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RESEARCH ARTICLE

PRE PARTUM SUPPLEMENTATION ON CERTAIN CHARACTERISTICS OF DAM AND CALF IN LOCAL BUFFALOES UNDER MIXED FARMING SYSTEM

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ABSTRACT

Sixty buffaloes were selected for an on-farm study to elucidate the effect of pre-partum supplementation on body condition score of dam, milk production, birth weight and growth rate of calf among local buffaloes reared under mixed farming system in Bidar district, Karnataka, India. Supplementation was done for 90 days till parturition using concentrate feed of known composition. Results revealed that pre-partum supplementation had a significant ($P \leq 0.01$) effect on body condition score of dam before and at the end of 3rd month of lactation and calf birth weight (27.75 ± 0.39 , 27.33 ± 0.40 , 28 ± 0.44 vs. 24.33 ± 0.56). Whereas, no effect was observed on calf growth rate/ average daily gain. Milk yield was significantly ($P \leq 0.01$) higher in dam supplemented (4.45 ± 0.20 , 4.62 ± 0.20 , 4.90 ± 0.20) compared to non supplemented groups (3.50 ± 0.20). However, no significant difference was observed in the milk constituents like milk fat, solid not fat and total solids.

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INTRODUCTION

India has the largest bovine population and ranks first in milk production in the world. India is the mother land for best milch breeds of buffaloes (105 millions, 18th Livestock census 2007). In developing countries like India, in spite of large livestock resource, average productivity is quite low which might be attributed to low genetic potential, poor nutrition and management and critical care at times. Since, livestock rearing in India is mostly carried out by landless laborers, small and marginal farmers care and management of the animals remains to be an area of concern. They do not always supplement milking animals with adequate quantity of concentrate but, only a small quantity during milking. Supplementation with concentrates is a key aspect to improve productivity in tropical dairy production. Improved nutrition during pre-mating period

stimulates ovulation and conception rates (Robinson *et al.*, 2006). On the other hand, enhancing nutrition by supplementary concentrate diet during the late gestation period increases birth weights of calves and milk production from the dam (Sanh, 2009). Body condition is a reflection of the body fat reserves carried by the animal and these reserves will be used to satisfy the energy needs of animal during lactation, scarcity of food and during ailments. Condition scoring provides a better understanding of biological relationships between body fat, milk production and reproduction. The visual and tactile appraisal of animal condition provides a good assessment of body fat reserves minimizing the influence of frame size and intestinal contents (Anitha *et al.*, 2010). Correlating the body condition and production of animal would help the farmers to increase the overall efficiency of feeding and management practices to derive maximum production. Many studies have been undertaken in high yielding cows in commercial farms. But, there is a little information on the effect of pre-partum supplementation and body condition score on production in small holder dairy system.

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Hence, an on-farm trial was undertaken to investigate the effect of supplementation on body condition score, milk production, birth weight and growth rate of calves in buffaloes reared under mixed farming system in Bidar district of Karnataka.

MATERIALS AND METHODS

Locale of the study

The on-farm study was conducted in six villages of Bidar district, Karnataka viz., Ghotala, Jajanmugali, Ramthirth, Chowkiwadi, Umapur and Laheshwar.

Selection of animals and feeding trial

60 buffaloes of 7month gestation were selected and they were distributed randomly and equally into 4 groups in which 3 groups supplemented with concentrate and a control group; where no supplementation to the animal was done. All the animals were dewormed before the start of trial and the animals of supplementation groups were fed with 2kg of concentrate feed of known composition daily for a period of 90 days along with the dry and green fodder as per the farmer's own practice.

Data collection

Body condition Score: Scoring was done to all the selected animals at three stages; before the start of feeding trial, before parturition and at the end of 3rd month of lactation by handling and looking at the certain points of animal body such as tail head, rump region and transverse process of the lumbar vertebrae to assess the fat coverage on the bone prominences at these points using 5 point scale in 0.25 increments (Wildman *et al.*, 1982).

Birth weight and Growth rate: The birth weight and the body weight of the calf at the age of three months were recorded using the hanging balance. Growth rate was estimated considering the average daily gain of the calves which was calculated mathematically considering the birth weight and the final body weight at the end of the study.

Milk parameters: The milk yield, fat% and SNF estimation was carried out at 0, 30, 60 and 90th day of lactation. The milk yield was estimated using measuring cylinder, fat % was estimated using electronic milko-tester and SNF was estimated by difference method after estimating total solids by oven drying technique.

RESULTS AND DISCUSSION

Body condition score

The animals score between >2 to 3+ were considered to be average or good condition, <2 were considered to be under conditioned; whereas >4 were considered to be over conditioned (Gearhart *et al.*, 1990). The mean scores of body condition at different stages for animals of different groups (Table 1) suggest that the pre-partum supplementation had a positive effect on body condition in turn on productivity of the animal and birth weight of the calves concluded that the

supplementation during pre-partum period, BCS, milk yield during early lactation and birth weight of calves are related. Before the start of feeding trial all the animals irrespective of the group were having almost similar condition score but, slight difference found between group IV and control group (I). At the time of parturition control group animals were having significantly ($P \leq 0.01$) low mean score than other groups suggests that the supplementation aids in maintaining the body reserves which is the reflection of good body condition. At the end of third month of lactation the mean scores of body condition of supplemented groups differed significantly ($P \leq 0.01$) with that of control group where in which more reduction in condition was evident among control group. Low body condition was observed among the non supplemented animals both at the time of parturition and at the end of 3rd month of lactation. Because, there was no scope for maintaining body resource which was supposed to be used for production in the early lactation period since, in the early lactation energy derived from the intake of feed is less than that of required for maintenance and production so utilization of available body reserves results in loss of condition and body weight; is necessary to meet the requirements for production. Hence, feeding during mid and late lactation (pre partum period) must be adequate to maintain milk production and allow the animal to restore body condition for the subsequent lactation (Butler and Smith, 1989).

Gearhart *et al.* (1990) stated that the ideal BCS at drying off should be the same as that desired at calving to achieve the maximum production. Froot and Croxton (1978) have also stated that the animals which are having an intermediate amount of fat, as estimated by body condition score, produced more milk than animals at either extreme. Das and Das (2007) reported that almost all the body measurements at pre-partum were positively and significantly correlated with the production traits of cross bred cows such as total milk yield, peak yield and days taken to attain peak yield. Whereas Ballard *et al.*, (2001) have reported that that energy supplementation during pre and post partum is not having any significant effect on body condition score of animals (2.91, 2.96 vs.2.89). Bayemi *et al.* (2008) have also reported that the pre-partum levels of feeding did not have any effect on body condition score (BCS) at 12 weeks of lactation and also no significant effect on birth weight and growth rate of calves.

Birth weight and growth rate of buffalo calf

The mean birth weights of calves in kg among the different supplemented groups (27.75, 27.33 and 28 kg) varies significantly with the non supplemented group (24.33kg) (Table 2) suggests the positive effect of challenge feeding on the birth weight of calf since, the supplementary feeding during pre partum period aids in growth of fetus as over one-half of the fetal growth occurs during last trimester of gestation (Prior and Laster, 1979). Similar findings were reported from Rafiq and Inskeep (1989) and Sajjan and Yadav (2007). Das *et al.*, (2007) and Mahiyuddin and Praharani (2010) reported that the calves born to animals under steaming-up ration were having higher birth weight comparatively than the calves born to animals of control group. Toolsee and Boodoo (2001) and Bayemi *et al.* (2008) have reported that breed factor is also

Table 1. Body condition score of dam

| Particulars | Groups | | | |
|---|--------------------------|--------------------------|-------------------------|--------------------------|
| | I | II | III | IV |
| BCS before feeding trial | 2.70 ^c ±0.01 | 2.78 ^{de} ±0.02 | 2.81 ^d ±0.01 | 2.92 ^{cd} ±0.01 |
| BCS before parturition | 3.10 ^{bc} ±0.01 | 3.35 ^b ±0.02 | 3.37 ^b ±0.01 | 3.53 ^a ±0.01 |
| BCS at the end of 3 months of lactation | 2.03 ^f ±0.03 | 2.58 ^e ±0.01 | 2.57 ^e ±0.01 | 2.72 ^e ±0.01 |

Notes: I = Control group; II, III and IV = groups supplemented with concentrate feed
^{abc} means within rows without common superscripts are significantly different at ($P \leq 0.01$)

Table 2. Mean values of birth weight and average daily gain under study

| Particulars | Supplementation | | | |
|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | I | II | III | IV |
| Birth weight (Kg) | 24.33 ^b ±0.56 | 27.75 ^a ±0.39 | 27.33 ^a ±0.40 | 28.00 ^a ±0.44 |
| ADG (gm) | 272.22±9.84 | 280.56±22.27 | 281.48±21.77 | 300.93±18.54 |

Notes: I = Control group; II, III and IV = group supplemented with concentrate feed
^{abc} means within rows without common superscripts are significantly different at ($P \leq 0.01$)

Table 3. Mean values of milk parameters under study

| Particulars | Supplementation | | | |
|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | I | II | III | IV |
| Milk yield (lit/day) | 3.79 ^c ±0.20 | 4.40 ^b ±0.20 | 4.55 ^b ±0.20 | 4.93 ^a ±0.20 |
| Milk fat (%) | 6.29±0.14 | 6.40±0.14 | 6.41±0.14 | 6.50±0.14 |
| Solid not fat (%) | 8.89±0.10 | 8.95±0.10 | 8.90±0.10 | 8.98±0.10 |
| Total solids (%) | 15.19±0.17 | 15.35±0.17 | 15.31±0.17 | 15.48±0.17 |

Notes: I = Control group; II, III and IV = groups supplemented with concentrate feed
^{abc} means within rows without common superscripts are significantly different at ($P \leq 0.01$)

having effect on birth weight of calves. The mean ADG of calves in grams among different groups (Table---) revealed no significant difference among supplemented groups and non supplemented group suggests that the supplementation during pre partum period in buffaloes is not having any effect on ADG of calves. Similar findings were reported from Bayemi *et al.*, (2008) and also reported that the breed factor also not having any effect on growth rate of calves.

Milk parameters

Milk yield: The analysis of variance revealed a significant ($P < 0.01$) difference between control and supplemented groups (Table 3). The higher yield suggests that the challenge feeding had a positive effect on milk yield (Greenhalgh and Gardner, 1957; Rafiq and Inskeep, 1989; Ballard *et al.*, 2001 and Das *et al.*, 2007). The nutrient supplementation may lower stress during early lactation, and this may be the reason for significant increase in milk yield of the present study. The increase in yield suggests that supplementation had a positive effect on milk production by increasing the body reserves at pre-partum, which were mobilized for development of extra milk secretory tissues during lactation. Bhat *et al.*, (2007) have also reported that increased milk production during the first 150 days of lactation is attributed to the challenge feeding, compared with the conventional feeding strategy. But, difference between and within the supplemented groups might be attributed to management practice, feeding practice followed by the individual farmers.

Milk composition: The mean fat% (6.40, 6.41 and 6.50 vs. 6.29), total solids (15.35, 15.31 and 15.48 vs. 15.19g) and solid not fat (SNF) (8.95, 8.90 and 8.98 vs. 8.89g) values of

supplemented groups were found to be non significant statistically with that of control group. But, the slight difference in values of fat and SNF were attributed to supplementation of additional essential nutrients in the form of concentrate feed during pre-partum. Mathialagan *et al.*, (2009) have also reported that The SNF content could be increased to an average of 0.49% and 0.35% in cows and buffaloes respectively on mineral supplementation. Oalafadehan *et al.*, (2008) reported that the total solid yield in supplemented cows (430 and 451g/d) were significantly higher than those of the non-supplemented cows (343g/d). Bhat *et al.* (2007) have reported that the milk fat, total solids and SNF content of challenge fed buffaloes were statistically at par compared to the buffaloes maintained as control. Steaming-up during pre-partum period had no effect on the fat and SNF content of the milk (Karim *et al.*, 2001 and Das *et al.*, 2007). But, among the supplemented groups the difference was non-significant. Similar findings were reported by Rafiq and Inskeep (1989), Ballard *et al.*, (2001), Gaafar *et al.*, (2009).

Conclusions

- Ideal body condition of the dam can be achieved by supplementing additional concentrate feed to the animals at pre-partum which in turn helps for higher production during the subsequent lactation, good birth weight of calves and less mortality.
- Higher production during the subsequent lactation can be achieved by supplementing additional concentrate feed to the animals at pre-partum.
- Promotion of improved feeding practices and other scientific management practices can be achieved by imparting awareness among farmers through on-farm trials.

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