



RESEARCH ARTICLE

Determination of some blood parameters during pregnancy and lactation periods in healthy Akkaraman Kangal ewes

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Sağlıklı Akkaraman Kangal koyunlarında gebelik ve laktasyon dönemlerine ait bazı kan parametrelerinin belirlenmesi

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Öz

Amaç: Akkaraman Kangal koyunlarında geç gebelik ve erken laktasyon dönemlerine ait serum konsantrasyonlarındaki bazı biyokimyasal belirteçlerin ve makro elementlerin üreme durumları üzerindeki etkilerini incelenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmanın materyalini mera koşullarında herhangi bir ek rasyona tabi tutulmayan 12 Akkaraman Kangal koyunu oluşturdu. Serum örnekleri geç gebelik ve erken laktasyon dönemlerinde alındı. Kan glikoz, kolesterol, kreatinin, trigliserit, alkalen fosfataz, total protein, albümin, çok düşük dansiteli lipoprotein, kan üre atozu, kalsiyum, fosfor ve magnezyum konsantrasyonları analizatörle ölçüldü.

Bulgular: Laktasyon dönemindeki koyunlarda alkalen fosfataz, albümin ve kalsiyum konsantrasyonları gebe koyunlara göre anlamlı derecede yüksek bulundu ($P<0.05$).

Öneri: Bu çalışma herhangi diyet ilavesi olmadan artış gösteren alkalen fosfataz, albümin ve kalsiyum konsantrasyonlarının laktasyon dönemi koyunlarda artan süt sentezi için vücut rezervlerinin mobilizasyonu kaynaklı olabileceğini göstermiştir. Mera koşullarında beslenen koyunlarda gebelik ve laktasyon dönemlerinde gıdasal takviyelerde bulunulmasının yararlı olabileceği düşünülmektedir.

Anahtar kelimeler: Gebelik, laktasyon, koyun, biyokimyasal belirteçler

Abstract

Aim: The aim of this study to investigate the influence in reproductive status on the serum concentration of biochemical markers and some macro elements in sera of Akkaraman Kangal ewes during late pregnancy and early lactation.

Materials and Methods: Twelve Akkaraman Kangal ewes were included in this study. The sheep were raised under pasture conditions and without any dietary complementation. Samples were taken during late pregnancy and early lactation from each ewe. Serum concentrations of glucose, cholesterol, creatinine, triglyceride, alkaline phosphates, total protein, albumin, very low density lipoprotein, blood urea nitrogen, calcium, phosphorus and magnesium were determined with analyzer.

Results: In the ewes during lactation, the concentrations of alkaline phosphates, albumin and calcium were significantly higher ($P<0.05$) compared to the pregnant ewes.

Conclusion: The study showed that increased alkaline phosphates, albumin and calcium levels may be induced mobilization of body reserves because of increasing milk synthesis in ewes during early lactation period and also without any dietary complementation. It will be helpful in nutritional supplements in ewes fed on pasture conditions during pregnancy and lactation periods.

Keywords: Pregnancy, lactation, ewes, biochemical parameters





Introduction

The efficacy of the feeding the reproductive status on biochemical and macro element concentrations in the blood serum of ewes during late pregnancy and lactation is important (Altıntaş and Fidancı 1993, Bell 1995, Akçapınar 2000, Antunovic 2011). In general the failure of animals to have their nutritional requirements met during late pregnancy and early lactation causes peri-parturient metabolic diseases in ewes such as pregnancy toxemia, hypocalcaemia, hypomagnesaemia, and lactation ketosis (Baird et al 1983, Brozos et al 2011).

Providing macro elements for lamb bone development, milk production, and increased energy in ewes during late pregnancy and first month of lactation, they are at risk for developing these diseases (Braithwaite 1983a, Braithwaite 1983b).

The aim of this study is to investigate the influence in reproductive status on the serum concentrations of biochemical values and some macro elements in the blood of Akkaraman Kangal ewes during late pregnancy and early lactation.

Material and Methods

This study was approved by the Animal Research Ethics Committee of Cumhuriyet University. Twelve Akkaraman Kangal ewes of sheep farm in Sivas, Turkey 2-3 of aged were included in this study. The sheep were raised under pasture conditions and without any dietary complementation. Samples were taken during late pregnancy (last fifteen day of pregnancy) and early lactation (first fifteen day after birth) from each ewe. Blood specimens for biochemical analyses were

taken from each ewe by jugular venipuncture and allowed to clot, and centrifuged at 4.000 rpm for 10 minutes. Sera were stored at -20°C until analysis. Serum concentrations of glucose, cholesterol, creatinine, triglyceride, alkaline phosphates (ALP), total protein, albumin, very low density lipoprotein (VLDL), blood urea nitrogen (BUN), calcium (Ca), phosphorus (P), and magnesium (Mg) were determined using an autoanalyzer (Mindray BS 200, PRC).

For the comparison of the studied parameters, after testing variables in Kolmogorov Smirnov test; Student t-test was used for parametric variables and Mann Whitney U test for nonparametric variables. Homogeneity of variances and intergroup comparisons were made through a software program SPSS version 14.0 (SPSS Inc, Chicago).

Results

Serum biochemical and macro element levels are shown in Table 1. In the ewes during lactation, the concentrations of ALP, albumin and calcium were significantly higher compared to the pregnant ewes ($P < 0.05$) whereas there was no any statistically significance ($P > 0.05$) determined between other parameters.

Discussion

In the present study, it was aimed to evaluate the effect of physiological changes and feeding in pasture on macro elements and biochemical parameters in ewes. It is important to determine blood parameters during late pregnancy and early lactation due to requirement of pregnancy and to prevent metabolic disorders (Baird et al 1983).

Table1. Serum biochemical values of ewes during pregnancy and lactation period (Mean±SE). (*Rodostits et al 2006)

Parameters	Pregnancy (n=12)	Lactation (n=12)	P Value	Reference values*
Glucose (mg/dL)	75.33±3.48	69.16±1.30	0.120	50-80
Cholesterol (mg/dL)	63.08±3.94	67.33±3.94	0.291	43.0-103
Creatinine (mg/dL)	0.88±0.03	0.94±0.02	0.319	1.2-1.9
Triglyceride (mg/dL)	12.41±1.93	18.00±2.23	0.072	-
ALP (IU/L)	86.83±11.70	137.16±19.70	0.024	70-390
Total protein(g/dL)	5.89±0.22	6.49±0.25	0.060	6-7.9
Albumin (g/dL)	3.08±0.04	3.34±0.03	0.001	2.4-3
Globulin (g/dL)	2.80±0.19	3.14±0.24	0.280	3.6-4.6
BUN (mg/dL)	6.41±0.46	7.25±0.37	0.177	10-35
VLDL (mg/dL)	2.50±0.37	3.75±0.46	0.480	-
Ca (mg/dL)	9.44±0.12	10.24±0.23	0.007	11.5-13
Mg (mg/dL)	1.98±0.04	1.88±0.02	0.051	2.2-2.8
P (mg/dL)	5.50±0.32	5.20±0.20	0.671	5.0-7.3



In the current study, the concentrations of glucose, cholesterol, ALP, total protein, and phosphorus levels are within normal range. Despite the concentration of albumin was high but creatinine and BUN were lower than normal range (Altıntaş and Fidancı 1993, Rodostits et al 2006). The concentrations of creatinine, blood urea nitrogen, calcium, and magnesium levels are lower than normal range in both groups (Altıntaş and Fidancı 1993, Rodostits et al 2006).

In the current study, total protein, albumin, and globulin levels were high in lactation period compare to late pregnancy but only significant increase was in albumin ($P < 0.001$, Table 1), and this could be caused by dehydration. This result is compatible with reported other studies (Yokuş et al 2006, Balıkcı et al 2009) but was higher than Özyurtlu et al (2007).

The level of ALP has significant increase ($P < 0.024$, Table 1) in early lactation but it is low in both periods than reported by Ercan et al (2014). High ALP levels in early lactation compared to pregnancy related with increased Ca levels and similar with other studies (Özyurtlu et al 2007, Zymantieni et al 2010). Zymantieni et al (2010) reported that strong and positive correlation between ALP and Ca levels in high milk production is similar with this study.

In this study, the concentration of calcium was lower than normal range and increased in lactation period compare to pregnancy ($P < 0.007$, Table 1). Hypocalcaemia is most common in small ruminants especially fed with natural pasture as a result of deficiency of grass or content of oxalates and sometimes occurs with hypomagnesaemia and hypophosphatemia. Hypomagnesaemia and hypophosphatemia stimulates parathyroid hormone (PTH) secretion and promotes Ca absorption in intestines (Braitwaite 1983a, Braitwaite 1983b, Yokuş et al 2004). Decreased magnesium and phosphorus concentrations lead to increase in Ca level during lactation compared to pregnancy and this similar with reported by Yokuş et al (2004).

Despite the fact that glucose levels were in normal range in both groups; glucose level was higher in pregnancy than lactation period. This result can be caused by requirement of lactose for milk production (Bell and Bauman 1997). The level of glucose is lower than Altınsaat (2001) but higher than Antunovic (2011) in pregnant ewes (Altınsaat 2001, Antunovic et al 2011). However higher than other study in both groups (Atakişi et al 2009, Gürgöze et al 2009) lower in lactating (Karapehlivan et al 2007).

Lactation plays important role that increasing triglyceride and VLDL levels (Nazifi et al 2002). Although there was not statistically significance in triglyceride and VLDL levels, the increased concentrations of those in the blood of the ewes during early lactation comparing to the late pregnancy ewes can be explained by energy deficiency and related with dec-

reased glucose level. Cholesterol and triglyceride levels are low in pregnant but high in lactating in ewes compared to reported study (Antunovic et al 2011). The concentration of triglyceride is lower than other studies which in pregnant ewes (Altınsaat 2001, Balıkcı et al 2009) and also both groups (Atakişi et al 2009). The concentration of VLDL is similar with reported by Nazifi et al (2002) during in both period.

Conclusion

Increased ALP, albumin and calcium levels may be induced mobilization of body reserves because of increasing milk synthesis in ewes during early lactation period and also without any dietary complementation. It is important to overcome the increasing need for energy and to prevent from disorders with the growing fetus in late pregnancy and high milk synthesis in early lactation. Thus particular attention should be show in feeding the Akkaraman Kangal ewes during these periods.

References

- Akçapınar H, 2000. Koyun Yetiştiriciliği. Yenilenmiş 2. Baskı, İsmat Matbaacılık, Ankara, Türkiye, pp: 36-67.
- Altınsaat Ç, 2001. Akkaraman koyunlarda B12 vitamini ve folik asit düzeyleri ile bazı hematolojik ve biyokimyasal değerler arasındaki ilişki. *Ank Üniv Vet Fak Derg*, 48, 141-145.
- Altıntaş A, Fidancı UR, 1993. Evcil hayvanlarda ve insanda kanın biyokimyasal normal değerleri. *Ank Üniv Vet Fak Derg*, 40, 173-186.
- Antunovic Z, Novoselec J, Sauerwein H, Speranda M, Vegara M, Pavic V, 2011. Blood metabolic profile and some of hormones concentration in ewes during different physiological status. *Bulg J Agric Sci*, 17, 687-695.
- Atakişi E, Atakişi O, Merhan O, Ögün M, Özcan A, Maraşlı Ş, 2009. Koyunlarda gebelik öncesi, gebelik ve doğum sonrası β -hidroksibütrik asit, glukoz ve trigliserit düzeylerinin araştırılması. *Erciyes Üniv Vet Fak Derg*, 1, 37-41.
- Baird GD, Van Der Walt JG, Bergman EN, 1983. Whole-body metabolism of glucose and lactate in productive sheep and cows. *Br J Nutr*, 50, 249-265.
- Balıkcı E, Yıldız A, Gürdoğan F, 2009. Investigation on some biochemical and clinical parameters for pregnancy toxemia in Akkaraman ewes. *J Anim Vet Adv*, 8, 1268-1273.
- Bell AW, 1995. Regulation of organic nutrient metabolism during transition from late pregnancy to early lactation. *J Anim Sci*, 73, 2804-2819.
- Bell AW, Bauman DE, 1997. Adaptations for glucose metabolism during pregnancy and lactation. *J Mammary Gland Biol Neoplasia*, 2, 265-278.
- Braithwaite GD, 1983a. Calcium and phosphorus requirements of the ewe during pregnancy and lactation 1. Calcium. *Br J Nutr*, 50, 711-722.
- Braithwaite GD, 1983b. Calcium and phosphorus require-





- ments of the ewe during pregnancy and lactation 2. Phosphorus. *Br J Nutr*, 50, 723-736.
- Brozos C, Mavrogianni VS, Fthenakis GC, 2011. Treatment and control of peri-parturient metabolic diseases: Pregnancy Toxemia, hypocalcaemia, hypomagnesaemia. *Vet Clin Food Anim*, 27, 105-113.
- Ercan N, Koçkaya M, Oğrak YZ, 2014. Study of some blood parameters and minerals in akkaraman Kangal breed of sheep. *Re Opin Anim Vet Sci*, 4, 532-534.
- Gürgöze SY, Zonturlu AK, Özyurtlu N, İçen H, 2009. Investigation of some biochemical parameters and mineral substance during pregnancy and postpartum period in Awassi ewes. *Kafkas Univ Vet Fak Derg*, 15, 957-963.
- Karapehlivan M, Atakişi E, Atakişi O, Yüceyurt R, Pancarcı SM, 2007. Blood biochemical parameters during the lactation an dry period in Tuj ewes. *Small Anim Res*, 73, 267-271.
- Nazifi S, Saeb M, Ghavami SM, 2002. Serum lipid profile in Iranian fat-tailed sheep in late pregnancy, at parturition and during the pot-parturition. *J Vet Med*, 49, 9-12.
- Özyurtlu N, Gürgöze S, Bademkiran S, Şimşek A, Çelik R, 2007. İvesi koyunlarda doğum öncesi ve sonrası dönemdeki bazı biyokimyasal parametreler ve mineral madde düzeylerinin araştırılması. *FÜ Sağ Bil Derg*, 21, 33-36.
- Rodostits OM, Gay CC, Hinhcliff KW, Constable PD, 2006. Appendix 2 Reference Laboratory values, in: *Veterinary Medicine a Textbook of the Diseases of Cattle, Sheep, Goats, Pigs and Horses*, 10th edition, WB Saunders, London, UK, pp:2047-2050.
- Yokuş B, Cakır DU, 2006. Seasonal and variations in serum chemistry and mineral concentrations in cattle. *Biol Trace Elem Res*, 109, 255-266.
- Yokuş B, Cakır DU, Kurt D, 2004. Effects of seasonal and physiological variations on the serum major and trace element levels in sheep. *Biol Trace Elem Res*, 101, 241-255.