BODY CONDITION SCORE (BCS) SYSTEM AS A TOOL FOR SELECTION OF DAIRY ANIMALS

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Abstract: Body condition is defined as the ratio of the amount of fat to the amount of non-fatty matter in the body of the living animal. Body conditions are reflection of the fat reserves carried by the animal. The ability to estimate the body condition more accurately and relate it to milk and milk components production would help the farmers in the selection of dairy animals and to increase the overall efficiency of feeding and management of dairy animals. So, it is essential to evaluate the body condition of dairy animals based on body conformation points to understand the present status of them and accordingly suggest the feeding and managemental practices for optimal performance in future.

Introduction: Dairy cow Unified Score Card formulated by The Purebred Dairy Cattle Association, USA (1994) is used as a tool for evaluating dairy cow. In this method, the score card formulated assigned for an ideal dairy cow by explaining all the body points to be considered for scoring will be taken as standard method to evaluate dairy cows. However, this score card is not much useful for a farmer because of more technicality involved and adaptation problems. In addition the breed characteristics should always be considered in the application of score card which requires a thorough knowledge of the different breeds. The users also require skill and experience. It is a lengthy process since more points are to be checked. To overcome these difficulties, during the last three decades the traditional and subjective appraisal of the body reserves in farm animals made by eye and touch, has been rationalized by the introduction of numerical systems of rating specific anatomical points.

This numerical or body condition score system (BCS system) is a subjective method to assess the body fat reserves particularly over the bony prominences like back and pelvic region. It is based on evaluation of the outer appearance of the animal that interacts with its body fat reserves and therefore is directly influenced by energy balance. It gives an immediate appraisal of the body state of the animal and is readily incorporated in operational decision making.(Gransworthy, 1988)

Body Condition Score system is universally accepted, non-invasive, quick and inexpensive method to estimate the degree of fatness. It helps to understand the present status of dairy animals and accordingly to suggest the feeding and managemental practices for optimal performance in future .

It is helpful as a cheap tool for the selection of dairy animals. BCS was observed to be highly correlated with both body weight and heart girth. Cows with BCS above 3.5 had more heart girth which is a true indicative of health condition and productive performance The cows of large frame size and measurements of physical parameters viz., wither height, hook height, intercostals space, heart girth and body weight did not receive high BCS indicating that assessment of the cows is based on body condition check points but not on body weight or frame size.(Anitha *et.al*, 2005)

It is good predictor of weight loss or gain and success of nutritional programmes. Helps to understand the influence of body condition at calving on ovarian functions and reproductive performance. Helps in minimizing the incidence of fatty cow or thin cow syndrome, clinical mastitis, anoestrum and certain metabolic disorders like ketosis.

Judging of dairy animals using Body Condition Score system

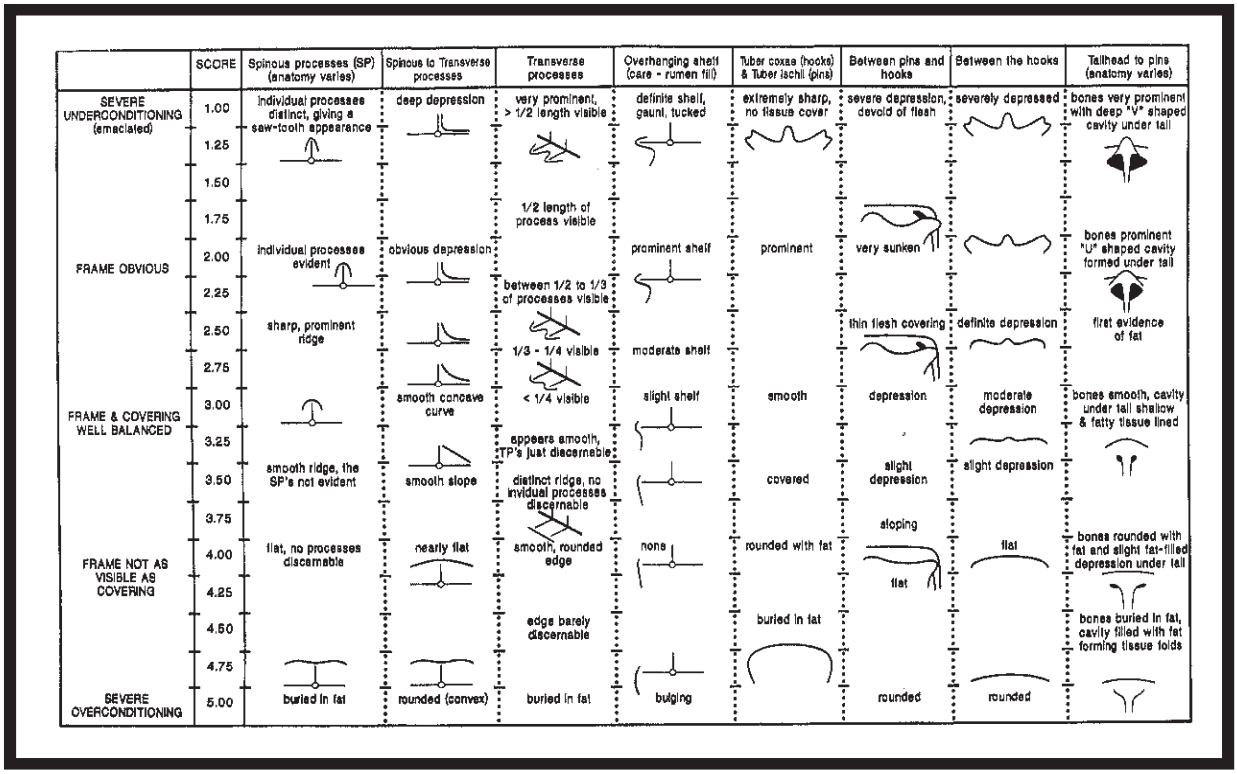
BCS in dairy cows

Eight skeletal check points are examined on a dairy cow to indicate the body condition

1. Spinous processes (the vertical prominences of the lumbar vertebrae),
2. Depression between the spinous and transverse processes.
3. Transverse processes (the transverse prominences of the lumbar vertebrae).
4. Overhanging shelf formed by the transverse processes above the flank.
5. Tuber coxae (hooks) and Tuber ischii (pin bones) bony prominences.
6. Depression between the Hook and Pin bones.
7. Depression between the Hooks and
8. Spinous and transverse processes of the Coccygeal vertebrae and Ischio Rectal Fossa (depression beneath the tail).

After each check point is observed by vision and palpation, the scores are recorded and an average BCS is assigned to the cow.(Chart 1)

Chart 1: BCS chart formulated by Edmonson et al (1989)for Holstein Friesian dairy cows.



Precision of BCS system:

- BCS and chemically determined body fat were highly significant.(Wright and Russel, 1984)
- Slaughter studies performed on cows with various BCS indicated a direct consistent relationship between the amount of subcutaneous fat and reserves of total body fat.
- Validation of body condition scores with ultrasonographic measurement of subcutaneous fat of dairy cows showed that BCS adequately reflected the subcutaneous fat of cows.(Domecq *et.al*, 1995)
- One unit of BCS corresponded with 3.9% body fat, 35 kg live weight.(Remond *et.al*, 1988)

Ideal BCS suggested for different life stages

Life stage of cow	Suggested ideal BCS
Heifer	2.0-2.5
Adult cow	3.0-4.0
At calving	3.5-4.0
70 days of lactation	2.5-3.0
150-200 days of lactation	3.0-3.25
At the time of drying	3.5-3.75

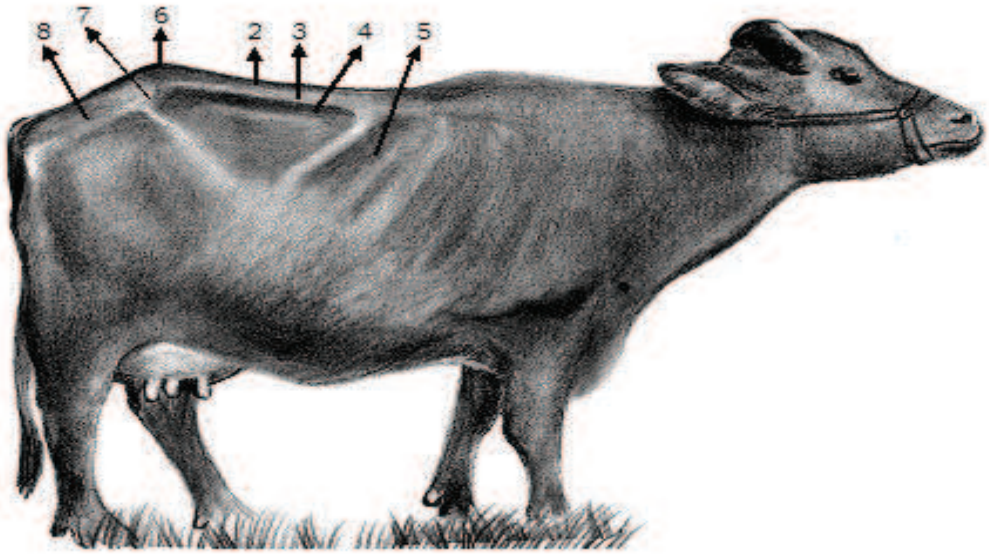
Cows with BCS of below 2 will be considered as underconditioned and above 4.5 as over conditioned

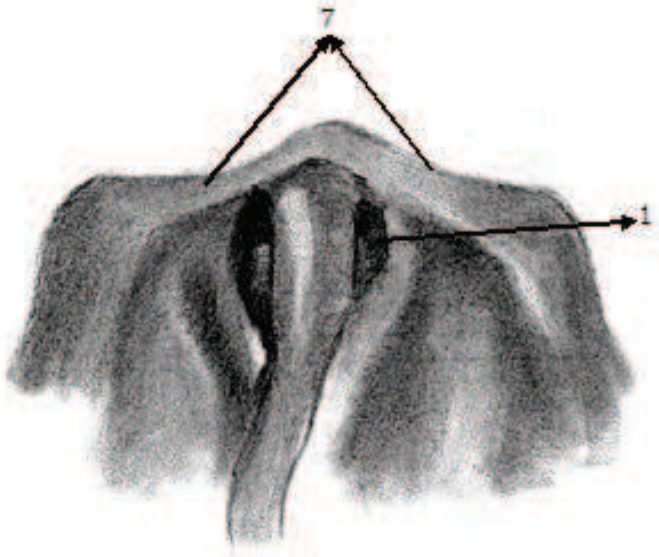
Body Condition Score (BCS) Systemin buffaloes.

The BCS chart for buffaloes is in a 1 to 5 scale using 0.5 increments examining 8 skeletal check points which include

1. Tail head to pin bones.
2. Spinous processes of the lumbar vertebrae.
3. Depression between the spinous and transverse processes.

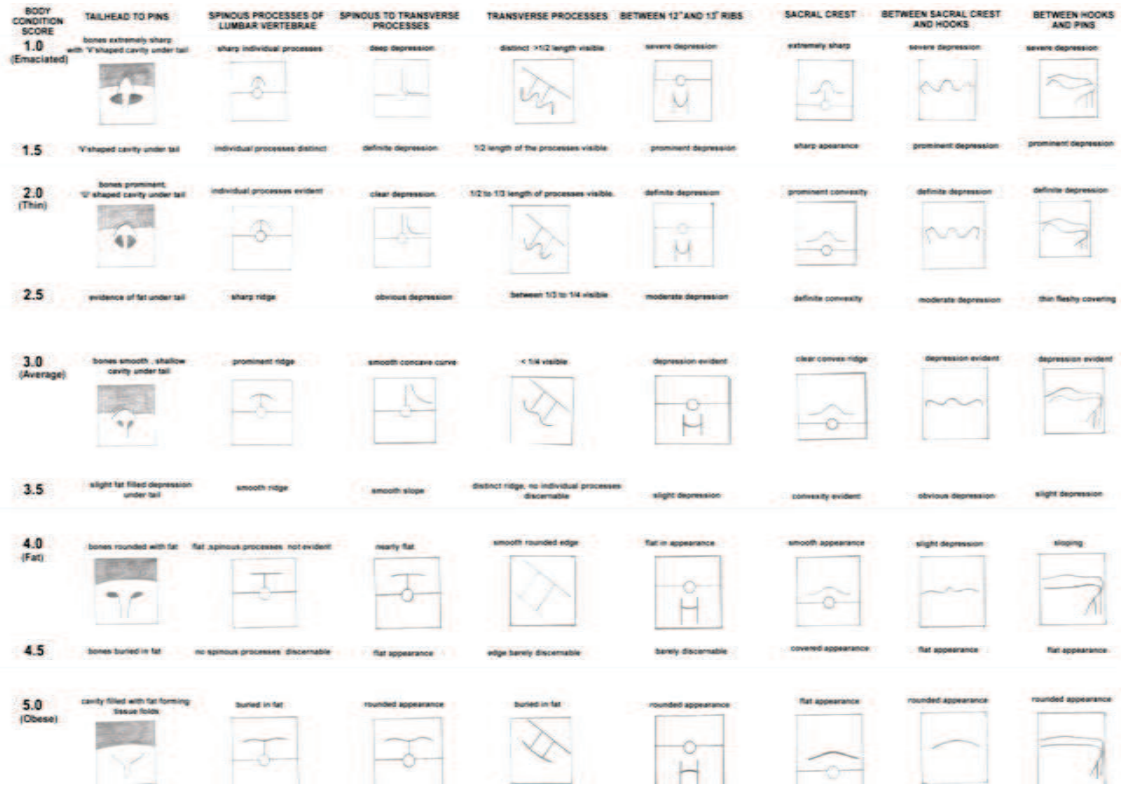
4. Transverse processes of lumbar vertebrae.
5. Point between 12th and 13th ribs.
6. Sacral crest.
7. Depression between sacral crest and hooks and
8. Depression between hooks and pins





After each check-point is observed by vision and palpation the scores will be recorded and an average BCS is assigned. A score of 1 indicates emaciated, 2 indicates thin, 3 indicates average, 4 indicates fat and 5 indicates obese condition.(Chart 2)

Chart 2 : BCS chart developed by Anitha *et al* (2010) for scoring Murrah and Graded Murrah buffaloes.



- The studies on the utility of Body Condition Score system as a tool for selection, productive , reproductive and health performance of dairy animals shown that:
- The anatomical studies, amount of fat reserves in slaughtered animals help in the identification of skeletal check points. The examination of amount of fat reserves in live animals by vision and palpation at the skeletal check points identified help in the assessment of scores. So, the consideration of anatomical studies, amount of fat reserves and the assessment of scores helped in the development of a valid BCS system.
- The farmers can be trained to score the buffaloes using the new BCS system by explaining in local language and through video so that they can feed the buffaloes accordingly at each stage to derive the maximum potential. The new BCS system developed is user friendly as the process is easy to learn, quick, repeatable and inexpensive.
- The ultrasonographic fat measurements at the five skeletal check points within each BCS showed that the fat thickness was highest at the tail ($P < 0.01$), followed by the lumbar area, ribs, sacral crest to hooks and hook to pins. The ultrasonographic measurements of mean body fat thickness for buffaloes of different body condition scores were presented in Table I. Significant ($P < 0.01$) difference was observed in the fat thickness for buffaloes of various BCS groups.The ultrasonographic measurements of fat reserves proved that as the BCS increases, the amount of fat reserves increase indicating that BCS adequately reflected in the amount of actual fat reserves BCS is highly correlated (0.85) with the ultrasonographic fat reserves.(Anitha *et.al*, 2010) Hence, BCS is a valid tool and can be used independently to estimate the actual amount of fat reserves.
- BCS is significantly correlated (0.86) with the carcass fat reserves. So BCS can be considered as a potentially useful predictor of body fat reserves and allows for selection and management decisions. Carcass fat and ultrasonographic fat reserves were significantly correlated which showed that ultrasonography has the potential to determine fat thickness with a high degree of accuracy and new BCS system was proved to be more valid.
- The buffaloes calving at a BCS of 3.5 – 3.99 could sustain the loss in BCS at peak production and show better reproductive performance. The

influence of body condition score at calving (BCSc) on the reproductive performance studied in 24 (4 x 6 Completely Randomised Design) buffaloes revealed that buffaloes of BCSc group 3.5 – 3.99 showed the best performance compared to BCSc groups of 2.5 - 2.99, 3.0 – 3.49 and 4.0 – 4.49 with earlier ($P < 0.05$) resumption of ovarian activity (29.33 days), less ($P < 0.01$) postpartum estrus period (46.66 days), less ($P < 0.05$) service period (58.83 days), less number of services per conception (1.50), higher rate of 1st service conception (66.66%) (Table 2).Hence, buffaloes should be maintained with an ideal BCS of 3.5 – 3.99 at calving.

- High breeding efficiency is possible by maintaining a calving BCS of 3.5 – 3.99 at every calving.(Table 2)
- The influence of BCSc on the productive performance studied in 40 (4 x 10 Completely Randomized Design) buffaloes revealed that the milk production traits like total milk yield upto 18 weeks of lactation, 305 day predicted lactation yield, peak milk yield, milk protein and solids not fat were higher in BCSc of 3.5 – 3.99 followed by the BCSc groups of 4.0 – 4.49, 3.0 – 3.49 and 2.5 – 2.99.(Table 3 & Table 4)
- The buffaloes should be able to produce high milk production, peak yield, show persistency of milk production as well as high yields of milk components which are the characteristics of ideal lactation curve. This can be achieved by maintaining the buffaloes with an ideal BCSc of 3.5 – 3.99, improving the plane of nutrition during 30-60 days of lactation to maintain the buffaloes in a positive energy balance even during the peak milk production and by monitoring the plane of nutrition regularly such that the buffaloes will not be depleted of their body reserves or over conditioned.
- Thin buffaloes in negative energy balance will be more susceptible to health disorders. Hence, maintaining an ideal BCS of 3.5 – 3.99 minimizes health disorders such as mastitis, anoestrum, retained placenta, ketosis and maximizes economic returns.
- Hence, the BCS system in a 1-5 scale using 0.5 increments is a valid, cheap, easier, applied measure of fatness in buffaloes and also an immediate appraisal of body fat reserves. It is an ideal tool of support for ideal reproductive, productive, feeding and health care management of buffaloes.

Table 1 : The Mean Ultrasonographic Fat Thickness (Mm) For The Five Scores Of Body Condition

BCS	Between 12th and 13th ribs	Lumbar area	Between sacral crest and hooks	Between hooks and pins	Between Tail head and pins	Mean of all check points
1.	1.6	1.8	1.3	1.2	2.7	1.72
2.	3.2	3.3	2.8	2.6	4.6	3.3
3.	4.3	4.6	3.8	4.0	6.4	4.62
4.	6.2	6.6	5.6	5.0	8.5	6.38
5.	8.0	8.0	6.8	5.9	12.5	8.06

Table 2 : Reproductive Performance Of Buffaloes Of Various Bcsc Groups In The Test Herd

Reproduction Parameters	BCSc			
	2.5 – 2.99	3.0 – 3.49	3.50 – 3.99	4.00 – 4.49
Post-partum resumption of ovarian activity	47.25 ± 2.39	42.00 ± 2.91	**29.33 ± 3.33**	39.33 ± 4.21
Post-partum estrus (days)	77.16 ± 5.33	65.66 ± 5.46	**46.66 ± 4.26**	55.16 ± 4.19
Service period (days)	125.16 ± 17.42	85.66 ± 5.83	**58.83 ± 9.01**	77.16 ± 14.76
No. of services per conception	2.66 ± 0.61	2.00 ± 0.40	**1.50 ± 0.37**	1.83 ± 0.52
1st service conception rate (%)	16.66	33.33	**66.66**	50
Breeding efficiency	70.49 ± 2.35	80.58 ± 2.01	**90.64 ± 1.98**	87.48 ± 1.10

Table 3 : Relationship Between Bcsc And Milk Yield In The Test Herd						
BCSc	**Milk yield upto 18 weeks of lactation (kg)**	**'F' Value**	**Predicted lactation yield (kg)**	**'F' Value**	**Peak milk yield (kg)**	**'F' Value**
2.5–2.99	1030.93[d]	150.33**	1981.05[d]	150.33 **	9.50[d]	78.73**
3.0–3.49	1197.12[c]		2300.39[c]		11.60[c]	
3.5–3.99	1658.67[a]		3187.31[a]		16.50[a]	
4.0–4.49	1359.92[b]		2613.23[b]		13.75[b]	

a, b, c, d : values with different superscripts vary significantly (P < 0.01)

Table 4 : Relationship Between Bcsc And Milk Components In The Test Herd						
BCSc	**At 6-8 weeks after calving**			**At 16-18 weeks after calving**		
	Fat %	**Protein %**	**SNF %**	**Fat %**	**Protein %**	**SNF %**
2.5 – 2.99	5.82[d]	3.12[d]	8.73[d]	6.44[d]	3.39[d]	8.99[d]
3.0 – 3.49	6.80[c]	3.47[c]	9.07[c]	7.54[c]	3.74[c]	9.34[c]
3.5 – 3.99	7.76[b]	3.96[a]	9.56[a]	8.62[b]	4.24[a]	9.84[a]
4.0 – 4.49	8.46[a]	3.74[b]	9.34[b]	9.37[a]	3.97[b]	9.57[b]

a, b, c, d : values with different superscripts vary significantly (P < 0.01)

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