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A study of some blood hematology for different genetic groups of Sheep In Iraq

دراسة بعض صفات الدم لمجاميع وراثية مختلفة من الاغنام في العراق

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Abstract

This study was conducted to assess the normal values of some biochemical constituents in blood serum of different genetic group of sheep Turkish Awassi . Assaf. Assaf X Local Awassi, Turkish X Local Awassi for both sexes From 2-month to 15 month of age . Overall mean values of Alkaline phosphates (ALP) for the different breeds and their crosseswas 40.1 KAU 100 ml and those for males and females were 41.1and 38.8KAU/100ml).Respectively. Overall values of GOT (67.9) was higher than that for GPT (40.3) across different breeds , ages and sexes .The values of total protein for all ages was 6.4 g 100 ml. The highest values were recorded at 12 months of age for Turkish X Local Awassi and for Local Awassi (7.8 and 7.7 g 100 ml. respectively).

Overall mean values of serum albumin was 47.4%) for different ages and different breeds and their crosses studied. Serum albumin for males and females was 46.0 and 49.0% , respectively). Values of a-globulin percent among different breeds and between males and females were found to be not signify- cant.No consistent significant differences were found either among breeds or between sexes for both the (Beta and Kamma globulin percents. The blood status studied were within normal range among the different breeds and their crosses , these values show that there is at least no pathological conditions , and fluctuation within normal range This indicate that pin physiological regulatory mechanisms are functioning well and those animals are able to adapt to various climatic conditions of Iraq . The reported blood values in the present study could serve as reference values in study blood biochemistry of Iraqi , Assaf, as well as Turkey sheep under different experimental and physiologically conditions.

الخلاصة:

اجريت الدراسة على ٧٥ حمل (ذكر و انثى) لانواع مختلفة من الأغنام(عساف ، تركي ، محلي ، عساف × محلي ، تركي × محلي) لتقدير القيم الطبيعية لبعض المكونات الحيوية لمصل الدم من عمر شهرين لغاية عمر ١٥ شهر.المعدل العام لقيمة تركيز انزيم الفوسفاتيز القاعدي للانواع المختلفة وتضريباتها كانت (٤٠.١ KAU / 100 ml) اذ بلغت 41.1 KAU/100 ml للذكور و 38.8 KAU 100ml / للأناث. بلغ المعدل العام لقيم انزيم كلوتاميك اوكسالك ترانزامينز (GOT) (٦٧.٩ U/L) وهو اعلى من تركيز أنزيم كلوتاميك بايروفيك ترانزامينيز (٤٠.٣ U/L) لمختلف انواع الاغنام وبين الذكور والاناث . المعدل العام للبروتين الكلي لمصل الدم لجميع الأعمار المدروسه من الاغنام كان بحدود 6.4 g / 100 ml واعلى قيمة له كانت في عمر ١٢ شهراً لاغنام مضرب (التركي × المحلي) و (للاغنام المحلية العواسية 7.7 و7.8 gm/dl) على التوالي . النسبة المئوية لبروتين الالبومين بلغت 47.7% لمختلف الأعمار و الأنواع المدروسة .اذ بلغت نسبة الألبومين للذكور 49.01% و 46.0% للأناث على التوالي. بينما لم تختلف قيم الفا كلوبيولين بين الانواع المختلفة للأغنام و الذكور والأناث عن بعضها البعض . ولم تكن هناك فروق معنوية بين الانواع المختلفة وبين الذكور والاناث من الاغنام في النسب المئوية لبروتين البيتا كلوبيولين و الكاما كلوبيولين . يستنتج مما سبق ان صفات الدم المدروسة كانت ضمن المعدلات الطبيعية للأنواع المختلفة و ان هذه القيم اظهرت بانه لم تكن هناك اي حالات مرضية ، وبعض التغيرات في القيم كانت ضمن المعدلات الطبيعية . وهذا يوضح بانه عملية التنظيم الفسيولوجي للجسم تعمل بصورة جيدة لهذه الحيوانات و هي قادرة على التأقلم للظروف البيئية المختلفة في العراق . ويمكن ان تعد هذه النتائج مؤشراً او مرجعاً مناسباً عند دراسة الاغنام العراقية و التركية.

Introduction :

The purpose of investigating blood composition is to have a way to distinguish normal states from states of stress. Such studies also contribute to the differentiation of adaptation problems and acclimatization problems. A blood status within the normal range mean there is at least no pathological conditions ; fluctuations within the normal range indicate that physio- logical regulatory mechanisms are functioning(1) . When , under climatic influence , blood composition does not change enough to give a clear sign of stress reaction , this can indicate either that the animal is easily able to adapt or that the stress from the climate was not as great as expected (2).

Although it is known that an optimum environment is necessary for the full realization of a high performance potential , there is still no way to determine whether observed performance depressions can be attributed to an un-favorable climatic environment studies of sheep blood in Iraq are rare(3). Reliable and comprehensive data on performance of different breeds of sheep are unavailable for both local and imported breeds . For this reason , it seemed worthwhile to collect data on imported sheep breeds using physiologically measurable criteria .This informations would then be useful in making further breeding decisions .

Materials and Methods:

The study .was conducted on 75 lambs (male and female) of different genetic group of sheep (Assaf , Turkey , Local , Assaf X Local and Turkey X Local) reared at the Al-Radwanieh station sheep breeding in central Iraq . All animals were apparently healthy. 15- months ; Blood samples were obtained from the external jugular vein once at . Approximatly 4 -5 ml of blood were drawn from jugular vein using a 20 - guage hypodermic needle and 10 ml vacutainer tubes . Blood was transferred as soon as possible to the laboratory .centrifuged at 2000 rpm for 10 minutes and obtained sera were aspirated into sterile vials and kept in deep freezer (-20°C) for analysis of serum alkaline phosphatase (4) and analysis of GOT , GPT (5) Total protein (gm / 100 ml) was estimated using the refractometer (Atogo Co. , LTD , Japan) according to the procedure described by Larkin (6).Electrophoretic analysis , was done to calculate the oncentration of different protein types (Albumin , Alpha , Beta and Gama globulins). this procedure used the cellulose acetate paper of shandon apparartus (Shandon Southern Products Ltd) on the voltage 240 during 23 minuts time .

Statistical analysis : The effect of breed of sheep and sex on some blood parameters were studied using the GLM (General Linear Modal , 1988) by SAS

(7) . Duncan multiple range test was used to compare between means.

Results :

Results of ALP activity of blood serum of different genetic group and sexes for different months are presented in table 1. The pooled data of ALP of different genetic group studied show that there were significant ($p<0.05$) differences among the different ages . Highest value reported (49.9 ± 4.5) KAU/100 ml at the age of 4 -months , while the lowest was 3.9±0.4 KAU/100

Table 1 : Serum *alkaline* Phosphatase (ALP) *activity* (K.A.U./dl) in different genetic group, sexes and ages of sheep

	No.	Age (month)					Overall mean
Overall mean		2	4	8	12	15	
	52	32.6±4.5C	47.9±4.5a	34.8±1.9b	9.0+0.9d	3.9±0.4d	40.1 ±1.9
Breed							
A	5	10.9±3.1b	85.6123.3a	28.5±4.5a	14.3±5.9a	3.6±0.3ab	40.1 ±6.9a
T	10	51.1 ±12.2a	38.4±5.8b	31.5±3.4a	7.0±1.3b	5.4±1.0a	37.1 ±3.5a
L	9	22.1±5.7b	40.8±2.7b	33.113.6a	8.6±2.2ab	2.5±0.5b	34±3.4a
A×L	12	37.8+10.9ab	52.2±13.2b	40.5±4.6a	10.2±1.5ab	5.0±1.0ab	41.81.4.3a
T×L	16	29.8±7.4ab	43.1±5.3b	36.1±4.1a	7.7±1.1b	2.8±0.3ab	43.4±4.0a
Sex							
Male	29	32.1±5.6a	50.2±7.3a	34.0±2.3a	8.7±1.3a	4.1 ±0.6a	41.1±2.7a
Female	23	33.3+7.3a	45.1 ±4.5a	35.8±3.4a	9.3+1.3a	3.7±0.5a	38.812.7a

A = Assaf, T = Turkey , L = Local

ml at the age of 15 months . Highest ALP activity was recorded for Assaf sheep at the age of 4 - months (85.6±23.3 KAU/100 ml) . The lowest value was obtained for local Awassi (2.5±0.5 KAU/100 ml) at the age of 15 -months . The differences among genetic groups were found to be not significant at the ages, 8 months of age.

Table 1 , show that differences between ALP / values for male and female sheep throughout the different months of the study were not significantly different. The results also show a similar trend for the values of body temperature .

The mean values of GOT and GPT enzymes of different genetic groups and different sexes of sheep are presented in tables 2 and 3.

It can be seen that the overall means values of GOT were higher than the GPT values . Highest GOT activity were recorded during 2 - , 12 - and 15 - months of the Iamb ages (table 2) . While the highest GPT levels was obtained during the 2 - month of age of lambs (table 3) . The lowest values obtained for GOT was recorded during the 2 – month for Assaf cross breed (39.5±2.2 U./L) and the 8 - months of ages (37.7±2.4 U./L) for the Turkey cross breed . The lowest GPT values were recorded for the Assaf cross breed (15.7±3.5 U./L) at the age of 2 - months and for the Turkey breed sheep (17.8±3.5 U./ L) at the 15 - months of age .

The concentration of GOT values for different genetic grup and their crosses were found to be not significant at different ages except for the lambs at 2 - months of age ($P<0.01$). The GPT concentration for the different genetic group and their crosses show that, the only significant ($p<0.01$) differences recorded were during the 12 - month and 15 -months of ages. The Assaf genetic

Table 2 : (glutamic oxaloacetic transaminase (GOT) activity (U/L) in different genetic group, sexes and ages of sheep.

	No.	Age (month)					Overall Mean
Overall mean		2	4	8	12	15	
	42	60.0±3.3	47.8±1.5d	39.6±l.ld	67.8±3.5b	97.2+2.7a	67.9+2.5
Breed							
A	5	61.1±7.9a	47.3±3.6a	40.1±1.4a	60.8+7.4a	87.2+5.6a	67.6+3.6a
T	7	59.2±7.3a	52.8±3.7a	40.1+2.5a	76.5±9.5a	98.0+8.6a	65.7±2.8a
L	7	72.3±9.8a	47.1±3.6a	39.9+2.1a	74.8 + 12.7a	106.6+5.1a	60.6+3.3a
A×L	9	39.5±2.2b	45.2±2. 7a	41.2+2.5a	66.2±8.1a	94.1+4.5a	63.4+2.8a
T×L	14	66.7+5.5a	47.1 ± 3.0a	37.7±2.4a	62.7 ± 4.1 a	97.4+6.2a	71.6+7.5a
Sex							
Male	23	61.1±7.9a	45.3+2.la	39.0+1.8a	72.0±5.8a	99.9 L3.8a	70.6+4.5a
Female	19	58.7+4.5a	50.9±2.0a	40.3+1.2a	63.3±3.6a	94.5+3.7a	64.71 1.7a

A = Assaf, T = Turkey , L = Local

Table 3 : (Glutamic pyruvic transaminase (GPT) activity (U/L) in different genetic group, sexes and ages of sheep) .

	No.	Age (month)					Overall Mean
Overall mean	41	2	4	8	12	15	
		47.0±6.9a	41.0±3.9b	26.3+1.6d	39.0±3.0c	38.9±3.9c	40.3+1.6
Breed							
A	5	60.8±28.3a	33.5+7. 1a	26.5+5. 1a	54.8±17.5a	63.1+11.3a	51.1±5.7a
T	6	57.7±27.3a	47.3+11.6a	20.1+3.5a	37.9±7.2ab	17.8±3.5c	36.1±3.9b
L	7	67.3117. la	40.1+8.6a	30.6+3. 1a	32.0+4. 1b	4 1.0±0.0ab	45.8+4.3ab
A×L	9	1 5.7±3.5a	37.8±9.3a	25.8±3.8a	36.6±4.5ab	42.7+8. lab	38.3±3.1b
T×L	14	41.8±7.3a	42.4+6.5a	27.7±2.6a	39.1±4.5ab	31.9±3.1bc	37.4+2.2b
Sex							
Male	22	48.7±10.0a	37.7±4.9a	28.5±2.3a	43.0+3.6a	42.1+5.2a	41.3+2.2a
Female	19	45.1+9.7a	44.7+6. 1a	23.5+2.0a	34.6±4.8a	35.7±5.7a	39.2±2.3a

A = Assaf, T = Turkey , L = Local

group recorded the highest values (60.8±28.3 U./L) , (63.1±11.3 U./L) for 2 - and 15 – months respectively as compared to other breeds.

Results showes no significant differences among the -different months for both GOT and GPT levels between males and females .

Total protein in blood serum for different months of age for the different genetic group studied and their sexes are presented in table 4. Overall means on the basis of age recorded highest values during the 12 - months of age (7.4±0.2 gm /100 ml) and it was significantly ($p<0.05$) higher in comparison to the values of other months of age .Highest values were recorded at the age of 12 - months for Turkey cross breed and the Awassi (7.8±1.3 and 7.7±1.4 gm /100 ml) respectively . These values of 8 , 12 , 15 month for the different genetic group studied were not signify= cantly different. The differences between males and females in serum total protein were found to be significant ($p<0.01$) only at the 2 , 4 and 15 months .

However, the overall mean differences between males and females were found to be not significant.

Overall values of the albumin serum - protein of different ages, genetic groups and sexes of sheep are given in table – 5 Highest percent of albumin fraction was obtained at the age of 2 - months for Assaf breed (65.9±1.4) . Albumin values for different breeds studied at the age of 2 - months were in general higher than the values of other ages for the same breeds . Aussaf sheep show higher albumin throughout the experimental period in comparison to the other breeds .

Table 4 : Total serum protein (gm/dl) in different genetic group, sexes and ages of sheep .

	No.	Age (month)					Overall Mean
Overall mean		2	4	8	12	15	
	21	5.7±0.1a	6.810.3b	6.1±0.2a	7.4±0.2bc	5.7±0.1a	6.4±0.1
Breed							
A	4	5.8±0.1ab	5.7±0.3b	5.1±0.2a	7.2±0.4a	5.8±0.6a	6.2 ±0.3b
T	4	5.3±0.4b	6.3±0.2a	6.1±0.2a	6.9±0.2a	6.2±0.4a	6.4±0.1ab
L	5	5.5±0.2b	6.5±0.4a	5.9±0.2a	7.7±1.4a	5.4±0.3a	6.3±0.2b
A×L	4	5.6 ±0.2ab	7.0±0.9a	6.3±0.la	7.2±0.3a	5.6±0. la	6.3±0.Ib
T×L	4	6.1±0.3a	7.2±0.2a	6.3±0.2a	7.8±1.3a	5.7±0.4a	6.7±0.1a
Sex							
Male	11	5.5±0.2b	6.310.311	6.3±0.2a	7.5 ±0.2a	6.0±0.2a	6.4±0.1a
Female	10	5.9±0.2a	7.3l0.3a	5.9±0.3a	7.4±0.2a	5.3±0.2b	6.4±0. la

A = Assaf, T = Turkey , L = Local

Table 5 : Serum albumin percent (%) in the different genetic group, sexes and ages of sheep.

	No.	Age (month)					Overall mean
Overall mean		2	4	8	12	15	
	25	53.6±2.0a	51.0±1.9a	47.7±0.7b	43.4±14C	5l.6±1.3a	47.4±0.5
Breed							
A	4	65.9± l.4a	65.9± l.4a	53.8±2.4a	50.7±2.5a	54.9±2.5a	53.0±1.8a
T	5	49.5±4.9b	49.5±4.9b	45.8±1.2b	42.4±2.2a	49.4±4.la	46.7±1. lb
L	5	5 2.4±4.5b	5 2.4±4.5b	48.1±1.4b	4.3±3.9a	51.4±1.7a	48.1±1.1b
A×L	4	53.8±2.6ab	53.8±2.6ab	48.3±0.8b	40.3±3.3a	50.2±1.8a	46.1±1.1b
T×L	7	49.9±3.7b	49.9±3.7b	45.6±1.5b	44.6±2.2a	52.7±5.0a	46.0±1. lb
Sex							
Male	14	50.8±2.8a	50.4±2.9a	46.4±l.la	44.9±2.0a	48.5±1.6b	46.01±0.7b
Female	11	57.0±2.6a	51.7±2.3a	49.3±0.8a	41.7±1.8a	54.7±1.8a	49.0±0.8a

A = Assaf, T = Turkey , L = Local

Overall mean differences between sexes was significant ($p<0.05$).generally specking Females tended to had higher albumin percent (49.0±0.8) than the males (46.0± 0.7) .

Values of alpha globulin of serum blood protein in different ages , genetic group and sexes of sheep are presented in table 6 .

Highest percentages of the alpha globulin was obtained during the age of 2 - months . These values are significantly ($p<0.05$) higher than values of other ages . differences between genetic group were found to be not significant .Overall values of Alpha globulin for male and female sheep were not differ significantly .

Beta globulin of serum blood for different ages , genetic group and sexes are presented in table 7. Highest overall means percentages of the Beta - globulin was obtained at age of 4 - months (15.8 %) . At the age of 1 5 - month Turkey breed showed higher value (14.6 %) . Beta globulin levels appeared to fluctuate for different ages and breeds. No consistent significant differences were found either among sexes throughout the experiment period .

Table 8 - shows the changes in Gamma - globulin percent during different ages , breeds and sexes .

The differences among breeds were found to be not significant at the ages 2 , 4 , 15 months. Highest value were found for Turkey breed at age of 8 and 12 months , while the lowest were for Assaf breed at the age of 8 and 12 months . No consistent significant differences were present among breeds, no significant different were found between male and female.

Table 6: Serum alpha - globulin percent (%) in the different genetic group , sexes and ages of sheep .

	No.	Age (month)					Overall Mean
Overall mean		2	4	8	12	15	
	25	19.1±1.7a	9.1 ±1.0c	9.2±0.9C	13.9±1.0b	10.6±0.7b	11.5±0.5
Breed							
A	4	13.4±5.3a	7.0 ±1.9a	7.2±1.8a	17.6±0.6a	16.1±0.5a	1 1.5±1.2a
T	5	19.8±4.3a	5.6±0.2a	10.1±2.0a	14.9±1.2a	7.8±2.5b	11.5±1.1a
L	5	21.3±2.8a	8.7±0.9a	9.1±2.1a	14.0±1.4a	12.7±1.9a	12.0 ±0.9a
A×L	4	I5.3±4.4a	8.3±3.7a	8.4±1.7a	15.3±1.9a	12.6±0.9a	10.9±0.8a
T×L	7	22.7+2.9a	10.8±2.2a	10.0±2.0a	1 1.9±2.1a	12.5±1.6a	1 1.4±0.9a
Sex							
Male	14	20.0±2.1a	9.5±1.7a	9.9+1.2a	1 1.6±1.5b	13.6±0.9a	1 1.3±0.6a
Female	11	18.0±3.0a	8.6±1.1 a	8.3+1.3a	16.6±1.la	1 1.5 ± 1.2a	1 1.6±0.7a

A = Assaf, T = Turkey , L = Local

Table 7 : **Serum** Beta - globulin percent (%) in the different genetic group, sexes and ages of sheep .

	No.	Age (month)					Overall Mean
Overall mean		2	4	8	12	15	
	25	13.2±1.4a	15.8±1.43	11.4±0.8b	9.5+0.8b	10.6±0.7b	13.2±0.5
Breed							
A	4	12.7±3.9a	13.1 ± 1.3a	11.3±3.1a	8.1+2.9a	8.2±l.4b	12.8±1.3a
T	5	11.8±1.9a	13.6±1.2a	9.0±2.3a	8.2 f 1,6a	14.6±1.5a	1 l.8±0.9a
L	5	14.2±2.5a	1 7.3±1.7a	13.3±1.7a	8.9+1.6a	10.9±1.1ab	14.2±1.0a
A×L	4	15.8±5.1a	18.6±2.2a	10.9±1.4a	12.8+2.5a	10.2±1.3ab	14.1±1.0a
T×L	7	12.2±3.2a	15.1±3.2a	12.0±l.4a	8.3+0.6a	10.3±1.6ab	12.8±0.9a
Sex							
Male	14	14.0±2.1a	14.9±1.8a	12.3±1.0a	8.4±0.8a	10.8+1.1a	13.9±0.7a
Female	11	12.2±1.8a	17.1±2.2a	10.1 ± 1.4a	10.6+1.4a	I0.5+0.9a	12.3±0.5a

A = Assaf, T = Turkey , L = Local

Table 8 : Serum gamma - globulin percent (%) in the different genetic group , sexes and ages of sheep .

	No.	Age (month)					Overall Mean
Overall mean		2	4	8	12	15	
	25	10.8±1.0d	21.9±1.7c	30.2±0.7a	29.0±1.3b	21.1±1.4C	25.3±0.6
Breed							
A	4	7.3±2.6a	17.8± 3.0a	26.6±2.2b	20.8±0.8b	19.2±1.4a	21.0±1.6b
T	5	13.1±2.5a	32.3 ±3.1a	32.8±1.1a	31.9+3.1a	21.5±1.8a	26.9±1.5a
L	5	9.2±1.6a	23.1±1.6a	28.9±1.5ab	26.5±2.0ab	21.9±3.0a	23.0± 1.2b
A×L	4	11.8±2.8a	22.9±1.4a	30.5±0.9a	27.9+3.2a	23.2±3.0a	26.3±1.1a
T×L	7	11.6±1.6a	22.5±4.0a	30.3±1.7ab	30.3±2.0ab	23.1±3.9a	27.0±1.2a
Sex							
Male	14	11.4±1.4a	23.1±2.3a	29.6±1.0a	31.0±1.9a	23.7±2.2a	26.2±0.9a
Female	11	10.0±1.3a	20.4+2.4a	31.1+0.9a	26.6±1.6a	20.8±1.6a	24.3±0.9b

A = Assaf, T = Turkey , L = Local

Table **9** : Albumin globulin ratio (A/G ratio) in the different genetic group , sexes and ages of sheep .

	No.	Age (month)					Overall mean
Overall mean		2	4	8	12	15	
	25	l.3±0.1a	1.2±0.1a	1.0+0.03b	0.9±0.1b	1.2+0.1a	1.0±0.02
Breed							
A	4	2.0±0.1a	1.5±0.1a	1.2±0.1a	1.1 ±0.la	1.3 ±0.1a	1.3±0.la
T	5	l.2±0.2b	0.9±0. 1a	0.9±0.04b	0.8±0.la	1.2±0.2a	0.9±0. lb
L	5	1.2±0.2b	1.0±0.1a	0.9+0.1b	0.9±0.la	1.2+0.1a	1.0±0.04b
A×L	4	l.3±0.lb	1.0±0.1a	1.0±0.03b	0.8±0.1a	1.2+0.1a	1.0±0.04b
T×L	7	1.3±0.2b	1.2±0.3a	0.9±0.1b	0.9±0.1a	1.2±0.2a	1.0+0.1b
Sex							
Male	14	1.2±0.1a	1.2±0.2a	0.9±0.04a	0.9.1.0. la	1.1 ±0.1a	0.9±0.03a
Female	11	l.5±0.1a	1.2±0.la	1,0±0.03a	0.8±0.1a	1.3+0.1a	1.1+0.04a

A = Assaf, T = Turkey , L = Local

Overall maximum values for serum albumin : globulin ratio of 1.3 : 1 was observed at the age of 2 - months , while , the minimum overall values was recorded at the age of 12 - months (0.9 : 1) . This ratio level tended to increase with the animal getting older(15 months).Presented results show that differences between albumin globulin ratio for different breeds were only significant for 2 - month ($p<0.05$) and 8 - months ($p< 0.05$) of age .

Assaf sheep show higher ratio ($p<0.05$) values for Albumin / Globulin (1.3 : 1) comparing to the ratio value of other breeds .

The overall mean values for serum Albumin / Globulin for male and female were (0.9 : 1 and 1.1 : 1) , respectively . the differences between sexes was found to be not significant .

Discussion

The interpretation of blood values in young sheep is complicated by environmental influences such as parasitism , nutrition and antigenic stimuli . However , as for alkaline phosphatase is widely distributed in several cellular activity and body fluids (8) , and characterized by its ability to hydrolyse a large variety of organic phosphatase esters with the formation of an alcohol and phosphorus ion (9) . Our result show that the overall means for the different breeds range between (34.0 - 43.8 K. A. U L dl) . These result reflect a marked increase in the activity of ALP during winter and to less degree in spring i.e. (when the lambs are 4 - 8 month old) . The present study found no differences in the activity of ALP between male and female throughout the period of the study . They tended to follow the same trends . However , Abd - Al - Rhman (10) in her study on the local Iraqi goats reported 6.7 - 16.60 (K. A. L. ml) and this value increase to 8 K. A. I'. / ml for the older female when compared to that at 2 - 5 month old . Saxena and Eapen (11) reported that ALP enzyme differ depending on breed and age of animal but did not affected by pregnancy .

The GOT and GPT enzymes are also known to be involved in several cellular activity (9 and 12) . Our results showed clearly an increase in the activity of GOT with increasing age from 39.6 unit L in ewe lambs 8 months to 97.2 unit/ L in 1 5 months old . The mean values of GOT reported by Nadir (13) for Awassi and Turkey sheep (male and female) aged (1 - 2 year) ranged between 114 - 123.6 Unit/L . While in goat Abd - Al -Rhman (10) reported a value of 12.5 -15.99 Unit L . for Iraqi does. As for GPT enzyme , our result shows its values ranged between 26.3 U / L in 8 months aged to 47. U / L when it was 2 months old . The activity of this enzyme were at the same trends for male and female throughout the study period . Nadir et al. (13) reported a values of GPT 95.9 and 86.5 U/ L , for Iraqi Awassi rams ewes and Turkish rams , respectively . In goat (10) reported a value of 9.8 - 10.7 U / ml . for older does . However , the differences in the previous results between investigators could be attributed to variation in the experimental conditions , age of the animals, season , location and time sampling.

As for total serum protein in the present study on sheep it was between 5.7 and 7.4 grams percent. Nadir et al. (13) found total serum protein were 8.4 , 8.2 and 8.4 g , 100 ml form healthy sheep (1 - 2 years old) Iraqi Awassi rams . ewes and Turkish rams , respectively . Hoeller and Hassan (14) found serum proteins of desert sheep in Sudan being at an average of 7.4 g / 100 m l . Mehrotra and Mullick (15) using the Kjeldahl method reported the mean protein concentration in serum of sheep to be 6.69 g / 100 ml , they also reported that

serum protein would be slightly lower than plasma proteins in the same blood since fibrinogen has been removed during clotting of the blood . In a study on Iraqi does , Abd Al-Rahman (10) reported the mean protein concentration in serum of goat to be 8.3 - 11.3 gm / 100 ml . As for mean total serum protein concentration was found to be lower in young sheep (2 - 8 month old) when compared with older sheep (12 - months old) . Similar results was reported by Perk and Lobl (16) who found that serum proteins to increase with age from 5.8 gm percent in ewe lambs 3 months to 7.4 gm percent in lactating ewes 3 years old .

However , no evidence has been found in our study to the effect that significant breed or sex differences exist.

Concerning different fractions of serum protein recorded during this study , our results can not be compared with other results on Iraqi sheep , since to the best of our knowledge such values are not available . However, the electrophoretic results obtained in our study were closed to the results obtained by Hoelier and Hassan (14) for desert sheep in Sudan (38.0% albumin .8.2% alpha globulin , 16.1 beta globulin , 37.8 gamma globulin) . Other study by (16) reported that albumin fraction decreased and the globulins increased with advancing age , which agree with the present results .

The blood status studied were within normal range among the different breeds and their crosses . These values show that there is at least no pathological conditions , and fluctuation within normal range , This indicate that physiological regulatory mechanisms are functioning well and those animals are able to adapt to various climatic conditions of Iraq . The reported blood values in the present study could serve as reference values in studying blood biochemistry of Iraqi as well as Assaf and Turkey sheep under different experimental or physiogical conditions .

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