



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2020; 8(1): 1857-1860

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Received: 19-11-2019

Accepted: 21-12-2019

Vikramjit Singh

Ph.D. Scholar, Department of Livestock Production and Management, College of Veterinary and Animal Science, Bikaner, RAJUVAS, Rajasthan, India

Subhash Chander Goswami

Professor, Department of Livestock Production and Management, College of Veterinary and Animal Science, Bikaner, RAJUVAS, Rajasthan, India

Arun KumarJhirwal

Assistant Professor, Department of Livestock Production and Management, College of Veterinary and Animal Science, Bikaner, RAJUVAS, Rajasthan, India

Vijay Kumar Choudhary

Head and Professor, Department of Livestock Production and Management, College of Veterinary and Animal Science, Bikaner, RAJUVAS, Rajasthan, India

Vijay Kumar

Principal Investigator, Centre for Organic Animal Products Technology, Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan, India

Corresponding Author:**Vikramjit Singh**

Ph.D. Scholar, Department of Livestock Production and Management, College of Veterinary and Animal Science, Bikaner, RAJUVAS, Rajasthan, India

Effect of challenge feeding on body condition scores and calf birth weight of Sahiwal cattle

Vikramjit Singh, Subhash Chander Goswami, Arun KumarJhirwal, Vijay Kumar Choudhary and Vijay Kumar

DOI: <https://doi.org/10.22271/chemi.2020.v8.i1aa.8534>

Abstract

The present research was carried out with the objectives of investigating the effect of challenge feeding on body condition scores and calf birth weight of Sahiwal cattle. The present study was conducted on eighteen healthy, advance pregnant Sahiwal cattle from 60 days prepartum to 120 days postpartum. The animals were divided into two groups i.e. control and treatment on the basis of milk yield, parity and body weight. The animals in control group were given standard ration while in challenge fed (treatment) group, the animals were given additional amount of concentrate mixture. The mean body condition score of control and treatment group during prepartum period was 3.49 ± 0.03 and 3.54 ± 0.03 , respectively with a non-significant difference. During post-partum period also there was no significant effect of challenge feeding on BCS of animals of the treatment group. The mean BCS of control and treatment group during postpartum period was 3.43 ± 0.03 and 3.52 ± 0.03 , respectively. The mean birth weights of calves in control and experimental group were 21.67 ± 1.56 and 25.78 ± 1.56 kg, respectively. The calves born to cows of challenge fed group were about 4.11kg heavier than calves born to cows of control group but statistically the difference was not significant.

Keywords: Body condition score, calf birth weight, Sahiwal cattle, challenge feeding, postpartum

Introduction

Livestock plays a crucial role in the economy of India. About 70% of India's population is dependent on agriculture and livestock associated activities. Feeding at a higher plane of nutrition during dry period and in early postpartum period in milch animals is privileged in many ways. 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) [3]. The period from two months pre-calving to three months post calving which includes the transition period is the most stressful period in the annual cycle of dairy cow. It is physiologically and nutritionally a very stressful period, particularly as feed intake is reduced, while the demand for support of foetal growth and initiation of milk synthesis are increased. During late gestation, feed intake is reduced (Hernandez-Urdenata *et al.*, 1976; Johnson and Otterby, 1981; Olsson, 1996; Murphy, 1999) [6, 8, 6, 14] particularly in the last few days of pregnancy. This period is very important for the animals to augment body reserves to meet the demands of growing foetus and to avoid negative energy balance peripartum. The primary aim of the present study was to investigate the response of the challenge feeding on body condition scores and calf birth weight in Sahiwal cattle assigned to different feeding levels during the prepartum and postpartum period.

Materials and Methods

The present study was conducted at the Livestock Research Station, Kodamdesar, RAJUVAS, Bikaner (Rajasthan) from 1st October'18 to 30 June'19.

Selection of Animals

Eighteen (18) pregnant Sahiwal cattle were selected 2 months prior to calving according to data obtained from breeding records of animals. These pregnant animals were distributed in two groups on availability based on parity, body weight and milk yield of previous lactations to maintain homogeneity among experimental animals. The same process was adopted until

there were nine animals in each treatment group. The experimental animals were separated from the main herd 7-10 days before start of experiment to acclimatize these experimental animals in the new suggested environment.

Experimental Treatment

Eighteen Sahiwal cattle will be distributed into two different groups namely control and treatment based on parity, body weight and milk yield of previous lactations, with nine animals in each group.

Table 1: Prepartum feeding schedule

Days prepartum	Control group	Treatment group (Challenge fed group)
60 days to 22 days	Forage-ad lib. Concentrate-2kg/day	Forage-ad lib. Concentrate-3.5kg/day
21 days to 0 day	Forage-ad lib. Concentrate-3.5kg/day	Forage-ad lib. Concentrate-3.5kg +250gm/day till it reaches 1% body weight

Table 2: Postpartum feeding schedule

Days postpartum	Control group	Treatment group (Challenge fed group)
1 st two weeks	Forage-ad lib. Concentrate for maintenance 2kg/day, Concentrate for Production-1kg/3 kg of milk	Forage-ad lib. Concentrate for maintenance-2kg/day Conc. for production-1kg/3kg of milk +500gm concentrate/day till free choice level
2 nd week onwards to 16 th week	Forage-ad lib. Concentrate for maintenance-2kg/day, Concentrate for production 1kg/3kg of milk	Forage-ad lib. Concentrate-Free choice

The amounts of various proximate principles available in readymade concentrate used during challenge feeding are as follows:-

1. M. E. 2500 Kcal/kg
2. Dry matter 89-91%
3. Crude Protein 20-21%
4. Fat (minimum) 4%
5. Crude fibre (maximum) 10%
6. Salt (maximum) 1%
7. Mineral mixture (minimum) 1%
8. Sand silica (maximum) 3%

Additional components that are present in concentrate feed as follows:

1. Vitamin A 7000 IU/kg
2. Vitamin D3 1200 IU/kg
3. Vitamin E 30 IU/kg

The amounts of various chemical compositions available in wheat straw (% DM basis) are as follows:-

1. **Organic matter:** 91.99 ±1.64
2. **Crude protein:** 2.86 ±0.23
3. **Ether extract:** 1.63 ±0.06
4. **Cellulose:** 43.37 ±0.26
5. **Total ash:** 8.12 ±0.17

Observations Recorded

Calf birth weight

The new born calves were weighed just after calving after removal of placenta attached to their body.

Body condition scores

To assess the body condition of the animal with fairly high accuracy, a simple technique called body condition scoring has been described, which is being used in many developed and some developing countries. For recording the body condition of animals, following points will be taken into account:

- a) Vertebral column (chine, loin and rump) flesh covering at the spinous processes of these regions.
- b) **Spinous processes:** Their prominence and sharpness.
- c) **Tail head region:** Prominence of depression backbone and pins and between pin and hook bones.

Considering above points Ferguson *et al.* (1994)^[5] formulated a score chart which was adopted in the present study. The BCS of experimental animals under investigation was recorded on fortnightly interval till the end of experiment. The body condition scoring chart has been presented as under (Ferguson *et al.* 1994)^[5].

Statistical analysis

Data collected from this experiment were statistically analyzed as per Snedecor and Cochran (1994)^[26] for two groups by using statistical 't' test. Data were expressed as Mean ±S.E. For calculation of Mean and S.E, descriptive statistics was used. Comparable means differed significantly if P <0.05 i.e. at 5% level of significance.

Results and Discussion

The results of challenge feeding of Sahiwal cattle on Body Condition Score (BCS) and calf birth weight had been discussed under the following major headings:

Body condition score

Body condition is a reflection of the body fat reserves carried by the animal. The scoring method involves a manual assessment of the thickness of fat and flesh covering at spinous process of lion, rump region, prominence of spinous process, sharpness of spinous process, amount of fat around tail head region and prominence of pelvic bones. The fortnightly means of body condition scores of the control and treatment group during prepartum and postpartum period are presented in table 3 and 4, respectively.

Table 3: Mean ± SE of fortnightly body condition scores of experimental animals during the prepartum period

Fortnight	Control	Treatment	P Value	Significance
4 th	3.47 ± 0.08	3.44 ± 0.07	0.79	NS
3 rd	3.47 ± 0.08	3.53 ± 0.08	0.62	NS
2 nd	3.47 ± 0.08	3.56 ± 0.07	0.43	NS
1 st	3.64 ± 0.06	3.69 ± 0.07	0.56	NS
0	3.39 ± 0.06	3.50 ± 0.07	0.26	NS
Overall	3.49 ± 0.03	3.54 ± 0.03	0.22	NS

Table 4: Mean \pm S.E. of fortnightly body condition scores of experimental animals during the postpartum period

Fortnight	Control	Treatment	P Value	Significance
1 st	3.42 \pm 0.12	3.56 \pm 0.11	0.40	NS
2 nd	3.47 \pm 0.12	3.58 \pm 0.13	0.54	NS
3 rd	3.42 \pm 0.11	3.53 \pm 0.11	0.42	NS
4 th	3.39 \pm 0.08	3.47 \pm 0.08	0.34	NS
5 th	3.42 \pm 0.07	3.44 \pm 0.09	0.61	NS
6 th	3.42 \pm 0.07	3.50 \pm 0.08	0.46	NS
7 th	3.44 \pm 0.08	3.53 \pm 0.10	0.52	NS
8 th	3.47 \pm 0.09	3.56 \pm 0.09	0.52	NS
Overall	3.43 \pm 0.03	3.52 \pm 0.03	0.06	NS

The mean body condition score of control and treatment group during prepartum period was 3.49 \pm 0.03 and 3.54 \pm 0.03. The slightly improved BCS of treatment group (Fig. 4.4) may be due to higher plane of nutrition during prepartum period. The fortnightly body condition score of animals of control and treatment group during the prepartum period did not differ significantly.

During post-partum period also there was no significant effect of challenge feeding on BCS of animals of the treatment group. The mean BCS of control and treatment group was 3.43 \pm 0.03 and 3.52 \pm 0.03, respectively. Although, in treatment group of cows the allowance of concentrate mixture was enhanced increasingly until they reached *ad lib*. In take levels, the significantly higher milk yield of treatment group of cows leading to higher body tissue losses may have nullified the effect of challenge feeding on their body condition scores.

The results obtained regarding body condition scores in the present study are in close agreement to those reported by Holter *et al.* (1990) [7], Roche *et al.* (2013) [21], Kamboj *et al.* (2016) [10] and Raval *et al.* (2019) [20] who observed that body condition scores was not affected during the period of supplementation but present findings were contrary to Samanc *et al.* (2010) [22].

Calf birth weight

The data on mean birth weights of calves born to experimental cows of control and treatment group is presented in table 5. The mean birth weight of calves in control and treatment group was 21.67 \pm 1.56kg and 25.78 \pm 1.56kg, respectively. The calves born to cows of challenge fed group were about 4.11kg heavier than calves born to cows of control group but statistically the difference was not significant. The higher prepartum feeding regime for the treatment group during the prepartum period might have resulted in higher mean calf birth weight as compared to control group.

Table 5: Mean \pm SE of birth weight (kg) of calves born to animals of control and treatment group

Control group		Treatment group	
Cow no.	Calf birth weight	Cow no.	Calf birth weight
311	21	314	21
297	25	123	20
73	28	267	22
277	26	05	32
205	17	160	23
223	15	252	24
166	24	276	29
88	23	06	30
07	16	207	31
Mean	21.67 \pm 1.56	Mean	25.78 \pm 1.56

The result of this experiment regarding birth weight agrees with the findings of Singhal *et al.* (1988) [25], Sharma *et al.* (1993) [23], Prasad and Tomer (1995) [18], Keady *et al.* (2001) [11], Khan *et al.* (2002a) [12], Panigrahi *et al.* (2005) [17], Kamboj *et al.* (2016) [10], Prima *et al.* (2018) [19] and Raval *et al.* (2019) [20] who reported that calf birth weights were not significantly affected by plane of precalving nutrition.

Contrary to these findings Corah *et al.* (1975) [2], Kroker and Cummins (1979) [13], Kale (1984) [9], Usmani and Inskeep (1989) [27], Chokhataridi (1995) [1], Singh *et al.* (2003) [24], Das *et al.* (2007) [4] and Ojha *et al.* (2015) [15] reported that increased feeding before calving increased average body weight of calves.

Conclusion

The result of this study revealed that there was no significant effect of challenge feeding on BCS of animals of the control and treatment group during prepartum and post-partum period and the calves born to cows of challenge fed group were about 4.11kg heavier than calves born to cows of control group with a statistically not significant difference.

Acknowledgement

The authors thankfully acknowledged the financial support and facilities provided by College of Veterinary and Animal Science, RAJUVAS, Bikaner to carry out the research work.

Conflict of Interest

We declare that we have no conflict of interest.

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