

# Dynamics of body condition score and its effect on performance traits of crossbred cattle

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**Abstract:** A study was conducted to evaluate the dynamics of body condition score in different physiological stages of crossbred cattle and its effect on performance traits at Mountain Livestock Research Institute, Mansbal, SKUAST-K from September 2014 to February, 2015. Fifty-four crossbred cattle of same age and parity were selected randomly and classified into three groups (A, B and C) on the basis of body condition score (BCS). Animals having BCS of 2-3, 3-4 and >4 on 6 point scale were allotted to group A, B and C, respectively. These groups were studied at seven different physiological stages viz. calving, early lactation, mid lactation, late lactation, dry period, heifer and pregnant heifer stages. BCS decreased significantly ( $p < 0.05$ ) in all the three groups from calving to early lactation with greater decrease in group C (0.92) followed by B (0.68) and A (0.47). Group B had significantly ( $p < 0.05$ ) higher average daily milk yield ( $5.65 \pm 0.09$ ) followed by C ( $4.18 \pm 0.27$ ) and A ( $3.04 \pm 0.35$ ). The peak milk yield was recorded significantly ( $p < 0.05$ ) higher in Group C ( $10.07 \pm 0.22$ ) followed by B ( $8.95 \pm 0.26$ ) and A ( $7.43 \pm 0.57$ ). Group A showed significantly ( $p < 0.05$ ) more days to attain peak milk yield, first service and dry-period than other BCS groups. It is thus concluded that BCS varies significantly ( $p < 0.05$ ) with different physiological status of crossbred cattle. Best time to enhance the BCS is during late lactation. Animals having BCS 3-4 performed better in productive and reproductive traits than animals of BCS >4 and BCS 2-3.

**Keywords:** Body condition score, physiological stages, performance traits, crossbred cattle

## Introduction

Managemental strategies in dairy farm are challenged by a number of problems related to production profile, nutrition, reproduction and metabolic diseases, etc. Timely identification and intervention of these problems through specific managemental tools will certainly increase productivity. Body condition score (BCS) is one such managemental tool which can be suitably utilized to overwhelm these problems and improve profitability of dairy farm. BCS is an accepted, non-invasive, quick, inexpensive and subjective measure to assess body reserves regardless of body measurement and body weight (Mushtaq *et al.*, 2012). BCS describes the systematic process of assessing the body fatness and energy status of an animal. Thus reflects the plane of nutrition on which an animal has been exposed over a reasonable period of time (Miko *et al.*, 2014). BCS shows variation with the advance of physiological stages (Bastin and Gengler, 2013; Yamazaki *et al.*, 2011) and cows become increasingly fat as they progress through pregnancy (Koenen *et al.*, 2001). Fat cows tend to lose more body condition during early lactation than thin cows (Roche *et al.*, 2007a). Over condition cows (BCS >5 on 6 point scale) remain at higher risk of metabolic and reproductive problems like difficult calving, retained placenta, fat cow syndrome, ketosis, milk fever, cystic ovaries, metritis etc. (Singh *et al.*, 2015 and Roche *et al.*, 2013). Regarding the importance of BCS as a management tool, the present study was conducted to investigate the dynamics of BCS in different physiological stage of crossbred cattle and its effect on production traits at an organized farm in temperate region of Kashmir valley.

## Materials and Methods

### Animals and experimental design

The present study was conducted at Mountain Livestock Research Institute (MLRI), Mansbal, SKUAST- Kashmir from September 2014 to February 2015. Fifty four healthy crossbred cattle (Jersey X local cattle) of same age and parity were classified into three groups on the basis of their body condition score

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**Table 1** Feeding schedule for crossbred cattle

Feeding/day	September + October + November			December + January + February		
	Physiological stage of animal			Physiological stage of animal		
	Lactating	Dry	Heifers	Lactating	Dry	Heifers
Concentrates (kg)	4	3	2	4	3	2
Green roughages (kg)	12	12	8	-	-	-
Grazing (hours)	7	7	7	-	-	-
Silage(kg)	-	-	-	8	8	4
Turnip(kg)	-	-	-	2	2	1

**Table 2** Mean value of BCS of crossbred cattle at different physiological stages in different BCS groups

Physiological stage	BCS in different groups		
	Group A	Group B	Group C
Calving	2.95±0.09 <sup>ac</sup> (07)	3.94±0.06 <sup>ab</sup> (21)	4.44±0.06 <sup>aA</sup> (10)
Early lactation	2.48±0.07 <sup>c</sup> (07)	3.26±0.07 <sup>ab</sup> (23)	3.52±0.10 <sup>dA</sup> (08)
Mid lactation	2.64±0.06 <sup>bc</sup> (15)	3.51±0.04 <sup>ab</sup> (34)	3.71±0.07 <sup>cdA</sup> (19)
Late lactation	2.78±0.07 <sup>abc</sup> (14)	3.71±0.04 <sup>ab</sup> (37)	3.88±0.07 <sup>bcA</sup> (23)
Dry period	2.89±0.04 <sup>ab</sup> (08)	3.87±0.06 <sup>abA</sup> (27)	4.01±0.08 <sup>bA</sup> (14)

Mean showing different superscripts (a, b, c & d) and A, B, & C in columns & rows differ significantly at P<0.05 respectively.

\*Number in parenthesis (n) depicts number of animals

(BCS). Animals having BCS of 2-3 on 6 point scale (Prasad, 1994) were allotted to group A, whereas animals with BCS of 3-4 and > 4 on similar scale were allotted to group-B and C respectively.

### Parameters recorded

BCS of these groups was monitored fortnightly through different physiological stages viz. calving (CL), early lactation (EL), mid lactation (ML), late lactation (LL), dry period (DP), heifer and pregnant heifer stages. Physiological stages of early lactation, mid lactation, late lactation and dry period were of the duration of three, four, three and two months, respectively while as calving stage comprised of 3-5 days before expected date of calving. Nutritional requirements of animals were met through a balanced combination of dry and green fodder with concentrate mixture supplementation (Table 1). Average daily milk yield was calculated as the ratio of the total lactation yield (kg) to lactation length (days); peak milk yield as the highest recorded test day milk production (kg) in a cow's first 150 days of lactation; days to attain peak milk yield as all the test days from 7 to 150 days in milk; dry period as the time duration from dry off to parturition and days to first service as the number of days from parturition to first service.

### Statistical analysis

The data obtained was analysed by one way analysis of variance method (Snedecor and Cochran, 1994) using SPS 20.0 version

software and results were expressed as mean ± SE and differences between means were considered significant at p<0.05.

## Results and Discussion

### Physiological stages and BCS

Group C cows had significantly (P<0.05) higher BCS in all the physiological stages followed by group B and group A, respectively, (Table 2). BCS was highest at calving and lowest at early lactation stage in all the three BCS groups and started to decrease thereafter significantly (P<0.05) from calving to early lactation with highest reduction in group C (0.92) and lowest in group A (0.47). It then started to increase from early lactation to dry period. The results of the present study coincide with the findings of Yamazaki *et al.* (2011); Gergovska *et al.* (2011 and Roche *et al.* (2007b) who reported that BCS reduces linearly in first month after parturition; reaches a lowest point at about 2-3 months and then gradually recovers. Bewley and Schutz (2008) also observed decrease in BCS during early lactation in dairy cows which has been attributed to the fact that energy from body reserves gets mobilized to support milk production and increases throughout the remainder of lactation (Kim and Suh, 2003). Roche *et al.* (2007a, c) found that fat cow losses more body condition during early lactation than thin cow. This might be due to the fact that fat cows yield more milk than thin cows

**Table 3** Mean value of production traits in different BCS crossbred cattle groups

BCS Group	Average daily milk yield (kg/day)	Peak milk yield (kg)	Days to attain peak milk yield (day)	Dry period (days)	Days to first service (days)
Group A (7*)	3.04±0.35 <sup>c</sup>	7.43±0.57 <sup>c</sup>	42.86±2.36 <sup>a</sup>	48.43±4.00 <sup>a</sup>	71.43±2.46 <sup>a</sup>
Group B (21*)	5.65±0.09 <sup>a</sup>	8.95±0.26 <sup>b</sup>	26.25±1.63 <sup>b</sup>	36.35±2.36 <sup>b</sup>	55.90±1.98 <sup>c</sup>
Group C (10*)	4.18±0.27 <sup>b</sup>	10.07±0.22 <sup>a</sup>	38.73±1.07 <sup>a</sup>	39.09±2.14 <sup>b</sup>	62.82±2.93 <sup>b</sup>

Mean showing different superscripts (a, b & c) in columns differ significantly at p<0.05. \*Number in parenthesis (n) depicts number of animals.

**Table 4** Correlation coefficient between BCS and production traits

	BCS	Daily milk yield (kg/day)	Peak milk yield (kg)	Days to attain peak milk yield (days)	Dry period (days)	Days to first service (days)
BCS	1					
Daily milk yield (kg/day)	0.343*	1				
Peak milk yield (kg)	0.662**	0.372	1			
Days to attain Peak milk yield	-0.072	-0.751**	-0.080	1		
Dry period (days)	-0.330*	-0.426**	-0.065	0.354*	1	
Days to first service (days)	-0.768**	-0.262	-0.462**	0.051	0.284	1

\* Significance at p<0.05., \*\* Significance at p<0.0

during early lactation and to support such milk yield, more body reserves get mobilized in fat cows (Lacetera *et al.*, 2005).

**Production traits and BCS**

Crossbred cows of BCS group B had significantly (p<0.05) higher average daily milk yield and attained peak milk yield (5.65±0.09 kg/day; 26.25±1.63 days) earlier followed by C (4.18±0.27 kg/day; 38.73±1.07 days) and then A group (3.04±0.35 kg/day; 42.86±2.36 days) as depicted in Table 3. Crossbred cows of BCS group C had significantly (p<0.05) higher peak milk yield followed by B and A with mean value of 10.07±0.22, 8.95±0.26 and 7.43±0.57 kg respectively. Days to attain peak milk yield in group A were non-significant (p<0.05) with that of group C. Peak milk yield was higher for BCS group C followed by B and A because the loss of BCS in early lactation were higher for BCS group C followed by B and A. The body reserves get mobilized to support lactation demand in early lactation. Crossbred cows of BCS group A had significantly (P<0.05) higher dry period and took more days to first service (48.43±4.00; 71.43±2.46 days) than C (39.09±2.14; 62.82±2.93 days) and B groups (36.35±2.36; 55.90±1.98 days) but dry period of group B was non-significant with that of group C. It indicates that cows having low BCS produce milk for short duration than that of moderate or high BCS cows. BCS group B showed better performance by coming to heat earlier (16 days)

than group A. Miko *et al.* (2014) reported that cows having moderate BCS have shorter interval to first service and conception than that of obese and low BCS cows. The results are in agreement with Gergovska *et al.* (2011) who observed that higher milk yield is related to greater and longer loss of BCS than those with low BCS at calving have the lowest milk yield in Holstein cows. Singh *et al.* (2009) reported similar findings related to peak milk yield, days to attain peak milk yield and days to first service in crossbred cows. The increased loss in BCS has been associated with high peak yield (Roche *et al.*, 2007b and Berry *et al.* 2007). Wathes *et al.* (2007) also reported that cows with BCS e” 3.0 took 3 weeks longer to conceive than cows with BCS of 2.0 to 2.9 on 5 point scale. Anitha *et al.* (2005) reported that cows having moderate BCS produce more milk than thin cows.

**Correlation between BCS and production traits**

Correlation coefficient (r) of average daily milk yield and peak milk yield with BCS was significantly (p<0.05) positive with r = 0.343 and 0.662, respectively, but correlation coefficient of days to attain peak milk yield with BCS was non-significantly (p>0.05) negative with r = -0.072 (Table 4). The correlation coefficient of dry period and days to first service with BCS was significantly (p<0.05) negative with r = -0.330 and 0.768, respectively. The results of the present study were within the range of estimated

correlation coefficient between production traits and BCS as reported by Dahiya (2006). Berry *et al.* (2007) found that correlation estimates between days to first service and BCS range from  $r = -0.37$  to  $-0.76$  and Prasad and Tomer (1998) reported that change in BCS was positively correlated with peak yield ( $r = 1.8$  kg of milk).

## Conclusions

The results revealed that greater the BCS at calving, greater is the loss of body reserves in early lactation. Loss of BCS in group having BCS >4 is almost twice than that of BCS 2-3 group. BCS >4 group loses BCS for longer time as compared to BCS 3-4 and BCS 2-3 groups. Best time to enhance the BCS is during late lactation and BCS 3-4 group is efficient in productive and reproductive traits as compared to BCS >4 and BCS 2-3 group.

## Conflict of interest

The authors declare that they have no conflict of interest

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