قسم : طب الحيوان وأمراض الدواجن .
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دراسات عن بروتينات الدم ومشتقاته باستخدام طريقة التحليل الكهربائي لأفلام الأجاروز في الاغنام والحملان والماعز

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أجريت عملية التحليل الكهربائي وكذلك قدرت كمية البروتينات الكلية لعدد ستة من الأغنام السليمة صحيا ، كذلك لعدد ثمانية من الحملان الصغيرة وعشرة من الماعز المشهود لهم بالصحة والعافية . لم يلاحظ أى تغيير في كميات مشتقات البروتينات المختلفة في هذه الحيوانات ، الا أنه لوحظ بعض الاختلافات الطفيفة بين أرقام هذه المشتقات . وقد عزيت هذه الفروق الى الاختلاف في الجنس والنوع وكذلك العمر .

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STUDIES OF THE SERUM PROTENS IN APPARENTLY HEALTHY SHEEP, LAMPS AND GOATS

(With 3 Tables & 6 Figs.)

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SUMMARY

Using standardized method for protein analysis and fractionation tests for protein separation and quantitation in sheep, lambs and goats were examined for normal basic values using agarose slide electrophoresis. In the present investigation, measurement of the total serum protein concentrations and the differential fractionation of the gamma, beta, alpha globulins and slbumin in six apparently healthy sheep, ten apprarently healthy, adult goats and eight young lambs were conducted. No noticeable changes could be detected regarding the quantitation of both sheep, lambs and goats sera, nevertheless, slight but not significant variations as to the different ages or sex were shown for total serum protein values as well as for albumin and gamma globulin fractions. The mean concentrations of individual protein fractions in sheep were found to be 89.04±9.82%, 60.07±3.29%, 6.99±1.08%, 13.23±0.80%, 9.98±1.35% and 9.55±2.99%, while in goats were 89.33±7.00%, 59.05±4.069, 8.28±0.91%, 15.69±1.25%, 7.38±2.15% and 9.09±1.48%. In young lambs were found to be 83.52± 5.05%, 55.78±6.45%, 10.12±2.27%, 15.61±1.80%, 10.27±3.02% and 8.37± 2.23%.

INTRODUCTION

Of noteworthy to mention that any morbid condition always affects the protein fractionation of animal serum either quantitatively or qualitatively (AFFONSO, 1960). He added also that changes in the plasma proteins are usually manifested by an increase of decrease in the concentration of normal components or by the appearance of abnormal proteins.

Using electromigration in stabilized electrolytes BOGUTH (1953) examined serum protein distribution in sheep and goats.

In 1960 CORNELIUS reported that serum proteins may normally vary between 50 and 80 g/l in our domestic animals. It is commonly accepted by MYLREA and HEALY (1968) and SCHALM (1976) that concentrations of the total serum proteins are low in the newborn of most species, commonly being less than 50 g/l. In buffalo calves, however, EL-ALLAWY (1973) using paper electrophoresis reported that total serum proteins were 60.86 g/l.

Due to this great range in the normal serum protein concentrations, the present study attention was focused to chemically and electrophoretically fractionate the various serum components in sheep, and goats to establish our own set of normal values for each species and their protein fractionations to be of benefit as an aid in the interpretation of serum assay in veterinary practice.

MATERIAL and METHODS

ANIMALS

The studies were completed on six apparently healthy adult sheep, ten apparently healthy adult goats and eight healthy young lambs. Animals were kept in loose housing system, where they had access to fresh water and fodder at all times.

BLOOD SAMPLES

Blood samples and serum separation from each animal were carried out by the ordinary method for haematology and analyzed for total serum proteins and protein fractionations on the same day. Total serum proteins were estimated using test kits (Boehringer Mannheim, W. Germany), while for fractionation 0.8 ul. of serum to the sample wells of the agarose film was pipetted using Hamilton syringe. The film was then processed for approximately 35 minutes using 95 ml. of universal barbital buffer in each chamber of the cell. At the completion of the electrophoretic separation, the film was the placed in 200 ml. of the amido-black 10 B working stain solution for 15 minutes, removed from the stain solution and then rinsed in 20 ml. of 5% acetic acid clearing solution using magentic stirrer operating for 30 seconds. The film was then completely dried for 20 minutes, sllowed to cool at room temperature, then washed in the 5% acetic acid clearing solution to clear the excess stain prior to drying for one minute with agitation. It is then transferred to a second stirrstain dish containing clean 5% acetic acid solution, rinsed again for one minute, until the excess stain is removed and dreid for 15 minutes. Densitometry of the stained film was performed with the DCD-16 Digital Computing Densitometer (Gelman Instrument Company), Model 39434, fitted with 520 mm. interference filter. With this densitometer values for optical density are automatically plotted as ordinates against distances along the electrophoresis strips as abscissas. Gaussian curves were constructed for each protein fraction. The results were expressed by taking as zero the migration of the gamma globulin and as 100 that of the albumin.

Statistical data were done according to SNEDECOR and COCHRAN (1967) using t-test.

RESULTS

Our obtained results for electrophoretic fractionation of sheep, lambs and goats serum proteins calculated as percentages are illustrated in (Table 1,2 and 3 Fig. 1,2,3,4,5 and 6 respectively).

DISCUSSION

It is clear from our obtained results that normal sera of apparently healthy sheep, lambs and goats appear ot contain five protein fractions (Table 1,2 and 3 and Fig. 1.2,3,4,5 and 6 respectively). These results are in close agreement with those results reported by SCHALM (1975) in dogs. On the other hand, we disagree with his results concerning ovine, caprine and felline serums as he stated that their serum are usually resolved into single alpha, beta and gamma zones.

The slight hypoalbuminaemia in goats No. 2 and 10, Table (3) could be attributed to be due to the slight inadequate supply of protein in ration. These interpretations were emphasized by WLENCH, GOTTSCH and REEVES (1935) and ZELDIS, ALLING, McCORD and KULKA (1945) who stated that dietary restriction of proteins in the dog leads to marked hypoalbuminaemia. It is also clear for these animals that slight, but not significant hyperglobulinaemia specially fo the alpha-2 and beta fractions had occurred.

Of interesting here to mention that our gained results in sheep, lambs and goats regarding the alpha-1 globulin are in close agreement with those reported by CORNELIUS, BLACK and KLEIBER (1959). On their studies in sheep and cows alpha-1 globulin, however their results in goats seem to be higher than ours as they reported a value of 13.7%.

Regarding the alpha-2 globulin fraction in our study in sheep (Table 1, Fig. 4 & 5) it seems to be slight higher than that reported by CORNELIUS, et al. (1959), however, go paralleled with their results regarding goats alpha -2 globulins.

Concerning the beta globulin fraction, our obtained results in sheep (Table 1 and Fig. 4 & 5) are in the same direction with the studies in sheep and cows recorded by CORNELIUS, et al. (1959), and in contrast, differ totally with their results in goats where they gave the figure 3.9%.

In view of our results given in Tables 1, 2 and Fig. 1, 2, 3, 4, 5 and 6 one can conclude that no significant differences in the gamma globulin fraction with those reported by CORNELIUS et al. (1959) for sheep, goats and cows.

The authors have the conclusion that the lack of agreement in these results in particularly that of alpha-1 and alpha-2 globulins could be attributed mostly by variations in age, species or food, however, it may be good enough to encourage further investigations to ascertain the specific changes that may occur in the altered phyiologica processes.

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Table (1)

Serum protein concentrations and protein fractinations in apparently healthy, adult sheep determined by agarose slide electrophoresis

Animal number	Total protein g/L	Albumin %	Globulin				A/C
			α_1	α_2	β	γ	
1	100.13	59.51	7.87	13.68	10.0	13.79	1.10
2	92.34	59.80	5.20	13.03	9.40	11.56	1.48
3	72.77	63.26	7.44	12.06	12.00	5.17	1.72
4	94.05	63.65	6.10	12.72	7.88	9.93	1.75
5	82.27	59.65	7.69	14.33	10.55	7.76	1.47
6	92.72	59.56	7.69	13.58	10.05	9.10	0.98
X	89.33	60.07	6.99	13.23	9.98	9.55	
S.D.	± 7.40	± 3.29	± 1.08	± 0.80	± 1.35	±2.99	

Table (2)

Serum protein concentrations and protein fractinations in apparently healthy, lambs determined by agarose slide electrophoresis

Animal number	Total protein g/L	Albumin %	Globulin				A/C
			α_1	α_2	β	γ	
1	88.16	59.46	9.04	15.27	7.41	8.80	1.46
2	86.83	46.39	9.03	19.47	15.11	9.18	0.86
3	76.19	67.34	6.09	13.48	9.01	4.16	2.05
4	82.27	59.49	13.19	14.59	6.20	6.54	1.47
5	86.83	53.45	10.58	16.06	12.31	7.67	1.14
6	88.35	55.34	9.24	14.45	10.56	11.41	1.21
7	83.60	50.09	12.45	16.32	11.28	9.84	1.00
8	76.00	54.39	11.41	15.28	9.50	9.42	1.19
X	83.52	55.78	10.12	15.61	10.27	8.37	
S.D.	± 6.05	± 6.45	±2.27	± 1.10	±3.02	±2.22	

Table (3)

Serum protein concentration and protein fractinations in apparently healthy adult Goats determined by agarose slide electrophoresis

Animal number	Total protein g/L	Albumin %	Globulin				A/C
			α_1	α_2	β	γ	
1	90.47	60.47	6.89	17.16	6.64	8.81	1.53
2	94.24	53.42	9.12	15.90	12.90	9.44	1.14
3	90.82	62.39	8.77	14.08	6.35	9.80	1.72
4	88.54	61.28	8.70	15.60	5.66	8.74	1.58
5	87.02	60.72	7.26	14.34	6.24	6.27	1.78
6	94.81	60.49	8.59	15.06	5.19	9.23	1.67
7	93.10	62.51	7.74	15.06	5.81	9.23	1.53
8	81.13	62.17	7.39	14.51	6.31	9.07	1.66
9	73.73	54.77	9.01	17.81	9.07	9.10	1.22
10	99.56	51.76	9.66	16.74	9.51	12.31	0.95
$\bar{X}$	89.33	59.05	8.275	15.69	7.38	9.09	
S.D.	±9.82	±4.06	±0.91	±1.24	±2.15	±1.48	

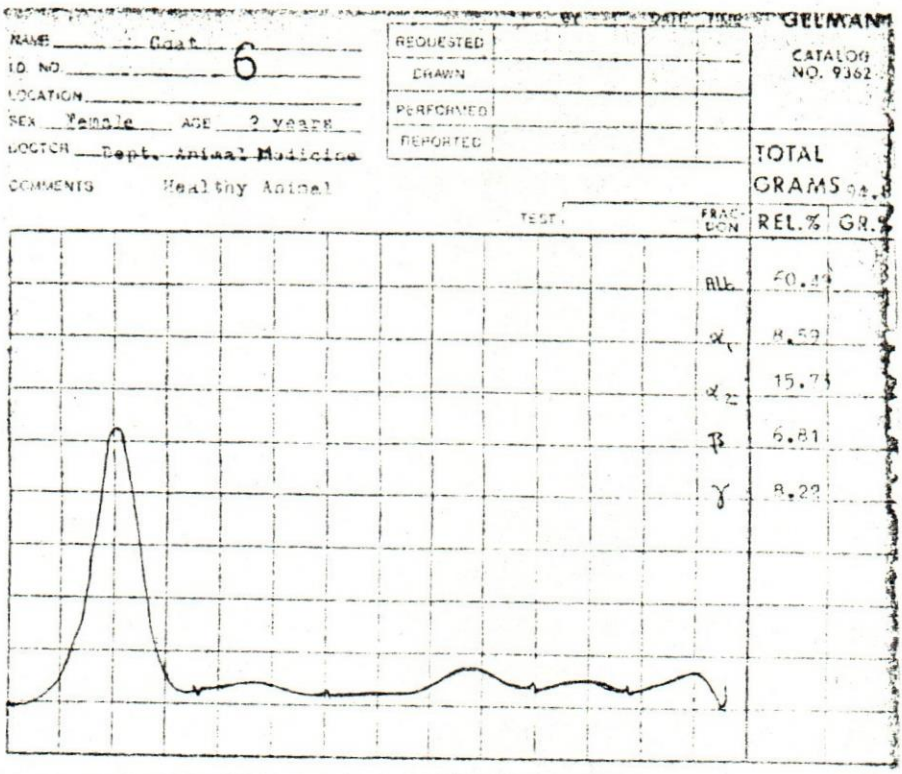

Fig. (1): Electrophoretic pattern of serum protein in 2 years old Goat.

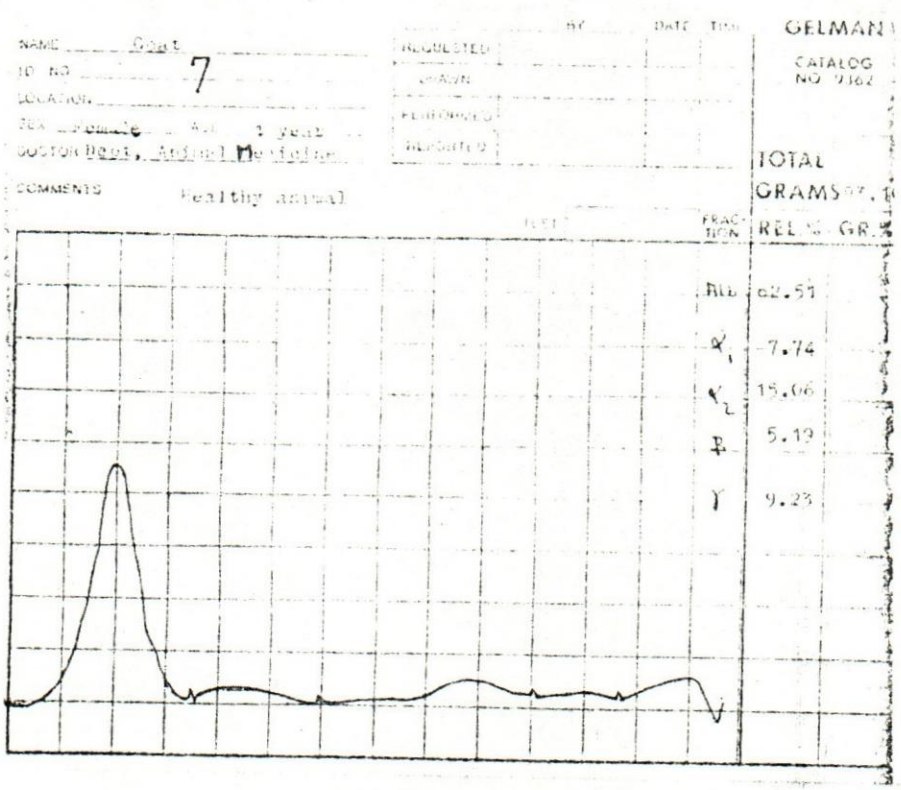

Fig. (2): Electrophoretic pattern of serum protein in 1 years old Goat.

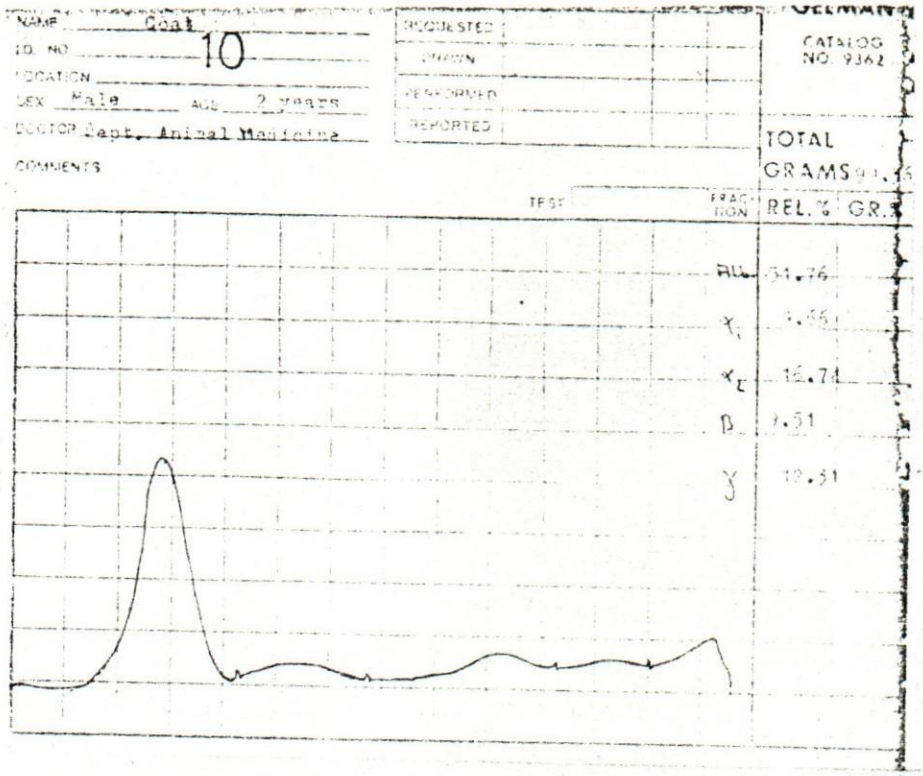

Fig. (3): Electrophoretic pattern of serum protein in 2 years old Goat.

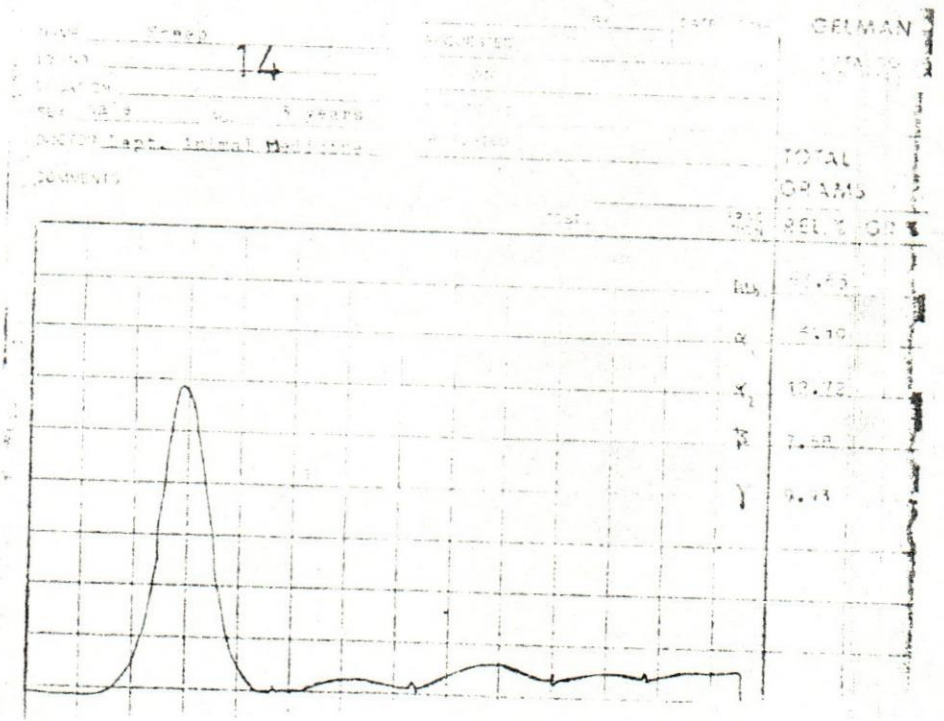

Fig. (4): Electrophoretic pattern of serum protein in a 3 years old sheep.

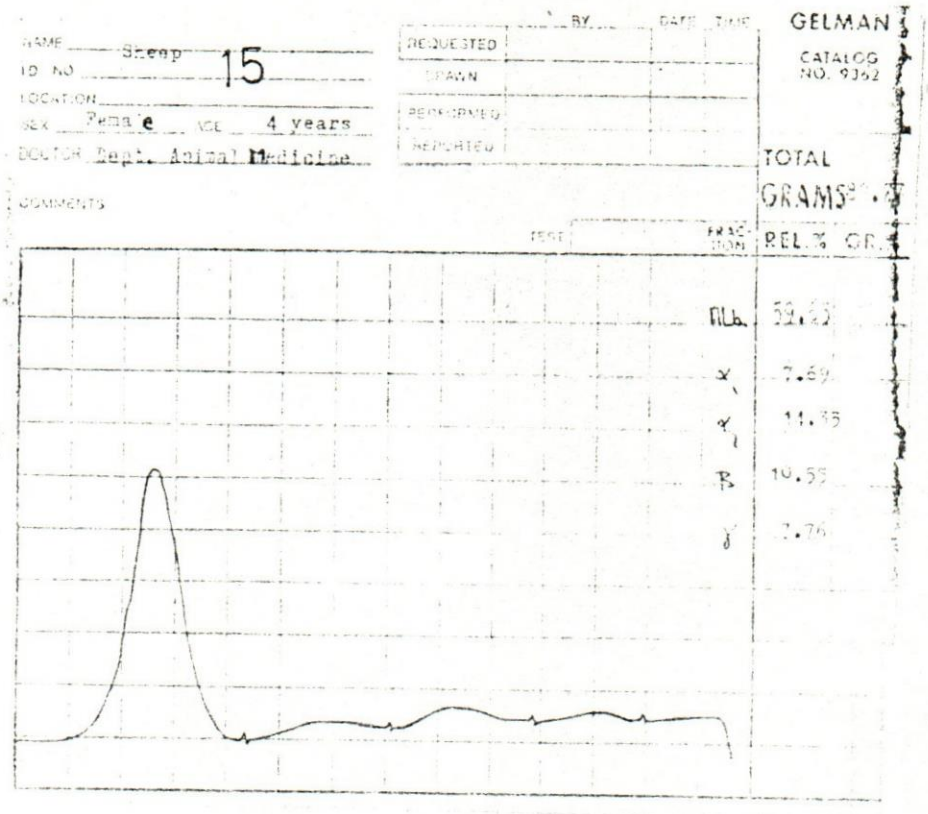

Fig. (5): Electrophoretic pattern of serum protein in a 4 years old sheep.

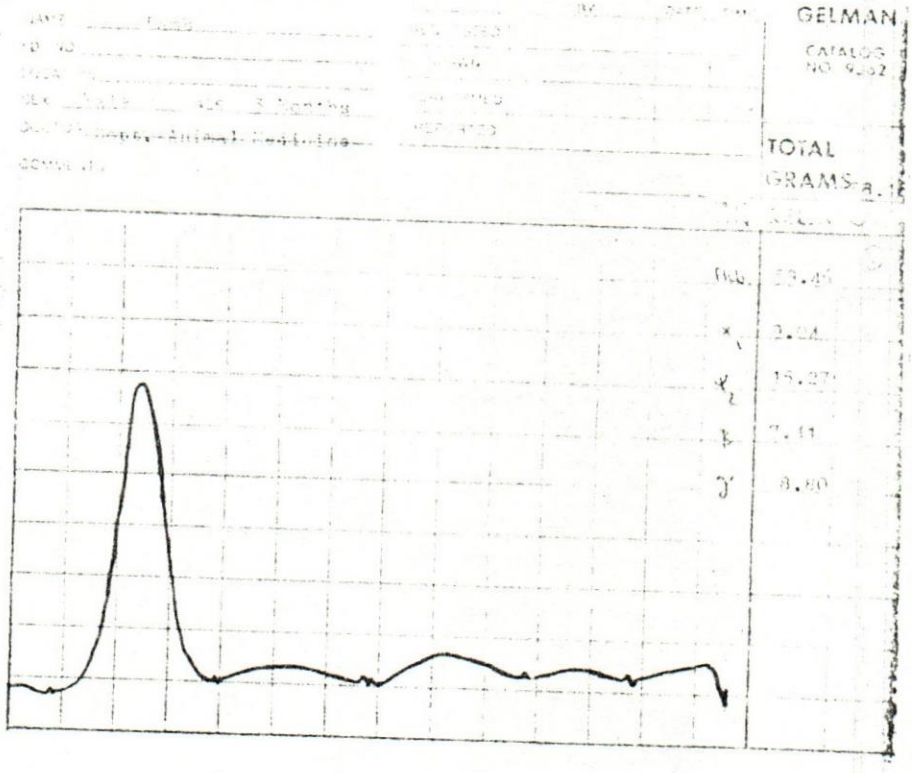

Fig. (6): Electrophoretic pattern of serum protein in a 3 month old lamb.