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STUDIES ON BLOOD BIOCHEMICAL CONSTITUENTS IN LACTATING MARATHWADI BUFFALOES

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ABSTRACT

The study includes certain blood Biochemical constituents in the three groups of Marathwadi buffaloes Group 1: First lactation (10 animals), Group 2: Second lactation (10 animals) and Group 3: Third lactation (10 animals). The blood glucose was significantly higher during third lactation as compared to first and second stages of lactation. During first lactation significantly higher total protein concentration was observed than that of second and third lactation.

Keywords: *Bubalus bubalis*, buffaloes, blood glucose, total protein, Marathwadi buffalo

INTRODUCTION

Buffaloes are predominant dairy animals and distributed in different regions in country and are well adapted to the local agro-climatic conditions. There are about 20% buffaloes of eight recognized breeds. Some breeds are high milk producers Murrah, *Nili Ravi*, Mehsana, Jaffrabadi and Surti are the best milk producing breeds. The milk production of these breeds at organized farms varied from 1,200 kg to 2,900 kg per lactation. Most buffaloes (80%) are non-descript and produced 400 to 600 kg milk per lactation (Chawla, 1999).

Performance in respect of fat percentage of an elite buffalo of Indian dairy breeds ranged from 6.8 to 7.9%. In comparison to the above mentioned Indian dairy buffalo breeds the average total milk production of 1172 Liters and fat percentage of 8.24% as reported by Gujar *et al.* (2000) in Marathwadi buffaloes is very closer to the recognized buffalo breed of India.

MATERIALS AND METHODS

Experimental groups

The experimental animals selected from different villages randomly around Parbhani city. The animals were categorized according to the stage of lactation into three groups.

Group 1: First lactation (10 animals).

Group 2: Second lactation (10 animals).

Group 3: Third lactation (10 animals).

The categorization of animal was based on the records available from owner and clinical

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examination/ physical examination of the animal, in which dental formula, horning, number of calving and age of animal was considered.

Management and feeding of animals

All the animals are selected from the well-established animals shed. Animals were maintained under free range system and animals were let loose for grazing in the field. The animals had free access to drinking water and were provided with abundant free clean water. All the buffaloes selected from the village's owners have good pedigree records and good maintains in the sense of feeding, clean water, and prompt vaccinations. Hygienic conditions near the shed.

Collection and handling of blood samples

Blood samples from the experimental animal were collected in the morning hours. The blood samples were obtained from Jugular vein by puncturing with a sterile disposable needles. About 15 ml blood samples were collected in the clean and sterilized test tube and tubes kept on ground immediately in slanting position for the extraction of serum. And about 3 ml blood in glass vials with anticoagulant (EDTA).

The whole blood sample was immediately deproteinized by Folin and Wu methods as described by Oser (1965) to avoid loss of blood glucose samples collected in large size (50 ml capacity) plastic bottles for estimation of physico-chemical constituents. The blood samples were carried in ice to the laboratory for further processing.

Serum was separated from blood samples within 4 to 5 h. of collection and stored at -20^{o}C until further analyses. The whole blood samples were immediately used for estimation of blood glucose.

METHODOLOGY

Analyses of blood biochemical constituents

Techniques

The blood constituents were analysed by using standard techniques categorized.

By spectrophotometry: A spectrophotometer ** (systronic spectrophotometer model 106) was used to read the trasmittance of coloured solutions. The constituents estimated were:

I) Blood constituents:

i) blood glucose,

ii) serum total protein.

Blood constituentsProcedures

Blood glucose was estimated by Folin and Wu method (1920, modified by Oser, 1965). The necessary reagents were prepared as per the procedure described.

Principle: blood is collected and mix with suitable anticoagulant and then hemolyzed and deproteinized. The protein free filtrate (PFF) is utilized to reduce specially prepared alkaline copper sulphate solution producing cu_2o. Which is then acted upon by phosphomolybdic acid reagent. Converting the cu_2o to a blue-colored solution finally obtained is compared with standard solution of glucose treated identically. The color was read in a spectrophotometer at 530 nm.

Calibration of method: Calibration for blood glucose was performed by processing working standards (containing 0.1, 0.2, 0.3, 0.4, 0.5, 0.6 mg) of glucose and processing in the same way as sample and blank. Calibration obtained is shown below (Equation 1).

Glucose = Reading from graph X Dialution factor X Factor for (mg/dl) % calculation

= Reading from graph X 200

Total protein (Biurets and point method)

Total protein was estimated by using Biuret method using a kit supplied by a commercial Biolab. * (biolab dignostics biosar (Cat. No. A 190)).

Principle: In the presence of an alkaline cupric sulphate the protein produces a violet color. The intensity of this reaction is proportional to protein concentration.

Calibration: calibration of total protein was performed by using protein standard (Containing 1.2,2.4,3.6,4.8 mg of protein) and processing in the same way as samples and blank. The colour was read at 550 nm. standard graph of total protein is shown below (Equation 2).

Total protein = Reading from graph X Dilution factor X Factor (mg/dl) for % calculation

= Reading from Graph X 4800

Statistical analyses

The data on constituents of blood samples were analysed by applying completely randomized design for comparison of graph mean. (Panse and Sukhatme, 1985) Similarly, simple correlation coefficients of dependent variables were also computed.

RESULTS AND DISCUSSIONS

Marathwadi buffalo entirely different from the Western and Northern types and clearly represents very ancient Indigenous types characterized by lighter to medium built with compact stature of 300 to 370 kg as an average weight. An attempt is being made for characterization, evaluation and conservation of Marathwadi buffaloes under ICAR adhoc research project by Gujar *et al*. (2000) in which the qualitative and quantitative characterization in relation to morphological traites, production potential and reproductive status is being studied. However, studies on blood Biochemical constituents, in lactating Marathwadi buffaloes are not available hence, present investigations were conducted to have a base line data on blood biochemical parameters,

The biochemical constituents studied in this project were blood glucose, serum urea nitrogen, total protein, total lipid, total cholesterol, calcium, phosphorus, sodium, potassium and chloride.

Blood glucose

The result of analysis of blood glucose is given in Table 1 and Equation 1 which indicates that blood glucose was significantly ($P<0.01$) higher during third lactation (63.12±1.92 mg/dl) as compared to first and second stage of lactation. (52.87±1.78 and 52.92±1.63 mg/dl, respectively). These values we higher than values reported by Syed *et al*. (1990), 43.7±0.98 mg/dl in Murrah buffaloes and Ramkrishna (1991) values and Jindal and Ludri (1995), 47.47±0.98 mg/dl, 48.8±2.28 and 57.7±2.57 mg/dl in stallfed and grazing lactating Murrah buffaloes, respectively; Bajaj (1993). 49.24±1.60 mg/dl in anoestrus Surti buffaloes. The observed higher levels of blood glucose during lactation may be due to metabolic adaptation associated with onset of lactation; there is increased glucose production with concomitant reduction in glycogen deposition in liver and muscles. Ruminants have evolved glucose-sparing mechanisms to shunt glucose towards lactose production and away from

Table 1. Blood biochemical parameters in lactating Marathwadi buffaloes.

Sr. No.	Parameter	Unit	Group 1	Group 2	Group 3	Grand mean
1	Blood glucose	mg/dl	52.87^{a}**±1.78	52.92^{a}±1.63	63.12^{b}±1.92	56.30
2	Total protein (S)	g/dl	7.76^{a}**±0.10	7.28^{b}±0.15	7.19b±0.21	7.41

**- (P<0.01) Significantly at 1 % level, *- (P<0.05) Significaltly at 5 % level.

Table 2. ANOVA for blood biochemical constituents of lactating Marathwadi buffaloes.

Sr. No.	Parameter	Source	d.f	M.S.S.	F-values
1	Blood glucose	Treatment	2	348.78	10.952**
		Error	27	31.846	-
2	Total protein (S)	Treatment	2	0.93289	3.5602*
		Error	27	0.26204	-

energy production. (Larson, 1985).

Serum total protein

Serum total proteins in different groups of lactating Marathwadi buffaloes is given Table 1 and Equation 2. The serum total protein during first lactation was significantly higher (P<0.01) than that of second and third lactation. These values were higher than values reported for Indian buffaloes (Lactating, 6.47±0.06 and dry, 6.00±0.07 g/dl) Kulkarni *et al.* (1984), Egyptian (7.43 g/dl) and Etalian (7.63 g/dl) buffaloes. The protein anabolic effects of significantly higher level of growth hormone in lactating cows as compared to dry was probably maintained higher levels of total serum protein in lactating dairy animals as compared to dry animals. Syed *et al.* (1990) reported 9.76±0.18 g/dl and 9.14±0.17 g/dl serum total protein in primiparous and pluriparous Murrah buffaloes. These values are higher than the values in Marathwadi buffaloes.

CONCLUSION

Blood biochemical constituents

The mean values of blood and serum biochemical constituents in group first, second and third respectively, were as follows: Blood glucose 52.87±1.78, 52.92±1.63 and 63.12±1.92 mg/dl, Serum total protein 7.76±0.10, 7.28±0.15 and 7.19±0.21 g/dl, urea nitrogen 16.51±0.59, 16.05±0.60 and 14.82±0.34 mg/dl total lipid 1.68±0.03, 1.65±0.02 and 1.64±0.03 g/dl, cholesterol 112.34±1.38, 104.57±2.04 and 103.56±2.28 mg/dl, calcium 9.81±0.9, 10.2±0.08 and 9.49±0.13 mg/dl, phosphorus 4.32±0.11, 4.02±0.07 and 3.67±0.01 mg/dl, sodium 143.90±2.88, 147.50±3.33 and 151.00±1.43 mEq/L, potassium 7.86±0.51 and 7.27±0.61 mEq/L, chloride 96.26±1.61, 98.03±1.98 and 98.62±1.73 mEq/L.

Among blood constituents, highly significant differences (P<0.01) existed in group means of blood glucose, serum total protein, From the above study it was concluded that:

a) Stage of lactation had the effect on

following blood constituents;

i) Blood glucose and serum chloride increased with the advancing lactation number.

ii) urea, total protein, total lipid, total cholesterol, calcium, phosphorus and sodium in serum decreased as the lactation number increased.

(b) Stage of lactation affected milk constituents;

i) blood glucose with milk lactose, serum total protein with whey total protein, serum cholesterol with whey cholesterol and serum potassium with whey potassium were non-significantly negative.

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