other two studies. It is tought that this situation have resulted from decreasing in population size of Turkish Grey Steppe cattle day by day.

Acknowledgements

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Feed Fermentation in Poultry Nutrition

E. Güngör, A. Altop, G. Erener
Department of Animal Science, Faculty of Agriculture, Ondokuz Mayis University, Samsun, Turkey

Fermentation has been used recently in poultry nutrition due to having great potential. It can improve the nutritional composition of feedstuffs, eliminate antinutritional components, enrich with enzymes, phenolic compounds and coloring agents. Fermented feedstuffs can increase performance, feed utilization, digestibility, immunity, antioxidant capacity, intestinal microflora in poultry. Improvements of feedstuffs by fermentation and effects of fermented feedstuffs on poultry are summarized in this study.

Introduction

Fermentation has been carried out traditionally for many years. It has received great interest from researchers for detoxification and biotransformation of agricultural residues. Fermentation may be divided into liquid-state and solid-state fermentation. Solid-state fermentation is preferred to liquid state fermentation in bioconversion of agricultural residues because of the being economical and having relatively less risk of contamination (Pérez-Guerra et al., 2003). Solid state fermentation (SSF) is defined as a microorganism activity on moist solid substance in absence of free water (Van de Lagemaat and Pyle, 2001). The low moisture content allows only a limited number of microorganisms to use in fermentation, mainly yeast and fungi and some bacteria. Agricultural residues are produced in vast amounts (Wang et al., 2015b) and increased about 5-10% annually worldwide (Wang et al., 2015a), which pose a disposal problem. These wastes can be used in animal nutrition. In recent years, fermentation has been used to utilize the agricultural residues. It can improve the nutritional quality of feedstuffs, eliminate antinutritional components, provide enzyme, phenolic compounds, organic acid and coloring pigments. Fermented feedstuffs can improve performance, feed utilization, digestibility, antioxidant capacity, intestinal microflora and morphology in poultry.

1.Nutritional enrichment It is crucial to meet the nutritional requirement of animal for taking desired yield and animal products. Balanced diet is only be made with feedstuffs having high nutritional quality. But it increases nutrition cost since prices of quality feedstuffs is high. Agricultural wastes can be made quality feedstuff through the fermentation process. Fermentation, generally, increase protein and decrease cellulotic components in the substrate (Table 1).

Table 1. Nutritional enrichment in agricultural wastes through solid state fermentation

Microorganisms	Substrates	CP	EE	Ash	NFE	CF	NDF	ADF	References
Aspergillus niger	Sour cherry kernel	+	+	+	-	-	-	-	Güngör (2018)
Aspergillus niger	Sour cherry kernel	+	=	+	-	=	=	+	Güngör et al. (2017)
Aspergillus niger	Grape seed	+	+	-	-	-	-	-	Altop et al. (2017a)
Aspergillus niger	Olive leave	+	+	+	=	-			Altop et al. (2017b)
Bacillus amyloliquefaciens	Rice bean	+				-			Supriyati et al. (2015)
Candida utilis and Aspergillus niger	Ginkgo biloba leaves	+							Zhang et al. (2015)
Aspergillus niger	Pine needle	+							Wu et al. (2015)
Trichoderma pseudokoningii (ATCC 26801)	Cassava	+							Bayitse et al. (2015)
Laminaria digitata	Seaweed	+							Hou et al. (2015)
Bacillus amyloliquefaciens	Rice bran	+	-	+					Supriyati et al. (2015)
Saccharomyces cerevisiae	Cassava	+							Boonnop et al. (2009)
Rhizopus stolonifer	Palm kernel cake, cassava peel and cocoa pod husk	+	-	+		-			Lateef et al. (2008)
Candida utilis ATCC 9256	Patato waste	+							Gélinas and Barrette (2007)
Aspergillus niger	Palm kernel	+	=			-			Iluyemi et al. (2006)
Aspergillus oryzae MTCC 1846	Rice bran	+							Rudravaram et al. (2006)
Saccharomyces cerevisiae	Cactus pear	+							Araújo et al. (2005)
Neurospora sitophila	Sugar beet pulp, wheat bran and citrus waste	+				-			Shojaosadati et al. (1999)

2. Eliminating antinutritional components Plants contain some components that harm animals such as tannin, gossypol, lectin, trypsin inhibitors etc., which is defined as antinutritional factors (Soetan and Oyewole, 2009).

They decreased nutrient digestibility, showed toxic effect and suppressed growth in animal (Etuk et al., 2012). Many antinutritional factors in agricultural residues such as tannin, phytic acid, HCN acid, lectin and gossypol can be eliminated by solid-state fermentation (Table 2).

Table 2. Elimination of antinutritional factors through solid state fermentation

Microorganisms	Substrates	Antinutritional factors	References
Lactobacillus salivarius	Canola meal	Decreased total glucosinolate	Ahmed et al. (2014)
Aspergillus niger	Cherry kernel	Amygdalin	Chang and Zhang (2012)
Saccharomyces cerevisiae	Cassava	Decreased HCN acid	Boonnop et al. (2009)
Lactobacillus sp. and yeast	Groundnut	Tannin and trypsin inhibitor	Mbata et al. (2009)
Aspergillus niger	Shea nut meal	Hydrolysable tannin	Dei et al. (2008a)
Aspergillus niger and Ceriporiopsis subvermispora	Shea nut meal	Saponin and hydrolysable tannin	Dei et al. (2008b)
Rhizopus stolonifer	Cassava peel	Cyanide	Lateef et al. (2008)
Aspergillus niger	Cottonseed meal	Decreased gossypol	Zhang et al. (2006)
Lactobacillus plantarum	Bean	Chymotrypsin inhibitor and lectin	Martín-Cabrejas et al. (2004)
Lactobacillus acidophilus	Sesame seed meal	Tannin and phytic acid	Mukhopadhyay and Ray (1999)

3. Enzyme production Poultry can not utilize nutrients in the feedstuffs like ruminants because they have not ability to produce some enzymes that break down fibrinolytic compounds. Exogenous enzymes can be used for increasing FCR and taking more animal product by less feedstuff. Plenty of enzymes such as cellulase, xylanase, phytase, lipase and protease can be produced by fermentation (Table 3)

4. Production of phenolic compounds Plants include great numbers of phenolic compounds having antioxidant effect. Antioxidants protect organisms from oxidative stress caused by free radicals. Actually, free radicals are unstable electrons taking action in immune system by killing photogen microorganism and occurring naturally with metabolic reactions in the body (Surai, 2016). It can damage all biological materials such as DNA, protein, lipid and carbohydrate because of being unstable form.

In animal nutrition, phenolic compounds can be used to prevent oxidative deterioration of feed and to protect animal from oxidative stress. However, phenolic compounds are used at a limited level because of being very expensive products (Nolan and O'Connor, 2008). Many phenolic compounds such as catechin, caffeic acid, ellagic acid can be produced from agricultural residues by solid-state fermentation (Table 4).

However, there are some studies presenting a decrease in total soluble phenolics by fermentation (Dei et al., 2008a).

Table 4. Production phenolic compound with solid state fermentation

Microorganisms	Substrates	Compounds	References
Thamnidium elegans	Maize	Gallic acid	Salar et al. (2012)
Kluyveromyces marxianus	Soybean curd residue	Gallic acid	Rashad et al. (2011)
Bacillus pumilus	Soybean	Gallic acid	Cho et al. (2009)
Aspergillus niger	Creosote bush	Gallic acid	Ventura et al. (2009)
Bacillus subtilis	Soybean	Catechin	Juan and Chou (2010)
Bacillus subtilis	Lupinus angustifolious seed	Catechin	Fernandez-Orozco et al. (2008)
Trichoderma harzianum	Soybean seed	Genistin	Singh et al. (2010)
Aspergillus oryzae and Aspergillus awamori	Wheat	Total phenolics content	Bhanja et al. (2009)
Aspergillus niger	Tar bush	Pyrocatechol	Ventura et al. (2009)
Phanerochaete chrysosporium	Pistachio hulls	Caffeic acid	Abbasi et al. (2007)
Saccharomyces cerevisiae	Wheat bran	Ferulic acid	Moore et al. (2007)

5. Organic acid production Organic acids can be used in order to prevent microbiological deterioration of feed and to improve intestinal microflora in poultry. Microorganisms can produce organic acids such as citric acid, succinic acid, lactic acid, oxalic acid (Table 5).

6. Production color pigment Meat and egg yolk color are important factors affecting consumer preference in poultry production (Ofosu et al., 2010). Color pigments which can change product color desired way are produced by microorganisms (Table 6).

Effects of fermented feed on poultry Body weight, egg yield, FCR and nutrient digestibility can be increased by improving nutritional composition, eliminate antinutritional factors in feedstuff and producing enzymes by microorganisms. Producing phenolic compounds can increase antioxidant capacity and producing organic acid can improve intestinal microflora and morphology in poultry (Table 7).

It has been reported that body weight was increased by fermented products of soybean meal (Lee et al., 2010: Mathivanan et al., 2006) shea nut meal (Dei et al., 2008a: Dei et al., 2008b), garlic and onion by-products (Kang et al., 2010) and cherry kernel (Güngör, 2018) in broiler.

Table 3. Enzyme production through solid state fermentation

Microorganisms	Substrates	Enzymes	References
Candida utilis and Aspergillus niger	Ginkgo biloba leaves	Cellulase, hemicellulase, glucosidase	Zhang et al. (2015)
Aspergillus niger	Pine needle	Cellulase, hemicellulase, β-glucosidase	Wu et al. (2015)
Aspergillus niger	Rice rust, rice bran, whey and sugarcane bagasse	Cellulolytic enzymes	Rocha et al. (2013)
Neurospora sitophila	Wheat straw	Cellulase, β-xylosidase, endoglucanases	Li et al. (2013)
Rhizopus stolonifer JS-1008	Corncob	Xylanase	Zhang et al. (2013)
Bacillus subtilis NRC1aza	Starch	Levansucrase	Esawy et al. (2013)
Aspergillus heteromorphus MTCC 8818	Rosewood sawdust	Tannase	Beniwal et al. (2013)
Trichoderma harzianum	Castor oil cake and sugarcane bagasse	Lipase	Coradi et al. (2013)
Aspergillus fumigatus	Wheat straw	Exoglucanase	Mahmood et al. (2013)
Bacillus subtilis GXA-28	Soybean residue	Fibrinolytic enzyme	Zeng et al. (2013)
Aspergillus niger GS1	Corn pericarp	β-xylosidase	Díaz-Malváez et al. (2013)
Natural microflora	Soy fibre residues	Alkaline protease	Abraham et al. (2013)
Bacillus sp. KR-8104	Wheat bran	α-amylase	Hashemi et al. (2013): Hashemi et al. (2010)
Cladosporium sp.	Wheat bran	L-glutaminase	Jesuraj et al. (2013)
Aspergillus niger	Citrus peel	Phytase	Rodríguez-Fernández et al. (2013)
Aspergillus niger	Apple pomace	β-mannanase	Yin et al. (2013)
Pleurotus ostreatus	Sugarcane bagasse	Laccase	Karp et al. (2012)
Trichoderma koningii	Wheat bran and chitosan	Chitosanase	da Silva et al. (2012)
Oerskovia xanthineolytica	Wheat bran and chitosan	Chitinase	Waghmare et al. (2011)
Colletotrichum lindemuthianum	Shrimp shell chitin waste and wheat bran	Chitin deacetylase	Suresh et al. (2011)
Aspergillus oryzae MTCC 5341	Wheat bran	Acid protease	Vishwanatha et al. (2010)
Aspergillus foetidus MTCC 4898	Wheat bran	Xylanase	Chapla et al. (2010)
Thermomyces lanuginosus 195	Wheat bran	Xylanase	Gaffney et al. (2009)
Aspergillus caespitosus	Wheat bran	Invertase	Alegre et al. (2009)

Body weight gain was also increased by fermented Artemisia princeps (Kim et al., 2012), rice bran (Supriyati et al., 2015), cottonseed meal (Nie et al., 2015) and Ginkgo biloba leaves (Zhang et al., 2015).

Ginkgo biloba leaves also increased egg yield after fermentation (Zhao et al., 2013). In contrast, Dei et al. (2008a) reported a suppression on body weight in broiler with dietary inclusion of fermented shea nut.

Table 5. Organic acid production through solid state fermentation

Microorganisms	Substrates	Organic acids	References
Aspergillus niger NRRL 567	Apple pomace	Citric acid	Dhillon et al. (2013)
Aspergillus niger NRRL 567 and NRRL 2001	Apple pomace	Citric acid	Dhillon et al. (2011)
Aspergillus niger NRRL 567	Peat moss	Citric acid	Barrington et al. (2009)
Aspergillus niger	Banana peel	Citric acid	Karthikeyan and Sivakumar (2010)
Aspergillus niger NRRL 567 and NRRL 328	Orange and pineapple wastes	Citric acid	Kuforiji et al. (2010)
Aspergillus awamori, Aspergillus oryzae and Actinobacillus succinogenes	Wheat bran	Succinic acid	Du et al. (2008)
Aspergillus niger, Aspergillus awamori and Aspergillus oryzae	Wheat flour and bran	Succinic acid	Dorado et al. (2009)
Aspergillus awamori and Aspergillus oryzae	Waste bread	Succinic acid	Leung et al. (2012)
Lactobacillus strains	Pine needle	Lactic acid	Ghosh and Ghosh (2011)
Lactobacillus plantarum MTCC 6161	Tea waste	Lactic acid	Gowdhaman et al. (2012)
Lactobacillus plantarum MTCC 1407	Cassava residue	Lactic acid	Ray et al. (2009)
Phanerochaete chrysosporium	Straw	Oxalic acid	Li et al. (2011)

Table 6. Production of pigments with solid state fermentation

Microorganisms	Substrates	Pigments	References
Monascus purpureus CMU001	Cornmeal	Red	Nimnoi and Lumyong (2011)
M. sanguineus and M. purpureus MTCC410	Rice	Red	Dikshit and Tallapragada (2012)
Monascus purpureus KACC 42430	Corn cob	Red	Velmurugan et al. (2011)
Monasus ruber	Rice	Orange, yellow and red	Vidyalakshmi et al. (2010)
Monascus purpureus	Rice	Lovastatin	Panda et al. (2009)
Penicillium sp. NIOM-02	Wheat	Red	Dhale and Vijay-Raj (2009)
Rhodotorula glutinis DM 28	Rice bran	β-carotene	Roadjanakamolson and Suntornsuk (2010)
Monascus pilosus NBRC4520	Rice	Red-lovastatin	Tsukahara et al. (2009)

Feed conversion ratio (FCR) was improved through fermented soybean meal (Feng et al., 2007: Mathivanan et al., 2006), Ginkgo biloba leaves (Yu et al., 2015: Zhang et al., 2015), rice bran (Supriyati et al., 2015) and sour cherry kernel (Güngör, 2018) in broiler and improved by fermented soybean meal (Xu et al., 2012a) and Ginkgo biloba leaves (Zhao et al., 2013) in laying hen. Fermented products can increase Lactobacillus in broiler cecum (Güngör, 2018: Kang et al., 2010: Sun et al., 2013a: Sun et al., 2013b) and ileum (Kim et al., 2012: Sun et al., 2013a: Sun et al., 2013b: Zhang et al., 2015) and also laying hen ileum and cecum (Zhao et al., 2013). Bifidobacteria can be increased in laying hen ileum and cecum (Zhao et al., 2013). Fermented feedstuffs can also decrease pathogen microorganisms in intestine. E. coli was decreased in broiler ileum and cecum (Sun et al., 2013a: Sun et al., 2013b: Zhang et al., 2015) and laying hen ileum (Zhao et al., 2013). Moreover, Salmonella was decreased broiler ileum and cecum (Zhang et al., 2015: Zhao et al., 2013). Intestinal morphology can be also affected by fermented feedstuffs. They increased villus height of broiler duodenum (Xu et al., 2012b: Yu et al., 2015: Zhang et al., 2015), jejunum (Xu et al., 2012b: Zhang et al., 2015), ileum (Mathivanan et al., 2006), villus height of laying hen duodenum and jejunum (Xu et al., 2012a), villus width in broiler ileum (Mathivanan et al., 2006), decreased crypt depth of broiler jejunum (Zhang et al., 2015) and also increased villus height:crypt depth in broiler duodenum (Xu et al., 2012a: Yu et al., 2015), jejunum (Yu et al., 2015) and laying hen duodenum and jejunum (Xu et al., 2012a)

Protease and amylase activities were increased through the inclusion of fermented cottonseed meal (Sun et al., 2013a) and Ginkgo biloba leaves (Yu et al., 2015). Besides, Mathivanan et al. (2006) reported that fermented soybean meal increased lipase activity. These results suggest that fermented products can increase digestibility in poultry. Thus, fermented products increased digestibility of dry matter, crude protein, organic matter and ash in broiler (Güngör, 2018: Nie et al., 2015).

Improving immune response is necessary to prevent poultry diseases. Nutritional regulation can enhance the immunity (Kogut, 2017). Fermented feedstuffs increased IgG, IgM and IgA in broiler (Ao et al., 2011: Feng et al., 2007: Xu et al., 2012b), IgG, IgA in laying hen (Xu et al., 2012a) and IgG, IgM in duck (Fazhi et al., 2011).

Fermented feedstuffs can also affect mineral metabolism in poultry. Serum phosphorus level was increased in broiler (Feng et al., 2007: Xu et al., 2012b), laying hen (Xu et al., 2012a) and duck (Fazhi et al., 2011). It also increases serum Ca level in broiler (Xu et al., 2012b) and duck (Fazhi et al., 2011).

Decrease in serum urea nitrogen level may indicate increased protein availability (Yu et al., 2015). Fermented feedstuff decreased serum urea nitrogen in broiler (Feng et al., 2007: Xu et al., 2012b: Yu et al., 2015) and laying hen (Xu et al., 2012a). It can be said fermented feedstuffs can improve protein utilization in poultry. Lipid metabolism of poultry can be affected by fermented feedstuffs. It decreased cholesterol level in serum (Ao et al., 2011: Lee et al., 2010: Zhao et al., 2013) and egg yolk (Fujiwara et al., 2008: Yu et al., 2015: Zhao et al., 2013). It also decreased triglyceride in serum (Ao et al., 2011), liver (Nie et al., 2015) and egg yolk (Zhao et al., 2013).

Moreover, it has been reported a decrease in abdominal fat (Nie et al., 2015), egg yolk LDL and an increase in egg yolk HDL (Zhao et al., 2013). Fermentation can provide antioxidant effect to feedstuffs. Lateef et al. (2008) reported that fermentation increased radical scavenging activity of cassava peel. Malondialdehyde (MDA) in serum (Wu et al., 2015), liver (Wu et al., 2015), breast meat (Ao et al., 2011: Kim et al., 2012) and tight meat (Kim et al., 2012) were decreased by fermented products. SOD was increased in serum, liver (Wu et al., 2015), jejunum and ileum (Zhang et al., 2015). GSH was also increased in jejunum and ileum (Zhang et al., 2015).

While fermentation can provide color pigments to feedstuff (Roadjanakamolson and Suntornsuk, 2010), coloring effect on poultry products has not been seen in examined studies. Fermented soybean and garlic powder have been reported to have no effect on egg yolk color (Fujiwara et al., 2008: Lee et al., 2010) and breast meat color (Ao et al., 2011), respectively.

In conclusion, fermentation can be used to improve the nutritional quality of feedstuffs, eliminate antinutritional components and produce enzyme, phenolic compounds, organic acid and coloring pigments. These functions of fermentation can improve performance, FCR, nutrient digestibility, intestinal microflora, morphology and increase antioxidant capacity in poultry.

However, although fermentation can increase color pigment in feedstuff, there was no observed changes in product color. There is a need for detailed studies on this area to confirm the results of previous studies and illuminate future of the feed fermentation in poultry nutrition.

Table 7. Effect of fermented feeds on poultry

Animal	Microorganisms	Feed	Effect of the experiment	References
Broiler	Aspergillus niger	Sour cherry kernel	Increased BW Improved FCR Increased digestibility Higher Lactobacillus (cecum)	Güngör (2018)
Broiler	Bacillus amyloliquefaciens	Rice bran	Increased BWG Improved FCR	Supriyati et al. (2015)
Broiler	Candida tropicalis	Cottonseed meal	Increased BWG Increased digestibility (dry matter, crude protein, ash) Decreased abdominal fat and triglyceride (liver)	Nie et al. (2015)
Broiler	Candida utilis and Aspergillus niger	Ginkgo biloba leaves	Increased BWG Improved FCR Decreased MDA (liver) Higher SOD, GSH (jejunum and ileum) Higher villus height (duodenum and jejunum) Lower crypt depth (jejunum) Increased Lactobacillus spp. (ileum) Decreased E. coli and Salmonella (ileum and cecum)	Zhang et al. (2015)
Broiler	Aspergillus niger	Pine needle	Higher SOD (serum and liver) Higher antioxidant capacity Decreased MDA (serum and liver)	Wu et al. (2015)
Broiler	Bacillus subtilis var. natto and Bacillus licheniformis	Ginkgo biloba leaves	Improved FCR Higher protease and amylase Higher villus height (duodenum) Higher villus height:crypt depth (duodenum and jejunum) Decreased serum urea nitrogen	Yu et al. (2015)
Broiler	Bacillus subtilis BJ-1	Cottonseed meal	Higher Lactobacillus spp. (ileum and cecum) Lower E. Coli (ileum and cecum) Increased amylase and protease activity	Sun et al. (2013a) Sun et al. (2013b)
Broiler	Lactobacillus fermentum Bacillus subtilis	Rapeseed meal	Higher IgG, IgM, phosphorus and calcium Higher villus height (duodenum and jejunum) Higher villus height:crypt depth (jejunum) Decreased serum urea nitrogen	Xu et al. (2012b)
Broiler	Weissella koreensis	Garlic powder	Higher IgG (serum) Lower MDA (breast meat) Decreased cholesterol, triglyceride (serum)	Ao et al. (2011)
Broiler	Lactobacillus plantarum	Garlic and onion by-products	Increased BW Higher lactobacillus (cecum)	Kang et al. (2010)
Broiler	Monascus purpureus	Soybean	Increased BW Lower cholesterol (serum) and cook loss	Lee et al. (2010)

Broiler	Aspergillus niger and Ceriporiopsis subvermispora	Shea nut meal	Increased BW	Dei et al. (2008a): Dei et al. (2008b)
Broiler	Aspergillus niger	Soybean meal	Increased BW and improved FCR Increased villus height and width (ileum) Increased lipase activity	Mathivanan et al. (2006)
Broiler	Aspergillus oryzae	Soybean meal	Increased BW and improved FCR Higher IgA, IgM Higher plasma phosphorus level Decreased serum urea nitrogen	Feng et al. (2007)
Brown male chickens	Lactobacillus	Artemisia princeps	Increased BWG Decreased MDA (breast and thigh) Higher Lactobacillus spp. (ileum)	Kim et al. (2012)
Laying hen	Candida utilis and Aspergillus niger	Ginkgo biloba leaves	Increased egg yield Improved FCR Lower cholesterol, triglyceride, LDL (egg yolk) Increased HDL (egg yolk) Increased Lactobacillus spp. and Bifidobacteria (ileum and cecum) Decreased E. coli (ileum) Decreased Salmonella (ileum and cecum)	Zhao et al. (2013)
Laying hen	Bacillus licheniformis	Soybean meal	Improved FCR Higher IgA, IgG and phosphorus (serum) Higher villus height (duodenum and jejunum) Higher villus height: crypt depth (jejunum) Decreased serum urea nitrogen	Xu et al. (2012a)
Laying hen	Bacillus ligniformis	Soybean	Lower cholesterol (egg yolk)	Fujiwara et al. (2008)
Duck	Lactobacillus plantarum and Bacillus subtilis	Rapeseed meal	Higher IgG, IgM, total phosphorus and calcium (serum)	Fazhi et al. (2011)

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The Use of Turmeric (Curcuma longa) in Broiler Nutrition

F. Kırkpınar*, Ö. Işık**, S. Mert*

* Department of Animal Science, Faculty of Agriculture, Ege University, Bornova, İzmir, Turkey

** Ödemiş Training School, Ege University, Ödemiş, İzmir, Turkey

Introduction

It is important to increase the performance to the extent permitted by genotype and improve the health parameters of animals in broiler production. By prohibitation of the antibiotics, there is interest in medicinal and aromatic plants as alternatives in order to maintain both broiler's performance and health. One of these plants, turmeric (Curcuma longa) which belongs to the Zingiberaceae family, distributed troughout tropical and subtropical regions of the world (Araujo and Leon, 2001). The plant grows 1-1.5 meter has funnel shaped flowers and yellow colored rhizomes. The turmeric rhizomes used as a spice or coloring and flavoring agent in several foods such as curry and mustard. It is also used medicinal areas due to its active chemicals.

Turmeric rhizomes contains 69.4% carbohydrates, 63% protein, 5.1% fat, 3.5% minerals and 13.1% moisture (Nasri et al, 2014). The active compounds found in turmeric are curcumin, demethoxcurcumin, bisdemethoxycurcumin and tetrahydrocurcuminoids (Oswa et al, 1995; Al-Kassie et al, 2011). These chemicals are called curcuminoids and turmeric contains 2-9% them depending on its origin and the soil conditions (Priyadarsini, 2014). Curcumin (diferuloylmethane) is major compound of turmeric rhizome and it gives the characteristic yellow color (Khan et al, 2012). Besides curcuminoids, turmeric rhizomes contains volatile oils such as aromatic turmerone, atlantone, zingibarone (Jurenka, 2009). The level of all these phyto-active chemicals in turmeric rhizomes may vary depending on the turmeric species, rearing conditions or preparation methods. Also curcumin highly sensitive to light, heat (pelleting heat has importance at this point) and pH (Gowda et al, 2009).

Due to its active compounds turmeric has been the subject of health studies conducted in recent years. Curcumin has shown to have anti-inflammatory, antioxidant, anticarcinogenic, antimutagenic, anticoagulant, antidiabetic, antibacterial, antifungal, anti protozoal, antiviral, antifibrotic, antivenom, antiulcer, hypotensive and hypocholesterolemic activities (Basavaraj et al, 2010). This review included researches on the use of turmeric in broilers and the results of these have been reasonably discussed.

The Use of Turmeric in Broiler Nutrition There are many studies generally aimed that the benefical effects of turmeric on performance and health of broiler.

Durrani et al, (2006), reported that the use of turmeric at the level of 0.5% in broiler feed, increased body weight gain, breast weight, thigh weight, decreased feed intake and improved feed conversation ratio in both starter and finisher phase. Besides these results, they found that level of 0.5% turmeric stimulate protein synthesis and gives highest thigh and breast weight. It has seen in this research, the using of turmeric in broiler feeds gives lowest cost per kg of feed relatives to these functional activities.

It is shown that a mixture of turmeric and cumin at levels of 0.75% and 1% in the diets improved body weight gain, feed intake and feed conversion ratio (Al-Kassie et al, 2011). Al-Sultan (2003) shown that the use of 0.5% turmeric powder in broilers feed gives highest body weight gain, best feed conversion ratio result. These levels increased both erythrotic and total leukocytic count. In addition to these results 1% turmeric group gives lowest fat percentage and 0.5-0.25% groups followed. However, Emadi and Kermanshahi (2007) reported that turmeric supplemented diets have no significant effect on body weight gain, feed consumption and feed conversion ratio of broilers. Likewise, supplementetion of turmeric powder (0.1-0.2%) in broiler diets has no effect on body weight gain, feed consumption, feed conversion ratio and carcass yields (Mehala and Moorthy, 2008). These differences may be depend on supplementation dose or ingredients of turmeric.

Coccidiosis is a protozoal disease that caused increase mortality and economic losses in poultry production. Anticoccidial drugs use in poultry feed for the preventing this disease. However, some researches shown that turmeric may prevent coccidiosis. Abbas et al (2010), found that addition 3% turmeric powder in Eimeria oocysts contaminated feed have maximum coccidiostatic effect in broiler as well as 12 g/50 kg salinomycin sodium (a coccidiostatic chemical) supplemented feed. Lee et al (2010), reported that a turmeric contained mixture in Eimeria acervulina contaminated diet reduced oocysts count in feces when compared with control group. Candra and Putri (2013), fed Eimeria maxima-infected broilers with 360 ppm turmeric extract supplemented diets. They reported that turmeric supplementation decrease mortality caused by Eimeria maxima infection.

Reactive oxygens or free radicals are specific molecules, atoms or compounds that damages macromolecules such as DNA, lipid, proteins and carbohydrates in animal body.

It is cause to preventing natural metabolism reactions and have negative effect on immune system (Surai, 2002). Curcumin may reduce the reactive oxygens level and increases the antioxidant enzymes levels.

Ahmadi (2010) reported that catalase and superoxide dismutase level significantly increased with 0.3 and 0.6% turmeric supplementation in broiler chicks and reduced melanodialdehyde level. In another study, the supplementation 90 ppm curcumin decrease the malondialdehyde levels in broiler (Suvanated, 2003). The basal diet supplemented with 74 mg/kg curcumin prevented or reduced the effects of aflatoxin in chicks fed aflotoxin-contaminated diets (Yarru et al, 2009). In the same experiment researchers found that curcumin have possitive effects on hepatic superoxide dismutase and glutathione peroxidase levels. Gowda et al (2009), fed the broilers with curcuminoids (74, 222, 444 ppm) and aflatoxin B1 (1 ppm) supplemented diets. They found that addition of 222 ppm curcuminoids demonstrated maximum antioxidant effect againts advers effects of aflatoxin B1. In the same experiment, the birds that fed with 444 ppm curcuminoid suplemented diets have poor performance cause of high concentations of curcuminoids pro-oxidant effects.

The performance parameters of broilers closely related to birds health status. It has been determined some hematological effects of turmeric rhizome powder on broilers.

These effects have increased total cholesterol, high-density lipoprotein and heamoglobin but decreased low-density lipoprotein, very-low-density lipoprotein, red blood cells and blood albumin (Emadi et al, 2007). Emadi and Kermanshahi (2007), concluded that aspartate aminotransaminase, alanine aminotransaminase, lactate dehydrogenase and alkaline phosphatase the higher level of which is related to liver toxicity, decreased significantly in broiler chicks fed supplemented with 0.25-0.75% turmeric.

Conclusions

When we investigated the researches about turmeric (Curcuma longa) has a benefical effects on broiler performance due to its antioxidant, antihepatoxicitic, immunomodulatory and anticoccidial effects. These activities may be according to the possitive effect on relative gene expressions or direct role of these compouns in metabolism. It is seen that the usage rate of turmeric is generally 0.5%. It is needed to more research for its economy, limitation amount and mode of action.

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The Use of Hemp Seed (Cannabis sativa) in Poultry Feed

F. Kırkpınar*, S. Mert*, Ö. Işık**

* Department of Animal Science, Faculty of Agriculture, Ege University, Bornova, İzmir, Turkey

** Ödemiş Training School, Ege University, Ödemiş, İzmir, Turkey

Introduction

Hemp (Cannabis sativa L.) is an annual herbaceous plant belonging to Cannabinaceae family known to have played a historically important role in food, fiber and medicine production (Russo and Reggiani, 2015). It commonly referred to as hemp, is a widely cultivated plant of industrial importance, as a source of whole seed, hulled seed, seed meal, oil and fibre (Callaway, 2004). Hemp is a dioecious plant that has 0.5-6 m length. It grows at rainy, warm and high relative humidity locations (Baydar, 2016). The female hemps has a narcotic compound named Δ9-tetrahydrocannabinol (THC) in their resin. Related this chemical, hemp cultivation has restricted in EU as well as Turkey. Because of the legal status of hemp in many countries, the scientific literature has little mention of its use in animal feeds (Silversides and Lefrançois, 2005). Therefore, new low level THC (0.1-0.3%) varieties of Cannabis sativa have been developed in some countries (e.g. Canada, China, France) for industrial purposes (Wang et al, 2008). In Iran, Pakistan and Turkey salty roasted hempseeds still sold by herbal stores for a snack and it also used as a bird feed (e.g. canary, pigions) during mating period to increase stamina of male birds (Karimi and Hayatghaibi, 2006).

Approximately 65-70% of the total costs of an enterprise in poultry production constitute the feed cost (Kutlu, 2015). Corn-soy based diets are usually used in poultry feeding. In order to meet the high energy and protein needs of birds, alternative raw materials were sought for conventional raw materials. This may be related the anti-nutritional factors in conventional raw materials or the high costs and the limitations of use.

Hemp seed protein is free of trypsin inhibitors and oligosaccharides which be found in soybeans (Eriksson and Wall, 2012; Stastnik et al., 2015). Hemp seed (whole, meal or cake) is an alternative protein and other nutrients (fatty acids, phenolic matter and energy) resource to traditional feedstuff such as soybean, maize gluten, potato protein and fish meal. The typical contents of hemp seed is given at Table 1. This review inculuded that some researches about the use of hemp seed in poultry feed.

Table 1. Typical contents of hemp seed (Callaway, 2004).

Contents (%)	Whole seed	Seed meal
Moisture	6.5	5.6
Ash	5.6	7.2
Protein	24.8	33.5
Oil	35.5	11.1
Some fatty acids in hemp seed oil (%)		
Polyunsaturated fatty acid (PUFA)	84	-
Palmitic acid	5	-
Oleic acid	9	-
Stearic acid	2	-
Linoleic asid	56	-
α-Linolenic asid	22	-
n6/n3 ratio	2.5	-
Some essential amino acids in hemp seed (%)		
Histidine	0.71	-
Isoleucine	0.98	-
Leucine	1.72	-
Phenylalanine	1.17	-
Threonine	0.88	-
Valine	1.28	
Lysine	1.03	-
Methionine	0.58	-
Tryptophan	0.20	-
Some vitamins and minerals in hemp seed (mg/100g)		
Vitamin E	90.0	-
Thiamie (B1)	0.4	-
Riboflavin (B2)	0.1	-
Phosphorous	1160	-
Potassium	859	-
Magnesium	483	-
Calcium	145	-
Iron	14	-
Manganese	7	-
Zinc	7	-
Copper	2	-

The Use of Hemp Seed in Poultry Feed Hemp seeds can be utilized as a good source of protein for poultry due to its high-quality storage proteins edestin and albumin that easily digested and contain essential amino acids (Callaway, 2004). Khan et al. (2010) fed 160 day-old broiler chicks with basal diet and basal diet+hemp seed (5, 10 and 20%). They found that 20% hemp seeds in broiler diets increased body weight gain, decreased feed/intake, correspondingly feed conversation ratio was improved.

In addition these results hemp seed has positive effect on carcass quality and decrease mortality and productive cost. In another study, Stastnik et al. (2015), added 5% and 15% hemp seed cake to broiler feed. In their study, it was found that 15% of hemp seed cake additions had negative effects on live weight and this group gave the worst feed conversion ratio and it no significant effect on carcass yield. There are some limitations and prohibitations in organic poultry nutrition. For example, solvent-extracted oil seed meals, animal origin protein sources and synthetic essential amino acids are prohibbitted in many countries as well as Turkey. Hemp seed may be used as an alternative source of protein in organic poultry feed with its rich nutrient content. Thus, Eriksson and Wall (2012), added hemp seed cake in organic broiler diets (10% in starter and 20% in grower diets). In this study they found that there were no differences in production performance, mortality and microbiological measures of carcass between control and hemp seed cake group. Kalmendal (2008) stated that 10, 20 and 30% addition of the hemp seed cake in broiler feeds has no significant difference on production performance. However, it has negative effect on dry matter digestibility due to high proportion of fibrous material. This effect can be prevented by dehulling proces. In a study, it was determined that feeds containing whole hemp seed (75 g/kg hemp seeds with 1 g/kg dextran oligosaccarides) was decreased blood serum lipid levels without any negative effects on performance parameters in broilers (Mahmoudi et al, 2015). This result could be caused of fatty acid profile of hemp seed.

Silversides and Lefrançois (2005), fed 43 week-old layer hens with hemp seed meal containing diets (0, 50, 100 and 200 g/kg). They found that there are no differences between groups for egg production, feed consumption, feed efficiency, body weight and egg quality. In addition these results, palmitic acid concentration of eggs reduced and α-linoleic acid concentration of egg increase linearly with level of hemp seed meal in diet. This results seems promising for functional egg production. Konca et al (2014), reported that japanese quails fed added 10 and 20% hemp seed diet given no significant effects on performance values and blood parameters. However, in the same treatment the omega-3 fatty acid content of eggs increased linearly with increasing dietary hemp seed content in the diet.

Conclusions

Hemp seed has good nutrition value for poultry and it can be added in different forms (whole seed or hemp seed cake/meal) in feeds. However, it may be contained fibrous material. Depending on this situation it can reduce the digestibility of other nutrients.

In addition these, hemp seed can possitive effects on the blood or egg lipid profile. Hemp seed can use in poultry feed but studies are needed to determine the amount and forms of hemp seeds used.

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In vitro dry matter digestibility of wheat straw silage inoculated by Lactococcus lactis M1363 and Streptococcus thermophilus strains

S. Yaman[1], V. Karakaş[2], E. Ünay[2]

[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Animal Production and [2]Technologies Department, 51240, Niğde, Turkey

International Center for Livestock Research and Training, 6852 Ankara, Turkey

Introduction

Wheat straw has a potentially important fodder crop. Therefore it has a serious potential to be subjected to preliminary degradation by treatment with fibrolytic enzymes or inoculated by lactic acid bacteria (LAB) which have been acquired fibrolytic properties prior to being fed to animals with a silage-like method.

Materials and methods

Lactococcus lactis and Streptococcus thermophilus strains were inoculated in the concentration of 2×10^7 CFU / g DM by spraying to wheat straw which has been chopped in 3 cm and soaked with water to be 35% DM and 10% sugar beet molasses added. Wheat silages were prepared in 2 L jars in the laboratory. LABs in deionized water with the concentration mentioned before were sprayed on chopped straw. Tthe control group was sprayed with water equal to the amount of deionized water applied to each silage LAB treated groups. Control and treatment groups were run as 10 replications. Before ensilage and 70 days after ensiling when the jars opened, samples were taken and DM, Ash, EE, CP, NDF, ADF and ADL analysis were made according to AOAC,1990. In vitro NDF digestibility of control and inoculated silages was determined by ANKOM Daisy incubator at the incubation times reported in NRC 2001 (24, 48 hours), as described by Goering and Van Soest et al.,1991.

Results

Chemical analysis of control group and inoculated wheat straw silages with Lactococcus lactis and Streptococcus thermophilus strains are as shown in Table 1. In vitro dry matter digestibility of control group and inoculated wheat straw silages with Lactococcus lactis and Streptococcus thermophilus strains are as shown in Table 2.

When the silages opened air dry matter content of inoculated silages are significantly different than the control silage. Ether extract, crude protein and ADF contents are not different between inoculated and control groups. Nötr detergent unsoluble fiber (NDF) and acid detergent unsoluble fiber (ADF) contents of WSS+L were significantly different than the control and WSS+S. Both 24 and 48 hours of in vitro dry matter digestibilities inoculated wheat straws (WSS+ L; WSS+ S) were significantly higher than control silage (WSS)

Table 1. Chemical anlysis of control group and inoculated wheat straw silages with Lactococcus lactis and Streptococcus thermophilus strains

Material	ADM	DM	100 % DM					
			Ash	EE	CP	NDF	ADF	ADL
Wheat straw		94,20	5,36	1,14	3,20	80,32	49,9	7,38
Silages								
WSS	36,78±0,176a	94,30±0,100a	5,75±0,017a	1,03±0,037	3,50±0,056	77,49±0,280a	49,18±0,201a	7,10±0,137
WSS+ L	35,28±0,249b	94,24±0,018a	6,10±0,000b	1,01±0,040	3,46±0,047	72,52±0,200b	45,94±0,145b	6,82±0,126
WSS+ S	35,17±0,112b	94,54±0,047b	6,27±0,085c	1,00±0,027	3,48±0,046	76,77±0,369a	48,82±0,215a	7,18±0,040
P	**	*	**			**	**	

WSS: control, wheat straw silage; WSS+L: Wheat straw silage inoculated with Lactococcus lactis; WSS+ S: Wheat straw silage inoculated with Streptococcus thermophilus; **:P<0.001, *:P<0.05

Table 2. In vitro dry matter digestibility of control group and inoculated wheat straw silages with Lactococcus lactis and Streptococcus thermophilus strains

Silages	In vitro dry matter digestibilities, %	
	24 h	48 h
WSS	28,90±0,435[a]	42,22±0,514[a]
WSS+ L	31,43±0,713[b]	48,00±0,578[b]
WSS+ S	31,69±0,222[b]	46,68±0,443[b]
P	**	**

WSS: control, wheat straw silage; WSS+L: Wheat straw silage inoculated with Lactococcus lactis; WSS+ S: Wheat straw silage inoculated with Streptococcus thermophilus; **:P<0.001, *:P<0.05

Conclusion

Inoculation of wheat straw with Lactococcus lactis and Streptococcus thermophilus strains before ensiling was improved the in vitro dry matter degradability of wheat silage.

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A research on possibilities to improve tomato pomace silage quality

H. Hanoğlu Oral, H. Umur, N. Çil Özgüven
Central Research Institute of Food And Feed Control, Bursa-Turkey

Introduction

Ensiled tomato pomace can be a potential protein and energy source in animal nutrition (Hadjipanayiotou,1994). However, the high moisture content of tomato pomace makes its fermentation and long term storage difficult (Galló et. al., 2017). Ensiling tomato pomace, as it is obtained, results in the loss of dry matter (10-15%) in the form of water soluble carbohydrates together with the silo water during silage fermentation due to high content of water. Lactic acid bacteria cannot obtain sufficient activity and number in the silage since they cannot meet the need for carbonhydrate at a sufficient level. Accordingly, the lactic acid content of the silage becomes low and causes the energy content to decrease. This study was carried out to investigate the effects of adding different levels of ground grains and alfalfa hay on the silage quality of tomato pomace silage.

Materials and methods

The fresh tomato pomace (TP) obtained from a tomato processing company at Karacabey, Bursa. Different levels of ground grains (wheat, barley, corn) and alfalfa hay were added to improve dry matter content of the silage. To determine the most suitable mixtures of silage, 5, 10, 15, and 20% of wheat grain (WG), barley grain (BG), corn grain (CG); and 2.5, 5.0, 7.5, and 10.0% of alfalfa hay (AH) were mixed on wet basis with TP and silaged into laboratory silo containers of 5 kg capacity. The crude nutrient contents of the TP and silages that were used in the experiment were determined according to the Weende analysis method. Phosphorus, calcium, and organic acid analysis were, respectively, performed according to Anonymous (1978), Anonymous (1995), and Lepper method indicated by Akyıldız (1984). The microbiological analysis were done according to methods described in Anonymous (1988) for Clostridium spp. and lactic acid bacteria; and according to Anonymous (1980) for yeast and mold. Differences between groups were analyzed by one-way ANOVA, SPSS package program (1999) is used.

Results

The organic matter (OM), crude protein (CP), crude fat (CF), crude cellulose (CC), calcium (Ca), phosphorus (P) and metabolic energy (ME) values of TP silage were found to be 95.40, 21.13, 14.11, 36.89, 0.74, 0.42, and 2874 kcal/kg on basis dry matter (DM) respectively. The addition of WG, BG and CG into TP with ratios of 5, 10, 15, and 20% decreased the CP and CC levels and increased the ME content ($P<0.05$). Silages made by adding 2.5, 5.0, 7.5, and 10.0% AH to TP had CP values between %18.29-20.24 and ME content between 2768-2894 kcal/kg. The pH values of silages of TP and its mixtures varied between 4.43-4.61, and organic acid contents between %1.26-1.81, %1.13-2.04 and %0-0.28 for lactic acid, acetic acid and butyric acid respectively. When silage groups are evaluated based on their organic acid content, all silages received 70 Flieg points and were in the high-quality silage class (Kılıç 1986). The silages of TP and its mixtures had lactic acid bacteria values between 6,0 x 102-6,0 x 104 cfu/g, Clostridium spp. between 1,0 x 101-5,0 x 102 cfu/g. Moreover, Clostridium spp. was found to be <10 cfu/g for TP+%2.5 AH and TP+%10 AH silages. Yeast and mold levels were found to be <10 cfu/g in all silages.

Conclusion

TP silage with 16.50 DM content yields low lactic acid content and metabolic energy content when ensiled alone. The addition of WG, BG, CG, and AH in increasing amounts improved the quality of silages due to the increased DM levels. Based on an individual evaluation of silages, it is possible to suggest that TP+20% WG, TP+20 CG%, and TP+10% AH silages were of best quality due to their high lactic acid bacteria levels.. Evaluation of the silage groups based on microbiological analysis results showed that the silages were of good quality. Based on the results, it can be concluded that tomato pomace can be preserved and fermented well mixed with high levels of groun grains or alfalfa hay.

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Effect of protected fat and protein on animal performance: Review

E. O.A. Olomonchı[1], J. D. Agossou[2], A. V. Garipoğlu[3]

[1]Univesity of 19 May, Faculty of Agronomy, Animal Science Department, Samsun-Turkey

[2]University of Çukurova, Faculty of Agronomy, Animal Science Department, Adana -Turkey

[3]Univesity of 19 May, Faculty of Agronomy, Animal Science Department, Samsun-Turkey

Introduction

In ruminants, the first factor influencing reproduction and lactation is nutrition. Thus, obtaining a high quantity of milk and a better quality of meat is a satisfaction of the protein and energy needs of the animal. The lack of feed resources and their low nutritional value are at the root of the low productivity of dairy cows. In early lactation, dairy cows consume less dry matter (DM). The use of protected proteins allows an increase in the supply of rumen undegradable protein (RUP) and essential amino acids limiting speed for the production of milk, meat and fiber; and an increase in the supply of rumen undegradable fat (RUF) with the ability to increase the energy density of the diet and provide sources of essential / bioactive fatty acids and conjugated linoleic acids to improve production efficiency and the quality of meat and dairy products. The supplementation of protected fat and protein during early lactation improve yields of milk and milk components.

Effect of bypass fat on production Protected fat supplementation not only increases milk yield, but also the composition of animal milk (Chen et al., 2002; Garg et al., 2003; White et al., 2004; Thakur and Shelke, 2010; Mansoori et al., 2011). Apart from milk yield, supplementation with protected fat also increases the proportion of unsaturated fatty acids but decreases the percentage of milk protein (Canale et al., 1990; Chen et al., 2002; Lohrenz et al., 2010). Ashes et al. (1997) reported that the effect of protected fat on certain milk components (milk fat and fatty acid content) in animals depends on the type and amount of dietary fat, inertia, or protection fat (these are the characteristics of the protected fat used as a dietary supplement) in the rumen. More specifically, the effect of protected fats can be explained by the availability of saturated fatty acids and unsaturated fatty acids for intestinal absorption. In fact, unsaturated fatty acids that have escaped rumen digestion are absorbed in the small intestine and through the blood they are transported to the mammary glands and then to milk fat (Staples and Cullens, 2005).

This causes a modification of the fatty acid profile in the milk (Precht et al., 2001) and also improve the energy intake of the diet. The use of protected fats causes an increase in milk fat (Mishra et al., 2004; Garg et al., 2008). On the other hand, the use of protected fats in the diet causes the decrease of milk protein in the majority of cases (Polidori et al., 1997).
In addition, protected fats also increase cholesterol levels in the blood, thereby influencing progesterone levels and boosting fertility (Staples et al., 1998).

Effect of bypass protein supplementation on dairy performances and Factor affecting its efficient use Bypass protein feeding has been shown to be quite useful in increasing milk production in medium and high yielding cows, especially when animals are energy deficient (Suresh et al., 2011). Indeed, numerous studies demonstrated that the supplement of different level of rumen-protected increased the milk yield and composition in cattle and buffalos (Garg et al., 2003; Mishra et al., 2006; Shelke et al., 2011). This successful improvement in milk production observed in animal supplemented with protected protein may be linked the high metabolizable energy intake due to fortification of the diet with rumen protected fat and protein. The results of numerous studies showed on feeding with different protected protein such as treated mustard, groundnut cake, sunflowers cake have positively affect the milk yield, milk composition and fat contents in lactating ruminants. In fact, the supplement reduced the concentration of saturated fatty acids by 19%, while that of unsaturated fatty acids increased by 36%. These results are similar to those reported by Walli and Sirohi (2004), who found that milk yield increase by 15% in dairy crossbred cows feeding on formaldehyde protected mustard cake. In a study to assess the efficiency of formaldehyde processed sunflower seed and naturally protected protein containing an optimal-bypass with 75% and 30% UDP respectively, Garg et al. (2003) found that the milk yield, fat and protein contents significantly increased. Suresh et al. (2011) concluded that the optimum level of UDP daily required for production of 10 kg 4% FCM is 571 g/h in lactating animal.

Conclusion

This paper highlighted the beneficial effect of the supplementation of protected fat and proteins on performance in dairy animals with. Indeed, recent studies successfully demonstrated that the use of different protected nutrient sources such as oil cake, chemical or thermal treated soybean or sunflowers increased the milk yield and composition.

The use of these proteins and fat sources limit the nitrogen losses due to microbial digestion in rumen. Consequently, result into a significant decline of nitrogen-induced environmental pollution. On other hand, evidences showed that the efficient use of protected fats and proteins constitute an important a cost-effective strategy for improving dairy performance namely milk yield and quality. All these results contribute to the well-being of human.

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Use of Medical Aromatic Plants in Ruminant Animals

A. R. Işık, S. Özkaya, H. Köknaroğlu

Isparta Applied Sciences University Graduate Seminar 2018

Introduction

Medicinal and aromatic plants are plants that are used as medicines to prevent diseases, maintain health, or improve diseases. While medical plants are located in areas such as nutrition, cosmetics, body care, incense or religious ceremonies, aromatic plants are used for smell and taste. Aromatic plants are also widely used in the food, cosmetics and perfumery sectors (Anonymous 2005). Various plants all over the world and in our country have been used for a long time in the treatment of tea, spices, perfumes, animal diseases and medicine. Important characteristics of microorganisms for fatal and human health of plants are being investigated in laboratories since 1926 (Taroglu S. and Çenet M. 2006). The use of feed additives in the European Union countries has been banned since 2006 due to reasons such as the fact that the side effects of synthetic substances have increased in recent years, especially the resistance of organisms against antimicrobial synthetic drugs (Anadon 2006) and as a result, the importance of natural plant sources and medical plants carrying these substances has increased more and more (Çelik E. and Yuvalı Çelik G. 2007). The use of antibiotics as growth stimulants in animal nutrition causes a problem called antibiotic resistance (Çetin, 2008, Buğdaycı, 2008). The World Health Organization (WHO) has stated that the erroneous use of antibiotics and microorganism-specific antibiotics are gradually becoming immune and ineffective in protecting human health. For this reason, the use of antibiotics in animal production in EU countries is prohibited and until 2006, only four antibiotics (avilamisin, salinomycin, monensin, flavofosolipol) were allowed to be used (Anadon, 2006). As a result, researchers have begun to search for growth factors that may be alternative to antibiotics. For this purpose, tibbi and aromatic plants and essential oils obtained from them have been extensively studied, and plant extracts which have been added to food and water have made progress in feed consumption, utilization of feed and carcass quality (Güler ve Dalkılıç, 2005; Çetin M, 2012)

Essential Oil Obtaining Method from Medical Aromatic Plants

Herbal essential oils are natural herbal products and are extracted from nonwoody parts of plants by steam or hydrodistilation (Dorman and Deans, 2000). Some may be made synthetically. At present there are 2600 herbal essential oils. Most of them are composed of a mixture of paraffin and wax in very small amounts of hydrocarbons, alcohols, esters, aldehydes (Zhang et al., 2005).

The Effects of Medical Aromatic Plants

Antimicrobial, coccidiostatic, antihelmitic, antiviral and anti-inflammatory activity and inhibition of aromatic plants which have been used for many years since disease treatment have been used to activate the immune system stimulation, feed consumption and digestive secretion secretion, especially due to their antioxidant properties (Sarıca ve Demir, 2003; Greathead 2003; Wenk 2003).

Use of Medıcal Aromatıc Plants in Rumınant Anımals

The purpose of applications that regulate the ruminant microbial ecosystem in the ruminant nutrition is to increase the utilization and productivity of the animals. Both achieving high yields and reducing environmental pollution from animals due to nitrogen excretion and methane emissions have become important targets for breeders. The use of ionophore antibiotics as feed additives at this stage has established a common ground for ruminant farmers' production and environmental objectives. Antibiotics used as feed additives have been used for a long period of time because they promote positive changes in the rumen fermentation by increasing the efficiency of energy and nitrogen metabolism (Nagaraja et al., 1997). But as to why meat and no longer leave in animal products such as milk and the emergence of resistant bacteria due to threat to human health, and the European Union 21.01.2006 (Official Newspaper Issue: 26056) as well as of the magnification factor in Turkey are prohibited from participating in animal feed (Anonymous, 2006; OJEU, 2003). After this process, the natural source additives such as phytochemical compounds were modified to modify the microbial ecosystem of the rumen, and the essential oils with antimicrobial effect attracted attention by enhancing the rumen fermentation (Macheboeuf et al., 2008). Because vegetable oils found in healthy animals and safe and be consumed by humans (OJEU, 2003) in Turkey as well as all over the world it has also started to give weight to their use in animal feed. Essential oils are plant metabolites that give characteristic odors and colors to plants and spices, which have an important use as natural feed additives in the animal feed due to antibacterial, antifungal and antioxidant properties (Castillejos et al., 2006).

The plants known as thyme in Anatolia; Origanum, Satureja, Thymbra, Thymus and Corydothymus (Başer, 1995). The active ingredients carvacrol and thymol are monoterpenoids with broad antimicrobial activity against gram-positive and gram-negative bacteria. Turkey has a rich flora and values recorded in the direction of the existing plant diversity (Tan, 1992). Today, the acquisition and evaluation of pure and especially main active ingredients of medical plants and essential oils of these plants are very important both in scientific and economic aspects (Kırbağ ve Bağcı, 2000). Unal (2011) reported that in a study conducted in male lambs, thyme oil containing 65% carvacrol and 0.3% thymol and added at doses of 250 ppm and 500 ppm in ration was statistically significant in terms of fattening performance and liver, empty stomach and empty bowel weights he did not bring the difference. Similar results were found in a different study with a mixture of Origanum onites L. and various essential oils, and found no statistically significant difference in performance characteristics (Özdoğan et al., 2011).

Offer et al. (2005) reported that the use of the same essential oil mixture at 0.5 g / day, 1 g / day and 2 g / day per animal in lactating cows resulted in a statistically insignificant increase in dry matter consumption compared to the control group. The use of essential oils as an additive in the ruminant feed can be accepted if they are used at doses that will positively affect the microbial population without causing any side effects to the fermentation of the rumen (Spanghero et al., 2008). The reduction in the production of total essential fatty acids (UIA), which occur as a result of the addition of essential oil, is negatively related to nutrition. What is important here is to define the dose rates of various volatile oils or their active ingredients, which helps to regulate rumen metabolism in a proper way without reducing total UIA concentrations (Benchaar et al., 2008).

Table 1: Rumen pH, total volatile fatty acids, acetate propionate ratio, ammonia nitrogen concentrations and fattening performance of thymus essential oil in ruminants (Ünal A., Kocabağlı N. 2014)

Essential Oil	Type	Dose	pH	Total Essential Fatty Acids	A/P rate	NH_3-N	Fattening Performance	References
Frying oil mixture containing thymol	Taurus	1 g / day per animal	No impact	Increase	----------	-----------	No impact	Meyer et al. (2009)
Oreganum vulgare	Fattening cattle in vitro	5 mg/1 50 mg/l 500 mg/	No impact Increa se	Increase Increase decrease	No impact	No impact decrease	-------------	Castillejos et al. (2008)
Thymus vulgaris	Fattening cattle in vitro	5-50-500 mg/l	decrea se	Increase	No impact	decrease	--------------	Castillejos et al. (2008)
Olegano and thyme containing essential oil mixture	Taurus invitro	160 µl/l 320 µl/l 480 µl/l 640 µl/l	No impact	No impact	No impact Decrease	No impact	--------------	Spanghero et al. (2008)
Frying oil mixture containing thymol	Fattening cattle	2 and 4 g / day	------	------	------	------	No impact	Benchaar et al. (2006a)
Frying oil mixture containing thymol	dairy cattle	1.2 g / day per animal	------	------	------	------	No impact	Tassoul and Shaver (2009)
Frying oil mixture containing thymol	dairy cattle	750 mg / day and 2 days	------	------	------	------	No impact	Benchaar et al. (2006b and 2007)
Frying oil mixture containing thymol	dairy cattle	0.5 g / day, 1 and 2 g / day	------	------	------	------	increase in dry matter consumption	Offer et al. (2005)

The Effects of Medical Aromatic Plants on Oxidative Stress

Oxidative stress, impairment of the balance between oxidant and antioxidants in favor of the oxidant system, formation of lipid peroxidation and cellular damage in the resulting organism. If the defensive mechanisms (antioxidant mechanisms) of the organism against the oxidative stress are insufficient, the oxidative damage occurs in the cells and the functions are seriously delayed. The severity of the disease increases as many diseases have a critical prescription in their pathogenesis. This mechanism is responsible for the aetiology of many diseases such as aging process and cardiovascular diseases, cancer, sepsis, degenerative neurological diseases, renal failure, infertility, muscle and liver diseases (Ercan N, Fidancı UR, 2012; Gutteridge JMC, 1993). During the normal metabolic stages of aerobic organisms, the oxygen molecule is reduced during the energy conversion of nutrients using oxygen, and various free radicals and reactive oxygen species such as hydroxyl, superoxide, nitric oxide and lipid peroxide are formed as by-products (Freeman BA, Crapo JD, 1982). Free radicals are classified as reactive oxygen species (ROS) and reactive nitrogen species (RNS). Molecules called ROS; (O2), hydrogen peroxide (H2O2), hydroxyl radicals (HO-), hypochloric acid (HOCl), singlet oxygen (O2), ozone (O3), alkyl radical (R), peroxyl radical (POO-) , organic peroxide radical (RCOO-), perhydroxyl radical (HO2-), alkoxyl radical (RO-). RNS molecules are nitric oxide (NO-), peroxynitrite (ONOO-) and are produced in small quantities during normal metabolic reactions of the body (Freeman BA, Crapo JD 1982, Gutteridge JMC 1995, Halliwell B 1994). Organic free radicals are grouped as endogenous and exogenous sources. Endogenous factors also occur at the cellular level with the release of free radicals in situations that prevent the removal of antioxidants such as exercise, stress, aging, chronic diseases, infection, malabsorption. Superoxide, hydrogen peroxide and hydroxyl radical are formed due to the normal aerobic mitochondrial respiratory chain. Reactive oxygen species are produced as a consequence of many enzyme activities such as xanthine oxidase (XOD), nicotinamide adenine dinucleotide phosphate (NADPH) oxidase, and neutrophil myeloperoxidase (MPO) (Gutteridge JMC, 1995). Exogenous factors can be classified as drug toxicities, environmental pollutants such as air pollutant phytochemicals, cigarette smoke, solvents, antineoplastic agents, metallic cations, ionizing radiation, ultraviolet rays, pesticides, ozone, diet (Çaylak E, 2011; Trimarchi JR et al. 2000). Reactive oxygen species are normal cellular metabolism products such as reactive nitrogen species. ROS and RNS have beneficial effects at low concentrations in the organism.

While ROS are involved in cellular response and stimulation mechanisms, free radicals are necessary for numerous enzymatic reactions and biological functions. The amount of free radicals that are necessary and balanced for the body is balanced, by interacting with macromolecules such as lipids, proteins and nucleic acids in their immediate surroundings. However, it causes cell structure and organelles disorders (Pekcan Z et al 2011). ROS cause a number of injuries in the organism, such as degradation of nucleic acid function, irreversible DNA damage, changes in enzyme activities, damage to proteins, and the formation of new immunological structures (Basaga HS 1990; Gutteridge JMC 1995), causing mutations or cancers. Transporting in farm animals, leading to yield losses and negatively affecting animal welfare, leads to destruction of the oxidant / antioxidant balance in favor of radicals (Freeman BA, Crapo JD 1982). Cetin et al evaluated oxidative stress parameters in sheep carried for 10 and 24 hours and reported that muscle contractions due to physical strain increased oxygen production and energy input into the organism and increased oxidative stress activity after transport. It is reported that this is due to the increase of oxygen-derived free radicals and many reactive oxygen species (Çetin M. 2012). Chirase et al. Reported that oxidative stress parameters were increased by elevation of enzyme activities such as lactic acid, lactate dehydrogenase, creatine phosphokinase (Chirase NK et al., 2004), depending on transport stress in cattle. In a study conducted to evaluate the vitamin E status of lipid peroxidation and natural antioxidant vitamins in dairy cows' livers, clinical findings of hepatic encephalopathy were observed in cows with hepatic insufficiency, blood values AST> 80 U / l, serum GLDH> 15 U / l and venous plasma ammonia> 35 mmol / l. They reported increased hepatic lipid peroxidation and decreased antioxidant status in cows with liver failure (Mudron P. et al 1999). Synthetic antioxidants were used against oxidative stress in ruminant animals. However, the use of synthetic antioxidants has begun to be discouraged due to public concern. That is why researchers have turned to medicinal aromatic plants. When the antioxidant properties of medicinal aromatic plants were discovered, the essential oils of medical aromatic plants were used in the livestock sector, especially in ruminant animals, and their antioxidant properties were examined. Farag et al. (1989) reported that thymol has high antioxidant activity by reducing the formation of hydroxy peroxide due to the presence of phenolic OH groups acting as hydrogen donors to the peroxide radicals that are released during the first step of lipid oxidation, in their study of the relationship between chemical composition and antioxidant properties of essential oils.

Simitzis et al. (2008) reported that they applied potash oil to the rations of bovine and ovine rats at a dose of 1 ml / kg in the form of a spray, and reported that this essential oil reduced oxidative lipid oxidation [malondialdehyde (MDA) formation], leading to a strong antioxidant effect and minimized oxidative stress parameters.

When the results obtained from different studies were evaluated, it was observed that the addition of essential oils obtained from medicinal aromatic plants to ruminant ratios did not cause a significant difference in fattening performance and organ weights. In terms of rumen parameters, it is thought that essential oils do not adversely affect digestive activities, but positively affect changes in total concentrations of fatty acids in some studies.

Conclusion

The main objective of animal production is to provide high yield, healthy and quality animal products. In this context, plant extracts and essential oils are not only appetizing and digestive stimulant but it is the feed additive that can help improve the health and well-being of animals and their performance with the effect on other physiological processes. It has also been found that medicinal aromatic plants can be used instead of anthelmintic drugs and antioxidants and antibiotics.

When placed in the rations it is necessary to put ruminant animals in rations of certain ruminant animals, especially since ruminant animals consume some characters of these plants (Taste, Odor, Color, etc.). Extensive studies are needed to determine the proper dosage of some plants and their extracts, the phytochemical composition of essential oils and their mechanisms of action, and the safe use of them in animal species.

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Effect of some medicinal plant oil extracts on in vitro methanogenesis and fermentation of feed in rumen liquor

G. Koltuk, S. Büyükkılıç Beyzi, Y. Konca

Department of Animal Science, Faculty of Agriculture, University of Erciyes, Kayseri, Turkey

Introduction

Methane produced by ruminants contributes to greenhouse gas production and global warming (IPCC, 2006). It has long been known that adding oil to ruminants' diets reduces enteric CH4 emissions (Czerkawski et al., 1966). Studies have shown that fixed and essential oils from different plants can alter acetic, propionic and butyric acid production and the number and variety of microorganisms in the rumen (Busquet et al., 2005; Kongmun et al., 2010). In recent years, the production of zucchini, coriander, menengi, almond and black cumin oil has been increasing in widespread in our country. It is believed that the oils obtained from these plants and the phytobiotics may influence the digestion rate of the feed in ruminant animals and reduce the gas lost as methane.

Materials and methods

The study was carried out using in vitro gas technique with different incubation period intervals. The treatments were made by adding basal ration (with a 60/40 roughage / concentrate ratio) at levels of 0, 5, 10, 15 and 20 mg / kg with menengi, almond and black cumin seed oils. Oils were obtained from commercially sold companies.

In the study, four male goats with 2 years old (45-50 kg) cannulas were used as donor for rumen liquid. 400 ml of rumen liquid was taken from each animal before being fed in the morning, and then fermentation liquid was prepared by mixing with artificial spit 2: 1 by filtration through a 4-layer cheese screen (Menke and Steingas, 1988). The rumen fluid was collected at 0, 4, 8, 12, and 24 hours of fermentation in order to determine the fermentation parameters in rumen during the study. The amounts of astringent, propionic and butyric acid were determined by using gas chromatograph.

Results

In vitro methanogenesis and fermantation parameters of feed with some medicinal plant oil extracts in rumen liquor was shown in Table 1. There is no significant effect on the total gas production, methane production, acetate, organic matter digestibility and metabolic energy in the rumen fluid of feed additive oils. However, addition of almond oil was increased the production of propionate and butyrate in rumen liquid (p <0.05).

Table 1. In vitro methanogenesis and fermantation parameters of feed with some medicinal plant oil extracts in rumen liquor

Oils	Conc., mg/kg	TGP, ml	MP, ml	MP, %	Asetate, mol/100 mol	Propionate, mol/100 mol	Butyrate, mol/100 mol	OMD, g/100g	ME, Mj/kg DM
C	0	79.7	7	8.1	57.5	22.7b	19.8a	84.1	13.1
Black cumin	5	76.6	5.9	7.7	57.1	19.5	23.4	81.4	12.7
	10	78.5	5	6.5	66.8	20.2	13	83.1	12.9
	15	98.6	6.4	6.5	55.9	20.8	23.3	100	15.7
	20	76.7	5.8	7.7	56.9	20.1	23	81.6	12.7
	Avrerage	82.6	5.8	7.1	59.2	20.2 ab	20.7 b	86.5	13.5
Menengi	5	72.5	6.1	8.5	64.3	21.4	14.3	78.1	12.1
	10	83.1	5.2	6.2	61	18.7	20.3	87	13.6
	15	62	6.6	10.5	74.7	24.6	0.8	69.1	10.7
	20	100.1	5.4	5.4	63.2	28.1	8.6	101.4	15.9
	Avrerage	79.9	5.8	7.6	65.9	23.3 ab	10.8ab	84.3	13.1
Almond	5	99.7	10.5	10.5	62.1	30.1	7.9	101	15.8
	10	47.1	3.5	8.2	64.3	21.3	14.4	56.6	8.7
	15	80.8	6.6	9	53.3	28.5	18.2	85	13.3
	20	89.2	7.2	8.4	56.8	26.5	16.6	92.1	14.4
	Avrerage	79.2	6.9	9.0	59.1	26.6 a	14.3 a	83.7	13.0
SEM		20.9	2.4	2.9	9.1	5.3	10	17.7	2.8
P		0.824	0.213	0.150	0.048	0.001	0.010	0.824	0.824

C: control, TGP: total gaz production, MP:methane production, P:probability, SEM: standart error of means, OMD: organic matter digestibility, ME: metabolisable energy

Conclusion

In this study, it is aimed to decrease the production of methane in the rumen by adding some oil resources. However, it has been determined that black cumin, melengi, and almond adhering to different levels to feed have no effect on methane production. The preventive effect of the oils on the rumen methanogenesis is determined by the amount and composition of the oil used (Dong et al., 1997, Machmüller et al., 1998). It was also observed that the ratio of propionate and butyrate increased in particular when almond oil was added. In some studies, it has been reported that addition to feed some oils increases propionate and butyrate with decreasing methane (Doreau and Chilliard, 1997; Wachira et al., 2000).

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Feeding of the broiler breeder and chick quality

S. Sarica, E. Berberoglu
Tokat Gaziosmanpasa University, Faculty of Agriculture, Department of Animal Science, Tasliciftlik/Tokat

Introduction

The profitability of a broiler production is mostly related to the quality of the hatched chick. Breeder nutrition is a key contributer to better chick viability, growth and carcass yield, as well as bird welfare. The nutrients required for chicken embryo development are derived from the nutrients stored in the egg, whose nutrient profile changes with the maternal diet and creates differences in nutritional status of the hatched chick (An et al., 2010). The present article reviews the nutritional factors such as diluted diet, dietary energy and protein concentration, amino acids, fats, some vitamin and trace minerals in broiler breeders that may improve chick quality and progeny performance.

Diluted breeder diets: Feeding of broiler breeders with the diet containig high fibre that were diluted with oat hulls (low energy and protein) during the rearing and laying periods increases the chick' quality and welfare (Hocking et al., 2006). Enting et al. (2007) fed broiler breeders on diets that contained 12 and 23 % less energy and other nutrients by dietary dilution with high fibre ingredients. The diet with 12 % dilution based on oat hulls produced larger eggs and chicks at 29, 41 and 60 week of age. Mortality was not affected by broiler breeded dietary treatments at 29 and 41 weeks whereas mortality at 60 weeks was highest in the offspring of breeders fed the conventional diet and lowest in broilers fed the -12 % diet during rearing a conventional diet during lay.

Amino acids: Nutrition of broiler breeder hens can influence egg quality and is there extremely important for the development of the embryo and the successful hatching of a high quality chick. The developing embryo and the hatched chick are completely depent for their growth and developments on nutrients deposited in the egg. All amino acids are not available in the feedstuffs for maintenance and production. Part of amino acids is indigestible and can vary among feedstuffs.

So to adjust broiler breeder diets with digestible amino acids of feedstuffs is much better and easier meets birds real requirements for maintenance of production and chick quality.

Nasr et al. (2011) found that feeding of Arian broiler breeders from 50 to 64 weeks with diets based on digestible amino acids of feedstuffs and nitrogen corrected true-metabolizable energy significantly increased egg weight and chicken weight.

Dietary lysine at suboptimal level negatively influence chick quality. Mejia et al. (2013) used corn-based distiller grains with solubles to reduce breeder dietary lysine and found that broilers young breeders (26 weeks) had low chick body weight and breast yield when broiler breeders were fed the lowest lysine (600 mg lysine/bird/day.

Protein level: Daily protein+amino acid intake of broiler breeders should be limited to overcome their excess breast deposition. Birds with excess breast meat will require relatively more energy as muscle (protein) requires to maintain a greater amount of energy. Therefore, it is major to control muscle mass of parent stock. Feeding excess protein in both rear and lay can result in overweight and fleshy birds. More researches showed that feeding increased levels of individual amino acids to female breeders can also reduce fertility quite significantly. Recent data reported that lower dietary protein levels support female fertility and chick quality (Kenny and Kemp, 2010).

It is found that feeding diet with a low protein during the first period of laying was found to reduce breast muscle and increase abdominal fat ratio. Higher abdominal fat content increased the hatchability yield during the first period of laying and led to more eggs during the second period. In addition, it is pointed out that feeding diet with the high energy of the second period of laying increased the hatchability capacity, decreased embryonic mortality and increased the number of first quality chick (Van Emuos, 2017).

Fats: The fatty acid composition of the breeder diet affect the fatty acid composition of the yolk, which can influence hatchability and chick quality (Chang et al., 2016). Supplementation of long-chain omega-3 fatty acids to diets of ageing broiler breeder hens lowered egg weight and reduced body weight up to 28 days and increased both feed conversion ratio and mortality of chicks (Koppenol et al. 2014). Van Elswyk et al. (1997) reported that increasing dietary n-3 fatty acid content might cause a decrease in circulating triglycerides of birds, thus limiting availability of lipids for yolk formation. As a result, feeding diet containing the fish oil caused to lower egg weight and associated broiler chick weight.

Bozkurt et al. (2008) found the supplementation of sunflower oil at 1.5% level to broiler breeder diet significantly increased egg weight and chick weight.

Vitamins and trace minerals: Vitamins and trace minerals are involved in most metabolic processes and are an important part of foetal development, therefore the consumption of suboptimal levels of these nutrients in commercial diet caused to negative responses to parent and chick quality. The major vitamins and trace minerals that affected chick quality and viability and skeletal development are fat-soluble vitamin D and E, and trace elements selenium, zinc and manganese.

Vitamin D_3 level in diet is extremely important for optimal progeny development. Atencio et al. (2005a) reported that chick weight gain was greatest when broiler breeders were fed the high maternal dietary concentrations of 2800 IU of vitamin D3/kg and the incidence of tibial dyschondroplasia in progeny was improved in the offspring of young (30-37 week) broiler breeders. This level was close to the commercial recommendation by Aviagen (2013) of 3500 IU/kg for breeder diets. In addition, the same researches's results showed that 25-OH-D_3(25-hyroxycholecalciferol), the more bioavailable form of vitamin D_3 has better biological value in maternal diets than has vitamin D_3 for mortality and bone ash of embryo. The breeder nutrition plays a major role on the antioxidant status and disease prevention in hatched broiler chicks.

For this aim, the supplementation of vitamin E to broiler breeder diet gained importance in recent years. Surai et al. (1997) found that there is a correlation between the alpha-tocopherol concentrations in yolks and the concentration in tissues of chick post-hatch. Some researches showed that increased immunity due to vitamin E has been shown to improve adaptative antibody transfer from parent to offspring (Boa-Amposem et al., 2001). Recommended level of added vitamin E of 100 IU/kg in breeder diets supported optimal chick health and performance (Aviagen, 2013).

Selenium, especially organic selenium, acted as an antioxidant and improved Se concentrations in the eggs (Jlali et al., 2013) and in the issue of offspring (Couloigner et al., 2015). A 1.25 % improvement in feed conversion ratio and higher rissue Se concentration of broiler chick whose parents were fed seleno-hydroxy-methionine or HMSeBA (0.2 mg Se/kg) was reported compared to offspring from parents fed either sodium selenite at 0.3 mg Se/kg or selenised yeast at 0.2 mg Se/kg (Couloigner et al., 2015).

The higher muscle Se concentration at hatch facilitated the transition of antioxidant system from vitamn E to the GPx in liver during the first days of the life of broiler chick, which in results in improvement in feed conversion ratio (Surai, 2002). Zinc plays a role on the feathering, progeny growth, viability and improvement cellular immune function of chick. It is reported that dietary supplementation of organic zinc and manganese in combination improved chick viability, cardiac function, livability and immune function (Hocking, 2007).

Breeder male diets: High energy diet in male broiler breeder increased offspring growth of chicks because this diet caused to the supernumerary sperm in eggs laid by hens inseminated with sperm from males fed high-energy diets (Attia et al., 1995). Morever, it is recommended that breeder males be given adequate cumulative energy (min. 2960 Kcal/kg ME) and crude protein (min. 14.7% CP).

Conclusions

This manuscript clearly showed that the nutrition of the breeders both maternal and paternal can affect only breeder performance, but also the embryo survival and development, offspring performance in terms of chick size and quality, early growth and consequently feed conversion ration. Therefore, there is more researches related to the effects of dietary various amino acids, vitamins and some organic trace minerals on broiler chick quality.

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Effect of Dietary Rosemary Essential Oil Supplement on Egg Yolk Protein Level During Different Storage Times

T. Çimrin[1] M. Demirel[2]

[1]Hatay Mustafa Kemal Üniversitesi Ziraat Fakültesi Zootekni Bölümü 31034 Hatay, Türkiye

[2]Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Zootekni Bölümü 65080 Van, Türkiye

* Corresponding author: tcimrin@hotmail.com

Introduction

Egg protein is different from other protein sources and it has the ability to turn into almost 100% body proteins by the body (Anonim 2018). Having a unique bio-availability, it is of great importance to carry out studies that will improve the shelf life of this food during its shelf life and enhance its functionality. In one study, proteins were identified as major targets for oxidative damage, and time-dependent increases in protein damage (Gülbahar, 2007). The aim of the study is to determine the effect of antioxidants and antimicrobial of additives added to the laying hens diets on egg yolk protein levels.

Materials and methods

In the study, 240 Bovans genotype white layers 32 week old were used. The chickens were divided into six groups. The first group control was fed with basal diet. The other 5 groups were fed with 500 mg/kg antibiotic (chlortetracycline); 200 mg/kg vitamin E (α-tocopherol acetate); 100, 200, and 300 mg/kg rosemary essential oil (REO) (Rosmarinus officinalis L.) suplemented to basal diet respectively. At the end of the study, 20 eggs from each group were stored in the room temperature (16 ± 2 ° C) for 14 days periods between 1-56 days. The amount of protein in the egg yolk the storage period filling was determined according to the Biuret protein analysis method (Layne, 1957). Biuret Protein Analysis: For protein definition, BSA (beef serum albumin) was applied and standard graph was given at Figure 1.

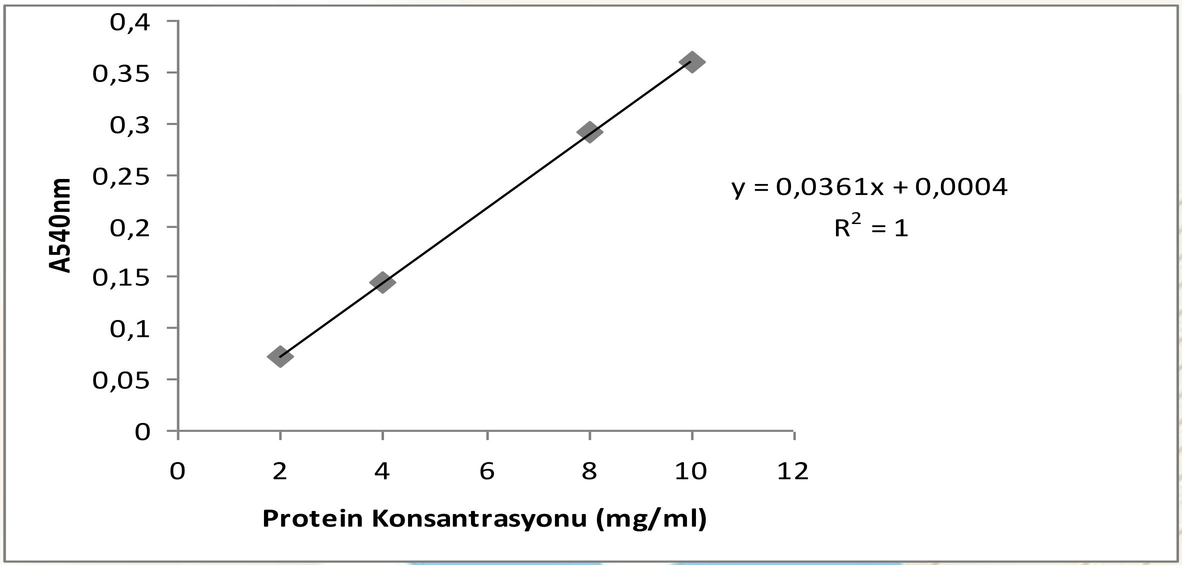

Figure 1. Standard Graph of Biuret Protein Definition

Preperation of Biruet Reactive; After 1.5 gr copper (II) sulfate pentahydrate and 6 gr potassium sodium tartarate were dissolved in 500 ml disstilled water, 300 ml 10 % sodium hydroxide was added onto the solution and this solution was completed with disstilled water to 1000 ml. For prevention of copper reduction, 1 gr potassium iodide was added into the solution and the solution was keep in dark.

Preparation of Samples and Standards; The standard graph of protein standards of which concentrations were variable between 2-10 mg/ml was prepared using stock BSA solution prepared in 10 mg/ml concentration. While the samples were being prepared, primarily, 10 gr yolk was weighed and it was homogenized with 1.15 % KCL (w/v) in 1:10 proportion. 0.1 ml from homogenizated solution was completed to 0.5 ml with 0.4 disstilled water. After 2.5 ml Biuret reactive was added into the solution and mixed, it was waited for 30 minutes in room temperature and then absorbance values were read at 540 mm in spectrophotometer. Yolk protein concentrations were calculated as mg/ml by putting the absorbance values which were read on standard graph.

The amount of protein = absorbance – 0.0004 /0.0361 (mg/ml)

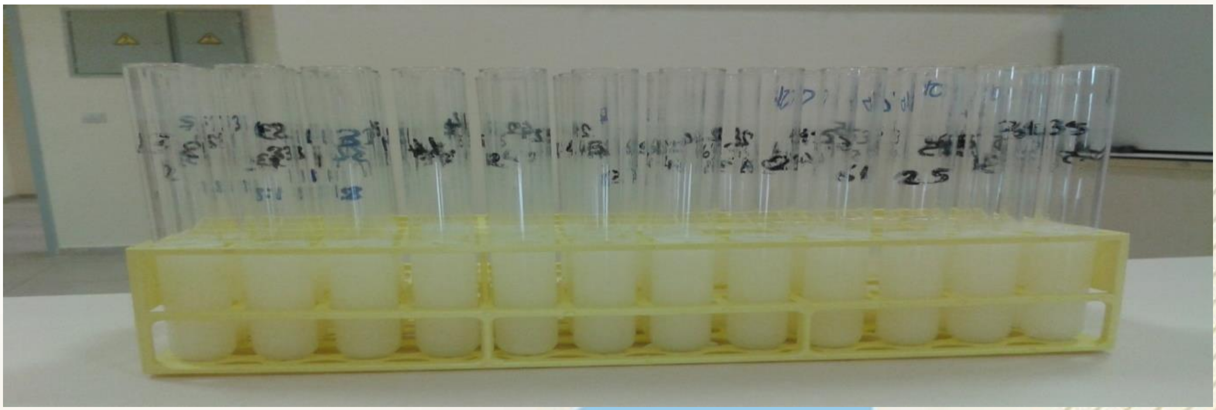

Figure 2. Homogenized egg yolk

Results

There was no significant difference between the groups in egg yolk mean protein values on days 1., 14., 28., 42. and 56. of storage. The change in only the control group was found to be statistically significant in terms of yolk protein values, depending on the time in the groups themselves. (P<0.001).

Table 1. Effect of application and storage time on egg yolk average protein values (mg/ml)

Groups	Storage Times						
	1d	14 d	28 d	42 d	56 d	F	P
Control	5.66±0.08a	5.53±0.07ab	5.37±0.16ab	5.08±0.27bc	4.59±0.22c	5.654	0.003
Antibiotics (500mg/kg)	5.58±0.33	5.39±0.31	5.35±0.17	4.81±0.47	4.58±0.21	1.787	0.171
Vitamin E (200mg/kg)	5.44±0.15	5.33±0.20	5.24±0.22	5.03±0.48	4.94±0.14	0.564	0.691
REO (100mg/kg)	5.61±0.13	5.3 1±0.23	5.27±0.19	5.15±0.43	4.81±0.45	0.827	0.524
REO (200mg/kg)	5.79±0.24	5.50±0.32	5.46±0.08	5.27±0.17	4.99±0.08	2.141	0.113
REO (300mg/kg)	5.94±0.05	5.71±0.41	5.31±0.13	5.10±0.33	5.03±0.30	1.998	0.134
F	0.858	0.293	0.210	0.163	0.578		
P	0.523	0.912	0.955	0.974	0.717		

[a, b, c]: the difference between the averages with different letters on the same line is important (P <0.05)

Conclusion

The additives used in the study have antioxidant and antimicrobial properties and are not substances of protein structure. For this reason, it is considered that there is no statistical difference between groups in egg yolk protein values. Depending on the time of the eggs belonging to the groups a statistical difference in only the control group in loss of protein values can be explained by the presence of fewer substances to protect the protein structure in the ration of this group. The decrease in the amount of protein in this group was faster. It has been reported that in different studies the herbal originated products have an inhibitory effect on protein destruction (Selje-Assman ve ark., 2008, Ben Salem ve ark.,2008).

In another study, Kutlu and Serbester (2014) reported that unsaturated fats in feeds were easily oxidized and that these oxidation products reacted with the epsilon amine group of lysine to lower the energy and protein content of the feed.

As a result, antioxidant and antimicrobial substances added to the mixed diet did not prevent the decrease of egg yolk protein content. However, according to the control group, the decrease in the supplemented groups was slower and statistically insignificant. For this reason, the effects of antioxidant and antimicrobial additives added to the ration on egg yolk protein can be investigated in more detail.

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Influence of Particle Size and Form of the Feed on Growth Performance and Digestive Organ Development of White Egg-Laying Pullets from 1 to 112 Days of Age

A. E. Tüzün[1], M. Bozkurt[2], B. Koçer[3], G. Ege[3]

[1]Adnan Menderes University, Kocarlı Vocational Scholl, Aydın, Turkey,

[2]Adnan Menderes University Faculty of Agriculture Department of Animal Science, Aydın, Turkey,

[3]Fig Research Institute, Department of Poultry, Aydın, Turkey.

Introduction

Optimal layer nutrition for a long liability and a high number of saleable eggs starts directly after hatch. However, fewer experiments focusing on feed structure have been carried out on layer strain poultry than broilers presumably due to mash form has been strong tradition in the feeding of egg-type layer chickens (Svihus, 2006; Röhe et al., 2014).

The issue of further processing of mash diet to pellets has resulted in a renewed interest in nutritional effects of diets which optimize the utilization of feed and improves feed conversion efficiency in association with enhancements of digestive organs (Abdollahi et al. 2013; Svihus,2011). Grinding changes feed texture and modify feed intake and development of the GIT (Frikha et al. 2011; Safaa et al.; 2009). However, the information available on the influence of feed particle size on development of digestive organs and productive performance in pullets is scarce. Therefore, research is warrented to evaluate the responses to feed structure by layer genotype of white strain as it holds the significant share of global commerical layer population.

Fine grinding of creals has been considered to be beneficial for proper utilization of the feed (Douglas et al. 1990), but negative implications on gut health and gizzard function were also noted (Amerah et al. 2007). However, by the time of writing, no scientific study on the interactive effects between particle size and feed form in nutrition of egg type layer chicken has appeared. Rather, the effect of either particle size or feed form were investigated in an interactive model with other dietary factors such as main creal and energy concentration of the diet and dietary fibre inclusion (Frika et al., 2009; Saldana et al., 2015; Guzman et al., 2017). In addition, these studies generally report performance data and measurements of digestive organs but there is stil a paucity of information regarding digestibility of nutrients and endogenous enzyme activity, most likely to be affected by the feed structure.

Therefore, the aim of this study was to investigate whether gastrointestinal function of pullets and consequently their growth performance affected by the feding of differently structured diets. For this purpose, investigations focused on the influence of particle size and form of the feed on the development of digestive organs as well as on the performance in pullets.

Materials and Methods

A total of 864 one-day-old Lohman LSL-Classic layer chickens were used in the present experiment. Upon arrival to the study facility, pullets were placed in a environmentally controlled room, weighed individually, and stratified into 4 groups of 216 pullets each. The average BW of the pullets was similar for all cages. The experimental unit was formed by 27 pullets housed in a cage, and 8 replicates were randomly assigned to each of the 4 experimental feeding programs. Diet formed a 2x2 factorial with 2 hammer mill screen size (4 vs 8 mm) and form (mash vs crumble). All feed batches (2 feeding periods and 2 diets/period) were divided into 2 portions; the first portion was used as such and the second portion was steam-conditioned at 84 °C for 20-30 s, passed through a pellet press provided with a 35-mm thick die and a 3-mm screen, and crumbled. Body weight and feed consumption were recorded by replicate at 28, 56, 84 and 112 d of age, and mortality was recorded daily. From these data, BW gain (BWG), FI and FCR corrected for mortality were determined by period and cumulatively. All the pullets of one cage that formed the experimental unit (27 birds per cage) were weighed individually and the uniformity of BW was determined by replicate. At 112 d of age, 2 birds per replicate were randomly selected, weighed individually, and killed by cervical dislocation. The digestive tract (from the beginning of the crop to the cloaca, including digesta content) and the liver and the pancreas were removed aseptically and weighed. Then, the crop, proventriculus and the gizzard were excised, emptied from any digesta, cleaned, dried with desiccant paper, and weighed. The weight of the liver and the pancreas and the total small intestines including duedonum, jejunum and ileum, and that of the empty organs was expressed relative to live BW (g/100g).

Results

Body weight uniformity at 4, 8, 12 and 16 wk of age was not affected either by the increase of sieve size and form of the diet. Mortality was minimal (<1%) and was not related to treatment. From hatch to 45 d of age FI of mash-fed pullets was 5.0% higher (P=0.002) than those receiving crumbles. However, there were no significant differences between pullets fed CG and FG diets.

Between d 29 to 56 and 57 to 84, significant responses regarding performance indices to change in feed form and particle size of the feed was observed. In the previous period, crumbling increased BWG (P=0.010) without no change in FI, thus decreased FCR (P=0.025) when compared to that mash regimen. In the latter period, FCR and BWG did not differ significantly between crumble-fed and mash fed pullets although feed consumption of crumble-fed birds was lower (P=0.033) than those on mash-regimen.

For the entire growth period (d 1 to d 112), cumulative FI was reduced (P=0.028) and BWG was improved when birds fed on crumbles instead of mash. Consequently, FCR was improved (P=0.006) with crumbling of the feed. Coarse grinding creals passing through a 8-mm screen slightly decreased cumulative feed consumption (69 g) and numerically increased BWG of pullets compared with that FG procedure using a sieve with 4-mm screen. This evoked statistically sifnificant (P=0.045) improvement in FCR in favour of CG regimen. A sifnificant statistical (P=0.033) interaction of particle size by feed form was observed for the overall BWG. Pullets benefited from CG feed provided that in the form of crumble, but no such effect was seen when feed was prepared as mash.

Weights of the crop, proventriculus, gizzard, pancreas and liver were influenced by physical form of the diet. At 112 d of age, the crop, proventriculus, pancreas and liver were heavier (P<0.05) in pullets fed mash diet than in pullets fed crumbles. Moreover, pullets fed mash diet had markedly heavier (P=0.001) gizzard than pullets fed crumble. No other effects of the feed form on GIT traits were observed.

The particle size of the diet affected the relative weights of digestive organs except for pancreas and the total small intestines. Pullets fed on CG feed had higher (P<0.05) crop, proventriculus, gizzard, liver and caecum weights than pullets given finely ground diets. Neither particle size nor the physical form of the feed affected the total and each segment of the small intestines including duedenum, jejenum and ileum.

Conclusion

In summary, the data emphasize the importance of ingredient particle size and feed form on the development of the GIT, which mirrored in the performance indices of the layer pullets at varying levels. However, the effect of particle size was less pronounced than did the feed form. Data also indicates that, from a nutritional point of view, the creals used for pullet feed can be ground more coarsely than is current practise, irrespectively of feed form.

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Microbiological and Nutrient Analysis of Spiriluna platensis Produced in Poultry Manure Enriched Medium.

M. Tufan[1] İ. Polat Açık[1], N. Toy[1], H. Cinli[1], M. Durmuş[1], M. Ünal, H. R. Kutlu[1]

[1] Agricultural Faculty, Department of Animal Science, Çukurova University, Adana, Turkey,

Introduction

Spirulina platensis is an interesting source of important protein for both human and animal consumption, which is cyanobacteria, is a crucial functional food additive. Spirulina platensis which is a photosynthetic micro algae, contains high crude protein content (62-70%) as well as precious metabolites (Fox, 1996). Recent studies have propound that dry chicken manure can be used as low-cost nitrogen source in cultivation of Spirulina platensis (Ungsethaphand at al., 2007).

Dry chicken manure(DCM) contains most of elements particularly nitrogen (N) and phosphorus (P) which microalg need for growth and flourish. In Turkey, about 7 million tons of poultry manure creates environmental problems per year(Eleroğlu at al., 2013). The aim of study, cell density was counted and dry biomass were analyzed (DCM medium) was to compare the microbiological quality of Spirulina platensis cultured in standart medium and DCM medium.

Materials and methods

Pure Spirulina platensis culture was supplied from The Culture Collection of Algae and Protozoa (CCAP) / U.K. DCM was provided from Çukurova University Faculty of Agriculture, Research and Application Farm. DCM (200g/L), sodium bicarbonate (40mg/L) and sodium metabisulphite (5 mg/L) were added to DCM culture medium (Ungsethaphand at al., 2009; Ungsethaphand at al., 2007; Venkataraman at al 1969; Piorreck at al., 1984). Culture volumes were extended from 250 ml to 20 L. Cultures were illuminated with daylight fluorescents and aerated with air pump. The biomass was harvested by using 42 µm mesh filter at 22nd day of the cultivation when culture reached maximum density. Then algae was rinsed with tap water, dried in drying oven at 600C - 6 hours and floured. Dried Spirulina platensis was analyzed for nutrient contents (dry matter, crude oil, crude ash, crude protein) according to Weende method.

The dried samples were microbiologically tested for the presence of bacteria such as, Salmonella spp., E.coli, Campliobacter spp., Coliform, Enterococcus spp., Lactic acid bacteria spp. Total count of aerobic mesophilic bacteria was also determined. Bacteriological test were by means of standard methods of isolation of individual species of bacteria as reported by ISO requirements.

Results

Growing parameters of Spirulina platensis cultivated in DCM medium (20 days); 421.8 mg/L cell, 3.40 mg/g chlorophyll-a density.

Nutrient composition of Spirulina platensis cultivated in DCM medium; 93.90 dry matter, 8.35 ash, 1.50 oil, 61.77 protein, 2.61 cellulose.

In the result as Salmonella, Campliobacter, E.coli, Coliform bacteria were not found in the both of control and treatment samples (DCM meculture medium). Enterecoccus spp. were found 3.91 log 10 cfu/gr for control, and 2.01 log10 CFU/gr for treatment groups respectively. Total count of aerobic mesophilic bacteria were determined 5.53 log10 CFU/gr for control and 2.98 log10 CFU/gr for treatment group respectively.

Conclusion

Depending on the growing conditions, Spirulina platensis contains crude protein, essential fatty acids, carbohydrates, vitamins, minerals, carotenes, phycocyanins, chlorophyll a (Vonshak, 2002). Spirulina, which has been important as ecologically and economically cell protein, is cultivated in poultry manure enriched medium, one of the environmental pollutants, affecting environmental recovery positively. It is important that the grown biomass does not carry microbial contamination of poultry that can cause disease for humans.

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Quality Control and Feed Quality in Feed Mill

M. Yılmaz, Y. Gurbuz
University of Kahramanmaras Sutcu Imam, Faculty of Agriculture, Campus of Avsar, Kahramanmaras-Turkey

Introduction

Feed Mill who regularly examines their company's mission tend to have a sense of who they are and where they are going. No other factor directly or indirectly related to the proper nutrition and high performance of animals is more critical than feed quality control and ration uniformity. In this commentator, information about quality control in feed production will be given. Although there can be abundant task statements, an overall mission of feed formulation and manufacturing might be: To offer customers with proficiently manufactured, safe, high-quality feeds that are suitably brought to their facilities and constantly contain the available nutrients required by animals for body maintenance, growth and reproduction.

Feed quality assurance (QA) program should succeed the materials (ingredients and supplies), equipment, personnel and procedures to proficiently bring a safe feeds that reliably contain the formulated nutrients to optimize the production of meat, milk and eggs. QA states to the rules, procedures and process controls that yield a consistent product, where as quality controls are the in-plant process that assure quality factors are saw during getting, manufacturing and sending. QA is a wide-ranging program of controls directed at safeguarding the production of feeds that meet a predefined set of standards (Rydell, 2005; Boyd, 1993). Since the development of an actual QA program, control rules and processes must be modified to the needs of each ability, this article will focus on the basics of a feed QA program and quality control measures rather than on specifics in the hope that the conversation will motivate thinking and revolution in the field of feed-quality and controls.

Feed Quality programs

A feed mill's business model should define the goals and objectives that must be happened to either maximize sales or optimize the production of meat, milk or eggs. A wide-ranging QA program will contain employee training, ingredient specifications and traceability, QA manual, standard operating procedures, critical control points, sampling and methodical schedules, reporting systems and analysis processes.

In addition to meeting the goals of the company's business model, the QA program must also safeguard the production of safe feed. Feed Quality Assurance Program (NGFA, 2002) contains six components that should be included in a QA guide:

- Feed ingredients receiving;
- Feed process control;
- Feed sampling and labeling;
- Feed product studies;
- Hygiene and pest/rodent control,
- Feed cargo and transport;

Feed ingredients receiving;

Feed mills do not have a mystic formula for improving poor-quality ingredients, but through the use of ingredient separation, grinding equipment, long-term conditioning and pelleting, the nutrient utilization of ingredients can be developed. In today's competitive business surroundings, product variation will lead to a loss of customers and variation in animal performance. Ingredients can account for 70-90% of the cost of producing feeds. Also, as feed mills get bigger, the percentage of the total cost accounted for by ingredients will tend to increase. Then many of the major feed ingredients originate as by-products from other industries, feed manufacturers often discovery themselves organization the difference of these by-products in an effort to change low-quality, in consistent ingredients into a consistent feed that happens the nutrient requirements of animals. However attractive it may be to purchase low-cost, inconsistent-quality ingredients, feed mills usually are not designed to manage ingredient variation and often do not productively accomplish the distinction. The result of not managing the variation is an inconsistent feed both in terms of nutrient content and physical form. Not only does it make good economic wisdom to pay consideration to ingredient quality, but a great portion of the variation in the nutrient content of finished feeds can be traced to ingredients. In fact, one poultry company was able to associate ingredients with 40-70% of the variation in nutrient content of the finished feeds (Jones, 2010). Nutrient content variations disturb the primary objective of feed manufacturing and cost in terms of performance. Feed mills that do analyze prior to receiving as argued earlier may not have the ability to isolate and re-formulate based on receipts, especially in large plants that turn their record several times a week. Therefore, predictableness is important with respect to feed ingredients. Ingredients must be foreseeable not only in their nutrient content but their physical properties.

Therefore, most manufacturers control on supplier/plant histories Feed ingredients must be defined in terms of analytical values (moisture, protein, fat, etc.), and second, they must be termed in terms of physical and/or sensory characteristics (density, color, odor, etc.). The first depiction defines ingredients in terms that analytical chemists understand, while the second describes ingredients so that the feed mill personnel can make judgments about ingredient value.

The ingredient quality received by a given feed manufacturer begins with your providers. Ingredient quality received at a given facility may well be a reflection of what your suppliers believe you want in terms of quality. Consequently, the first task in a good feed quality assurance program is to design an methodology to connect your commitment to quality to ingredient suppliers(McEllhiney 1981). While there can be a myriad of approaches, the following steps outline one approach to communicating your commitment to quality:

(a) If you are committed to obtaining quality ingredients, your actions must reflect that promise, otherwise your suppliers will understand through your lip service and supply the ingredient quality your actions have indicated you want. This means that companies must not just look for bargains (low price) in feed ingredients, that quality must be top.

(b) Visual appearance of the product, physical characteristics (e.g., grind or bulk density) of the product, expected analytical analyze values, sampling procedures, analytical analyze methods, criteria for rejecting to accept ingredient cargos and the process for deficiency claims. These terms with your suppliers to determine whether or not they can supply your needs. Companies should have an agreed supplier list of those companies that meet your quality needs. The approved supplier list and ingredient specifications should be sent to the receiving personnel, the laboratory leader and buying agent.

(c) All received ingredients is particularly important at this point to be definite that samples of the load are collected suitably. After sample collection, correct on-site quality-control tests (e.g., moisture, test weights, mycotoxins, rancidity, etc.) should be accomplished. If the cargo is found deficient, it is important to throwaway the load. While elimination of deficient loads may seem to be a drastic stage, it is a step that will permission no hesitation in your supplier’s mind as to your promise to value. (d) The values obtained from these analyses will provide you with a continuing estimation of the quality of your supplier’s product.

This stage is also essential since laboratory results are basic to provide the last decision of ingredient quality. (e) Feed mill managers, nutritionists and purchasing agents must have reports that let them to make suitable management decisions to improve ingredient quality.

Generating analytical results that are not used in organization or buying decisions due to a poorly planned report is both a waste of time and resources in a company. Diagrams can be used to demonstrate quality over a period of time and can include upper and lower control limits.

(f) Contract your suppliers know that you are awake of the quality of their product. This will support your dealers know that you really care about receiving high-quality ingredients.

(g) If you do not adjust your formulas to reflect the actual tries, in effect, you have missed much of the time and money you spent on the proves.

(h) Purchasing on fee alone does not account for all of the price connected by the use of products, since there is a cost of use associated with each product. In other words, the manufacture system must be modified to the use of each product. While adaptations cost, this cost is frequently ignored because it is hard to measure. In terms of feedstuff quality, this means that variations in the nutrient content of finished feeds may be associated with the number of suppliers and that each seller is an extra source of difference.

Feed process control

High-quality feedstuff are made into high-quality feeds includes three modules within the feed mill: personnel, equipment and procedures. If quality is missing in any of these three components, the consistent manufacture of high-quality, safe feed is not likely

Personnel. Three general appearances should be required in new mill staffs: productivity, interest or awareness and the ability to work as a team member. Employees should complete a formal exercise process that outlines their duties in manufacturing a safe, quality feed (Stark, 2010).

This training should contain not only what job to do, but why the job is required. Employees should be educated firstly and reminded sometimes through the performance analysis process how important their job is to the total quality effort and how their performance compares to that of their work description.

Equipment. Equipment choice, process, repair and troubleshooting can become a very complex matter, which can not be covered sufficiently in a short space. Nevertheless, applying the following overall points to each specific piece of equipment will help decrease equipment problems

• Was the equipment designed to do the job it is doing? Application

• Was the equipment installed according to the manufacturer's recommendations? Installation

• Are the critical adjustment points within the machine set correctly? Adjustment

• Is the machine being operated according to the manufacturer's recommendations? Operation

• Is the equipment being run within the rated capacity? Capacity

•Is the correct amount and type of lubricant used within the time frame suggested by the manufacturer? Lubrication

• Does your company have a written preventive maintenance program? Maintenance

Procedures. Feed mills either don't have printed typical operating procedures (SOPs), haven't trained their staffs to the SOPs or don't follow them as printed. SOPs should be established for each critical action in the feed manufacturing procedure. Procedural problems are common difficulties in feed mill processes. They should be involved in new worker training and the operator certification procedure. Every procedure founded should combine the following:

• Communication: Does the person doing the procedure recognize what is estimated? If another person had to take over their job would he/she know?

• Identification: Are controls on equipment obviously identified? Are bagged ingredients clearly labeled and stored in an orderly manner?

• Traceability: Will this process allow you to trace problems to their source?

• Verification: Are samples being taken and stored that will let you to verify the source of the problem?

• Records: Are all records being kept of use? If records are of no use or potential use discontinue gathering. Useful records should be stored in a clean, safe and accessible home.

• Safety: Does the SOP framework the safety processes (lockout/ tag-out, permits, etc.) and the suitable personnel protective equipment required to properly complete the process?

Produced feed labelling

In many conditions, feeds are used quickly after they are mass-produced and animals eat the feeds before any analyzes can be made. How much finished-feed sample and analysis should be done? While the response to that question will depend on many factors, a common rule of scan is to gather two samples of each formulation per week or one per batch.

Combined processes should progress a sampling database that takes one or two feed samples on each move in order to screen the manufacturing procedure during the week. Commercial actions should gather a sample of each batch run in the event that there is a customer protest. Labeling feed fittingly and the final review of the feed labels is classically the accountability of the QA group. Labeling requests may differ from state to state; so, it is vital to be familiar with the requirements of the state(s) in which you manufacturing and sell feed.

Feed transport, delivery

Feed transport and transfer is the latest step in the manufacturing procedure. Written databases should outline the stages the delivery driver must take previous to filling the truck, during the loading procedures and, lastly, how the feed is distributed at the farm.

The processes should outline sequencing and flushing stages at the farm or upon arrival at the feed mill. In addition to the delivery procedure, there must be acceptable papers to trace the product from the feed mill to the transport place. This data is required in the event of a product recall. The info is also required for companies that must follow to the rules established in the Food & Drug Administration's bioterrorism act of 2002. Lastly, delivery trucks and trailers should be inspected as part of a routine defensive maintenance program. The check should look for material build-up in transfer points, broken doors, cracks in the units and damaged transfer equipment (screw and drag conveyors).

Cleaning precautions, pest/rodent control

A well planned and performed housekeeping program also helps control pests (insects, mice, rats and birds) by removing their food and water sources and nesting areas. Clean feed mills are a result of the commitment of the organization, machinists and maintenance group. The director must set the housekeeping principles and anticipations and then lead by example, machinists must maintain a clean work area and description problems to organization and maintenance staffs must seal all conveyors and safeguard the dust control equipment is effective correctly.

Producted feed investigations

A written program should be established to handle buyer complaints, feed studies and recollections. Customer criticisms should be examined directly using a checklist that summaries the inquiry steps and forms the results and corrective actions of the criticism. In the event that an inquiry results in a memory, there should be a their tasks.

Recollection team members characteristically contain individuals from feed manufacturing, quality assurance, sales, organization, lawful or regulatory and public relations. The feed recollection plan should be studied annually and a simulated recall conducted at least once every two years to evaluate the usefulness of the recall plan, procedure and group.

Process control points in feed mill

Quality control in feed manufacture is of greatest importance in the complete achievement and productivity of animal farmhouse. Once quality staffs, equipment and processes have been well-known with a QA program, control can best be continued by applying effort at the "critical quality control points" in the mill (Charles and Frank 2010). These "critical quality control points" are: Ingredient stock: Ingredient stocks can be trying to mill staffs. However, since record programs provide manufacturers with a measure of testing to see that the accurate amount of ingredient has been used in a given time period, these databases can let manufacturers to clasp faults before they get out of hand

Bunker cleaning: If containers are not periodically cleaned, feedstuff or feeds can build up on the sides, encouraging mold development and cross infection. The feed mill must have a written limited space program, which detects both the confined spaces and permit-required spaces. Employers that require staffs to enter confined spaces must deliver the correct bin access equipment and training for each specific involved in the process.

Checkup of equipment: While maintenance processes should safeguard that equipment is periodically examined, certain critical points and equipment parts should be examined more regularly. Discharge gates and elevator waders should be cleaned and inspected for wear or leakage.

Grinding: If the hammer mill and/or other grinding equipment do not work correctly, then mixing, pelleting and animal performance may unsuccessful. Therefore, hammer and screen condition and abrasion should be checked weekly. Magnets should be cleaned and checked for correct operation daily or at the shift change. Grind uniformity should be checked visually each shift to guarantee that there are no holes in the screens.

Hammer mills are characteristically selected in processes that produce pellets due to their ability to produce a consistent fine crushed product, easy process and insignificant maintenance necessity.

Batch verification system: Batch system should be done on a monthly basis. Begin the validation procedure by confirming that a clean finished-feed bin is obtainable. Following, batch and mix a mash formula in the typical way and record the batch weight.

Mixing: Mixing is one of the most critical periods in any feed manufacturing process.

Pelleting and cooling: Pelleting and pellet cooling is a multifaceted procedure that has a number of input variables that must be regularly watched and adjusted. Particle size, mash moisture, steam quality and air temperature and humidity will affect the quality of the feed.

Meters and scales. If the mixing procedure is under control, whether or not the formula is made according to the nutritionist's advice may well depend on the accuracy and adjustment of the scales and meters. Consequently, each facility should own and use test weights to check the calibration of scales weekly.

Truck control and cleaning: Trucks are occasionally ignored as a source of moisture, mold and drug contamination. Companies should have flushing and sequencing procedures in place to prevent cross-contamination of medicated feeds.

Conclusion

When a problem is discovered, it should be addressed and resolved as soon as possible. The stages outlined under are one method of addressing finished-feed problems;

- Inquire the lab to recheck the assay and continue to examine the problem. Is the assay correct?
- How was the sample taken? Was the sample demonstrative?
- Is only one nutrient level out of control or are numerous?
- Was the regular team operational the mill when the feed was produced?
- Check inventory records for any differences between the actual and predicted account records.

- Check the scales and metering devices for accurate adjustment.
- Check feedstuff and produced-feed silos at the feed mill for hang-ups or linking problems.
- Recheck the mixing time to be certain it is accurate for the ration complex.
- Check the feedstuff assay values to see if they show a lacking load was received

• Check the formula matrix to be certain that ingredient analyze values are accurate and reflect the values currently being received.

After going through these 10 steps, it is probable that you may still not know what caused the problem. While this is frustrating, your labors have not been in vain. Laboratory staffs, the mill workers, the office staff, the nutritionist and several other persons have all become aware of your company's dedication to the production of high-quality feeds.

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The effect of yeast fermented diet supplementation on growth, fecal microbiota and ileum histomorphology of of quails (Coturnix coturnix Japonica).

F Saydut, I Coskun*

Kirşehir Ahi Evran University. Agricultural Faculty. Department of Animal Science, Kirşehir, 40100, TR

Introduction

Food additives as a growth promote have been used to increase animal performance by decreasing stress factors, subclinical disease challenge or pathogenic bacteria in industrial animals. After the ban of antibiotic using as a growth promoter, different food additives have been researched for two decades. Jung et al., (2010) reported that there is an urgent need to determine eco-friendly food additives as a growth promoter instead of antibiotic use. In earlier studies, it was determined that fermentation of feedstuffs with different bacteria increased performance of broiler chickens. For instance, Mathivanan et al., (2006) reported that A. niger fermented soybean meal boosted broiler performance and ileum villi length. Sun et al., (2013) reported that B. subtilis fermented cottonseed meal enhanced LAB and ileum villi length in broiler chicks. Although fermented different feedstuffs have been used in earlier studies. There is no study on the fermented feed or ration in literature. Therefore the aim of this study was to investigate the effect of yeast fermented diet supplementation to the quail diet on weigth gain, fecal microbiota and ileum histomorphology.

Materials and methods

Quail diet diluted 1/1 distilled water and fermented with yeast at 24 hours. One hundred twenty male quails aged 21 d were used in this study and the trial lasted for 21 days. Three dietary groups were confirmed. Dietary groups were 1) control. 2) M1 group (%5 fermented diet supplementations) 3) M2 group (%10 fermented diet supplementation). In this study 21 day old 120 male quails 123 ±1 g were used. 120 quails distributed into three groups with four replicate (each replicate included 10 male quails). Experiment lasted 21 day. Weight gain, feed intake and feed conversion ratio (FCR) recorded weekly. Mortality was not calculated since there was no death in any treatments.

Samples of the caecal contents were collected into sterile glass tubes in which they were kept on ice until subsequent inoculation into agars. Lactic acid bacteria (LAB), yeast, count determined in caecal samples. Ileum villi length and width were evaluated by using an image processing and analysis system (ZEN 2012 SP2) for Zeiss Primo Star HD Light Microscope. The data were analyzed using the ANOVA procedure of SPSS software (SPSS 15).

Table 1. The effect of yeast fermented diet supplementation on growth, fecal microbiota and ileum histomorphology

	Control	M1	M2	SEM	P
Feed intake (g)	490.58	465.83	471.33	5.67	0.178
Weigth gain (g)	148.50	157.06	151.42	2.50	0.399
FCR	3.32	2.99	3.12	0.08	0.246
LAB	7.28	7.04	6.52	0.17	0.156
YEAST	5.97	6.49	6.38	0.12	0.128
GITL (cm)	22.70b	23.70b	25.77a	0.46	0.016
GITW (g)	2.39b	2.73a	2.35b	0.07	0.024
Villi length (μ)	250.80c	274.25b	309.19a	0.29	0.001
Villi width (μ)	34.87b	40.57a	36.00a	0.73	0.001
Crypt depth (μ)	14.60b	18.66a	16.36b	0.40	0.001

SEM= Standart error of means.

Results

At the end of the study growth parameters did not change but weight gain was tend to in M1 group and feed conversion ratio developed in M1 group. Gastrointestinal length (GITL) increased in dietary groups ($p<0.05$). Gastrointestinal weight (GITW) increased in M1 group. Gizzard increased M2 group ($p<0.05$). Villi length increased linearly in dietary groups ($p<0.01$). Villi width and crypt depth increased M1 group ($p<0.01$). Fecal microbiota did not change. But fecal yeast count was tend to increase in M1 group.

Conclusion

At the end of this study, it was found that %5 fermented diet supplementation developed weight gain and FCR, GITL, GITW, villi length, villi width and crypt. To conclude %5 fermented diet supplementation can use to improve growth parameters, ileum histomorhological parameters. Digestive system and fecal microbiota in male quails.

Acknowledgements

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Egg Production and Egg Quality Traits of Breeder Pheasant Fed Diets Supplemented With Dry Oregano (Origanum Vulgare Subsp. Hirtum L.) and/or Nettle (Urtica Dioica L.) Leaves

O. Öçalan[1], A. Yıldırım[2]

[1]Sheep Breeding Research Institute, Department of Feed and Animal Nutrition, Balıkesir/Turkey

[2]Gaziosmanpaşa University, Faculty of Agriculture, Department of Animal Science, 60240 Tokat/Turkey

Introduction

In Turkey, the natural dry oregano (Origanum vulgare subsp. Hirtum L.) and/or stinging nettle (Urtica dioica L.) leaf powder to breeder pheasants rations on egg yield and egg quality of pheasant and the lack of scientific research that studied the antioxidant capacity of this plant leaves, however it adds originality to this current research. In the present study, it was aimed to determine the effects of dry oregano and/or nettle leaf powder to diet on egg production and egg quality characteristics of breeder pheasants at the end of their laying period (55 weeks old).

Materials and methods

Eighty four breeder pheasant layers at the age of 55 weeks were randomly allocated to one of four treatments with three replicates of six female and one male breeder per treatment in a completely randomized design. The birds were fed standard layer diets control (0 g/kg), 10 g/kg oregano leaf powder (%1 OL), 10 g/kg nettle leaf powder (%1 NL) and 5 g/kg oregano+5 g/kg nettle leaf powders (%0,5 OL+%0,5 NL) for 8 weeks period. Feed and water were supplied ad libitum. The experimental diets were isonitrogenous and isoenergetic and were formulated to meet or slightly exceed the nutrient requirement of laying breeder phesants according to the NRC (1994). Breeder pheasants were weighed individually at the beginning and end of the experiment. Feed consumption was recorded weekly and calculated as g per pheasant per day. Viability was observed visually and recorded daily. Feed efficiency was calculated as g feed per g egg.

From the beginning of week 55 of the experiment to the last day of the experiment, eggs belonging to each group were collected once a day (at 15:00). Egg yield and internal, external egg quality characteristics were determined. Total antioxidant activity was measured using Oyaizu's (1986). A total phenolic constituent of OL and NL was performed, employing the literature methods involving Folin-Ciocalteu reagent and gallic acid as standard (Slinkard & Singleton, 1977). The data were analysed by SPSS 17.0 software for Windows (Inc. Chicago, IL. USA).

The differences between groups were determined by one-way ANOVA test. All values were presented as means and standard error mean and significance levels were set at $P < 0.05$.

Results

The results showed that dry oregano and/or nettle leaf powder supplementation did not have significant ($P>0,05$) effects on body weight, livability and feed efficiency while %1 NL supplementation had effect on feed intake and egg weight towards increasing ($P<0,05$). Overall, there were no differences among groups in external egg quality parameters, except egg shell thickness and egg shell weight ($P>0,05$), while significant increase in %0,5 OL + %0,5 NL group was observed in albumen pH of internal egg quality. The trolox equivalent antioxidant capacity (TEAC), ferric reducing antioxidant power (FRAP) and total phenolics concentration of OL and NL were 0,114±0,003 mmol trolox/g, 0,148±0,016 mmol TEAC/g and 39,145 ±0,696 g gallic acid equivalents (GAE)/kg; 0,078±0,002 mmol trolox/g, 0,084±0,003 mmol TEAC/g and 15,406 ±0,369 g gallic acid equivalents (GAE)/kg respectively.

Table 1. Effects of dietary OL and NL on means of external and internal egg quality characteristics

Parameters	Control	%1 OL	%1 NL	%0,5 OL+%0,5	SEM[1]	P
Egg weight, g	$31,21^{b}$	$31,39^{b}$	$32,07^{a}$	$29,80^{c}$	0,147	**
Shell breaking	1,28	1,18	1,36	1,50	0,078	ns
Egg shell thickness	$288,2^{b}$	$293,4^{b}$	$308,3^{a}$	$291,9^{b}$	2,47	*
Shell weight (g)	$2,86^{b}$	$2,99^{ab}$	$3,23^{a}$	$2,96^{ab}$	0,048	*
Albumen index	10,18	10,32	9,70	10,26	0,142	ns
Yolk index	41,39	40,57	40,15	41,06	0,295	ns
Haugh unit	88,20	89,70	83,95	89,61	0,953	ns
Yolk colour	10,42	11,33	11,00	10,62	0,140	ns

OL: Oregano leaf; NL: Nettle leaf; [1]Mean of the standard error; Means within a row with different superscripts differ significantly. * $P<0.05$; **$P<0.01$.

Conclusion

As a result of research, it could be said that only %1 NL supplementation in a breeder pheasant's diet did change the egg production performance of layers and there is only a positive effect on egg weight and egg shell quality increase which could contribute to efficiency of producing hatching eggs.

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The Effects of Age of Grafted Larvae and Number of Grafted Larvae on Weight of Queen Bees

S. Okuyan[1] E. Akyol[2]
[1]School of Environment Natural Resources and Geography Bangor University Gwynedd, LL57 2UW, UK
[2]Niğde Ömer Halisdemir University Faculty of Agricultural Sciences and Technologies

Introduction

The weight of queen bees is significant for acceptance rate, mating ratio, the onset of oviposition after emergence, diameters of spermatheca, and the number of sperm in the spermatheca (Ethem Akyol, 2008). The age of grafted larvae is the most important element affecting the quality of queen honey bees and their physical characteristics (Mahbobi et al. 2012; Woyke, 1967). According to Korkmaz et al. (2005) Younger larvae enable the production of high quality queen honey bees. In addition, number of grafted larvae can change to quality of queen bees.

Materials and methods

This study was conducted between 19th June and 11th July. In this experiment, one breeding colony which included an artificially inseminated Apis mellifera anadolica (Muğla ecotype) queen bee was used. 495 plastic queen cell cups, and eleven starter hives were used. Moreover, royal jelly was used throughout larvae transfer. In addition, grafting tools and 495 queen bee hair roller cages were employed. Shimadzu TW423L sensitive scale was used to measure the body weight of the queens. Moreover, CO_2 tanks were used to anaesthetize queen bees, which allow for an easy measurement of the physical parameters of the queens. Royal jelly pen and a small dark glass jar were used to collect and store royal jelly. A refrigerator was used to keep freshly collected royal jelly in 4°C. Furthermore, two wet towels were used to protect larvae from dryness during transfer from the transfer room to the site of starter hives. 240 larvae (one, two, and three days old) were grafted into 4 different starter hives, 135 larvae (one, two, and three days old) were grafted into three different starter hives, and 120 larvae (one, two, and three days old) were grafted into four different starter hives.

Thus, there are four cell starter hives comprise 60 larvae, three cell starter hives comprise 45 larvae, and four cell starter hives comprise 30 larvae. Weight (mg) of queen bees were measured after immediately hatching.

Results

Totally, 495 larvae were grafted to rear queen bees, and 414 queen bees were reared. Thus, the overall larvae acceptance rate was calculated as 83%. Grafted larvae age had a statistically significant effect on the wet weight (n=414; mean=166.37 mg; P<0.001), Grafted larvae number, however, did not have significant effect on queen bees wet weight (n=414; mean=166.9 mg; P>0.05).

Table 1 overall queen weights

NGL LA	30	45	60	Average	P
1	177.34	179	169.11	173.60^{a}	***
2	167.53	165.92	167.16	166.91^{b}	
3	158.97	163.38	155.83	158.70^{c}	
Average	167.82	168.93	164.23	166.37	
P		NS			

LA, larval age; NGL, number of grafted larvae; P, p value; NS, no significant

NS: P>0.05; ***: P<0.001

Conclusion

Age of grafted larvae has a significant effect on queen bees weight both this study and (Mahbobi et al. 2012), and Akyol et al (2008) illustrated that weight of queen bees has significant effects. On the other hand, the number of grafted larvae did not have a significant effect on queen bees body weight, and there appears to be no previous research exploring the effects of grafted larvae number on queen bee weight. Depending on the result of this study suggest that one-day-old larvae are allowing to rear heavier queen bees.

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Life Force of Colony and Wintering Ability of Caucasian Honey Bee (Apis mellifera caucasica) Colonies in Mediterranean- Black Sea - Continental Climatic Regions of Turkey

S. Akturk, S. Gunbey
Apiculture Research Institute, Republic of Turkey Ministry of Agriculture and Forestry, Ordu, Turkey

Introduction

In Beekeeping, year-long processes consist of interdependent periods. Annual achievements of production, cultivation and maintenance are reached with correct definitions and works made in previous period. We should think these periods like the rings of a chain and undoubtedly the wintering stage is one of the most important parts among them (Jevtic et al.,2005; Genc and Kaftanoglu, 1993). Geographical and topological properties of Turkey lead to alternating climate types of different properties, and among them there are major differences in terms of temperature, humidity, daily temperature changes etc. in winter period.

Materials and methods

In this study, Mersin which located in mediterranean climate region Ordu which located in black sea climate region and Ankara which located in continental climate region, cities preferred and effect of these different region to wintering ability and life force of colony was investigated. İn this research, 3 level of city factor as Ankara, Ordu, Mersin; 2 factors of altitude as city level and above city level was existing. height difference for levels was almost 600 m. 7 sub group of observation was considered at the beginning of the study. Tukey multiple comparison test was used for determining of differences between subgroups. percentage values in terms of wintering ability characteristic experimented by reverse angle transformation before percent value variance analysis.

Results

For city level factor Ankara, Ordu, Mersin and general averages, respectively; 32,71 ± 2,62, 32,50 ± 3,46, 12,60 ± 3,10 ve 25,93 ± 1,78. For above city level factor, respectively; 39,00 ± 2,62, 40,66 ± 2,83, 10,50 ± 3,46, 30,05 ± 1,72. For 3 level of city factor as Ankara, Ordu, Mersin general averages respectively; 35,85 ± 1,85, 36,58 ± 2,23, 11,55 ± 2,32. Tukey multiple comparison test was used for determining of between 3 level of city factor. Wintering abilities of Ankara and Ordu cities was higher than Mersin city statistically. Besides, for life force of colony in terms of city level and above city level Ankara, Ordu and Mersin respectively; %100 - %100, %57 - %86, %71 - %57.

Table 1. Descriptive statistics values and comparison results for life force and wintering ability

City	Altitude	n	Life force (%)	Wintering ability (%)	General averages (%)
Ankara	City level	7	100	32,71 ± 2,62	35,85 ± 1,85 A
	Above city level	7	100	39,00 ± 2,62	
Ordu	City level	4	57	32,50 ± 3,46	36,58 ± 2,23 A
	Above city level	6	86	40,66 ± 2,83	
Mersin	City level	5	71	12,60 ± 3,10	11,55 ± 2,32 B
	Above city level	4	57	10,50 ± 3,46	

Conclusion

As a result, this work shows that beekeepers can reassessment the mediterranean climate regions which have high temperatures and sudden temperature changes in winter. Also, unsuitability of mediterranean climate regions for caucasian honey bees was similar to previous study (Güler, 1995). And new studies should be made by adding different species of bees for the performance of overwintering in different climates.

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Effects of different packaging materials on content of heavy metal in honey

E. Akyol, A.Unalan, R. Battaloglu, D.A. Ceylan, A. Gul, A. Yoruk, A. Ceyhan

Nigde Omer Halisdemir University, Faculty of Agriculture Sciences and Technologies, Nigde, Turkey

Introduction

Natural honey is one of the most widely sought products due to its unique properties, which are attributed to the influence of the different groups of substances it contains. Honey is used for nutritional, medicinal and industrial purposes and it is an important commodity in the international market (Buba et al, 2013). Some factors can affect heavy metals contents of honey. Metals are pollutant residues detectable in honey and in fact account for most of the inorganic pollutants found in this food product. Metal pollutants can be accumulated through the food chain and, at levels exceeding safe thresholds, can be toxic to humans and even damage physiological functions (Mejias and Garrido, 2017). Heavy metals contents of honey, like the other food products, is also very importance for human health. It is well known that packaging materials of food products is one of deterministic factors on heavy metals contents of the foods. For this purpose, this study was carried out to determine the effect of different packaging materials on heavy metal contents in honey.

Materials and methods

Honey samples in the study were obtained from a beekeeper in the Nigde region. Analyzes of heavy metals contents (Iron-Fe, Copper-Cu, Chromium-Cr, Cadmium-Cd, Nickel-Ni, Lead-Pb and Zinc-Zn) of honey samples with 5 samples in each groups; fresh/raw honey (non-packaging group) as the control group; four experimental groups are as glass jar, plastic bin, tin box and pet bottle packaging materials after they were stored for one year period, chemical analysis were made in the laboratory of Nigde Omer Halisdemir University, Faculty of Agriculture Sciences and Technology. Before the variance analysis for statistical analysis of data, all data was checked for normality by Shapiro Wilk test in SPSS program (SPSS, 2009) and it was seen that the distributions were normal in all groups. Then data were analysed by One-way ANOVA to see the effects of different packaging materials on the heavy metals contents of honey. And then, the Duncan test was also used for multiple comparisons tests for statistically significant groups.

Results

Variance analysis showed that different packaging materials did not cause a statistically significant difference (P>0.05) in the Cu, Cd and Zu contents of the honey; however, it was also found statistically significant difference for Fe, Cr, Ni and Pb contents (the tin box group has higher values of Fe, Cr, Ni and Pb than the other packaging materials groups, P<0.01) (Table 1). Besides, although tin box had the highest contents of all investigated heavy metals in honey than the other packaging materials, glass jar had the nearest values to the fresh honey heavy metal contents.

Table 1. Variance analysis results for heavy metal contents (Mean ± SE, µg/g) of different honey packaging materials

Groups Heavy medals	n	Control	Glass Jar	Plastic Bin	Ped Bottle	Tin Box	P
Fe	5	1.326±0.163 [b]	1.370±0.112 [b]	1.377±0.164 [b]	1.395±0.095 [b]	2.988±0.068 [a]	**
Cu	5	0.148±0.020	0.150±0.016	0.159±0.025	0.203±0.039	0.278±0.125	NS
Cr	5	0.481±0.145 [b]	0.778±0.139 [b]	1.003±0.724 [b]	0.824±0.236 [b]	1.870±0.482 [a]	**
Cd	5	0.110±0.002	0.130±0.010	0.145±0.014	0.140±0.015	0.153±0.012	NS
Ni	5	0.594±0.192 [b]	0.699±0.176 [b]	1.112±0.590 [b]	1.054±0.203 [b]	1.933±0.051 [a]	**
Pb	5	0.123±0.039 [c]	0.299±0.118 [bc]	0.458±0.099 [b]	0.315±0.078 [bc]	0.734±0.056 [a]	**
Zn	5	2.484±0.210	2.751±0.437	2.940±0.361	2.890±0.365	3.219±0.201	NS

** P<0.01, Different leters in the same row indicate statistically significant differences (Duncan, P<0.01) NS: Non-Significant

Conclusion

As can be seen from the results given in Table 1, like many food products, the type of packaging materials used during storing of honey would have a significant effect on the content of heavy metals in honey, and this is particularly a problem that needs to be carefully considered in terms of human health.

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Determination of conservation priorities in Bombus terrestris populations in Antalya region by using microsatellite markers

B. Argun Karsli, F. Gürel
Department of Animal Science, Faculty of Agriculture, Akdeniz University, 07070, Antalya, Turkey

Introduction

Bumble bees are among the most recognizable, abundant and ecologically important groups of pollinating insects. In natural plant pollinator communities, bumble bees are often considered keystone species because of their generalist pollination services, whereby they support plant community diversity by visiting both rare and common plant species (Memmot et al., 2004; Goulson et al., 2008; Burkle et al.,2013; Brosi & Briggs, 2013). Bombus terrestris L. is the most common bumble bee species found in Turkey and especially in the natural fauna of Antalya region. In addition, B. terrestris is reared extensively today on a mass scale and is widely spread commercially in many countries including Turkey where it is used as a pollination agent. In recent years, wild B. terrestris populations have been decreasing, likely due to reduced genetic diversity, habitat destruction and subsequent loss of nesting and food resources, inbreeding in fragmented wild populations, introduction of non-native parasites and impacts of pesticides (Goulson et al., 2008; Williams & Osborne 2009; Graystock et al., 2013). That is, wild bumble bee populations with low levels of genetic diversity may suffer from reduced population growth and increased disease susceptibility (Beekman et al., 2000). The ecological and economic importance of B. terrestris, coupled with their recent declines, has led to a growing interest in the investigation of bumble bee genetic diversity conservation. For this reason, the determination of conservation priorities for B. terrestris populations has become very important. In summary, the aim of this study was to analyze genetic diversity, genetic relationships and in the wild B. terrestris populations conservation priorities using microsatellite markers.

Materials and methods

Microsatellite-based genetic characterization has the potential to provide useful information for conservation of bumble bee genetic resources.

Based upon sites in which the same short sequence is repeated multiple times, they present a high mutation rate and codominant nature, making them appropriate for the study of both within- and between-breed genetic diversity (Sunnucks 2000). In this study, a total of 192 worker bee samples were collected from seven wild B. terrestris populations (AK, KM, DM, GB, TM, BB and FS). Total DNA was extracted from one leg of each of the sampled workers following a modified Chelex extraction protocol as described by Walsh et al (1991). All individuals were genotyped at twenty polymorphic microsatellite markers ((BT06, BT09, BT20, B100, B116, B118, B119, B121, B124 and B126). (B100, B118, B119, B124, B126, B132, B96, B11, BT06, BT09, BT20, BT28, BT26, BT10, BTMS0033, BTMS0119, BTMS0131, BTMS0082, BTMS0124 and BTMS0045) to quantify genetic differentiation and assess conservation priorities (Estoup et al., 1995, 1996; Funk et al., 2006; Stolle et al., 2009). And then 96 automated capillary electrophoresis was used for detect the sizes of the PCR products. Determination of conservation priorities in the B. terrestris populations, were made according to the methods described by Petit et al (1998) and Caballero and Toro (2002) by using MolKin program (Gutirrez et al. 2005).

Results

We applied different methods to assess conservation priorities for the wild B. terrestris populations. There were slight differences in results of the two methods. This may be attributable to their methodological differences [i.e., these methods quantify the importance of each subpopulation (line) in terms of maximization of gene diversity (Caballero and Toro, 2002) or allelic richness (Petit et al., 1998)].The contribution to genetic diversity of each populastion is shown in Table 1. According to the methods described by Cabellaro and Toro (2002) the highest contribution to genetic diversity was made by FS (-0.278), while the lowest contribution was made by the BB population (0.032). According to Petit et al. (1998), FS population (1.070) made highest and GB population (-0554) made lowest contribution to genetic diversity. This result indicates that the lowest contribution to total genetic diversity was obtained from BB according to the method of Caballero and Toro (2002), whereas the lowest contribution was obtained from GB according to the method of Petit et al. (1998).

Conclusion

The importance of preserving B. terrestris populations biodiversity has received increasing attention in recent years. The commercial populations gene pool lacks the considerable genetic diversity found in wild bumble bee populations, given that the commercial population gene pool has its root in a limited number of queen samples. Conservation of diverse wild B. terrestris populations genetic resources is accordingly considered to be important for sustainable natural ecosystem and commercial rearing production.

In conservation genetics, main objective is to preserve the genetic variability within populations, assuming there is a positive correlation between genetic variation and population viability. In conclusion, according to the results of this study, the FS population showed the highest genetic diversity in both methods of analysis. Therefore, conservation studies should be started from FS population.

Table 1. Contribution to genetic diversity in seven wild B. terrestris populations.

	According to Cabellaro and Toro			According to Petit et al.		
	Total (%)	Within pop. (%)	Between pop. (%)	Total (%)	Within pop. (%)	Between pop (%)
AK	-0.107	0.014	-0.122	0.449	0.071	0.378
KM	-0.074	0.079	-0.153	0.065	-0.362	0.428
DM	-0.109	0.018	-0.126	0.456	-0.175	0.631
GB	-0.021	0.173	-0.194	-0.554	-0.756	0.202
TM	-0.145	-0.175	0.029	0.109	0.486	-0.377
BB	0.032	0.084	-0.053	0.612	0.442	0.170
FS	-0.278	-0.208	-0.070	1.070	0.294	0.776

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Education of Royal Jelly Production for Female Apiarists in Ordu Province

U. Karatas
Apiculture Research Institute, Pk:10- Dedeli - Altınordu/Ordu

Introduction

Ordu province that is among the leading provinces in apiculture in Turkey takes the first rank in terms of colony number, honey production and honey efficiency per colony and since it has an opportinity of evaluating other apicultural products apart from honey provides royal jelly production in Ordu which has a high apiculture potential. In this Project it was aimed to provide women in Ordu to set up their own business with education of general apiculture and royal jelly production, create new employment opportunities by encouraging them for royal jelly production as well as contribute liberation of economical freedom of women and high nutritional value food production.

Materials and methods

The Project was conducted by 20 female apiarists in apiary of Ordu Apiculture Research Institution. In the Project the names of 20 female apiarists (curious for royal jelly production, vulunteer women) that will be fiven education were determined and these female apiarists were given education over Ordu Metropolitan Municipality Vocational and Art Training Centre. Female apiarists were given totally 80 hours of royal jelly education production as 40 hours of technical and 40 hours of practical training in Ordu Apiculture Research Institution. In the training after general apiculture education module, the trainees were subjected to royal jelly production as the specific subject. After training the çömen were subjected to written and practice exam. The women that are successful in the exam were given certificate by Ordu Metropolitan Municipality Vocational and Art Training Centre. This 40 hours of hands-on training and production activities was achieved in bee colonies in institution apiary field. Firstly colonies were equalized in terms of bee frame numbers and baby fields. The colonies of Ordu province are 10 frame colonies having young queens and equal power of worker bee population. Totally 200 colonies as 10 colony for each woman were assigned and they were provided to make production. The financial support of 200 bee colonies was supplied by Ordu Metropolitan Municipality.

The juice that is used in the Project was prepared homogeneously in juice preperation unit in Apiculture Research Institution. The prepared juice was given to each colony every day as 1 lt eachtime. The graft was done every day and each female apiarist made totally 20 frame larval transfer to each starter colony by using one transfer frame (in each frame 66 queen cells×20 frames = 1320 larval transfer).

So 20 women made 9240 graft (1320 ×7=9240) in a week and totally (9240×2=18480) 18480 graft were done in 2 weeks. The royal jellies obtained from colonies at each harvest were put into dark coloured bottles seperately and kept in deep freeze.

Results

With this project which was done, 20 female apiarists were incited to establish their own job, their self-reliance increased, the active usage of our other sources except from nut and honey was provided, and a new job employment for our women was created. It was seen that this project with high income would be a role model to our women especially from our province and in the other provinces and to the sectors. It was observed that the employment will increased with the increase in the number of those who make the production of apiculture and royal jelly and the quality in the production.

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Impact of honeybee vitamin mixtures on food consumption in Bombus terrestris*

A. Gosterit, G. Oytun Cicek
Isparta Applied Sciences University, Faculty of Agricultural Sciences and Technologies, Department of Animal Science, Isparta, Turkey

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Introduction

In bumblebee rearing, pollen and sugar syrup are main food resources. Like many other organisms, food quality affects colony development in bumblebee. It is known that pollen which containing high content of protein, amino acid and vitamin is preferred for successful rearing (Genissel et al., 2002; Baloglu and Gurel, 2015). Sugar syrup which used for rearing under the artificial conditions has same effect. For this reason, improving the food quality will also improve the colony quality (Gosterit et al., 2015). This experiment was carried out to determine the effect of honeybee vitamin mixtures on pollen and sugar syrup consumption of colonies in Bombus terrestris.

Materials and methods

To design the experimental groups, four different diets were used to feed queens: standard sugar syrup and normal pollen (group A), sugar syrup contains vitamin mixture and normal pollen (group B), standard sugar syrup and pollen contains vitamin mixture (group C), sugar syrup contains vitamin mixture and pollen contains vitamin mixture (group D). Queens in all groups were fed ad libitum. Vitamin mixture which used for supplementary feeding for honeybees (containing 500.000 IU Vitamin A, 50.000 IU Vitamin D3, 500 mg Vitamin E, 1.000 mg Vitamin C, 200 mg Vitamin B1, 250 mg Vitamin B2,100 mg Vitamin B6, 0,5 mg Vitamin B12, 500 mg, 150 mg Vitamin K for its 100 g) was added to sugar syrup and pollen cake. The proportion of vitamin mixture was 5‰ in pollen cake and sugar syrup. Standard rearing procedure was followed for rear colonies (Gosterit and Gurel, 2016). All queens were allowed to found colonies in a climate controlled room (27–28 °C and 50 % RH). The nests were checked every day and the syrup and pollen were replaced or added when necessary. After the first worker emergence (beginning of social phase), the nests were transferred to the larger rearing boxes and colony development was controlled by daily observation.

Pollen and sugar syrup consumption were determined for different time of colony development such as the first worker emergence, 10 workers production, 50 workers production and end of the colony life. One-way analyses of variance were run to determine the effects of vitamin mixtures on food consumption (Minitab, Version 16.2.4).

Results

Pollen and sugar syrup consumption in different time of colony development were given in Table 1 and Table 2, respectively.

Table 1. Effect of honeybee vitamin mixture on pollen consumption (gram) (a, b: P<0.05)

Groups	Time of colony development							
	First worker emergence		10 workers production		50 workers production		End of the colony life	
	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S.H
Group A	22	10,14 ± 0,56	22	24,37 ± 1,48 ab	18	70,61 ± 3,48	22	189,7 ± 11,7 a
Group B	20	9,80 ± 0,44	20	20,75 ± 1,24 b	7	71,00 ± 3,34	18	180,5 ± 14,3 ab
Group C	23	10,83 ± 0,40	23	24,43 ± 1,17 ab	16	84,69 ± 5,58	17	172,8 ± 12,0 ab
Group D	21	10,19 ± 0,53	19	27,89 ± 1,48 a	11	81,36 ± 5,55	13	133,4 ± 12,1 b

Table 2. Effect of honeybee vitamin mixture on sugar syrup consumption (milliliter) (a, b: P<0.05)

Groups	Time of colony development							
	First worker emergence		10 workers production		50 workers production		End of the colony life	
	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S.H	N	$\bar{x} \pm$ S. H
Group A	24	20,17 ± 0,38 b	22	57,00 ± 3,51	18	145,39 ± 8,02	22	524,5 ± 26,9 a
Group B	20	18,05 ± 0,42 c	20	50,40 ± 3,17	7	146,86 ± 5,78	13	396,9 ± 30,2 b
Group C	27	21,74 ± 0,42 a	23	56,17 ± 2,96	16	170,30 ± 17,70	17	438,8 ± 29,9 ab
Group D	21	18,95 ± 0,50 bc	19	58,74 ± 2,60	11	152,91 ± 9,38	17	426,2 ± 29,2 ab

Conclusion

According to results, colonies which fed with standard diet consumed the 189.7 gram pollen and 524.5 milliliter sugar syrup throughout their life. However, results showed that diets including honeybee vitamin mixture decreased the pollen and sugar syrup consumption of colonies in bumblebee.

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Investigation of mating possibility of unmated Bombus terrestris queens after diapause

A. Gosterit
Isparta Applied Sciences University, Faculty of Agricultural Sciences and Technologies, Department of Animal Science, Isparta, Turkey

Introduction

Due to their excellent pollinator behavior, bumblebees are indispensable element for especially greenhouse tomato production. These bees are produced commercially by small number of commercial companies under controlled condition and sold to farmers. All stages of life cycle are realized independently from nature. Bombus terrestris is the most commonly commercially reared species. Colony initiation, queen and male rearing, mating, and breaking of diapause are main stages for bumblebee rearing practices under controlled conditions (Gosterit and Gurel, 2014). Obtain the mated queens is one of the most critical necessity for sustainability of year round rearing. Young queens are mated with only one male in flight cages and put into artificial diapause at 2-5 °C for at least 2 months (Gosterit and Gurel, 2009). At the end of the diapause duration, survived queens are transferred to individual nest boxes and allowed to found colonies in a climate-controlled room (27–28 °C and 50 % RH) (Velthuis and Doorn, 2006). Some scientific studies which explain the necessities of mating stage are conducted by different researchers. Many factors such as age and body size, volatile pheromones secreted from the labial glands, male / queen ratio in mating cage, environmental conditions such as light intensity and frequency, temperature, photoperiod and nest material have effects on queen mating success (Kwon et al., 2006; Amin et al., 2012). However, there is no data about whether the unmated bumblebee queens mate after diapause duration or not. Therefore, the aim of this study is investigate the mating possibility of unmated B. terrestris queens after diapause under controlled conditions.

Materials and methods

Two experimental groups were designed. While the queens were mated after diapause duration in first group, queens were mated before diapause in second group. For first group, young virgin queens (7 days old) produced by our laboratory colonies were put in to diapause for 2 months.

After the diapause period, these hibernated and unmated queens were placed in mating cage and mated with males. On the other hand, young queens (7 days old) were mated with males before diapause in second group. One hundred and fifty queens were given a mating chance in both groups. Queens of two groups were mated in separate cages. Males which twice of the number of queens were added to each mating cages at the same time. Immediately after the initiation of copulation, the time was noted and each mating pair was separately transferred to a transparent plastic box. As soon as copulation was terminated, the time was noted. Groups were compared in terms of mating latency, copulation duration and mating ratio of queens. One-way analysis was performed to compare the groups (Minitab statistical software, version 16.2.4). The percentages of the mated queens were compared by two-proportion z-tests.

Results

Results showed that B. terrestris queens can also mate after diapause. However, mating ratio of unmated and diapaused queens was very low and significantly different from nondiapaused queens. While only 30 queens mated in first group, 130 queens mated in second group. Mating latency, copulation duration and mating ratio of 30 queens for both groups were given in Table 1.

Table 1. Mating latency (minute), copulation duration (minute) and mating ratio (%) of queens (a, b: P<0.01)

Mating stage (Groups)	Mating latency	Copulation duration	Mating ratio
	Average ± Standard Error		%
Before diapause (First group)	6.53 ± 1.24^{a} (N=30; Min= 1; Max=38)	25.47 ± 1.35 (N=30; Min= 14; Max=45)	$86{,}66^{a}$
After diapause (Second group)	14.77 ± 2.21^{b} (N=30; Min= 1; Max=52)	28.63 ± 1.38 (N=30; Min= 16; Max=54)	$20{,}00^{b}$

Conclusion

According to standard rearing process of B. terrestris, queens are mated before diapause and then they are put in to diapause. Many queens also can not used esspecially in absence of male and time.

Therefore, known of mating success of unmated queens after diapause can be important for success of mass rearing. However, inceasing of mating ratio and testing of mated queens for their colony foundation succes are necessary.

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Reliable registered method for determination of pure and indirect adulterated honey produced by feeding bee colonies (Apis mellifera L.) with industrial sugars (BAL-KAY)

A. Guler, H. Onder, S. Biyik

Faculty of Agriculture Animal Science Department, Ondokuzmayis University, Atakum, Samsun-Turkey

Introduction

Honey is vulnerable to various adulterations at each stage of production and processing (White et al., 1998; Anklam, 1998; Bogdanov et al., 2005). Purity, fraudulent state, plant origin and region of honey are determined by using many methods based on its sugar components, pollen analysis and different carbon isotope ratio (IRMS) (Basoglu et al., 1996; White et al., 1998; Oddo et al., 2004; Elflein and Raezke, 2008; Ruiz-Matute et al., 2010). The carbon isotope values of foods make it possible to determine the origin of the food. In particular, the ratio of $\delta^{13}C$ /$\delta^{12}C$ in honey, difference between the $\delta^{13}C$ value of honey and its protein ($\Delta\delta^{13}C$, ‰) are the most reliable methods. However, none of these carbon isotope analysis methods can detect the fraudulent made with C_3 sugars such as sugar beet (Padovan et al., 2003; Guler et al., 2014). There has been discussion reliable methods are necessary needed to distinguish indirect adulterated honey produced by excessively feeding bee colonies with different industrial sugars syrup. The statistical methods such as Canonical analysis, Principal Component analysis (Krauze and Zalewski, 1991; Cotte et al., 2003) and Multivariate Discriminant Analysis methods (Iglesias et al., 2004; Ruoff et al., 2007; Guler et al., 2007). Guler et al., 2008) have been used with the aim of classifying pure and adulterated honey samples. The Multivariate Discriminant Analysis method is used to determine whether the origins of different biological units are different or not (Cooley and Lohnes, 1971; Le, 2001; Miret et al., 2005). Thus, Guler et al. (2008) showed that this method was able to discriminate unadulterated honey samples from sucrose adulterated ones by using organoleptic characteristics. For these reasons, first of all it was aimed to improve standard identification functions and constant coefficients for the pure and adulterated honey samples origin. Therefore it will be possible to estimate or identify unknown honey samples using these coefficients developed by a software program for the Microsoft Windows operating system.

Materials and Methods

The colonies with two aged queen bees of the same genetic origin were used in the studies. All of the environmental factors were equalised, and all of the maintenance and control procedures were performed. All treatments group honeys were produced by the shaking method (Guler, 2008). After settling bees in the empty hives, cake and syrup were not further provided to the colonies, and veterinary drugs were not used for any honeybee diseases. The 5, 20, 50 and 100 litter levels of syrup made from Corn sugar (Zea mays, High Fructose Corn Syrup (HFCS), beet sugar (Beta vulgaris) sucrose sugar were used for bee colonies feeding and pure blossom (Control group) honeys were produced. Honey samples were analysed for the characteristics given as quality criteria by International Honey Commission (IHC) (Bogdanov et al., 2005), EU Council Directive (2002) and Codex Alimentarius (2001). Moisture was measured at 20°C by Abbe Refractometer by refractive methods (AOAC 1998 method 969.38B).

Fructose, glucose, maltose, and sucrose were identified and determined by high performance liquid chromatography (HPLC) according to DIN 10758 (1997). Hydroxymethylfurfural (HMF) was determined spectrophotometrically as outlined by Harmonization methods of International Honey Commission (IHC). The diastatic activity was based on starch hydrolysis (AOAC 1998 method 958.09) as 300/time to a value of absorbance of 0.235 at 660 nm. A weighed sample was ignited in a muffle furnace at 550°C to a constant weight for ash determination (AOAC, 1998 method 923.03; Cotte et al., 2003).

Potassium was determined by using the Atomic Absorbance Spectrophotometer (AAS) according to AOAC (1998) method 985.35. Proline was determined spectrophotometrically by using ninhydrin in methyl cellosolve, and absorbance was read at 512 nm. A standard curve using pure proline was constructed according to AOAC (1998) method 979.20. After calibrating the conductimeter, the electrical conductivity of each honey solution at 20% dry matter was measured at 20°C by Harmonised methods of the IHC (Bogdanov et al., 2005). Free acidity was determined photometrically by AOAC (1998) method 962.19, and vitamin C and vitamin B_5 was determined by R-Biopharm Vitafast Pantotenik Acid, Microbiological microtiter Plate Test to quantitate. For pure blossom honey (control), and adulterated honey samples: $\delta^{13}C$ values were determined by isotope ratio mass spectrometry (EA-IRMS) after complete sample combustion to carbon dioxide, as described by AOAC (1998) method 991.41.

The C_4% sugar contents in honey samples were determined by using AOAC (998.12) (White & Winters, 1998; Elflein & Raezke, 2008**).** Multivariate Stepwise Discriminant Analysis Method used as statistical analysis (Cooley and Lohnes, 1971; Krauze and Zalewski, 1991). In addition by using standard descriptor coefficients, a software program was developed for the Microsoft Windows operating system.

Results

Standard Multivariate Canonical Discriminant Function and Constant Descriptive Coefficients developed for 27 chemical characteristics of many pure and adulterated honey samples produced in many researches feeding honeybee colonies with different commercial sugars. Seven characteristics including C_4%, vitamin C, Fructose/Glucose (F/G), viscosity, invertase and difference between the $\delta^{13}C$ value of honey and its protein ($\Delta\delta^{13}C_{p\text{-}h}$) were found as the most discriminative (Table 1). By using standard descriptor coefficients of these seven characteristics, a software program was developed for the Microsoft Windows operating system that supports English and Turkish languages consisting of two windows in the Visual Basic 2010 software.

Table 1. Standard discrimination and identification function coefficients have been developed for the 7 properties of honeys from different sugar sources

Property	Kanonik discriminant function coefficients					
	1	2	3	4	5	6
%C_4	0.81	0.34	-0.53	0.38	-0.18	1.04
Vit C	-0.10	6.65	1.32	3.37	-2.26	0.07
F/G	2.97	0.91	15.58	-3.32	2.82	-0.37
Viscosity	0.00	0.00	0.00	0.00	0.00	0.00
Invertaze	0.09	0.10	-0.006	0.30	0.63	0.01
$\delta^{13}C_{p\text{-}}C_ş$	-0.39	1.24	-1.60	0.75	-0.14	6.69
Proline	-0.00	0.07	0.004	0.00	0.001	0.01
Constant	-18.86	-19.21	-27.18	-30.98	-33.96	-11.10

In this study, standard discrimination and identification functions have been developed for the 7 properties of honey (Table 1). The method can safely be used for discrimination of pure and fraudulent honeys which their sources are unknown.

By using standard descriptor coefficients, a software program was developed for the Microsoft Windows operating system that supports English and Turkish languages consisting of two windows in the Visual Basic 2010 software development environment (Figure 1). With the present invention it is possible to determine the fraudulent made with all kinds of sugar (C3 and C4). It can be installed and run on computers with Microsoft Windows operating system. In the lab the analytical results of the honey samples in relation to C4, Vitamin C, Fructose/Glucose ratio, Viscosity, Invertase, Prolin and difference between the δ^{13}C value of honey and its protein ($\Delta\delta^{13}$C, ‰) are entered into the system. In case there is no missing data, the operation bar designed in green is running and the Show Report and Reset buttons are shown after the calculation. When the Reset button is clicked, all data for the new operation is reset and returned to the input screen. Turkish and English reports can be taken in line with the entered data. The user can save the report in RichTextFile (.rtf) format by specifying the location and file name using the relevant dialog window, and the report is sent to the connected printer with the PrintDocument and PrintDialog procedures when the print button is clicked (Figure 1b). The icon for the software is custom designed with Iconcreator freeware software. On the opening screen of the design there are Ten Label, one Combobox, seven Textbox, three Button, one Progress bar and one Timer object. In the design of the report window there are One Richtextbox, two Button, one PrintDialog and one Print Document object. The icon of the software designed as . The invention is registered in the General Directorate of Copyright of the Ministry of Culture and Tourism.

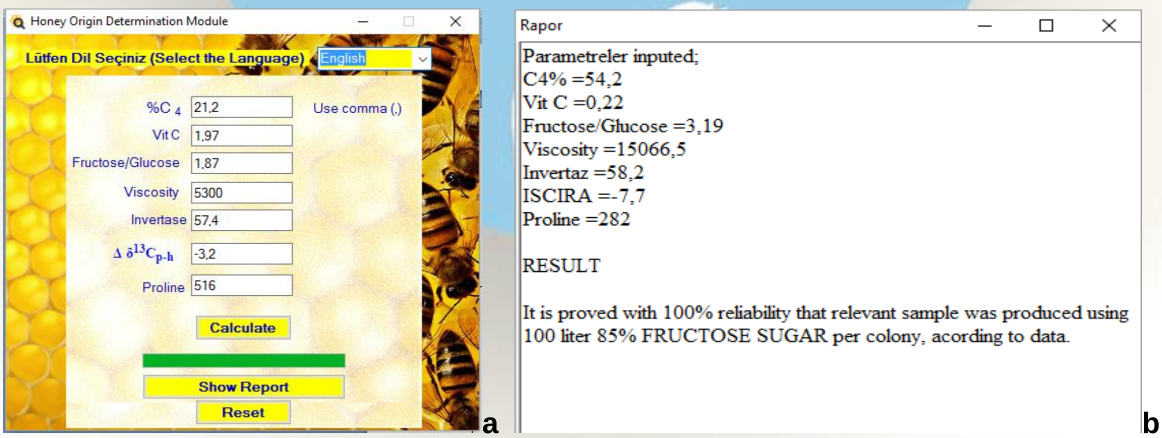

Figure 1. Microsoft Windows operating system (a) and the operation bar designed in green is running and show report (b)

Discussion

Especially sucrose sugar adulterated honey production is the problem of the whole world and it is known that 60-65% of the produced blossom honeys are sucrose adulterated. Because the current analytical methods are not efficient to determine the adulterated made with C_3 plant sugars, especially sugar beet (Beta vulgaris). These publicity measures on the market of audit institutions are possible with traceability. In this case, it is understood how such a reliable method is necessary.

With the present invention it is possible to determine the fraudulent made with all kinds of sugar (C_3 and C_4). It is possible to identify with 99-100% accuracy any origin of unknown honey samples taken from market or beekeeper as pure or adulterated by using Visual Basic on computer. Hence, through this method it is possible to determine whether the honeys are pure or not, whether they are produced from HFCS and sucrose, and the syrup levels with (15 kg and over) which they are produced. The invention is directed to the use of national and international institutions, laboratories and organizations in the area of import and export control of this product.

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Identification of Şanlıurfa Native Honey Bees and Investigation of Breeding Potential

G. Ö. Özbakır
Harran University Faculty of Agriculture Department of Animal Science-Şanlıurfa

Introduction

Honey bees have been adapted to different ecological conditions and different subspecies and ecotypes have emerged in terms of morphological, physiological and behavioral characteristics. However, many honey bee genotypes are seen in our country as a mixture. Increasingly, the use of Caucasian honey bees and hybrids in apiculture has become widespread both in Southeast Anatolia and in various regions of the country. Honey bee ecotypes showing valuable properties specific to the regions with different morphological, physiological and behavioral characteristics need to be identification and preservation.

Materials and Methods

The samples representing Şanlıurfa native honey bees were obtained from Bozova (40), Viranşehir (40) and Suruç (60) districts. Glass jars, chloroform and 70% ethyl alcohol were used for collection and preservation of honey bee samples. Leica S8 APO macroscope and image processing system was used to measure morphological characters. Standard morphometry was used to measure morphological characters (Ruttner, 1988). 32 different morphological features of each worker honey bee were determined.

Results

The tongue length of the honey bees in Bozova is 6.365±0.0148 mm, 6.311±0.0207 mm for Suruç and 6.389±0.0263 mm for Viranşehir ($P<0.05$). In terms of HL, FWL, FWW, FWI and HLL, the differences between district groups was found significant. In terms of a,b and T3+T4 the differences between district groups were found insignificant. When the groups were examined in terms of the CVA and CVB lengths of the cubital cell; there was no difference between the groups in terms CVA ($P>0.05$), but there was a significant difference in length CVB ($P<0.01$) (Table1, Table 2).

Correlations between morphological characters were also investigated. Between the TL and FeL (r=0.424; P<0.01), between the MetL and FeL (r=0.724; P<0.01); between the FWL and FeL (r=0.657; P<0.01), between the FWL and MetW (r=0.548; P<0.01), between the FWW and MetW (r=0.469; P<0.01) were found correlation.

Table 1. Descriptive statistics of morphological characteristics by district groups

Characters	Bozova	Suruç	Viranşehir
TL (mm)	6.365±0.0148^{ab}	6.301±0.0207^{b}	6.389±0.0263^{a}
HL (mm)	0.165±0.0021^{b}	0.155±0.0028^{c}	0.178±0.0023^{a}
a (mm)	1.027±0.0056	1.046±0.0071	1.032±0.0044
b (mm)	0.262±0.0051	0.272±0.0058	0.268±0.0039
T3 (mm)	2.175±0.0067^{ab}	2.165±0.0051b	2.196±0.0088^{a}
T4 (mm)	2.117±0.0058^{b}	2.138±0.0042^{a}	2.134±0.0078^{ab}
FeL (mm)	2.412±0.0099^{a}	2.358±0.0098^{b}	2.427±0.0073^{a}
TiL (mm)	3.128±0.0091^{a}	3.015±0.0186^{b}	3.156±0.0099^{a}
MetL (mm)	2.021±0.0072^{a}	1.914±0.0080^{c}	1.984±0.0079^{b}
MetW (mm)	1.174±0.0034^{a}	1.109±0.0056^{a}	1.163±0.0042^{b}
FWL (mm)	8.615±0.0220^{b}	8.556±0.0276^{b}	8.747±0.0377^{a}
FWW (mm)	2.894±0.0078^{b}	2.908±0.0141^{b}	2.998±0.0196^{a}
CVA (mm)	0.511±0.0049^{b}	0.518±0.0042^{ab}	0.533±0.0070^{a}
CVB (mm)	0.212±0.0031^{c}	0.222±0.0023^{b}	0.232±0.0032^{a}
A4	31.97±0.208^{a}	32.23±0.251^{a}	30.38±0.288^{b}
B4	102.65±0.666^{a}	98.89±0.766^{b}	103.45±0.717^{a}
D7	102.51±0.551^{a}	99.54±0.446^{b}	99.96±0.612^{b}
E9	20.80±0.134^{a}	19.99±0.162^{b}	20.39±0.217^{ab}
G18	102.40±0.567	102.52±0.401	101.01±0.459
J10	53.81±0.908	52.79±0.430	53.90±0.578
J16	92.33±0.316^{b}	94.73±0.382^{a}	94.17±0.572^{a}
K19	77.21±0.295^{c}	80.72±0.353^{a}	79.15±0.388^{b}
L13	13.58±0.102^{a}	13.04±0.127^{b}	13.45±0.153^{ab}
N23	89.73±0.262^{a}	89.23±0.458^{a}	87.55±0.491^{b}
O26	31.62±0.326^{b}	35.33±0.490^{a}	35.19±0.865^{a}

$^{a,\,b,c}$ Different letters represent statistically significant and different groups in the same row (P<0.05)

Conclusions

A study on 380 honey bee samples in Şanlıurfa (Özmen Özbakır and Fıratlı, 2013) compared this study; the results were quite similar in terms of TL, HL, FWL and FWW, T3+T4 and HLL, CI, MTI morphometric characteristics.

It can be said that the region-specific honey bee ecotype is still present. However, local honey bees do not perform in a sufficient level for efficient beekeeping in the province due to some physiological and behavioral characteristics (Öztokmak and Özmen Özbakır, 2017). In addition to adapting to the hot and arid climate of the province, a breeding program based on the singular selection method can be proposed for the beginning.

Table 2. Descriptive statistics of seconder morphometrics by district groups

Characters	Bozova	Suruç	Viranşehir
T3+T4(mm)	4.29±0.012	4.30±0.008	4.33±0.015
HLL (mm)	7.56±0.024[a]	7.28±0.029[b]	7.57±0.023[a]
FWI	33.61±0.082[b]	33.99±0.108[a]	34.27±0.112[a]
CI	2.44±0.046	2.35±0.038	2.32±0.050
CI%	41.67±0.819	43.11±0.643	43.91±0.927
TI	3.98±0.082	3.95±0.092	3.88±0.061
MTI	58.12±0.155	58.00±0.275	58.62±0.187

[a, b] Different letters represent statistically significant and different groups in the same row ($P<0.05$)

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The Importance of the Honeybee Pheremones in Colony Arrangemant and Effect on Performance

G. Bulut
Republic of Turkey Ministry of Agriculture and Forestry, 06200-Ankara

Introduction

Feramons are one of the most advanced ways of communicating the behavioral or physiological response of social beetles such as honey bees (Apis mellifera L.). In almost every aspect of the life of the colony there is an important role in activities such as development, reproduction, gathering, defense, orientation. The vast range of pheromones identified in the honey bees show a highly developed olfactory system to distinguish a large number of volatile substances, together with a multitude of environmental smells. The distinction between pheremones and colonies creates an interaction between queen bees-workers, workers-workers, queenbee-dronebees, adult bees and brood. How it affects the pheremone's on colony performance in case of lack or excess of the level of release within the hive will be evaluated with by the work done until today

Materials and methods

Honeybees communicate to each other by two ways: the physical communication by the dance language and the chemical communication by means of pheromone and/or odor that transmit important information to members of the honeybee colony. Pheromones play an important role in recruitment communication (Free, 1987).

Pheromones enable communication between all honeybee casts: between queen-workers, worker-workers, queen-drones and adult bees and pups (Winston 1987).In honeybees, as in other animals, there are two types of pheromones: primary pheromones and releaser pheremones.

Feremons are chemicals that are secreted by the exocrine gland and which give a behavioral or physiological response to another animal of the same species. The honeybee colony is an important factor in sustaining the continuity of generation and complexity. The primary pheremone found in honeybees is long-term developmental / behavioral changes her the queen pheremone releaser pheremone appears mostly in worker bees and plays a role in short-term behavior change.

The worker bees of different ages in the colony undertake different tasks, they can accelerate, delay, and even reverse their behavioral development in response to changes in the colony's internal and external environment. This flexibility within the colony and the age-related division of labor are tried to be explained on the basis of science branches such as behavioral biology, endocrinology and genetics. There is no conclusive evidence as to whether there is a central control of the division of labor in honey bee colonies. In small colonies, the queen detects colony needs and modulates worker activity. However, it is not known whether workers can direct their activities from one task to another. The honey bee mandibular glands produce exocrine glands as pheromones, whose secretions can function as alarm pheromones, an important component of colony defense.

Mandibular glands are the largest in the queens according to body size, large and well developed in workers and very small in males. A study to demonstrate the importance of QMG 3 days after the birth of queen-grown queens, the QMG is surgically removed and after healed, the virgin queen. In the construction of the new queen cell in the virgin queen bee colonies in the control group and that the worker bees are not effective in the behavior of the worker bees around the queen bee stated that each chemical alone would not be effective (Maisonnasse at all, 2010). The worker bee mandibular gland pheromone can play an important role in defense and food search in two important aspects of colony life, however, its function in honey bees remains unclear. It is known that honey bees use nectar to mark depleted flowers for energy saving. In a honey bee colony, the brood stimulates the development of the hypopharyngeal glands of the nurse bees. There is a chemical signal of 10 fatty acid ester mixtures on the larva cuticle. It has been found that the mixture of 10 ester, ethyl oleate and methyl palmitate stimulates protein synthesis of hypopharyngeal glands of nurses. Thus, in Apis mellifera, chemical signals from the incubation function as a primer. Chemicals, composed of 10 different esters, known as pupa pheremone, allow worker bees to show more pollen collection activities. In according to a study it is determined that the pollen collection activities increased as a result of the pheremone which is synthetically given to the colonies and increased the carrot pollination (Sagıli at all, 2015). There is multiple semiochemicals in the biology of social insects This is because the larger semichymal word provides an evolutionary advantage for the colony.

Results

It is seen that many chemical compounds have synergistic effects in which Pheremones alone is not responsible for a single event. The exact negativity of the colony in the absence of a ferment is not yet known

Conclusion

The effects and precise chemical nature of Specific pheremone activities remain a matter for future research. The understanding of neuronal and molecular mechanisms in pheremone processing is represented by separate parts of an extremely complex structure.

There is no study yet to be able to fully understand the pheremone communication mechanism in honey bees, to show all parts, complex paths and multiple connections of this complex chemical communication system.

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The points to be considered on record keeping and identification in animal breeding

H. Çelikyürek[1], K. Karakuş[1], T. Aygün[2], G. Dellal[3]

[1] Van Y.Y.U, Gevaş Vocational High School, Department of Plant and Animal Production, Van, Turkey

[2] Van Y.Y.U, Faculty of Agriculture, Department of Animal Science, 65080 Van, Turkey

[3] Ankara University, Faculty of Agriculture, Department of Animal Science, Dışkapı / Ankara, Turkey

Introduction

In animal husbandry, the records kept in the enterprises are extremely important to increase the productivity of animal production, to get high income, to be able to reveal animal breeding values, to make effective breeding organizations, to meet qualified breeding needs, and to determine the animals need to weed out and keep in hand. Consequently, the records must be kept correctly and correctly interpreted (Çelikyürek and Aygün, 2014). With this study, it will be tried to give information about the importance of record keeping and identification in animal husbandry and the issues to be considered in their application.

Identification

Identification of animals has been used since the animals were domesticated. Animals are identified for different purposes by different methods. Identification methods such as hot stamping, caustic marking, cold stamping, paint stamping, notching, tattooing (Aydın, 2007) are used for identification of animals. Electronic identification methods (Çelikyürek et al., 2018) such as passive RFID tag and rumen bolus injected under the skin, and biometric methods such as nose printing, DNA analysis, retina patterns, face recognition and iris patterns (Çelikyürek and Karakuş, 2017) are used recently intensively.

It is known that some of these methods used for animal identification have suffered from animal welfare, deformation, loss and loss of feature (Mori et al., 2000). Animal identification by using traditional methods, it is reported that animal behaviors can be adversely affected and cause harmful results, and it can lead to getting erroneous data in the research results (Bugge et al., 2011; Lu et al., 2014). Using RFID injected under the skin or using the rumen boluses requires expertise.

The application of these methods can cause serious accidents that could lead to animal injuries or even deaths (Bugge et al., 2011; Lu et al., 2014). New studies are being carried out in order to reduce the problems and deadlocks in this method and the other traditional identification methods.

Therefore, biometric identification methods have begun to be used besides present identification methods (Çelikyürek and Karakuş, 2017).

According to Celikyurek et al., (2018), electronic and biometric identification systems that are easy to use and integrate with software that can work with and provide software enables the use of electronic devices and equipment.

As it is seen from the information given above, animals are identified with many different methods and techniques. When choosing methods and techniques for animal breeding, the points to be noted are as follows;

- Should not cause pain and discomfort,
- Should not change the appearance of the animal,
- No deformations,
- Should not be lost,
- Ought to protect its nature and shape,
- Should not lose its feature,
- Should not adversely affect animal behavior,
- Had better not cause harmful results,
- To be recognized on the national and international platforms,
- Should not give rise to getting faulty data in research results,
- No injuries,
- Need to be used with existing software or need to be easy to integrate with,
- Should have substantial and distinctive anatomical and molecular properties,
- Ought to be reusable, callable and measurable in structure and flexibility,
- To be different within the general structure and the grade will be higher,
- Should not cause confusion,
- Easy-to-read,
- Need to be faster and correct in terms of accuary and processing time,
- Should be a system that can carry out access to the previous data faster and without error,

Record Keeping

Livestock occupies an important place in Turkey as well as in the whole world in terms of adequate and balanced nutrition for growing population in Turkey and used as raw materials in many areas of industry (Gaytancıoğlu, 2008).

In advanced animal breeding, it has become a necessity to record in different forms according to the size of the business scale for modern breeding systems and integration into world livestock. One of the most important steps in the implementation of effective animal breeding programs is, of course, the keeping of descriptive yield records.

Record keeping and identification are the leading methods that need to be applied for modernization of animal husbandry and economic improvement of enterprises (Çelikyürek, 2015).Business owners keep records on notebooks, agendas, cards or computers depending on the nature of the enterprise. Using computers on record keeping has gradually increased in recent years in parallel with the development of information technology. What is important in terms of keeping records is keeping records correctly, reliably and regular intervals.

The obtained records are transformed into information and the use of this information in the decision making processes of the enterprises has become one of the most important qualities of the firms with high competitive power. Hence, keeping records is an important activity for enterprises to make decision accurately and properly. However, livestock in our country is mostly in conventional style and is a small family business. In such enterprises, economic efficiency level is not taken into account and product cost analysis is not performed. The main reason for the failure of our record keeping activities and its failure to develop in Turkey is that its importance has not yet been fully understood (Çelikyürek, 2015). The question of why and how to keep records is not answered satisfactorily not only by farmers but also by staff and managers assigned to this job primarily (Kumlu, 1999). Uneducated farmers generally do not keep records but record keeping is the most important step in increasing productivity and profitability in any livestock operation at whatever level.

In addition to the above informations, the advantages of keeping records in animal production is also made for the purposes and aims listed below.

- To increase productivity in animal production,
- To earn high income,
- A complete understanding of animal values,
- For the convenient breeding organizations,
- The production of pedigree animals that can meet the needs of qualified breeding,

- For increasing and conserving operational efficiency and desired efficiency,
- To record the efficiency, reproduction and all breeding informations of animals,
- In order to obtain accurate information on selection criteria and breeding flow process,
- In sheep and goat breeding, to increase the quantity and quality of herd yield,
- For the purpose of facilitating the enterprise or farmer in determining the animals to be sorted or handled (Karaca et al., 2012).

Conclusion

The method of meeting the requirements of the animal identification and traceability system is need to be easily applicable for different animal species; furthermore, should provide animal welfare, quick accessing to data, traceability to animal and enterprise origin (Çelikyürek and Karakuş, 2017). Being able to provide traceability after slaughter is also important in terms of disease control and health (Smith et al., 2008). The basic tool in record keeping is the identities of animals. Problems encountered in the animal numbering by traditional methods used up to now cause significant production losses and failure of effective breeding activites. Especially on issue of numbering, it is not wrong to say that the attachability and readability rates on animals are extremely low. One of the most important matter in identification methods that use nowadays is rise of these rates to the highest levels (Çelikyürek, 2015). The most important issue in the recording; It is necessary to make sure that the records are accurate and reliable.

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Features of Red and White Meat Consumption in Some Provinces in Turkey (Istanbul, Samsun, Hatay and Kayseri)

H. Ö. Özdemir[1], U Karadavut[2] , G. Şimşek[2] , M. E. Yazıcı[2] , S. Akçam[2]

[1]Technical Sciences Vocational High School, Ahi Evran University, Kirsehir-Turkey

[2]Department of Animal Science, Ahi Evran University, Faculty of Agriculture, Kirsehir-Turkey

Introduction

Human health and nutrition are the most important products for animal nutrition. Knowing the purchasing preferences of animal products, which have an important place in human nutrition, is decisive in determining the breeding and nutrition models. Red and white meat is the source of protein that must be taken in daily life in terms of health (Akçay and Vatansever 2010). It is known that consumption of animal-derived proteins increases as th welfare levels of communities increase (Cankurt et al., 2010). The inadequacy of animal product pruduction, the inability to meet domestic demand and the high cost of animal products cause the consumption of animal origin foods to decrease. At least 50 % of protein taken in body and 25 % of the calorie need to be fed from the animal products for a balanced diet (Gürlük and Turan, 2008). Animal products are rich in protein, are sources of energy, minerals and vitamins, and should be consumed for health reasons due to their conjugated linoleic acid content (Özen, 2005).

Annual per capita consumption of red meat per capita in Turkey was reported to be 12.1 kg . This rate is 51.5 kg in Argentina, 50.7 kg in Australia, 39.3 kg in Brazil, 36.0 kg in Canada, 34.3 kg in Russia and 45.8 kg in the United States (Denli et al., 2016). In terms of total meat consumption, per capita meat consumption is 142 countries in Austria, 125 in the US, 82 in Germany and 80 kg in the UK. meat consumption is about 12 kg per capita in Turkey (Şeker et al., 2011). Overall per capita consumption of red meat considering seems to be behind compared to developed countries, the consumption in Turkey. The main reason for this is; compared to other foods of processed meat and red meat it is more expensive in Turkey. In addition to increasing the meat production required for a balanced diet of people, it is also very important to determine the meat consumption habits (Yaylak et al., 2010). Recently, changes in meat consumption preferences have begun to take place due to the difficulties in terms of feed quantity and quality, which are very important in terms of meat quality.

There is a transition from white to red with the influence of promotions made especially by exaggerating the media channel (Lichtenstein et al., 2006). Made in this study were selected based on their meat consumption Turkey aimed to determine the ratio of red and white meat consumption habits in some provinces.

Thus, it will be possible to determine the level of change seen in terms of both red meat and white meat. The information obtained will contribute to improving the chances of a healthier and successful projection project to be carried out on a prospective basis.

Materials and methods

The material of this study is the primary data obtained from consumers through face to face interviews in Istanbul, Kayseri, Hatay and Samsun provinces. Questionnaires were conducted by face-to-face interviews with randomly selected 120 people and a total of 480 people, including those in the central districts of these provinces stated in 2015. The data obtained from the questionnaire were prepared and analyzed for the analyzes to be carried out in the computer environment. Relationships between data sets were examined in a 95% confidence interval by applying descriptive and inferential statistical methods to examine variables together.

The Kolmogorov-Smirnov test was used to investigate the hypothesis of normality in this study. When the Kolmogorov-Smirnov normality test was applied, our data showed no normal distribution. The Kruskal-Wallis test, which was used in examining the differences between the averages in the data sets without normal distribution, was applied to the data of the nonparametric one-way ANOVA, and differences were observed between the groups. Spearman's correlation analysis, another test used to examine the relationship between variables, is applied in data sets with no normal distribution. The Spearman correlation coefficient test was used to examine the relationship between variables that were not normally distributed according to the Kolmogorov-Smirnov normality test. The data obtained from the study were analyzed in the SPSS 21 statistical package program.

In this study; Consumers were offered the opportunity to respond more than once to multiple-choice questions asked about meat consumption.

Results

When the consumption of red and white meat per person is examined, Istanbul, Samsun, Kayseri and when Hatay province on the basis of developed countries meat consumption in Turkey is observed to be much less.

When we look at the consumption of red meat and poultry meat per year, Kayseri province consumes 1.98 times per person per day while red meat is consumed, resulting in approximately 101.54 grams per serving. The annual consumption of red meat according to these amounts is approximately 10,454 kg. Again in Kayseri province, it is seen that chicken meat is consumed 2,6 times per week per person, while each portion is about 119.33 grams. This means that approximately 16,133 kg of chicken meat is consumed annually in Kayseri province.

In Hatay province, red meat is consumed on an average of 3.25 times a week, while each serving is approximately 129.48 grams. In this case, approximately 21,882 kg of red meat per year is consumed in the province of Hatay. In addition to this, chicken meat was consumed 2.61 times a week, and these portions were found to be 129.98 grams. In this case, approximately 17,640 kg of chicken meat per year was consumed in Hatay province.

In Samsun province consuming annual red and poultry meat; consuming red meat 2,00 times a week, each serving is approximately 203.33 grams. According to these results, 21,146 kg of red meat per year is consumed in Samsun province. Chicken meat was consumed 2,69 times a week on average and each portion consisted of approximately 243,29 grams. According to this, annual consumption of chicken meat per person in Samsun province is 31,414 kg. Turkey's largest province is being consumed 2.02 consumption of red meat per week times the annual per capita in Istanbul is approximately 191,2 grams per serving. The annual consumption of red meat per capita for Istanbul province is 20,083 kg. In the case of chicken meat consumption in Istanbul is consumed 2,64 times per week consisting of 198,75 grams. The annual consumption of chicken meat per capita in Istanbul is approximately 27,284 kg. Kayseri, Samsun, Hatay and Istanbul proved that the average annual consumption of red meat per capita was approximately 18,591 kg and the consumption of chicken meat was 21,921 kg. Kızıloğlu and Kızıloğlu (2013), the amount of meat per day per capita in Turkey 26 g, 62 g, the European Union and the United States reported a 74 gram level. According to this, our country could not reach even half of developed countries in terms of daily meat consumption.

Sarıözkan et al., (2007), based on their study of students at Erciyes University stated that meat consumption is already under a lot of it in an amount less than the average of Turkey. When we have determined that this ratio is about 12 g in preliminary studies we have done before, we can say that the next generations grew inadequately in terms of meat consumption. Of course, it is thought that meat prices are high and the declines in purchasing power are effective in this. Arica (2017) stated that people who live in the province of Hatay consisted mainly of animal products, nutritional products with 27%, vegetable products with 32%, and animal and vegetable products with 41%. Moreover, those who prefer animal products found that 34% consumed red meat, 26.9% consumed white meat (poultry), 4.6% consumed fish meat, and 33.4% consumed all three meat products. It is understood that eating habits lead to differences in meat consumption and consumption of meat type.

In general, it can be said that the amount of consumption for Samsun province started to increase. According to records of Samsun Provincial Directorate of Food Agriculture and Livestock, it is known that meat production is 11,944 tons in 2015, while it is 2,6 times in 2009 amount (Anonymous, 2017). Uzundumlu et al. (2011) found that 4.5 kilograms of beef and veal per person, 4.5 kilograms of sheep and goat meat, 16 kilograms of poultry meat and 10 kilograms of meat were consumed per person in a study conducted by 400 people living in the Küçükçekmece district of Istanbul province they have. Considering the consumption of red meat and white meat, it is seen that there is an insufficiency in the selected cases as an example.

Consumers' eating patterns for red and white meat are grouped in nine different ways. Participants in the survey were asked to number them. Meat consumption is an important factor for meat production and quality. For red meat (Table 1); The most widespread consumption in Istanbul was consumed by frying with 18.33%. In addition, frying consumption was 23.33% in Kayseri province, 20.00% in Samsun and 20.83% in Hatay. However, 26.66% of the people living in the province of Kayseri, red meat is most commonly observed on pide. (Pide : Made from yeast dough, on request egg, minced meat, cheese, etc. cooked thin seared food). The consumption rate of red meat on pide in Hatay is 34.16%. However, when red meat consumption patterns are examined; frying, in kebabs and on pide the foreground.

Table 1. Red meat consumption rate percentage table

Eating style \ Cities	Istanbul (%)	Kayseri (%)	Samsun (%)	Hatay (%)
By Boiling	11,66	10,83	13,33	11,66
Fry	18,33	23,33	20,00	20,83
With vegetables	12,54	9,16	15,00	9,16
Barbecued	10,83	10,00	8,33	15,83
In kebabs	5,82	10,00	25,83	35,00
Roasting	12,50	12,50	21,66	20,83
On Pide	14,16	26,66	19,16	34,16
It does not matter	5,00	3,33	11,66	5,83
I do not like red meat	9,16	6,66	7,50	10,83

For the determination of white meat consumption patterns, the grouping for red meat has also been applied here. Nine different ways of eating were to be numbered by the participants, and the results obtained are given in Table 2.

According to Table 2, it was determined that white meat was consumed by frying with 54.16% in Istanbul. In Kayseri, 26% of consumers have responded to barbecue and not to notice. In Samsun, the most common white meat consumption were seen with 34.16% and Hatay with 40.83%.

Table 2. White meat consumption rate percentage table

Eating style \ Cities	Istanbul (%)	Kayseri (%)	Samsun (%)	Hatay (%)
By Boiling	22,50	25,83	34,16	11,66
Fry	54,16	20,83	16,66	16,66
With vegetables	11,66	15,00	28,33	16,66
Barbecued	14,16	26,66	23,33	15,83
In kebabs	4,16	4,16	12,50	25,00
Roasting	5,83	2,50	1,66	10,83
On Pide	2,50	3,33	2,50	0,83
It does not matter	17,50	26,66	24,16	40,83
I do not like white meat	5,83	2,50	7,50	10,83

Generally speaking, 27.29% of the people prefer to eat chicken regardless of how chicken meat is consumed. However, this ratio was determined as 6.45% in red meat. According to this, our people would like to consider different options for eating red meat, but white meat does not pay attention to it. According to a study by Kayseri Erciyes University, while purchasing red meat, the students took the first three orders as mince (44.6%), cubed meat (39.4%) and ready-made meatball (16.0%) according to the purchase frequency among the preferred products. It has been determined that students can not buy products such as tenderloin or chops first. It was also found that chickens (43,8%) were preferred when buying chicken meat, followed by chicken leg (34.7%) and wing meat (21.5%) respectively (Sarıözkan et al., 2007). It is seen that chicken meat is not roasted and preferred on pide. Whether or not there is a correlation between the responses given by the participants in the study cases was examined by the nonparametric Spearman Correlation. According to the variables examined, it was found that consumers had the opinion "There are significant differences between different brands of red meat" and they always buy the same brand. They also see significant differences between different brands of chicken meats. According to this, we can say that companies can be more successful by coming to the forefront of brand perception.

There is no relationship between red meat and white meat production and marketing. The fact that the relationship has not been observed suggests that both meat originate from the fact that the receivers are balanced at a certain point. Participants responding to the question "Always buy the same brand of red meat," they said, "I always buy the same brand of red meat," and at the same time, "I buy red meat from the same place" and "Always buy the same brand chicken meat."

This suggests that consumers will not change their preferences unless they have very special circumstances in case of a certain satisfaction. Similar results have been valid for white meat, and consumers have expressed that they prefer to buy white meat at all times. In fact, these results are at the forefront of issues that need to be addressed to producers and marketers. It is understood that manufacturers and marketers need to rely on consumers for a certain quality and cleanliness. In connection with this, consumers are paying attention to packaging during product purchase. The answers to the question "I always buy red meat from the same place" supports this in that similar results have appeared in all the cases. The same answer has been valid for white meat. In fact, these answers and the answers given above seem to support each other.

Consumers are always picking up from the same place they actually know and think they know; because it is understood that the sensitivity is high and paying attention especially in packaging and packaging issues.

A great majority of consumers who doubt that red and white meat are packaged in unhealthy environments are also concerned that the animals in which red and white meat are obtained are also raised in a healthy and hygienic manner. Even though it is not very accurate in terms of perception, it shows that producers and marketers should pay attention to general thinking in this direction. The significant emergence at the p <0.01 level of the answer to the question "I am concerned about the proper breeding of the animals on which red meat is obtained." Indicates that consumers have a high degree of concern about the subject. In connection with this, unhealthy production strengthens unhealthy packaging and unhealthy marketing and unhealthy food perception. In all the cases of red or white meat, the same outbreak shows that you are concerned about the structure of meat or the health of its contents. Consumers in the places where they work have not made a big difference in their answers to the question "There are important differences between different brand chicken meats". Consumers believe that quality changes according to brands. For this reason, they always say they buy the same brand white meat. Consumers are concerned that chickens may be packaged in unhealthy environments.

The fact that consumers in general responded to similar questions in the study made is due to the fact that consumers have similar concerns. However, it is understood that the influence of the media is high in the formation of such concerns. Especially television and internet channels are known to be very effective in routing. However, perceiving the whole of what is sung around here poses a problem and can cover the superiority of the truths.

The Kruskal Wallis analysis method was applied to the obtained data, which is one way variance analysis method applied on non-parametric data with no normal distribution on province basis. The answers given are shown by giving the calculated chi-square values as a result of the analysis that shows differences according to the age group and education among the averages (Table 3, Table 4 and Table 5). According to this, the responses of participants aged 18-70 to each question were examined and it was seen that the age variable did not affect the answers given. Age is considered as a decisive factor in terms of development and evaluation. However, it was not seen as a distinctive feature in the results obtained here. The reason for this is that the consumption of red and white meat according to age has not changed much in preference.

Table 3. Chi-Square Values Calculated According to Age-Dependent Kruskal Wallis Test

Characteristics	Istanbul	Samsun	Hatay	Kayseri
There are significant differences between different brands of red meat	37,060	22,277	30,974	27,503
I always buy the same brand of red meat	46,894	33,693	39,223	33,827
I always buy red meat from the same place	40,311	43,317	36,653	35,592
I worry that red meat is packed in unhealthy environment	40,432	43,133	38,800	35,749
I worry that the animals where red meat is obtained are not being cultivated properly	41,390	38,068	53,358	33,344
There are important differences between different brand chicken meats	50,137	34,564	34,640	33,834
I always buy the same brand chicken meat	41,246	43,341	35,471	22,326
I always buy chicken meat from the same place	37,306	37,406	42,178	22,955
I worry that the chickens are packed in unhealthy environment	47,448	35,657	38,052	29,425
I am concerned that the animals from which the chicken meat is obtained are not being raised properly	35,092	31,763	45,871	29,489

Test statistic[a,b] a. Kruskal Wallis Test b. Grouping Variable: age

The answers for each question addressed to the participants were not affected by the gender factor on a provincial basis. There is no significant difference between the answers given by women and men. However, it was found that women who responded to the fourth question in the province of Hatay (I worry that the red meat was packed in unhealthy environment) were more worried than the males at $p < 0.05$ meaning participants. Significant gender differences did not appear, indicating that participants had similar views.

Especially women are expected to have high sensitivity for meat consumption and selection. In the work done, there was a conclusion in this direction and the sensitivity of women was somewhat high. However, it has been determined that this height is not statistically significant. This, again, shows that those who perceive operations are successful at large.

Table 4. Chi-Square Values Calculated According to Kruskal Wallis Test as Affected by Gender

Characteristics	Istanbul	Samsun	Hatay	Kayseri
There are significant differences between different brands of red meat.	1,422	,519	1,144	,612
I always buy the same brand of red meat	1,329	4,104	,024	,672
I always buy red meat from the same place	3,426	2,340	2,410	,508
I worry that red meat is packed in unhealthy environment	1,659	1,017	9,334 *	,310
I worry that the animals where red meat is obtained are not being cultivated properly	,019	,000	7,420	,087
There are important differences between different brand chicken meats	,103	,694	2,313	,910
I always buy the same brand chicken meat	,933	5,553	,650	2,670
I always buy chicken meat from the same place	1,450	,019	,016	,432
I worry that the chickens are packed in unhealthy environment	2,609	,128	,178	1,601
Animals where chicken meat is obtained I am concerned that it is not cultivated properly	,930	,214	1,206	4,101

Test statistic[a,b] a. Kruskal Wallis Test b. Grouping Variable:gender, *0,05

The evaluation made by considering education levels is composed of primary education, high school, associate degree, undergraduate, graduate and doctor. When the questions given to the provinces were examined, the level of education did not affect the answers of the participants to the questions about consumers' brand preferences for animal products and perceived risks in animal products. This is again very interesting.

Because as the level of education increases, the selectivity increases in perception. There is a natural change in terms of factors such as understanding, thinking, and decision-making processes; but this change shows that there is no significant change in meat preferences.

Table 5. Chi-square values calculated according to Kruskal Wallis test as a result of education

Characteristics	Istanbul	Samsun	Hatay	Kayseri
There are significant differences between different brands of red meat	5,657	4,920	3,075	4,037
I always buy the same brand of red meat	4,981	7,755	8,382	1,806
I always buy red meat from the same place	2,966	5,629	7,090	11,280
I worry that red meat is packed in unhealthy environment	1,353	7,142	4,061	2,482
I worry that the animals where red meat is obtained are not being cultivated properly	3,830	4,642	5,803	2,346
There are important differences between different brand chicken meats	3,477	5,726	1,674	8,974
I always buy the same brand chicken meat	2,477	4,523	6,838	6,256
I always buy chicken meat from the same place	2,373	,556	5,610	19,198
I worry that the chickens are packed in unhealthy environment	6,535	4,636	,753	4,891
I am concerned that the animals from which the chicken meat is obtained are not being raised properly	5,235	3,183	9,005	7,959

Test statistic[a,b] a. Kruskal Wallis Test b. Grouping Variable: education

Turkey, which attempts to identify meat consumption preferences of consumers in general there are a number of studies. Atay et al. (2004) In the province of Chine of Aydın province, Aygün et al. (2004) In the province of Van, Karakuş et al. (2008) In the province of Gaziantep, Yaylak et al. (2010) examined consumers' consumption habits in İzmir province; As a result, they found that meat consumption had a value around the country average. It is known that cultural or social differences affect meat consumption both in quantity and shape. It is expected that studies carried out in different fields will guide us in revealing these differences. In this study performed in Istanbul, Samsun, Bursa and Kayseri selected, including four provinces in terms of the coverage of a significant part of Turkey is considered to be a guiding.

Consumption habits of red meat and poultry meat in urban areas in Istanbul, Kayseri, Hatay and Samsun were investigated in terms of brand preferences of consumers and perceived risks in animal products. The gender, age and education of the consumer were not influential factors on the consumption of red meat and white meat.

Red meat consumption, production and marketing and white meat consumption, production and marketing are statistically related factors. While producing and marketing animal foods consumed, it is important to know that there are important steps to become a healthy society by being in good quality and clean.

With this study, results from similar regional and local studies can contribute to direction, development and updating of marketing strategies of manufacturers, industrialists and decision makers in the red meat and white meat sector in the direction of consumers' preferences and demands.

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The Potential of Organic Livestock Farming in Central Anatolia Region

H. Tüfekci[1], M.A. Boz[1],

[1]Agricultural Faculty, Bozok University, Yozgat, Turkey

Introduction

The aim of this study is determining the potential of organic husbandry and presenting a general view with investigating the general situation and changing by year plant and livestock production of Central Anatolia Region.

Organic Livestock It is emerging as a basic choice that the obtaining best yield and quality from per animal with the aim of the herb and animal originated food needs of the rapidly growing world population. However the use of chemicals such as hormones and antibiotics in animal breeding due to residual effects of them are reporting to cause serious health problems in humans (Ak and Kantar, 2007; Şayan and Polat, 2001). Organic livestock farming is an environmentally friendly production method, that allowing to demonstrate all aspects of their natural behavior to livestock, providing organic feeding, there is no use of additives such as hormones, antibiotics, and etc.with the purpose of increasing yield, controlled by control and certification organizations and offering healthier products to people (Anonim 2005; Ak 2002; IFOAM 2002; Rahman 2001).
Organic production has mostly appeared in the field of plant production and it has become increasingly widespread. But, organic livestock production process has begun depending on trends of want to consumption of high safe animal products of consumers as like in plant products in developed countries, increasing of environmental consciousness and sensitivity to animal rights.

Organic Livestock in Central Anatolia Region In particular, the regions where the natural resources are rich and dominated by the native breeds are suitable for organic animal husbandry. Sheep and goats breeding are made with native races which are resistant to diseases and animals are often fed in grassland and stubble. Therefore, the transition to organic farming possibilities in Central Anatolia in sheep and goat breeding are higher. Despite the presence of sheep decrease rapidly in Turkey, it is still one of the most common animal production efforts. Considering consumption habits at country level too, sheep is the most suitable species for organic animal husbandry.

It can be utilized for the organic livestock production that the areas which are not useful for plant production and it can be considered that the forage, animal barns, and the other costs are low. On the other hand, the feeding of the goats is largely based on nature and feeding by hand is almost non-existent. For this reason, it can be said that the transition of organic production is easy in the goats. Central Anatolia Region, intensive farming and to be among the unpolluted regions because of industry, the main livelihood of agriculture and animal husbandry create a region that Turkey has 30% of the total land's, have broad grassland areas of importance to organic farming (Turkey 32% of total meadow-pasture areas), also due to having a 19% share of the total animal presence in Turkey and features like that livestock is done with native breeds and hybrids, it is seen that in the organic beekeeping and have a significant potential for organic sheep and goat breeding.

Table 1. Presence of Livestock Farming in the Central Anatolia Region (Anonim, 2018)

	Cattle	Water Buffalo	Total Large Ruminant	Sheep	Goat	Total Small Ruminant	General Total	Share in Turkey (per cent)
Konya	867.896	602	868.479	1.615.119	240.367	1.855.486	2.723.965	%4,5
Ankara	462.250	2.158	464.408	1.233.120	254.093	1.487.213	1.951.621	%3,2
Kayseri	345.549	5.802	351.351	578.609	68.415	647.024	998.375	%1,7
Sivas	332.329	5.142	337.471	487.542	68.662	556.204	893.675	%1,5
Eskişehir	136.388	391	136.779	644.275	89.463	733.738	870.517	%1,4
Aksaray	234.638	1.121	235.759	538.805	69.852	608.657	844.416	%1,4
Niğde	147.892	20	147.912	480.906	70.574	551.500	699.412	%1,2
Karaman	62.238	-	62.238	408.607	176.038	584.645	646.883	%1,1
Yozgat	231.887	3.640	235.527	296.232	52.441	348.673	584.200	%1
Kırşehir	189.568	166	189.734	194.728	26.245	220.973	410.707	%0,7
Çankırı	138.183	1.332	139.515	105.847	23.728	129.575	269.090	%05
Nevşehir	79.346	83	79.429	125.319	9.759	135.078	214.507	%0,4
Kırıkkale	69.183	555	69.738	101.220	26.818	128.038	197.776	%0,3
Total	3.297.347	21.012	3.318.340	6.810.329	1.176.455	7.986.804	11.305.144	%19

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Organic Animal Production in Turkey: Current Situation and Future

[1]G. Dellal, [1] E. Pehlivan, [1]A. Uçar, [2]H. Çelikyürek, C. Erkan, [1]M. Türkoğlu

[1] Ankara University, Faculty of Agriculture, Department of Animal Science, Dışkapı / Ankara, Turkey

[2] Van Y.Y.U, Gevaş Vocational High School, Department of Plant and Animal Production, Van, Turkey

Introduction

According to the Codex Alimentarius Commission, organic agriculture is a holistic production system that aimed at protecting and enriching the health of the agro-ecosystem, biodiversity, biological cycles and biological activity of soil. Thus; it is assumed that people contribute to healthier nutrition, protection of the ecosystem, creating employment and ensuring rural development at significant levels (Chander et al., 2011). In recent years, significant increases have occurred in the organic animal products market in the world and in the EU (Willer and Lernoud, 2014). Although, market share of organic animal production in Turkey today is low, there are many opportunities for the development of this production branch. The transfer of these opportunities into a good evaluation and implementation will positively affect the contribution of this production branch to the country's agriculture and economy. In this paper, the current situation and problems of the organic livestock sector in Turkey have been examined and proposals have been developed to solve these problems.

Organic Animal Production in World

According to the 2012 statistics, the numbers of organic certified bovine, sheep, pig and poultry in the world are approximately 4.6, 5.6, 1.0 million heads and 73 million, respectively, and these figures represent 3%, 0.5%, 0.1% and 0.3% of the total number of animals of the same species in the world, respectively. Globally, significant increases were observed in organic certified animal numbers between 2007 and 2012. The most significant increase occurred in the number of poultry (127%) and followed by bovine (71%), pig (65%) and sheep (34%) (Table 1).

Table 1. Organic Certified Animal Numbers between 2007-2012 Years in the World (Willer et al., 2014)

Species	2007	2008	2009	2010	2011	2012	Changes (2007-2012) (%)
Bovine	2.682.144	3.059.068	3.457.549	3.513.268	4.582.779	4.582.910	+ 70.9
Sheep	4.224.160	4.019.186	4.892.185	4.661.428	5.413.645	5.642.683	+ 33.6
Pig	649.822	695.182	686.330	777.606	1.014.497	1.072.410	+ 65.0
Poultry	31.963.268	42.261.451	41.150.344	53.388.092	69.940.909	72.594.657	+ 127.1

Organic animal production in the world is concentrated mainly in Europe and North America. Respectively, 70%, 80% and 77% of organic cattle, sheep and pigs are in Europe and 53%, 44% of poultry are in North America and Europe, respectively. (Willer Et al., 2014). The first three countries with the highest organic of bovine, ovine, pig and poultry in the world are respectively; China, USA, France; Argentina, England, Italy; China, France, Germany and USA, France, Germany (Table 2).

Table 2. The First Three Countries with the Highest Number of Organic Certified Cattle, Sheep, Pigs and Chickens in the World (Willer et al., 2014)

Animal Species (million heads)	Countries		
Bovine	China (0.677)	USA (0.477)	France (0.440)
Sheep	Argentina (1.15)	England (0.89)	Italy (0.7)
Pig	China (0.215)	France (0.184)	Germany (0.144)
Poultry	USA (37)	France (11.6)	Germany (5.3l)

Organic Animal Production in EU

There have been increases numbers of in all organic farm animals in the EU in 2003-2015. The highest increase occurred in the bees, followed by poultry, bovine, pig, sheep and goat (Table 3).

Table 3. Change of Organic Certified Animal Numbers in the EU in the Period of 2003-2015 (Anonymous, 2015a)

Species	2003	2006	2009	2012	2015	Change (2003-2015) (%)
Bovine	918 584	1 744 538	2 204 676	3 250 557	3 709 233	+ 303.8
Sheep	1 539 548	2 712 183	3 232 649	4 294 024	4 485 075	+ 191.3
Goat	336 311	517 058	575 266	656 366	755 103	+ 124.5
Pig	252 521	465 538	598 418	912 871	978 559	+ 287.5
Poultry	6 921 331	11 368 575	12 864 077	26 010 830	33 746 441	+ 387.6
Bees	134 198	220 435	385 528	380 792	776 175	+ 478.4

In the EU, compared to farm animal species, data of the production of organic certified animal products is inadequate. However, according to the data of 2015, organic certified total meat production is 251.332 tons. The first three countries with the highest organic beef production: United Kingdom (25,300 tonnes), Italy (25,264 tonnes) and France (18,906 tonnes), for organic sheep meat production: Spain (8,344 tonnes), United Kingdom (7,500 tonnes) and Italy (6,514 tonnes): for organic goat meat production: Italy (685 tons), Spain (520 tons) and the Czech Republic (21 tons), for pig meat production, France (9,708 tons), Denmark (9,130 tons) and Italy (8,743 tons), and for organic poultry meat production: France (15,023 tons), Italy (13,687 tons) and the United Kingdom (8,500 tons) (Table 4).

Table 4. Organic Certified Meat Production in the EU in 2003-2015 (tonnes) (Anonymous, 2015a)

Product	Species	2003	2006	2009	2012	2015
Meat	Cattle	729	8,607	28,736	340,957	139,996
	Sheep	378	460	1.370	114,899	27,000
	Goat	2	29	135	1,773	1,205
	Pig	57	274	18.518	61,847	41,700
	Poultry	-	135	6.170	20,448	41,431

According to 2015 data, 2,526,210 tons of organic cow milk are produced in the EU. The first three countries in the production of organic cow milk are the United Kingdom (814,100 tons), France (588,489 tons) and Sweden (370,259 tons).

According to the same year data, organic certified sheep and goat milk production is 123.569 tons and 60.796 tons, respectively (Table 5). Italy (21,976 tons), Netherlands (20,261 tons) and Spain (9,988 tons) were the major producers of organic goat milk while Italy (103,525 tons), France (15,891 tons) and Bulgaria (1,455 tons) were the major producers of organic sheep milk, respectively.

Table 5. Organic Certified Milk Production in the EU in 2003-2015 (tonnes) (Anonymous, 2015a)

Product	Species	2003	2006	2009	2012	2015
Milk	Cattle	-	67.061	-	37.569	2.526.210
	Sheep	-	87	-	-	123.569
	Goat	-	668	-	-	60.796

In the EU, organic certified egg production is 3.258.258.526 in 2015. With the first three countries in egg production are Romania (900,000,000) Italy (708,004,275) and Netherlands (461,859,174).

Organic certified total honey production is 8.372 tons in and the first three countries with highest production are Romania (3,344 tons), Bulgaria (2,160 tons) and Spain (912 tons) (Table 6).

Table 6. Organic Certified Honey and Egg Production in EU in 2003-2015 (tonnes) (Anonymous, 2015a)

Product	2003	2006	2009	2012	2015
Egg	358	324	31.459	14.870	3.258.258.526*
Honey	2	2.058	5.484	38.760	8.372

*: numbers

Organic Animal Production in Turkey

Significant increases in the number of certified organic animals in all species have occurred in Turkey between 2004 and 2015. The highest increases were in chicken, cattle, sheep, goat and bee species respectively (Table 7). However, the share of this production branch in total animal production (<1%) is very low in 2015 (GTHB, 2015; Anonymous, 2015b).

Table 7. According to Species Organic Certified Animal Numbers Between 2004 and 2015 in Turkey (head) (GTHB, 2015).

Years/Species	Cattle	Sheep	Goat	Chicken	Bees
2004	602	10.519	8.811	250	27.839
2008	4.327	11.713	474	22.428	11.207
2012	56.204	24.711	8.463	281.132	92.172
2013	47.715	73.190	18.639	881.614	32.342
2014	9.639	16.043	6.256	500.137	36.391
2015	8.234	22.566	14.297	952.610	38.296
2004-2015 Change (%)	+1268	+115	+62	+380944	+38

Although the numbers of certified organic animal has increased significantly since 2004 in all species, significant declines have occurred in some years. Mainly the most important reason behind the declines after 2011 was the elimination of entrepreneurs who did not have organic animal production certificate from called “OTBİS (Organic Agricultural Information System)”. According to the 2015 data, 2,605 tons of meat, 19,735 tons of milk, 667 tons of honey and 58,938,769 eggs were produced as organic certified in Turkey.

The highest level contribution to organic certified total meat production is provided by organic poultry meat (82%) while the highest level contribution to organic certified total milk production is provided by organic cow milk (92%) (Table 8).

Table 8. Organic Certified Meat (tonnes), Milk (tonnes), Egg (number) and Honey (tonnes) Productions Between 2004 and 2015 in Turkey (GTHB, 2015).

Products	Species	2004	2008	2012	2013	2014	2015
Meat(tonnes)	Cattle	100	346	177	3.126	231	459
	Sheep	300	207	19	128	38	14
	Goat	50	-	75	98	16	2
	Poultry	-	1	5	1.618	1.122	2.130
Total Organic Meat		450	554	276	4.970	1.407	2.605
Milk (Tonnes)	Cow	138	7.640	16.725	51.002	15.113	18.115
	Sheep	3	674	126	1.103	232	472
	Goat	14	397	776	2.675	164	1.148
Total Organic Milk		605	8.711	17.627	54.780	15.509	19.735
Honey (tonnes)		737	180	513	336	275	667
Egg (Number)		500	4.424.000	36.105.556	48.040.778	64.898.912	58.938.769

As can be seen from Table 9, while the number of farmers who received organic animal production certificate in 2004 was 166 in Turkey, this number increased to 542 in 2015. The production branch where the farmers received the more organic certification was apiculture. Organic animal production is carried out in almost every region of Turkey (Table 10). However, there are differences in the type and density of production according to regions. As a matter of fact, according to the data of 2015, organic certified cattle products are produced in 6 and organic certified sheep and goat products are produced in 2 regions in Turkey. While the Aegean region ranks first in terms of organic certified cow milk production, the Western Marmara region ranks first in terms of organic certified beef production.

Production of organic certified sheep and goat meat is mainly carried out in the Western Marmara and Middle East Anatolian regions, while milk production is carried out in the Western Marmara region. Organic certified egg production are produced in 9 and organic certified poultry meat production are produced in 3 regions and both production branches are highest in the Aegean region. While organic certified honey is produced in every region of Turkey except Eastern Marmara region, production at the highest level is in the Aegean region. (Table 10). It can be said that these differences in production are mainly due to differences in the knowledge and experience of traditional animal production, as well as economic, cultural, sociological and environmental factors specific to the region (Dellal et al., 2015).

Table 9. Number of Provincial and Farmers Produced Organic Certified in Turkey (GTHB, 2015)

Years	Cattle		Sheep		Goat		Poultry		Bees		Total Farmer Number
	City	Farmer	City	Farmer	City	Farmer	City	Farmer	City	Farmer	
2004	1	2	1	2	1	2	1	1	-	159	166
2008	7	19	4	6	1	1	7	7	17	93	126
2012	11	127	2	11	3	3	8	11	31	355	510
2013	14	1.129	6	371	5	114	9	24	33	279	1.917
2014	11	156	8	23	8	14	12	36	38	321	537
2015	9	67	7	63	5	43	16	48	34	322	542

Table 10. Organic Certified Animal Production Quantities by Region in Turkey in 2015 (tonnes) (GTHB, 2015)

Regions	Cattle		Sheep		Goat		Poultry		Bee
	Milk	Meat	Milk	Meat	Milk	Meat	Egg	Meat	Honey
West Marmara	1.697	318	396	11	1.130	1	5.341.686	-	33,35
Aegean	9.850	-	-	-	-	-	21.680.529	1.118	298,24
East Marmara	-	-	-	-	-	-	8.024.700	-	-
West Anatolia	-	-	-	-	-	-	7.087.174	-	8,04
Mediterranean	-	-	-	-	-	-	1.900.000	-	16,41
Central Anatolia	-	-	-	-	-	-	656.780	-	23,00
West Black Sea	1.761	47	-	-	-	-	14.040.000	994	4,29
East Black Sea	3.524	-	-	-	-	-	202.500	-	156,61
Northeast Anatolia	729	56	-	-	-	-	-	-	47,34
Central East Anatolia	554	38	76	3	18	1	5.400	18	47,82
Southeast Anatolia	-	-	-	-	-	-	-	-	31,97
TOTAL	18.115	459	472	14	1.148	2	58.938.769	2.130	667,07

Problems of Organic Animal Production and Solutions in Turkey

Although some of the problems in organic animal production in Turkey are similar to the problems in traditional production, also it has specific problems of organic livestock production. Among the general problems are small and fragmented land assets of livestock enterprises, decrease in family and external work force, uncontrolled animal movements, lack of shelter and equipment, problems related to support and marketing, high production costs, animal diseases, lack of organization, inadequacy of pasture lands, reduction and pollution of water resources, and inconsistencies in public policies. Specific problems and solution proposals related to organic animal production are examined below.

- Animal Origin: Although the use of native farm animal breeds, lines and ecotypes is mainly recommended in organic animal production, producers, especially organic poultry farmers prefer culture breeds instead of these breeds because of their low yields. These breeds have higher environmental demands (especially nutrition) and they are more vulnerable to diseases, increasing their production costs. For this reason, the use of native genotypes resistant to internal and external parasites and diseases should be encouraged in the areas where organic production is to be carried out.

- Herd health management: In organic animal production, the use of chemical drugs and antibiotics is prohibited. On the other hand, because of the inadequate levels of alternative preventive and therapeutic applications for organic animal production in Turkey, herd health management is become very difficult at serious levels.

This problem is experienced in all organic animal production branches and it is increased the production costs considerably. Different practices such as the development of phytotherapy and homeopathic products instead of traditional practices in the conservation and treatment of herd health and the improvement of the resistance of native farm animal breeds to diseases by genetic and environmental applications in order to solve this problem in the world and EU, and the results obtained are transferred to practice. For this reason, the development and application of these alternative methods for organic animal production in Turkey will provide positive contributions to the conservation and treatment of herd health by adhering to the standards.

- Animal welfare: The main problem with respect to animal welfare is that the living and feeding areas required for each animal inside and outside the shelter and the dimensions of the equipment such as feeder and watering cannot be ensured according to the standards. Enterprises that are engaged in or will make organic animal production due to many factors are struggling to sustainably maintain the necessary living and feeding areas per animal in accordance with the standards. For the solution of this problem, planning should be done by taking the opinions of all stakeholders in the sector.

- Feeding: As it is at the global level, there are problems in terms of the origin and feeding practices of the feeds used at the beginning of the problems in organic animal production in Turkey. These include quality and inadequacy of organic pastureland and problems in the production of organic rough and concentrated feed, and difficulties in finding organic feed ingredients. In order to solve these problems, cooperation with the state, university and sector will contribute positively to the increase of the organic certified rough and concentrated feed production levels and qualities, the establishment of the legal legislation for the use of these feeds in organic production only and also the support of the R & D activities.

- Product processing: As an organic produced raw animal products must be evaluated in accordance with standards in organic processing plants. Most of the organic livestock breeding enterprises in Turkey have low capacities and no organic product processing facilities. This situation affects the profitability of these enterprises negatively. For this reason, enterprises producing raw organic animal products, especially organic milk and meat, should be given special emphasis on the establishment of their processing facilities by state and / or producer organizations (Altan and Şeremet, 2013; Petek, 2013).

- Transition period: In the case of organic farming, the costs of certification and business inputs are high, and farmers cannot afford the costs alone, or even the initial costs of input are very high.

For this reason, certification or input costs in the transitional period can be covered by the state to encourage farmers to pass organic animal production.

- Supports: Consumption and production of organic animal products are very low in Turkey due to consumer awareness and inadequate purchasing power. Therefore, it is necessary to support organic animal production. It cannot be said that the supports given to organic animal production in Turkey are inadequate. However, making sustainable support will provide significant contributions to the development of the organic livestock sector.

- Product marketing: The domestic market for organic animal products in Turkey has not yet been developed sufficiently and organic animal products exports cannot be done. Focusing on advertising / promotional activities to remove market limitations and initiatives to increase the accessibility of organic products to the markets will contribute to resolving the problem.

- The outlook of traditional livestock industry's to organic livestock sector: Along with the traditional livestock sector, the agricultural chemicals and chemical fertilizer sector are one of the important obstacles to the development of organic livestock production. Thus, all stakeholders in the traditional and organic agriculture sector should work together to solve this problem.

- Inadequacy of scientific research on organic animal production: The scientific studies and researches related to organic animal production in Turkey are quite inadequate. In order to solve this problem, an infrastructure for scientific researches related to organic animal production should be established in research institutions such as the Universities, the Ministry of Food, Agriculture and Livestock and TUBITAK and work should be started in mutual cooperation.

- Organic labeled marketing of organic unlabeled products: One of the most important obstacles to the inadequate development of organic farming / livestock production in Turkey is the organic marketing of organic unlabeled products. Regular inspections should be made and unfair competition opportunities should not be given in order to ensure the sustainability of the consumers' confidence in organic animal products.

- The high prices of organic animal products: The high prices of organic livestock products affect the demand for these products negatively. Increasing organic livestock production and establishing the marketing systems of the producers organizing their own products will make positive contributions to decrease the prices of organic livestock products.

- Inadequate knowledgeable and experienced technical staff: In general, there is a lack of knowledgeable and experienced technical staff in all branches of the organic animal production sector.

For this reason, it is necessary to educate knowledgeable and experienced members of the standards and technical features of organic animal production and to be included in all branches of industry.

- Problems with the certification process: One of the problems of this process is the decrease in the quality of the control operations due to the fact that the controllers working in the certification bodies perform checks outside their specialties.

Thus, the legislation that will enable the controllers working in the control and certification institutions to be redefined and assigned according to their expertise areas should be established.

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Genotoxic and Toxicopathological Effect of Aflatoxin B_1 in Grass Carp (Ctenopharyngodon Idella)

H. Khan, U. Sadique, F. A. Khan, S. Ahmad, F. Ahmad.
Department of Animal Health, Faculty of Animal Husbandry and Veterinary Sciences
The University of Agriculture Peshawar-Pakistan

Introductıon

Mycotoxin the secondary metabolites of fungi is a Greek word 'mycos' which means fungus (Fink-Gremmels, 2008). Mycotoxins have a negative economic impact worldwide regardless of the escalating understanding of these fungal metabolites. Decreased egg production, less meat and reduced feed efficiency and immunosuppression, lowered productivity, reduced weight gain, interference with reproduction and damage to vital body organs result in decreased economy. These problems are too much greater than that of instant morbidity and mortality (Hussein and Brasel, 2001). In the long list of more than three hundred 300 recognized mycotoxins, the Ochratoxins (OT), Aflatoxins (AF), Zearalenone, Trichothecenes and Deoxynivalenol (DON) are more toxic and well known for their toxicities. (Scott, 1990) Genus Aspergillus is responsible for the production of AFB1 and other related mycotoxins, which can contaminate peanuts, cereals and other plants (Wilson and Payne, 1994). The effect of AFB1 and other mycotoxin as a carcinogenic agent is well-studied (Hendricks, 1994; Grizzle and Goodwin, 1998). Fungal metabolites also cause reduce growth performance and immunosuppression in fish (Manning et al., 2003). Mostly liver is affected by AFB1 and its conversion to a severe fatal metabolite occur in the liver.

Due to the strong mutagenic, teratogenic and carcinogenic effects, AFB_1 is considered as the most common and harmful mycotoxin for animal, human and aquatic life (IARC, 1993 and Han et al., 2008). AFB_1 produce reactive oxygen species and free radicals and cause injury to the cell (Baynes, 1991). Chromosomal damage occurs due to the stimulation of the release of free radicals by AFB_1 (Amstad et al. 1984). The reactive oxygen species may in part be involved in the carcinogenic activity of AFB_1 (Shen et al., 1996). Due to AFB_1 contamination a decrease in growth is one of the major negative effects (Manning et al., 2003). The low maximum permitted levels of aflatoxin recognized by many countries ranges from 1 – 25 µg/kg of total aflatoxin. The limit for food in global trade is to be set at 15µg/kg of total Aflatoxin recommended by the odex committee on food additives and contaminants of the codex alimentarius commission (Van Egmond, 1989).

Aflatoxins residues retain in animal tissues due to which the public health is at high risk to the active metabolites of aflatoxin (Murjani 2003).

Due to the continuous study of nature of aflatoxins, in freshwater aquatic species, aflatoxicosis has been studied mainly in rainbow trout (Hendricks 1994; Halver 1969), in American channel (Gallagher and Eaton 1995), Nile tilapia (Tuan et al..2002), Indian carp (Murjani 2003).

In many parts of the world, it has been demonstrated that a hepatitis B virus infected individuals have hepatocellular carcinoma mainly caused by AFB_1 (Han et al., 2008). The first aflatoxicosis case in aquaculture was reported in May 1960 when an epidemic of hepatomas occurs in Oncorhynchus mykiss hatcheries farm in Idaho, United State. There is the presence of primary hepatocytes carcinoma with big, multinodular livers in postmortem examination (Wales 1970).

Materials and Methods

The experiments were carried out according to the Rules and Regulation of the Animal Ethics Committee FAHVS, The University of Agriculture Peshawar. The Grass carp n=150 in healthy state and of similar age about <1 year, approximate weight of 40g-45g, 4 -5 inches in length and of both sexes were obtained from Government Fish Hatchery, Mardan and were allocated into five groups each having three replicates. Group A receiving no treatment while group B, C, D and E were exposed to different concentrations of AFB_1 25 ppb, 50 ppb, 75 ppb and 100 ppb/kg of diet respectively for 7 weeks. Fish were acclimatized for 1 week in glass aquaria.

Aflatoxin production, extraction and quantification

Aspergillus flavus spores were cultured on rice for the production of AFB_1 (Shotwell et al., 1966). HPLC and fluorescent detection method was used for the quantification of AFB1 (Trenk et al., 1971).

Parameter studied

Specific growth rate (SGR) and Feed conversion ratio (FCR)

All the fish in each tank were weighed and counted on 7th week. The SGR was calculated as follows:

Specific growth rate (%/day) = ln(final weight)-ln(initial weight) × 100/ t

Where t=number of days.

Feed conversion ratio = Total feed intake / weight gain

Hematological and blood biochemical profile

At the end of the experiment blood from the caudal vein of each fish was collected for hematological parameters including RBCs count, Hb, MCV, MCHC, MCH, PCV, TLC and DLC using hematology analyzer (Celly 70).

Liver and kidney function tests were determined from the serum. These tests include Glucose, AST, ALT, Total protein, Albumin, globulin, urea and creatinine estimation using semi-automatic chemistry analyzer (Convergys 100)

Genotoxicity

The genotoxic potential of the AFB1 was measured by micronucleus (MN) (Kuhswaha, 2012). Micronuclei were scored as ovoid or circular, non-refractive, small chromatin bodies displaying the same staining and focusing pattern as the normal nucleus (Al-Sabtii and Metcalfe 1995). The percentage of micronuclei was calculated by the following formula.

$$\text{Micronucleus \%} = \frac{\text{Number of erythrocytes containing micronucleus}}{\text{Total number of erythrocytes scored}} \times 100$$

Histopathology

The tissue samples of kidney, gills, liver and intestine were collected from freshly killed fish and directly put in 10 % formalin for fixation to avoid tissue deterioration. Briefly, after fixations tissues were put in ascending grades of alcohol for dehydration and in xylene for clearing. Paraffin was used as embedding media and thin sections were prepared by rotary microtome and then tissue slides were stained with hematoxyline & eosin (H & E) for histopathological studies as per protocol of (Bancroft and Gamble, 2007).

Statistical Analysis

The data obtain was compiled in Microsoft Excel and was analyzed through Statistix 8.1 software using one way ANOVA (CRD).

Results

Average Weight Gain and Specific Growth Rate

Results shows that average weight gain and SGR was significantly affected ($P<0.05$) by increasing concentrations of AFB_1 in the feed. The higher weight gain and SGR was recorded in control group followed by group B, C, D and E (Table 1).

Table 1.The average weight gain and specific growth rate of Grass carp fed with different concentrations of AFB_1 added diet for 7 weeks.

Group	Average Final Weight (g)	Average Initial Weight(g)	Average Weight Gain(g)	SGR (%)
A	57.86	42.51	$15.35^{a}\pm0.10$	$0.63^{a}\pm0.07$
B	53.12	43.28	$9.84^{b}\pm0.04$	$0.42^{b}\pm0.07$
C	52.14	43.36	$8.78^{b}\pm0.03$	$0.36^{c}\pm0.09$
D	49.69	42.86	$6.83^{bc}\pm0.05$	$0.30^{d}\pm0.05$
E	48.73	42.18	$6.55^{c}\pm0.09$	$0.28^{d}\pm0.08$

Values (Mean±SE) in the column shown by different letters are significantly different ($P\leq0.05$).

Feed Conversion Ratio and Survival Rate

There was no significant difference in FCR of control group and group B and C ($P>0.05$) but FCR of control group was significantly high ($P<0.05$) from group D and group E. No mortalities were recorded in all groups and the survival rate was 100% (Table 2).

Table 2: Feed conversion ratio and survival rate of Grass carp fed with different concentrations of AFB_1 added diet for 7 weeks.

Group	FCR	Survival Rate (%)
A	$2.09^{c}\pm0.05$	100
B	$2.14^{bc}\pm0.03$	100
C	$2.18^{bc}\pm0.03$	100
D	$2.23^{b}\pm0.04$	100
E	$2.34^{a}\pm0.04$	100

Values (Mean±SE) in the column shown by different letters are significantly different ($P\leq0.05$).

Hematology

The total red blood cells (RBC) count of group E was significantly ($P<0.05$) decreased as compared to control group but there was no significant difference between control group and group B and C. For PCV there was no significant difference ($P>0.05$) in group A, B and C while the PCV of group A was significantly different ($P<0.05$) from group D and group E.

The hemoglobin concentration of control group was significantly different from group C, group D and group E but no significant difference (P>0.05) from group B. The MCV in group A, B, C and D has no significant difference (P>0.05) but the MCV of group A was significantly decreased (P<0.05) from the group receiving higher dose of AFB_1 in the diet. Among all the groups the concentration of MCH and MCHC show no significant difference (P>0.05). On the basis of eryhtrocyte indices the anemia was classified as normocytic normochromic in group A, B, C and D respectively while microcytic normochromic anemia was found in group E (Table 3).

Table 3. Hematological parameters of Grass carp fed with different concentrations of AFB_1 added diet for seven weeks.

Group	RBC*10/µl	PCV (%)	Hb(gm/dl)	MCV(fl)	MCH(pg)	MCHC(gm/dl)
A	1.60^{a}±0.01	32.6^{a}±0.88	8.2^{a}±0.14	203.28^{a}±0.34	51.2^{a}±0.11	25.2^{b}±0.64
B	1.50^{ab}±0.03	32.0^{a}±0.52	8.0^{ab}±0.14	201.14^{a}±0.80	50.5^{a}±0.94	25.1^{b}± 0.73
C	1.53^{bc}±0.02	30.3^{ab}±0.66	7.6^{c}±0.11	198.23^{a}±0.59	49.7^{a}± 0.49	25.0^{b}± 0.92
D	1.47^{c}±0.01	28.6^{b}±0.66	7.6^{bc}±0.17	194.09^{ab}±0.98	51.9^{a}± 0.77	26.7^{ab}± 0.21
E	1.40^{d}±0.12	25.6^{c}±0.33	7.0^{d}±0.06	182.45^{b}± 0.35	50.2^{a}± 0.31	27.5^{a}±0.3

Values (Mean±SE) in the column shown by different letters are significantly different (P≤0.05).

The TLC of all the groups significantly (P<0.05) decreases with the increase in concentration of AFB1. The lymphocyte percentage of group A was significantly higher as compared to the groups fed with higher concentration of AFB_1 in the diet but there was no significant difference (P>0.05) between group A and B. There was significant increase (P<0.05) in monocyte and neutrophil in group E as compared to control group. The percentage of basophil and eosinophil have no significant difference (Table 4).

Table 4. TLC and DLC of Grass carp fed with different concentrations of AFB_1 added diet for seven weeks.

Group	WBC*10^3/µl	Lymphocyte (%)	Monocyte (%)	Neutrophil (%)	Basophil (%)	Eosinophil (%)
A	$12.4^{a}\pm0.55$	$71.3^{a}\pm0.88$	$1.6^{b}\pm0.33$	$24.0^{c}\pm0.15$	$1.3^{a}\pm0.33$	$1.6^{a}\pm0.66$
B	$12.7^{a}\pm0.2$	$69.0^{a}\pm0.15$	$1.6^{b}\pm0.66$	$25.3^{bc}\pm0.66$	$1.6^{a}\pm0.33$	$2.3^{a}\pm0.33$
C	$10.5^{b}\pm0.37$	$64.6^{b}\pm0.85$	$3.3^{b}\pm0.88$	$28.0^{b}\pm0.52$	$2.0^{a}\pm0.57$	$2.0^{a}\pm0.57$
D	$9.3^{c}\pm0.12$	$62.0^{b}\pm0.15$	$6.0^{a}\pm0.78$	$28.6^{b}\pm0.88$	$1.6^{a}\pm0.66$	$1.6^{a}\pm0.33$
E	$8.1^{d}\pm0.13$	$53.0^{c}\pm0.15$	$7.6^{a}\pm0.33$	$35.0^{a}\pm0.15$	$1.6^{a}\pm0.33$	$2.6^{a}\pm0.66$

Values (Mean±SE) in the column shown by different letters are significantly different ($P\leq0.05$).

Blood Biochemical Profile

The ALT and AST showing significant increase ($P<0.05$) in the level with increase in AFB_1 concentration. Group E shows significant raise ($P<0.05$) in level of ALT and AST as compared to the control group A and other treatment groups (B, C and D). The significant increase ($P<0.05$) was also demonstrated among the different treatment groups such as group B, C, D and E with rise in AFB1 concentration. Glucose concentration shows significant rise ($P<0.05$) in the level with the increasing concentration of AFB_1. Among group E and D there was no significant variance ($P>0.05$) but there was significant increase ($P<0.05$) in glucose level with increase in AFB_1 concentration. Total protein and albumin shows the drastic decrease in concentration with the increasing level of AFB_1, which show significant ($P<0.05$) inverse relationship. Globulin concentrations showing no significant increase ($P>0.05$) in varying levels of AFB_1 treatment in grass carp. The urea and creatinine levels significantly increase ($P<0.05$) with increasing level of AFB_1 concentration in the feed (Table 5).

Table 5.Hepatotoxic and Nephrotoxic effect in Grass carp fed with different concentrations of AFB_1 added diet for seven weeks.

GROUP	ALT (IU/ l)	AST (IU/ l)	Glucose (mg/dl)	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Creatinine (mg/dl)	Urea (mg/dl)
A	15.8^{e}±0.42	26.6^{e}±0.23	62.3^{d}±0.45	6.05^{a}±0.19	4.2^{a}±0.12	1.8^{a}±0.07	0.19^{d}±0.013	10.1^{c}± 0.15
B	21.08^{d}±0.77	33.2^{d}±0.17	68.6^{c}±0.45	5.8^{ab}± .05	3.9^{ab}±0.13	1.9^{a}±0.07	0.24^{c}±0.012	12.3^{b}±0.63
C	25.6^{c}±0.73	40.5^{c}±0.07	75.0^{b}±0.73	5.4^{b}±0.24	3.7^{b}±0.10	1.6^{a}±0.33	0.28^{b}±0.011	12.6^{b}±0.84
D	31.7^{b}±0.78	47.7^{b}±0.84	80.6^{a}±0.20	4.2^{c}±0.08	2.7^{c}±0.11	1.5^{a}±0.17	0.30^{ab}±0.011	13.1^{ab}±0.48
E	38.3^{a}± 0.60	55.2^{a}±0.34	83.6^{a}±0.45	3.8^{d}±0.04	2.06^{d}±0.03	1.7^{a}±0.07	0.32^{a}±0.012	14.6^{a}±0.21

Values (Mean±SE) in the column shown by different letters are significantly different (P≤0.05).

Genotoxicity

The micronucleus frequency percentage of grass carp of group A, b and C were zero percent but there was significant increased (P<0.05) in group E followed by group D (Table 6).

Table 6. Micronucleus Assay Frequency of Grass carp fed with different concentrations of AFB_1 added diet for seven weeks.

Group	Micronucleus Frequency (%)
A	0
B	0
C	0
D	0.85^{a}±0.02
E	2.15^{b}±0.01

Values (Mean±SE) in the column shown by different letters are significantly different (P≤0.05).

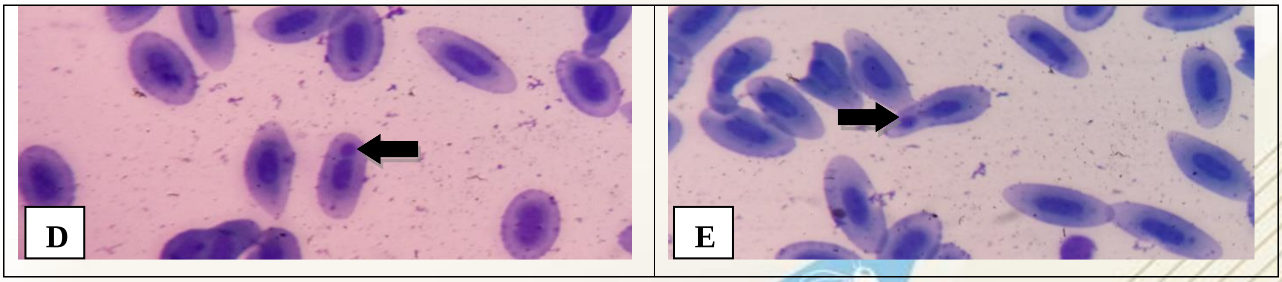

Fig 1: RBC of Grass carp. D) Erythrocytes of grass carp fed with 75µg AFB_1/Kg of diet. Erythrocyte containing micronucleus. E) Erythrocytes of grass carp fed with 100µg AFB_1/Kg of diet. Erythrocyte containing micronucleus. (1000X) Geimsa stained.

Histopathology

The liver tissue of grass carps exposed to different levels of AFB_1 show hydrophic degeneration, fatty change, necrosis and leukocytic infiltration and pyknotic nuclei (Fig 2). The fatty change was more severe in group E followed by group D. Mild leukocytic infiltration and pyknotic nuclei were also observed. Microscopically the kidney of grass carp show nephrosis, leukocytic infiltration, vacoulation of epithelial cell, pyknotic nuclei and glomerular shrinkage in dose dependent manner (Fig 3). The increase in the level of AFB_1 in the diet causes severe changes. The histomorphology of intestine of grass carp show hypoplasia of goblet cells, villi sloughing, leukocytic infiltration with the increase in concentrations of AFB_1 in diet (Fig 4). The gills of grass carp were also affected. In group D and E there was sloughing of respiratory epithelium, degeneration of the lamellae, congestion, leukocytic infiltration and necrosis (Fig 5).

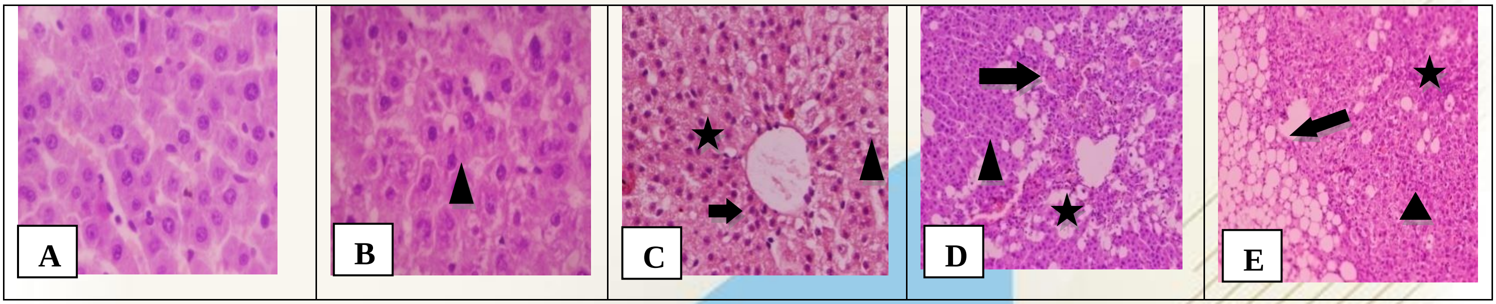

Fig 2: Photomicrograph of liver of grass carp exposed to different levels of AFB_1. A) Liver of control group. B) Liver of grass carp given 25 µg AFB_1 showing mild cloudy swelling of hepatocyte. C) Liver showing fatty change, hydrophic degeneration and pyknotic nuclei. D) Severe fatty change, hydrophic degeneration, leukocytic infiltration. E) Showing severe fatty change, hydrophic degeneration. H & E stained 100X and 400X.

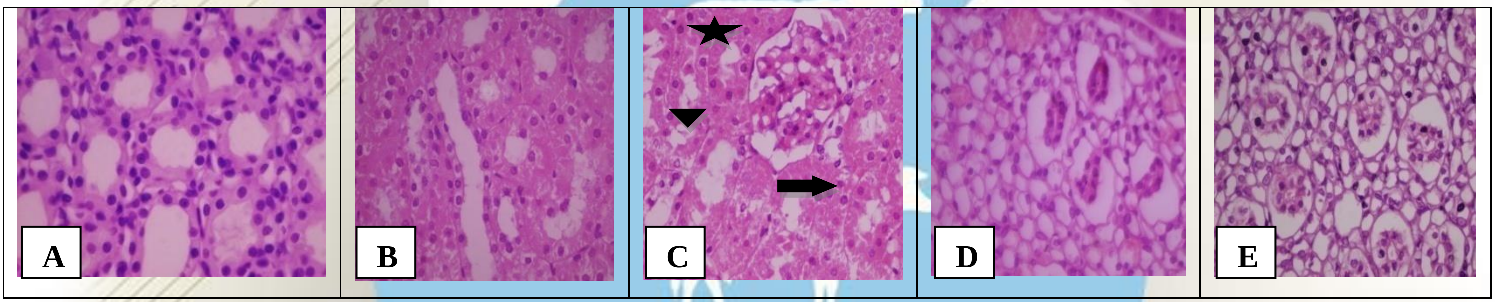

Fig 3: Photomicrograph of kidney of grass carp exposed to AFB_1. A) Kidney of normal group. B) Kidney of grass carp given 25 µg AFB_1 showing normal histomorphology. C) Kidney showing vacoulation of epithelial cell and glomeruli shrinkage. D) Vacoulation of epithelial cell, nephrosis and glomeruli shrinkage. E) Showing vacoulation of epithelial cell, nephrosis and pyknotic nuclei H & E stained 100X and 400X.

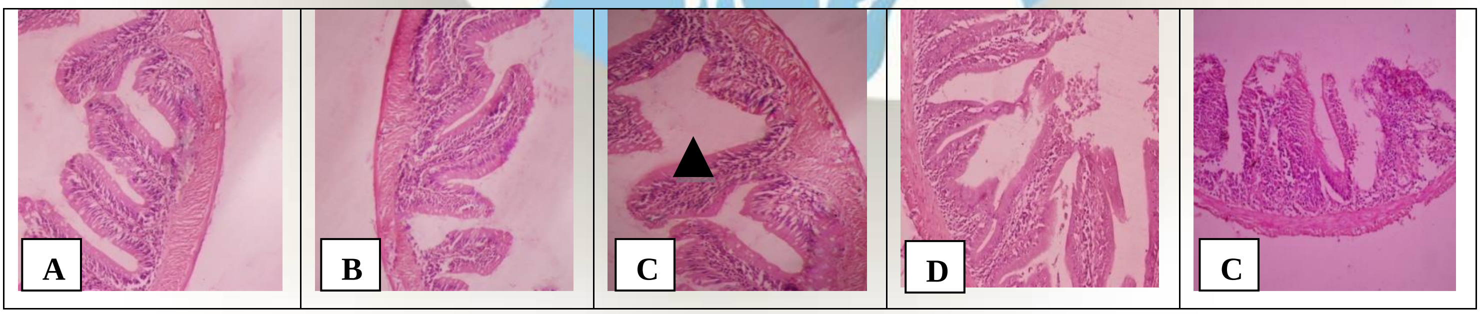

Fig 4: Photomicrograph of intestine of grass carp exposed to AFB_1. A) Normal intestine of control group. B) Normal intestine of grass carp exposed to 25 µg $AFB_{1.}$ C) Showing hypoplasia of goblet cells, leukocytic infiltration. D) Hypoplasia of goblet cells, villi sloughing. E) Hypoplasia of goblet cells, villi sloughing, leukocytic infiltration. H & E stained (100X).

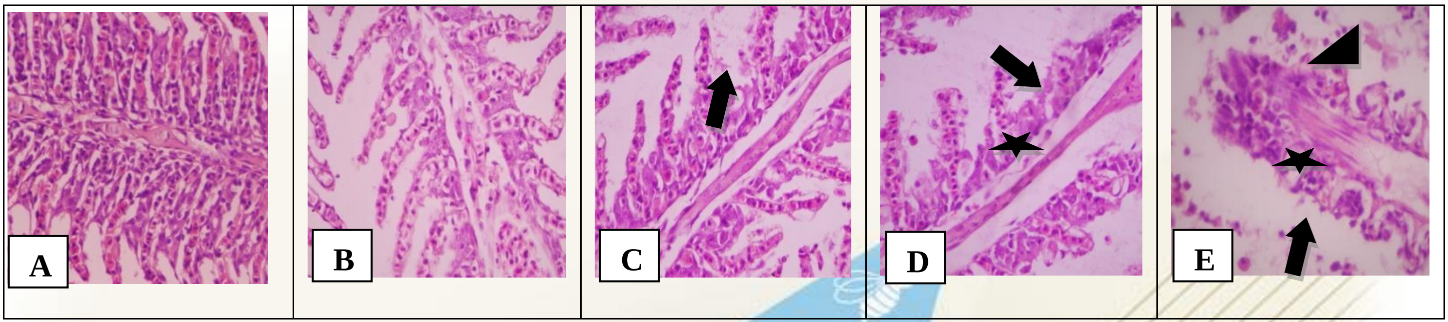

Fig 5: Photomicrograph of gills of grass carp exposed to AFB_1. A) Normal gills of control group. B) Normal histomicrograph of grass carp exposed to 25 µg AFB_1.. C) Showing Showing lamellae degeneration. D & E) Showing lamellae degeneration, exfoliated respiratory epithelium, leukocytic infiltration.

Discussion

The present study showed that the weight gain and specific growth rate of grass carp fed with different concentrations of AFB_1 in the diet was significantly lower than control group ($P<0.05$). The results of current study were agreed with the study of Tuan et al., (2002), Cagauan et al., (2004) and Zaki et al., (2008) who investigated that feeding of low to high concentrations of AFB1 for a longer duration produces a decrease in feed intake and weight gain efficacy. Andleeb et al., (2015) conducted studied on fry Catlacatla and found the highest weight gain in control group as compared to aflatoxin treated groups. Sephadre et al., (2009) investigated that there was a decrease in weight gain and SGR in fish treated with 75 ppb and 100 ppb AFB1 per Kg of diet as compared to control group after two months. Jantrarotai & Lovell (1990) studied that Nile tilapia were fed with 10mg AFB_1/kg of diet for 56 days and there is 24% growth reduction as compared to control group.

The hematological and blood biochemical profile in the current study was significantly affected by different concentrations of AFB_1. The hematocrit and hemoglobin concentration was reduced because of the decreased in total erythrocyte count. Due to damage to the lymphoid follicle the lymphocyte percentage declined. (Rizkalla et al., 1997, Hussein et al., 2000) studied the effect of AFB_1 in low concentrations for long duration in Nile tilapia which revealed marked anemia and leucopenia. Similar results were observed in channel catfish and common carp by Jantrarotai and Lovell (1990), Jantrarotai et al., (1990) and Pepeljnjak et al., (2003) channel catfish and common carp. The results showed that AFB_1 causes increase in the serum AST, ALT, glucose, urea and creatinine level. The increase in AST, ALT and glucose is due to the damage to liver. AFB_1 causes injury to the hepatocytes which contain preformed AST and ALT released into the blood.

The higher level of glucose in the blood indicates liver damage. The findings of current study were agreed with the results of Hendricks (1994) Tuan et al., (2002) which showed elevated levels of urea and creatinine in the blood of Nile tilapia exposed to different concentrations of $AFB_{1.}$

The serum total protein and albumin levels decreased significantly in a dose dependent manner. This is due to the binding of AFB_1 metabolites with the macromolecules of cell and damage to the hepatocytes. Liver is mainly involved in the synthesis of different proteins. (Patterson 1976) studied that AFB_1 hepatotoxicity interfere the synthesis of proteins by bond formation of AFB1 adducts to the macromolecules of cell.

The histopathological examination showed that higher concentrations of the AFB1 can cause changes in the liver, including hydrophic degeneration, leukocytic infiltration, necrosis and progressive fat deposition particularly at 75 and 100ppb AFB_1/kg. The gills showed degeneration of lamellae and lifting of respiratory epithelium. In kidney tissue nephrosis, glomeruli shrinkage and cell vacoulation were observed.

The intestine showed hypoplasia of goblet cells, sloughing of epithelial cells and leukocytic infiltration. Histopathological studies revealed liver cell degeneration and necrosis and progressive fat deposition at a level of 75ppb and 100ppb AFB1/kg of diets after 2 months Sephadri et al., (2010).

Liver is the principle target organ for $AFB_{1.}$ After the absorption the AFB_1 enter into the liver, cause injury to the hepatocytes, fatty change which leads to necrosis of hepatocytes. This is because of the reaction of AFB1 to the different proteins of the cell, as a result there is inhibition of lipid and carbohydrate metabolism and synthesis of proteins Joner (2000).

The genotoxic effect of AFB_1 in grass carp was studied by micronucleus assay. The genotoxicity was only recorded at 75ppb and 100ppb AFB_1/kg, having micronucleus frequency percentage of 0.85 and 2.15 % respectively. Abd-Allah et al., (1999) evaluated the DNA damage of AFB_1 in rainbow trout (sensitive) and channel catfish (resistant) using comet assay. Through intra peritoneal route 0.5 mg AFB_1/ ml DMSO/ kg body weight was administered to fish. The Comet assay was performed on total blood, kidney cells and hepatocytes of both channel catfish and rainbow trout after 4 and 24 hours. Significant ($p<0.05$) and high genotoxicity was exhibited by trout kidney tissue and blood tested after 4 hours which then reduced by 24 hours. DNA damage gradually increased with time in liver cells.

Conclusion

The present study concluded that the production performance of fish is reduced in AFB_1 treated groups lead to economic loss. AFB_1 in higher concentrations affect the hematological and blood biochemical profile. The microscopic examination of tissues showed that AFB_1 causes pathological changes. AFB_1 is genotoxic and induced DNA damage in fish at higher concentrations (75 & 100µg/Kg of diet).

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POSTER RESENTATIONS

Possibilities of Use of Corn Stalk and Straw in Animal Feeding

T. Ayasan, S. Aykanat
East Mediterranean Agricultural Research Institute, Adana-Turkey

Introduction

Harvesting in corn agriculture; it is usually done in the period when the testicles mature and the seedlings fall below 13-14%. The remaining corn stalks after harvest are often left on the field, and sometimes burned on the stomach, causing both loss and biological life in the soil. Stalk remaining in the field; is one of the important idle sources that can be evaluated within the feed groups of animal feed stuff. Generally, in the Adana region, harvest height in grain corn is just below the cob. The aim of the corn harvest is to harvest the harvesters because they are usually grains. If there is a harvest for both straw and straw, the height of the shape should be from the nearest point to the soil as in silage. In this case, the speed of the harvester is slow and the fuel consumption is high. Therefore, the cost of harvest is slightly higher if maize is harvested for grain and stalk. The stubble, which is produced by the harvest of corn which is widely grown in our country, is being used in animal feeding in recent years. Approximately 46% of a corn plant consists of grain and 54% consists of stem + leaf + stalk+husk.

Corn stalks are in general a low quality feed. The dry matter of the corn stalk was 89.85%; crude protein 3.79%; NDF is 67.42% and ADF is 39.93% (Açar et al., 2015). Typically corn stalks are included in diets at < 20 % of the total dietary dry matter. Dairy cattle will sort corn stalks within TMRs if they are too long; thus, fine chopping is recommended. Corn stalks can be successfully ensiled after grain harvest if the stalks contain sufficient moisture (>45 %) to ensile. The utility of ensiling corn stalks is often highly dependent on fall weather and drying conditions. Corn stalks are commonly baled using large square or round balers when moisture contents are <15-20% (Hoffman et al., 2016). When 2000 kg of corn stalk is burned, 1700 kWat energy is obtained in 1 hour; 1500 kg of cotton stalks are burned and 1700 kwat energy is obtained in 1 hour. Corn stover is one of the main crop straws characterized by multi-source, wide distribution, high abundance, low cost, less competing usage, and great potential for development and utilization (Eastridge, 2007; Li et al., 2014). Straws are typically high in fiber and low in crude protein (Anderson and Hoffman, 2009).

The dry matter of the corn straw was 91%, the crude protein was 3.3%; crude oil 2.2%; NDF and ADF were 69% and 43%; lignin%8.9; crude ash is 8.4% and metabolic energy is 1.50 Mcal / kg (Açar et al., 2015). The amount of corn stalk and straw given to animals varies according to the farms (Table 1). The risk of mold in the corn straw after the harvest hanging towards the winter period is high. Especially in the region daytime and night when the temperature difference is too much and the humidity is humid, corn stalk, leaves and cob are observed to mold.

Table 1. Amounts of corn stalk and corn straw given to animals:

	Age, months	Body weights, kg	Type	Amount, kg
Corn stalk	14-18	350-400	Heifer	0.5
Corn stalk	13-24	450-500	Heifer	2.0
Corn stalk	14-23	300-360	Pregnant Heifer	3.0
Corn stalk	8-14	200-280	Heifer	3.5
Corn stalk	8-12	300-350	Fattening Cow	1-2
Corn straw	36-40	550-600 kg	Milk Cow	3.0

Table 2 gives some comparisons of corn straw and wheat straw.

Straws	Pre-shred Bales Number (number/da)	After-shredding Bales Number (number/da)	Bale Weight (kg/number)	Production cost (TL/number)	Sale Price (TL/number)
Corn Bales	10	15	30	6-6,5	9
Wheat Bales	10	12	25	3-3,5	5
Straws	Weight (kg/trailer)	Production cost (TL/trailer)	Straw yield (number*trailer/da)		
Corn straw	800-900	130	1,5-2		
Wheat straw	500-600	110	2-2,5		
Feeds	Biological Yield (kg/da)		Biological Yield (%)		
	Grain	Stalk	Grain	Stalk	
Wheat	927	1858	33	67	
Corn	1500	1800	45	55	

Conclusion

Corn stalk and corn straw are one of the alternative feed sources; detailed work should be done in this regard.

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Determination of Nutritive Values of Different Silage Corn Varieties

T. Ayasan[1], H. İnci[2], S. Aykanat[1]

[1]East Mediterranean Agricultural Research Institute, Adana-Turkey

[2] Bingol University Agricultural Faculty, Department of Animal Science, Bingöl-Turkey

Introduction

Corn silage is one of the most important roughage sources of animals. Many farms are being used for reasons such as easy preparation and economic. Having a high level of net energy source also plays an active role. Corn silage consist of 7.40% crude protein, 4.30% crude ash, 3.20% crude fat, 31% dry matter, 37.20% ADF, 48.90% NDF (Ayasan et al., 2012). This study was carried out to determine and to compare the feed values of different corn silage varieties by chemical analysis.

Materials and methods

This study was carried out to determine the feed value of five different silage corn varieties (Adasa 16, Mocho, Torro, Ranger and PL712) by chemical analysis. Adasa 16 was obtained from fields of East Mediterranean Agricultural Research Institute (36°51'18" North, 35°20'49" East) and other varieties were obtained from different firms. Silage corn samples were ground using a lab mill to pass a 1-mm screen. Standard methods as described in AOAC (1990) were used for the determination of ash, ether extract, crude fibre and nitrogen (N) contents. Crude protein levels were calculated using the equation N × 6.25. The acid detergent fibre (ADF) and neutral detergent fibre (NDF) content were determined according to Van Soest et al. (1991). Metabolisable energy (ME) and net energy lactation (NEL) were calculated by using formulas. All chemical analyses were carried out in three replicate. All data was analysed using analysis of variance (ANOVA) and means were compared using Duncan's multiple range test and least significant difference test at $P<0.05$ if ANOVA showed a significant effect (SPSS, 1999).

Results

As a result of this study, between the silage corn varieties in terms of crude protein (CP), crude fat (CF), neutral detergent fiber (NDF) and hemicellulose (HEM) were found significantly important (P<0.05) but differences between the varieties in terms of dry matter (DM), crude ash (CA), acid detergent fiber (ADF), crude cellulose (CS), digestibility energy (DE) and metabolic energy (ME) were not found significant (P>0.05). The highest crude protein content was obtained from the variety of Ranger with a value of 12.10%, whereas the lowest value was obtained from the PL712 variety with a value of 8.60%. Adasa 16's crude protein content was determined as 10.75%. The hemicellulose of silage corn varieties ranged from 13.50% (Mocho) to 20.85% (Adasa 16). Crude ash content of silage corn varieties changed from 1.44 to 1.85%. The Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF) contents of silage corn varieties switched from 16.61 to 25.35% and 3.01 to 4.50% respectively.

The ether extract (EE) contents of silage corn varieties ranged from 2.65 to 4.29%. The metabolisable energy (ME) and Net energy contents of silage corn varieties ranged from 3.35 to 3.44 MJ/kg DM and 2.15 to 2.21 Mcal/kg DM% respectively.

Conclusion

When the results obtained from this study were evaluated, Adasa 16 and another corn silage varieties can be successfully use for ruminant feeds.

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Intensive goose production

E. Cilavdaroglu[1], M. A. Boz[2], U. S. Yamak[1]

[1]Department of Animal Science, Agricultural Faculty of Ondokuz Mayis University, Samsun/ Turkey

[2] Department of Animal Science, Agricultural Faculty of Bozok University, Yozgat /Turkey

Introduction

Demand on alternative poultry species has been increased in recent years. Geese are poultry species that are reared and consumed all over the world with their ability to easily adapt to different environmental conditions. Geese are grown in two forms for commercial purposes. In the first system; for a certain period (up to 16-28 weeks), the geese are grazed on pasture and subjected to intensive diet program is applied 2-3 weeks before slaughter. In the second system; geese are kept in intensive conditions and fed f for 8-9 weeks and then slaughtered. This 8-9-week period could be applied as 10, 12, 14 or 17 weeks depending on breed and the targeted slaughter weight. In both practices, there could be differences in live weight, amount of feather, carcass weight, fat ratio and taste among adult geese. On the other hand, these two practices vary depending on country, local conditions, harvesting period of other agricultural products, breeding traditions, condition of care and the consumer's interest in goose meat. Under semi-intensive conditions, geese could be slaughtered at 20-24 weeks of age (Boz et al., 2017a). In Turkey, the geese that commonly rear in small flocks, additional feeding is either never performed or given in small amounts (Boz et al., 2014). In this production model, geese that are fed by home residuals for 5-6 months old and reach 4-5 kg live weight (Sarica et al., 2014). In this paper, information has been given about worldwide goose genotypes which commonly reared in intensive conditions. Fattening periods, live weight obtained at the end of fattening, carcass weight and feed consumption values were compared (Bombik et al., 2014; Ottenburghs et al., 2016). In addition, the results obtained from local breeds and commercial genotypes have been examined.

Conclusion

By comparing the results obtained in different studies in Turkish geese, the possibility of shortening the fattening period by applying different feeding and growing techniques was investigated.

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The effect of adding different levels of green tea powder (Camellia sinensis) to the diet on productive performance for meat broilers

S. J. Hamody[1], A.A.Qassim[2], L. K. Bandar[1]
College of Agricultural , University of Baghdad, Deparment of Animal Production ,Iraq[1]
Ministry of Agriculture, Office of Agricultural Researches, Deparment of Animal Resources Researches, Poultry Researches Station, Baghdad , Iraq[2]

Introduction

The use of antibiotics in poultry was identified as a result of resistance to bacteria and residues of antibiotics in poultry products, therefore, many natural alternatives have been used, particularly medicinal plants with a positive effect on the production and physiological performance of meat broilers (Hernandez et al., 2001), for its effective role as natural antimicrobial, natural oxidation inhibitors and growth promoters that enhance the immune system by stimulating the immune system (Craig, 1999).One of these plants used in the poultry is the green tea (Camellia sinensis) (Yang et al., 2003), one of the most important herbs that are used popular as a drink has an anti-role of aging as well as it gives protection against heart disease and prevent tooth decay because it contains natural fluoride, it turns out that green tea leaves contain a multi-phenols have the role of antioxidant including many Catechins types, which include epicatechin are (EC) and epicatechingallate (ECG) and epigallocatechin gallate (EGCG) also has counter the activities of antimicrobial (Cao et al., 2005) and anti-inflammatory and viruses Parasites (Crespy and Williamson, 2004), Green tea and fenolates were used as dietary supplements in hen layig chicken (Uganbayar et al., 2005) and also showed positive effects in the production performance of broilers and breast meat (Kaneko et al., 2001; Sarker et al., 2010), Green tea powder was introduced in meat broilers diets by the researchers at levels 1.0, 2.5 and 5.0%, with a significant decrease in the weight increase of birds (Kaneko et al., 2001) and level 1.5% (Biswas and Wakita, 2010). In the absence of a study on the use of green tea in the meet broilers diet in Iraq and at different levels from the previous research conducted in different countries of the world, this experiment was conducted to determine the best proportion in the production performance of meat broilers.

Materials and methods

This study was carried out at the Poultry Research Station of the Agricultural Research Department / Ministry of Agriculture during the period from 1/4/2018 to 14/5/2018, by using 300 chick of one day aged Ross308 with 36.7 gram as an average weight, these chicks were kept in a closed hall of 15 chambers and distributed randomly each chamber contains 20 birds, and these birds were fed on 3 diets according to the table (1), one day aged chicks were fed on diets contain green tea powder of (0.5 , 1 , 1.5 , 2 g/kg feed) levels for treatments T_2 , T_3 , T_4 , T_5 respectively and compared with control treatment (T_1) that is devoid from addition, each treatment contains 3 replicates each replicate contains 20 birds, feed and water were introduced freely (ad libitum) all along the experiment, and the heat was controlled by using gaseous incubators, and the hall was supplied with an ongoing illumination and turning off the power for one hour to habituate the birds on the power failure.

Table 1. Percentage composition of the experimental diets

Ingredients %	Types of diets		
	Starter 1-13D.	Grower14-27d.	Finisher28-42d.
Yellow corn	47.5	50.85	54.84
Wheat	10	10	10
Soybean Meal (48.5% CP) [1]	32	28	24
Meat Meal [2]	5	5	5
Hydrogenated Vegetable Fat	3	4.15	4.3
Dicalcium Phosphate	0.7	0.5	0.4
NaCl	0.1	0.1	0.1
Limestone	1.2	1.14	1.1
Methionine	0.25	0.13	0.13
Lysine	0.25	0.13	0.13
Total	100	100	100
Calculated Values[3]			
M.E. Kcal/ Kg Diet	3059	3177	3277
Crude Protein %	22.5	20.9	19.3
Crude Fibre %	3.5	3.4	3.2
Lysine, %	1.38	1.19	1.09
Methionine Plus Cystine %	1.08	0.92	0.88
Ca , %	1.02	0.95	0.9
Available P, %	0.45	0.41	0.38

[1] Soybean cake used an Argentine source of crude protein content by 48% and 2440 Kcal/ Kg M.E.

[2] Protein Meal User Product From Netherlands Origin **(**Brocon**)** Contain 40% Crude Protein 0.2107 Kcal / Kg Protein M.E., 0.5% Crude Fat 2.20% Crude Fiber 5%, Calcium 4.68% ,Phosphorus 3.85% Lysine 4.12%, Methionine 4.12% , Methionine Plus Cystine 0.42%, Tryptophan 0.38%, Threonine 1.70%. It Contains A Mixture Of Vitamins And Minerals Needed Believes Rare Birds Of These Elements.

[3]Based on National Research Council recommendations (1994).

Productivity traits, which included body weight, weight gain, feed consumption and feed conversion efficiency were measured every week for 6 weeks. Experimental data were analyzed using CRD (Complete Random Desig) using the (SPSS 2017), and the significant differences between the averages were measured using the Duncan Multiple Range Test (Duncan, 1955).

Results

The results of the addition of green tea to the diet in the body weight (Table 2) showed a significant increase in the first week of the experiment in favor of the treatment of adding 2 g per kilogram feed and did not differ from the rest of the addition treatments in T_2, T_3 and T_4 (0.5, 1 and 1.5 g / kg feed), But differed from the control treatment devoid from addition and this result continued in favor of addition treatments compared to the control treatment during the second and the third weeks of the experiment,In the fourth week of age, the body weight of T_2, T_4 and T5 (0.5, 1.5 and 2 g / kg feed) increased in comparison to T_1 and T_3 (0.5 and 1.0 g / kg feed), in the fifth week of age there is a significant increasing in body weight in favor of treatment T_2 compared with the rest of the treatments. In the last week of the experiment, the increase in body weight was in favor of all addition treatments compared with the control treatment which is devoid of addition.As for the weight increase, the addition of 2 g of green tea powder per one kilogram feed showed a higher increase in weight during the first two weeks. No significant differences were observed between the third and fourth weeks. In the fifth week of treatment, T_2 recorded as the best treatment.In the sixth week of age, the T4 and T5 treatments were superior to the control treatment and did not differ from T2 and T3. In the total weight increase, all addition treatments showed a significant increase compared with the control treatment which is devoid from the addition.These results were not consistent with other researchers (Kaneko et al., 2001), Biswas, Wakita (2001), Sarker et al. (2010), who used levels 1, 1.5, 2.5 and 5.0% of green tea powder in broiler diets And led to a decrease in the weight increasing,It also did not agree with Erener et al. (2011), which set the ratio of 0.2 g / kg the most appropriate ratio of the addition of green tea powder to the diet in the meat broiler.

Table 3 indicates the effect of adding levels of green tea powder to the diet in the amount of feed consumed, which showed no significant differences in weeks 1, 2 and 3 weeks of age, While feed consumption increased in the fourth week of the age of the two treatments T_1 and T_2, which did not differ from the two treatments T_4 and T_5 but differed from treatment T_3, which recorded less-consuming feed in this week, and in the fifth week of age treatment T_2 recorded as a higher feed consuming, and less feed consumption treatment was T_5. In the last week of the experiment (week 6), the T_1 and T_2 treatments returned to the highest consumption of feed compared with the other treatments T_3, T_4 and T_5 . T_4 and T_5 were the lowest consumption of feed, recording 1485.96 and 1478.70 g respectively.

As for food conversion ratio there was no significant difference between the two treatments in the first week, while the second and third weeks showed a significant improvement in the food conversion ratio compared to the treatment devoid from addition of green tea powder (control treatment). In the fourth week of age, food conversion ratio has decreased in control treatment T_1 and T_5 compared with the rest of the treatmrnts, and in the fifth week the deterioration in food conversion ratio was recorded in the treatments T_1 and T_4. In the last week of experiment (6), the improvement in food conversion ratio was for all green tea powder addition treatments compared to control treatment. This improvement was observed in the total period of the experiment from 1 to 6 weeks. As for the refinment rate and percentage of internal intestines shown in Table (4), the highest refinment rate was recorded in the treatment T_3, which added 1% of the green tea powder to its diet and did not differ significantly from the other addition treatments, but differed from the control treatment T_1 . The highest liver weight was recorded in T_5 compared to T_1 and gizzard weight was lowest for T_3 and no significant differences in heart weight were observed. Abdominal fat inversely decreased in all other treatments, in addition to the increased levels of green tea in the diet compared to T_1 control, and this result agreed with what Saraee has concluded (2014). This positive result in low abdominal fat has an important role can be associated with the increase in body weight as this increase in body weight may be due to increased weight of the carcass cuttings and not to increased abdominal fat, although no significant differences In the weights of the carcass cuttings and the differences were mathhmatical only. These results indicate that green tea levels added to the diets have been instrumental in improving the productive performance of the meat broilers as a result of containing the various Polyphenole such as Epicglocatechingallette which have an effective role as antioxidant (Craig, 1999) The microbial community of intestinal flora has changed and plays an important role in the health of birds by increasing the number of beneficial bacteria at the expense of harmful bacteria (Guo et al., 2004).

Table (5) shows the effect of adding different levels of green tea powder to meat broiler diets in estimation pf oxidation indicators in stocked meat for 30 days. A high significant decrease (P <0.01) in the number of milligrams of melonaldehyde (MDA) per one kilogram meat T_3, T_4, and T_5 were significaly decreased in comparison with T_1 control treatment.

Table 2 . Effect of Green Tea on Body Weight and Body Weight Gain of Broiler

Age week	Treatment*				
	T_1	T_2	T_3	T_4	T_5
Body Weight (g.)					
1	137.16±1.63b	145.84±1.98ab	142.81±1.76ab	142.38±1.10ab	151.39±1.53a
2	367.06±9.67b	434.30±10.76a	387.78±12.82ab	442.66±10.08a	407.66±3.84a
3	782.70±14.10b	876.50±10.08a	835.76±5.33ab	895.73±9.51a	868.50±8.20a
4	1176.66±23.34c	1368.60±18.85a	1264.90±32.98b	1367.54±16.85a	1340.86±20.14a
5	1671.66±27.62c	1925.26±23.05a	17964.18±16.68b	1791.96±12.22b	1778.66±11.25b
6	2313.78±25.95b	2642.56±22.96a	2586.16±25.76a	2767.88±30.93a	2753.01±35.63a
Body Weight Gain (g.)					
1	100.11±1.67c	108.83±3.95bc	105.70±3.98ab	110.07±0.97ab	114.68±1.55a
2	229.90±8.82c	288.46±4.92b	244.97±10.91c	295.30±11.06bc	256.27±4.77a
3	415.63±19.14	442.20±9.54	447.98±16.12	453.06±17.61	460.83±24.36
4	393.96±16.83	492.10±17.72	429.13±23.45	471.81±32.03	472.36±43.71
5	495.00±50.92ab	556.66±48.22a	499.28±37.12ab	424.42±11.37b	437.80±18.45ab
6	642.11±74.16b	717.30±54.26ab	821.98±33.64ab	975.91±40.51a	974.35±74.30a
1-6	2315.78±96.53b	2644.56±22.60a	2588.56±26.33a	2769.83±34.57a	2755.01±80.91a

Means in the same row with different superscripts were significantly different (P<0.05). * treatment mean T_1:control without adding, T_2,T_3,T_4 and T_5 :(0.5 ,1,1.5,2g green tea / kg diet).

Table 3 . Effect of Green Tea on Feed intake and Feed Conversion Ratio of Broiler

Age week	Treatment*				
	T_1	T_2	T_3	T_4	T_5
Feed intake (g.)					
1	117.66±14.63	103.13±17.26	119.13±10.25	103.46±8.75	124.61±12.73
2	324.90±5.73	339.96±6.80	299.56±17.11	318.10±34.12	345.13±7.88
3	543.46±19.57	609.26±27.02	605.70±5.42	622.93±17.47	610.23±11.52
4	771.69±28.62a	790.70±29.37a	701.86±7.10b	728.16±6.71ab	735.80±13.72ab
5	871.96±10.74ab	903.00±6.04a	825.60±60.28ab	794.03±5.68bc	728.13±6.30c
6	1222.10±6.24a	1191.033±8.71a	1361.73±7.23b	1485.96±3.59c	1478.70±8.78c
1-6	3953.76±47.52	3939.10±61.37	3915.60±29.43	4054.66±32.65	4024.61±4.45
Feed Conversion Ratio (g./g.)					
1	1.17±0.14	0.95±.01	1.12±0.07	0.94±0.08	1.08±0.09
2	1.42±0.07a	1.17±0.01b	1.23±0.1ab	1.07±0.09b	1.34±0.02ab
3	1.55±0.02a	1.37±0.03b	1.35±0.05b	1.39±0.11b	1.32±0.05b
4	2.00±0.22a	1.61±0.11b	1.65±0.11b	1.57±0.15c	1.68±0.07a
5	1.79±0.16a	1.64±0.12b	1.65±0.03ab	1.87±0.06a	1.67±0.06ab
6	1.95±0.23a	1.67±0.12ab	1.72±0.20b	1.53±0.06c	1.53±0.06c
1-6	1.71±0.52a	1.49±0.10b	1.51±0.33b	1.46±0.08b	1.46±0.43b

Means in the same row with different superscripts were significantly different (P<0.05). * treatment mean T_1: control without adding, T_2,T_3,T_4 and T_5 :(0.5 ,1,1.5,2g green tea / kg diet).

The effect of using green tea powder on meat broilers diets on Peroxide value was found from Table (5) to be a high significant decreasing (P <0.01) in the number of peroxide parameters as T_3, T_4, T_5 was significaly decreased compared to the control treatment, while T_2 was not significantly different from the rest of the treatment. As well as notes from the table (5) when estimating the proportion of free fatty acids in meat a high significant decreasing (P <0.01) in the proportion of free fatty acids and T_4 and T_5 treatments were significanly decreased compared with the control treatment T_1.The high significant decrease of oxidative indicators (MDA, PV and FFA) is due to the fact that the addition of different levels of green tea powder in meat broilers diets has prevented the deterioration of meat quality by inhibiting the process of oxidation, staining and decomposition of fat and fatty acids in broilers' meat stocked for 30 days,Green tea powder acid acts as an enzyme antioxidant by stimulating the cells to increase the formation of enzymes (glutathione peroxidase and catalase) that maintain cells, inhibit the formation of free roots and remove hydrogen peroxide in animal tissues,As well as the green tea powder acid plays a secondary role in association with glutathione peroxidase, which leads to prolong the length of its residency in the cells and thus prevents the formation of free roots in the stocked broilers meat, which prolongs the length of storage of meat without deterioration of its features preserving it from oxidation and staining due to storage (Yang et al., 2003).

Table 4 . Effect Of Green Tea On dressing percentage and goblet , breast , thigh , drumstick

Carcass Quality %	T_1	T_2	T_3	T_4	T_5	Sg.
Dressing	73.51±0.37b	75.16±0.85ab	75.87±0.39 a	74.46±0.80ab	74.27±0.62 ab	*
Liver	1.82±**0**.04 b	2.42±**0**.13 ab	2.39±**0**.27 ab	2.01±**0**.10 ab	2.59±**0**.30 a	*
Gizzard	1.82±**0**.04 a	1.91±**0**.07 a	1.47±**0**.07 b	1.71±**0**.06 a	1.76±**0**.10 a	*
Heart	**0**.46±**0**.07	**0**.44±**0**.02	**0**.46±**0**.04	**0**.42±**0**.02	**0**.47±**0**.05	NS
Abdominal fat	2.06±.04 a	**0**.94±.04 b	**0**.77±.04 c	**0**.45±.02 d	**0**.31±.02 e	*
Breast	38.86±1.76	38.03±1.78	38.83±.79	38.37±1.22	39.81±1.02	NS
Back	20.44±1.45	22.01±1.98	20.59±**0**.98	20.32±**0**.46	18.13±**0**.33	NS
Thigh	13.35±1.43	12.98±**0**.97	12.90±**0**.66	13.08±**0**. 60	14.92±**0**.72	NS
Drumstick	12.39±**0**.08	12.17±**0**.01	12.39±**0**.16	12.61±**0**.86	13.18±**0**.36	NS

Means in the same row with different superscripts were significantly different (P<0.05). * treatment mean T_1:control with out adding, T_2,T_3,T_4 and T_5 :(0.5 ,1,1.5,2g green tea / kg diet).

Table 5 . Effect of Green Tea on MDA , P.V and FFA

Carcass Quality %	T_1	T_2	T_3	T_4	T_5	Sg.
MDA	1.03±0.02 a	0.95±0.01ab	0.53±0.04 b	0.51±0.01 b	0.51±0.02 b	*
PV	1.76±**0**.32 a	1.45±**0**.51 ab	1.09±**0**.28 b	0.99±**0**.45 b	0.98±**0**.32 b	*
FFA	1.09±0.02 a	0.75±**0**.02 ab	0.53±**0**.05 ab	0.40±**0**.06 b	0.38±**0**.03 b	*

Means in the same row with different superscripts were significantly different (P<0.05). * treatment mean T_1:control with out adding, T_2,T_3,T_4 and T_5 :(0.5 ,1,1.5,2g green tea / kg diet).

Conclusion

We conclude from this study the possibility of adding 0.5-2 g/kg feed of green tea powder (Camellia sinensis) to the diet to obtain a positive improvement on the productive performance of meat broilers.

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Yogurt fermented diet increased ileum histomorhological parameters of quails (Coturnix coturnix Japonica).

A Korkmaz, I Coskun*
Kirsehir Ahi Evran University. Agricultural Faculty. Department of Animal Science, Kirsehir, 40100, TR

Introduction

After the ban of antibiotic using as a growth promoter, different food additives have been researched for two decades. Jung et al., (2010) reported that there is an urgent need to determine eco-friendly food additives as a growth promoter instead of antibiotic use. In earlier studies, it was determined that fermentation of feedstuffs with different bacteria increased performance of broiler chickens. For instance, Mathivanan et al., (2006) reported that A. niger fermented soybean meal boosted broiler performance and ileum villi length. Although fermented different feedstuffs have been used in earlier studies. there is no study on the yogurt fermented feed or ration in literature. But it is source of lactobacilli species and it can be candidate of different fermented diets. It contains lactobacilli and other beneficial bacteria that enhances health, digestion and suppress the pathogens by improving the balance of microbes in the digestive tract (Metchnikoff, 1998). Therefore the aim of this study was to investigate the effect of yogurt fermented diet supplementation to the quail diet on growth, fecal microbiota and ileum histomorphology.

Materials and methods

Quail diet diluted 1/1 distilled water and fermented with yogurt at 24 hours. One hundred twenty male quails aged 21 d were used in this study and the trial lasted for 21 days Three dietary groups were confirmed. Dietary groups were 1) control. 2) Y1 group (%5 fermented diet supplementations) 3) Y2 group (%10 fermented diet supplementation). In this study 21 day old 120 male quails 123 ±1 g were used. 120 quails distributed into three groups with four replicate (each replicate included 10 male chicks). Experiment lasted 21 day. Growth, feed intake and feed conversion ratio (FCR) recorded weekly. Mortality was not calculated since there was no death in any treatments. Samples of the caecal contents were collected into sterile glass tubes in which they were kept on ice until subsequent inoculation into agars.

Lactic acid bacteria (LAB) determined in caecal samples. Ileum villi length and width were evaluated by using an image processing and analysis system (ZEN 2012 SP2) for Zeiss Primo Star HD Light Microscope. The data were analyzed using the ANOVA procedure of SPSS software (SPSS 15).

Table 1. The effect of yogurt fermented diet supplementation on growth fecal microbiota inner organ development and ileum histomorphology

	Control	Y1	Y2	SEM	P value
Feed intake (g)	490,58	476,89	478,44	6,43	0,679
Weigth gain (g)	148,50	156,89	147,72	2,67	0,327
FCR	3,32	3,04	3,24	0,08	0,122
LAB	7,28	7.40	6,80	0,13	0,082
GITL (cm)	22,70	22,48	21,86	0,55	0,832
GITW (g)	2,39	2,58	2,35	0,09	0,605
Villi length (µ)	247,85b	308,62a	237,78b	4,15	0,000
Villi vidth (µ)	34,87b	42,28a	39,01ab	0,93	0,003
Cryptdepth (µ)	14,97	15,37	14,07	0,33	0,286

SEM= Standart error of means

Results

At the end of the study growth parameters did not change but live weight gain was tend to in Y1 group. Feed intake, LAB, FCRGastrointestinal length (GITL) and Gastrointestinal weight (GITW) and crypt depth did not different. Villi length increased in Y1 group from control and Y2 groups (p<0.01). Villi width increased in Y1 group from control group (p<0.01).

Conclusion

At the end of this study. it was found that %5 fermented diet supplementation developed weight gain and FCR, GITL, GITW, villi length, villi width and crypt. To conclude %5 fermented diet supplementation can use to improve growth parameters, ileum histomorhological parameters. digestive system and fecal microbiota in male quails.

Acknowledgements

This study is a part of MsC thesis of first author

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Using of Grasshoppers as Protein Source ın Poultry Nutrition

K. Sacıhan, F. Saydut, A. Korkmaz, İ. Coşkun

Kirşehir Ahi Evran University. Agricultural Faculty. Department of Animal Science, Kirşehir, 40100, TR

Introduction

Soybean has been used as protein source in poultry diet. Soybean production is provided form America continent. Soybean breeding in our country does not provide the requirement. So soybean is imported from America and Brazil to our country. The imported soybean is entirely GMO. Recently, the rations have been complicated in terms of consumer demand regarding the use of raw materials with GMOs. Demand for meat and eggs of animals reared in organic free range system are increasing. Especially the use of soybean as a protein source is the most important source of cost in diet. Therefore, researchers have focused their efforts to work on alternative protein sources or ecofriend foods. Researchers have been studied different protein sources that can be an alternative to animal protein sources that have high protein content, such as fish meal, meat bone meal, other slaughter by-products, hydrolyzed feather meal, poultry by-products, insects, fly larvae, worms. Recent studies have focused on the use of grasshoppers (Orthoptera: Acrididae) instead of soy bean in diet.

Nutrient Composition of Grasshopper meal

Studies have shown that grasshopper meals contains 65% protein, 8% crude fat, 9% chitin, 3.5% ash, 2% calcium, 1% phosphorous and is a valuable source of protein and high fat content for poultry feeds in terms of unsaturated fatty acid composition and high in amino acid profile (Wang et al., 2007). Anand et al., (2008) reported that grasshopper meal could be 50-55% alternative to fish meal

Studies on poultry

Wang et al. (2007) reported that the supplementation of 50,100,150 gr grasshopper meal had no adverse effect on performance. Finke et al. (1985) reported that the supplementation of grasshopper meal has no effect on performance. Nakagaki and DeFoliart (1987) reported that grasshopper meal improves feed efficiency, with high levels of methionine, arginine, high metabolic energy and protein contained in grasshopper meal.

Sun et al. (2012) reported that the increase in red color and protein content, meat pH, loss of cooked and fat content in the meat of free-grown broiler chicks reared with grasshoppers meal. They also reported that the meat of chicks consumed grasshoppers had a high chewing score, aroma.

Conclusions and Recommendations

In earlier studies, it is concluded that grasshoppers do not supplement more than 50% of the ration because they contain high levels of chitin but the consumption of grasshopper has positive effects on the quality characteristics of chicks meats, improves aroma, increase redness of meat and it can be used in conventional production in terms of consumer demand. However, as the number of studies in the literature on the using of grasshopper is finite. Therefore different studies should be conducted on the use of different animal species and different doses of grasshopper supplementation in diet.

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The Metabolic Profile Parameters for Dairy Cow

S.Ergul[1], T. Ayasan[1], E. Say[1], H. Hızlı[1], S. Coban, O.G. Dundar[1]
[1]East Mediterranean Agricultural Research Institute, Adana-Turkey

Introduction

The metabolic profile is a method for determining the metabolic state of dairy cows, plays an important role in the detection of nutrient deficiencies in animals and early detection of metabolic diseases (Radostits et al., 2007; Chalmeh et al., 2015). Metabolic profile is used to prevent and control negative energy balance that will occur after birth. This study was conducted to determine metabolic profile measures of cows in different lactation periods.

Materials and methods

This study was carried out at winter 2017 on 31 Holstein dairy cow, Adana, TURKEY. Holstein dairy cows bred in East Mediterranean Agricultural Research Institute Hacıali Farm were used as material. The animals in trial were selected from animals of the same age group. In the blood samples taken from 31 animals in each stage, keton, blood urea nitrogen (BUN), calcium (Ca), phosphorus (P), aspartate aminotranspherase (AST/GOT), alanine aminotranspherase (ALT/GPT), ɣ glutamyl transpeptidase, glucose, cholesterol, total protein (TP), albumin and magnessium (Mg) concentrations and activities were determined. Blood was taken 4 hours after feeding. All data are presented as mean ± standard deviation. Differences between groups were analyzed by one-way ANOVA. SPSS package program (1999) is used. The level of significance was not set at P<0.05.

Results

As a result of this study, all metabolic profile parameters were not affected by mid lactation, late lactation, far-off dry and close-up dry (Table 1). Mean blood urea nitrogen was found to be 19.13 mg/DL. Serum concentration of beta keton in late lactation was higher than another groups but no significantly (P>0.05). The level of AST, ALT, glucose, cholesterol and albumin in mid lactation cows was higher than others but no significantly (P>0.05).

The level of total protein and calcium in late lactation cows was higher than others but no significantly (P>0.05). And the level of ɣ glutamyl transpeptidase in close-up dry was higher than others but no significantly (P>0.05).

Table 1. Metabolic profile parameters

Blood parameters	Mid lactation	Late lactation	Far-off dry	Close-up dry
Beta keton, mmol/L	0.83±0.15*	1.13±0.57	0.80±0.14	0.70±0.34
Blood urea nitrogen (BUN), mg/dL	18.19±2.65	18.33±3.89	21.63±3.84	18.38±3.75
Calcium (Ca), mg/dL	9.59±0.46	10.01±0.4	9.68±0.53	9.36±0.58
Phosphorus, mg/dL	6.87±1.27	6.63±0.8	7.47±0.65	6.53±0.74
Magnesium, mg/dL	2.32±0.13	2.21±0.22	2.39±0.23	2.28±0.19
Aspartate aminotranspherase (AST/GOT), U/L	99.57±22.13	91.00±26.75	85.67±16.06	74.91±16.26
Alanine aminotranspherase (ALT/GPT), U/L	33.00±3.65	29.00±6.03	30.83±7.81	29.00±5.12
ɣ glutamyl transpeptidase, U/L	21.71±6.07	21.86±6.82	23.83±10.42	26.00±6.43
Glucose, mg/dL	57.00±34.17	42.00±33.46	36.00±41.27	34.82±25.57
Cholesterol, mg/dL	208.86±32.95	198.14±36.73	185.00±50.16	173.36±53.44
Total protein (TP), g/dL	8.47±0.57	8.76±0.61	8.18±0.56	8.56±0.88
Albumin, g/dL	4.36±0.24	4.11±0.26	4.20±0.54	4.14±0.32

*Not significant (P>0.05).

Conclusion

When the results obtained from this study were evaluated, metabolic profile parameters were not affected by different periods.

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Relationship Between Feeding and Reproduction Hormones in Early Lactation Period in Dairy Cattle

F. Sert
Eastern Mediterranean Agricultural Research Institute, Adana, Turkey

Introductıon

In recent years, intensive dairy farms have been able to increase the genetic potential of the herd, resulting in high fertility problems as high milk yield can be achieved. Therefore, care should be taken that the cows are fed during prenatal, prepartum, postpartum and early lactation periods. The aim of this article is to emphasize the importance of nutrition to improve reproductive performance and fertility (Lucy, 2001; Görgülü, 2011).

Effect of Feeding on Reproduction

When it's time to calving, the concentration of estrogen, prolactin and glucocorticoid is increased while the concentration of progesterone present is decreased in blood. Estrogen is rapidly reduced after calving, and prolactin and glucocorticoid concentrations reaches normal levels (Chew et al., 1979). PGF2α concentration starts to increase 24-36 hours before calving, reaches peak at calving, decreases after calving. Prolactin stimulates milk secretion as well affects sexual glands, gonadotropin secretion, water, sodium and potassium excretion from the kidneys (Evans et al., 1989). There is a decrease (hormonal, fetus) in dry matter intake in dairy cattle during the transition period. Thus, GnRH production, LH and FSH amounts in the hypothalamus are reduced, therefore negatively affecting the ovarian sensitivity to FSH and LH. In order to remove this negative effect, feed intake reduction should be minimized in the prepartum period and feed intake in the postpartum period should be maximized (Westwood et al., 2002), quality forage must be used and the rate of concentrate feed should be increased in the diet (Görgülü, 2011). The energy level of the feed is the most important factor affecting reproductive function (Boland et al., 2001, Özdemir and Denkbaş, 2003). Therefore, fat is used to meet ration energy levels in high-yield dairy cattle at the early of lactation (Duske et al., 2009). Also because of the fatty acids they contain are directly affect reproductive function (Şirin and Kuran 2004). In order to achieve more milk yield in dairy cattle farms, it is preferred to feed with high amounts of protein containing rations.

High rations of protein content while increasing milk yield, it causes the level of urea above the recommended levels (8-12 mg/dl) in rumen, blood, ammonia, milk, follicles and uterine fluids (Sederevicius et al., 2008). This is caused by early embryonic deaths in the disorders of fertilization (Aydın, 2007). Vitamins (vitamin A, β-caroten, vitamin E, selenium, vitamin D and vitamin C) and minerals (Ca, P, K, Mn, Zn and I), which are of primary importance on reproductive fertility, are necessary for healthy growth, reproduction and reproductive fertility of animals and its deficiencies may cause disorders in reproductive system and reproductive fertility (Sönmez, 2013; Şahin, 2008). For optimum fertilization, the Ca/P balance should be between 1.5 / 1 and 2.5 / 1.

Conclusion

There is a significant relationship between energy intake and reproductive performance in high yielding dairy cows. Excessive energy uptake, especially during the transitional period, causes serious problems for fertility in the lactation period. In order to reduce the adverse effect of negative energy balance during early lactation period, various feeding strategy should be applied. High reproductive performance and fertility is an important factor for the farmer to make profit in dairy farms. Care must be taken when feeding.

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Relationships between population size of poultry red mite (Dermanyssus gallinae) and hematological values in infested laying hens

E. Eralp, H. Erdem, C. Konyali, B. Coşkun, T. Savaş

Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

Dermanyssus gallinae is a hematophagous mite that is found extensively throughout the world in poultry farms. Due to biology of the mite also makes it difficult to determine the degree of infestation. A parameter is needed for the detection of the influence of a particular population size of mite on the host. Therefore, we investigated whether the degree of mite infestation can be assessed by blood parameters.

Materials and methods

Sixteen hens aged 60 weeks of the Atabey genotype were used. The chickhens, separated into two groups as control and infested group. The number of mites was estimated weekly via photos of these traps with a computer program (Konyalı, 2016). Hematocrit values were determined by the Sahli method. The standard method was used for the determination of leukocyte types (Konuk, 1981). The weekly observed mite population size data were fitted by time with different equations (Excel 2010). Best fitting determination coefficients were found by an 3rd degree polynomial function. Therefore, all blood parameters were adjusted to polynomial functions of the third degree. The best fit by time of the 3rd degree polynomial function was determined for the hematocrit value. This was followed by a regression analysis ($Y=\beta_0+ \beta_1X+\varepsilon$) was carried out between the number of mites and the difference of the hematocrit values of the control group from the infected group, in which the number of mites was logarithmic transformed.

Results

The population size varied by the function $y = 8.8566 \cdot x^3 - 10^6 \cdot x^2 + 5 \cdot 10^{10} \cdot x - 7 \cdot 10^{14}$ (R^2 = 0,9492) over the time. The best fitting by time of the 3rd degree polynomial functions were found for lymphocyte (R^2 = 0.6184), hemoglobin (R^2 = 0.6066) and hematocrit value (R^2 = 0.8249).

Although usually the eosinophil and monocyte rate is preferred for the detection of parasitic infection, however, the results of this study indicate that it has no close association with the population size of the mite. The regression analysis was resulted with a high significance (b = 12.02, P=0.009).

Figure 1. Changes of blood values of the infested group and mites' population size during the experiment

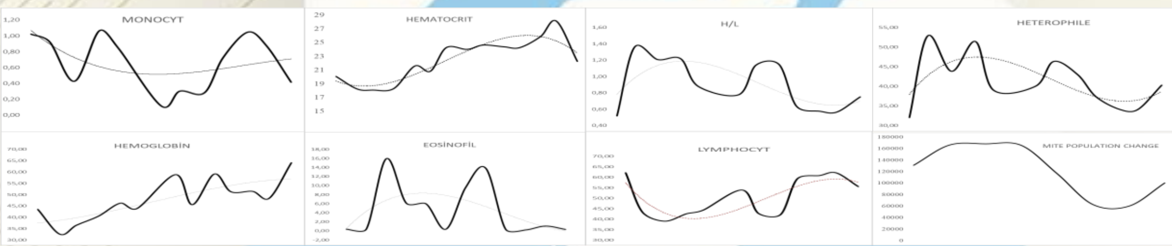

Table 1. Fitting by time of the 3rd degree polynomial functions for studied traits and determination coefficients

Trait	Equation	R^2
Mite population size	$y = 8.8566 \cdot x^3 - 10^6 \cdot x^2 + 5 \cdot 10^{10} \cdot x - 7 \cdot 10^{14}$	0.9492
Heterophile	$y = 0.0015 \cdot x^3 - 196.1 \cdot x^2 + 8 \cdot 106 \cdot x - 10^{11}$	0.3978
Eosinophil	$y = 0.0334 \cdot x^3 - 0.8863 \cdot x^2 + 6.2327 \cdot x - 4.8485$	0.2875
Lymphocyte	$y = -0.0022 \cdot x^3 + 284.11 \cdot x^2 - 107 \cdot x + 2 \cdot 10^{11}$	0.6184
Monocyte	$y = -2 \cdot 10^{-5} \cdot x^3 + 2.7099\ x^2 - 115364 \cdot x + 2 \cdot 10^9$	0.2309
H/L	$y = 6 \cdot 10^{-5} \cdot x^3 - 7.7494 \cdot x^2 + 329836 \cdot x - 5 \cdot 10^9$	0.4503
Hemoglobin	$y = -0.0003 \cdot x^3 + 32.534 \cdot x^2 - 10^6 \cdot x + 2 \cdot 10^{10}$	0.6066
Hematocrit	$y = -0.0005 \cdot x^3 + 62.926 \cdot x^2 - 3 \cdot 10^6 \cdot x + 4 \cdot 10^{10}$	0.8249

Conclusion

Biochemical and hematological values react very quickly to internal and external effects of the organism. Therefore, it is difficult to deduce single values to single effects. However, from similar changes of the effect and their reaction (biochemical or hematological) over time can be deducted to a relationship. It has been already reported by older studies that the hematocrit value is an indicator of parasitic infestation (Wanless ve ark., 1997). The regression analysis of the hematocrit differences between control and infested groups shows us a clear difference between healthy and D. gallinae infested birds, as well as that the hematocrit value can be used to estimate the level of infestation.

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Mother-offspring behaviors during suckling in Gökçeada, Maltese and Turkish Saanen goats

C. Tölü, E. Dalar, T. Savaş
Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

The most important factor determining mother-offspring interaction in mammals is the breeding system. For example, while the mother and offspring are always together in natural life, the dimension of the relationship in livestock is determined by people (Dwyer and Lawrence, 2005). In this study, we determined the behaviors of mother-offspring and other individuals during suckling period in goat genotypes.

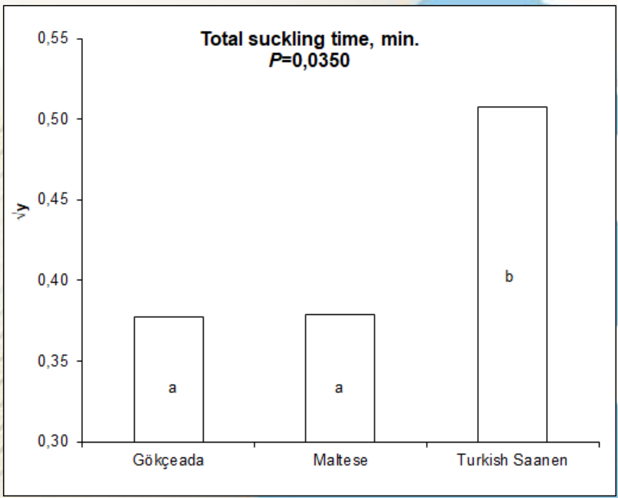
Materials and methods

The study was conducted in Gökçeada, Maltese and Turkish Saanen genotypes and their offspring, aged between 7-43 day. The goat and kid were registered with the camera during suckling for 30 minutes in the evening. In each observation, 4 goats and their kids were observed in indoor (2 x 3 x 4 m). A total of 33 observations were registered by 26 goats and offspring from each goat breed. Mother-offspring meeting times, leaves times, suckling frequency and time, frequency of acceptance or rejection, bunting, aggressive biting, nose-pushing were observed with continuous sampling method. Square root (√y) transformation was applied to the analysis data to meet the prerequisites of variance analysis. Suckling behaviors of variance analyses with a fixed model including goat breed and age of goat kid as covariant were conducted. The variance analyses of interaction behaviors were conducted with a fixed model including goat breed, individual whose behavior is directed (goat, own kid or foreign kid) and fixed interactions. Tukey test was used in post-hoc analyses.

Results

Turkish Saanen goat show more behavior of suckling and rejection than Gökçeada and Maltese goats (Figure 1). Aggressive behaviors were not significant according to goat breeds (P>0.05). The goats showed more bunting to other goats than their own kid and foreign kids (Table 1).

The goats demostrated more agressvive biting to foreign kids than their own kid and other goats (P≤0.05). The goats showed more nose-pushing to their own kid or foreign kids than adult goats (P≤0.05).



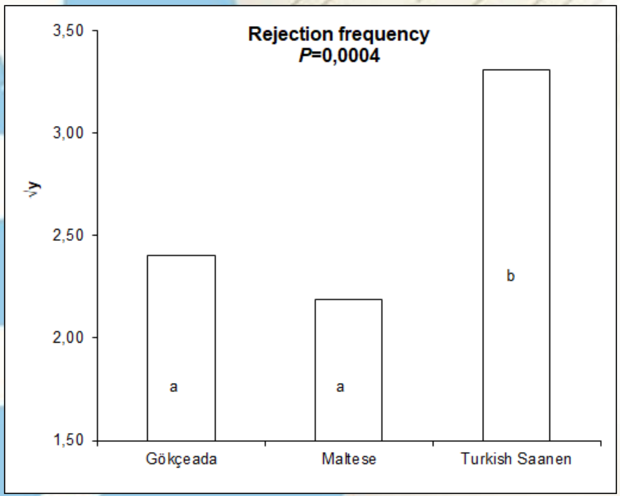


Figure 1. Suckling and rejection during 30-min suckling periods according to goat genotypes

Table 1. Least squares means (LSM)±standard error (SE) and significant level for the goat agonistic behaviors during 30-min suckling periods

Agonistic behavior of goats	Other goat	Own kid	Foreign kid
	LSM±SE	LSM±SE	LSM±SE
Bunting	1.89±0.13^{a}	0.16±0.32^{b}	0.47±0.16^{b}
Aggressive biting	0.01±0.01^{a}	0.00±0.03^{b}	0.06±0.01^{a}
Nose-pushing	0.28±0.06^{a}	0.89±0.15^{b}	0.93±0.07^{b}

Differences between least squares mean indicated with different letters in the same line for each behavior are significant (P≤0.05).

Conclusion

Turkish Saanen differed in terms of suckling behaviors from other goat breeds. Turkish Saanen goats had more suckling of time and frequency and consequently more rejection frequencies. The goats performed the bunting behavior against goats, the agressivve biting behavior against foreign kids, and the nose-pushing behavior against their own kids and foreign kids.

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Hematological values and coccidial oocyst of lambs and goat kids which reared in wood slatted and straw floors

C. Atalay, C. Tölü

Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

One of the most important environmental factors where farm animals are raised is the floor of animal shelters. Poor or improper bedding material and wet floors increase the risk of mastitis and other diseases (Contreras et al., 2003). This study discussed on some hematological values, OPG (oocysts per gram faeces) burden and diarrhea frequency of lambs and kids which are raised in wood-slatted and straw floors.

Materials and methods

A total of 24 lambs (12 female, 12 male) and 24 kids (12 female, 12 male), which are 52 days old on average, was weaned and taken to the experimental units. Two different floors types, one with straw floor on concrete surface and the other with wood-slatted floor (5 cm width at 2 cm intervals), were installed. Each of the barred areas in a half-open barn was 2.75 x 2.75 m. Three animals in the same kind and gender were placed in each area. The animals were provided with ad libitum access to alfalfa hay, concentrate feed, water and mineral licking block. The study was completed in total 120 days. The faecal sample was taken from the rectum, brought to the laboratory and subjected to analysis. The samples were preserved at +4 ºC and, OPG and EPG were determined with the modified McMaster method without any distinction between species (Tölü and Savaş, 2016). A saturated salt solution was used and the flotation technique was utilized in faecal analyses.
The hematological values were detected with the blood samples taken simultaneously from vena jugularis. Hematological analysis were made in an automatic blood counting machine (Mindray / BC 3000 Plus). The blood and faeces samples were collected at intervals of 15 days. In order to fulfill the preconditions for the analysis of variance, the OPG was subjected to logarithmic (Log (OPG+100) transformation.

A linear model including floor (wood-slatted, straw), animal species (lamb, kid) and gender (male, female) was utilized in the repeated measurement variance analyses for all traits. Tukey test was utilized in the post-hoc analyses.

Results

HCT, Hb, RBC and diarrhea frequency were differed significantly from floor type (Table 1). These parameters showed higher values on the straw floor than on the wood-slatted floor ($P \leq 0.05$). However, the diarrhea frequency in stawa floor was higher than wood-saltted floor ($P \leq 0.05$). The lambs have higher values in hematological values, but have lower values in terms of OPG value than the goat-kids ($P \leq 0.05$). While the HCT and RBC values were higher in the females, the WBC and diarrhea frequency was higher in males ($P \leq 0.05$).

Table 1. Least square means (LSM) and standard error of the mean (SEM) for some of the hematological values and coccidial oocyst (OPG) burdens determined by floor type, animal species and gender

Traits	Floor		Animal species		Gender		SEM
	Wood-Slatted	Straw	Sheep lamb	Goat kid	Male	Female	
HCT, %	23.58^{a}	25.42^{b}	28.96^{a}	20.04^{b}	23.68^{a}	25.32^{b}	0.43
Hb, g/dL	9.35^{a}	9.84^{b}	10.17^{a}	9.02^{b}	9.61	9.58	0.06
RBC, x10^{6}/mm^{3}	6.23^{a}	6.59^{b}	7.48^{a}	5.35^{b}	6.21^{a}	6.61^{b}	0.10
WBC, x10^{3}/mm^{3}	8.31	8.62	9.69^{a}	7.25^{b}	8.84^{a}	8.09^{b}	0.24
OPG*	7.06	7.30	6.39^{a}	7.97^{b}	7.04	7.32	0.10
Diarrhea frequency, %	0.12^{a}	1.25^{b}	0.43	0.93	1.25^{a}	0.13^{b}	0.35

*The logarithm (Log (OPG + 10) transformation was applied to the data. HCT: Hematocrit; Hb; Hemoglobin; RBC: Red blood cell; WBC: White blood cell; OpG: Oocysts per gram feaces; Differences between least squares mean indicated with different letters in the same line for each factor are significant ($P \leq 0.05$).

Conclusion

While the straw floor is better in hematological values in study, the height of diarrhea frequency could be taken into consideration in straw floor. Hematological values were higher in lambs, while OPG values were higher in goat-kids both types of floor.

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Agricultural Engineer N. Öztürk, Department of Animal Science, Faculty of Agriculture, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, TURKEY

Dr. S. Yılmaz, Department of Aquaculture, Faculty of Marine Science and Technology, University of Çanakkale Onsekiz Mart, Campus of Terzioğlu, 17100 Çanakkale, TURKEY

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Detection of Scrapie Related PRNP Polymorphisms in Palestinian Sheep Breeds Assaf and Awassi

O. Alsayed, S. Erkunt, C. Un

Ege University Faculty of Science Department of Biolog, 35100, Bornova/Izmir

Introduction

Scrapie is an infectious disease that infects the central nervous system of sheep (Prusiner, 1982). Polymorphisms of prion protein gene (PRNP) at codons 136, 154 and 171 are found to be related with resistance and susceptibility to scrapie disease (Tongue et al., 2004; Yaman and Un, 2017). The aim of this study is detection of scrapie related PRNP polymorphisms in Palestinian native sheep breeds to represent their risk groups.

Materials and methods

In this study, 38 healthy and randomly chosen local Palestinian sheep belonging to Awassi and Assaf breeds were investigated. Blood samples were collected by Palestinian Veterinary Services (Gaza, Palestine) into tubes containing EDTA and DNA was isolated from blood samples manually. PCR amplification of prion protein coding gene amplification was carried out with a final volume of 30 µl. PCR products were conducted on a 1.5% agarose gel for electrophoresis and were visualized with a long wavelength UV transilluminator and were sequenced after purification where the sequencing reactions were run. Sequences were analysed by using MEGA 6 program for detection of polymorphisms at codons 136, 154, 171. The susceptibility to scrapie was evaluated by the grouping system which is proposed by Tongue et al. (Tongue et. Al., 2004) according to each breed's genotypic distribution.

Results

ARQ, ARR, ARH, AHQ, ARL and VRQ alleles (Table 1) and ARR/ARQ, ARQ/ARQ, ARQ/ARL, ARH/ARQ, ARH/ARL, AHQ/ARQ and ARQ/VRQ genotypes (Table 2) were detected in PRNP gene. ARQ allele was discovered as a dominant allele in this study with a frequency of 0.76 for Awassi and Assaf breeds while the uncommon allele ARL was identified at low frequencies in both breeds.

In addition, two different polymorphisms were recognized (V12I and L23H) at different codons of PRNP gene. Results have indicated that the most of the genotypes belong to risk group 3.

Table 1: Allele frequencies of PRNP in Palestinian sheep breeds

Allele	Awassi Breed	Assaf Breed
ARQ	0.764	0.761
ARR	0.205	0.000
ARH	0.000	0.095
AHQ	0.000	0.071
VRQ	0.000	0.023
ARL	0.031	0.050

Table 2: Genotype frequencies of PRNP in Palestinian sheep breeds:

Risk group	Genotype	Awassi	Assaf
2	ARR/ARQ	0.438	0.000
3	ARQ/ARQ	0.562	0.571
3	ARQ/ARL	0.000	0.048
3	ARH/ARQ	0.000	0.142
3	ARH/ARL	0.000	0.048
3	AHQ/ARQ	0.000	0.142
5	ARQ/VRQ	0.000	0.048

Conclusion

Results of this study demostrate the significance of implementing appropriate breeding programs to increase the ARR allele frequency for genetic resistance. According to low ARR allele frequency in Assaf breed, inbreeding has to be avoided in breeding programs. Insertion of sheep from flocks with high ARR is suggested to increase resistant allele frequency in both breeds.

Acknowledgements

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Fertility and Survival Rate in Saanen Goats Raised in Institute Conditions

A. Özdemir, O. Öçalan, T. Sezenler, E. Şengül
Sheep Breeding Research Institute, Bandırma, Balıkesir, Turkey

Introduction

Turkey has 10.63.672 head of goats (TUIK, 2017). Saanen goats were brought to Turkey at the beginning of 1959 and they are reared as purebred and crossbred. The researchers in Turkey call this goat as milk type Turkish Saanen goat (Kaymakçı et al., 2005). The Saanen goat originated from Switzerland is one of the world's famous milk breed goats. This breed has been taken almost everywhere in the world because of its ability to various environmental conditions. Turkish Saanen goats are defined as: the body structure is strong, males and females are horned or hornless, has short ears, white body color and short hairy, its breast is well placed between the two legs, and it has high fertility rate and produces high milk yield. For these reasons, especially in Turkey, breeding is generally for milk production. It reaches the genus and grow fast in early ages. This breed usually gives birth to twins or triplets (Ceyhan and Karadağ, 2009).

Materıals and Methods

The animal material in this study is composed of 76 heads of Saanen goats and 124 heads of kid raised under the conditions of the Bandırma Sheep Research Institute. The mating began in September 2017 and hand-mating method is applied in the mating season. Reproductive data were taken from mating time of goats until the kid’s weaning time at 120 days of age.

Result

Reproductive characteristics are given in Table 1. The birth rate was 79% and single born, twin born and triplet born lams were 12%, 76% and 12%, respectively. Fecundity and litter size were 163% and 206%, respectively. Survival rate of mature goats and kids until weaning were %100 and %98, respectively. Survival rate of kids was not significantly affected by age of mother, type of birth, sex and kidding season

Table 1. Some Fertility and Litter Size Characteristics of Saanen Goats (2018)

Breeding Season Inforrmation (Head)		Fertility(%)	
Number of Goat Mated	76	Survival Rate (Female Goat)	100
Number of goats kidded	60	Birth Rate	79
Number of sterile goats	16	% single born kids	12
Dying / Cut- Off Goat	---	% twin born kids	76
Number of birth kid	124	% triplet born kids	12
Number of stillbirth kid	4	Fecundity	163
Number of live birth kid	120	Litter Size	206
Number of single born kids	7	Death Birth Rate	3
Number of twin born kids	92	Live Birth Rate	97
Number of triplet born kids	21	Survival rate at weaning (0-120 days)	98
Number of death kids (0-120 days)	2		

Conclusion

According to the results obtained during the 2018 mating and birth season, it can be said that the Saanen goats adapted to the regional conditions.

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Heritabilities based on sire model and test days for milk performance traits in Turkish Saanen goats

M. Mandacı, H. Erdem, H.I. Akbağ T. Savaş, C. Tölü
Department of Animal Science, Faculty of Agriculture, Çanakkale Onsekiz Mart Univwersity, Campus of Terzioğlu, 17100 Çanakkale, Turkey

Introduction

The dairy goat intensive production systems are only profitable with high-yielding genotypes. Therefore genetic breeding are important for high milk yield and high milk contents. For a planning a breeding program in dairy goats are heritability estimates of milk yield and milk contents of primary importance. Heritabilities show us where genetic variations are still available (Wearden, 1979). The aim of this study is to show the trend of genetic variance during lactation for some milk performance traits.

Materials and methods

Data included 3422 milk yield, milk fat and milk protein yield test day records of 343 Turkish Saanen goats, born from 187 dams and 37 sires of the experimental flock of Çanakkale Onsekiz Mart University, between 2001-2015. A sire model with fixed effects of year, parity and test days, as well as interactions was used separate for test days of the individual goat. The analyzes were carried out with the program package SAS.

Results

The lactation begin with low heritabilities for milk yield and milk protein yield. However, milk fat yield had a middle heritability in the first test day. Peak of the lactation is characterized by low genetic variances for all traits. With decreasing milk yield, the heritabilities increase for milk yield. On the other hand high and relatively stable genetic variances were found for milk fat yield and milk protein yield after peak performance.

Conclusion

The heritabilities estimated by Zumbach et al. (2007) for milk yield in pooled German goat breeds show decreased trend during 1st and 2nd lactations. However, in the 3rd lactation, the heritabilities increased in the middle of the lactation. On the other hand, Mucha et al. (2014) found high heritabilities in the end of lactation for all lactations in dairy goats.

In our study, high genetic variances of the last two-thirds of lactation suggested that there is a broad area for genetic improving of the persistence.

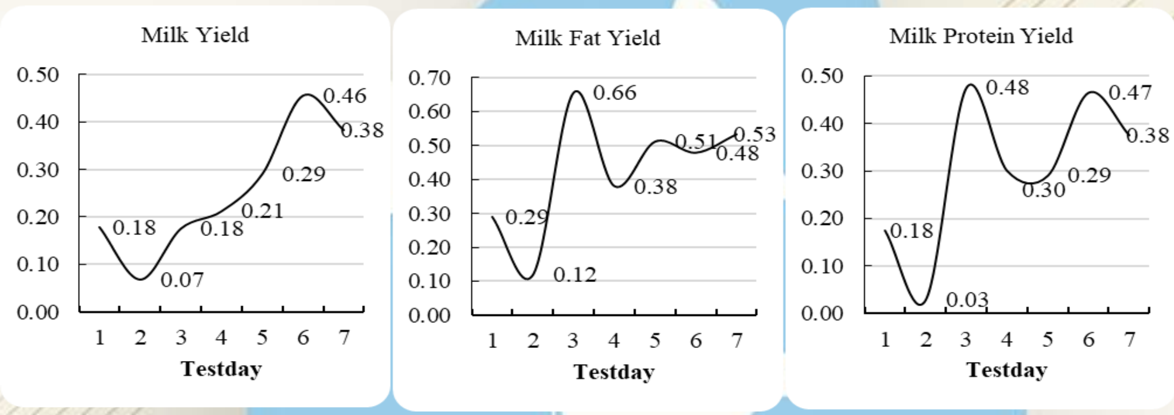

Figure 1. Trends of the heritabilities for milk yield, milk fat yield and milk protein yield during lactation

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Determination of Relationships between Body Weight and Some Body Measurements Using Regression Equations forAnatolian Water Buffalo Raised in Istanbul

M. İ. Soysal[1*], S. Genç[2], M. Aksel[3], E. K. Gürcan[1]

[1]Namık Kemal University, Faculty of Agriculture, Department of Animal Science, 59100, Tekirdag, Turkey

[2]Ahi Evran University, Faculty of Agriculture, Department of Agricultural Biotechnology, 40100, Kırsehir, Turkey

[3]Istanbul WaterBuffalo Breeders Association, Istanbul, 34100, Turkey

*Corresponding author e-mail: misoysal@gmail.com

Introduction

The aim of study was todetermine possible relationships between body weight and several body measurements using regression equations as linear, multiple linear and nonlinear (polynomial) models for Anatolian water buffalo raised in Istanbul. In this way, breeders were estimated body weight from body measurement especially chest girth with regression equation without weighing. For this propose, total 214 head Anatolian water buffalos' body weight, withers height, body length and chest girth were taken individually for female and male animal.

Materials and methods

Animalmaterial of this study was consisted of total 214 head Anatolian water buffalos' body weight (BW) and some body measurement like withers height (WH), body length (BL) and chest girth (CG). Body measurements and body weight of animal were taken measure cane, measure tape (cm) and weighbridge (kg). Descriptive statistics, correlation coefficient and linear, multiple and polynomial regression equations were researched for female and male animals. These regression equations were compared with coefficient of determination and the highest coefficient of determination were chosen best fitted model (Soysal, 2007). Data were analyzed using MINITAB package program (MINITAB, 2000).

Results

The overall mean and standard error of the WH, BL, CG and BW were determined as 107.32 ± 0.84 cm, 105.47 ± 1.18 cm, 136.85 ± 1.73 cm and 192.64 ± 6.44 kg respectively. The effects of gender factor were found significant as statisticallyfor WH, BL, BW ($P<0.05$). Phenotypic correlation were calculated between BW-WH, BW-BL and BW-CG 0.87, 0.80 and 0.92 respectively also in general group. At the same time, linear, multiple linear and nonlinear (polynomial) regression equation were compared with coefficient of determination with several tables. The best fitted model were shown to estimate body weight from body measurements at table 1 for female, male and general groups.

Table 1. The best fitted regression equations between body weight (BW) and chest girth (CG)

Gender (Model)	Regression Equation	Coefficient of Determination (R^2) %
Female (Linear)	BW=-319.6+3.782CG	86.3
Female (Quadratic)	$BW=155.6-3.111CG+0.02412CG^2$	94.6
Female (Cubic)	$BW=-33.4+1.26CG-0.00787CG^2+0.000074CG^3$	94.6
Male (Linear)	BW=-209.2+2.877CG	88.3
Male (Quadratic)	$BW=-181.8+2.489CG+0.001325CG^2$	88.4
Male (Cubic)	$BW=103.4-.3.612CG+0.04247CG^2-0.000087CG^3$	89.2
General (Linear)	BW=-213.7+2.957CG	82.7
General (Quadratic)	$BW=80.38-1.781CG+0.01853CG^2$	87.2
General (Cubic)	$BW=-96.9+2.654CG-0.01680CG^2+0.000090CG^3$	87.3

Conclusion

It was concluded that the breeders could be estimated body weight from chest girth with using these regression equation.

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Influence of transfer to high salinity on chloride cells, oxygen and energy consumption in common carp Cyprinus carpio

Mohammed S. Al-Khshali*, Hasan A. Al Hilali**
Department of Animal Production, University of Baghdad,
Directorate of Animal Resourse, Ministry of Agriculture **

Introduction

Aquaculture plays an important role in solving famine and malnutrition problems in the whole world through providing fish and other marine animals which are rich in protein, vitamins, minerals and amino acids. The quantity and quality of the feed are insufficient to obtain high fish production, as the environmental factors also play a vital role to obtain a high production, salinity is one of the important factors beside the oxygen and the temperature, it has a direct effect on fish growth (Mommsen.,1998). The chloride cells which located in the gills are responsible for the process of ion transmission and ion equilibrium, as well as their participation in the process of acid and base balance (Kaneko and Hiroi.,2008). Changes in respiratory rate of fish is one of the common physiological responses to face the salt stress. The change in oxygen consumption is usually used to estimate the change in metabolic rate under environmental imbalance conditions (Dube and Hosetti., 2010).

Materials and methods

Common carp at the average weight of 15 ± 3 g were obtained from a local fish farm, south of Iraq fish were distributed on four different salinity treatments (0.1, 5, 10 and 15g/l) and tested in two replicates for each salinity treatment.

Chloride cell Determining of the ratio and number of chloride cells in the gills had done according to Sargent et al.(1978).

Oxygen consumption

Oxygen consumption of common carp at various salinities were measured according to Nordlie and Leffer (1975).

Results

Table 1 shows that the number and ratios of chloride cells in gills in different salt concentrations of common carp

Salt concentrations (g/l)	number of chloride cells in gills	ratio of chloride cells %
0.1	$8.18 \times 10^5 \pm 1.08 \times 10^5$ C	8.42 ± 0.86 C
5	$10.36 \times 10^5 \pm 1.05 \times 10^5$ B	11.34 ± 0.90 B
10	$12.14 \times 10^5 \pm 1.03 \times 10^5$ A	12.14 ± 1.30 A
15	$11.95 \times 10^5 \pm 1.06$ O10^5 A	11.90 ± 1.12 A

Table 2 shows the oxygen and energy consumption in different salt concentrations of common carp

Salt concentrations (g/l)	Oxygen consumption rate (mg / kg / h)	amount of energy consumed (kcal / kg / h)
0.1	85.93 ± 3.26 D	0.28 ± 0.001 D
5	150 ± 4.06 C	0.50 ± 0.004 C
10	181.25 ± 4.46 B	0.61 ± 0.007 B
15	196.87 ± 5.06 A	0.66 ± 0.012 A

g, gram ; l, litter ; mg, milligram ; Kg, kilogram ; h, hour

Conclusion

This study summarized that high salt concentrations had negative effect on the physiological traits of common cap, such as numbers and ratios of chloride cells in gills, oxygen and energy consumption.

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Growth traits of kids of Honamlı goats in conditions Antalya and Isparta

H. Erduran, B. Gök, İ. Halıcı, H. Baş, Z. Acar
Bahri Dağdaş International Agricultural Research Institute, Konya, Turkey

Introduction

Honamlı goats are reared by Turkish nomads in Antalya, Burdur, Isparta, and Konya cities, located in the Taurus Mountains of Mediterranean region in Turkey. The objective of this study was to evaluate the effect of birth type, farm, maternal age and sex on growth traits of kids of Honamlı goats raised in Antalya and Isparta Provinces of Turkey. All data were analysed by using a General Linear Model procedure. Statistical analysis was made using the JMP 11 computer program (SAS, 2013).

Materials and methods

İn the experiment were obtained from 150 head kids of Honamlı goats in three farms under extensive conditions. The birth of kids were in February. The kids weaned approximately at 3 months of age. The birth weights, weaning weights of (third month) and sixth month of Honamlı kids were weighed. The weights of the kids were made with 100 gram-sensitive scales in the morning.

Results

Honamlı kids birth weights, weaning weights of (third month) and sixth month live weights, average daily weight gain up to 180th day were found 3.76 kg, 24.3 kg, 41.2 kg and 207 g respectively. The effects of birth type, farm, maternal age and sex in terms of, birth weights (except for farm), weaning weights, sixth month live weights (except for maternal age) and average daily weight gain up to 180th day (birth type and maternal age) were significant ($P<0.01$, $P<0.05$).

Conclusion

As a result, it can be said that the effect of birth type, farm, maternal age and sex on growth traits of Honamlı kids is very important.

Acknowledgements

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Arrangements of the Outdoor Area in Guinea Fowl Raised the Free-Range and Organic System

A. Yıldırım

Tokat Gaziosmanpaşa University, Faculty of Agriculture, Department of Animal Science, 60240 Tokat/Turkey

Introduction

Guinea fowl can be successfully reared under semi-intensive conditions with less effort that is why it has been very important for third world countries. With the help of developments in organic farming techniques in recent years the Guinea fowl has been given importance as an alternative poultry. While partly known in some parts of Asia and South America it is widely bred in some European countries such as France, Italy and Belgium (Champagne, 2003). As a result of the scientific researches carried out in France, strains are now in use with fast growing guinea fowls of which egg production can reach up to 190. While hens can lay down up to 175-200 eggs after a 35-week laying period there are lines reaching up to 1.5-1.7 kg of live weight and a feed conversation ratio of 2.7-2.9 within 11-12 weeks by intensive breeding and selection works (Le Coz-Douin, 1992). These fowls have kept their characteristics until today such as being matured, pullulated and resistant to diseases under different ambient temperatures. Other advantages are their need for less water and practical semi-intensive breeding in the farms or around villages. Their suitability to organic breeding, holding the characteristics as a genetic means, and increase in performance by improvement of a genetic strain by selection show that the production of these animals can be prevalent and needed in the near future. (Yıldırım, 2012).

The important of the Outdoor Area in Free-Range and Organic System

The presence of an access outdoor is a major element characterizing the production of guinea fowl under signs of free-range and organic quality. To enable the sustainability of these modes of production, it is necessary to optimize the management of the outdoor to best meet the needs of guinea fowl and relevant environmental management and to scrutinize the producing extra income for the raiser.

For that, it was above all necessary to know the diversity of the existing pasture land as well as the management practices of the breeders. Before any thoughts on the development of pasture, it is important to represent the different spaces that compose it.

Access to an outdoor pasture composed of facilities, including plants, allows guinea fowl to better express their exploratory behavior and limit their stress by providing them shade and places of protection against predators protection from predators. The arrangement of the outdoor areas with diversification, it will promote the expression of the behavioral repertoire of guinea fowl: scratching, pecking, searching, running etc., and at the same time stimulate the musculoskeletal system.

Tree planting is both useful for protecting against wind and weather, providing shade, guiding animals in their movements and protecting them from raptors. In summer, as with all poultry it is important for guinea fowl to be able to take shelter under various arrangements in order to leave their house. The knowledge will be provided to breeders and researchers on appropriate pasture arrangements, typology of plant implantation and optimal outdoor area structures under free-range and organic poultry systems (Yıldırım and Eleroğlu, 2018). Seven types of open space arrangements have been identified, these are meadow course, coppice course, course with comfort facilities, course with agroforestry management, diversified course, complete course, course on existing tree (forest course). and they have cadvantages over each other. In all cases, it should be ensure the proper regular maintenance of trees (coppicing, replacement, trimming, pruning) to promote the passage in the vicinity, and modulate the shading (CASDAR, 2014).

Conclusion

The study of outdoor management practices is rewarding and has highlighted the levers of action so that the courses can provide an added value to the animal breeder about guinea fowl breeding. These elements (types) are necessary to better adapt the technical support to be provided to farmers according to their own situation. In fact, the type of development, rangeland management and technical support will have to adapt to the local context and the profile of each farmer.

The type of course will also depend on the type of fixed or mobile house, the total surface of the course to be managed on the farm. Also each region have its own pedo-climatic conditions (wind, sun, soil type, rainfall), and a clean natural and urban environment (for example, woodland region, a region with a high density of cities/rural areas, low human density). All of these elements need to be considered in the arrangement of outdoors. The design of a course may not be applied in the same way depending on the condition of the farm. Considering the differences in management method among breeders, training of breeders plays an important role. Moreover, current outstanding studies are carried out related to outdoor areas with trees; they concern biodiversity, the contribution to carbon storage according to the type of rangeland management, the impact of plantation types on flows nitrogen, reducing greenhouse gas emissions.

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The Effect of Brood Reinforcement in the Production of Royal Jelly

N. P. Canverdi, Ü. Kayaboynu, M. Duman, T. Kılıçin, E. Sarıkaya, Ü. Karataş
Apiculture Research İnstitute Directorate, Ordu, Turkey

Introduction

Turkey with its rich flora and about 8 million (FAO, 2015) is an important country in beekeeping in the World. When beekeeping is mentioned in Turkey, only honey production comes to mind, besides, other bee products like royal jelly, pollen, propolis are also produced. With the recognition and awareness of these products, even if it is small, It is produced. This study, in royal jelly production, by supporting the starter colony with unsealed-sealed brood was done to determine the effect of larva acceptance rate, royal jelly production per colony and amount of royal jelly per unit.

Materials and Methods

Study was conducted with 10 local honey bee starter colonies at Ordu Beekeeping Research Institute in June, 2017. The starter colonies were divided into 2 groups. While royal jelly production was done by supporting 5 starter colony with unsealed brood. Royal jelly production was done by supporting other 5 starter colonies with sealed brood. 45 larva were grafted in all starter colonies, this process was repeated 3 times (45x3x5). In 675 grafted larva in each group, larva acceptance rate, total royal jelly production per colony and amount of royal jelly per unit in the colonies was determined. All statistical calculations were done in SPSS 22.0 V statistical package program.

Results

In the study, among the unsealed and sealed brood reinforcement groups applied in royal jelly production, there was no statistically significant difference in grafting retention rate. In the study, in the unsealed and sealed brood reinforcement to the starter colonies, There was no difference between the number of larva holding and the rate of holding larva. While unsealed brood retention rate was found to be 59.40%, sealed brood retention rate was found to be 56,27%.

In the study, among supported groups with unsealed and sealed brood in royal jelly production, a statistically significant difference was not detected between the amount of rojal jelly in the cell (P = 0.989) and the total royal jelly quantity (P = 0.949).

Conclusion

There are many factors affecting the efficiency of royal jelly in honey bee colonies, but In this study, it was determined that the unsealed and sealed brood reinforcement applied to the starters did not show any difference in the production of royal jelly.

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ABSTRACTS

Nutritional, enzymatic and antioxidant enrichment of apple pomace by fungal fermentations

S., Yasar, R. Tosun

Igdir University, Agricultural Faculty, Department of Animal Science, Igdir, Turkey

Abstract

There is an increasing trend in adding value to or utilizing from agricultural by-products, used for feeding stuffs or the production of many types of bio-molecules. In this study, the optimum conditions of pH, fermentation periods, stirring rate and moisture content of substrate were fixed and used to ferment apple pomace by two species of fungal microorganisms, Pleurotus ostreatus (P. ostreatus) and Phanerochaete chrysosporium (P. chrysosporium) for 21 days. The samples taken at 7, 14 and 21 d were analysed in triplicates for the determinations of nutritional, enzymatic and antioxidant parameters. As compared to apple pomace with no inoculant, the fungal growth of P. ostreatus and P. chrysosporium reached to a maximum level by 4 log increase at 14 and by 2 log increase at 7 days of fermentation, respectively. The use of a modern bioreactor to optimise all the fermentation conditions was very successful. As overall, the fermentations with P. ostreatus and P. chrysosporium significantly ($P<0.05$) increased crude ash and crude protein of apple pomace, expect there was a significant decrease of ash content of apple pomace in 21 days of P. ostreatus fermentation. A remarkable increase in the content of crude fat, by about 22 folds (from 0.40% to 9.0%), of apple pomace by P. ostreatus fermentation, whereas the fermentation of apple pomace with P. chrysosporium significantly ($P<0.05$) reduced the fat contents by up to 50%. On the other hand, the fermentations of both fungal microorganism significantly ($P<0.05$) reduced the total dietary fibre content of apple pomace up to 80%.Fermentation with P. ostreatus significantly ($P<0.05$) reduced the tannin contents and meanwhile increased the pectin contents of apple pomace. Fermentation of apple pomace by P. ostreatus and P. chrysosporium significantly increased total phenolic compounds, but the flavonoid compounds of apple pomace was overall reduced by P. ostreatus and increased by P. chrysosporium. In most of the fermentation periods the activities of all enzymes and antioxidant capacities measured as DPPH and ABTS were significantly ($P<0.05$) increased by P. chrysosporium.

It can be concluded that the studied fixed fermentation conditions for P. ostreatus and P. chrysosporium were well suited for the purposes of nutrient fortification and enzymatic and antioxidant enrichment of apple pomace.

Key words: fungal growth, apple pomace, enzymes, antioxidant

A novel technology to improve reproductive and productive performances of dairy cows: Intravaginal probiotics

E. Pehlivan[1], B. N. Ametaj[2]

[1] Department of Animal Science, Faculty of Agriculture, Ankara University, Ankara, Turkey, 06450

2 Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Alberta, Canada T6G 2P5

Abstract

During the last decades, intensive genetic improvement studies, improvement of ration composition, and the use of novel technologies have significanlty increased milk yield of dairy cows. However, concurrently with the increase in milk yield, there has been a significant decreases in reproductive efficiency oif dairy cows making infertility the number one reason for culling of dairy cows. Postpartum uterine infections are one of the main reasons that influences the reproductive performance of dairy cows. Infection of the uterus impairs reproductive performance and more than 30% of dairy cows become subfertile or infertile and are culled from the herd. Various antibiotics used for treating uterine infections lack efficiency and aggravate the inflammation process. In addition, milk is discarded because of antibiotic residues. Hormonal treatments also have not shown enough efficiency to be embraced by veterinary practitioners. Currently there is no effective strategy to prevent uterine infections in dairy cows. In fact, uterine diseases are treated with different antimicrobials such as antibiotics, iodine solutions, sulfa drugs and sulfonamide as well as chemical antimicrobials. Utilization of antimicrobials directed at Gram-negative or Gram-positive bacteria, besides killing the pathogenic bacteria cause multiple harmful effects on uterine tissue and local immune responses. In recent years, due to these adverse effects of antimicrobials, efforts to find new eco-friendly (green) and more efficient technologies have increased. Preventive treatment with intravaginal probiotics has been used to lower the incidence of uterine infections and increase the overall reproductive performance of dairy cows. Additionally, intravaginal probiotics have demonstrated the ability to enhance immune functions such as increasing the number of immune cells and adjusting expression of cytokines or antibodies in the organism.

Overall, it can be said that utilization of intravaginal probiotics in dairy cows have resulted in positive effects with regards to lowering the incidence of uterine disease, improving immune system and reproductive performance, increasing milk production and modulating its composition. In this article, more details will be discussed with regards to the use of probiotic in dairy cows and their effect on reproductive and productive performances of dairy cows.

Key words: Dairy cow, intravaginal probiotics, reproductive performance, milk yield

An important safety and productivity problem for beekeepers: Bears

C. Erkan[1], A. Gösterit[2] and T. Aygün[1]

[1]Faculty of Agriculture, University of Van Yüzüncü Yıl, Tuşba, Van, 65080, Turkey

[2]Faculty of Agricultural Sciences and Technologies, University of Isparta Applied Sciences, Çünür, Isparta, 32560, Turkey

Abstract

In beekeeping, an agricultural activity nested in nature, beekeepers encounter various hazards at different stages of production. The beekeepers often encounter one of these hazards, the bears due to their shrinking habitats, leading to problems in safety and productivity. The present study that aimed to analyze the causes, damage levels of bear encounters, which became one of the most important problems of beekeepers in recent years, and methods of protection from the bears with a different perspective also scrutinized the occupational health and safety dimension and emphasized the potential risks.

Ursus arctos L., indigenous to Turkey and also known as brown bear, has adapted to different habitats since it is both herbivorous and carnivorous. Brown bears that usually prefer forested and uninhabited areas are usually found in Black Sea and Eastern Anatolian Regions in Turkey, however it was observed that their numbers increased in Central Anatolian, Mediterranean and Aegean Regions due to the recent conservation efforts that were initiated in 2003. Brown bears, which could consume a wide range of nutrients, started to live in areas closer to human settlements due to the expansion in agricultural cultivation and increase in highlands tourism activities and their encounters with beekeepers who need to set up their hives in rural areas. Besides the honeycombs they love, the smell of food that is likely to originate from lodging areas increases the frequency of bear encounters around apiaries.

Bear hunting was prohibited with the Land Hunting Law no. 4915, which also aims to preserve sustainable wildlife, and the brown bears could loot the apiaries to appease their hunger after their brumal sleep during the spring and to store energy before the brumal sleep during the autumn. In order to keep the bears away from the apiaries, several technological devices such as electric fences could be used, and also practices that would attract animals to inhabited areas should be prevented. Furthermore, in the case of physical encounter, it would be better to remain calm and move away from the site with movements that would not trigger aggressive behavior.

Having knowledge about bear behavior would also assist one to prevent an attack at this stage. On the other hand, as in all production activities, the analysis and elimination of the risks present in the work environment and external risks in beekeeping should be assessed with risk analysis, which is significant for occupational health and safety.

Key words: Beekeeping, Brown bear (*Ursus arctos* L.), Occupational health and safety, Risk analysis.

TMR Formulations for Fattening Cattle in Microsoft Excel Environment

İ.Erdem[1], A.Şahin[2]

[1] Ministry of Agriculture and Forestry of Republic of Turkey, Akçakent, 40000, Kırşehir, Turkey

[2]Department of Animal Science, Faculty of Agriculture, University of Kırşehir Ahi Evran, Kırşehir, 40100, Turkey

Abstract

The studies on feed formulations for beef cattle are available on the literature and web sites intensively. Different diet formulations have been used and offered users online, but the recent efforts to improve the ration have been rarely encountered. Easy-to-use feed formulation programs are needed for Anatolian stockpersons and farmers who are dealing with fattening cattle. In this MSc thesis, it was aimed to develop a TMR formulation program that can be easily used by the nutritionists. Also, this work was aimed to compare the ideal feed formulation with the used formulations by beef cattle keepers. In this MSc study, TMR rations were formulated for cattle fattening operations. A ration formulation program was prepared for fattening cattle in the Excel environment. Test rations for live weights of 250, 280 and 300 kg were prepared in accordance with ideal nutitional requirements by using this program. The acceptance of meeting the nutritional requriments was based on current legislation of Ministry of Agriculture and Forestry of Repuclic of Turkey. The accuracy of the ration samples used by beef cattle owners was compared with the ideal nutritional requirement values. Statistical comprarison was tested by using One Sample T Test in SPSS statistical software. The feed formulation program has following traits; (a) New raw materials can be identified, (b) New raw material can be added, (c) It can change the nutrient values of raw materials, (d) Raw material prices can be changed, (e) General or specific formulas can be defined for the raw materials, (f) Raw material groups can be defined, (g) An unlimited number of nutrients can be identified, (h) Raw materials can be removed and (i) If the file is corrupted for any reason, it can be re-downloaded. It was easy to use the ration formulation program, which is used initial live weight and daily gain as variables and suitable for entering of new feed raw materials. Thus, the use of this program can contribute to adequate and balanced nutrition of fattening animals.

The used rations by Anatolian feedlot enterprises were found to be appropriate and inappropriate according to ideal requirements. Here, on the field, farmers offer TMR having higher in CP, NEm, Vitamine D and, consequently, causing higher cost per kg diet. To conclude, the present TMR program was improved fro daily requirement basis and suggested for feedlot enterprises.

Key words: TMR, Diet Formulation, Fattening Cattle, Nutritional Requirements

An Investigation on Structural Properties of Beef Cattle Farms in Antalya Province

A. Galiç, N. H. M. Hassan

Akdeniz University, Faculty of Agriculture, Department of Animal Sciences, 07058 Antalya, Turkey

Corresponding author: galic@akdeniz.edu.tr

Abstract

Cattle fattening in Turkey is generally composed of small farms that are working with high costs and low productivity. In addition, it is mostly done in indoor-based, and pasture-based fattening is very limited. On the other hand, Turkey is far behind from the EU and the US in terms of the average carcass weight. Therefore, the costs per unit product are high. In this case, imports are frequently brought to the agenda in order to meet the domestic demand and reduce meat prices. The projections showed that beef production of Turkey should be increased by almost 50% in 10 years, in order to meet the rising demand. The way to provide this permanently is to identify the current situation and the deficiencies in cattle fattening and to offer solutions for this. In this study, information about the farms that are members of the Red Meat Producers Association of Antalya Province was revealed.

Keywords: Cattle fattening, feed sources, structural properties

Applications Causing Residuals in Turkey's Honey Production

F. Gürel, E. Çakar

Akdeniz University, Department of Animal Science, 07058, Antalya, Turkey

Corresponding author: fgurel@akdeniz.edu.tr

Abstract

In order to increase the productivity in agricultural production, the techniques and applications developed especially in the last quarter century have increased the use of chemicals in both crop production and beekeeping. The use of pesticides and antibiotics to prevent pests and diseases has raised the issue of residues in bee products. Licensed and many unlicensed pesticides are used by beekeeper in Turkey. Even the use of licensed pesticides to prevent diseases, some applications such as long-term application, overdose and honey harvesting immediately after the application have cause undesirable contamination in honey. In addition, the use of naphthalene, which has been widely used in the past years for the protection of honeycombs in our country, has also caused undesirable residue in honey. Turkey that has over 7 millions beehives and 100 000 tons/year honey production is the one of the most important countries in beekeeping in the world. However the problem of residue in honey leads to the loss of pure, natural product characteristics of honey and it also makes domestic consumption and export difficult. In this paper, the practices leading to the residue in honey production of our country are examined and some suggestions were presented for sustainable apiculture and food safety.

Key words: Honey, residue, sustainable apiculture, food safety

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