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GROWTH AND BEHAVIOURAL PATTERNS OF FEMALE CROSS-BRED CALVES UNDER DIFFERENT SHELTER MANAGEMENT PRACTICES DURING WINTER SEASON

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Abstract

Fifteen crossbred calves were divided into 3 groups of 5 animals each on the basis of their similar body weight and age. Each group was allotted to three housing system *viz.* (T_1, loose house; T_2, loose house + bedding + curtains and T_3 ,conventional barn) during winter season. Average maximum temperature was significantly ($P<0.05$) higher in T_1 and minimum temperature was higher ($P<0.05$) in T_3 as compared to other two groups. Mean DM intake/100 kg body weight was higher ($P<0.05$) in T_3 calves as compared to other group calves. Average daily voluntary water intake and voluntary water intake /kg DM consumed were higher ($P<0.05$) in T_3 group as compared to T_1 and T_2 group. Average daily weight gain (g) was 484.44$\pm$48.98, 566.67$\pm$102.05 and 560.00$\pm$94.08 in T_1, T_2 and T_3, respectively. The weight gain and feed conversion ratio (DMI: gain) was significantly higher ($P<0.05$) in T_2 as compared to other groups. The feed conversion efficiency (kg) was better in T_2 (9.62) as compared to T_1 (10.78) and T_3 (9.84) groups. The animals spent more time in feeding during day than at night in all groups. Average feeding time (minutes) per day (24 hours) was more ($P<0.05$) in T_3 calves as compared to T_1 and T_2 calves. The average resting time (minutes) was higher ($P<0.05$) in T_2 (641.73) and as compared to T_1 (604.67) and T_3 (625.00) during day (24 hours). It was concluded that the modified house (Loose house+ bedding+ curtains) and conventional barn improved body growth and physical comfort of crossbred calves as well as more economical during winter season.

Keywords: Barn house, Bedding, Behaviour, Crossbred calves, Curtains, Growth, Loose house.

Animal housing helps in moderating the range of micro-environment to which the animals are exposed and optimizes their production by protecting them from extreme climates. A shelter is required both during summer as well as winter to counter the various vagaries of adverse climate and to provide a comfortable environment to the animals. The calves are exposed to low atmosphere temperature as well as wet floors which may affect their growth and health. The various managemental practices such as providing Tarpaulin, bedding and jacketing etc. protect cattle from cold stress during winter (Yadav *et al.,* 1990). The degree of comfort depends upon the type of housing which indirectly affects the health of animal inhabiting it (Rokde and Tomer, 2000). The aim of good management of calves during their early life is to attain optimum growth & better feed conversion efficiency & thereby to reach early maturity.

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MATERIALS AND METHODS

Fifteen female crossbred calves (average 18 months old) were taken from the dairy farm. SKN Agriculture University, Jobner, from 05-12-2014 to 05-03-2015 and divided into 3 groups of 5 animals each on the basis of their nearness of body weight and age. Each group was allotted randomly to the following housing conditions/treatments:-

T_1 - Loose house (control)

House having covered area with asbestos cement sheet roofing, grooved cement concrete floor in

covered area, brick paved floor in open area which surrounded by 1.5 meter high from three sides.

T_2 - Loose house + Bedding + Curtains

Bedding of left over wheat bhusa was changed at weekly intervals and loose house as detailed above in T_1 was used as modification. Curtains were provided to calves at night hours for protection from cold stress.

T_3 Conventional barn (closed)

In conventional barn is completely closed structure as roofed and walls are also complete with windows, grooved cement concrete floor and ventilators located at suitable places to get more ventilation and lighting. Animals were tied at neck by iron - chains.

Crossbred calves were offered wheat straw (*Triticum aestivum*) *ad lib.* as dry fodder. The concentrate mixture in pelleted form was procured from market which contained 20.53% CP, 2.25% EE and 14.69% CF. The animals were fed as per NRC recommendations for dairy cattle. The samples of feed and fodder were analyzed for proximate principles (AOAC, 2000) The weighed quantity of dry fodder and concentrate was offered to animals and the leftover were weighed for 2 consecutive days at weekly interval. Maximum, minimum, dry and wet bulb temperatures were recorded at 8.30 am and 3.00 pm daily. The relative humidity was calculated from dry and wet bulb reading using hygrometric table. The Temperature Humidity Index (THI) was calculated as per MC Dowell 1972 as given below:

THI = 0.72 (dry bulb temp. ^{0}C + wet bulb temp.^{0}C) + 40

The calves were weighted at the beginning and at monthly interval and at the end of the experiment. The body weight of the animals was recorded in the morning at 9 AM after they had been kept off-feed for 14 hours. Fasting before weighing was done in an attempt to reduce the gut fill, thereby minimizing the weight fluctuations. The feeding behaviour of animals was recorded at monthly interval. The data was statistically analyzed by standard statistical methods (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Microclimate in difference experimental house

The means of different climatic variables in different houses are presented in Table 1. The average maximum temperature was higher (P<0.05) in T_1 as compared to T_2 and T_3 .While minimum temperature was significantly higher (P>0.05) in T_2 and T_3 as compared to T_1. It may be due to protection from cold by curtains as well as bedding in T_2 and maximum area closed by wall in conventional barn But the minimum temperature was lower (P<0.05) in loose house than other groups. The minimum temperature was also significantly higher which was with in the ranges of comfort zone of crossbred calves Jat & Yadav (2010).

0The mean relative humidity was significantly higher (P<0.05) in T_3 as compared to other treatments. The meanTHI values were higher in T_3 as compared to T_2 than in T_1. The loose house had lower (P<0.05) THI than other types of houses. The results are in agreement with findings of earlier workers Mehla (1982), Singh (2000), Chakrabarti (1991), Jat & Yadav (2010) and Shekhawat and Chaudhary (2012).

Table 1. Average temperature (^{O}C), relative humidity (RH %) and temperate humidity index (THI) values in different houses

Parameters	T_1	T_2	T_3
Maximum temperature	**22.55^a ± 0.184** (19.00 – 28.93)	**21.09^b ± 0.132** (18.07 – 26.67)	**20.61^c ± 0.137** (16.87 – 26.03)
Minimum temperature	**13.69^c ± 0.245** (8.59– 17.69)	**14.07^b ± 0.204** (10.04 – 18.92)	**15.50^a ± 0.150** (10.12 – 20.51)
Relative humidity (%)	**68.74^b ± 0.546** (65.97 – 72.29)	**67.48^c ± 0.424** (65.39 – 70.50)	**72.45^a ± 1.676** (63.88 – 83.29)
Temperature humidity index (THI)	**63.59^b ± 1.256** (59.80 – 72.52)	**64.30^a ± 1.138** (58.02 – 71.28)	**64.64^c ± 1.153** (57.27 – 73.39)

Means having different superscript differ significantly (P<0.05)

Growth

The data on average daily weight gains of calves under three treatments are presented in Table 2. The average daily body weight gain was 484+48.98, 566.67+102.05 and 560.00+94.08 g in T_1, T_2 and T_3, respectively. The average final body weight of calves from 10- 30 months of age was 210.00+31.91, 220.40+46.65 and 219.40+42.98 kg in T_1, T_2 and T_3, respectively. The lowest gain in weight was observed in crossbred calves reared in T_1 followed by T_3 and T_2. The calves in T_1 group were to be by exposed to low atmosphere temperature as well as wet floors which may have affected their growth. The growth rate was significantly higher ($P<0.05$) in T_2 as compared to T_1 and T_3 groups which may have resulted from impact of protection from cold by bedding and curtains as modifications of loose house. The results are similar to those reported by Chakrabarti (1991), Singh (2000) and Jat & Yadav (2010)).

Table 2. Average body weight gain/day (g) of cross bred calves

Months	T_1	T_2	T_3
1	286.67+54.97	520.00+153.51	466.67+147.07
2	500.00+136.99	600.00+136.99	520.00+130.94
3	666.67+213.38	580.00+60.94	693.33+144.15
Mean	**484.44 ^{c}±48.98**	**566.67^{ab}±102.05**	**560.00^{ab}±94.08**

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

Feed conversion efficiency

The feed conversion efficiency was 10.78 +1.958, 9.62 +1.333 and 9.84 +1.159 kg in T_1, T_2 and T_3 groups, respectively (Table 3). The loose house claves required more amount of dry matter, to obtain one kg gain than animals in other two groups which may be attributed to less DMI and less weight gain due to cold and less for comfortable. The feed conversion efficiency or input-output ratio was significantly higher in T_2 than T_3 and T_1 groups. This feed conversion efficiency was higher in T_2 due to higher growth rate as well as physically comfort and more resting and feeding time of these calves. Similar results obtained by Yadav *et al.* (1990), Chakrabarti (1991), Singh (2000) and Jat and Yadav (2010).

Table 3. Average daily body weight gain (kg) and feed conversion ratio of crossbred calves

Parameters	T_1	T_2	T_3
Average daily body weight gain (kg)	0.484^{c} ±0.048	0.566^{ab} ±0.102	0.560^{ab} ±0.094
feed conversion ratio (DMI: gain)	10.78^{a} ±1.958	9.62^{c} ±1.333	9.84^{b} ±1.159

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

Feeding behaviour

The data on average time spent in eating by calves under different housing conditions is presented in Table 4. The average eating time was 195.47 +5.557, 227.47 +10.866 and 248.40 +9.926 minutes during day time in T_1, T_2 and T_3 respectively. The average eating time was 76.87 +2.821, 93.67 +1.045 and 99.60 +2.613 minutes during night time in T_1, T_2 and T_3 respectively. The average time spent in eating during 24 hours was significantly less ($P<0.05$) in T_1 as compared to T_2 and T_3. These results are in close agreements with the finding by Singh et al. (1985), Sharma and Singh (2002), Jat and Yadav (2010) and Chauhan et al. (2014).

Lying (resting) time

The data on average resting behaviour are presented in Table 5. The average resting time spent by crossbred calves was 200.00+7.388, 225.27+8.892 and 215.00+7.072 minutes during day (12 hours) time in T_1, T_2 and T_3, respectively. The

corresponding figures for night were 404.67+7.525, 416.47+6.820 and 410.00+ 5.913 minutes. The total time spent in resting per day (24 hrs) in T_1, T_2 and T_3 group calves was 604.67+11.915, 641.73 +12.687 and 625.00+12.520 minutes, respectively. The results are in close proximately with the findings of Singh *et al.* (1985) and Sharma and Singh (2002).

Table 4. Average feeding time (minutes) of crossbred calves

Parameters	T_1	T_2	T_3
Day time	$195.47^{c} \pm 5.557$	$227.47^{b} \pm 10.866$	$248.40^{a} \pm 9.926$
Night time	$76.87^{c} \pm 2.821$	$93.67^{b} \pm 1.045$	$99.60^{a} \pm 2.613$
Total	**$272.33^{c} \pm 6.023$**	**$321.13^{b} \pm 10.731$**	**$348.00^{a} \pm 11.369$**

Means having different superscript differ significantly (P<0.05)

Table 5. Average resting time (minutes) of crossbred calves

Parameters	T_1	T_2	T_3
Day time	$200.00^{c} \pm 7.388$	$225.27^{b} \pm 8.892$	$215.00^{a} \pm 7.072$
Night time	$404.67^{c} \pm 7.525$	$416.47^{b} \pm 6.820$	$410.00^{a} \pm 5.913$
Total	**$604.67^{c} \pm 11.915$**	**$641.73^{b} \pm 12.687$**	**$625.00^{a} \pm 12.520$**

Means having different superscript differ significantly (P<0.05)

Economics / Variable cost

The cost on different accounts for crossbred calves rearing under different housing conditions are given in Table 6. Any mode of housing system should ultimately lead to economics raising of dairy animals. The total feeding cost based on farm price was Rs. 25275.6, 26096.4 and 26312.4 in T_1, T_2 and T_3, respectively. The higher cost in T_3 group may be due to more expenditure incurred on labour and feed. The labour cost was higher in barn house group as compared to other groups. The total variable cost per kg gain was Rs.142.27, 129.53 and 131.16 in T_1, T_2 and T_3, respectively. The cost per unit gain in body weight was less in T_2 followed by T_3 and T_1. Relatively lower cost/kg gain in body weight in T_2 can be attributed to higher growth rate of calves in this group. The present findings are in conformity with those reported by Facsor (1981), Singh *et al.* (1992), Singh (1996), Singh (2000) and Jat & Yadav (2010). Singh (2000) reported that cost/kg gain was lower in modified loose house group calves as compared to loose house group calves.

Table 6. Cost of calves rearing under different housing modifications

Particulars	T_1	T_2	T_3
1. Cost of curtain/bedding	-	695 (2.11)	-
2. Cost of labour	5500 (17.74)	6000 (18.16)	6500 (19.67)
3. Cost of medicine	240 (0.77)	240 (0.73)	240 (0.73)
5. Cost of feed consumed (Rs.)	25275.6 (81.49)	26096.4 (79.00)	26312.4 (79.60)
7. Total variable cost /calf	6203.12	6606.28	6610.48
8. Total body weight gain/ calf(kg)	43.6	51.0	50.4
9. Cost/kg gain	142.27	129.53	131.16

(On farm basis price) (Figures in parentheses are percentage)

It is concluded that T_2 calves had satisfactory growth rate, better feed conversion efficiency, more resting time and economically as compared to other treatments due to provide the better protection from cold and wet floors to animals during winter season.

REFERENCES

1. AOAC, 2000. Official Methods of Analysis (17th edn.), Association of official Analytical Chemists. Washington, D.C.
2. Chakrabarti, A. 1991. Effect of winter management systems on growth performance of female Murrah buffalo calves. *M.V.Sc. Thesis*, Deptt. of LPM, C.C.S. Haryana Agriculture University, Hisar.
3. Chauhan, H.D.; Prajapati, K.B.; Rajpura, K.R. Tajane, J.B. and Jain, A.K. 2014. Feeding and resting behavior of Kankrej cows under different housing systems. *J. Ani. Feed sci. and Tech.*, 9-13.
4. Facsar, I. 1981. Milk hygienic and udder health evaluation of commercially suitable cowshed for loose housing with deep bedding. Proc. of 4th International Symposium on Mastitis Control, Hungry. *Dairy Sci. Abst.,* 44:2367
5. Jat, R.P. and Yadav, B.L. 2010. Growth and behavioural pattern of buffalo calves under different shelter modifications during winter. *Indian J. Ani. Sci.*, **80**(7): 686-689.
6. Mehla, O.P. 1982. Effect of modification housing during winter on growth and some physiological parameters of buffalo calves. *M.V.Sc. (LPM) Thesis*, Deptt. of LPM, C C S Hariyana Agriculture University, Hisar.
7. McDowell, R.E. 1972. Improvement of livestock production in warm climates. *WH Freeman and Co; San Francisco*. 51-53.
8. Rokde S.N. and Tomar O.S. 2000. Effect of housing on incidence of diseases in crossbred Karan Swiss and Karan Fries calves. *Indian Journal Animal Production Management,* **16**:64-65.
9. Singh, M.P.; Karki, D.B.; Mehla, O.P. and Sastry, N.S.R. 1985. Behavioural patterns of growing buffalo heifers under three different housing conditions. *Indian J. Dai. Sci.*, **38**: 289-294.
10. Singh, Y. 2000. Effect of certain managemental practices on the performance of buffalo heifers, *Ph.D. Thesis*. Deptt. of LPM, Haryana Agriculture University, Hisar, India.
11. Singh, M.P.; Sastry, N.S.R. and Singh, R.A. 1992. Labour utilization pattern and economics of buffalo heifer calves rearing under three housing conditions. *Indian J. Ani. Prod. Mgmt.*, 8: 230-234.
12. Singh, Y. 1996. Studied of certain summer managemental practices on performance of growing buffalo calves. *M. V. Sc. Thesis*, Deptt. Of LPM, C C S Haryana Agricultural University, Hisar, India.
13. Sharma, P. and Singh, K. 2002. Shelter seeking behavior of dairy cattle in various types of housing systems. *Indian J. Ani. Sci.*, **72**: 91-95.
14. Shekhawat, L.S. and Chaudhary, J.L. 2012. Effect of roof modifications in loose house on intake and utilization of nutrients and milk yield in lactating crossbred cows during winter season. *J. Dai. Sci.*, **65**(6): 501-07.
15. Snedecor, G.W. and Cochran, W.G. 1994. Statistical methods. 8th Edn. Lowa, State University Press, Ames, Lowa.
16. Yadav, R.S.; Yadav, M.S.; Singh, M.P. and Kashi Ram 1990. Effect of provision of bedding and jacketing on growth performance of buffalo calves during winter season. *Indian J. Ani. Prod. Mgmt*., **6**:195-200.