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GROWTH PERFORMANCE AND FEED INTAKE OF BUFFALO CALF UNDER DIFFERENT SHADE MATERIALS DURING WINTER SEASON

R.S.D. Barman[1]*, M.K. Chaudhary, R.K. Verma[2] and D.K. Jha[3]

Department of Livestock Production Management,

[1]Bihar Veterinary College, Patna-800014, (Bihar Agricultural University, Bhagalpur)

[2]Assistant Professor, Deptt. of Vet. Physiology, Ranchi Veterinary College, Ranchi- 834006

[3]Scientist B, Deptt. of Animal House, RMRIMS, Agamkuan, Patna- 800007

E-mail: barman.ravi@rediffmail.com (**Corresponding Author*)

Abstract: The present study was carried out during winter season for a period of 120 days to see the effect of different shade materials on the performance of twenty four buffalo calf. Twenty four buffalo calves after colostrum feeding were selected for study and divided into 4 groups (6 calves in each group). The different groups of calves were studied under different roof materials as followed: Asbestos roof (T1), Pre painted CGI Sheet roof (T2), Thatch with polythene shading roof (T3): Galvanized iron sheet roof (T4). The overall body height changes were 6.53±1.86, 3.33±0.76, 11.00±3.59 and 7.00±1.48, the body length changes were 6.00±2.45, 5.16±3.99, 9.33±2.98 and 6.83±2.26, the heart girth changes were 9.84±4.94, 8.50±4.86, 9.84±1.62 and 9.83±3.78 and pouch girth changes were 8.34±5.16, 8.34±2.75, 16.67±4.25 and 5.67±3.70 cm for T1, T2, T3 and T4, respectively. All the body measurement showed an increasing trend with advancement of age and increase in body weight. The overall changes viz., body height, body length, heart girth and pouch girth was higher in T3 as compared to other shade materials. DMI of concentrate feed was significantly higher ($P<0.05$) in T1 (1.44±0.04 kg) followed by T3 (0.83±0.01 kg) and minimum ($P<0.05$) in T4 (0.57±0.02 kg). However, the DMI of green fodder did not differ significantly among between the groups throughout the fortnights. Whereas, the DMI of dry fodder was least ($P<0.05$) in T4 (0.59±0.02 Kg) as compared to T1 (0.99±0.09 Kg) and T3 (0.78±0.02 Kg). Overall DMI/individual was significantly ($P<0.05$) lower in T4 than T2, T3 and T1.

Keywords: Body measurements, Growth, Heart girth, Different shade materials.

Introduction

As per as Animal Husbandry and Dairy sector is concern, calves form the future dairy herd [8]. Production and reproduction status of any herd largely depends on growth and vigour of calves. Overall dairy farm profit can be maximized by reducing calf mortality, better managemental practices and supplementation of the good nutrients and feed additives. Among the various managemental factors involved in optimum growth and production, an adequate diet containing essential nutrients is required [3]. As a result of fast growing trend

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of restricting the amount of milk or milk replacer during the first few weeks of life in an effort to encourage solid feed intake and allow early weaning, the concept of accelerated growth programmes, accelerated early nutrition, intensified nutrition has been practiced by replacing the whole milk with skimmed milk and calf starter along with supplementation. Calf feed supplemented with various preparations of mineral mixture, vitamins, probiotics etc. These are not only costly but also adulterated. So there has been need to provide good herbal replacement of these preparations so that farmer can grow it even in kitchen garden.

The performance of any domestic species including buffalo depends on the influence of heredity and environmental factors. Keeping aside the genetic make-up of the individual management practices play an important role for improving the overall performance of animal to a great extent. The main aim of better management of heifer is to obtain optimum growth rate, efficient feed conversion efficiency as per their genetic potential thereby to attain early maturity weight and subsequently reduce the age at first calving which has direct effect on the life time production performance of animals.

Growth is a complex phenomenon and is difficult to define in simple terms. Growth is taken as increase in body weight. However, an animal can show skeletal growth without putting water or fat from the body. So combinations of body weight and body measurements were applied. In this study gain in body weight and size (length, height, heart girth and pouch girth were used as measurements of growth. The winter climate in North – east region of the country is quite harsh due to low ambient temperature (1-2ºC) which causes high mortality and low growth rate in buffalo calves leading to great economic loss. It is, therefore essential to protect the buffalo calves from cold to obtain optimum growth as per their genetic potential.

Materials & Methods

The present study was conducted during winter season for a period of 120 days (November to February). Twenty four buffalo calves after colostrum feeding were selected for study and divided into 4 groups (6 calves in each group). *Each season taken new calf of similar age group.* The different groups of calves were studied under different roof materials as followed: Asbestos roof (T1): commercially available asbestos was used. Pre painted CGI Sheet roof (T2): commercially available pre painted CGI sheet having thickness 0.13 mm to 0.5mm, Zinc coated -60gram/m^2-120gram/m^2 which is durable, anti corrosive and excellent water proof. Thatch with polythene shading roof (T3): four inch thick layer of paddy straw fixed to

bamboo frame. Galvanized iron sheet roof (T4): commercially available in the market without painted.

The calves were weighed individually before feeding and watering in the morning at fortnightly interval (15 days interval). Along with the recording of fortnightly body weight, the body measurement viz., height at withers, body length, heart girth and pouch girth were also taken with the help of measuring tape on centimeters scale (cm) at fortnightly interval for each buffalo calf. Body measurement was taken when the buffalo calves are standing in a normal body posture. Body weight of each calf was recorded at fortnightly intervals during the experimental period. Weighing was always recorded around 8.00 AM. The weighing of calves were done by hanging balance with capacity of weighing up to 100 kg (the minimum graduation being 0.001 kg). The rate of growth was calculated as follows: Body Weight Gain (kg) = Body weight at the end of experiment (kg) - Body weight at beginning of experiment (kg) . The feed intake data was taken daily and total dry matter intake was estimated at the end of week. Concentrate, dry fodder and green fodder were offered to the animals individually in separate pens. Weighed quantity of fodder and concentrate were given to the animal and residue were collected and weighed separately. Dry Matter Intake (DMI) from all feed sources were calculated separately and then all added to find out the total dry matter intake of calves for each treatment group.

The data obtained from the studies were compared by analysis of variance (ANOVA) as per the methods described [7].

Results and Discussion

The performance of the animals is said to be impaired on exposing them to extremes of climatic condition. Environmental conditions especially shelter management also affect the 24 hour behavior in dairy animals in a varying range, which could be used to study the effectiveness of roofing material in a particular agro-climatic region. So there is need to study the effect of growth performance under different shade material of buffalo calves.

Growth performance

Body weight gain of buffalo calves during winter season

The fortnightly body weight gain of calves in all the four groups are presented in table 1. The Initial body weight was 95.50±4.71, 43.00±2.31, 50.17±4.08 and 40.22±2.01kg in T1, T2, T3 and T4, respectively. The fortnightly body weight of calves increased steadily and reached the final body weight and found maximum increased body weight in T3. There was no significant difference in increase body weight but slightly higher body weight changes in

T3 grouped calves might be due more comfortable conditions under shade which facilitate the growth of calves irrespective of low minimum ambient temperature during experimental period. The present findings are agreement with earlier reports [1, 4].

Body measurement in winter season

All the body measurement such as body height, body length, heart girth and pouch girth of buffalo calves are presented in Table 2. The overall body height changes were 6.53±1.86, 3.33±0.76, 11.00±3.59 and 7.00±1.48, the body length changes were 6.00±2.45, 5.16±3.99, 9.33±2.98 and 6.83±2.26, the heart girth changes were 9.84±4.94, 8.50±4.86, 9.84±1.62 and 9.83±3.78 and pouch girth changes were 8.34±5.16, 8.34±2.75, 16.67±4.25 and 5.67±3.70 cm for T1, T2, T3 and T4, respectively. All the body measurement showed an increasing trend with advancement of age and increase in body weight. The overall changes viz., body height, body length, heart girth and pouch girth was higher in T3 as compared to other shade materials. The present findings are similar to those of reported by others [1, 4].

Average daily weight gain (kg) in winter season

The fortnightly average daily body weight gains of calves in winter season are presented in Table 3. The average daily gain for T1, T2, T3 and T4 was 0.21±0.02, 0.18±0.02, 0.34±0.03 and 0.13±0.01 kg, respectively during the experimental period. The table revealed that there was maximum average weight gain by group T3 followed by T1, T2 and least in T4. [8] Observed that covering the roof with a thatch materials proved beneficial and resulted significantly ($P<0.01$) higher body weight gains over tin roofing. The present findings are also supported by others [6, 9].

Feed intake

Dry matter intake (DMI) (kg/day) of buffalo calves in winter season

Fortnightly dry DMI from different source viz. concentrate, dry fodder and green fodder from all sources in different treatment groups are presented in table 3, 4 and 5. The table revealed that the DMI of concentrate feed was significantly higher ($P<0.05$) in T1 (1.44±0.04 kg) followed by T3 (0.83±0.01 kg) and minimum ($P<0.05$) in T4 (0.57±0.02 kg). However, the DMI of green fodder did not differ significantly among between the groups throughout the fortnights. Whereas, the DMI of dry fodder was least ($P<0.05$) in T4 (0.59±0.02 Kg) as compared to T1 (0.99±0.09 Kg) and T3 (0.78±0.02 Kg). Overall DMI/individual was significantly ($P<0.05$) lower in T4 than T2, T3 and T1. Higher DMI in T1 and T3 group calves as compared to T2 and T4 might be due to better physical environment as evident from higher minimum temperature and low THI under the respective shade material. [2] reported

higher feed intake by cow kept under RCC (12.96±0.15 kg/animal/day) followed by thatch (11.74±0.19 kg/animal/day) and roof over tree shelter (9.88 ±0.14 kg/animal/day).

Conclusion

The body measurement viz. changes of body height, body length and pouch girth were more in T3 as compared to other group whereas, pouch girth was similar in T1 and T3.

Dry matter as concentrate (1.44±0.04) and dry fodder (0.99±0.09) were significantly higher ($P<0.05$) in T1 as compared to other group. Whereas water intake (63.52±1.62 L/day) was significantly lower ($P<0.05$) in T3 as compared to other groups. ADG were found to be maximum in T3 group (0.34±0.03 kg) followed by T1 (0.21±0.02 kg) as compared to T2 (0.18±0.02 kg) and T4 (0.13±0.01 kg).

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Table 1: Mean± SE of fortnightly body weight changes of buffalo calves during winter season

Fort nights	Asbestos (T1)	PPGCI roof (T2)	Thatch roof (T3)	GI sheet roof (T4))
I	95.50±4.71	43.00±2.31	50.17±4.08	40.42±2.01
II	98.83±4.08	46.33±2.39	56.50±4.27	42.35±2.19
III	102.00±4.08	50.17±5.19	60.17±4.22	43.83±2.28
IV	104.33±4.34	52.33±4.93	64.83±4.12	45.33±2.32
V	108.17±4.01	54.83±4.78	68.50±3.94	47.00±2.51
VI	111.33±4.05	57.00±5.07	73.50±4.91	49.00±2.54
VII	113.83±4.24	59.00±4.94	80.33±3.70	51.57±3.20
VIII	118.00±4.65	62.33±5.15	86.67±2.81	54.73±3.66

Table 2: Mean± SE of fortnightly body measurement (cm) of buffalo calves during winter season

Fortnights	Asbestos roof (T1)	PPCGI roof (T2)	Thatch roof (T3)	GI sheet roof (T4)
Body height				
I	99.83±2.44	81.00±5.03	87.33±1.54	80.50±2.20
II	101.33±2.34	83.67±1.47	88.17±1.54	81.00±2.03
III	101.92±2.34	85.50±1.71	89.83±1.48	82.17±1.99
IV	102.83±1.67	85.50±1.71	89.83±1.47	82.17±1.90
V	102.50±2.50	86.33±1.61	91.33±2.15	83.67±2.18
VI	103.33±2.35	86.83±1.47	93.16±3.49	84.33±2.19
VII	104.16±2.00	87.50±1.50	95.83±3.97	86.33±1.90
VIII	106.16±2.05	87.83±2.50	98.33±4.02	87.50±2.05
Overall changes	**6.53±1.86**	**3.33±0.76**	**11.00±3.59**	**7.00±1.48**
Body length				
I	92.83±2.91	71.00±3.06	78.00±2.51	71.50±2.82
II	95.16±2.76	73.66±2.79	78.83±2.39	72.5.00±2.60
III	96.16±2.67	73.83±2.35	79.83±2.40	73.93±2.62
IV	96.33±2.71	74.16±1.82	80.50±2.41	75.33±3.13
V	97.33±2.42	74.83±1.30	81.51±2.23	75.83±2.66
VI	98.33±2.32	75.16±1.74	83.66±2.69	76.33±2.79
VII	98.66±4.00	75.33±1.15	85.33±3.03	78.16±2.85
VIII	98.83±3.00	76.16±1.75	87.33±3.70	78.33±3.17
Overall changes	**6.00±2.45**	**5.16±3.99**	**9.33±2.98**	**6.83±2.26**
Heart girth				
I	105.33±0.96	77.50±5.48	97.33±1.39	84.00±4.14
II	105.67±0.85	79.33±4.94	98.00±1.13	89.33±2.93
III	105.67±0.65	81.00±5.17	99.33±1.17	90.17±2.92
IV	107.50±1.50	81.00±5.17	99.50±1.12	90.33±2.93
V	109.67±2.67	82.67±3.00	101.00±1.36	90.83±2.87
VI	109.83±2.62	83.33±2.84	102.53±1.52	90.83±3.01
VII	111.50±2.65	85.00±2.30	104.16±1.75	92.33±3.02
VIII	115.17±4.58	86.00±2.04	107.17±2.35	93.83±3.07

Overall changes	**9.84±4.94**	**8.5±4.86**	**9.84±1.62**	**9.83±3.78**
Pouch girth				
I	106.83±2.75	87.83±2.43	97.33±2.78	91.33±2.77
II	108.17±2.53	90.00±2.03	98.33±3.83	91.50±2.70
III	109.16±2.50	91.50±2.10	99.67±4.22	92.33±2.77
IV	110.33±2.47	91.50±2.10	101.00±4.59	92.33±2.77
V	111.83±2.50	92.50±2.40	106.67±4.74	94.33±2.47
VI	113.67±2.73	93.50±1.97	108.67±5.16	94.67±2.58
VII	114.50±1.50	94.67±1.81	109.00±4.35	96.17±2.51
VIII	115.17±4.58	96.17±1.57	114.00±4.08	97.00±2.51
Overall changes	**8.34±5.16**	**8.34±2.75**	**16.67±4.25**	**5.67±3.70**

Table 3: Mean± SE of fortnightly ADG (kg) of buffalo calves in winter season

Fortnights	**Asbestos roof (T1)**	**PPCGI roof (T2)**	**Thatch roof (T3)**	**GI sheet roof (T4)**
I	0.22±0.04^{a}	0.22±0.04^{a}	0.42±0.09^{b}	0.12±0.02^{a}
II	0.20±0.02	0.25±0.04	0.24±0.04	0.12±0.02
III	0.15±0.02^{a}	0.14±0.04^{a}	0.30±0.06^{b}	0.12±0.02^{a}
IV	0.25±0.02	0.15±0.02	0.24±0.04	0.13±0.02
V	0.22±0.02^{ab}	0.14±0.04^{a}	0.34±0.07^{b}	0.13±0.02^{a}
VI	0.15±0.02^{a}	0.14±0.04^{a}	0.45±0.02^{b}	0.17±0.02^{a}
VII	0.21±0.02^{a}	0.22±0.04^{a}	0.42±0.09^{b}	0.13±0.02^{a}
Overall changes	0.21±0.02^{a}	0.18±0.02^{a}	0.34±0.03^{b}	0.13±0.01^{a}
FCR	9.48±0.05a	6.7±0.05b	6.86±0.08b	10.28±0.15c
FE	0.32±0.05	0.33±0.03	0.35±0.02	0.30±0.02

Means bearing different superscript in a row differ significantly (P<0.05)

Table 4: Mean± SE of fortnightly concentrate (kg/day) intake of buffalo calves in winter season

Fortnights	**Asbestos roof (T1)**	**PPCGI roof (T2)**	**Thatch roof (T3)**	**GI sheet roof (T4)**
I	1.37±0.03^{a}	0.55±0.02^{b}	0.80±0.02^{c}	0.48±0.02^{b}
II	1.39±0.04^{a}	0.59±0.02^{b}	0.81±0.02^{c}	0.51±0.02^{b}
III	1.39±0.04^{a}	0.61±0.03^{b}	0.80±0.02^{c}	0.55±0.03^{b}
IV	1.39±0.04^{a}	0.66±0.03^{b}	0.82±0.02^{c}	0.55±0.03^{b}
V	1.39±0.04^{a}	0.68±0.03^{b}	0.84±0.01^{c}	0.57±0.03^{b}
VI	1.39±0.04^{a}	0.71±0.04^{bc}	0.83±0.02^{b}	0.60±0.05^{c}
VII	1.46±0.07^{a}	0.74±0.02^{b}	0.85±0.01^{b}	0.61±0.05^{c}
VIII	1.75±0.04^{a}	0.79±0.02^{b}	0.86±0.01^{b}	0.65±0.04^{c}
Overall changes	**1.44±0.04^{a}**	**0.67±0.03^{b}**	**0.83±0.01^{c}**	**0.57±0.02 ^{d}**

Means bearing different superscript in a row differ significantly (P<0.05)

Table 5: Mean± SE of fortnightly dry fodder (kg/day) intake of buffalo calves in winter season

Fortnights	Asbestos roof (T1)	PPCGI roof (T2)	Thatch roof (T3)	GI sheet roof (T4)
I	1.17±0.15^{a}	0.5±0.01^{b}	0.71±0.03^{c}	0.5±0.02^{b}
II	1.07±0.09^{a}	0.52±0.02^{b}	0.75±0.02^{c}	0.52±0.03^{b}
III	1.17±0.15^{a}	0.54±0.02^{b}	0.75±0.02^{cd}	0.55±0.03^{bd}
IV	0.58±0.03$^{a\,b}$	0.58±0.03^{ab}	0.77±0.03^{a}	0.56±0.05^{b}
V	0.98±0.07^{a}	0.64±0.03^{b}	0.80±0.02^{ab}	0.62±0.05^{b}
VI	0.71±0.09	0.67±0.03	0.81±0.02	0.63±0.05
VII	0.88±0.08^{a}	0.71±0.04^{ab}	0.83±0.01^{ab}	0.63±0.04^{b}
VIII	1.44±0.03	0.74±0.02	0.85±0.02	0.67±0.04
Overall changes	**0.99±0.09^{a}**	**0.61±0.03^{b}**	**0.78±0.02^{b}**	**0.59±0.02^{b}**

Means bearing different superscript in a row differ significantly (P<0.05)

Table 6: Mean± SEM of fortnightly green fodder (kg/day) of buffalo calves in winter season

Fortnights	Asbestos roof (T1)	PPCGI roof (T2)	Thatch roof (T3)	GI sheet roof (T4)
I	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
II	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
III	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
IV	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
V	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
VI	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
VII	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
VIII	0.37±0.02	0.37±0.02	0.37±0.02	0.37±0.02
Overall changes	**0.37±0.00**	**0.37±0.00**	**0.37±0.00**	**0.37±0.00**