

## Nili-Ravi Buffalo I. Energy and Protein Requirements of 6-9 Months Old Calves

BASRA, M.J., M.A. KHAN<sup>†</sup>, M. NISA<sup>†</sup>, M. RIAZ<sup>‡</sup>, N.A. TUQEER<sup>†</sup> AND M.N. SAEED

*Livestock and Dairy Development Department, Punjab-Pakistan*

<sup>†</sup>Departments of Animal Nutrition and <sup>‡</sup>Livestock Management, University of Agriculture, Faisalabad-38040, Pakistan

### ABSTRACT

This study was conducted to investigate the effect of feeding different levels of protein and energy on growth response of male buffalo calves. Twenty-seven Nili-Ravi buffalo male calves (6-9 months; 100 kg weight) were randomly assigned to nine experimental rations. Rations were formulated to test three levels each of protein and metabolisable energy {low 80%, medium 100% and high 120%; NRC (2001) for Holstein Frisian cattle}. Non-significant differences were observed in body weight gain, feed consumption and feed efficiency by buffalo male calves fed different experimental rations. Maximum body weight gain and lowest feed conversion ratio was observed in calves fed on medium Protein-high energy ration. The calves consumed 442 g of CP day<sup>-1</sup>, and 8.76 M cal of ME day<sup>-1</sup> for maximum gain of 470 g day<sup>-1</sup>. It was concluded that CP requirement for buffalo male calves is the same as recommended by NRC (2001) for Holstein Frisian cattle. However, the energy requirement of buffalo male calves is high (up to 20%) of NRC recommended level for male cattle.

**Key Words:** Protein; Energy; Buffalo calves

### INTRODUCTION

Supply of protein and energy in proper amount and proportion is important to raise buffalo male calves for breeding and beef production. However, the information available on the nutrients requirements of buffalo male calves is limited. Protein and energy are two important constituents of a ration for dairy and beef animals. Ludri and Razdan (1980) reported that dietary protein intake level of 40% less than that recommended by NRC (1976) level of crude protein (CP) showed no adverse effect on digestibility of nutrients and a positive nitrogen balance was observed. Baruah *et al.* (1988) studied the feed intake, nutrient utilization and growth in male buffalo calves fed different levels of protein and energy and reported that level of energy significantly affected the gain in body weight. They also observed that 75% protein feeding than NRC has no significant effect on growth response. Adaptation to the nutrient requirement standards recommended for cattle by National Research Council (NRC) (2001) for buffalo does not seem wise, unless proved by the research. The present study was conducted to investigate the effect of feeding different levels of protein and energy on growth response of male calves.

### MATERIALS AND METHODS

Twenty seven buffalo male calves of same age (6 to 9 month of age) and weight (Av. 100 kg) were fed nine experimental rations with three levels each of CP and metabolisable energy (ME) (low 80%, medium 100% and high 120% of NRC, 2001 standards for Holstein Friesian calves) in a 3×3 factorial arrangement of treatments. Nine

treatment combinations were low protein-low energy (A), low protein-medium energy (B), low protein-high energy (C), medium protein-low energy (E), medium protein-medium energy (F), medium protein-high energy (F), high protein-low energy (G), high protein-medium energy (H) and high protein-high energy (I). The composition of rations is given in Table I. The animals were weighed initially and thereafter fortnightly. The calves were fed *ad libitum* and orts were collected and weighed. The feed and orts samples were analyzed for dry matter (DM) and CP contents by the methods of AOAC (1990).

Data were analyzed as a completely randomized design with factorial arrangement for levels of protein and ME using the GLM procedure of SAS (1988). In case of an interaction, means were separated by Duncan's multiple range test (Steel & Torrie, 1984).

### RESULTS AND DISCUSSION

**Intake.** Daily feed consumption per calf was 2.72, 3.00, 2.88, 2.74, 2.96, 2.94, 2.34, 2.84 and 2.95 kg, respectively for ration A to I (Table II). Non-significant differences were observed in dry matter (DM) intake among the calves fed different experimental rations. These findings were in an agreement with Sengar and Joshi (1986), who reported non-significant differences in DM intake in buffalo male calves fed 96.54, 82.39 and 63.55% level of CP and 100% TDN. The calves fed rations A to I consumed 333, 361, 320, 414, 444, 442, 426, 513 and 529 g of CP each day<sup>-1</sup>, respectively (Table II). The CP consumed g kg<sup>-1</sup> metabolic body weight (W<sup>0.75</sup>) per day was 9.50, 10.14, 8.85, 12.07, 12.43, 12.00, 11.86, 14.18 and 14.87, respectively (Table II). The CP consumption

**Table I. Experimental diets**

Ingredients	Diets								
	A	B	C	D	E	F	G	H	I
Barley grains	14.00	20.00	20.00	5.00	14.00	16.00	1.00	11.00	14.00
Maize grains	9.00	11.00	16.00	7.00	13.00	20.00	1.00	10.00	12.50
Cotton Seed Meal	13.00	6.00	3.00	25.00	5.00	2.50	36.50	15.50	11.00
Soyabean Meal	2.00	10.00	11.00	1.00	20.00	23.00	1.00	20.00	25.00
Molasses	2.00	7.00	10.00	2.00	6.00	6.50	2.00	5.00	5.75
Oat hay	60.00	42.00	32.00	60.00	40.50	25.00	58.50	37.50	25.00
Oil (C.S. Oil)	—	4.00	8.00	—	1.50	7.00	—	1.00	6.75
Min. Max.		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
DM%	91.87	91.29	91.07	92.10	90.95	90.94	92.37	91.17	91.25
CP%	12.12	12.05	11.13	15.10	15.02	15.02	18.20	18.04	17.93
ME K cal./Kg	204.85	250.76	282.15	205.08	250.38	297.71	207.55	251.65	299.55

**Table II. Dry matter (DM), crude protein (CP), and metabolisable energy (ME) intake by calves**

Items	Diets								
	A	B	C	D	E	F	G	H	I
DM consumed/calf/day (Kg)	2.50	2.74	2.62	2.56	2.69	2.67	2.16	2.59	2.74
DM consumed g/Kg W <sup>0.75</sup> /day	71.34	76.94	72.41	74.61	74.12	72.51	60.14	71.59	77.02
ME consumed/calf/day (Mcal)	5.57	7.52	8.12	5.62	7.41	8.76	4.86	7.15	8.83
ME consumed KCal/kg W <sup>0.75</sup> /day.	159	211	224	164	207	238	135	198	248
CP consumed/Calf/day (g)	333	361	320	414	444	442	426	513	529
CP consumed (g/Kg W <sup>0.75</sup> /day).	9.50	10.14	8.85	12.07	12.43	12.00	11.86	14.18	14.87

**Table III. Weight gain, feed consumption and feed efficiency of calves**

Items	Diets								
	A	B	C	D	E	F	G	H	I
Av. Daily Wt. Gain (gm)	337	438	450	349	377	470	462	434	418
Av. Daily Feed Consumed (Kg)	2.72	3.00	2.88	2.74	2.96	2.94	2.34	2.84	2.95
Feed Efficiency	8.08	6.90	6.42	8.00	7.81	5.80	6.10	6.55	7.26

increased with the increase in level of CP content in the ration. Statistically non-significant differences were observed in CP intake among calves fed different rations. The ME consumed K cal kg<sup>-1</sup> of metabolic body weight per day was 159, 211, 224, 164, 207, 238, 135, 198 and 248, respectively (Table II). The ME intake increased with the increase in ME level in experimental rations.

**Weight gain.** The average daily weight gain of calves fed ration A to I was 337, 438, 450, 349, 377, 470, 462, 434 and 418 g, respectively (Table II). Statistically non-significant differences were observed in live weight gains by calves fed different experimental rations. The calves fed ration F (medium protein-high energy) gained maximum, whereas calves fed ration A (low protein-low energy) gained minimum. Generally, calves fed rations with low and medium levels of CP and high levels of energy gained more than others. These observations were in an agreement with Sengar *et al.* (1985) who reported non-significant differences in growth rate and feed efficiency in buffalo calves fed two rations with CP levels 80 and 100% and energy level 100% of NRC (1976). Rathee and Yadav (1970) reported non-significant difference in the growth rate of buffalo calves fed on different levels of CP content.

**Feed efficiency.** The feed conversion ratio was 8.08, 6.90,

6.42, 8.00, 7.81, 5.80, 6.10, 6.55 and 7.26 in calves fed rations A to I, respectively (Table III). Non-significant differences were observed among different experimental diets. Calves fed ration F gained maximum weight with least quantity of feed required/kg live weight gain. The ME requirement observed in our study was more than that suggested for cattle (NRC, 2001). This was in agreement with Sebastien *et al.* (1970) who reported that ME requirement of buffalo is more than those of cattle.

## CONCLUSION

The CP requirement of buffalo male calves is adequate that is described for cattle in NRC (2001). However, the ME requirements for buffalo male calves are greater than those suggested for cattle.

## REFERENCES

- Association of Analytical Chemists, (AOAC) 1990. *Official Methods of Analysis*, 15<sup>th</sup> ed., Arlington Virginia, USA
- Baruah, K.K., S.K. Ranjhan and N.N. Pathak, 1988. Feed intake, nutrient utilization and growth in male buffalo calves fed different levels of protein and energy. *Buffalo J.*, 22: 131–8

- Ludri, R.S. and M.N. Razdan, 1980. Efficiency of nitrogen utilization by Zebu cows and buffaloes 1. Nutrient utilization and nitrogen balance on preformed protein diets. *Trop. Agri.*, 57: 83–90
- National Research Council, (NRC) 1976. *Nutrient Requirements of Beef Cattle*, 5<sup>th</sup> ed., National Academy of Sciences, Washington D.C., USA
- National Research Council, (NRC) 2001. *Nutrient Requirements of Dairy Cattle*, 7<sup>th</sup> ed., National Academy of Sciences, Washington D.C., USA
- Rathee, C.S. and I.S. Yadav, 1970. Effect of different protein levels on the performance of Haryana calves. *Indian J. Dairy sci.*, 23: 95–9
- Sebastian, I., V.D. Mudgal and P.G. Nair, 1970. Comparative efficiency of milk production by Sahiwal cattle and Murrah buffalo. *J. Anim. Sci.*, 30: 253–6
- Sengar, S.S, D.C. Joshi and S.B. Johri, 1985. Effect of feeding different levels of protein on nutrient utilization and growth in male buffalo calves. *Indian J. Anim. Nutri.*, 2: 27–30
- Sengar, S.S. and D.C. Joshi. 1986. Effect of dietary protein levels on feed intake and nutrient utilization in adult male buffalo calves. *Indian J. Anim. Sci.*, 3: 288–91
- Statistical Analysis System, (SAS) 1988. *SAS user's guide: Statistics*, SAS Inst. Inc., Carry, NC.
- Steel, R. G. D. and J. H. Torrie, 1984. *Principles and Procedures of Statistics: A Biometrical Approach* (2<sup>nd</sup> Ed). McGraw Hill Book Co. Inc., New York, USA

(Received 01 January 2003; Accepted 10 May 2003)