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Effect of managemental conditions on total digestible nutrient intake in Murrah buffalo calves in hot-humid weather

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Abstract

An experiment was conducted on 24 Murrah buffalo calves of either sex between 6 to 9 month of age at animal Farm, LUVAS, Hisar during summer season from July 15, 2015 to October 15, 2015 (90Days). Experimental calves were divided into four treatments having six animals in each treatment *viz.* Loose housing system + 100% feeding level (T1), Loose housing system + 120% feeding level (T2), Conventional barn housing system + 100% feeding level (T3) and Conventional barn housing system + 120% feeding level (T4). There was significantly higher ($p<0.05$) temperature and temperature humidity index in conventional house than loose house. The analysis of variance revealed that there was no significant difference in Total digestible nutrients intake between two housing systems. However, Total digestible nutrients intake was significantly ($P<0.05$) influenced by feeding level. Daily Total digestible nutrients intake was significantly higher in ICAR 120% level than ICAR 100% level. It may be concluded that the total digestible nutrients intake significantly influenced by the feeding level.

Keywords: Murrah buffalo calves, total digestible nutrients intake, loose housing system, conventional barn housing system and feeding level

Introduction

Buffaloes have immense agricultural importance by virtue of their high production potential through meat and milk for mankind besides being a source of sustenance to the poor and marginal farmers as well as landless labourers in the developing world. Buffalo is a triple purpose animal, being suitable for milk, meat and draught. Buffalo can efficiently utilize the roughages and crop by-products into high quality milk suitable for a wide range of dairy products. Buffaloes are better converter of poor quality fibrous feeds into milk and meat. Some workers have also demonstrated a better digestive ability of buffaloes than cattle to utilize poor quality roughage (Agarwal *et al.*, 2009) [1]. Exposure of buffaloes to the poor managemental conditions in hot-humid weather evokes a series of drastic changes in the biological functions that include depression in feed intake, efficiency and utilization, disturbances in metabolism, hormonal secretions and blood metabolites. Such changes result in impairment of reproduction and productive performances. Calf mortality also associated with the type of housing, feeding, management practices, weather conditions, external and internal parasitic infestation and bacterial infections especially those causing septicaemia and enteritis (Blood *et al.*, 1994) [3]. So, the present work was undertaken to study the effect of managemental conditions like types of housing systems and levels of feeding on total digestible nutrients intake in Murrah buffalo calves in hot-humid weather.

Materials & Methods

The experiment was conducted from 15th July 2015 to 15th October, 2015 at the Buffalo farm of Livestock Production Management Department, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar. Hisar city is situated in semi-arid region and climatic condition is sub-tropical in nature. Geographically, Hisar is situated at 29° 10' N latitude, 75° 40' E longitude and 215.2 meters altitude.

Animals and Experimental Design

Twenty four Murrah buffalo calves of either sex between 6 to 9 month of age were selected from the Old Buffalo Farm, Livestock Production Management Department, LUVAS, Hisar. These calves were divided into four groups of six calves each on the basis of nearness of their

weight. Prior to start of experiment an adjustment period of 10 days will be given to all the calves. The experiment groups were randomly allocated to one of the four treatments *viz.* Loose housing system + 100% feeding level (T1), Loose housing system + 120% feeding level (T2), Conventional barn housing system + 100% feeding level (T3) and Conventional barn housing system + 120% feeding level (T4). Feeding level were according to the ICAR recommendation.

Feeding and Watering

All the experimental calves were fed jowar during the experimental period. Wheat straw *ad libitum* and a concentrate mixture containing Barley, Ground Nut cake (GNC), Deoiled Rice Polish (DORP), Mineral mixture (MM) and Salt was prepared. The allowance of concentrate mixture was fixed in such a way that calves of T₂ and T₄ got 20 per cent higher and calves of T₁ and T₃ at normal ICAR recommendation level of concentrate per head per day. A weighted amount of Jowar was fed to all calves daily according to dry matter requirement of calves other than the dry matter present in the concentrate mixture. The Quantity of different feeds fed to each calf was adjusted at fortnightly intervals in order to meet the requirement of the calves with the change in their body weight. Animals were given *ad lib* fresh water throughout the experimental period. Before formulation of rations, the feed ingredients were analyzed (AOAC, 2005) [2] for proximate composition (Table 1). Based upon the proximate composition of feed ingredients, the ration for the different experimental groups of animals was formulated. The composition of the experimental diet of different treatment groups and proximate chemical composition is presented in (Table 2.).

Observations

Chemical analysis of feed ingredients for proximate principles

Analysis of chemical constituents of feed ingredients was done in the laboratory. All parameters like Total moisture, Crude proteins, Crude fibers, Total Ash and Ether extract were analyzed accurately by laboratory methods.

Feed Intake

Amount of feed and water intake was measured in 3 consecutive days in a fortnight. In every fortnight to determine feed intake the buffalo calves were given weighted quantity of feed and fodder as per their requirements. The feed intake during the experimental period was determined on the basis of feed and fodder offered and left over for three consecutive days in a fortnight.

Digestion Trial

A digestion trial of 5 days collection period was conducted at the end of the experiment to know the effect of treatment on

digestibility of feed and fodder. During the collection period of the trial, all the dung voided by the individual calf was collected manually in separate labelled plastic buckets provided with lids. The dried dung of individual calf was pooled for 5 days, milled and stored in plastic bag for proximate analysis except for crude protein, which was analyzed by wet dung sample preserved in 40 per cent sulphuric acid in plastic bottles. Representative sample of concentrate mixture, Jowar, Wheat straw and left over feed were also taken daily during the trial and dried in hot air oven for determining dry matter content. The five days dried samples for feed and fodder were pooled, milled and stored for proximate analysis. The feed, fodder and dung samples were analyzed for proximate analysis according to AOAC (2005) [2].

Statistical Analysis

The experiment data was planned and analyzed as per Snedecor and Cochran, 1999.

Results and Discussion

Total digestible nutrients intake

The average daily Total digestible nutrients intake, Total digestible nutrients intake per 100 kg body weight and Total digestible nutrients intake per kg metabolic body size under different treatments and two housing systems and two level of feeding have been presented in Table 3 and 4. The average daily Total digestible nutrients intake and Total digestible nutrients intake per 100 kg body weight were 3.295±0.001, 3.696±0.001, 3.296±0.001 and 3.585±0.001, and 2.368±0.169, 2.665±0.154, 2.487±0.1272 and 2.629±0.152 kg in treatments T₁, T₂, T₃ and T₄ Respectively. The corresponding values per kg metabolic body size ($W^{0.75}$) were 80.971±4.317, 91.072±3.940, 84.160±3.215 and 89.549±3.858 gm in T₁, T₂, T₃ and T₄ Respectively. The average daily Total digestible nutrients intake and Total digestible nutrients intake per 100 kg body weight were 3.496±0.001, 3.496±0.001, 3.295±0.001 and 3.641±0.001, and 2.516±0.151, 2.558±0.129, 2.428±0.116 and 2.647±0.130 kg in loose house, Conventional barn, ICAR 100% and ICAR 120% respectively. The corresponding values per kg metabolic body size ($W^{0.75}$) were 86.022±3.846, 86.855±3.256, 82.566±2.920 and 90.311±3.305 gm in loose house, Conventional barn, ICAR 100% and ICAR 120% respectively. The analysis of variance revealed that there was no significant different in Total digestible nutrients intake between two housing systems. However, Total digestible nutrients intake was significantly ($P<0.05$) influenced by feeding level. The daily Total digestible nutrients intake/100kg body weight and Total digestible nutrients intake per kg metabolic body size was non-significant. Daily Total digestible nutrients intake was significantly higher in ICAR 120% level than ICAR 100% level.

Table 1: Chemical analysis of feed ingredient (on DM basis)

Ingredients	DM%	OM%	CP%	CF%	EE%	ASH%	NDF%	ADF%	NFE%
Barley	92.06	89.71	10.5	7.02	3.5	2.3	24.23	8.71	76.7
GNC	92.72	85.74	39.16	8.12	8.31	7.1	23.07	10.12	37.54
DORP	90.07	83.61	14.5	13.09	2.1	6.41	49.23	16.13	64.1
Sorghum	25	14.32	7.45	27.01	3.4	10.73	64.87	37.84	51.45
Wheat Straw	90	78	2.81	35	1.05	12.16	74.83	51.9	49.14

Table 2: Ingredients of concentrate mixture (kg) and its chemical composition (on DM basis).

Ingredients	Quantity in kg	DM%	OM%	CP%	CF%	EE%	ASH%	NDF%	ADF%	NFE%
Barley	40	36.8	35.88	4.2	2.8	1.4	0.92	9.692	3.484	30.68
GNC	30	27.81	25.71	11.748	2.4	2.49	2.1	6.921	3.036	11.262
DORP	27	24.3	22.572	3.915	3.51	0.54	1.728	13.2921	4.3551	17.307
Whole Conc.	100	88.91	84.162	19.863	8.71	4.43	4.748	29.9051	10.8751	59.249

Whole concentrate mixture also contain 2 kg Mineral mixture (MM) and 1kg Salt.

Table 3: Average daily Total digestible nutrients (TDN) intake of buffalo calves under different treatments.

Treatments	Daily TDN intake (kg)	TDN intake/100kg body weight (kg)	TDN intake/kg W ^{0.75} (gm)
T ₁	3.295±0.001	2.368±0.169	80.971±4.317
T ₂	3.696±0.001	2.665±0.154	91.072±3.940
T ₃	3.296±0.001	2.487±0.127	84.160±3.215
T ₄	3.585±0.001	2.629±0.152	89.549±3.858

Table 4: Effect of Housing System and level of feeding on average daily Total digestible nutrients (TDN) intake (kg) by buffalo calves.

Variable	Housing systems		Feeding levels	
	Loose house	Conventional barn	ICAR 100%	ICAR 120%
Daily TDN intake (kg)	3.496 ^c ±0.001	3.496 ^c ±0.001	3.295 ^a ±0.001	3.641 ^b ±0.001
TDN intake/100kg body weight (kg)	2.516±0.151	2.558±0.129	2.428±0.116	2.647±0.130
TDN intake/kg W ^{0.75} (gm)	86.022±3.846	86.855±3.256	82.566±2.920	90.311±3.305

Means in Rows with different superscripts differ significantly ($P < 0.05$)

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