دراسات تغذية الجاموس خلال فترة الجفاف
٣ـ الأختلاف فى نشاط بعض انزيمات سيرم الدم

أ٠ع٠ سالم ، ع٠ عبدالمطلب ، ج٠ع٠ عبد الحافظ

أجريت هذه التجربة على الجاموس المصرى الحامل وفى فترة الجفاف (قبل الولادة بشهرين) فى محطة التجارب الزراعية للانتاج الحيوانى بكلية الزراعة جامعة أسيوط ٠ وقسمت الحيوانات على حسب الانتاج الفعلى للبن فى الموسم الحليب السابق وكذلك وزن الجسم ٠ وغذيت المجموعة الأولى (المقارنة) على مستوى ١,٤ × العليقة الحافظة خلال فترة الجفاف ٠ وحسبت الاحتياجات الغذائية خلال فترة الحليب على أساس معادلة غنيم (١٩٥٨) ٠

واخذت عينات الدم من الوريد الوداجى عند اليوم ٦٠، ٣٠، ١٥ قبل الولادة ، وكذلك بعد الولادة مباشرة وعند ٣٠، ٦٠، ٩٠ يوم من فترة الحليب ٠

وقد قدر فى سيرم الدم كل من الانزيمات جلوتاميك أوكسال أستك ، وجلوتاميك بيروفيك ترانس أمينيز والالكلين فوسفاتيز ويمكن تلخيص النتائج فى الاتى :ـ

١ـ يتراوح قيم نشاط انزيم S-GOT من ٤٢,٣ ـ ٤٨,٤ فى المجموعة المقارنة خلال فترة الجفاف بمتوسط قدره ٤٤,٦ ± ١,٣ وحدة ٠ بينما قيم المجموعة الثانية (التجريبية) كانت ٤٧,١ ـ ٤٨,٥ بمتوسط قدره ٤٧,٦ ± ٠,٤ وحدة على الترتيب ٠

٢ـ خلال فترة الجفاف كانت قيم النشاط لانزيم S-GPT ١٩,٣ ± ٢,٩ ، ٢٠,٧ ± ١,٤ لمجموعة المقارنة والتجريبية على الترتيب ٠ وبعد الولادة أصبحت هذه القيم فى المتوسط ١٤,٤ ± ٢,٧ ، ١٤,٧ ± ٢,٢ وحدة على الترتيب ٠

٣ـ كان متوسط قيم انزيم SAP ٢٧,٧ ± ٠,٨ ، ٣٠,١ ± ٠,٨ وحدة لمجموعة حيوانات المقارنة والتجريبية على الترتيب ٠

٤ـ بعد الولادة وأثناء الحليب ـ انخفضت مستويات جميع الانزيمات المدروسة وكان هذا الانخفاض معنويا ٠

٥ـ مستوى التغذية للحيوان خلال فترة الجفاف يؤثر على مستوى نشاط انزيم S-GOT, S-GPT, SAP, وهذا التأثير كان معنويا فى حالة مستوى انزيم S-GOT فقط٠

Dept. of Anim. Prod.,
Faculty of Agric. Assiut Univ. ARE,
Head of Dept. Prof. Dr. A.M. El-Gammal.

NUTRITIONAL STUDIES OF BUFFALOES DURING DRY PERIOD
III- VARIATION IN THE ACTIVITY OF SOME SERUM ENZYMES

(With 3 Tables and 1 Figure)

By
I.A., SALEM, A.A. MOTTELIB*, and G.A. ABDEL-HAFIZ.

(Received at 5/6/1979)

SUMMARY

This experiment was carried out on the dry buffaloes selected from the herd of experimental Farm of Animal Production Department, Assiut University. The animals were devided into two groups according to their milk production of the previous lactation and body weight. The 1st group was considered as control and fed on energy level of 1.4 x maintenance; the 2nd one was received energy intake of 1.8 x maintenance during dry period. After parturition, both groups were treated similarly for the first twenty weeks of lactation period. The energy requirement for milk was calculated according to GHONEIM (1958).

Blood samples were taken at 60th, 30th, 15th day pre-parturition, as well as, immediately after parturition 30th, 60th and 90th day of lactation period. The serum glutamic oxalactic (S-GOT)and glutamic pyruvic transaminases (S-GPT) and alkaline phosphatase (SAP) were determined. The results could be summarised in the following:-

1- The S-GOT activity ranged from 42.3-48.4 units for control group (A) during the dry period with an average of 44.6±1.3 units. While for the experimental group (B) the corresponding values were 47.1-48.5 and 47.6±0.4 units respectively.

* Dept.of Med. & Infections Diseases.Fac.of Vet.Med.,Ass.Univ.

2- During dry period the S_GPT averages were 19.3±2.9 and 20.7±1.4 units for control and experimental groups respectively . After parturition, the averages were 14.4±2.7 and 14.7±2.2 units respectively.

3- The SAP values were 27.7±0.8 and 30.1±0.8 units for control and experimental groups respectively during dry period.

4- After parturition and during the lactation period, all enzymes decreased siginificantly.

5- The high level of feeding intake during the dry period of pregnant buffaloes had effect on the level of S-GOT, S_GPT and SAP activities, and this effect was siginificant only with S_GOT activity at 5% level.

INTRODUCTION

The blood analysis generally reflects the animal health and state of metabolism. Activity of some serum transaminases and alkaline phosphatase as affected by prygnancy, reproductive cycle, lactation period, growth, fattening and carcass yield was documented by SMARNOV, (1974), and GRAF, (1977).

New methods evaluating the utilization of foddstuffs were reported by MAGEDOV (1968). The activity of liver enzymes is considered as a factor to control the utilization of nitrogen of food stuffs. He added that an axcess of protein and amino acids had no effect on the level of serum glutamic oxalacetic(S_GOT)and serum glutamic pyruvic transaminases(S_GPT). While SMERNOV (1974) noticed some elevation of transaminases enzymes during the increase of protein level in ration.

Due to the contradictory results obtained by the previous investigators on sheep and the lacking data concerning the

effect of the physiological states and level of energy intake on enzyme activities in buffaloes; thus, the present investigation was decided to study the influence of nutritional regimens on dam buffaloe during dry period. Their effects on the values of serum alkaline phosphatase (SAP) and transaminases (SGOT) and (SGPT) during dry period and 3 months of next lactation will be also included.

MATERIALS AND METHODS

The experiment was carried out on elven dry buffaloes selected from the herd of Experimental Farm of Animal Production Department, Assiut University. Animals were divided into two groups A & B according to their milk production of the previous lactation and body weight. The control group (A) consisted of 6 animals, while the experimental one (B) consisted of five animals. All animals were at two months before the second calving.

During the dry period (only two mouths before parturition), the animals of the control gourp (A) were fed on the energy level of 1.4 x maintenance, while the animals of the experimental group (B) were fed on the energy level of 1.8 x maintenance.

The estimation of maintenance requirements, feeding stuffs and system of feeding were described in details previously (ABDEL-HAFIZ and SALEM, 1979).

After parturition, all animals of both groups were fed similarly for the first twenty weeks of lactation period. However, blood samples were taken until 12th week of lactation.

Energy requirement for milk production was calculated according to GHONEIM (1958).

The blood samples were taken from the jugular vein. The sampling periods were at 60th, 30th 15th day pre parturition, as wall as, immediately after parturition, 30th, 60th and 90th day of lactation period. The blood samples were allowed to clot at room temperature and the separtated serum was centrifuged to obtain clear fluid. The SGOT and SGPT were determined according the method of REITMAN and FRANKEL (1957) and the alkaline phosphatase was determined by the method of BELFIELD & GOLDBERG (1971), modification of the KIND and KING procedure (1954).

The data were analysed statistically by the method of SNEDECOR (1962).

RESULTS AND DISCUSSION

Table (1) and (2) show the level and average with standard arror of SGPT, SGPT and SAP values pre-and post-parturition in buffaloes as influnced by feeding different levels of energy.

These data show that there was a significant difference of SGOT activity between the experimental and control groups during dry period as positively affected by high level of energy intake ($P < 0.05$). During lactation period, levels of the experimental group exceeded the control one, yet, the difference was not siginificant ($P > 0.05$), due to individual variation.

As shown in table (1) and fig. (1); the maximum level of SGOT was found during dry period even 15th day before parturition. Thereafter, the level was significantly decreased. However, the rate of decrease was more pronouneed (about 49.5 %)

in the control group than that of experimental one (about 20.0% only). These findings agreed with the data of ELIASOV and KABEROV (1966); GLAWISCHNING and NEUMEISTER (1969) and BOSTEDT (1974), who believed that the increase of SGOT during the last period of gestation as the result of increasing the foetus requirements to synthesize new tissues in cattle.

The behaviour of serum GPT activity during different physiological states, as well as,different levels of energy intake was similar to that of SGOT (Table 1&2 and Fig. 1).

The increasing of SGOT and SGPT activity is necessary for accelerating the rate of metabolism and protein biosynthesis needed for foetal growth as well as milk producing capacity for the next lactation. These results may confirm a previous work (ABDEL-HAFIZ and SALEM, 1979) where a higher milk production and a relatively more gained weight of calves at birth of the experimental group than control one.

The findings assured also the investigations of HERAK, KOVACEVIC, SEMUNDIC DENDIC and RISTIC (1975) and GRAF (1977), which refered to the significant correlation of SGOT and SGPT with milk production and food conversion in cattle.

The wide range of SAP activities in normal cattle prohibits its use as an indicator of liver insufficiency in this species. GARNER (1950) observed an average of 11.8 King-Armstrong units/110 ml of serum with a range of 4.7 - 62.4 Units in 294 zebu cattle. AGERGAARD (1976) and AGERGAARD and KATHOLM (1977) found that the SAP is partly genetically controlled and also added that the determination of SAP activity should provide a useful criterion for the evaluation of potential growth in calves.

Table (1): The averages with standard errer of S-GOT, S-GPT and SAP values as affected by different physiological states and energy level intake in Egyptian buffaloes.

Items	Animal group	Pre-parturition			Post-parturition			
		two months	One month	15 day	Immediately	one month	two months	three months
S-GOT	A	48.4±6.9	42.3±6.8	45.6+4.3	27.7±2.0	38.5±2.3	28.4±1.6	22.5±2.0
	B	47.2±2.6	47.1±7.9	48.5±5.3	38.5±0.1	37.5±2.1	29.6±2.1	28.0±2.2
S-GPT	A	16.6±1.2	16.1±1.9	20.0±3.0	17.7±3.2	18.3±2.6	10.5±1.5	11.5±0.4
	B	19.7±2.2	18.9±1.2	23.5±2.1	18.5±1.0	18.3±0.9	11.6±1.5	10.3±0.5
SAP	A	29.1±2.3	26.2±0.5	28.0±2.5	9.1±1.2	7.2±1.3	5.7±0.9	4.4±1.2
	B	31.2±2.1	28.6±3.2	30.4±3.1	10.2±0.1	7.5±1.4	6.2±1.3	4.6±0.5

A = Control group

B = Experimental group

Table (2) S-GOT, S-GPT and SAP of Egyptian buffaloes pre- and post-parturition as affected by energy intake.

Blood serum enzymes	Animal group	Pre-parturition $\bar{X} \pm SE$	P	Post-parturition $\bar{X} \pm SE$	P
S-GOT	A	44.6±1.3	< 0.05	29.3±3.3	> 0.05
	B	47.6±0.4		33.5±2.7	
S-GPT	A	19.3±2.9	> 0.05	14.4±2.7	> 0.05
	B	20.7±1.4		14.7±2.2	
Alkaline Phosphatase	A	27.7±0.8	< 0.05	6.6±1.0	> 0.05
	B	30.1±0.8		7.2±1.2	

Table (3) Analysis of variance of S-GOT, S-GPT and SAP as affected by diferent physiological states and different treatments of feeding level.

Source of variation	d.f	Mean squares of S-GOT	S-GPT	SAP
Between periods	6	485.440**	118.040**	930.170**
" treatments	1	307.550*	21.010	0.470
Error	42	69.782	12.000	3.01

* significant at 5 % level

** " at 1 % level

As shown in table (1) and Fig. (1), serum AP activity was higher in the dry period until 15th day before parturition. The difference was significant (P / 0.01) between the SAP activity during dry period and those values after parturition. This finding agreed with the investigations of WILSON (1955) who observed a marked increase in activity of SAP associated with the approach of parturition. The increase of alkaline phosphatase activity during pre-parturition can be considered as a function of ossification process (bone cells) correlated with growth intensity in which this enzyme is considered as a catalyst of mineral metabolism and associated with bone cell formation. Inspite of insignificant variation in SAP activity of both groups of animals given different levels of energy intake, the experimental group exceeded the control group with about 8.7% in the activity of SAP during the dry period. On the other hand, both groups of animals had nearly the same level of SAP post-parturition. Our findings agreed with KANEKO and CORNELIUS (1970) and BOSTEDT (1974) who found that the SAP increased pre-parturition and significantly decreased after parturition. They concluded that the endometrium of the uterus and placenta have a great amount of SAP activity and after parturition, due to changes in these tissues or destruction, the level of this enzyme decreased in blood serum.

Generally, it can be concluded from the present data that improvment buffaloe nutrition during the dry period(two months before parturition) is necessary to elevate some enzymatic activities affecting consequently the metabolismsm where milk yield of the next lactation and growth of newborn calves are expected (ABDEL-HAFIZ and SALEM, 1979).

Due to the small number of animals used which was available in the Experimental Station, these results are considered as a primarily step, and so a series of experiments are needed on a large number of animals having a different ages (number of lactations) given different levels of nutrition to determine the more suitable level of energy.

REFERENCES

Abdel-Hafiz, G.A. and Salem,I.A. (1979): Nutritional studies of buffaloes during dry period 1. Milk yield, Milk compostion and body performance of dams and their calves. 14th Arab. Vet. Cong. 24-29 March, 1979 Cairo, the National Research Center, Dokki.

Agergaard, N. (1976): Plasma alkaline phosphatase activity and growth in calves. Arsbereting , Institut for Steriltetsforskning,Kongelige Veterinaer-og Landbohojskoke, 19, A 30-39.

Agergaard, N.; Katholm, J. (1977): Plasma alkaline phosphatse activity and isoenzyme composition as an indication of growth in calves. Arsberetning, Institut for Sterilitetsforskning Kongelige Veterinaer-og Landobojskole, 20, 115-129.

Belfield, A. and Goldberg, D. (1971): Revised assay for serum phenyl phosphatase activity using 4-amino-antipyrine. Enyzyme, 12: 561.

Bostedt, H. (1974): Enzymaktivitiien im Blutserum Von Rindern in der zeit und die Geburt. Berl-Munch. Tierarztl-Wschr. 87: 365-371.

Eliasov, E.Z. and Kaberov, R. Sh. (1966): (Cited by Smernov, O.K., 1974).

Graner, R.J. (1950): Vet. Record 62,729 (cited by Kaneko, J.J. and Cornelius, C.E., 1970).

Ghoneim, A. (1958): Animal Nutrition Anglo-Press, Cairo.

Glawischning, E. und Neumeister, E. (1969): Wien tierwzti, Mschr. 56, 30-33.

Graf, F. (1977): Serum enzymes and metabolites in farm animals related to high production.Israel Journal of Medical Science 13 (4) 436.

Herak, M., Kovacevic, V., Semundic Bendic B., and Ristic, G. (1975): Changes in serum transaminase (SGOT) and (S GPT),alkaline phosphatase activity in sows during lactation and after the weaning of the piglets. Veterinarski Arhiv, 45 (314) 71-82.

Kaneko, J.J. and Cornelius, C.E. (1970): Clinical Biochemistry of Domestic Animals. 2nd Ed. Academic Press,New York and London.

Kind, P. and E. King (1954): Estimation of plasma phosphatase by determination of hydrolysed phenol with amino-antipyrine J. Clin. Path. 7: 322.

Reitman, S. and Frankel, S. (1957): A colorimetric method for glutamic pyruvic transaminases. Am. J. Clin. Path. 28 - 56.

Smernov, O. K. (1974): Early prediction of animal production Moscow, Koloc, 1974.

Snedecor,G.W.(1962): Statistical methods Iowa State University Press, Ames, Iowa, U.S.A.

Wilson, A.A. (1955): Brit. Vet. J. 110: 233.
(Cited by Kaneko and Cornelius 1970).

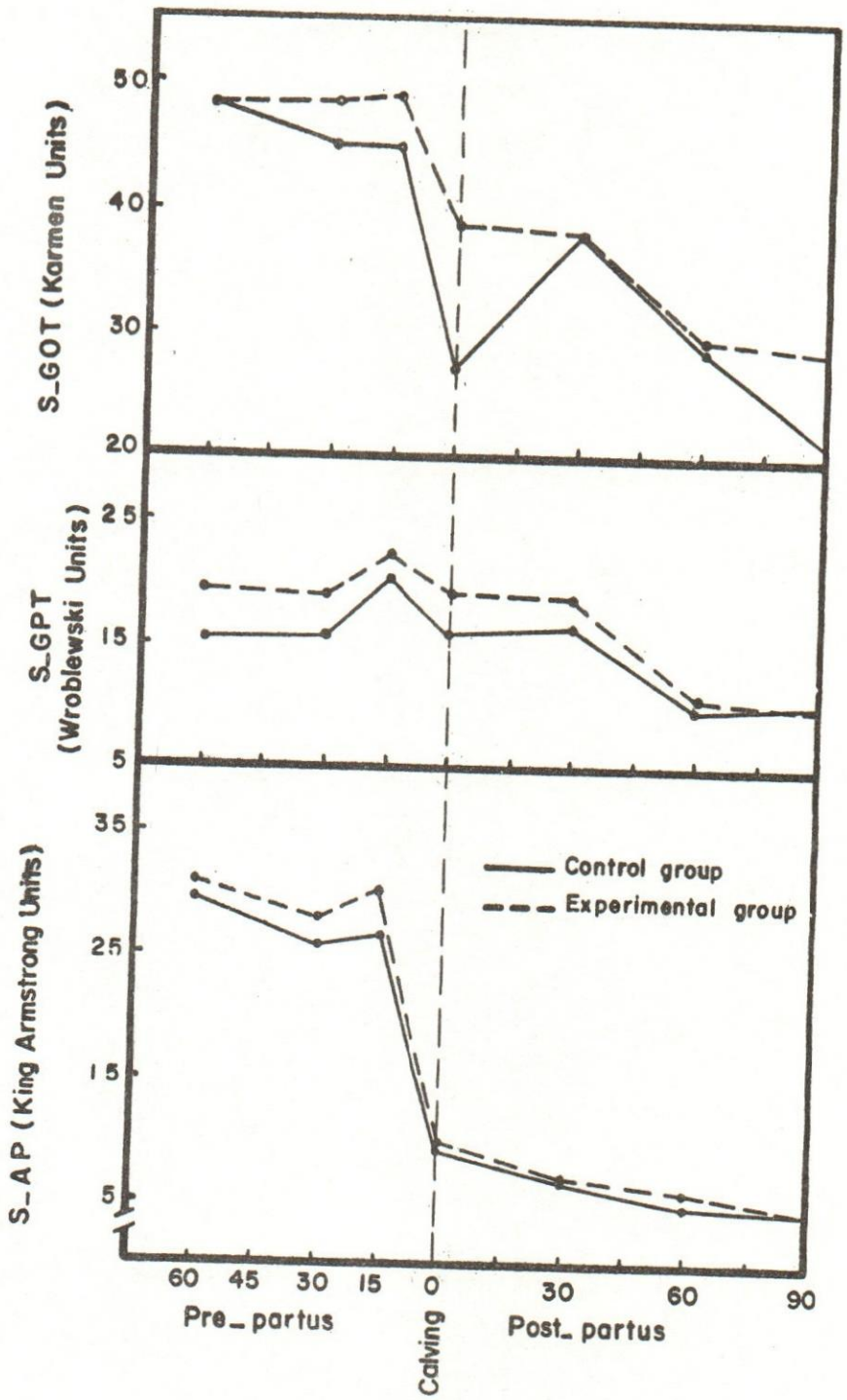

Fig. (1): Shows the variation of S GOT, S GPT and S AP activity as affected by the physiological states of animal and level of energy intake