SHORT COMMUNICATION

Reproductive and Productive Performance of Surti Buffaloes as Influenced by Different Protein Levels in the Ration around Parturition

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Abstract

The transition period is the most stressful in the annual cycle of dairy animals, particularly buffaloes, as feed intake is reduced, while the demand for support of fetal growth and galactopoietic functions are increased. This experiment was carried out on 30 advanced pregnant Surti buffaloes in two phases (15 each) from 210 days of gestation till 90 days postpartum to evaluate the effect of varying level of protein feeding on their productive and reproductive performance. The animals were randomly divided into three equal groups each of 10 (5+5) animals. Control group (n=10) was fed concentrate mixture to meet the nutrient requirement as per ICAR (2013) standards. Whereas, treatment group 1 and 2 consisted of 15% and 25% more CP % of requirements, respectively, over Control group. Results revealed that at parturition buffaloes in all the three groups experienced reduction in body weight of around 38 kg due to expulsion of fetus, placenta and lochia. However, in treated groups of buffaloes within three months postpartum rise in body weight was observed. Moreover, no significant difference was observed in placental expulsion time or weight of placenta or time taken for uterine involution and onset of first postpartum estrus. Milk production of first three months and peak yield per day were significantly higher in the buffaloes fed with 25% more CP. Moreover, fat per cent, 6 % FCM whole milk yield and milk yield per day were also significantly ($p<0.05$) higher in buffaloes fed with 25% more CP. It was concluded that 25% more CP supplementation have increased milk yield and improved milk composition without any adverse effect on reproductive health status of buffaloes.

Key words: 6 % FCM, Crude protein, Milk fat, Parturition, Surti buffalo.

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Introduction

The period from three months pre-partum till three months post-calving (transition period) is the most stressful in the annual cycle of dairy animals, particularly buffaloes, as feed intake is reduced, while the demand for support of foetal growth and galactopoietic functions are increased (Mondal *et al.*, 2018). Protein is the most critical nutrient for the growth, production and reproduction in buffaloes. Buffaloes fed with steaming up diet, showed increased ($p<0.05$) calving rate (+14.7%), daily milk yield (+44.8%) and calf birth weight (+25.6%) over the un-supplemented group of buffaloes (Abdul kareem *et al*., 2011). The impact of the inadequate protein intake during last trimester of pregnancy cannot be overcome by increased feed intake during postpartum period, as is observed in most of the cases in field conditions. Iqbal *et al.* (2017) concluded that provision of concentrate ration @ 0.5 % of body weight is economical for optimum growth performance and feed conversion ratio (FCR) in Nilli-Ravi buffaloes heifers. Challenge feeding during pre-partum period has shown the increased ($p<0.05$) daily milk yield in buffaloes and zero mortality rate in new born calves (Raval *et al*., 2019). Thus, considering this fact, we conducted a study regarding feeding of varying level of protein around parturition in Surti buffaloes to improve their productive and reproductive performance.

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Materials and Methods

The experiment was conducted at Surti buffalo farm of RBR Unit of Anand Agricultural University, Anand, Gujarat, India over a period of two years. Total 15 pregnant Surti buffaloes (*Bubalus bubalis*) of identical age, body weight and parity in their last trimester of gestation were distributed in to three equal treatment groups, 5 buffaloes in each group, for this

study. The experiment was repeated on another 15 pregnant buffaloes next year. The experimental diet was fed from the 270 days of gestation and was kept continued up to 90 days postpartum. The control and two treatment groups of 2 phases over a period of 2 years (n=10 each) were as follows:

Control (C): Concentrate mixture requirement supply as per ICAR (2013) (18% CP)

Treatment-1: Control + 15% more CP%

Treatment-2: Control + 25% more CP%

On a daily basis, the voluntary feed intake was recorded. Based on voluntary feed intake and composition of feed ingredients, the DM intake was derived for each buffalo in a particular treatment group. At the biweekly interval, body weight of each buffalo was measured by using digital weighing balance throughout the whole experimental period. Buffaloes were weighed early in the morning before feeding. Cost of feeding was derived based on the cost of feed ingredients and milk selling rate. All the buffaloes were maintained individually under observation and weekly palpation to assess uterine involution and symptoms of onset of first postpartum estrus. Regarding production performance, the milk yield was recorded on daily basis for each buffalo. The milk samples were taken for its composition from morning and afternoon milking and evaluated in milk analyzer (Lactoscan). The data generated was analysed for statistical significance using a package for the social science (SPSS, version 2010) as per Snedecor and Cochran (1994).

Results and Discussion

Changes in body weight around parturition of Surti buffaloes fed with different level of protein, *i.e.* Control (18% crude protein), T_1 (15% more CP %) and T_2 (25% more CP %) are depicted in Table 1. Due to parturition, *i.e.,* expulsion of fetus, placenta and lochia; reduction in body weight of buffaloes in all the three groups recorded was around 38 kg. However, in treated groups of buffaloes, within three months postpartum, rise in body weight was recorded. Moreover, no significant difference was observed in placental expulsion time or weight of placenta or time taken for uterine involution and duration of onset of first postpartum period. Pre-partum or post-partum complication was not observed in any case. Further, Singh *et al*. (2019) reported that calves born from challenged fed cows were about 3.60 and 4.67 kg heavier than calves born to cows of un-supplemented group, and their birth weight of calves was also increased ($p<0.05$) by 18.09 and 23.61 %, respectively, in T_1 and T_2 challenged fed groups of calves.

Milk yield, its composition and economics are recorded in Table 2 and 3, respectively. Milk production data included the milk suckled by calves @ 10% body weight. Statistically the milk production of first three months and peak yield per day were significantly ($p<0.01$) higher in the buffaloes fed with 25% more CP. Whole milk yield, milk yield per day and 6 % FCM recorded were also higher in buffaloes fed with 25% more CP. Similar results were reported in Murrah buffaloes by Ranjan *et al*. (2012). Feeding 5% higher protein level than the requirement had significantly increased milk fat%, however other components were unaffected with higher protein level in cows (Sarker *et al.,* 2015). Islam *et al.* (2021) reported contrary results than the present finding of increased in milk yield and FCM yield, however, the, milk composition remained unaffected in lactating buffaloes with different level of protein fed. Therefore, it can be concluded that feeding high level protein diet as concentrate during postpartum period is beneficial to meet with positive energy balance and improve production performance without affecting postpartum function adversely.

Table 1: Performance of Surti buffaloes, influenced by feeding different protein levels around parturition (n=10 x 3=30).

Performance Parameters	Treatment groups		
	Control (C)	Control + 15% more CP% (T_1)	Control + 25% more CP% (T_2)
Parity	3.30±0.55	2.90±0.60	3.80±0.67
B.Wt. (kg) before parturition	439.20±16.92	414.30±14.03	447.20±19.71
B.Wt. (kg) after parturition	400.50±17.52	377.40±13.33	408.30±19.18
Difference in B.Wt. (kg)	38.70±2.94	36.90±1.10	38.70±1.43
B.Wt. after 1st month PP (kg)	409.50±15.00	388.20±19.80	415.00±17.50
B.Wt. after 2nd month PP (kg)	415.00±14.40	392.80±15.80	422.50±16.33
B.Wt. after 3rd month PP (kg)	419.70±13.50	400.00±17.80	427.70±14.00
Birth weight of calves (kg)	24.94±0.58	23.42±0.94	24.91±0.67
Placental expulsion time (hr)	6.01±0.66	6.53±0.64	5.28±0.52
Weight of placenta (kg)	2.11±0.09	2.03±0.15	2.29±0.09
Time for ut. involution (days)	29.30±1.05	28.10±0.95	29.50±0.92
Onset of first PP estrus (days)	79.40±2.89	76.60±3.18	74.50±2.80

PP- Postpartum; Statistically the differences were non-significant between the treatment means of all parameters.

Table 2: Production performance of Surti buffaloes as influenced by feeding different protein levels from before 30 days till 90 days of parturition (n=30)

Milk yield (kg)	Treatments / Groups			SEm	CD (0.05)	CV%
	Control (C)	Control + 15% more CP% (T_1)	Control + 25% more CP% (T_2)			
Milk prod of 90 days postpartum (kg)	652.20^{c}±6.09	748.20^{b}±4.70	825.60^{a}±8.40	6.12	17.13	6.4
Milk yield /Day (kg)	7.25^{c}±0.07	8.31^{b}±0.05	9.17^{a}±0.09	0.07	0.19	6.40
Peak yield (kg)	8.50^{b}±0.30	9.20^{a}±0.39	10.30^{a}±0.40	6.06	14.48	6.23
Days to reach peak yield	36.90±5.43	38.80±6.26	41.10±6.47	5.90	NS	5.35
6% FCM production for 90 days (kg)	758.44^{c}±6.42	924.50^{b}±7.80	1084.06^{a}±9.75	7.83	21.89	6.58
6% FCM (Yield(kg)/day)	8.42^{c}±0.07	10.27^{b}±0.09	12.04^{a}±0.11	0.08	0.24	6.57
Average feed cost / Day (Rs.)	160.00^{c}±5.89	170.12^{b}±4.29	185.94^{a}±4.18	4.79	9.13	6.40
Feed cost per kg 6% FCM (Rs.)	19.00^{c}±0.30	16.56^{b}±0.33	15.44^{a}±0.30	0.31	0.91	5.18
Difference/ reduction in feed cost Rs. (% benefit)	---	2.44 (12.85%)	3.56 (18.74%)	---	---	---

Superscripts, a, b, c indicate significant differences between the group means at 5% levels.

Table 3: Milk compositions % of Surti buffaloes as influenced by feeding different protein levels 30 days before till 90 days postpartum (n=30).

Milk constituents	Treatments / Groups			SEm	CD (0.05)	CV%
	Control (C)	Control + 15% more CP% (T_1)	Control + 25% more CP% (T_2)			
Total Solid	17.59^{c}±0.03	18.02^{b}±0.16	18.76^{a}±0.07	0.11	0.32	4.89*
Fat	7.4^{c}±0.03	8.04^{b}±0.04	8.71^{a}±0.03	0.04	0.10	3.47*
Solid Not Fat	10.19±0.04	9.98±0.11	10.05±0.09	0.09	0.34	3.60^{NS}
Protein	3.46±0.16	3.68±0.10	3.59±0.14	0.13	0.22	4.19^{NS}
Lactose	3.46±0.17	3.51±0.12	3.51±0.33	0.20	0.33	3.89^{NS}

Means with different superscripts differ significantly (P<0.05) between the control and treatments group.

Conclusion

From the findings of this study, it can be concluded that feeding high level protein diet (15 and 25% more CP) during transition period in Surti buffaloes is beneficial to meet with the positive energy balance and improve postpartum reproductive and productive performance. Feeding high level protein diet (25% CP) during postpartum period in Surti buffaloes leads to increase in milk yield and fat %. Hence, it reduces the cost of feeding per kg milk production (with 6% FCM) up to 18.74%.

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