

Body Condition Score is not a Predictor of Back Fat in Primiparous Crossbred Cattle

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Abstract—The present study was designed to investigate the effects of parity on body weight (BW), body condition score (BCS) and back fat thickness (BFT) and the relationship among BW, BCS, and BFT in primiparous and multiparous crossbred cattle. The total 30 crossbred jersey cattle were examined and divided into two groups, 15 primiparous cattle and 15 multiparous cattle. The BCS were measured visually, in 1 to 6 scales for each animal and the Ultrasonography (USG) technique used for the BFT by linear transducer with 5.0 MHz frequency. The USG images obtained from both side of rump regions and made average for correlation estimation. The BCS and USG images were collected on the same day after morning milking. The data were analyzed by simple t-test for BW, BCS and BFT comparison between primiparous and multiparous cattle group and correlation made between BW, BCS and BFT in primiparous and multiparous cattle group separately using GraphPad PRISM® (version 7.00). The BW, BCS and BFT ($319.00 \pm 6.98\text{Kg}$ vs. $379.00 \pm 17.0\text{ Kg}$; 3.56 ± 0.136 vs. 4.23 ± 0.330 and $14.7 \pm 1.02\text{mm}$ vs. $17.0 \pm 2.63\text{ mm}$) were significantly higher in multiparous cattle compared to primiparous cattle. It was found that BCS had high correlation ($r = 0.826$) with BFT, BFT vs. BW ($r = 0.729$) and BW vs. BCS ($r = 0.789$) in multiparous cattle group. However, There was low correlation ($r = 0.378$) between BCS and BFT, both BFT and BW showed negative correlation ($r = -0.0318$) whereas BW vs. BCS represented moderate correlation ($r = 0.533$) in primiparous cattle group. These results suggest that the primiparous cattle are less mature, nutrients used in overall growth of body as well as production but limited amount store as subcutaneous fat. Finally, second parity onwards BCS can able to predict the BFT and BW of crossbred moderate yielding animals.

1. INTRODUCTION

Body condition scores (BCS) are the subjective, visual or physical evaluation of the measure of endogenous energy stored in fat and muscle on a live animal [8]. The BCS assessment gives thought regarding the nutrition status of cows and has essential capacities to utilize their body vigorous stores amid times of negative energy balance (NEBAL). Dairy animals require satisfactory energy stores (subcutaneous fat) with a specific end goal to supply their basal metabolism, growth, lactation and reproductive capacity [4, 14]. The BW and BFT can likewise be used to evaluate body energy stores

of the animals [10]. The BFT measured by using USG machine that is quick and non-invasive practice. The ultrasonography was performed in different site of the carcass and observed that the rump is an appropriate site to evaluate the subcutaneous fat as because of the large quantity of fat tissues deposit in rump area of the animals [6, 11]. There has being a strong correlation ($r=0.90$) estimated between body fat and BFT [10]. This result indicates BFT is the measurement of body reserve. Thus, our current objective was to assess difference in BW, BCS and BFT and their relationship in primiparous and multiparous crossbred cattle.

2. MATERIALS AND METHODS

The present study was carried out at Eastern Regional Station, National Dairy Research Institute (ERS-NDRI), cattle yard located in Kalyani, West Bengal. The total 30 crossbred jersey cattle were examined and divided into two groups, 15 primiparous cattle and 15 multiparous cattle. The lactation stage of all experiment cattle was 90 days to 150 days range. All experimental cattle reared under loose housing system and gave same feeding management. The BCS assessment made in the visual method and took 1 to 6 point scales, adopted from [9] for each cattle whereas BFT was measured by Ultrasonography machine (Mindray, Model-DP6600vet). The USG images were taken in B-mode, using 5.0 MHz frequency with a linear transducer. The images were taken to measure length of subcutaneous fat as BFT which demarked between skin and deep fascia above gluteus muscle. The USG images obtained from both side of rump regions and made the average for correlation estimation. The BCS and USG images were collected on the same day after morning milking.

3. STATISTICAL ANALYSIS

The data were analysed by simple t-test for BW, BCS and BFT comparison between primiparous and multiparous cattle group and Pearson's correlation applied between BW, BCS and BFT in primiparous and multiparous cattle group

separately using GraphPad PRISM® (version 7.00). The p-value <0.05 was considered as significant for all tests.

4. RESULTS AND DISCUSSION

The jersey crossbred were moderate yielder animal at our farm condition. The BW, BCS and BFT in primiparous and multiparous animals presented in Table1. The correlations between BW, BCS and BFT in primiparous and multiparous animals were shown in Table2. In this present study, the BW, BCS and BFT were significantly higher in multiparous cattle compared to primiparous cattle. It was depicted multiparous cows were more mature and higher internal energy reserve because BCS is able to predict subcutaneous fat in rump region [1, 3] and BFT can be used to estimate body energy reserves of the animals [10]. There was a high correlation ($r = 0.826$) between BCS with BFT in multiparous but low correlation ($r = 0.378$) between BCS and BFT in primiparous. Because, the primiparous cows are less mature animals, have a maximum nutrient utilised for growth of animals and energy storage limited [12]. There was a higher correlation between BCS and BFT seen by [1, 10, 13] whereas [7] reported low correlation ($r=0.49$) in between BCS and BFT but did not specify any age or category of animals. The BW and BFT were showed higher correlation ($r = 0.729$) in multiparous cattle but there was a negative correlation ($r = -0.0318$) found in primiparous cattle. There are differences in the control of tissue mobilization between primiparous and multiparous animals, which led nutrition partitioning into growth and milk production in first lactation [12]. In multiparous cattle had higher correlation in between BW and BCS ($r = 0.789$) whereas moderate correlation ($r = 0.533$) was found in primiparous cattle. The variation was due to age and milk production level of animal. It was seen that our experimental multiparous cattle were low yielder compared to primiparous cattle; the same feeding led to storage of nutrient in body not spare with milk yield in multiparous cattle. Another report said that there was a low relationship ($r=0.37$) between BW and BCS [1].

Table 1: Comparison of body weight (BW), body condition score (BCS) and back fat thickness (BFT) between primiparous and multiparous cattle

PARAMETERS	PRIMIPAROUS	MULTIPAROUS	P value
BW (in Kg.)	319.00 ^a ± 6.98	379.00 ^b ± 17.00	<0.05
BCS (1 to 6 scale)	3.56 ^a ± 0.136	4.23 ^b ± 0.330	<0.05
BFT (in mm)	14.70 ^a ± 1.02	17.00 ^b ± 2.63	<0.05

Table 2: Pearson's correlation coefficients (r) for the relationships among BW, BCS and BFT (P <0.05)

Parameters	PRIMIPAROUS	MULTIPAROUS
Correlation between BCS and BFT	$r = 0.378$	$r = 0.826$
Correlation between BW and BFT	$r = -0.0318$	$r = 0.729$
Correlation between BCS and BW	$r = 0.533$	$r = 0.789$

5. CONCLUSIONS

The primiparous cattle are less mature, nutrients used in the overall growth of body as well as production but limited amount store as subcutaneous fat. In case of mature multiparous cattle, the BFT is valid for estimation of subcutaneous fat. Finally, second parity onwards BCS can able to predict the BFT and BW of crossbred moderate yielding animals.

6. ACKNOWLEDGMENTS

The authors heartily acknowledge all staffs of the ERS-NDRI, Kalyani farm for their valuable support. Thankful to Dr. P. R. Ghosh, without his cooperation, this study would have been impossible to conduct.

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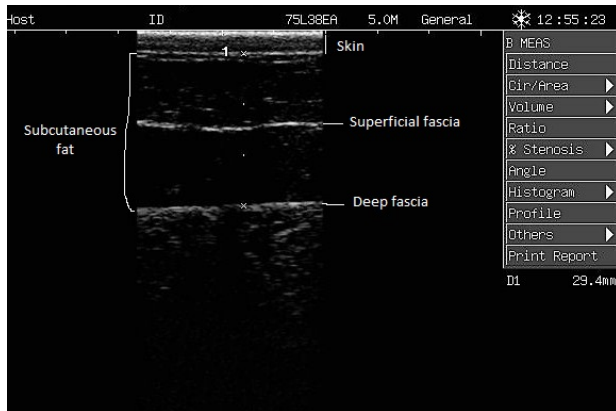


Fig. 1: Ultrasound image shown back fat thickness of cattle



Fig. 2: Round marked area of both side of rump, placed transducer for back fat measurement.