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Original Research

Effect of Dietary Incorporation of Badri Cow Urine on Growth and Well Being of Growing Badri Heifers Reared in Group

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Abstract

Present study was conducted to study the effect of feeding concentrate feed potentiated with Badri cows' urine on morphometric traits and well-being parameters of 31 growing Badri heifers for a period of 60 days. The animals were divided into control and treatment groups and then subdivided as per two age groups i.e., 6-12 and 13-18 months. Freshly mixed concentrate feed with urine @200 ml urine/ kg of feed was offered to the animals of treatment group once daily whereas equal quantity saline was incorporated in concentrate feed of control group animals. Overall, least-squares means of morphometric traits were 82.15±0.61 cm (body length), 81.40±0.55 cm (height at withers), 95.96±0.51 cm (chest girth), 118.33±1.00 cm (paunch girth) and 74.85±1.05 kg (estimated body weight). A majority of animals in control and treatment group animals had pink Conjunctival Mucus Membrane (CMM) and were found 'standing plus ruminating' in the beginning and at the end of the experiment. Overall, least-squares means for Body Condition Score was 3.70 ±0.07 and Tail Fold Thickness was 7.11±0.22 mm. However, no significant changes were seen in morphometric traits and wellbeing parameters at the end of the study. There was an overall improvement in the total feed (fodder and concentrate) intake from 12.73 to 13.01 kg/ animal/ day and reduction in left-over from 0.56 to 0.41 kg/ animal/ day during the study. Thus, it may be concluded that the urine potentiated feed was palatable to growing Badri cattle and it could improve growth if fed for longer periods.

Keywords: Badri Cattle, Concentrate Feed, Conjunctival Mucus Membrane, Morphometric Traits, Tail-Fold Thickness, Urine

Introduction

Badri cattle are short-heighted small-sized cattle breed with an average body weight of 200-250 kg, found in hilly areas of Uttarakhand (NBAGR, 2017). This breed is very energetic and vigorous characterized by black or brown hooves and muzzle, prominent hump, small udder and low milk yield, about 1 kg/ day (Chandran *et al.*, 2012). Its small straight legs, small and hard foot pad help the animal to climb hilly terrain. Badri cattle are reared by the villagers mainly for bullock power, milk and manure (Patoo *et al.*, 2016). One cattle breeding centre for conservation of germplasm of Badri has been established at Nariyal village in district Champawat (Uttarakhand) since 2012 with a herd size of about 150 breedable females. Despite being maintained at zero input system, Badri cattle contribute significantly to the economy of the state by providing draught power, milk and manure (Pundir *et al.*, 2010). Ayurveda states vast potentialities of indigenous cow urine as a human medicine (Chauhan and Prasad, 2004). Cow urine is complex animal excreta containing a variety of minerals, metabolites, phenols and heterocyclic bases along with enzymes and steroids. These biologically active compounds may be exploited in the form of appropriate formulations for pharmaceutical or therapeutic applications in man and animals and for pest control in agriculture (Dash and Kashyap, 1980). Information on Badri cattle is scanty in literature but its importance in the development of Uttarakhand is immense. Cattle urine has been explored much for its curative action and much is needed to be explored for Badri cattle. Hence, the present study was conducted to assess the effect of Badri cows' urine on growth and well-being parameters of growing Badri cattle.

Materials and Methods

Present investigation was undertaken to study the effect of feeding concentrate feed potentiated with Badri cow urine on the performance of growing female Badri cattle under farm condition of Uttarakhand from January, 2018 to March, 2018 at Beni unit of Instructional Dairy Farm Nagla, College of Veterinary and Animal Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.

Experimental Design

Experimental work was conducted on female Badri heifers of 6 to 18 months of age maintained under loose housing and group management system. The selected animals were grouped into control and treatment groups, ensuring that the average body weight of both the groups was similar. These two groups were further divided into 2 sub-groups on the basis of the age of the animals i.e. from 6-12 months and 13-18 months, respectively. Nutritional requirements of animals were met through a balanced combination of dry and green fodder with concentrate mixture supplementation, as per standard routine practice of the farm. Green fodder offered to the cattle included a mixture of Berseem, Chari and Maize fed at the rate of about 10 kg per animal daily (total of about 310 Kg for 31 animals daily). Mixture of hay and wheat straw was fed at the rate of about 2 kg per animal daily (total of about 62 Kg for 31 animals daily) as dry fodder. Concentrate feed was fed in a manner as mentioned in Table 1. All the selected animals were dewormed 10 days prior to the beginning of experiment using Fenbendazole (Fentas®, Intas pharmaceuticals Ltd.) at the dose rate of 5 mg/ kg body weight, single dose orally.

Table 1: Experimental design

Groups	Control		Treatment	
Regimen	Concentrate feed mixed with normal saline @ 200 ml/ kg		Concentrate feed mixed with Badri cow urine @ 200 ml/ kg	
Sub groups	C1: n=7	C2: n=8	T1: n=7	T2: n=9
	6-12 months	13-18 months	6-12 months	13-18 months
Total Amount of feed offered(kg)	15.96	20.16	16.17	19.98

Concentrate feed was potentiated with the urine @ 200 ml urine/ kg of concentrate feed and offered to animals of both the age-groups (6-12 months and 13-18 months) of treatment group for a period of 60 days, at 9 AM every day. In control group, concentrate feed was incorporated with normal saline at the same rate and offered to the animals of both the age-groups (6-12 months and 13-18 months) for the same period (Table 1). Urine and normal saline were added in respective concentrate feed afresh daily just prior to their offering.

Feed Intake and Left-Over

The total feed (both fodder and concentrate feed) offered along with the feed left in the manger by the cattle of both control and treatment groups were measured for three consecutive days in the beginning and at the end of the experiment. Averages of these readings were taken to arrive at feed intake and left over.

i. Total feed intake/animal/day in a group = $\frac{\text{weight of total feed offered in the group- weight of left-over feed}}{\text{total number of heifers in the group}}$

ii. Left-over/ animal /day in a group = $\frac{\text{weight of left-over feed in the group}}{\text{total number of heifers in the group}}$

Body Morphometric Traits

These included body length (BL), chest girth (CG), height at withers (HAW), paunch girth (PG) and tail-fold thickness (TFT) and were measured on 0 day and 60th day of the experiment in all animals using a measuring tape at 9 AM. Estimated body weight (EBW) was arrived at using Shaffer's formula (Patoo *et al.,* 2016). Tail fold thickness was measured as the average thickness of the skin folds on each side between pin bone and dock after raising the tail, using a standard Vernier caliper (reading error 0.05 mm).

Parameters of Well-Being

These included *viz.* colour of Conjunctival Mucus Membrane (CMM), Body Condition Score (BCS), Activity Score (AS) and Tail Fold Thickness (TFT) were measured on 0^{th} day and 60^{th} day of the experiment in all animals at 9 AM. CMM was examined and its colouration was recorded as whitish, pale, pink, red or brick red. BCS was sensorialy observed at 7 distinct body check points, *viz.* loin (spinous process and transverse process), pin bone, hook bone, rump, tail head ligament and sacral ligament and 1 to 5 score was given (Arik, 2011). As included normal agility of the animals (standing or sitting before the arrival of the observer and animals standing on seeing the observer) and it was observed for each animal once daily for 3 consecutive days, at 3 pm, at the beginning and at the end of the experiment. The data obtained in the present study were analyzed statistically and subjected to test of significance (Snedecor and Cochran, 1994) and least-squares analysis of variance (Gupta, 2010).

Plate 1: Experimental growing Badri cattle grouped as control group

Plate 2: Experimental growing Badri cattle grouped as treatment group

Plate 3: Concentrate feed for potentiation with Badri cow urine

Results and Discussion

Body Morphometric Traits

Body morphometric traits as per overall least-squares means of the experimental animals were 82.15±0.61 cm body length (BL), 81.40±0.55 cm height at withers (HAW), 95.96±0.51 cm chest girth (CG), 118.33±1.00 cm paunch girth (PG) and 74.85±1.05 kg estimated body weight (EBW). A highly significant difference existed between Badri cattle of both the age groups in BL (73.47±0.90 *vs.* 90.83±0.82 cm), HAW (76.64±0.82 *vs.* 86.15±0.74 cm), CG (90.20±0.76 *vs.* 101.73±0.69), PG (108.84±1.48*vs.* 127.83±1.34 cm) and EBW (58.24±1.55 *vs.* 91.45±1.41 kg), which was obvious due to age difference between the animal groups (Table 2).

Table 2: Least-squares means of morphological traits of growing Badri cattle

Effects		Obs.	BL (cm)	HAW (cm)	CG (cm)	PG (cm)	EBW (kg)
Age group	G1	28	73.47^{A}±0.90	76.64^{A}±0.82	90.20^{A}±0.76	108.84^{A}±1.48	58.24^{A}±1.55
	G2	34	90.83^{B}±0.82	86.15^{B}±0.74	101.73^{B}±0.69	127.83^{B}±1.34	91.45^{B}±1.41
Treatment	T1	30	82.92±0.87	81.69±0.79	95.75±0.73	118.50±1.43	75.60±1.50
	T2	32	81.38±0.85	81.11±0.77	96.17±0.72	118.16±1.39	74.10±1.46
Interaction	G1 x T1	14	73.00^{a}±1.27	76.25±1.16	89.07±1.07	105.16^{A}±2.09	56.65^{a}±2.19
	G1 x T2	14	73.94^{a}±1.27	77.03±1.16	91.32±1.07	112.51^{A}±2.09	59.83^{a}±2.19
	G2 x T1	16	92.83^{b}±1.19	87.13±1.08	102.43±1.00	131.84^{B}±1.95	94.55^{b}±2.05
	G2 x T2	18	88.82^{b}±1.12	85.18±1.02	101.02±0.95	123.82^{B}±1.84	88.36^{b}±1.93
Overall		**62**	**82.15±0.61**	**81.40±0.55**	**95.96±0.51**	**118.33±1.00**	**74.85±1.05**

Values bearing different superscripts in the same column differ significantly (P<0.05; P<0.01).
G1: All animals between 6-12 months age.
G2: All animals between 12-18 months age.
T1: All animals in control group.
T2: All animals in treatment group.
G1 T1: all the animals of control group between 6-12 months age.
G1 T2: all the animals of treatment group between 6-12 months age.
G2 T1: all the animals of control group between 12-18 months age.
G2 T2: all the animals of treatment group between 12-18 months age.

However, no significant difference was seen in all the morphological parameters of the animals in control and treatment groups of similar ages, probably due to shorter experimental period. The inter-group significant variation due to interaction was observed for BL, PG and EBW which was obvious again due to age differences between the two groups. However, there was no significant variation due to treatment in these traits within the groups. The results were in agreement with the work on Badri cattle (Pundir *et al.*, 2010), Red Purnia cattle (Bruce, 1990) and in the

Hill cattle of Himachal Pradesh (Dhiman, 2006). Estimated body weight (EBW) of the Badri cattle of Uttarakhand was found to be higher in present study than that reported by other researchers (Pundir *et al.,* 2013).

Well-Being Parameters

Majority of animals in control group had pink Conjunctival Mucus Membrane (CMM) to the magnitude of 86.67% and 93.33% in the beginning and at the end of the experiment, respectively. Similarly, majority of animals in treatment group had pink CMM in the beginning (81.25%) and at the end of the experiment (81.25%). Rest of the animals had pale CMM (Table 3). The increase in the percentage of animals with pink CMM in the treatment group may be attributed to total solids and total proteins in Badri cow urine as reported by Patoo *et al.* (2016).

Table 3: Qualitative analysis of colour of conjunctival mucus membrane in growing Badri cattle

Colour Type	At the Beginning of Study				At the End of Study			
	C1 (n=7)	T1 (n=7)	C2 (n=8)	T2 (n=9)	C1 (n=7)	T1 (n=7)	C2 (n=8)	T2 (n=9)
Pale (%)	14.29	28.57	12.5	11.11	14.29	14.29	-	22.22
Pink (%)	85.71	71.43	87.5	88.89	85.71	85.71	100	77.78
Overall	**Control (C1 + C2)**		**Treatment** (T1 + T2)		**Control (C1 + C2)**		**Treatment** (T1 + T2)	
Pale (%)	13.33		18.75		6.67		18.75	
Pink (%)	86.67		81.25		93.33		81.25	

Activity score revealed that in control group, in the beginning and at the end of the experiment, majority of animals were found 'standing plus ruminating' at the time of recording the observation with an activity score to the magnitude of 71% and 57%, respectively. For treatment group, in the beginning and at the end of the experiment, majority of animals were observed to be 'standing plus ruminating' to the magnitude of 87% and 78%, respectively. For the younger animal group (6-12 months), the percentage of animals that were 'standing plus ruminating' were found to increase significantly from 42.8% to 87.5% due to treatment (Table 4).This increase in the percentage of animals of younger age-group undergoing treatment may be attributed to total solids and total proteins in Badri cow urine as reported by Patoo *et al.* (2016).

Table 4: Analysis of activity score (AS) of growing Badri cattle

Scoring Parameters	Beginning of Study				End of Study			
	C1 (n=7)	T1 (n=7)	C2 (n=8)	T2 (n=9)	C1 (n=7)	T1 (n=7)	C2 (n=8)	T2 (n=9)
Animals taking rest plus ruminating (%)	14.29	14.29	-	-	-	-	-	-
Animals standing (%)	28.57	42.8	12.5	33.33	14.29	12.5	28.57	11.11
Animals standing plus ruminating (%)	57.14	42.8	87.5	66.67	85.71	87.5	71.43	88.89
Average	**Control (C1 + C2)**		**Treatment** (T1 + T2)		**Control (C1 + C2)**		**Treatment** (T1 + T2)	
Animals taking rest plus ruminating (%)	7.14		-		7.14		-	
Animals standing (%)	21.43		12.5		35.71		22.22	
Animals standing plus ruminating (%)	71.43		87.5		57.14		77.78	

Overall least-squares mean of the experimental animals for BCS was 3.70±0.07 and for TFT was 7.11±0.22 mm. No significant difference was seen in BCS between the animals of both the age-groups (3.57±0.10 *vs.* 3.83±0.09). However, TFT showed significant ($P<0.01$) difference between the animals of both the age-groups (5.14±0.33 *vs.* 9.07±0.30 mm). The increase in TFT of older age-group animals undergoing treatment may be attributed to total solids and total proteins in Badri cow urine as reported by Patoo *et al.* (2016). BCS and TFT remained unaffected due to treatment and interaction effects (Table 5).

As a conclusion, no significant difference was seen in well-being parameters between control and treatment groups, probably due to shorter experimental period. The inter-group significant variation due to interaction in tail fold

thickness was seen mainly due to age differences between the two groups. This indicated that feeding urine-treated concentrate feed for 60 days had no adverse effects on well-being traits of growing Badri cattle.

Table 5: Least-squares means of well-being parameters of growing Badri cattle

Effects		Obs.	BCS (1-5)	TFT (mm)
Age group	G1	28	3.57±0.10	5.14^{A}±0.33
	G2	34	3.83±0.09	9.07^{B}±0.30
Treatment	T1	30	3.76±0.09	5.43^{A}±0.32
	T2	32	3.64±0.09	8.79^{B}±0.31
Interaction	G1 x T1	14	3.64±0.14	5.13^{A}±0.46
	G1 x T2	14	3.50±0.14	5.16^{A}±0.46
	G2 x T1	16	3.88±0.13	5.73^{A}±0.43
	G2 x T2	18	3.78±0.12	12.42^{B}±0.41
Overall		**62**	**3.70±0.07**	**7.11±0.22**

Values bearing different superscripts in the same column differ significantly (P<0.05; P<0.01).
G1: All animals between 6-12 months age.
G2: All animals between 13-18 months age.
T1: All animals in control group.
T2: All animals in treatment group.
G1 T1: all the animals of control group between 6-12 months age.
G1 T2: all the animals of treatment group between 6-12 months age.
G2 T1: all the animals of control group between 13-18 months age.
G2 T2: all the animals of treatment group between 13-18 months age

Feed Intake and Left-Over

An improvement in the total feed (fodder and concentrate) intake from 12.73 to 13.01 kg/ animal/ day and reduction in left-over feed from 0.56 to 0.41 kg/ animal/ day was observed (Table 6). This showed that the experimental cattle gradually developed liking for the urine potentiated feed and thus, such feed was found palatable to the cattle.

Table 6: Analysis of feed intake and left-over of fodder and concentrate feed by growing Badri cattle per day

Consumption/ Left-over	At the Beginning				At the End			
	C1	**T1**	**C2**	**T2**	**C1**	**T1**	**C2**	**T2**
Consumption								
(i) Fodder(kg/ animal/ day)	6.11	6.17	6.53	5.87	6.17	6.3	6.6	5.99
(ii) Feed (kg/ animal/ day)	0.33	0.35	0.36	0.34	0.35	0.37	0.38	0.35
Total (kg/ animal/ day)	**6.44**	**6.52**	**6.89**	**6.21**	**6.52**	**6.67**	**6.98**	**6.34**
Left-Over								
(i) Fodder(kg/ animal/ day)	0.32	0.26	0.34	0.24	0.26	0.19	0.28	0.18
(ii) Feed (kg/ animal/ day)	0.05	0.03	0.06	0.03	0.03	0.02	0.04	0.02
Total (kg/ animal/ day)	**0.37**	**0.29**	**0.40**	**0.27**	**0.29**	**0.21**	**0.32**	**0.20**

Overall	**At the Beginning**		**At the End**	
	Control (C1 + C2)	**Treatment** (T1 + T2)	**Control** (C1 + C2)	**Treatment** (T1 + T2)
Consumption (kg/ animal/ day)	**13.33**	**12.73**	**13.5**	**13.01**
Left-over (kg/ animal/ day)	**0.77**	**0.56**	**0.61**	**0.41**

Conclusion

Based upon the observations, it may be said that the urine-potentiated feed showed a slight positive non-significant improvement in the performance of growing Badri cattle during the period of 60 days and it could have led to more promising results if the experiment would have been continued for a longer period. Further, the potentiating dose rate of urine in feed could be standardized in future experiments.

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Conflict of Interests

There is no conflict of interest.

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