Effect of Challenge Feeding on Production Performance of Surti Buffaloes

Article *in* International Journal of Livestock Research · July 2019

CITATIONS
0

READS
36

6 authors, including:

Dr Vipul Patel
Kamdhenu University
38 PUBLICATIONS **13** CITATIONS
SEE PROFILE

Lalitchandra Sorathiya
Kamdhenu University
103 PUBLICATIONS **211** CITATIONS
SEE PROFILE

V.B. Kharadi
Navsari Agricultural University
62 PUBLICATIONS **253** CITATIONS
SEE PROFILE

Abhishek B. Parmar
Kamdhenu University, Gujarat
12 PUBLICATIONS **14** CITATIONS
SEE PROFILE

Original Research

Effect of Challenge Feeding on Production Performance of Surti Buffaloes

A. P. Raval[1]*, L. M. Sorathiya[1], M. A. Katariya[1], V. B. Kharadi[2], V. R. Patel[2], N. B. Patel[2] and A. B. Parmar[1]

[1]Department of Animal Nutrition, Livestock Research Station, NAU, Navsari, Gujarat, INDIA
[2]Livestock Research Station, Navsari Agricultural University, Navsari-396 450, Gujarat, INDIA

***Corresponding author:** dr.ajayraval@gmail.com

Rec. Date:	May 08, 2019 11:20
Accept Date:	Jun 08, 2019 16:59
DOI	10.5455/ijlr.20190508112036

Abstract

Twenty advanced pregnant Surti buffalo heifers were randomly divided into 2 groups of 10 animals in each to evaluate the effect of challenge feeding on production performance. The animals in control group (CN) were given standard ration while in challenge fed (CF) group, the animals were given additional amounts of concentrate mixture. The mean DM intake of heifers during pre-partum period was similar (10.52 vs. 11.20 kg) in both the groups. However, the post-partum DM intake was higher (P<0.05) in challenge fed group than the control group (10.77 vs. 12.33 kg). The concentrate intake was higher during pre- and post-partum periods in the CF group. The overall mean daily milk yield was higher (P<0.05) in CF group as compared to CN group (2.16 vs. 3.61 kg/d). The milk composition (fat, lactose, protein and SNF content), body condition score and calf birth weight were similar in the both groups. The net income per cow per day was higher in CF than CN group. It was concluded that the challenge feeding in Surti buffaloes improved production performance during early lactation and was found to be economical.

Key words: Challenge Feeding, Milk Production, Surti Buffalo

How to cite: Raval, A., Sorathiya, L., Katariya, M., Kharadi, V., Patel, V., Patel, N., & Parmar, A. (2019). Effect of Challenge Feeding on Production Performance of Surti Buffaloes. International Journal of Livestock Research, 9(7), 164-170. doi: 10.5455/ijlr.20190508112036

Introduction

The period from two months pre- and post-calving is the most stressful period in the annual cycle of dairy cows, particularly as feed intake is reduced, while the demand for support of foetal growth and initiation of milk synthesis are increased (Singh *et al.,* 2003; Mondal *et al.,* 2018). Requirements for pregnancy represent nutrients necessary to support the both growth and maintenance of foetus, placenta, uterus and mammary gland. Bovine foetal growth is not linear by gestational age, but exponential with more than 60 per cent of total foetal weight being accrued during the final two months of gestation (Panigrahi *et al.*, 2005). This foetal growth pattern places the greatest nutritional burden on the late pregnant cow. Consequently, last two months of pregnancy needs special care in terms of higher provision of essential nutrients. Therefore, the

theory behind challenge feeding is feeding at a higher plane of nutrition during dry period and in early postpartum period in milk animals (Dann *et al.*, 2006). Suboptimal transition from dry period to lactation can decrease total milk production, reproductive performance and the profit potential of dairy animals. Thus, it is necessary that milch animals must be judiciously and adequately fed during this period to exploit their production potential (Bhat *et al.*, 2000) with minimum health problems so that the income level of the dairy farmers is improved.

Apart from this in Surti buffalo heifers lower birth weight of leads to increased calf chances of mortality as maternal nutritional status during late pregnancy is reported to have considerable influence on the colostrum quality and subsequent absorption by the calf (Hough *et al.*, 1990). Further, birth weight of the calf also affects the subsequent growth rate. The heavier calf gains weight at a faster rate than the calf with lower birth weight, even if both are given adequate nutrition. Considering the above points, the present experiment was planned with an aim of achieving better production performance of Surti buffalo heifers through challenge feeding.

Materials and Methods

The experiment was conducted at Livestock Research Station, Navsari Agricultural University, Navsari, Gujarat, India during July 2017 to October 2017. Average annual rainfall of the region is 135.80 cm. The temperature remained between 20 ºC to 33 ºC and relative humidity remained between 56 to 87 percent.

Experimental Animals and Feeding Schedule

Twenty advances pregnant Surti buffalo heifers were selected 60 days before expected date of calving and randomly divided into 2 groups of 10 animals each in CON and CF groups (Table 1) on the basis of body weight (376.90±11.78 and 379.80±17.72 kg). They were randomly allocated into control and challenge feeding schedule.

Table 1: Feeding schedule of experimental animals

Pre-partum (From 60 days pre-partum up to calving)		
Treatment	**Concentrate Mixture**	**Roughage**
CN (n=10)	3 kg (1 kg maintenance + 2 kg pregnancy) Approx. 0.75% of BW	*ad-libitum*
CF (n=10)	4 kg (1 kg maintenance + 3 kg pregnancy) Approx. 1.0% of BW	*ad-libitum*
Post-partum (From calving to 60 days post-partum)		
CN (n=10)	1 kg maintenance + 1.0 kg/2.0 kg of milk	*ad-libitum*
CF (n=10)	1 kg maintenance + 1.0 kg/2.0 kg of milk + 0.5 kg/d till free choice level	*ad-libitum*

Housing and Management

The buffalo heifers were housed in a naturally ventilated, cement floored tie stall with facility for individual feeding and watering from dry off (60 d prior to expected calving) till parturition. Five days before the

 DOI 10.5455/ijlr.20190508112036

expected date of calving, the animals were shifted to the calving box for parturition where facilities for individual feeding and watering were available. After parturition the calves were separated from the dams and reared individually in calf pen adopting uniform management procedures.

Measurements

There was daily recording of feed (DM) intake and left over was collected individually for each animal. Buffalo heifer were offered weighed quantities of concentrate after recording of residues, if any, at 9:00 hrs followed by chaffed forages at 11:00 hrs. and 14.00 hrs. The body weight of individual heifer was recorded at the onset of experiment and thereafter at fortnightly intervals up to completion of experiment. The body condition of individual cows was estimated by using visual body condition scoring (BCS) developed by Edmonson *et al.* (1989) adopting a 1 to 5-point scale of 1 as thin to 5 as obese using 0.5-unit increments. The newborn calves of the experimental heifers were weighed at birth before colostrum feeding.

Proximate composition of feed offered is mentioned in Table 2. The compound concentrate mixture (BIS type -I) contained at least 22 percent protein was used. The dry fodder used was mainly jowar/paddy straw and green fodder was jowar fodder. The chaffed roughage (3 parts green fodder: 1-part dry fodder) was provided *ad libitum* and concentrate was offered as per the feeding schedule (Table 1) for maintenance and production during pre-partum and post-partum periods. The animals were fed as per feeding standard of ICAR, (2013). The samples of feeds offered and left over were collected and analysed for proximate composition (AOAC, 2005). Daily milk yield of individual buffalo heifer was recorded during morning and evening milking for 60 days and milk samples of morning evening milking were obtained on fortnightly interval for the analysis of milk components (AOAC, 2005) using automatic milk analyzer (Milkoscan). The data were analyzed to test for significance differences between means of variables of diets using the t-test (Snedecor and Cochran, 1994).

Table 2: Proximate composition of feed offered (as on % DM basis)

Attribute	Concentrate (Type -1)	Green Fodder (Jowar)	Dry Fodder (Paady Straw/ Jowar Straw)
Organic matter	97.1	92.3	89.4
Crude Protein	22.6	5.4	3.1
Crude fibre	9.9	24.6	35.7
Ether extract	5.2	1.8	1.1
NFE	59.4	60.5	49.4
Total Ash	2.9	7.7	10.6

Results and Discussion

Nutrient Intake

The mean DMI during pre-partum period was 10.52±0.33 and 11.20±0.52 kg/d in CN and CF, respectively. The mean DMI from concentrate mixture was higher (P<0.01) in CF group compared to CN (2.83 vs 3.80

 DOI 10.5455/ijlr.20190508112036

kg/d). However, DMI through roughage was statistically similar. These results are in agreement to those reported by Panigrahi *et al.* (2005) who observed that feeding on a higher plane pre-partum did not affect DMI of crossbred cows significantly.

The mean DMI during postpartum period was higher in CF (10.77 vs 12.33) compared to CN. Similarly, DMI from concentrate mixture was higher (P<0.05) in the treatment group as compared to control group (2.08 vs 4.31 kg/d); however, DMI through roughage was similar in both groups. Similar results were obtained by Kamboj *et al.* (2016) when crossbred cattle fed with higher plane of nutrition. As the milk yield of animals increased, the concentrate mixture intake also increased continuously from first to last week of postpartum experimental period to replenish the body tissue losses due to higher milk production. The fortnightly body condition score of both treatment groups during the pre-partum and post-partum were similar (Table 3) which might be due to higher milk yield of treatment group of buffaloes leading to higher body tissue losses which may have unified the effect of challenge feeding on their BCS.

Table 3: DM intake on experimental group during pre-partum and post-partum periods

Parameter	CN	CF	P value
Pre-partum			
Body weight (kg)	376.90±11.78	379.80±17.72	0.911
Concentrate DMI (kg/d)	2.83^{b}±0.09	3.80^{a}±0.18	0.000^{***}
Roughage DMI (kg/d)	7.69±0.24	7.41±0.35	0.508
Dry matter intake (kg/d)	10.52±0.33	11.20±0.52	0.281
Body condition score	3.48±0.04	3.59±0.05	0.985
Post- partum			
Body weight (kg)	351.80±11.29	352.20±16.98	0.985
Dry matter intake (kg/d)	10.77^{b}±0.35	12.33^{a}±0.59	0.035^{*}
Concentrate DMI (kg/d)	2.08^{b}±0.07	4.31^{a}±0.21	0.000^{***}
Roughage DMI (kg/d)	8.69±0.32	8.02±0.63	0.359
Body condition score	3.40±0.04	3.48±0.03	0.857
Birth weight of calves (kg)	22.48±1.54	24.60±0.86	0.276

*Means with different superscript in a row differ significantly (*P<0.05; ***P<0.001)*

The birth weights of calves in both the groups were statistically similar (Table 3) though the calves born to treatment group were on an average about 2.1 kg heavier than those born to buffalo heifers of control group. The results are in agreement to those of other workers (Keady *et al.*, 2001; Khan *et al.*, 2002; Panigrahi *et al.*, 2005; Kamboj *et al.*, 2016) who observed that calf birth weights were not significantly affected by plane of pre-calving nutrition. Contrary to this Singh *et al.* (2003) and Das *et al.* (2007) reported that increased feeding before calving increased average body weight of calves.

 DOI 10.5455/ijlr.20190508112036

Production Performance

The daily milk yield of treatment group of heifers was higher (P<0.05) than that of control group which might be attributed to a positive energy balance due to extra concentrate feeding during pre-partum as well as post-partum periods. The additional concentrate feeding might have also encouraged development of secretory tissues in mammary glands and made available extra nutrients for enhanced milk synthesis. The positive effect of challenge feeding on milk yield was also reported by Singh *et al.* (2003) and Das *et al.* (2007). The milk composition parameters like fat, lactose, protein and SNF were similar in both the groups (Das *et al.* 2007). On the other hand, Singh *et al.* (2003) reported that animals kept on higher feeding levels had better milk fat content than animals kept on lower feeding level.

Days to peak milk yield of the heifers were significantly (p<0.05) lower in CN as the control group attained peak yields quite earlier than those in CF group. However, peak milk yield (kg) was similar in both the groups. These findings are in agreement with Bhatt *et al.* (2000) and Das *et al.* (2007) who found that higher feeding regimes had no significant effect on peak milk yield of animals. While, Singh *et al.* (2003) reported significant higher peak yield in animals fed at higher level than those fed at lower level.

Table 4: Production performance of Surti buffaloes heifers during post-partum periods

Parameter	CN	CF	P value
Milk yield (kg/d)	2.16^{b}±0.14	3.61^{a}±0.42	0.040*
Milk fat (%)	5.90±0.19	5.94±0.23	0.919
6 % FCM (kg/d)	2.15±0.54	3.59±1.42	0.08
Solid not fat (%)	10.18±0.13	10.01±0.08	0.246
Protein (%)	4.31±0.09	4.20±0.07	0.342
Lactose (%)	5.23±0.05	5.28±0.04	0.194
Peak yield (kg/d)	3.47±0.18	4.00±0.35	0.589
Day to peak milk yield (d)	46.70^{b}±2.90	58.40^{a}±3.62	0.021*
Calf mortality (%)	20.00 (2)	0.00 (0)	--

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

Economics of Feeding

The economics of feeding is mentioned in Table 5. Total feed cost (Rs. /d/animal) in treatment group was significantly higher (P<0.01) than control group because of additional concentrate consumed by animals. However, higher feed cost was compensated by high milk yield which fetched more price per day as compared to control. Kamboj *et al.* (2016) also found that challenge feeding in crossbred cows was economical. Cost per kg milk yield was significantly higher in CN group as compared to CF indicating that challenge feeding is economical also.

DOI 10.5455/ijlr.20190508112036

Table 5: Economics of feeding during pre-partum and post-partum periods

Parameter	CN	CF	P value
Total Feed cost (Rs. /d/animal) *	110.39^{b}±3.34	133.57^{a}±5.53	0.001**
Milk selling price (Rs. /d/animal)	82.37^{b}±7.15	142.41^{a}±17.90	0.011*
Net Profit (Rs. /d/animal)	-28.02±5.91	8.54±8.15	--
Feed cost/milk (Rs. /kg)	53.20±4.02	40.56±4.22	0.044*

**Cost of concentrate: 21 Rs/Kg, Green fodder: 3 Rs/Kg, Dry fodder: 6 Rs/Kg, Milk Fat: Rs 640/Kg; Means with different superscript in a row differ significantly (*P<0.05; **P<0.01)*

Conclusion

It was concluded that the practice of challenge feeding improved the productive performance of Surti buffalo heifers during early lactation which was also economically beneficial.

Acknowledgement

We are thankful to Director of Research, Navsari Agricultural University and Research Scientist and Unit Head, Livestock Research Station, Navsari Agricultural University, Navsari for permitting this study and providing necessary facilities.

References

1. AOAC. (2005). *Official Methods of Analysis.* 18th edn. Association of Official Analytical Chemists. Washington DC, USA.
2. Bhat, A. S., Parmar, O. S. and Gill, R. S. (2000). Economical impact of challenge feeding on milk yield and its composition in high yielding crossbred cows. *Indian Journal Dairy Science*, 53, 93-98.
3. Dann, H. M., Litherland, N. B., Underwood, J. P., Bionar, M., D'Angelo, A., McFadder, J. W. and Drackley, J.K. (2006). Diet during far off and close-up dry period affect periparturient metabolism and lactation in multifarious cows. *Journal of Dairy Science*, 89, 3563-3577.
4. Das, K. S., Das, N. and Ravikumar, G. V. P. P. (2007). Effect of 'steaming-up' on subsequent production in dairy cows. *Indian Journal of Animal Science*, 77, 583-585.
5. Edmonson, A. J., Lean, I. J., Weaver, L. D. Farver, T. and Webster. G. (1989). A body condition scoring chart for Holstein dairy cows. *Journal of Dairy Science*, 72, 68-78.
6. Guo, J., Peters, R. R. and Kohn, R. A. (2007). Effect of a transition diet on productive performance and metabolism in periparturient dairy cows. *Journal of Dairy Science*, 90, 5247-5258.
7. Hough, R. L., McCarthy, F. D. Kent, H. D., Eversole, D. E. and Wahlberg, M. L. (1990). Influence of nutritional restriction during late gestation on production measures and passive immunity in beef cattle. *Journal of Animal Science*, 68, 2622-2627.
8. ICAR. (2013). *Nutritional Requirements of Cattle and Buffalo.* Indian Council of Agricultural Research, New Delhi, India.
9. Kamboj, M. L., Mengistu, R. A., Bindal, S. and Datt, C. (2016). Challenge feeding and milk production performance in crossbred cows. *Indian Journal of Animal Nutrition*, 33, 285-289.
10. Keady, T. W. J., Mayne, C. S., Fitzpatrick, D. A. and McCoy, M. A. (2001). Effect of concentrate feed level in late gestation on subsequent milk yield, milk composition and fertility of dairy cows. *Journal of Dairy Science*, 84, 1468-1479.
11. Khan, M. A. A., Islam, M. N., Khan, A. A. S. and Akbar, M. A. (2002). Effect of feeding high and low energy levels during late pregnancy on the performance of crossbred cows and their calves. *Asian-Australasian Journal of Animal Science*, 17, 947-953.

DOI 10.5455/ijlr.20190508112036

12. Mondal, T., Gupta, M., Parthasarathi, B., Khatti, A., Singh, S., and Choudhary, S. (2018). Transition stress in dairy cattle- role of energy balance and micronutrients. *International Journal of Livestock Research*, 8(11), 22-28. doi: 10.5455/ijlr.20171211022928
13. Panigrahi, B., Pandey, H. N. and Pattnaik, A. K. (2005). Effect of pre-partum feeding of crossbred cows on growth performance, metabolic profile and immune status of calves. *Asian-Australasian Journal of Animal Science*, 18, 661-666.
14. Singh, J., Singh, B., Wadhwa, M. and Bakshi, M. P. S. (2003). Effect of level of feeding on the performance of crossbred cows during pre-and post-partum periods. *Asian-Australasian Journal of Animal Science*, 16, 1749-1754.
15. Snedecor, G.W. and Cochran, W.G. (1994). *Statistical Methods.* 7th edn. Iowa State University Press, Ames, IA., USA.

DOI 10.5455/ijlr.20190508112036