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Research Article

NUTRIENT AND WATER INTAKE BY MURRAH BUFFALO CALVES UNDER DIFFERENT FEEDING REGIMES

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ABSTRACT

Sixteen Murrah buffalo calves of pre-ruminant age (20 days) were divided into four groups of four each. Animals of treatment group (T_1 and T_2) were fed individually according to 100 and 120 per cent ICAR recommended level of nutrition, respectively. The same feeding levels were repeated in calves of group T_3 and T_4, respectively but reared in group feeding system. The feed and fod der used were conventional concentrate mixture, green berseem, sorghum, mustard, sugarcane top and treated wheat straw with 4% urea. The average daily DM, CP and TDN intake per 100 kg body weight and per kg $W^{0.75}$ differed significantly due to levels of feeding, however, difference between rearing system was non-significant. Average daily voluntary feed and water intake were significantly influenced by levels of feeding.

Key words: Nutrient uptake, water intake, feeding regimes, buffalo calves

The feed intake in cattle and buffaloes is influenced by body weight, age, sex, climate, feeding pattern, physiological status, level of production, gastrointestinal factors, health and other managemental practices (Thomas *et al.*, 1969). Voluntary feed intake is the most important factor affecting the growth of young stock. Dry matter intake had positive correlation with water intake (Radadia *et al.*, 1980). Reduction in the growth efficiency of animals induced by feeding management conditions is greatly compounded by change in feed and water intake. Study of the comparative merits of feeding levels vis-à-vis individual and group feeding of pre-ruminant calves was the aim of the present investigation.

MATERIALS AND METHODS

Sixteen Murrah buffalo calves of pre-ruminant age (20 days) were divided into four groups of 4 calves in each on the basis of their age and body weight. These calves were dewormed and sprayed against external parasites and an adjustment period of 10 days was given to each animal before start of the experiment. The calves in T_1 and T_2 groups were fed individually, while calves in T_3 and T_4 groups were fed in a group. The calves in groups T_1 and T_2 were fed rations providing normal requirement i.e. 100% whereas, calves of T_3 and T_4 groups received 20% higher ration of the ICAR recommendations. Weighed quantity of whole milk (as per ICAR recommendations) up to 3 months of age was fed to the experimental calves. According to availability, a weighed quantity of green berseem, mustard, sorghum and sugarcane top was given to the calves and a fixed amount of oat silage was also fed during scarcity of green fodder to meet the desired nutrient requirement. In addition, weighed quantity of ammoniated wheat straw and untreated wheat straw were provided as basal roughage to each buffalo calves. The conventional concentrate mixture (fish meal 10 %, GNC 24.0%, wheat bran 24.0%, wheat 38.0%, mineral mixture 3.0% and common salt 1.0%) was offered to meet the nutrient requirement of these calves. The experimental feeding continued for a period of 190 days. During this period, the feed and water intake was recorded at regular interval.

Proximate analysis of feed and fodder offered was determined by AOAC (1995). The calves were given weighed amount of feed and fodder daily computed as per ICAR (1997). The

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records of daily feed offered and residue was maintained to calculate the feed and nutrient intake. A measured quantity of fresh water was offered for two consecutive days in every fortnight ad-libitum individually to each calf by placing a graduated bucket full of water three times a day (6 am, 12.30 pm and 5.30 pm) to know the voluntary water intake. Simultaneously the available water from the feed and fodder consumed by calves on a particular day was calculated on the basis of their moisture content. The total water intake was then calculated in terms of per kg dry matter consumed and per kg metabolic body size ($W^{0.75}$). The data were analyzed statistically according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

The chemical composition (DM basis) of feed and fodder fed to buffalo calves has been presented in Table 1. The crude protein content of urea treated wheat straw was enhanced from 2.73% (untreated) to 7.77% in ammoniated wheat straw.

***Nutrient uptake*:** The daily dry matter, crude protein and TDN intake under two levels of feeding and two rearing system have been presented in 'Table 2. Daily dry matter intake was significantly influenced by the feeding level. However, there was no significant difference in daily dry matter intake between two rearing systems. The percent dry matter intake and dry matter intake per kg $W^{0.75}$ did not differ significantly either by level of feeding or rearing system. The interaction due to feeding level and rearing system was not significant. Sarma (1991) and Shenu (2000) reported increased feed intake in calves fed higher level of crude protein. The results of the present study

Table 1
Average proximate composition of feeds and fodder (% DM basis) fed to experimental animals

Feed/Fodder	Dry	Crude matter	Crude protein	Ether fibre	NFE extract	Ash
Urea (ammonia) treated wheat straw	35.70	7.70	31.11	1.11	49.58	10.50
Wheat straw (untreated)	90.17	2.73	36.43	2.30	47.28	11.26
Sugarcane top + sorghum	27.40	6.74	27.35	3.45	52.17	10.29
Sorghum	28.96	7.56	27.60	3.37	50.47	11.00
Berseem + mustard	19.26	13.27	21.43	2.01	50.40	12.89
Oat silage	37.00	7.80	30.90	1.60	48.50	11.20
Concentrate mix	90.94	20.01	5.38	3.77	61.26	05.58

Table 2
Effect of levels of feeding and rearing systems on nutrient intake

Variable	Feeding levels		Rearing system	
	T1 (100%)	T2 (120%)	T3	T4
Dry matter intake (kg)				
DMI (kg/d)	1.32^{b}+0.0066	1.68^{a}+0.084	1.48+0.078	1.53+0.077
DMI/100 kg B.Wt.	2.04+0.043	2.11+0.041	2.04+0.038	2.11+0.045
DMI/kg$W^{0.75}$	0.057+0.002	0.061+0.002	0.06+0.002	0.060+0.002
Crude protein intake (g)				
CPI	229.53^{b}+6.410	324.55^{a}+11.337	276.23+10.558	277.85+10.324
CPI/100 kg B.Wt.	380.05^{b}+6.366	444.24^{a}+9.269	411.01+7.833	413.28+9.315
CPI /kg $W^{0.75}$	10.47^{b}+0.126	12.51^{a}+0.155	11.51+0.179	11.47+0.172
TDN intake (kg)				
TDNI	1.26^{b}+0.052	1.65^{a}+0.072	1.45+0.068	1.46+0.065
TDNI/ 100g B.Wt.	1.98^{b}+0.035	2.12^{a}+0.027	2.05+0.032	2.05+0.032
TDNI/kg $W^{0.75}$	0.055^{b}+0.001	0.062^{a}+0.001	0.059+0.001	0.059+0.001

Means having different superscripts differ significantly ($P<0.05$)

corroborated with the results reported by Agarwal (1984). On the contrary, Smpath *et al*. (1993) did not find significant effect on dry matter intake in buffalo calves and crossbred female calves raised on different planes of nutrition. In irrespective treatments the dry matter intake per 100 kg body weight varied from 2.04+0.043 to 2.11+0.045 kg at different age of calves. ICAR (1997) recommended 2.75 kg dry matter per 100 kg body weight for buffalo calves, which is marginally higher than results obtained in the present study.

Significant differences in daily crude protein intake and crude protein intake (CPI) per 100 kg body weight were observed, however, CPI Kg $W^{0.75}$ did not differed significantly due to feeding level. Rearing system had no effect on CPI. The interaction was found non-significant. Shenu (2000) found that daily digestible crude protein intake (DCPI) digestible crude protein per 100 kg body weight and per kg $W^{0.75}$ were statistically non significant between rearing system. On the contrary, Chakrabarti (1991) reported significant effect of housing on crude protein intake. In agreement with the findings of these authors, it can be concluded that the rearing system has no significant impact on CPI. However, the group-reared calves consumed slightly higher CPI than individually reared calves. Mudgal and Sivaiah (1982) reported that feeding of different levels of crude protein to buffalo calves has significant effect on daily CPI/100 kg body weight and per kg $W^{0.75}$. The results of present study are in agreement with these investigations. On the contrary, Sengar *et al*. (1987) did not find any significant effect on CPI due to different levels of feeding.

The level of feeding had significant ($P<0.05$) effect on daily TDN intake, TDN intake per 100 kg body weight and TDN intake per kg $W^{0.75}$. However, the rearing system had no significant effect on TDN intake. The interaction was found non-significant. Shenu (2000) reported that there was significant ($P<0.05$) difference in TDN intake and TDN intake per 100 kg body weight in cows maintained on higher level of energy (30% above NRC) feeding standard. The results obtained in the present study are in agreement with the above investigations.

***Water intake*:** Average daily voluntary water intake and total water intake by buffalo calves under different feeding regimes have been presented in Table 3. The feeding level had no significant effect on voluntary water intake per kg DMI and per kg $W^{0.75}$. The differences in voluntary water intake due to rearing system were not significant but the calves reared in group consumed 6 per cent more water as compared to calves reared individually. Chakrabarti (1991) also reported similar findings. The interaction on voluntary water intake due to level of feeding and rearing system was non-significant. Higher

Table 3
Effect of levels of feeding and rearing systems on average daily voluntary water intake and total water intake (l)

Variable	Feeding levels		Rearing system	
	T1 (100%)	T2 (120%)	T3	T4
Daily voluntary water intake	4.03^{b}+0.154	4.72^{a}+0.198	4.25+0.198	4.50+0.162
Voluntary water intake/ kg DM consume	3.39^{a}+0.129	3.10^{a}+0.120	3.16^{a}+0.130	3.34^{a}+0.121
Voluntary water intake/ kg $W^{0.75}$	0.18^{a}+0.005	0.18^{a}+0.005	0.18^{a}+0.006	0.19^{a}+0.004
Daily total water intake	4.93^{b}+0.182	5.78^{a}+0.236	5.21^{ab}+0.229	5.50^{ab}+0.199
Total water intake/ kg DM consume	4.10^{a}+0.139	3.83^{a}+0.137	3.94^{a}+0.146	3.99^{a}+0.131
Total water intake/ kg $W^{0.75}$	0.22^{a}+0.005	0.22^{a}+0.005	0.22^{a}+0.006	0.23^{a}+0.004

Means having different superscripts differ significantly ($P<0.05$)

voluntary water intake for calves offered 120% feeding levels was because of more dry matter consumption as compared to 100% feeding level calves. Sivaiah and Mudgal (1984) reported that increase in DMI is generally associated with the voluntary water intake. They also reported that high dry matter intake increase voluntary water intake in buffalo calves. These results are agreement with the present study.

The average daily total water intake, water intake /kg DM consumed and per kg $W^{0.75}$ under two feeding levels and two rearing systems have been presented in Table 3. The feeding level had no significant effect on total water intake/Kg DM consumed and per kg $W^{0.75}$. However, level of feeding had significant ($P<0.05$) effect on daily total water intake. The differences in total water due to rearing system did not differ significantly. The interaction on water intake due to level of feeding and rearing systems was not significant.

Calves fed as per ICAR recommendations consumed higher amount (4.10+0.139 litres) of water per kg dry matter consumed as compared to those calves fed at 120 per cent ICAR feeding level (3.83+0.137 litre), though the differences was not significant. There is a positive relationship between the water consumption and dry matter intake, increasing intake of dry matter is generally associated with the increased total water intake (Pandey *et al.*, 1989). Verma (1966) reported 5.11 and 6.11 litres of water as requirement for every one kg of DMI. The value observed by the above investigator is more or less similar with the present investigation. Shenu (2000) reported that rearing system and feeding level in the diet of cattle and buffalo calves do not have significant effect on water intake per kg $W^{0.75}$ and per kg dry matter consumed, which is similar to present study. Although, contrary findings was reported by Poudel (2001). The results obtained under the present study clearly showed that feed and water intake increased with increased levels of feeding.

Results obtained from the present study indicates that due to higher level of feeding, the nutrients and water intake of calves increases leading to increased growth rate during growing period which will ultimately reduce the age of first calving.

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