BODY CONDITION SCORE IS A PRECISE TOOL TO EVALUATE BEEF COWS

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Story in Brief

Ninety-eight Hereford x Angus beef cows were used to determine reproducibility (the correlation between an animal's score by one technician and its score by a different technician), repeatability (the correlation between an animal's score on one occasion and its score by the same technician on another occasion), and degree of expertise required to assess body condition. Body condition score (BCS) was determined by using a nine-point scale in which 1 represents an emaciated cow and 9 an obese cow. Three groups of technicians with different degrees of expertise scored the cows. Group 1 (G1) consisted of four technicians with at least 2 yr of experience in using the nine-point system. The technicians did not discuss their scoring methods prior to the day of data collection. Group 2 (G2) was five technicians that were familiar with cattle but they had no previous experience body condition scoring cows and were trained the day before the experiment as to how to score the animals by a member of G1. Group 3 (G3) consisted of four technicians with no experience with cattle and they were simply instructed to give the cows a score between 2 to 8. Reproducibility was 0.65^{a}, 0.42^{b} and 0.50^{ab}, for G1, G2 and G3, respectively (different superscripts differ, $P<0.05$), and was less than repeatability (0.83^{a}, 0.68^{b} and 0.59^{b}, for G1, G2 and G3, respectively; $P<0.05$), indicating that periodical training of technicians is needed to standardize the system. In G1, technicians disagreed on the BCS of a cow by more than 1 unit in 4% of the animals, suggesting that the nine-point scale is a precise system to evaluate cows within 1 unit of BCS.

(Key Words: BCS, Repeatability, Reproducibility.)

Introduction

The term "condition" was first described by Murray (1919) in an attempt to determine the amount of fat in animals, since no other method was available for that purpose. Since then, several scoring systems have been developed to describe body condition in live animals.

The most commonly used nine-point system in the United States (Wagner et

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al., 1988), has never been subjected to statistical analyses, and no attempt has been made to quantify the degree of expertise that is needed to accurately estimate body condition score. Therefore the objectives of this experiment were: 1) to determine the reproducibility and repeatability of the nine-point BCS system, and 2) to determine how much expertise is needed before a scorer can accurately evaluate beef cows.

Materials and Methods

Ninety-eight Hereford x Angus cows that weighed an average of 410 ± 5 kg and were an average of 4.5 years old (range 3 to 10 yr) were used. Body condition score (BCS) was assessed by using a nine-point scale (Wagner et al., 1988).

Three groups of technicians with different amounts of expertise in the body condition scoring of cows using the nine-point scale (1=emaciated, 9=obese) participated. Each technician was provided with a notebook and pencil to record data without consultation between technicians during the scoring procedure. Technicians were allowed to touch the cows to estimate fat deposition. Each technician scored the cows a second time, later in the same day, without access to previous data. The cows passed through the chute randomly to minimize the possibility of recalling the score that was given to an individual cow previously.

Group 1 (G1) consisted of four technicians with at least 2 yr of experience in using the nine-point system. The technicians did not discuss their scoring methods prior to the day of data collection. They were allowed to give 0.5 scores if they thought that it would better describe a cow.

Group 2 (G2) included five technicians with no previous experience who were trained the day before the experiment, as to how to score the animals by a member of group 1. They were allowed to use pictures and the definitions of the nine-point system during the trial, as well as to give 0.5 scores if they thought that it would better describe a cow.

Group 3 (G3) consisted of four technicians with no experience with cattle, and they were instructed to give a score between 2 to 8 in which 2 represented a very thin animal and 8 a very fat animal.

Analyses of variance was performed and expected mean squares were calculated for cow (c), technician (t), c*t, repetition (r), t*r and residual (e). Reproducibility (RPR) was calculated as the variance due to c divided by the variance due to c, t, c*t and e. Repeatability (RPE) was calculated as the variance due to c, t and c*t divided by the variance for c, t, c*t and e.

Results and Discussion

Only one technician scored cows in the range from 2 to 8 (Table 1). Technicians in G2 did not score any cows as a BCS 2, while technicians in G3 did not score any cow as 2 or 8. Cows were grouped into fewer score categories by G2 and G3 as compared with G1.

The reproducibility between all possible combinations of technicians in G1 ranged from .50 to .78 (Table 2). One member of G1 (C) used a different technique to score the animals. While technicians A, B and D palpated ribs and pin bones of the cows to estimate the BCS, technician C gave the score based only on visual observation. This difference in technique might explain the low RPR between technicians C and D. In fact, C and D completely agree on only one cow, while in 60% of the cows they disagreed by more than .5 units of BCS. However the difference was not as notable when technicians C and B or C and A were compared. On the average only 15% of the time they disagreed by more than .5 units of BCS. On the other hand, technician D disagreed on 29% of the cows by more than .5 unit of BCS with A and B. This indicates that the different technique used by technician C, as well as a different scale for the cows but using the same technique, were involved in the range of RPR observed in G1. Technicians disagreed on the BCS of a cow by more than 1 unit in only 4% of the cows, suggesting that the nine-point scale is a precise system to evaluate cows within 1 unit of BCS.

Repeatability was greater than reproducibility for all three groups (Table 3), indicating that periodic training of technicians is needed to standardize the system. Group 1 had a significantly greater RPE as compared with G2, implying that one training session was not enough to learn how to assess BCS. Since technicians in G2 were trained at the same time by one instructor, it was expected to have a better standardization as compared with G3. However, there was no significant difference in reproducibility between G2 and G3 which provides further evidence that one training session was not enough for technicians to learn how to assess BCS. The nonsignificant difference in reproducibility between G1 and G3 might be due to the fact that members of G3 tended to score the cows in fewer categories. In fact, more than 93% of the cows were given scores 4, 5 or 6 (Table 1), which in turn, exaggerated reproducibility.

In summary, the use of this BCS method by trained technicians provides a precise system to evaluate energy reserves of cows.

Literature Cited

Murray, J.A. 1919. J. of Agric. Sci. 9:174.
Wagner, J.J. et al. 1988. J. Anim. Sci. 66:603.

Table 1. Percentage of cows in each score given by technicians in both replications (n = 196). Fractions of scores were rounded down to whole numbers.

	SCORE						
Technician	2	3	4	5	6	7	8
Group 1							
A	1	5	30	51	7	3	3
B	0	3	24	66	4	3	0
C	1	1	10	67	18	3	0
D	0	4	62	25	4	4	1
Group 2							
A	0	0	2	35	59	4	0
B	0	0	5	53	36	6	0
C	0	6	37	37	15	4	1
D	0	6	52	33	7	2	0
E	0	4	46	41	5	3	1
Group 3							
A	0	1	11	55	31	2	0
B	0	0	10	65	21	4	0
C	0	4	24	44	23	5	0
D	0	4	26	61	9	0	0

Table 2. Reproducibility (RPR) between technicians in Group 1, and number of cows in which two technicians agreed (0) or disagreed by more than .5 units of BCS.

Technicians combination	RPR	Units of BCS			
		0	≤0.5	≤1	≤1.5
A-B	.78	30	60	6	2
A-C	.65	20	58	13	7
A-D	.67	16	54	25	3
B-C	.69	25	64	7	2
B-D	.62	16	54	27	1
C-D	.50	1	37	49	11
Mean	.65	18%	56%	22%	4%

Table 3. Repeatability (RPE) and reproducibility (RPR) for the three groups of technicians

	RPE	RPR
Group 1	$.83^{a}$	$.65^{a}$
Group 2	$.68^{b}$	$.42^{b}$
Group 3	$.59^{b}$	$.50^{ab}$

a,b Means with different superscript a column differ ($P<0.05$).