

RESPONSE OF DIFFERENT LEVELS OF CRUDE PROTEIN OF TOTAL MIXED RATION ON NUTRIENT INTAKE, GROWTH RATE AND FEED EFFICIENCY IN NILI RAVI BUFFALO CALVES

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ABSTRACT: Twenty Nili Ravi buffalo male calves of 11 to 12 months of age and weighing 170-190 kg were enrolled for this study in a completely randomized design (CRD) to inspect the varying level of crude protein (CP) on nutrient intake, weight gain and feed efficiency of male buffalo calves on total mixed ration (TMR) based ration. Four experimental rations A, B, C and D were formulated containing 10, 12, 14 and 16% CP respectively while all diets contained 2.4 Kcal/kg ME. The animals were individually fed ad libitum intakes and all standard managemental standards were observed. The dry matter intake (DMI) was higher (6.81 kg) in buffalo calves fed TMR containing 12% CP (group B) followed by those fed TMR A (6.73 kg), TMR C (6.08 kg) and TMR D (5.62 kg) respectively. Daily weight gain was statistically significant ($P < 0.05$) higher (0.93 kg) in animals fed TMR B having 12% CP followed by those fed TMR A (0.86 kg), TMR C (0.85 kg) and TMR D (0.84 kg) respectively. Similarly feed efficiency (feed intake per unit gain) in animals fed TMR B (7.90 kg), TMR C (7.90 kg) and TMR D (7.91 kg). The feed efficiency was significantly lower ($P < 0.05$) as compared to group A which have significantly higher ($P < 0.05$) feed efficiency (8.49). It is thus concluded that TMR of 12% CP had good results.

Key words: Buffalo calves, Crude protein, Total Mixed Ration.

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INTRODUCTION

Buffalo is considered to be a better converter of low quality roughages (high NDF) and can produce more valuable products such as meat and milk by using it. In Pakistan inadequate feed resources and imbalance feeding practices have been identified as major cause of low production in ruminants. Animals require a balanced feed consisting of energy, protein, vitamins and minerals according to their body requirements. In Pakistan animals have to face two scarcity periods of fodder during the summer and cold winter which hamper the animal productivity and quality & type of fodder also effect the micro flora activity in the rumen which in turn decreases the digestibility of the fodder and lowers down the growth rate and production performance in buffalo.

TMR presents a best solution and to solve all above mentioned problems. It is a mixture of both the roughage and the ingredients of animal prepared feed, formulated and mixed to supply the animal's requirements. It is designed to be the single feed source given over a period for 24 hours and fed ad lib for optimum results. By eating TMR, animals receive exactly the same quality and quantity of feed day after day and no need of extra fodder/diet is required by the animals as all the requirements can be included in the TMR. A wider

variety of less palatable feeds can be utilized in the ration and it presents a better control of the animal's diet. It increases dry matter intakes (DM) and reduces the digestive upsets in the animals by minimizing pH fluctuations in the rumen. TMR can be offered to animals after the age of 6 months and after @ 3.0% of body weight. It normally contains 12% crude protein (CP), 2.32 Mcal per kg ME and 33% NDF but buffalo can perform well up to 38% NDF level. When the animal is at production level, the CP level of TMR should be increased to balance its nutritive requirement. Fresh, clean and abundant water is required when TMR is being fed to animals. It is given in 2-3 equal allowances normally. Wheat straw is used for preparation of TMR to meet the rumen fill, fiber and NDF level but corn cobs and good quality hay of berseem, lucern and oat can also be incorporated.

Feeding of buffalo calves according to nutritional requirements not only can enhance their productivity but can also twist the livestock business towards a profitable enterprise (Tipu *et al.* 2012). Most of the information used in feeding and management of buffalo is mainly taken from research data relating to dairy cattle (Ibrahim *et al.* 2001). The current project was designed to judge the exact profile of TMR for better growth of male buffalo calves

MATERIALS AND METHODS

Twenty buffalo male calves of 18 to 21 month of age and weight (Av, 180kg) were selected for this study and divided into four groups (five animals in each group) according to completely randomized design (CRD) to study the effect of varying levels of crude protein of total mixed ration on nutrient intake, growth rate and digestibility in buffalo calves. The animals were weighed initially and periodical thereafter for three proceeding months. Animals were kept on concrete floor in separated pens. Fresh and clean water was made

available round the clock for whole experimental period. Four iso – nitrogenous and iso – energetic experimental diets were formulated using NRC (1996) for energy and protein (table - 1).The control group (B) contained protein level 12%. The group A, C & D had CP level 10, 14, 16% respectively. The ME level remained same for every treatment i.e. 2.28 M cal /kg in all the groups. The animals were individually fed at ad libitum intakes. Experimental period lasted for 90 days. First 10 days were given for dietary adaptation and 80 days for sample collection. Feed offered and refusals were recorded daily and composited for analysis.

Table – 1. Ingredients and Chemical Composition (%) of Experimental Rations

Ingredients	Experimental Diets			
	A	B	C	D
Maize Broken	28	22	13	12
Wheat straw	16	18	18	18
Wheat Bran	29	23	22	14
Cotton seed cake	10	5	5	4
Maize gluten Meal 30%	0	10	20	26
Canola meal	0	2	0	3
Rape seed meal	0	5	5	5
Cane Molasses	15	15	15	15
Mineral mixture	2	2	2	2
Total	100.0	100.0	100.0	100.0
DM%	87.29			87.88
		87.52	87.72	
CP%	10.16	12.40	14.30	16.12
ME M.cal/kg	2.24	2.24	2.24	2.24
NDF%	20.08	19.48	21.75	21.08
ADF%	6.49	6.87	7.41	7.46
ADL%	2.32	2.01	2.05	2.06
Cellulose %	5.16	5.41	5.96	5.92
HC%	13.59	12.61	14.34	13.62
Ash%	8.20	8.06	7.87	7.85

Sample Collection and Chemical Analysis

The samples of experimental diets and refutations was dried at 55^o C in a forced air oven and ground to 2mm particle size through a Wiley mill. These samples was analyzed for DM, N content and ash by the methods of AOAC (1990), neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) by the methods described by Van Soest *et al.* (1991) and Metabolizable energy (M Cal/Kg was calculated by method of Wardeh(1981).

Statistical Analysis

The data obtained for each parameter (The dry matter intake, digestibility, weight gain and feed efficiency) were analyzed according to Complete Randomized Design

In case of significant ($p < 0.05$) difference among treatment means, the Duncan's Multiple Range test was applied (Steel *et al.*, 1997).

RESULTS

Dry Matter Intake

The daily dry mater intake (DMI) of groups A, B, C and D was 6.73 kg, 6.81 kg, 6.08 kg and 5.62 kg respectively. The difference was highly significant ($P < 0.0001$).The group having 16%CP consumed significantly lower dry mater intake (Table 2).

Weight Gain

The daily weight gain for groups A,B,C, and D was 0.86 kg,0.93 kg,0.85 kg and 0.84 kg respectively.

The group consuming TMR 12% CP posed significant higher ($P < 0.05$) Daily weight gain. Whereas other groups have nearly same type of daily weight gain.

Feed efficiency

The feed efficiency (feed intake per unit gain) in calves among different treatment groups was significant ($P < 0.05$). The feed efficiency of groups A, B, C and D was 8.49, 7.89, 7.90 and 7.91 respectively. The groups which expended 12% CP had better feed efficiency.

Table 2. Effects of feeding different levels of TMR on dry matter intake, weight gain and feed efficiency of buffalo calves.

Parameters	Group A	Group B	Group C	Group D	P. Value
DMI (Kg)	6.73 ^a ±1.16	6.81 ^a ±1.16	6.08 ^b ±0.87	5.62 ^c ±2.53	0.0001
Weight gain(Kg)	0.86 ^b ±0.24	0.93 ^a ±0.26	0.85 ^b ±0.24	0.84 ^b ±0.36	0.0001
Feed Efficiency	8.49 ^a ±3.10	8.15 ^a ±3.55	7.90 ^b ±3.11	7.91 ^b ±4.71	0.05

Values are mean ± standard deviation. Values within rows with varying superscripts differ significantly

DISCUSSION

Dry Matter Intake

This study is in agreement with the Jabbar (2001), Khan *et al.* (1994), Pasha *et al.* (1988) and Tipu *et al.* (2012). According to them, the dry matter intake was significantly ($P < 0.05$) improved in the TMR having 12% CP. Same was the case in our study as the dry matter intake was higher in above mentioned composition TMR. The CP 12% had positive effect on dry matter intake of buffalo calves

Weight gain

The weight gain of TMR having 12% CP was highly noteworthy ($P < 0.0001$) as compared to other treatment groups. Same effects were also demonstrated by Jabbar *et al.* (2001), Khan *et al.* (1994), Kordnejad (2004), Pasha *et al.* (1988) and Tipu *et al.* (2012). They all illustrated an equivalent trend of weight gain (0.9-1.0 kg/day) in buffalo calves fed total mixed ration (TMR) having CP around 12%. Similar results were also described by Veira *et al.* (1980) and Sivaiah and Mudgal (1982), who observed that feeding buffalo calves at 12% CP had positive effect on growth response of buffaloes. Moreover Pirmohamedi *et al.* (2004) established that the protein concentration of 12% CP was suitable for growth of Iranian male buffalo calves.

Feed efficiency

The feed efficiency among different treatment groups was significant ($P < 0.05$). The feed efficiency of groups A, B, C and D was 8.49, 7.89, 7.90 and 7.91 respectively.

The feed efficiency was better in the TMR having crude protein 12% as compared to other groups which was maintained by Jabbar *et al.* (2001), Khan *et al.* (1994), Kordnejad (2004), Pasha *et al.* (1988) and Tipu *et al.* (2012). They all demonstrated better feed efficiency in TMR having 12% CP. The feed efficiency of buffalo calves is suited to above mentioned concentration of protein as compared to other levels

Conclusion

The results of this study exposed that best crude protein level of Total Mixed Ration for male buffalo calves of one year of age is 12%.

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