

Investigation Levels of Certain Serum Biochemistry Components and Minerals of Pasturing Akkaraman Sheeps in Adiyaman Province*

Doğan KURT¹, Beran YOKUŞ², Dilek Ülker ÇAKIR³, Orhan DENLİ⁴

¹ Dicle University, Faculty of Veterinary Medicine, Department of Physiology, 21280, Diyarbakir, Turkey

² Dicle University, Faculty of Veterinary Medicine, Department of Biochemistry, 21280, Diyarbakir, Turkey

³ Çanakkale Onsekiz Mart University, Faculty of Medicine, Department of Biochemistry, Çanakkale, Turkey

⁴ Dicle University, Faculty of Medicine, Department of Physiology, 21280, Diyarbakir, Turkey

Abstract: The present study aimed to determine reference values during dry period within pasture conditions in Samsat, Kahta, Besni, Gerger, Golbasi, Celikhan, and central districts of Adiyaman province by measuring the levels of several biochemical variables and minerals. Serum urea, creatinine, urea/creatinine ratio, uric acid, total bilirubin, direct bilirubin, AST, ALT, LDH, GGT, CK, ALP, amylase, cholesterol, LDL, VLDL, triglyceride, total protein, albumin, globulin, alb/glob ratio, calcium (Ca), magnesium (MG), Ca/Mg ratio, phosphorus (P), sodium (Na), potassium (K), chloride (Cl), iron (Fe), and Fe binding levels were investigated in blood samples obtained from 70 Akkaraman sheeps between 2-4 ages with healthy appearances. The investigated variables in Akkaraman sheeps in various districts of Adiyaman including the central district were consistent with the results obtained in other studies conducted elsewhere, in general. However, the evaluation with respect to districts showed statistically significant differences for urea, TB, ALT, AST, triglyceride, and Fe levels among sheep populations from different districts ($p<0.05$).

Key Words: Adiyaman, Akkaraman, serum biochemistry, sheep, mineral, enzyme

Adiyaman Bölgesinde Merada Yetiştirilen Koyunlarda Bazı Serum Biyokimyasal Değişkenler ile Mineral Madde Düzeylerinin Araştırılması

Özet: Bu çalışmada Adiyaman ili Samsat, Kahta, Besni, Gerger, Gölbaşı, Çelikhan ve Merkez İlçe'de mera şartlarında beslenen Akkaraman ırkı koyunlarda kuru dönemde bazı biyokimyasal değişkenlerin ve mineral madde düzeylerinin belirlenerek Adiyaman iline ait referans değerlerin ve farklılıkların ortaya konulması amaçlandı. Klinik olarak sağlıklı görülen 70 adet 2-4 yaşlarında Akkaraman koyunundan alınan kan örneklerinde serum üre, kreatinin, üre/kreatinin oranı, ürik asit, total bilirubin (TB), direkt bilirubin (DB), AST, ALT, LDH, GGT, CK, ALP, amilaz, kolesterol, LDL, VLDL, trigliserit, total protein (TP), albumin, globulin, Alb/Glob oranı, kalsiyum (Ca), magnezyum (Mg), Ca/Mg oranı, fosfor (P), sodyum (Na), potasyum (K), klor (Cl), demir (Fe) ve Fe bağlama düzeyleri incelenmiştir. Adiyaman merkez ve ilçelerinde meradaki Akkaraman ırkı koyunlarda incelemiş olduğumuz değişkenlerle ilgili değerlerin değişik bölgelerde yapılan çalışmalarda elde edilen değerlerle uyumlu olduğu görülmektedir. Ancak, ilçelere göre değerlendirdiğimizde üre, TB, ALT, AST, trigliserit ve Fe düzeylerinde önemli farklılıklar saptanmıştır ($p<0.05$).

Anahtar kelimeler: Adiyaman, Akkaraman, serum biyokimyası, koyun, mineral, enzim

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Introduction

Via properly evaluation of the values of blood and serum biochemistry current overall health of an animal can be understood and direct data on yield and nutrition can be obtained, as well. In order to appropriately evaluate an animal health statue by its biochemical data, those values should be compared with the laboratory results obtained from healthy subjects which are called "reference values".

Serum components of animals vary depending on different factors including animal, species, age, gender, growth rate, health status, nutrition, condition, hormonal status, season, and physiological conditions (lactation, pregnancy and dry period) (1,2,3).

Because composition of the soil and the components of the plants vary depending on the regional differences, serum components of the animals bred within pasture conditions, are affected as well (4,5).

The aim of the present study was to lay out the reference values for Akkaraman sheeps bred in Adiyaman province, to determine any nutritional disorder, and to shed a light on the forthcoming studies on those animals.

Materials and Methods

Seventy healthy female Akkaraman sheeps between 44-52 kg and aged 2-4 years which have been fed in pastures without giving any supplements, obtained from stocks owned by people in Samsat, Kahta, Besni, Gerger, Golbasi, Celikhan, and Central districts of Adiyaman. Ten animals from each five stocks (2 animals per stock) in those provinces were selected randomly constituted the materials of the present study.

During early hours in the morning, 10 ml blood was obtained from v. jugularis of the sheeps. Blood samples were transferred to the laboratory by cold chain procedure and serums were separated after being centrifuged at 3000rpm for 15 minutes. Serum samples were stored at -20 °C until the date of analysis. Urea, creatinine, uric acid, total bilirubin, direct bilirubin, aspartate aminotransferase (AST), alanin aminotransferase (ALT), lactate dehydrogenase (LDH), gamma-glutamyl transpeptidase (GGT), creatine kinase (CK), alkalen phosphatase (ALP), amylase, cholesterol, LDL, VLDL, triglyceride, total protein, albumin, globulin, Ca, Mg, P, Na, Cl, Fe, and iron binding capacity analyses were carried out by commercial test kits in a biochemistry auto analyzer (OLYMPUS AU 640). The data obtained from the study were analyzed by SPSS package program (Version 10.0) using ANOVA and Tukey- HSD as post-hocs.

Results

The mean values and standart deviations of biochemical and several electrolyte values for healthy Akkaraman sheeps of Adiyaman region are shown in Table 1 and 2.

Discussion

In the present study, concentrations or activities of several biochemical variables were determined in blood sera of clinically healthy Akkaraman sheeps in districts of Adiyaman province. While the evaluation of

concentrations of total protein, albumin, cholesterol, uric acid, creatinine, total bilirubin, direct bilirubin, activities of AST, ALT, LDH, CK, ALP, and amylase, concentrations of certain minerals (Ca, Mg, P, Na, K, Cl, Fe) and Fe binding capacity revealed no differences among various districts. They were consistent with the results obtained in studies carried out on sheeps of different regions and countries, in general (1,6,7,8,9). However, the analyses of data in terms of different districts revealed statistically significant differences among sheeps for concentrations of urea, total bilirubin, triglyceride, and Fe and for activities of the enzymes ALT, AST ($p<0.05$).

Serum macro and trace elements which show considerably different values between animals, are known to vary depending on factors such as age, gender, nutrition, fasting, and environmental changes (4,7,10,11). Different Fe levels we found in animals of same climate and regions may be due to the differences in structure of the soil such as pH and vegetation.

Sheep breeding has always been an important field in terms of nutritional habits. Health problems still remain an issue for the family farms in our region. Solving health issues with an economic perspective bears importance in terms of breeders.

Conclusion

In conclusion, we believe serum biochemical variables and concentration of minerals of clinically healthy Akkaraman sheeps in Adiyaman province, may shed a light to other studies as reference values for our region in terms of environmental and nutritional conditions, and may be useful for veterinarians when evaluated within framework of clinical results.

Table 1: The concentrations, ratios or activities of certain serum biochemical variables

| | Group 1 (Samsat) (n= 10) | Group 2 (Kahta) (n= 10) | Group 3 (Besni) (n= 10) | Group 4 (Gerger) (n= 10) | Group 5 (Golbasi) (n= 10) | Group 6 (Celikhan) (n= 10) | Group 7 (Adıyaman merkez) (n= 10) | Total (n= 70) |
|-------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|---------------------------------|----------------------------------|--|------------------|
| Urea (mg/dl) | 33.22±9.33 ^{ab} | 24.5±5.38 | 19.87±7.91 ^a | 29.11±9.95 | 24.0±9.04 | 20.50±8.99 ^b | 25.25±6.04 | 25.1 ± 8.99 |
| Creatinine (mg/dl) | 0.87±0.94 | 0.93±0.15 | 1.06±0.09 | 1.09±0.38 | 1.05±0.44 | 0.87±0.16 | 0.81±0.11 | 0.95±0.26 |
| Urea/Creat. Ratio | 33.86±15.02 | 26.86±7.42 | 18.85±8.03 | 27.22±7.29 | 26.82±17.17 | 25.03±13.09 | 32.31±10.57 | 27.29±12.19 |
| Uric acid (mg/dl) | 0.22±0.24 | 0.24±0.13 | 0.37±0.34 | 0.58±0.34 | 0.47±0.44 | 0.3±0.34 | 0.3±0.4 | 0.37±0.33 |
| T.Bilirubine (mg/dl) | 0.4±0.25 ^a | 0.19±0.07 ^a | 0.23±0.05 | 0.25±0.11 | 0.32±0.13 | 0.38±0.3 | 0.24±0.11 | 0.28±0.16 |
| D.Bilirubine (mg/dl) | 0.03±0.01 | 0.03±0.02 | 0.01±0.01 | 0.05±0.07 | 0.02±0.01 | 0.05±0.03 | 0.06±0.04 | 0.04±0.03 |
| AST (U/l) | 88.33±40.87 | 88.9±22.39 | 59.37±14.74 | 82.1 ±21.49 | 77.2±30.3 | 86.94±16.35 | 88.06±20.86 | 81.93± 25.97 |
| ALT (U/l) | 22.55±8.17 | 27.4± 12.11 ^a | 15.37±3.73 ^a | 21.33±7.31 | 21.8±4.36 | 17.9±5.27 | 22.0±7.44 | 21.32±7.94 |
| LDH (U/l) | 386.71±328.58 | 510.7±234.91 | 245.5±66.9 | 362.62±220.3 | 437.71±323.8 | 522.3±245.43 | 513.71±16.03 | 437.6±251.2 |
| GGT (U/l) | 56.21±16.13 | 51.38±11.49 | 43.62±6.96 | 55.42±15.79 | 47.79±14.79 | 44.62±10.25 | 41.27±8.78 | 48.77±13.16 |
| CK (U/l) | 64.66±43.44 | 78.44±50.23 | 44.0±23.59 | 45.22±20.7 | 58.30±31.18 | 85.4±46.9 | 91.12±61.89 | 66.87±43.35 |
| ALP (U/l) | 139.75±67.04 | 137.87±49.24 | 144.5±34.07 | 100.33±45.89 | 141.9±79.43 | 104.44±31.8 | 92.66±40.62 | 124.05±54.8 |
| Amylase (U/l) | 8.0±4.0 | 7.25±1.67 | 16.0±8.83 | 15.55±18.85 | 19.89±20.37 | 8.71±6.68 | 10.0±6.04 | 12.59±12.62 |
| Cholesterol (mg/dl) | 72.75±26.01 | 81.62±28.99 | 65.25±8.06 | 92.75±29.95 | 72.11±11.19 | 64.87±17.52 | 71.0±17.93 | 74.48±22.33 |
| LDL (mg/dl) | 41.71±23.85 | 39.14±13.62 | 36.75±5.92 | 42.65±16.73 | 40.55±11.24 | 21.75±7.37 | 25.32±11.37 | 35.6 ±15.15 |
| VLDL (U/l) | 6.50±3.86 | 4.83±1.54 | 11.91±4.69 | 7.59±4.48 | 5.93±4.52 | 9.5±0.71 | 7.5±2.13 | 7.68±4.39 |
| Triglyceride (mg/dl) | 31.67±23.54 | 25.14±7.49 ^a | 59.57±23.4 ^{a,b,c} | 43.28±17.7 | 29.66±22.61 ^b | 31.37±11.17 ^c | 33.2±7.33 | 36.88±19.41 |
| Total Protein (g/dl) | 7.74±0.46 | 7.49±0.58 | 7.24±0.57 | 7.77±0.54 | 8.03±1.68 | 7.91±0.67 | 7.6±0.42 | 7.7±0.86 |
| Albumin (g/dl) | 3.15±0.21 | 3.0±0.18 | 3.07±0.12 | 3.05±1.17 | 3.32±0.44 | 3.01±1.01 | 3.31±0.91 | 3.13±0.67 |
| Globulin (g/dl) | 4.6±0.64 | 4.71±1.11 | 4.16±0.53 | 4.70±2.54 | 4.71±1.3 | 4.88±0.71 | 4.3±1.16 | 4.76±1.32 |
| Alb/Glob Ratio | 0.69±0.13 | 0.62±0.21 | 0.74±0.1 | 0.55±0.19 | 0.72±0.13 | 0.64±0.26 | 0.84±0.33 | 0.68±0.21 |

Note: Means and standard deviations (mean ±SD) of the variables, and the results of statistical analyses for groups (10 sheep from each district, 70 sheep in total) are shown. a,b,c,d,e: A statistically significant difference is present between the values expressed with the same letters in the same row (p<0.05).

Table 2. Concentrations of investigated minerals and Fe binding capacity value

| | Group 1 (Samsat) (n= 10) | Group 2 (Kahta) (n= 10) | Group 3 (Besni) (n= 10) | Group 4 (Gerger) (n= 10) | Group 5 (Golbasi) (n= 10) | Group 6 (Celikhan) (n= 10) | Group 7 (Central of Adiyaman) (n= 10) | Total (n= 70) |
|--------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|---------------------------------|----------------------------------|--|------------------|
| Ca (mg/dl) | 10.93±0.91 | 10.46±0.63 | 11.0±0.43 | 12.73±3.41 | 11.45±1.57 | 10.55±0.28 | 10.11±0.33 | 11.17±1.72 |
| Mg (mg/dl) | 2.69±0.23 | 2.81±0.21 | 2.66±0.14 | 3.08±0.82 | 2.83±0.49 | 2.59±0.10 | 2.68±0.16 | 2.77±0.41 |
| Ca/Mg Ratio | 4.11±0.53 | 3.68±0.41 | 4.13±0.23 | 4.27±0.59 | 4.13±0.32 | 4.07±0.43 | 3.77±0.23 | 4.07±0.45 |
| P (mg/dl) | 5.7±1.69 | 4.63±1.58 | 5.75±0.59 | 4.67±1.15 | 5.72±0.87 | 4.67±0.41 | 5.19±0.9 | 5.28±1.23 |
| Na (mmol/l) | 144.55±4.97 | 14.7±3.53 | 131.37±47.08 | 146.66±5.4 | 149.0±5.65 | 145.85±4.78 | 151.46±7.85 | 144.92±18.29 |
| K (mmol/l) | 5.08±0.8 | 4.77±0.72 | 5.4±0.77 | 5.32±1.78 | 5.86±1.06 | 5.08±0.61 | 5.81±0.99 | 5.32±1.06 |
| Cl (mmol/l) | 110.6±7.17 | 107.0±2.94 | 114.0±3.02 | 121.26±38.18 | 125.51±24.79 | 109.52±12.21 | 116.03±15.65 | 114.9±19.72 |
| Fe (µ/dl) | 137.96±47.54 | 116.62±23.61 ^{ab} | 174.00±24.39 ^{ac} | 125.12±44.39 | 175.13±0.46 ^{bd} | 125.82±5.08 ^{cd} | 128.47±1.01 | 140.34±39.75 |
| Fe Bind. (µ/dl) | 194.41±41.35 | 189.19±25.1 | 189.12±18.54 | 219.66±37.04 | 184.79±30.21 | 137.5±27.14 | 110.3±29.1 | 190.56±34.53 |

Note: Means and standard deviations (mean ±SD) of the variables, and the results of statistical analyses for groups (10 sheep from each district, 70 sheep in total) are shown. a,b,c,d,e: A statistically significant difference is present between the values expressed with the same letters in the same row (p<0.05).

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Corresponding Author:

Dr. Dogan KURT, Dicle University, Faculty of Veterinary Medicine, Department of Physiology, Diyarbakir –TURKEY, Tel: 0 412 248 80 20
E-mail: dogankurt@gmail.com , dogank@dicle.edu.tr