GROWTH PERFORMANCE AND HAEMATOLOGICAL AND HORMONAL PROFILE OF JAFFRABADI BUFFALO HEIFERS SUPPLEMENTED WITH RUMEN BYPASS LYSINE AND METHIONINE

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ABSTRACT

An experiment was conducted to evaluate supplementation of rumen protected LYS (lysine) and MET (methionine) on haematological and hormonal profile in Jaffrabadi buffalo heifers. Eighteen buffalo heifers aged 15-21 months of University farm were randomly divided into three groups each of 6 animals and receiving one of the three dietary treatments for a period of 180 days, viz., T1-DCP requirement met through concentrate mixture, T2-DCP requirement through cottonseed cake and concentrate mixture (50:50) and T3- DCP requirement through concentrate mixture with supplementation of rumen bypass LYS and MET @ 5.0 g and 2.5 g/day/animal, respectively. Changes in the body weight, haematology and plasma profile of gonadal steroid hormones were estimated on day 0, 90 and 180 of treatment periods. Weight gain of heifers was significantly improved with T3; however there was no effect of dietary treatments or periods on the hematological values or plasma estradiol and progesterone profile of experimental heifers. Mean values for the entire periods for estradiol and progesterone were 22.61±4.18, 22.28±3.59, 31.00±9.03 pg/ml and 0.24±0.05, 0.15±0.03, 0.20±0.06 ng/ml, respectively. A linear response with regard to estradiol level was observed only in T3 group. It was inferred that inclusion of bypass LYS and MET @ 5.0 g and 2.5 g per day/animal in diet, though significantly enhanced body weight gain, has no significant effect on haematological and hormonal parameters in Jaffrabadi buffalo heifers.

KEY WORDS : Lysine, Methionine, Jaffrabadi heifers, Haematology, Estradiol, Progesterone

INTRODUCTION

Jaffrabadi buffalo heifers, a heavy buffalo breed of Saurashtra region of Gujarat state (adult BW 650 kg), are bred at 337 kg of average body weight and 50 to 55 months of age at first calving in the native tract (Anonymous, 2011). Growth rate manipulation to average rate of 500 g per day can reduce the AFC to around 40 months (Bhatti et al., 2007). Nutritional management, a valuable tool that embodies concentrate feeding coupled with bypass amino acids for making limiting amino acids available in the lower gut may provide desirable growth in Jaffrabadi heifers to attain required body weight for conception. Recently, the effect of bypass protein, fat and/or rumen protected amino acids have been evaluated towards performance of buffalo calves and lactating buffaloes with beneficial effects (Mandal *et al.*, 2002; Movaliya *et al.*, 2013; Savsani *et al.*, 2013 and Odera *et al.*, 2015). The objective of the study was to evaluate the effect on growth, haematological parameters and plasma estradiol and progesterone levels of protected lysine and methionine feeding in Jaffrabadi buffalo heifers.

MATERIALS AND METHODS

Eighteen Jaffrabadi heifers (15 to 21 months old) from Jaffrabadi buffalo herd of the Cattle Breeding Farm, Junagadh Agricultural University, Junagadh, Gujarat were randomly divided into three equal groups of six each and were offered Protein-DCP requirement (ICAR, 1998) through three different

dietary treatments, viz., T1 - commercial concentrate, T2 - DCP requirement met through commercial concentrate and cottonseed cake (50:50) and T3 - commercial concentrate supplemented with rumen bypass LYS and MET @ 5.0 and 2.5 g/animal/day (commercially procured brand Metipearl and Lysipearl from Kemin Industry Asia Ltd.), respectively, for a period of 6 months.

Blood samples were collected by jugular vein puncture on days 0, 90 and 180 of feeding trial in 10 ml vaccutainers containing EDTA and were transported to laboratory in thermocol box on dry ice. Mean RBC (red blood cell), WBC (white blood cell), Hb (haemoglobin), MCV (mean corpuscular volume), MCHC (mean corpuscular haemoglobin concentration), MCH (mean corpuscular haemoglobin), PLT (total platelets), PCT (mean platelet volume) and HCT/PCV (hematocrit/packed cell volume) values were estimated using autohaematology analyzer BC-Vet 2800. Parts of samples were centrifuged and plasma samples stored at -20^{0}C.

Plasma estradiol and progesterone concentrations were estimated by employing standard RIA technique of Robertson (1979) and Kubasic *et al*. (1984), respectively, at Radio Immuno Assay Laboratory of Reproductive Biology Research Unit, Anand Agricultural University, Anand. Labeled Antigen (I^{125}), antibody coated tube and standards were procured from Immunotech, France. The sensitivity of the estradiol and progesterone assays was 9.58 and 0.1 ng/ml, respectively. The intra- and inter-assay coefficients of variation were 14.4 and 14.5 % for estradiol and 5.4 and 9.1 % for progesterone. The data was statistically analysed by using ANOVA and Duncan's multiple range test (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The average body weight changes observed during the experiment are given in Table 1. It is evident that the growth was uniform and linear during the entire experimental period in all three treatment groups with significantly (P<0.05) higher body weight gain in T3 group as compared to T1 and T2 groups. The absolute body weight however did not differ between groups initially or at the end. Similar finding with supplementation of methionine (10 g/d/h) and lysine (20 g/d/h) has been documented in buffalo calves by Mandal *et al*. (2002) and Vahora *et al*. (2012).

Table 1: Mean body weight change (kg) in growing Jaffrabadi buffalo heifers of different protein treatment groups during experimental period

Periods	DCP feeding treatments			Statistical significance		
	T1	T2	T3	SEm	CD 5 %	CV %
0 day	259.20 ± 3.98	255.32 ± 10.53	257.45 ± 11.41	12.07	NS	11.49
180 day	374.67 ± 14.06	382.67 ± 16.35	402.67 ± 11.14	14.02	NS	8.88
Difference	115.47 ± 4.35^a	127.35 ± 8.01^a	145.22 ± 3.50^b	5.64	17.00	10.68

NS -Non-significant, SEm -Standard error mean, CD -Critical difference, CV -Coefficient of variance

The mean haematological values obtained in different treatment groups are shown in Table 2 during experimental period. Neither the period nor the treatment group influenced the haematological parameters in the experimental Jaffrabadi buffalo heifers. These findings are in the same range as reported by Movaliya et al. (2013) in buffalo calves. In an experiment on lactating Jaffrabadi buffaloes to see the effect of bypass fat on blood parameters Savasani et al. (2013) recorded that Hb, PCV, RBC and WBC values differ significantly between groups receiving varying levels of bypass fat. Their values though in normal range were however higher than those documented by Jain *et al.* (1982) and Naveenchandra *et al.* (2008).

Table 2: Comparative mean haematological values in different treatment groups of experimental Jaffrabadi buffalo heifers

Treatment	RBC (x10^6/ cmm)	WBC (x10^3/ cmm)	HB (g/dL)	MCV (fL)	MCH (pg)	MCHC (%)	PLT (x10^3/ cmm)	PCT (%)	HCT (%)
T1	7.33± 0.20	18.08± 2.84	13.03± 0.30	49.45± 0.56	17.75± 0.22	36.01± 0.12	174.39± 13.17	0.12± 0.01	36.14± 0.76
T2	7.89± 0.24	18.31± 1.06	13.83± 0.48	48.87± 0.96	17.51± 0.34	35.97± 0.18	220.61± 23.31	0.15± 0.02	38.42± 1.32
T3	7.67± 0.41	14.26± 1.04	13.43± 0.64	47.72± 1.22	17.23± 0.40	36.20± 0.11	197.00± 12.03	0.13± 0.01	36.64± 1.98
SEm	0.29	1.85	0.4925	0.95	0.33	0.1419	16.95	0.01	1.44
CD at 5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	9.46	26.81	8.98	4.8	4.59	0.96	21.04	20.84	9.54

NS -Non-significant, SEm -Standard error mean, CD -Critical difference, CV -Coefficient of variance

Table 3: Plasma estradiol (pg/ml) and progesterone (ng/ml) levels in Jaffrabadi buffalo heifers of different treatment groups during experimental period

Hormone	Days	T1	T2	T3	SEM	CD 5 %	CV %
Estradiol (pg/ml)	0 day	13.83±1.99	13.00±2.16	13.83±2.48	2.22	NS	40.12
	90 day	36.00±9.14	27.50±8.85	36.00±14.24	11.03	NS	81.45
	180 day	18.00±5.32	26.33±7.03	43.17±13.90	9.51	NS	79.84
	Mean	22.61±4.18	22.28±3.59	31.00±9.03	6.108	NS	59.15
Progest-erone (ng/ml)	0 day	0.33±0.09	0.16±0.04	0.15±0.04	0.06	NS	70.26
	90 day	0.27 ±0.17	0.18± 0.05	0.24 ±0.14	0.13	NS	135.88
	180 day	0.12±0.01	0.12±0.02	0.21±0.07	0.04	NS	68.70
	Mean	0.24±0.05	0.15±0.03	0.20±0.06	0.05	NS	59.93

NS -Non-significant, SEM -Standard error mean, CD -Critical difference, CV -Coefficient of variance

As regards plasma steroid hormones profile (Table 3), there was no clear cut trend in T1 and T2, but in T3 there was a linear response with regard to estradiol level suggesting that the follicular activity was gradually enhanced with protected amino acids supplementation in buffalo heifers. Similarly, progesterone did not reveal any clear trend between periods in any of the group. The treatment effect was non-significant at 0, 90, 180 days on the plasma concentrations of both estradiol and progesterone. Kinal *et al.* (2011) however evaluated the effect of methionine supplementation in cows, which improved the milk content and some of the blood parameters and decreased the number of somatic cells in milk with improving the reproductive parameters.

It was concluded that the feeding of DCP with and without rumen protected lysine and methionine and the period of feeding, though improved weight gain significantly, but has no effect on the haematological values or plasma profile of gonadal steroid hormones, except estradiol for follicular development, in experimental Jaffrabadi buffalo heifers at the selected age group.

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