Western Beef Resource Committee

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Cattle Producer's Handbook

Management Section 775

Frame Scores and Feeder Cattle Grades

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For an efficient cow-calf operation, estimates of cow performance can help plan management strategies. Frame scores are one way that producers can predict performance of their cattle. Frame scores project mature size, indicate carcass composition, and estimate performance potential and feed requirements.

Frame scores are classifications of skeletal size. Skeletal size indicates mature proportions and subsequently cattle growth patterns. Frame scores are objective number scores that typically range from 1 to 9. Hip height measurements adjusted for age are used to calculate the numbers.

With proper age adjustment, the frame score for the animal should be the same its entire life. This should hold true no matter at what age the measurements are taken. This assumes that there will be proper nutrition and management for that animal.

In real life situations, management or nutrition may not be consistent. Because of this, sometimes animals will change frame scores (usually no more or less than 1) in their lifetime.

Fig. 1. Three different frame scores.

Cattle with low frame scores are smaller and shorter. Cattle with this type of frame usually mature earlier and at lighter body weights. They finish for slaughter earlier and at lighter weights in the feedlot. Cattle with high numbered frame scores are taller and usually later maturing. They weigh more at maturity. They finish at higher weights in the feedlot and tend to convert feed to gain more efficiently. They may not carry as much marbling, lowering carcass value.

Which frame size is more desirable depends upon environmental conditions that the cattle are in as well as management goals and objectives. Fig. 1 is an example of various frame sizes of similar body condition.

Hip height is measured at a point directly over the hook bones (Fig. 2). A specially designed device measures hip height. It has a bubble level on a sliding arm on a pole with scaled measurements. You can also use other methods. It is important, however, that the animal is standing squarely and its head held in a normal position for any measuring technique used.

Adjustments when frame scoring at 205 and 365 days of age must be made for age of calf and age of dam. For the 205-day weights, take hip height measurements

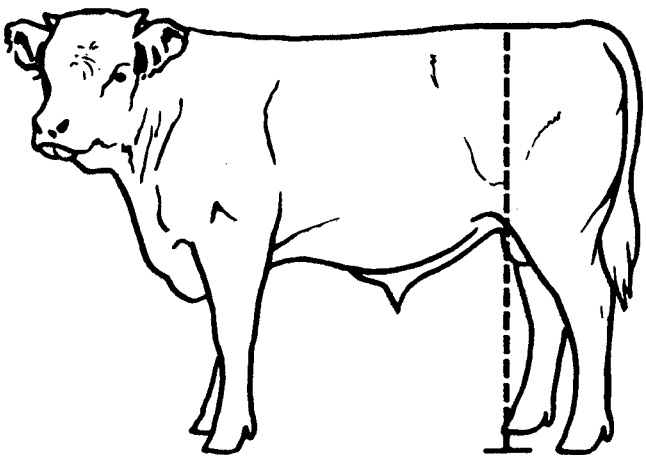

Fig. 2. Proper measurement location for hip heights.

Table 1. 205-day and 365-day height adjustment factors and formulas.

Formula for 205-day height:

Adjusted height = {actual height + [(205 - actual age) x age of calf adjustment]} x age of dam adjustment

Formula for 365-day height:

Adjusted height = actual height + [(365 - actual age) x age of calf adjustment]

Factors for adjusting weaning height:

	Bulls	Heifers
Age of calf	0.033	0.025
Age of dam		
2 and 13 or older	1.020	1.020
3 and 12	1.015	1.015
4 and 11	1.010	1.010
5 through 10	1.000	1.000

Factors for adjusting yearling height:

	Bulls	Heifers
Age of calf		
under 365 days	0.033	0.025
over 365 days	0.025	0.025

Source: BIF Guidelines for Uniform Beef Improvement Programs 1990.

between 160 and 250 days of age. For the 365-day weight, cattle should be at least 330 days of age to take the measurements. Table 1 shows the proper adjustment factors for calf age and age of dam. For an example, a bull calf born on March 1 and weaned on October 20 with a 2-year-old dam that measured 43 inches would have an adjusted reading of:

Adjusted height = {actual height + [(205 - actual age) x calf age adjustment]} x dam adjustment
= {43 + [(205-234) x .033]} x 1.02
= [43 + (-.0957)] = 42.043 x 1.02
= 42.9

Calculations are similar when adjusting for yearling heights with the exception the age of the dam factor is not used. The actual frame score is derived from the adjusted hip height and the animal's age. The frame score can be derived from a chart (see Tables 2 and 3 on next page). Charts are different for bulls and heifers. Values for steers are not available; however, bull height estimates may be used as an approximation for steers.

Some breed associations have developed charts that they consider more accurate for their respective breeds. For example, a bull measuring 50 inches (adjusted) at 345 days of age, from the chart, would be approximately a frame score 6.

Frame scores can predict mature cow size. Large frame heifers will grow into large frame cows. The larger the frame score, the higher the mature weight. The larger the size of the cow, the greater the nutrient demands.

When sufficient nutrients are available, reproductive rates are similar between frame sizes. If nutrition is short, such as in arid regions, a more moderate frame sized cow will be more likely to have its nutrient needs met. This is important in heifer development programs, since moderate frame sizes will reach puberty at an earlier age. Refer to fact sheets 413, 446, 720, and 733 for additional information on selecting the proper frame size that matches your ranch resources.

Feeder Cattle Grades

Frame scores combined with muscle scores can indicate feedlot finish weights. Large framed animals grow faster but take longer to finish and have heavier slaughter weights. The USDA feeder cattle grading system is based on frame scores and muscle thickness. For feeder cattle, instead of using BIF frame scores, designations of large, medium, and small frames are used (Table 4).

Large-frame feeder cattle (frame scores 6, 7, 8, and 9) have large skeletons, being tall and long bodied. Large-frame steers produce a choice carcass between 1,250 to 1,500 pounds and heifers between 1,150 to 1,400 pounds. Medium-frames (frame scores 4 and 5) are smaller than large frames, but frames are still called a slightly large frame and produce a choice carcass at 1,100 to 1,250 pounds for steers and 1,000 to 1,150 pounds for heifers. Small-frame cattle (frame scores 2 and 3) are shorter, and steers produce choice carcasses at 1,100 pounds or less and heifers at 1,000 or less.

Muscle Scores—Four muscle scores are used (1, 2, 3, and 4) to describe muscle thickness of feeder cattle:

Number 1: Feeder cattle that possess minimum qualifications for this grade usually display predominate beef breeding. They must be thrifty and moderately thick throughout. They are moderately thick and full in the forearm and gaskin, showing a rounded appearance through the back and loin with moderate width between the legs, both front and rear. Cattle show this thickness with a slightly thin covering of fat. Cattle eligible for this grade may carry varying degrees of fat.

Number 2: Feeder cattle that possess minimum qualifications for this grade usually show a high proportion of beef breeding, and slight dairy breeding may be detected. They must be thrifty and tend to be slightly thick throughout. They tend to be slightly thick and full in the forearm and gaskin, showing a rounded appearance through the back and loin with slight width between the legs, both front and rear. Cattle show this thickness with a

Table 2. Frame score formulas and charts (in inches) for bulls.

	Frame score								
Age in months	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
5	33.5	35.5	37.5	39.5	41.6	43.6	45.6	47.7	49.7
6	34.8	36.8	38.8	40.8	42.9	44.9	46.9	48.9	51.0
7	36.0	38.0	40.0	42.1	44.1	46.1	48.1	50.1	52.2
8	37.2	39.2	41.2	43.2	45.2	47.2	49.3	51.3	53.3
9	38.2	40.2	42.3	44.3	46.3	48.3	50.3	52.3	54.3
10	39.2	41.2	43.3	45.3	47.3	49.3	51.3	53.3	55.3
11	40.2	42.2	44.2	46.2	48.2	50.2	52.2	54.2	56.2
12	41.0	43.0	45.0	47.0	49.0	51.0	53.0	55.0	57.0
13	41.8	43.8	45.8	47.8	49.8	51.8	53.8	55.8	57.7
14	42.5	44.5	46.5	48.5	50.4	52.4	54.4	56.4	58.4
15	43.1	45.1	47.1	49.1	51.1	53.0	55.0	57.0	59.0
16	43.6	45.6	47.6	49.6	51.6	53.6	55.6	57.5	59.5
17	44.1	46.1	48.1	50.1	52.0	54.0	56.0	58.0	60.0
18	44.5	46.5	48.5	50.5	52.4	54.4	56.4	58.4	60.3
19	44.9	46.8	48.8	50.8	52.7	54.1	56.7	58.7	60.6
20	45.1	47.1	49.1	51.0	53.0	55.0	56.9	58.9	60.9
21	45.3	47.3	49.2	51.2	53.2	55.1	57.1	59.1	61.0

Source: BIF Guidelines for Uniform Beef Improvement Programs, 1990.

Table 3. Frame score formulas and charts (in inches) for heifers.

	Frame score								
Age in months	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
5	33.1	35.1	37.2	39.3	41.3	43.4	45.5	47.5	49.6
6	34.1	36.2	38.2	40.3	42.3	44.4	46.5	48.5	50.6
7	35.1	37.1	39.2	41.2	43.3	45.3	41.4	49.4	51.5
8	36.0	38.0	40.1	42.1	44.1	46.2	48.2	50.2	52.3
9	36.8	38.9	40.9	42.9	44.9	47.0	49.0	51.0	53.0
10	37.6	39.6	41.6	43.7	45.7	47.7	49.7	51.7	53.8
11	38.3	40.3	42.3	44.3	46.4	48.4	50.4	52.4	54.4
12	39.0	41.0	43.0	45.0	47.0	49.0	51.0	53.0	55.0
13	39.6	41.6	43.6	45.5	47.5	49.5	51.5	53.5	55.5
14	40.1	42.1	44.1	46.1	48.0	50.0	52.0	54.0	56.0
15	40.6	42.6	44.5	46.5	48.5	50.5	52.4	54.4	56.4
16	41.0	43.0	44.9	46.9	48.9	50.8	52.8	54.8	56.7
17	41.4	43.3	45.3	47.2	49.2	51.1	53.1	55.1	57.0
18	41.7	43.6	45.6	47.5	49.5	51.4	53.4	55.3	57.3
19	41.9	43.9	45.8	47.7	49.7	51.6	53.6	55.5	57.4
20	42.1	44.1	46.0	47.9	49.8	51.8	53.7	55.6	57.6
21	42.3	44.2	46.1	48.0	50.0	51.9	53.8	55.7	57.7

Source: BIF Guidelines for Uniform Beef Improvement Programs, 1990.

Table 4. Relationship of frame size to projected mature cow weight and slaughter weight at choice quality grade.

Feeder cattle frame size (USDA)	**Small**		**Medium**		**Large**			
BIF frame score	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mature cow weight, lb	955	1,030	1,100	1,175	1,250	1,320	1,400	1,470
Steer slaughter weight, lb	850	1,100	1,100	1,250	1,250	1,350	1,450	1,500
Heifer slaughter weight, lb	700	1,000	1,000	1,150	1,150	1,200	1,300	1,400

Source: Adapted from Boggs, South Dakota State University, 1991.

slightly thin covering of fat. Cattle eligible for this grade may carry varying degrees of fat.

Number 3: Feeder cattle that possess minimum qualifications for this grade are thrifty and thin through the forequarter and the middle part of the rounds. The forearm and gaskin are thin, and the back and loin have a sunken appearance. The legs are set close together, both front and rear. Cattle show this narrowness with a slightly thin covering of fat. Cattle eligible for this grade may carry varying degrees of fat.

Number 4: Feeder cattle included in this grade are thrifty animals that have less thickness than the minimum requirements specified for the frame score 3 grade.

By combining frame score (small, medium, large) with muscle score (1, 2, 3, 4) classifications, this gives a possibility of classifications 1 to 12. For example, L-1 is a large framed, heavier muscled animal, and S-12 is a small framed, lighter muscled animal (Table 5).

One more feeder cattle grade is called inferior. It is used for cattle that will not perform normally and includes unthrifty animals because of mismanagement (disease, parasites, poor nutrition, etc.) and double muscled cattle.

Table 5. Frame scores and muscle scores combined.

	Muscle scores			
Frame size	**1**	**2**	**3**	**4**
Large frames (6 to 9)	L-1	L-2	L-3	L-4
Medium frames (4 & 5)	M-5	M-6	M-7	M-8
Small frames (2 & 3)	S-9	S-10	S-11	S-12

The purpose of USDA Feeder Cattle Grades is to sort feeder cattle into similar groups that will facilitate their selling and buying. These grades also sort feeder cattle into similar outcome groups in a feedlot. An indication of frame size is important when estimating growing and finishing cattle nutrient requirements, and projected feed intake.

Summary

Frame score is considered to be moderately heritable to highly heritable. As such, selection can significantly change frame scores, primarily achieved through sire selection. With a heritability estimate of .40, about 40 percent of a bull's difference in frame score from herd average will appear in the progeny.

Frame score measurements are descriptive of animal type and growth patterns in beef cattle. They are useful in evaluating animal nutritional requirements, characterizing target market weights, and aid in selection decisions.

References

Guidelines for Uniform Beef Improvement Programs. 1996. Beef Improvement Federation. Northwest Research Extension Center, 105 Experiment Farm Rd., KS 67701. Seventh Edition. pg. 18.

U.S. Standards for Grades of Feeder Cattle. October 2000. USDA. AMS-586.

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