

Effect of different level of concentrate feeding on growth performance during early life in Mehsana buffalo calves

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ABSTRACT

An experiment was conducted to study the effect of compound concentrate mixture and cotton seed cake (CSC) feeding in Mehsana female calves of 3 to 6 months age at Livestock Research Station, S.D.A.U., Sardarkrushinagar situated in semi-arid region of Banaskantha district of North Gujarat having latitude of 24.35 North and longitude of 72.59 East. The experiment was conducted on sixty-seven clinically healthy growing female buffalo calves of 3 months age and categorized randomly into three treatment groups i.e. group-I (n=22), group-II (n=23) and group-III (n=22) on the basis of body weight and age. The treatment groups were given accelerated feeding as Group-I (N=22) fed 0.5 kg compound concentrate and 0.850 kg cotton seed cake, Group II (N=23) fed 1.5 kg compound concentrate and Group III (N=22) fed 0.5 kg compound concentrate as per routine ration scale of the station and served as control group for comparison. Observations were recorded for monthly body weights and daily weight gain. The generated data were analyzed as per the standard statistical procedures. The significant ($P<0.05$) higher weight after experiment was found in both treatment groups (Group-I & II) as compared to control group in the experiment whereas, the significantly ($P<0.01$) higher weight gain per day (420.00 ± 29.0) during experiment was found in treatment group-II which was fed on compound concentrate mixture followed by group-I (349.50 ± 21.50) and group-III (258.10 ± 19.3), respectively. The difference in weight gain during experiment period was highly significant ($P<0.01$) between all three groups suggests that the feeding of compound concentrate mixture was effective in weight gain of Mehsana buffalo calves. Therefore, it is concluded from above study that feeding of compound concentrate mixture @ 1.5 kg/day/calf improved optimum growth rate in Mehsana buffalo calf of 3-6 month age.

Key words: Accelerated feeding, Mehsana buffalo calves, Growth performance

Provision of an optimal environment for the calf is critical for establishing the patterns of growth and development which is essential to allow the heifer to express its genetic potential for milk production and reproduction during its prolific life. Maternal nutrition during pregnancy is already recognised as a key factor for genetic programming *in utero* and this influence is extended through the

complexity of hormones, growth factors and immunostimulants incorporated into colostrum and milk consumed by the neonatal calf. This usual process is most often disrupted when calves are weaned abruptly or allow just for let-down in buffaloes after second to third month of parturition to maximise milk production for commercial exploitation. Then, it is crucial to accelerate the rate of maturation of the ruminal papillae through the provision of concentrate starter rations and high-quality forage, which promote

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subsequent digestion and volatile fatty acids (VFA) production. Managemental interventions to promote these processes in exotic cattle are well developed, however, little is known of these processes in dairy buffalo such as the Mehsana breed.

MATERIALS AND METHODS

The study was conducted at Livestock Research Station, S. D. Agricultural University, Sardarkrushinagar, north Gujarat, India. Total 67 healthy Mehsana buffalo calves of 3 months age were selected for the experiment and randomly divided into three groups, one control and two treatments. The treatment groups were given accelerated feeding as group I (N=22) was fed with 0.5 kg compound concentrate and 0.850 kg cotton seed cake, group II (N=23) fed only 1.5 kg compound concentrate and group III (N=22) fed 0.5 kg compound concentrate (as per routine ration scale of the station) on daily basis and serve as control group for comparison. The ration fed to group I and II was designed on isonitrogenous basis. The treatment was followed from three to six months of age and body weights of calves were recorded at monthly interval to calculate weight gain. The data were subjected to one-way ANOVA and Fisher's pair wise comparison to know the level of significance.

Percent average composition of feed (on DM basis) fed to experimental calves

Composition (%)	Compound concentrate	Cotton seed cake
Dry matter	90.61	88.87
Organic matter	90.21	91.95
Crude protein	18.73	24.51
Crude fiber	05.94	11.39
Ether extract	02.58	9.10
Nitrogen free extract	62.95	46.94

RESULTS AND DISCUSSION

The birth weight and weight gain during different age are presented in table-1. It was revealed from the table-1 that the mean body weight at birth in all three groups was non-significant, whereas weight at 3 months was highly significant ($p < 0.01$) in group-I in comparison to group-II and III in the beginning, while weight at 6 months was highly significant ($p < 0.01$) in group I and II in comparison to group III.

The significantly ($P < 0.01$) higher weight was found in both treatment groups as compared to control group at the end of experiment. The weight gain (g/day) was significantly ($P < 0.01$) higher in group-II (420.00 ± 29.0) which was fed compound concentrate mixture followed by group-I (349.50 ± 21.50) compared to group-III (258.10 ± 19.3).

The difference in weight gain during experiment period was highly significant (p value) between all three groups suggests that the feeding of compound concentrate mixture is effective to achieve desirable weight gain in Mehsana buffalo calves. The weight at the age of 12 months was also significantly (p value) higher in the both treatment groups as compared to control group indicates that accelerated feeding of Mehsana buffalo calves resulted in to better growth rate up to the age of 12 months without further treatment thereafter, henceforth feeding of Mehsana calves between the age of 3-6 months is very critical and needs to be taken care of as in the field this is the common practice followed at this age where calves totally deprived from milk and allowed to suckle only for let-down.

Table: 1 Weight and weight gain at different age in Mehsana buffalo calves.

Variable	Group I	Group II	Group III	P value
N	22	23	22	
BW (kg)	—	25.44±0.41 ^a	25.96±0.20 ^a	0.511 ^{ns}
3MW (kg)	58.86±1.56 ^A	55.94±1.38 ^{A^b}	54.05±1.04 ^B	0.047*
6MW (kg)	90.32±2.40 ^A	91.74±2.77 ^A	77.27±1.92 ^B	0.000*
12MW (kg)	143.58±3.48 ^A	138.70±3.49 ^A	124.56±4.12 ^B	0.003*
WG1 (g/day)	371.20±17.80 ^A	338.90±13.8 ^{A^b}	312.10±12.4 ^B	0.025*
WG2 (g/day)	349.50±21.50 ^B	420.00±29.0 ^A	258.10±19.3 ^C	0.000*

Note: * $P < 0.01$; different superscript in a row differs significantly.

bw—birth weight, 3MW—3 months weight, 6MW—6 months weight, 12MW—12 months weight, WG1—weight gain between birth to 3 months and WG2—weight gain between 3 months to six months

Similar to present investigation, feeding calves large amounts of milk replacer (2-2.5 pounds/day (0.91-1.14 kg/day)) with higher protein concentrations (30% rather than 20%) for accelerated calf growth programs resulted in 3-5 times better growth rates than that of traditional programs (Van Amburgh *et al.*, 2001). Yanar *et al.*, 2002 have also reported that daily weight gains between birth and 6 months of age was significantly ($P < 0.01$) higher in the *ad libitum* fed group than in the 2, 2.5 and 3 kg/day concentrate fed groups. While, the findings of Khan *et al.* (2002) in disagreement with present findings as they have reported significantly ($p < 0.05$) higher body weight in early weaned calves fed with cottonseed meal supplemented with lysine and methionine as compared to other groups. Shivakumar *et al.* (2005) have also reported significantly ($p < 0.05$) higher body weight in female calves fed on treated cotton seed hull (CSH) diet as compared to untreated CSH based diet. The results were further not supported by Yunus *et al.*, (2004), as they found significantly ($p < 0.01$) higher body weight in calves fed cottonseed meal (CSM) ration due to higher undegradable dietary protein (UDP) content in CSM. Anonymous (2010) also reported significant increase ($p < 0.05$) in body weight in female Mehsana buffalo calves of 10-14 months of age fed on CSC diet than that of the control group for 6 months of experimental trial.

The findings of present investigation on daily weight gain were in agreements with findings reported by Van Amburgh *et al.*, 2001 and Yanar *et al.*, 2002 and in disagreement with Khan *et al.*, (2002) who has reported significantly higher body

weight gain in early weaned calves fed with Cottonseed meal supplemented with lysine and methionine as compared to other groups. Shivakumar *et al.*, (2005) have reported the daily weight gain was significantly higher ($P < 0.05$) in female calves fed on treated cotton seed hull (CSH) diet as compared to untreated CSH based diet. The findings were also not supported by Ali *et al.* (2008) who reported the highest body weight gain in calves fed CSC based diet followed by Anmol Vanda and all groups, which differed significantly ($P < 0.01$) from each other. Anonymous (2010) also reported 10% higher ($P < 0.05$) in body weight gain in female Mehsana buffalo calves of 10-14 months of age fed on CSC diet over the control group with similar feed intake for 6 months of experimental trial. On the contrary to the present findings, Jabbar *et al.* (2006) have found no significant difference in body weight gain in crossbred male calves fed with CSC, sunflower meal (SFM) and CSC+SFM based diet.

Finally, the results indicates that the feeding of compound concentrate mixture to female Mehsana calves helped to improve the body weight during 3 to 6 months of age. Proximate analysis of different feeds suggests that, ration was balanced and adequate in all nutrients. Also, it might be due to improved digestibility and utilization of supplied nutrients through feed. Ingestion of solid feed is necessary to stimulate rumen development in the young calf as it facilitates the development from a pre-ruminant to a functioning ruminant. Solid feeds like concentrates and forages, unlike liquid feeds, are preferentially directed to the reticulo-rumen for digestion (Church, 1988). A slow shift from liquid feed like milk or milk replacer to solid feed like grains or forage is a key factor in minimizing mortality and morbidity losses due to diseases and improves daily weight gains (Khan *et al.*, 2008), as well as in minimizing weight loss and

distress at weaning (Drackley, 2008). Solid feed especially concentrates or high carbohydrate diets stimulate rumen microbial proliferation and volatile fatty acid production, which initiate rumen development. Concentrates have the greatest effect on rumen development. Restricted amounts of liquid feed and ad libitum solid feed intake positively affect development of rumen weight, volume and function in calves (Weary *et al.*, 2009). Diaz *et al.*, 2001 reported that in the absence of solid feed, calves' consumed bedding material, suggesting a growing hunger for solids as calf's age.

CONCLUSION

Mehsana buffalo calves fed with compound concentrate mixture without cotton seed cake (CSC) performed better than the compound concentrate mixture with CSC in terms of body weight gain therefore, it is concluded from above study that feeding of compound concentrate mixture alone @ 1.5 kg/day improved optimum growth rate in Mehsana buffalo calf having around 56 kg initial body weight of 3-6 months age.

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