قسم : الانتاج الحيـــوانـــي .
كلية الزراعة ـ جامعـة أســيوط.
رئيس القسم : أ.د . حاتم الحمادى .

تأثير موسم الولادة على قيم البروتين الكلـي ومكوناته بسيرم الدم خلال فترة الادرار فـي أبقار الفريزيان والجاموس المصرى تحـــت ظروف مصـر الوسطى

ابراهيم سالم ، فاروق علام ، عبد المجيد درويش ، حسن دغش

أجريت هذه الدراسة على ١٢ بقرة فريزيان حلابه و ٥ ٢ جاموسه حلابه مصريه بمزرعة الانتاج الحيواني بكلية الزراعة ـ جامعـــة أسيوط ، وقد أخذت عينات من دم هذه الحيوانات وتـــــم تحليلها لقيم البروتين الكلي ومكوناته المختلفة .

١ـ لم يتضح تأثير النوع على قيم البروتين الكلي ومكوناتـــــه المختلفه فيماعدا مكونات الجاماجلوبيولين ، ومن جهة أخرى وجد أن قيم البروتين الكلي كانت مرتفعة في سيرم ابقـــار الفريزيان عنهـا في سـيرم الجاموس.

٢ـ وضحت النتائج أن هناك زيادة معنويه في نسبة جـامـــا جلوبيولين في سيرم دم الحيوانات التي ولدت في الصيف بالمقارنة بالحيوانات التى ولدت في الشـتاء .

٣ـ وجد أيضا ارتفاع معنوى في نسبة الالبيومين : الجلوبيولين بالنسبة لسيرم دم الحيوانات التي ولدت في الشـــــتاء بالمقارنة بالتي ولدت في الصيف .

٤ـ لم يحدث أى تغيير معنوى في مكونات الدم الأخـــــرى بأختلاف موسم الولادة بخلاف كلا من نسبة جاماجلوبيولين وكذلك النسبة بين الالبيومين والجلبيولين الكلي .

Dept. of Animal Production,
Faculty of Agric., Assiut University,
Head of Dept. Prof. Dr. Hatem El-Hammady.

EFFECT OF CALVING SEASON ON VALUES OF TOTAL SERUM PROTEIN AND ITS FRACTIONS DURING LACTATION PERIOD OF FRIESIAN AND BUFFALOES IN UPPER EGYPT

(With 8 Table)

By
I.A. SALEM, F.M. ALLAM, A.H. DARWISH and H.A. DAGHACH
(Received at 7/5/1983)

SUMMARY

Twelve lactating Holstein-Friesian cows and twenty five lactating Egyptian-buffaloes were used in this study. These animals were reared at the experimental Station of Faculty of Agriculture, Assiut University.

Total blood serum protein were estimated by Ab-refractometer method. Serum protein fractions was also determined electro-phoretically.

Results obtained can be summarized as follows:

1- Genus had no significant effect on total serum proteins and its fractions except on gamma-globulin frasction. On the other hand, blood serum of Friesian cows contained more total protein (6.43 ± 0.02 gm/100 ml) than that of buffaloes (6.20 ± 0.02).

2- Blood gamma-globulin was significantly ($P < 0.05$) higher in the blood of lactating animals calved at summer months as compared to those calved at winter months.

3- Albumin: globulin ratio was significantly higher ($P < 0.01$) in the blood of both winter calved genus as compared with that of summer calved genus.

4- Blood components other than gamma-globulin and albumin: globulin ratio were not significantly affected by calving season.

INTRODUCTION

Total serum proteins and its fractions in Friesian cows and buffaloes are affected by various envious environmental factors. The relationship between total serum proteins of dairy animals and their milk yield was the subject of many previous study. KOVAL (1971) observed that total serum proteins increased during early lactation (first 4 months) and then decreased during the end of lactation (7th - 10th month).

DENILENKO and FEDOTOV (1973) showed that total serum proteins concentration varied considerably, reaching the peak at early and at the end of lactation, however its concentration was low during mid lactation. ROWLANDS et al (1975) found that total serum proteins concentration declined during the weeks perior to calving following by a slight rise after calving.

FOMICHEV (1963) showed that during the whole lactation period the beta-globulin fraction of blood serum was higher than any other globulin fraction. In Buffaloes, SALERNO and TIBERIO (1963) reported that immediately after calving alpha and beta globulin fractions were higher in the blood serum while albumin and gamma-globulin fractions were low. Values were however reversed as lactation period progressed. KOVAL (1971) found that blood serum protein fractions: albumin, alpha, beta and gamma globulins were increased during early lactation and then decreased up to the 10th months of lactation. DANILENKO and FEDOTOV (1973) showed that the concentration of globulin fractions in blood was lower during the 1st half of lactation than during the 2nd half. LITTLE (1974) and ROWLANDS et al (1975) showed that serum albumin concentration tend to fall shortly after calving and then gradually increased during the first few months of lactation.

HEWETT (1974) observed that albumin concentration in the blood serum was not affected by animal's stage of lactation which was in agreement with the most previous results.

DANILENKO and FEDOTOV (1973) and KITCHENHAM et al (1975) found a significant positive correlation between serum albumin and milk yield. On the other hand, FLORESCU et al (1964) found no significant correlation between serum albumin and milk yield.

The present work aimed to follow up the possible changes that could occure in blood serum proteins of Friesian cows and Buffalo under the influence of either season of calving or lactation period.

MATERIAL and METHODS

Twelve lactating Holstein-Friesian cows and twenty five lactating Egyptian buffaloes belonging the Experimental Station of Assiut University were used throughout the present study.

The age of Friesian cows ranged between 4 and 5 years (1st and 2nd lactations) while buffaloes ranged between 3 and 4 years (all first lactations).

Whole blood samples were monthly collected from the jugular vein of animals, for obtaining clear serum. Total serum protein and its fractions were estimated according to MACFATE (1972) and BLOCK et al (1958) respectively.

The obtained data were subjected to statistical analysis according to SNEDECOR and COCHRAN (1969).

RESULTS

Results are represented in Table 1 - 8.

DISCUSSION

Table 1 showed mean values of total serum protein and its fractions of lactating Friesian and fuffalo cows calving either during winter or summer months. Total serum proteins was higher for Friesian and buffalo cows calved during summer as compared to those calved during winter. The difference, however, was not statistically significant. Results also indicate that summer calvers of both genus started lactation period with higher level of total serum proteins as compared to winter calvers (Table 2).

Values of total serum proteins was then fluctuated in an unidentified pattern up to the end of lactation. However, values were more or less very much simillar throughout the lactation period. According by the interaction between calving season and months of lactation, there was no statistically significant effect on total serum protein.

Results also indicated that serum albumin fractions of both genus was not affected by calving seasons or the interaction between calving season and genus. On the other hand, the values of total serum globulin was significantly ($P/\_\_ 0.05$) affected by the calving season (Table 3 and 4). It was found that, the lactating Friesian and buffaloes which calved during summer season had a higher globulin fractions in their blood than those calved during winter seasons. This, however, resulted in a significant ($P/\_\_ 0.01$) low blood albumin to globulin ratio in the summer calved animals of both genus as compared to winter calved ones.

With regared to globulin fractions, results indicated that alpha and beta globulins, (Table 5 and 6) were not affected significantly by calving seasons. However, it was noticed that summer calvers had a higher blood values of alpha and beta glubulins as compared to those calved at winter season. Serum gamma globulins (Table 7) were significantly ($P/\_\_ 0.05$) affected by valving season. Results showed that lactating Friesian cows calved in winter had a higher value of blood serum gamma-globulin as compared to those calved in summer. Buffaloes, on the other hand, had a higher blood serum gamma globulin when calved in summer than when calved in winter. These different trends were statistically significant ($P/\_\_ 0.05$). Results also indicated that serum albumin, alpha and beta globulins were not affected by the interaction between calving season and stage of lactation. As shown in Tables 3-8, values for these blood serum components for both genus calved either in winter or summer season were flutuated throughout different months of lactation. Results also showed that blood serum gamma globulin was affected by the interaction between calving season and months of lactastion. Summer calvers of both genus started their lactation with high levels of gamma globulin in their blood as compared to those calved in winter. Values for summer calvers were then decreased while for winter calvers increased up to the third month of lactation then remain constant until the seventh month of lactation after which it increases again till the end of lactation. It was found that summer calvers started their lactation with high total serum proteins and its fractions. This was also found by ROUSSEL et al (1972), ROWLANDS et al (1975) and SALEM (1979). They suggested that the increase in serum proteins may be an adaptive mechanism for the lactating animals to counteract the adverse effects of heat stress during summer. This is mediated through the importance of blood proteins especially albumin in maintaining the normal blood osmotic pressure during hot summer by their greater water holding capacity. Moreover, the increase in serum globulin in summer calvers may be due to the fact that high ambient temperature elevate the resistence of the animals by increasing serum beta and gamma globulins. The data also indicated that serum albumin to globulin ratio was high after parturition in the winter calved animals than those calved in summer. Values were then declined in winter calved animals till the end of lactation and increased in those calved in summer up to the ninth month for Friesian and third month for buffaloes, then decline again in both genus.

As a conclusion it was detected that the blood serum gamma globulin was significant affected by either season of calving or period of lactation. Consequently albumin: globulin ratio was also disturbed.

REFERENCES

Block, R.J., Durrum, E.L. and Zweig, G. (1958): A manual of Paper Chromatography And Paper Electrophoresis. IInd Ed., New York (1958).

Danilenko, L.I. and Fedotov, P.A. (1973): Proteins in blood of kazakh mares during lactation. Trudy Alma-Atinskoga Zooveternarnoga Inst. 23. 81-87.

Florescu, ST., Constantinscu, A. and Tacu, A. (1964): Protein and proteinogrom modification in concentration with cow milk production. Rev.Noum. Biol.(Ser. Zool.) 9(2) 115-122.

Fomichev, Yu.P. (1963): Indices of protein and fat metabolism in cows with different fat contents of the milk, ZOOtekhniya (85) 50-53.

Hewett, C. (1974): Acta Veterinaria Scandinavica, Supplem. 50. c.f. Rowands et al (1975).

Kitchenham, B.A., Rowlands, G.J. and Shorbagi, H. (1975): Relationship of concentrations of certain blood constituents with milk yield and age of cows in dairy herds. Res. Vet. Sci. 18: 249-252.

Koval, S.S. (1971): Lactation change in blood serum protein and its fractions in Semmental cows. Nauchnya Zapiski Belstseerkovskogo sel'sko khozyaistvennogo Inst. 1971. No. 21, 20-23.

Little, W. (1974): An effect of stage of lactation on the concentration of albumin in the serum of dairy cows. Res. Vet. Sci. 17, 193-199.

MacFate, R.P. (1972): Introduction To Clinical Laboratory. III ed., Med. Publ. Inc. Chicago,USA.

Rousse., J.D., Koonce, K.L. and Pinerom M.A. (1972): Relationships of blood serum protein and protein fractions of milk constituents and temperature season, J. of Dairy Sci. 55/8, 1093-1096.

Rowlands, G.J., Mantson, R., Rita, M.P. and Sally, M.D. (1975): Relationships between stage of lactation and pregnancy and blood composition in a herd of dairy cows and the influence of seasonal changes in managements on these relationships. J. of Dairy Res. 42: 349-362.

Salem, I.A. (1979): Seasonal variation in some body reactions and blood concentration in lactating buffaloes and Friesian cows with references to acclimatization. Assiut Vet. Med. Journal (in Press).

Salerno, A. and Tiberio, M. (1963): Electrophoresis of blood serum protein of buffaloes post partum and of their calves. Annali Sper. agr. 17:(3/4) 369-383.

Snedecor, C. and Cochran, W. (1969): Statistical analysis. 5th Ed., Iowa state University Press. Amer, Iowa USA.

ACKNOLEDGEMENT

The authors are grateful to Professor Dr. Abdel-Rahim Abdel-Mottelib, Department of Internal Medicine, Faculty of Vet. Med., University of Assiut for guidance and also for his help in writing and revising the manuscript.

TOTAL SERUM PROTEIN OF FRIESIAN AND BUFFALOES

Table (1)
Average of blood total serum proteins and its fractions during winter and summer calvers of Friesian cows and buffalo

	Holstein friesian		Egyptian - buffaloes	
	winter calv. $\bar{X} \pm$ S.E.	summer calv. $\bar{X} \pm$ S.E.	winter calv. $\bar{X} \pm$ S.E.	summer calv. $\bar{X} \pm$ S.E.
Blood total serum protein gm/100ml.	6.31 ± 0.09	6.57 ± 0.09	5.98 ± 0.16	6.31 ± 0.11
Albumin gm/100ml.	2.69 ± 0.06	2.60 ± 0.06	2.65 ± 0.04	2.42 ± 0.04
Total globulin gm/100ml.	3.60 ± 0.07	3.96 ± 0.11	3.32 ± 0.03	3.88 ± 0.09
Alpha-globulin gm/100ml.	0.87 ± 0.02	1.08 ± 0.04	0.97 ± 0.01	1.00 ± 0.02
Beta-globulin gm/100ml.	0.69 ± 0.02	0.77 ± 0.02	0.69 ± 0.01	0.79 ± 0.02
Gamma-globulin gm/100ml.	2.10 ± 0.04	2.08 ± 0.08	1.61 ± 0.02	2.07 ± 0.08
Albumin : Globulin ratio	1.06 ± 0.03	0.68 ± 0.03	0.84 ± 0.01	0.64 ± 0.01

Table (2)
Average of blood total serum proteins values of Fresian cows and buffaloes during winter and summer calvers

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	Winter	5.68± 0.21	6.10± 0.34	6.46± 0.33	7.04± 0.38	6.29± 0.42	6.14± 0.91	7.03± 0.29	6.90± 0.73	6.82± 0.47	6.22± 0.40
	Summer	6.85± 0.92	6.16± 0.26	7.05± 0.02	6.35± 0.86	5.84± 0.35	6.85± 0.42	6.32± 0.53	5.83± 0.24	6.41± 0.57	6.66± 0.19
Buffaloes	Winter	5.69± 0.37	5.35± 0.17	6.45± 0.48	6.01± 0.39	6.20± 0.22	5.82± 0.24	6.42± 0.31	6.09± 0.03	6.06± 0.33	5.57± 0.44
	Summer	7.60± 1.36	7.22± 1.04	5.93± 0.55	5.85± 0.22	6.62± 0.31	6.17± 0.45	6.35± 0.21	7.49± 0.73	6.30± 0.38	5.88± 0.59

Table (3)
Average of albumin values of Friesian and buffaloes during winter and summer calvers

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	Winter	2.39± 0.20	2.51± 0.27	2.54± 0.20	3.10± 0.28	2.80± 0.43	2.68± 0.24	3.20± 0.36	2.37± 0.18	3.06± 0.42	2.34± 0.18
	Summer	2.71± 0.24	2.19± 0.58	3.17± 0.10	2.58± 0.35	2.46± 0.22	3.63± 0.09	2.56± 0.23	2.47± 0.11	2.77± 0.20	2.90± 0.10
Buffaloes	Winter	2.64± 0.22	2.29± 0.23	2.86± 0.23	2.78± 0.20	2.72± 0.18	2.52± 0.15	2.83± 0.32	2.78± 0.23	2.53± 0.18	2.29± 0.22
	Summer	2.61± 0.37	2.43± 0.28	2.35± 0.18	2.34± 0.14	2.50± 0.16	2.44± 0.18	2.63± 0.27	2.81± 0.29	2.58± 0.27	1.96± 0.56

Table (4)
Average of total globulin values of Friesian and buffaloes during winter and summer calvers

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	Wenter	3.29± 0.35	3.55± 0.15	3.92± 0.19	3.94± 0.37	3.48± 0.16	3.47± 0.67	3.83± 0.30	4.52± 0.77	3.76± 0.20	3.88± 0.29
	Summer	4.94± 0.37	3.97± 0.85	3.88± 0.10	3.77± 0.43	3.38± 0.26	4.36± 0.44	3.86± 0.29	3.18± 0.23	3.92± 0.51	3.63± 0.30
Buffaloes	Wenter	3.05± 0.26	3.02± 0.11	3.50± 0.35	3.31± 0.25	3.53± 0.19	3.37± 0.07	3.65± 0.18	3.45± 0.17	3.33± 0.19	3.44± 0.24
	Summer	5.00± 1.02	4.79± 0.80	3.57± 0.40	3.45± 0.21	4.10± 0.25	3.57± 0.33	4.17± 0.26	4.32± 0.54	3.82± 0.12	3.86± 0.03

TOTAL SERUM PROTEIN OF FRIESIAN AND BUFFALOES

Table (5)
Average of alpha-globulin values of Friesian and buffaloes during winter and summer calvers (winter: W. summer: S.)

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	W	0.844± 0.058	0.884± 0.077	0.859± 0.083	0.917± 0.133	0.857± 0.113	0.774± 0.045	1.047± 0.129	1.169± 0.235	1.022± 0.144	0.821± 0.087
	S	0.912± 0.224	1.392± 0.678	1.134± 0.084	1.005± 0.121	1.052± 0.065	1.098± 0.099	0.963± 0.140	0.793± 0.058	0.869± 0.239	0.806± 0.145
Buffaloes	W	0.961± 0.062	1.031± 0.135	0.965± 0.079	0.936± 0.053	0.994± 0.052	0.941± 0.100	1.035± 0.088	0.828± 0.022	1.058± 0.173	0.691± 0.035
	S	1.034± 0.278	1.067± 0.075	0.966± 0.078	1.012± 0.099	1.147± 0.157	0.983± 0.079	1.093± 0.107	1.266± 0.165	1.034± 0.080	0.928± 0.048

Table (6)
Average of beta-globulin values of Friesian and buffaloes during winter and summer calvers (winter: W. summer: S.)

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	W	0.710± 0.090	0.696± 0.079	0.736± 0.143	0.609± 0.083	0.776± 0.078	0.640± 0.039	0.645± 0.115	0.966± 0.237	0.779± 0.107	0.608± 0.070
	S	0.782± 0.069	0.627 ± 0.054	0.854± 0.095	0.704± 0.112	0.671± 0.077	0.951± 0.075	0.857± 0.136	0.765± 0.123	0.731± 0.129	0.638± 0.064
Buffaloes	W	0.706± 0.076	0.688± 0.055	0.711± 0.122	0.712 ± 0.095	0.722± 0.052	0.612± 0.061	0.754± 0.086	0.687± 0.058	0.628± 0.049	0.592± 0.110
	S	1.126± 0.174	0.810± 0.099	0.636± 0.076	0.730± 0.114	0.817± 0.090	0.799± 0.083	0.750± 0.012	0.963± 0.111	0.713± 0.027	0.645± 0.080

Table (7)
Average of gamma-globulin values of Friesian and buffaloes during winter and summer calvers (winter: W. summer: S.)

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	W	1.95± 0.20	1.97± 0.18	2.29± 0.10	2.41± 0.20	1.85± 0.05	2.26± 0.39	2.10± 0.19	2.34± 0.38	1.96± 0.27	2.40± 0.22
	S	3.24± 0.27	1.95± 0.08	1.90± 0.08	2.06± 0.30	1.66± 0.17	2.17± 0.37	1.95± 0.31	1.81± 0.18	1.92± 0.37	2.23± 0.11
Buffaloes	W	1.38± 0.16	1.21± 0.15	1.79± 0.20	1.64± 0.10	1.73± 0.10	1.75± 0.13	1.60± 0.20	1.65± 0.14	1.84± 0.14	2.10± 0.23
	S	2.84± 0.57	2.91± 0.72	1.40± 0.36	1.77± 0.11	2.15± 0.22	1.90± 0.18	1.92± 0.19	2.64± 0.21	2.16± 0.14	2.30± 0.07

Table (8)
Average of albumin-globulin ratio of Friesian cows and buffaloes during winter and summer calvers (winter: W. summer: S.)

Species	Calving season	MONTHS OF LACTATION I	II	III	IV	V	VI	VII	VIII	IX	X
Friesian	W	0.784± 0.162	0.711± 0.079	0.649± 0.051	0.831± 0.144	0.815± 0.135	0.787± 0.082	0.865± 0.148	0.570± 0.098	0.820± 0.114	0.611± 0.052
	S	0.550± 0.022	0.610± 0.277	0.817± 0.045	0.702± 0.104	0.742± 0.074	0.643± 0.116	0.753± 0.039	0.728± 0.070	0.820± 0.122	0.811± 0.058
Buffaloes	W	0.884± 0.098	0.764± 0.103	0.929± 0.153	0.872± 0.053	0.788± 0.054	0.790± 0.031	0.804± 0.101	0.841± 0.064	0.728± 0.053	0.708± 0.091
	S	0.534± 0.043	0.520± 0.044	0.679± 0.072	0.678± 0.054	0.604± 0.082	0.671± 0.044	0.725± 0.015	0.599± 0.025	0.690± 0.059	0.505± 0.044