

Original Research Article

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Effect of Challenge Feeding on Calf Birth Weight and Cow Body Weight Gain

Neeraj Singh, P. A. Kahate*, R. R. Shelke, S. D. Chavan and S. P. Nage

*Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh
KrishiVidyapeeth, Akola, Maharashtra-444104, India*

**Corresponding author*

ABSTRACT

The aim of present study was to find out the effect of 'challenge feeding' on performance and economics of milk yield of crossbred cows. Eighteen advance pregnant crossbred cows were selected 60 days before expected date of calving and were divided into 3 groups i.e. control (T₁), treatment (T₂) and (T₃) on the basis of milk yield, parity and body weight for this study. During the pre-partum period, animals of T₁ control group were fed 1 kg concentrate for maintenance per day from 60th day to prior to calving till the day of parturition. T₂ group animals were fed 1 kg concentrate for maintenance plus 1.5 kg concentrate as challenge feed per day from 60th day to 22nd day prior to calving and from 22nd day prior to calving till parturition animals were fed 1 kg concentrate for maintenance plus 2 kg concentrate as challenge feed per day. T₃ group animals were fed 1 kg concentrate for maintenance plus 2 kg concentrate as challenge feed per day from 60th day to 22nd prior to calving and from 22nd prior to calving till parturition animals were fed 1 kg concentrate for maintenance plus 2.5 kg concentrate as challenge feed per day. During the postpartum period, animals of T₁, T₂ and T₃ group were fed based on their milk yield as per thumb rule i.e. 1 kg concentrate per day for maintenance and 1 kg concentrate per 2.5 kg of milk production. The mean DMI (kg) in T₁, T₂ and T₃ cows during pre-partum period was 7.82, 9.04 and 10.09 kg respectively which did significantly between treatments. The postpartum DMI was significantly higher (P<0.05) in T₃ (11.40 kg) as compared to T₂ (10.74 kg) and T₁ (9.66 kg) treatments. The overall mean daily milk yield per animal was significantly higher (P<0.05) in T₃ (11.03 kg) as compared to T₂ (9.85 kg) & T₁ (6.96 kg). The difference in mean calf birth weight T₁, T₂ and T₃ was 19.9, 23.5 & 24.6 kg respectively. The overall means of body weight gain of cow in the treatment T₁, T₂ and T₃ groups were 31.33, 41.33 and 46.83 kg, respectively. It was concluded that the practice of challenge feeding of crossbred cows improved the production performance during early lactation without affecting their periparturient health and was found to be economical.

Keywords

Challenge feeding,
Milk production,
Crossbred cows,
Pre-partum, Post-
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Introduction

India is predominantly an agriculture country as 65% of India's population is dependent on agriculture and allied activities. The population of milch crossbred animals stands at 19.42 million, in 2012 and milk production is about 16 % of the total milk produced in country. In developing countries, more than 70% of the expenditure, in dairy farming is on the feeding of animals. Most of the farmers are, not aware of the benefits of quality feeding and that of balanced diet. In India, concentrate feeding to animals is neglected due to poor economic condition of farmers.

The milch animals are deprived of concentrate during dry period as well as in milking stage and thus these dairy animals are deprived of essential nutrients. These nutrients are very much essential to fulfil the requirements of growth and maintenance of Foetus, placenta, and uterus as well as to replenish the body tissue losses due to milk production postpartum. This lack of concentrate feeding along with low availability of good quality fodders is the major reason behind the poor productivity of our crossbred cattle population. Many reports are available on challenge feeding however, the information showing the effect of Challenge feeding on performance and economic of animal is good under Indian condition. The present work was under taken up to make comparative study of challenge feeding.

Materials and Methods

The present investigation entitled "Effect of challenge feeding on performance and economics of milk production of crossbred cows" was conducted at Livestock Instructional Farm, Department of Animal Husbandry & Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2018-2019.

Selection of animals

Eighteen pregnant crossbred cows were selected 2 months prior to calving according to data obtained from breeding records of animals. As and when available animals were selected and divided in 3 groups based on parity, body Weight and milk yield of previous lactations to maintain homogeneity among experimental animals (Table 1). The same process was adopted till there were six animals in each treatment group. The experimental animals were separated from the main herd 7-10 days before start of experiment to make the experimental animals adjust to the new environment.

Duration of experiment

The present study was conducted for a period of 60 days pre-partum to 60 days postpartum. The total duration of the experiment was approximately 6 months as all the animals were not available at the same time.

Feeding and Management

Eighteen dry pregnant crossbred cows were selected from the Dairy herd of the university on the basis of Parity, body weight, previous lactation yield and expected date of calving (Table 1). The experiment lasted 60 days pre-partum and 60 days post-partum period duration. The animals divided into three equal groups were offered feed animals of T₁ control group were fed 1 kg concentrate for maintenance per day from 60th day to prior to calving till the day of parturition. T₂ group animals were fed 1 kg concentrate for maintenance plus 1.5 kg concentrate as challenge feed per day from 60th day to 22nd day prior to calving and from 22nd day prior to calving till parturition animals were fed 1 kg concentrate for maintenance plus 2 kg concentrate as challenge feed per day. T₃ group animals were fed 1 kg concentrate for

maintenance plus 2 kg concentrate as challenge feed per day from 60th day to 22nd prior to calving and from 22nd prior to calving till parturition animals were fed 1 kg concentrate for maintenance plus 2.5 kg concentrate as challenge feed per day. During the postpartum period, animals of T₁, T₂ and T₃ group were fed based on their milk yield as per thumb rule i.e. 1 kg concentrate (Table 2) per day for maintenance and 1 kg concentrate per 2.5 kg of milk production.

The animals were fed individually. Water was available to the animal around the clock. The animals were weight twice in week before offering them any feed or fodder in morning. All the animals in both the treatment groups were maintained under uniform housing conditions.

All the animals were housed in the shed for the entire period of experiment except before 8 days of calving all the animal were transferred in the individual calving pens.

Immediately after parturition, the animals were closely watched for incidence of any metabolic disorder like parturient paresis, ketosis and other disease mastitis, which were treated accordingly by the Veterinarian.

All the Eighteen crossbred cows were milked by hand milking twice a day i.e. 6 A.M., 5 P.M. As a usual practice the animals were washed before milking. Before each milking teats and udders were massaged to initiate let down of milk. The animals were handled gently and calmly. Milk yield was recorded after each milking.

Statistical analysis

The data obtained was analyzed by Randomized Block Design (RBD) as per the procedure described by Gomez and Gomez (1984).

Results and Discussion

The results of challenge feeding of crossbred cows on DM intake, milk production, milk composition, calf birth weight, peak yield, days taken to achieve peak milk Yield, and economics of challenge feeding on milk yield.

Chemical composition of feedstuffs

The chemical composition of the different feeds used in experimental rations is presented in table 2.

Dry matter intake

The dry matter intake includes pre-partum and post-partum average daily dry matter intakes of cows in all treatment are presented in table 3. The feed intake in crossbred cows during pre-partum period 18.00, 19.58 and 21.17 kg in T₁, T₂ and T₃ group respectively. The feed intake was significantly higher in T₃ as followed by T₁ and T₂ group of cows while lowest in treatment T₁. The average daily intake of dry matter during pre-partum period was 7.82, 9.04 and 10.09 kg per cows in T₁, T₂ and T₃ group respectively. The cows from T₃ group consumed more DM than that of T₁ and T₂ group. Higher intake of DM per 100 kg body weight was observed in treatment T₃ and lowest in T₁. The present results of investigation are agreement with Vandehaar *et al.*, (1999) and Keady *et al.*, (2001) reported that higher feeding of regime in pre-partum periods increases the dry matter intake significantly.

The feed intake in crossbred cows during post-partum period 20.01, 21.47 and 22.64 kg in T₁, T₂ and T₃ respectively. The feed intake was significantly higher in T₃ as compare to T₁ and T₂ group respectively. The overall means of daily dry matter intake during two months of postpartum period were 9.66, 10.74 and 11.40 kg for T₁, T₂ and T₃ group

respectively. The average daily dry matter intake of the T₃ group was significantly higher (P<0.05) over the T₁ and T₂ group during the postpartum period. The overall mean of DMI per 100 kg BW during the postpartum period were 3.12, 3.37 and 3.57 kg in T₁, T₂ and T₃ treatment groups respectively. The average

daily DM intake per 100 kg BW in treatment T₃ was significantly higher as compare to T₁ and T₂ groups. This is might be due to increase the concentrate in challenge feeding. Post-calving DMI did not differ significantly between treatment and control group.

Table.1 Details of experimental animals

| Groups | Sr. No. | Animal No. | Lactations completed | Average lactation yield of previous lactations (kg) | Body weight (kg) |
|----------------|---------|------------|----------------------|---|----------------------|
| I | 1 | CB- 732 | 1 | 1640 | 241 |
| | 2 | CB- 696 | 2 | 1701 | 340 |
| | 3 | CB- 791 | 3 | 1760 | 282 |
| | 4 | CB- 779 | 2 | 1680 | 316 |
| | 5 | CB- 752 | 2 | 1780 | 304 |
| | 6 | CB- 756 | 1 | 1650 | 294 |
| Average | | | 1.83 ± 0.30 | 1701.8 ± 23.43 | 296.16± 13.69 |
| II | 7 | CB- 695 | 3 | 1680 | 262 |
| | 8 | CB- 664 | 2 | 1720 | 335 |
| | 9 | CB- 772 | 1 | 1750 | 280 |
| | 10 | CB- 773 | 2 | 1620 | 320 |
| | 11 | CB- 757 | 3 | 1790 | 305 |
| | 12 | CB- 762 | 1 | 1660 | 290 |
| Average | | | 1.83 ± 0.30 | 1703.33±25.38 | 298.66± 10.92 |
| III | 13 | CB- 788 | 1 | 1710 | 261 |
| | 14 | CB- 731 | 3 | 1770 | 334 |
| | 15 | CB- 746 | 2 | 1750 | 278 |
| | 16 | CB- 730 | 2 | 1690 | 317 |
| | 17 | CB- 776 | 3 | 1650 | 302 |
| | 18 | CB- 778 | 1 | 1680 | 289 |
| Average | | | 1.83 ± 0.30 | 1708.33±18.33 | 296.83± 10.82 |

Table.2 Chemical composition of feedstuff (%DM) basis)

| Sr. No. | Name of fodder crop | DM (%) | CP (%) | CF (%) | EE (%) | NFE (%) | Total ash(%) |
|---------|---------------------|--------|--------|--------|--------|---------|--------------|
| 1. | Berseem | 14.38 | 16.34 | 22.3 | 3.2 | 51.9 | 15.4 |
| 2. | Maize | 23.3 | 7.9 | 28.7 | 1.9 | 48.53 | 7.0 |
| 3. | Napier | 21.4 | 1.8 | 35.76 | 2.40 | 44.18 | 10.16 |
| 4. | Soybean straw | 90.51 | 6.81 | 38.32 | 1.65 | 41.36 | 11.86 |
| 5. | Concentrate | 90.80 | 17.63 | 11.68 | 2.72 | 64.08 | 3.89 |

Table.3 Effect of challenge feeding on DM intake during pre-partum and post-partum period

| | T ₁ | T ₂ | T ₃ | F-test | SE(m) | CD at 5% |
|---------------------------|----------------|----------------|----------------|--------|-------|----------|
| Pre-partum DMI (kg/day) | | | | | | |
| Average daily feed intake | 18.00 | 19.58 | 21.17 | Sig. | 0.20 | 0.60 |
| Average DMI | 7.82 | 9.04 | 10.09 | Sig. | 0.01 | 0.04 |
| Average DMI/100kg BW | 2.55 | 2.84 | 3.16 | Sig. | 0.04 | 0.12 |
| Post-partum DMI (kg/day) | | | | | | |
| Average daily feed intake | 20.01 | 21.47 | 22.64 | Sig. | 0.12 | 0.40 |
| Average DMI | 9.66 | 10.74 | 11.40 | Sig. | 0.02 | 0.08 |
| Average DMI/100kg BW | 3.12 | 3.37 | 3.58 | Sig. | 0.04 | 0.12 |

Table.4 Effect of challenge feeding on calf birth weight, BW gain of cow and Milk production

| | T ₁ | T ₂ | T ₃ | F-test | SE(m) | CD at 5% |
|--|----------------|----------------|----------------|--------|-------|----------|
| Average calf birth weight (kg) | 19.90 | 23.50 | 24.60 | Sig. | 0.28 | 0.91 |
| Average BW gain of cow (kg) | 31.33 | 41.33 | 46.83 | Sig. | 0.56 | 1.79 |
| Increase in calf birth weight Over control (%) | - | 18.09 | 23.61 | - | - | - |

Table.5 Economics of challenge feeding in crossbred cows

| Particulars | Treatments | | |
|---|----------------|----------------|----------------|
| | T ₁ | T ₂ | T ₃ |
| Total concentrate mixture consumed during pre-partum period (kg) | 60 | 160.5 | 190.5 |
| Cost of total concentrate mixture (Rs. 20/ kg) | 1200 | 3210 | 3810 |
| Cost of concentrate mixture over control group | -- | 2010 | 2610 |
| Average calf weight | 19.9 | 23.5 | 24.6 |
| Percent increase of calf weight over control group | -- | 18.09 | 23.61 |
| Average cow body weight gain | 31.33 | 41.33 | 46.83 |
| Increase body wt. gain over control group | -- | 10.00 | 15.50 |

The present results of investigation are agreement with Agenas *et al.*, (2003) reported that the prepartum DMI corresponded well with the experimental design but there was no significant difference in postpartum DMI of the three treatment groups. Dann *et al.*, (2006) observed that the cows that were given the highest plane of nutrition prepartum had lowest DMI postpartum. Guo *et al.*, (2007) reported that Post-calving DMI did not differ significantly between treatment and control group.

Calf birth weight and body weight gain of cow

The mean birth weights of calves in all treatment groups were 19.9 ± 0.35, 23.5 ± 0.22 and 24.6 ± 0.24 kg respectively. The calves born to cows of challenge fed group T₂ and T₃ were about 3.6 and 4.67 kg heavier than calves born to cows of T₁ group and statistically the difference was significant. The birth weight of calves was increased by 18.09 and 23.61 percent in treatment T₂ and T₃ group

respectively. The result of this experiment regarding birth weight agreement with the findings of Kale (1984), Usmani and Inskip (1989), Chokhataridi (1995), Singh *et al.*, (2003) and Das *et al.*, (2007) reported that increased feeding of challenge feeds before calving increased average body weight of calves.

From the table 4 revealed that the total body weight gains of cow in the treatment were T₁, T₂ and T₃ groups were 31.33, 41.33 and 46.83 kg respectively. The live weight of all the animals, at 60 d pre-partum, was comparable, thereafter; it increased linearly in all the groups. The average body weights one day before calving were significantly higher (P<0.05) in T₂ and T₃ increases significantly (P<0.05) in all weeks

Economics of challenge feeding

The total concentrate mixture consumed during pre-partum period in T₁, T₂ and T₃ group 60, 160.5 and 190.5 kg respectively. Since the cost of concentrate mixture 1200, 3210, and 3810 in T₁, T₂ and T₃ group respectively. In treatment group increase calf birth weight over control group in 18.09 and 23.61 percent in T₂ & T₃ group respectively. Body weight gain of cow over control group 10.00 and 15.50 kg in T₂ and T₃ group respectively (Table 5).

The practice of challenge feeding of crossbred cows improved the production performance and calf birth weight during early lactation without affecting their peri-parturient health and calf birth weight increased T₂ and T₃ group over control group by 18.09 and 23.61 per cent respectively. The practice of challenge feeding was found economical in view of cost of per litre of milk production. The cost of milk production per litre in T₁, T₂ and T₃ were 25.90, 23.79 and 23.72 during the early stage of lactation

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