EFFECT OF PHASE FEEDING ON BLOOD BIOCHEMICAL PROFILE IN PRE-RUMINANT CROSSBRED CALVES

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Abstract

An experiment was carried out with fifteen crossbred calves below one week of age for a period of 20 weeks, in two phases viz. phase I (milk feeding phase, up to six weeks) and phase II (weaned phase, from six to 20 weeks) to assess the effect of phase feeding on blood biochemical profile in pre-ruminant crossbred calves. The calves were divided into three groups I, II and III of six each as uniformly as possible with regard to age, sex and body weight and were allotted to three dietary treatments T_1, T_2 and T_3 respectively. Calves belonging to Group I were offered calf starter containing 24 per cent crude protein (CP) throughout the period of study, group II with 18 and 21 per cent CP and group III with 15 and 18 per cent CP during phase I and II, respectively.All calves were fed with whole milk up to six weeks of age at the rate of 10 per cent of their body weight. All the three rations were made isocaloric containing 70 per cent TDN and good quality green grass was also offered to all calves from first week of age. The calves were fed as per ICAR standards. Haematological parameters such as haemoglobin, plasma glucose, plasma protein, serum calcium and serum phosphorus were evaluated and there was no significant difference (P >0.05) in any of the parameters among the groups. It could be inferred that phase feeding of pre-ruminant crossbred calves had no adverse effect on blood biochemical profile.

Key words: Phase feeding, crossbred calves, calf starter, protein, blood parameter

Crossbreeding has been adopted as a national policy for enhancing milk production of indigenous cattle. The calves so produced have higher growth potential and early maturity, if optimum quantity of protein, energy, minerals and vitamins are provided. In the traditional calf rearing method, whole milk is fed up to three months of age along with calf starter which is a crucial link for proper ruminal development and successful weaning. In India, farmers cannot afford to rear calves on milk alone as it could diminish the financial returns to them. The quantity as well as the duration of milk feeding can be reduced by increased intake of calf starter or by introducing green fodder at an early age to meet the nutrient requirements. The feed cost accounts for 60-65 per cent of the total cost in dairy farming. Protein is the major constituent which determines the cost of the feed. Since milk is a very good source of protein, it is to be assessed whether it is needed to provide a calf starter with 23 to 26 per cent CP along with milk. Hence dividing the pre ruminant calf hood into two phases – milk feeding phase (up to six weeks) and weaned phase (six to 20 weeks) and providing calf starter with different protein levels will be helpful to reduce the cost of rearing. So the study was planned to assess the effect of phase feeding of calves with calf

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starters containing different levels of CP onblood biochemical profile of calves from birth to 20 weeks of age.

Materials and Methods

Fifteen healthy crossbred calves of one week of age selected from University Livestock Farm and Fodder Research and Development Scheme (ULF and FRDS), College of Veterinary and Animal Sciences, Mannuthy, formed the experimental subjects for the study. After one week of suckling colostrum, calves were weaned and housed individually in well ventilated, clean and dry shed with facilities for feeding and watering. The calves were divided into three groups of five each with regard to age, sex and body weight and were allotted randomly to one of the three dietary treatments, T_1 (Calf starter with 24 per cent CP up to 20 weeks of age), T_2 (Calf starter with 18 per cent CP up to 6 weeks and 21 per cent CP from 6 to 20 weeks of age) and T_3 (Calf starter with 15 per cent CP up to 6 weeks and 18 per cent CP from 6 to 20 weeks of age)and were fed as per ICAR (Ranjhan, 1998) standards. Calves were dewormed at the first week of feeding trial followed by once in every month during the experimental period of 20 weeks. Whole milk was offered to all the calves, up to six weeks of age at the rate of 10 per cent of their body weight. Calf starters were made isocaloric containing 70 per cent TDN and along with that good quality green grass was also offered from first week of age. The ingredient composition of experimental rations in phase I and phase II are presented in Table 1 and 2.

Blood samples were collected from all animals at first, sixth and 20thweek of the experiment. These samples were analyzed to determine haemoglobin (cyanmethaemoglobin method using standard kits), plasma total protein (Jong and Vegeter, 1950), calcium, phosphorus (Bernhart and Wreath, 1955), and plasma glucose (GOP-PAP methodology using standard kits). Haemoglobin was estimated by cyanomethaemoglobin method using reagents from Agappe diagnostics Ltd, Ernakulam, India. Plasma total protein, calcium and phosphorus were determined using the blood analyzer and the kits supplied by Agappe diagnostics, Ernakulam, India. Plasma glucose was estimated by GOP-PAP methodology using reagents from Agappe diagnostics Ltd, Ernakulam, India. Data gathered on various parameters were analyzed statistically using Analysis of Variance (Snedecor and Cochran, 1994).

Results and Discussion

Data on haematological studies is documented in Table 3. The average blood haemoglobin concentration for group I, II and III were 11.78, 12.08 and 12.05 g/dl at 1st week, 11.73, 11.55 and 11.58 g/dl at 6th week and 12.09, 12.03 and 11.46 g/dl at 20th week of the trial respectively. The average plasma protein concentrations of the experimental animals were 6.12, 6.08 and 6.12 g/dl at 1st week, 6.34, 6.27 and 6.21 g/dl at 6th week and 6.82, 6.63 and 6.59 g/dl at 20th week of the experiment for group I, II and III respectively. The average plasma glucose concentration for group I, II and III were 96.45, 96.99 and 97.04 mg/dl at 1st week, 86.70, 86.44 and 86.84 mg/dl at 6th week and 60.97, 60.72 and 60.39 mg/dl at 20th week of the trial respectively. The average serum calcium concentration of the experimental animals were 11.15, 11.31 and 11.21 mg/dl at 1st week, 11.30, 11.27 and 11.03 mg/dl at 6th week and 11.27, 11.28 and 11.20 mg/dl at 20th week

Table 1. Ingredient composition of calf starters given to calves in phase I, %

Ingredients	Percentage composition of calf starter		
	T_1	T_2	T_3
Maize	41.50	56.00	60.50
Wheat bran	17.00	18.50	21.50
Soya bean meal	28.25	12.00	4.50
Dried fish	10.00	10.00	10.00
Di calcium phosphate	0.25	0.50	0.50
Salt	1.00	1.00	1.00
Calcite	2.00	2.00	2.00
Total	100.00	100.00	100.00
Trace mineral-vitamin mixture (g)	15.00	15.00	15.00

Table 2. Ingredient composition of calf starters given to calves in phase II, %

Ingredients	Percentage composition of calf starter		
	T_1	T_2	T_3
Maize	41.50	47.50	56.00
Wheat bran	17.00	19.00	18.50
Soya bean meal	28.25	20.25	12.00
Dried fish	10.00	10.00	10.00
Di calcium phosphate	0.25	0.25	0.50
Salt	1.00	1.00	1.00
Calcite	2.00	2.00	2.00
Total	100.00	100.00	100.00
Trace mineral-vitamin mixture (g)	15.00	15.00	15.00

of the trial for group I, II and III respectively. The average serum phosphorus concentrations of the experimental calves were 6.40, 6.46 and 6.43 mg/dl at 1st week, 6.49, 6.53 and 6.61 mg/dl at 6th week and 6.75, 6.89 and 6.82 mg/dl at 20th week of the experiment for group I, II and III respectively. There was no significant difference (P >0.05) in any of the haematological parameters between the groups at 1st, 6th and 20th week of the experiment.

In accordance with the present study, Lohakare *et al.* (2006) studied the effect of dietary protein levels on the performance, nutrient balances and metabolic profile of cross bred calves and reported that haemoglobin, serum levels of glucose, total protein, calcium and inorganic phosphorus did not show any variation due to dietary treatments and in a study to assess the effect of different dietary protein levels on feed intake and blood parameters in growing sahiwal calves, Dinesh *et al.* (2013) found that there was no significant difference in blood haemoglobin, blood glucose and total plasma protein in calves with varying diet CP concentrations ranging from 13.5 to 16.5 per cent. Shukla *et al.* (1993) studied the relationship of blood biochemical constituents with body weight gains and age in 12 weeks old crossbred calves and observed an average plasma total protein concentration of 6.44 g/

Table 3. Haematological parameters of experimental calves

Parameter	Week	Group		
		I	II	III
Haemoglobin (g/dl)	1	11.78±0.52	12.08±0.23	12.05±0.17
	6	11.73±0.54	11.55±0.33	11.58±0.45
	20	12.09±0.57	12.03±0.19	11.46±0.47
Plasma protein (g/dl)	1	6.12±0.11	6.08±0.07	6.12±0.04
	6	6.34±0.13	6.27±0.12	6.21±0.02
	20	6.82±0.06	6.63±0.10	6.59±0.04
Plasma glucose (mg/dl)	1	96.45±1.02	96.99±1.42	97.04±1.32
	6	86.70±1.29	86.44±1.30	86.84±0.70
	20	60.97±0.31	60.72±0.29	60.39±0.13
Serum calcium (mg/dl)	1	11.15±0.12	11.31±0.07	11.21±0.16
	6	11.30±0.08	11.27±0.08	11.03±0.30
	20	11.27±0.08	11.28±0.08	11.20±0.30
Serum phosphorus(mg/dl)	1	6.40±0.10	6.46±0.14	6.43±0.04
	6	6.49±0.11	6.53±0.16	6.61±0.07
	20	6.75±0.07	6.89±0.23	6.82±0.16

dl at 20 weeks of age. In a comparative study of haematological and blood biochemical parameters of milk-fed and conventionally reared calves between two and 14 weeks of age Al-shami *et al.* (2007) found that average blood haemoglobin concentration ranged from 9.66 to 12.31 g/dl in milk fed calves and 11.80 to 12.50 g/dl in conventionally reared calves which is in accordance with the values obtained in the present study. They also observed average total serum protein concentration that ranged from 6.21 to 6.41 g/dl in milk fed calves and 6.18 to 6.45g/dl in conventionally reared calves.

Babitha *et al.* (2011) studied the effect of extended colostrum feeding on certain physiological and endocrinological parameters of pre-ruminant crossbred calves from birth to one month of age and reported that blood glucose level increased steadily from the lowest value (102.00mg/dl) observed immediately after birth and reached a peak value (137.33mg/dl) on 30thday of age in the group fed colostrums for 3 days of age which is higher than the values obtained for glucose in the present study.

References

Al-shami, S.A. 2007. Comparative study of haematological and blood biochemical components in milk fed and conventionally reared Hassawi breed calves. *Scient. J. King Faisal. Univ. (Basic & Appl. Sci.).* **8:** 99-106.

Babitha, V., Philomina, P.T. and Dildeep. V. 2011. Effect of extended colostrum feeding on the plasma profile of insulin, thyroid hormones and blood glucose of crossbred pre-ruminant calves. *Indian. J. Physiol. Pharmacol.* **55:** 139-146.

Bernhart, D.N. and Wreath, A. 1955. Colorimetric determination of phosphorus by modified phosphomolybdate method. *Analyt. Chem.* **27:** 440-441.

Dinesh, K., Chander, D., Das, L.K. and Kundu, S.S. 2013. Effect of different dietary protein levels on feed intake and blood parameters profile in growing Sahiwal calves. *Indian. J. Anim. Nutr.* **30:** 370-373.

Jong, H.H. and Vegeter, J.J. 1950. Determination of serum proteins with the biuret test. *Pharm. weekbl*. **85:** 755-764.

Lohakare, J.D., Pattanaik, A.K. and Khan, S.A. 2006. Effect of dietary protein levels on the performance, nutrient balances, metabolic profile and thyroid hormones of crossbred calves. *Asian-Aust. J. Anim. Sci.* **19:** 1588-1596.

Ranjhan, S.K. 1998. *Nutrient Requirements of Livestock and Poultry.* (2nd ed). Indian Council of Agricultural Research, New Delhi. 72p.

Shukla, D.C., Varshney, V.P., Gupta, P.S.P. and Mahapatro, B.B. 1994. Plasmaconcentration of thyroxine (T_4), triidothyronine (T_3) and certain other blood biochemical constituents in growing crossbred (Bos taurus x Bos indicus) calves. *Asian-Aust. J. Anim. Sci*. **7**: 69-74.

Snedecor, G.W. and Cochran, W.G. 1994. *Statistical Methods.* (8th ed). The Iowa State University press, Ames, IA, p. 314.

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