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Texas Adapted Genetic Strategies for Beef Cattle

X: Frame Score and Weight

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Body size is an important genetic factor in beef cattle production. Historically, size was first estimated by measurements such as height or length. As scales were developed, weight became more common as a measure of size. Measurement and weight are related, but their rates of maturity differ. By 7 months of age, cattle reach about 80 percent of mature height but only 35 to 45 percent of mature weight. At 12 months, about 90 percent of mature height is reached, compared to only 50 to 60 percent of mature weight.

Frame Scores

Beef Improvement Federation (BIF) Frame Scores, a method of estimating skeletal size based on hip height, are shown in Table 1. Frame scores represent differences in height at the same age of about 2 inches. Values in the chart represent averages of thousands of cattle, but individual animals may vary.

Heights should be determined on the topline directly over the hips or hooks with cattle standing on a firm, flat surface, legs symmetrically positioned and head in a normal position. The most common device for determining height is a measuring stick, available at many livestock supply companies. It consists of a cross-arm (with a bubble level) attached in a 90-degree angle to an upright containing a rule.

The chart lists only six scores but may be expanded for cattle outside the listed values. Formulas in the chart can be used to calculate scores for animals 5 to 21 months old, although 12 months is probably the most useful age for determining frame score. Although frame score is not an exact measure of skeletal dimension, as differences in angulation of skeletal junctions influence height, frame score is the simplest, most useful method for estimating relative skeletal size.

Skeletal Size, Body Weight and Composition

Weight is often used to characterize body size, but a mature cow weighing 1,100 pounds in moderate fatness or body condition weighs only 800 pounds when extremely thin and 1,500 pounds when extremely fat. So, size is more accurately characterized by including relevant factors other than weight, such as skeletal size and body condition.

USDA Feeder Cattle Grades separately evaluate Frame Size (Small, Medium and Large) and body thickness (1 = moderately thick or thicker, 2 = slightly thick, 3 = thin, 4 = very thin or thinner). A USDA Medium Frame steer is projected to finish at 1,100 to 1,250 pounds, with 0.5 inch of fat cover. Slaughter heifers are projected to weigh 100 pounds less than equivalent-sized steers. A USDA Medium Frame animal has a frame score ranging from about low 4 to mid 5. USDA Small is below this range, and USDA Large is above. In fact, anything above frame score 7 should probably be called Very Large.

The weight of mature cows in moderate body condition (Body Condition Score 5) averages the same as that of equivalent frame score steers with 0.5 inch of fat. Mature bulls weigh about 55 to 60 percent more than cows of the same frame score. Mature cow weight varies approximately 7 to 8 percent for each unit change in Body Condition Score, and extremes in muscling can cause weight to vary as much as 10 percent. For a complete discussion of the Body Condition 1 through 9 scoring system, consult Texas Cooperative Extension publication B-1526, “Body Condition, Nutrition and Reproduction of Beef Cows.”

The most useful measure of body size is weight at a standard fatness or condition, which also accounts for differences in muscling, a shortcoming of the frame score system. Frame score is most valuable as a predictor of weights at slaughter, puberty and maturity.

For further reading

To obtain other publications in this Texas Adapted Genetics Strategies for Beef Cattle series, contact your county Extension office or see the Extension Web site *http://tcebookstore.org* and the Texas A&M Animal Science Extension Web site *http://animalscience.tamu.edu*.

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Table 1. Cattle Frame Scores Based on Hip Height in Inches[1]

MALES[2]							FEMALES						
	Frame Score[3]							Frame Score[3]					
Age in Months	3.0	4.0	5.0	6.0	7.0	8.0	Age In Months	3.0	4.0	5.0	6.0	7.0	8.0
5	37.5	39.5	41.6	43.6	45.6	47.7	5	37.2	39.3	41.3	43.4	45.5	47.5
6	38.8	40.8	42.9	44.9	46.9	48.9	6	38.2	40.3	42.3	44.4	46.5	48.5
7	40.0	42.1	44.1	46.1	48.1	50.1	7	39.2	41.2	43.3	45.3	47.4	49.4
8	41.2	43.2	45.2	47.2	49.3	51.3	8	40.1	42.1	44.1	46.2	48.2	50.2
9	42.3	44.3	46.3	48.3	50.3	52.3	9	40.9	42.9	44.9	47.0	49.0	51.0
10	43.3	45.3	47.3	49.3	51.3	53.3	10	41.6	43.7	45.7	47.7	49.7	51.7
11	44.2	46.2	48.2	50.2	52.2	54.2	11	42.3	44.3	46.4	48.4	50.4	52.4
12	45.0	47.0	49.0	51.0	53.0	55.0	12	43.0	45.0	47.0	49.0	51.0	53.0
13	45.8	47.8	49.8	51.8	53.8	55.8	13	43.6	45.5	47.5	49.5	51.5	53.5
14	46.5	48.5	50.4	52.4	54.4	56.4	14	44.1	46.1	48.0	50.0	52.0	54.0
15	47.1	49.1	51.1	53.0	55.0	57.0	15	44.5	46.5	48.5	50.5	52.4	54.4
16	47.6	49.6	51.6	53.6	55.6	57.5	16	44.9	46.9	48.9	50.8	52.8	54.8
17	48.1	50.1	52.0	54.0	56.0	58.0	17	45.3	47.2	49.2	51.1	53.1	55.1
18	48.5	50.5	52.4	54.4	56.4	58.4	18	45.6	47.5	49.5	51.4	53.4	55.3
19	48.8	50.8	52.7	54.7	56.7	58.7	19	45.8	47.7	49.7	51.6	53.6	55.5
20	49.1	51.0	53.0	55.0	56.9	58.9	20	46.0	47.9	49.8	51.8	53.7	55.6
21	49.2	51.2	53.2	55.1	57.1	59.1	21	46.1	48.0	50.0	51.9	53.8	55.7
Mature	52.3	54.1	55.9	58.0	60.0	62.0	Mature[4]	48.2	50.0	52.0	53.9	55.8	57.5
Frame Score (5-21 months) = 0.4878 (Ht) - 0.0289 (Days of Age) + .00001947 (Days of Age)^2 + 0.0000334 (Ht) (Days of Age) - 11.548							Frame Score (5-21 months) = 0.4723 (Ht) - 0.0239 (Days of Age) + 0.0000146 (Days of Age)^2 + 0.0000759 (Ht) (Days of Age) -11.7086						
Steer Slaughter Weight[5]	1010	1105	1200	1295	1390	1485	Heifer Slaughter Weight[5]	910	1005	1100	1195	1290	1385
Mature Bull Weight[6]	1590	1740	1890	2040	2190	2340	Mature cow Weight[7]	1010	1105	1200	1295	1390	1485

[1] Approved by the Beef Improvement Federation.

[2] Steers continue growth longer than bulls, being about 1/2 to 1 inch taller at 18 to 21 months.

[3] USDA MEDIUM FRAME SIZE is a frame score of approximately 4.0 to 5.5.

[4] If calved first at 2 years old. Add 1 inch if calved first at 3 years.

[5] At 0.5 inch fat cover.

[6] At 12 months, bulls weigh 50 to 60% of this mature weight, under most development programs.

[7] Moderate body fatness, cow Body Condition Score 5 (where 1 = extremely thin and 9 = obese; cow weight varies 7% to 8% per condition score and up to 10% for extremes in muscling). For breeding at 14 to 15 months heifers should weigh 60 to 65% of this mature weight.

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