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Research Article

BODY CONDITION SCORING OF DAIRY COWS FOR ASSESSMENT OF NUTRITIONAL STATUS UNDER FIELD CONDITION IN DHARMAPURI DISTRICT

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Abstract: The Body condition scoring (BCS) for 101 Jersey (Jx) and 112 Holstein Friesian (HFx) crossbred cows in various stages of lactation with a history of second calving and animals in the late gestation were assessed for this study. It revealed that he BCS of Jx was 2.4 ,2.4 2.4 and 2.9 in early, mid and late lactation and late gestation, respectively In HFx the BCS was 2.4, 2.6, 2.4 and 3.1 in early, mid, late lactation and late gestation ,respectively. The BCS of dairy cows in late gestation was significantly higher in both breeds, whereas the BCS during different phases of lactation was comparable. This suggests that animal does not lose its body conformation significantly during lactation phase. Though BCS was indicative of energy balance, but influence of experience of the assessors causes individual variation on the BCS value of the same dairy cows. Hence, BCS could not be considered as an accurate measurement for determining the nutritional status of animals.

Keywords: *BCS, Statistical Analysis*

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Introduction

The dairy cows od Dharmapuri district was assessed for its Body condition score (BCS) as it is a subjective method for determination of body fat reserves or evaluating the energy reserve in the form of subcutaneous fat tissue deposited in the area around hips, loins and tail root. Amount of body reserves which cow have prior to calving, have very strong impact on potential problems after calving. Ruegg and Milton (1995) [1] reported that risk of problem occurring at calving reduced when cows are in optimum body condition for that specific phase of production cycle. Novakovic *et al*. (2010) [2] opined that BCS less than 3.00 prior to calving experience decreased milk production during early lactation. Pedron *et al*. (1993) [3] reported that cows losing more than 1.00 BCS lead to decrease in quantity of milk. Hence an attempt was made to study the effect of BCS on various physiological stages of lactation in dairy cows and its effect on season and its interaction to assess the nutritional status of Dairy cows in Dharmapuri district. Similarly, Pensyivania state University developed guide lines for determination of BCS by the appearance of rump (hook bone, thurl, pinbone,). Novakovic *et al*. (2010) reported the optimum BCS in HFx cows at calving was 3.56 (ranging from 2.55 to 4.63). Cows in peak lactation BCS was 2.30 and it ranged from 1.35 to 3.16 and in mid lactation the animal should have BCS of 2.5 with a range value 1.35 to 3.43. Hayashi *et al*. (2005) [4] reported that the BCS of cows during lactation ranged between 2.5 to 3.39, Ward *et al*. (2009) [5] reported that BCS of lactating cows mostly ranged between 2.5 and 3.0. Hady *et al*. (1994) [6] recorded cows with BCS less than 2.5 was associated with low production of milk because of insufficient energy. Hamit yildiz *et al*. (2009) [7] reported that BCS of late gestation animals ranged between 2.90 and 3.12. Whereas Waltner *et al*. (1993) [8] reported BCS at calving was within the range of 2.0 to 3.0. Similarly, Gransworthy (2008) [9] suggested that the target BCS at calving should not be less than 3.0 for dairy cows to optimize health and production.

Ferguson *et al*. (1994) [10] reported BCS was difficult for the inexperienced assessors, to correctly score the animals and hence body weight and BCS was not an accurate measurement for determining the nutritional status of animals

Materials and Methods

A total of 101 Jersey (Jx) and 112 Holstein Friesian (HFx) crossbred cows in various stages of lactation with a history of second calving and animals in the late gestation were randomly selected for the study. Body Condition Score was recorded for all the animals surveyed using 0 to 5 points scale by viewing ten body points. A visual scoring technique designed by Edmonson *et al*. (1989) [11] with 0.25 unit increments was used (point 1 indicates emaciated and point 5 - severely over conditioned). The BCS was based on the palpation of the transverse process of the loin vertebrae, cranial coccygeal vertebrae and tuber ischii. The amount of muscle present, skeletal feature and fat cover in eight anatomical points namely, brisket (sternum), shoulder ribs, loin (lumbar vertebra), sacral crest, hooks, stifle, tail head and pins were accounted for scoring the animals.

Statistical Analysis

The data obtained were subjected to statistical analysis as per Snedecor and Cochran (1994) [12] and the data was subjected to analysis of variance (ANOVA) and t-test. Further, means were compared using Duncan's multiple range test by using the software package SPSS version 12 (SPSS,1996) [13].

Results and Discussion

The BCS of Jx cows was 2.4, 2.4, 2.4 and 2.9 and in HFx it was, 2.4, 2.6, 2.4 and 3.1 in early, mid and late lactation and late gestation, respectively as per [Table-1]. The BCS of dairy cows in late gestation was significantly higher in both breeds, whereas the BCS during different phases of lactation was comparable. This suggests that animal does not lose its body conformation significantly during lactation phase. The BCS in the study area was comparable with the reports of Waltner *et al*. (1993); Hayashi *et al*. (2005); Ward *et al*. (2009) ; Novakovic *et al*. (2010); Bell *et al*. (2018) [14] as they observed BCS in lactating cows ranged between 2.55 and 4.63, 2.5 and 3.39, 2.5 and 3.0, 2.0 and 3.0, respectively. Further, BCS of mid lactation in this study was in line with study of Novakovic *et al*. (2010) (BCS of 2.5 with a range value 1.35 to 3.43).

SN	BCS	Appearance
1	BCS -1 Very thin	Skeletal structure is very prominent. Deep depression noticed next to spine, between the pelvis and rib cage, between the hooks and pin bones and around the tail head.
2	BCS-2 Thin	Skeleton is very apparent. Spinous processes are clearly visible, but small amount of fat tissue over spine, hooks, and pins. The ribs and pelvis can be palpated. There is evident depression between hooks and pins and over transverse processes in the loin area. The tail head is seated in a shallow cavity and some fatty tissue covering the pin bones.
3	BCS -3 Average to normal	The animal appears smooth over the spine, hooks and pins with a minor depression in the loin area. A layer of fat covers the ribs and pelvis. A moderate depression observed between the hooks and pins. There is a gentle U shape from hooks to pinbones. The tail head can easily be felt.
4	BCS-4 Fat	No spinous processes detectable. No depression in the loin area, which gives the top – line of the animal flat, table top appearance. The ribs cannot be felt. The hooks and pins are rounded, folds of fat around the tail head. Individual short ribs cannot be seen.
5	BCS-5 Very fat	Smoothed appearance due fat cover over the spine and between hooks and pins. Spinous and transverse processes are covered. The ribs and pelvic bones are covered with fatty tissue. The tail head is concealed in a thick layer of fatty tissue. The rump is filled in from hooks to pins above the thurl.

Table-1 *Percentage deficit /excess of nutrient intake of Jxand HFx cows at different physiological stages in relation to NRC (2001) feeding standards.*

Breed	Parameters	Early lactation	Mid lactation	Late Lactation	Late gestation
Jx	Body weight (kg)	$333^{b} \pm 4$	$347^{b} \pm 11$	$337^{b} \pm 4$	$377^{a} \pm 12$
Jx	BCS	$2.4^{a} \pm 0.03$	$2.4^{a} \pm 0.03$	$2.4^{a} \pm 0.05$	$2.9^{b} \pm 0.06$
HFx	Body weight (kg)	408 ± 4^{b}	437 ± 12^{b}	$406^{b} \pm 8$	$465^{a} \pm 7$
HFx	BCS	$2.4^{a} \pm 0.06$	$2.6^{a} \pm 0.03$	$2.4^{a} \pm 0.08$	$3.1^{b} \pm 0.05$

Table-2 *Percentage deficit /excess of nutrient intake of Jx and HFx dairy cows at different seasons in relation to NRC (2001) feeding standards*

Breed	Parameters	Summer	Winter	Rainy
Jx	Body weight (kg)	$355^{a} \pm 7.23$	$325^{b} \pm 8.92$	$353^{a} \pm 6.95$
Jx	BCS	2.50 ± 0.06	2.37 ± 0.3	2.48 ± 0.5
HFx	Body weight (kg)	432 ± 6.76	419 ± 11.13	424 ± 6.03
HFx	BCS	2.61 ± 0.06	2.54 ± 0.08	2.56 ± 0.03

Table-3 *Interaction of body condition score and seasons of Jx and HFx dairy cows at different Interaction physiological stages and seasons in relation to NRC (2001) feeding standards*

Particulars	Summer				Winter				Rainy			
	EL	ML	LL	LG	EL	ML	LL	LG	EL	ML	LL	LG
Body weight (Jx) (kg)	334^{bc}	386^{a}	342^{bc}	337^{bc}	346^{b}	298^{c}	337^{bc}	395^{a}	320^{bc}	364^{bc}	332^{ab}	397^{a}
	± 6.2	± 14.45	± 5.99	± 5.04	± 5.22	± 18.92	± 9.95	± 25.35	± 7.78	± 13.65	± 7.58	± 22.10
BCS (Jx)	2.37^{a}	2.41^{a}	2.49^{a}	2.43^{a}	2.32^{a}	2.41^{a}	2.34^{a}	2.74^{b}	2.41^{a}	2.37^{a}	2.45^{a}	2.80^{b}
	± 0.06	± 0.10	± 0.13	± 0.04	± 0.04	± 0.03	± 0.04	± 0.33	± 0.09	± 0.04	± 0.12	± 0.08
Body weight (HFx) (kg)	407^{cd}	431^{abcd}	391^{d}	459^{abc}	407^{cd}	411^{bcd}	401^{d}	467^{a}	409^{bcd}	432^{abcd}	426^{abcd}	463^{ab}
	± 7.28	± 2.61	± 3.72	± 12.15	± 7.39	± 33.98	± 9.51	± 10.73	± 7.17	± 11.34	± 17.05	± 18.05
BCS (HFx)	2.45^{abc}	2.55^{abc}	2.26^{a}	3.12^{ab}	2.30^{ab}	2.55^{abc}	2.48^{abc}	3.04^{c}	2.45^{ab}	2.67^{bc}	2.32^{ab}	2.85^{bc}
	± 0.07	± 0.08	± 0.14	± 0.08	± 0.17	± 0.06	± 0.14	± 0.07	± 0.04	± 0.02	± 0.10	± 0.09

Body condition score (BCS) of dairy cows at different physiological stages

BCS Score	Hook bones	Pin bones
3	Round	Round
2.75	Angular	Round
2.5	Angular	Angular
<2.5	Angular	Angular

The BCS of these dairy cows in this study area was not less than 2.5, as Hady *et al*. (1994) stated that milk yield was affected in animals where the BCS was below 2.5, due to the intake of insufficient energy. Similarly, the BCS of late gestation was comparable and agreed with the value of Gransworthy (2008), (less than 3.0) for optimum health and production. Further, BCS of dairy cows in this study did not lose 1 unit during early lactation, which was indicative measure of negative energy balance and occurrence of metabolic diseases. As the loss of BCS score unit during various lactation stages was not significant, it was contrary with the findings of Ruegg and Milton (1995) who reported that loss of BCS of 0.80 in early lactation affected the milk yield in dairy cows which was not noticed in this study.

Though BCS was indicative of energy balance, but influence of experience of the assessors causes individual variation on the BCS value of the same dairy cows. Hence, BCS could not be considered as an accurate measurement for determining the nutritional status of animals as well [15].

BCS of dairy cows during different seasons

The BCS of Jx cows was 2.5, 2.4 and 2.5, and in HFx it was, 2.6, 2.5 and 2.6 in summer, winter and rainy seasons respectively as per [Table-2]. The BCS value ranged from 2.37 to 2.50 in JX and 2.54 to 2.61 in HFx and was comparable between seasons within the breeds though slight variation was noticed [Table-2]. But, the result agreed with the report of Ferguson *et al*. (1994) who reported that there existed no significant difference between seasons in BCS.

The percent deficit of BCS varied from 2.32 to 2.80 in all season at various physiological stages for Jx as per [Table-2]. The BCS was significantly higher in late gestation when compared to stages of lactation in all three seasons. Similarly, BCS was comparable in physiological stages irrespective of seasons, But the reports agreed with the findings of Novakovic *et al*. (2010) who reported the optimum BCS in Jx cows ranging from 2.55 to 4.63 and in cows in peak lactation the BCS was 2.30 and ranged from 1.35 to 3.16.

The percent deficit of BCS varied from 2.26 to 3.12 in all season at various physiological stages for HFx as per [Table-3]. The BCS was higher in late gestation of all seasons due to the gravid uterus and less during late lactation of summer due to the shortage of grazing facilities and as the animal was in low production during this phase and supplementation was not given. In all other seasons it was comparable. But the reports are in line with the findings of Novakovic *et al*. (2010) who reported the optimum BCS at calving ranged from 2.55 to 4.63 and during lactation the range value was between 1.35 and 3.43.

Summary and Conclusion

The BCS of Jx was 2.4 ,2.4 2.4 and 2.9 in early, mid and late lactation and late gestation, respectively In HFx the BCS was 2.4, 2.6, 2.4 and 3.1 in early, mid, late lactation and late gestation ,respectively. The body weight and BCS were significantly higher during late gestation in both breeds due to the presence of gravid uterus. The BCS of dairy cows in late gestation was significantly higher in both breeds, whereas the BCS during different phases of lactation was comparable. This suggests that animal does not lose its body conformation significantly during lactation phase. The BCS of these dairy cows in this study area was not less than 2.5stated that milk yield was affected in animals where the BCS was below 2.5, due to the intake of insufficient energy, Further, BCS of dairy cows in this study did not lose 1 unit during early lactation, which was indicative measure of negative energy balance and occurrence of metabolic diseases. Though BCS was indicative of energy balance, but influence of experience of the assessors causes individual variation on the BCS value of the same dairy cows. Hence, BCS could not be considered as an accurate measurement for determining the nutritional status of animals

Application of research: Survey work on the Body condition scoring of dairy cows at various physiological status and its variation durion different seasons

Research Category: Veterinary and Animal Sciences

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Study area / Sample Collection: Dharmapuri district

Breed name: Holstein freisein cross animal and Jersey cross animals

Conflict of Interest: None declared

Ethical approval: Ethical approval taken from Veterinary University Training and Research Center, Salem, 636001, Tamil Nadu Veterinary and Animal Sciences University, Chennai, 600051, Tamil Nadu, India
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References

[1] Ruegg and Milton (1995) *Journal of Dairy Science*, 78(3), 552-564.
[2] Novakovic Z., Stretenovic L.J., Aleksic S., Petrovic M.M., Pantelic V., Ostojic-Andric D. and Niksic D. (2010) *Biotechnology in Animal Husbandry*, 26, 309-318.
[3] Pedron O., Cheli F., Senatore E., Baroli D. and Rizzi R. (1993) *J. Dairy Sci.*, 76, 2528-2535.
[4] Hayashi Y., Shah S., Shah S.K. and Kumagai H. (2005) *Livestock Research for Rural Development*, 17, 132-141.
[5] Ward W.R., Murray R.D., White A.R. and Rees E.M. (2009) *Recent Advances in Feeding of Ruminants*, 476-498.
[6] Hady P.J., Domecq J.J. and Kaneene J.B. (1994) *J.Dairy Sci*., 77, 1543-1547.
[7] Hamit Yildiz.,Nevzat saat and Halil Simsek (2009) *Pakistan Veterinary Journal*, 31(2), 125-128.
[8] Waltner S., Mc.Namar J.P. and Hillers J.K. (1993) *J. Dairy Sci*., 76, 3410-3419.
[9] Gransworthy P.C. (2008) *Recent Advances in Animal Nutrition. P.C. Gransworthy and J. Wiseman, ed. Nottingham,UK*, 61-86.
[10] Ferguson J.D., Galligan D.T. and Thomas N. (1994) *J. Dairy. Sci*., 77, 2695-2703.
[11] Edmonson A.J., Lean I.J., Weawer I.D., Farver T. and Webster G. (1989) *J. Dairy.Sci*., 72, 68-74.
[12] Snedecor G.W. and Cochran W.G. (1994) *Statistical methods, Oxford and I.B.H. publications, New Delhi, India.*
[13] SPSS (1996) *Statistical packages for Social Sciences. Ver.12, SPSS Inc.,Linois, USA.*
[14] Bell M.J., Maak M., Sorley M. and Proud R. (2018) *Frontiers in Sustainable Food System*, 2, 1-7
[15] Harris B.L. and Kolver E.S. (2006) *Livestock Improvement Corporation*,1-24.
[16] Ruegg P.L., Gooder W.J., Holmberg G.A., Weanes C.A. and Huffman L.D. (1992) *American Journal of Veterinary Research*, 53, 5-9.