

Cow Herd Performance Testing

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What Is Cow Herd Performance Testing?

The cow herd performance testing program is designed to record information on economically important traits. These traits can be grouped into three main areas.

1. **Reproduction** – the ability of the cow to produce a calf every 365 days.
2. **Growth Rate** – the ability of the preweaned calf to grow rapidly.
3. **Composition** – the frame score and muscle score, which are related to carcass grade, yield and size as the finished product on the rail.

Cow herd performance testing will benefit the cattle operation if the records are used for directing the herd breeding program. It is the best tool available for selecting high-performing, high-quality replacement heifers and for identifying and culling cows with low-performing and low-quality calves. Herds that have used the program for several years have increased weaning weights by 10 to 15 pounds per year.

Program Requirements

The following is a list of requirements to participate in the cow herd performance testing program:

- The calf must be identified (ear tag, tattoo, brand, etc.).
- Calf sex must be recorded (bull, heifer or steer).
- Calf birth dates must be recorded.
- Dams (cows) must be identified

(ear tag, tattoo, brand, etc.) and matched to their calves. Ear tags are the most common way to identify cows. Because ear tags are commonly lost, it is strongly recommended that cows also be ear tattooed. If an ear tag is lost, the tattoo can be read and a new ear tag inserted.

- Know birth date of dam (initially this can be estimated in commercial operations lacking such records).
- Identify the calf's sire (this can be omitted in commercial herds using multiple sire breeding programs).

Scales

Scales are required to weigh cows and calves. The producer is not required to own or buy a set of scales. Many counties have scales available from various organizations (county cattlemen's association, fair board, etc.) or individuals. These scales can be either borrowed or rented.

Weighing Cows and Calves

Performance test guidelines recommend calves be weighed when they are close to 205 days of age. The accepted age range is 160 to 250 days of age. Weighing calves less than 160 days of age will cause an over-estimation of adjusted weaning weights. Weighing calves over 250 days of age will result in underestimation of adjusted weaning weights. Therefore, data from calves outside the age range is not figured into the herd average. An additional weigh day may be necessary if the herd is on a

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split calving season or on an extended calving season.

It is recommended to also weigh the cows at the same time the calves are weighed. The cow weight will be used to identify which cows wean a high percentage of their body weight. Generally, cows that wean a high percentage of their body weight are more efficient and profitable than cows that wean a low percentage of their body weight.

Hip Height

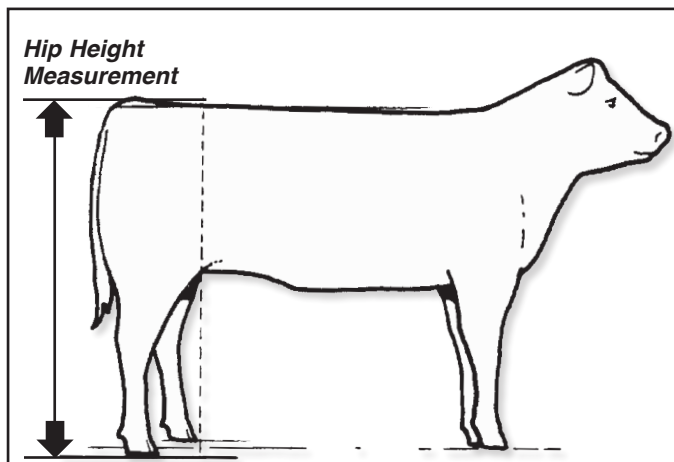
Calf hip heights should be measured and adjusted to 205 days of age and for age of dam. Hip height indicates the makeup of a calf's weaning weight (such as a 500-pound adjusted weight on a small, medium or large frame). Hip height can be related to a numerical frame score (such as frame scores 1 through 9 or 10). Also, frame score or hip height can be related to the approximate weight of a calf when it achieves a given quality grade or attains a given amount of fat thickness.

The recommended site for linear height measurement is a point directly over the hooks (Figure 1). This measurement is adjusted to production end point at 205 days and 365 days (within Beef Improvement Federation ranges currently used for adjusted weights).

Frame score is a convenient way of describing the skeletal size of cattle. With appropriate height growth curves, most animals should maintain the same frame score throughout their life, while their actual height increases with age. This allows one frame score value to be used regardless of when the animal was evaluated. However, the frame score will change for animals that mature earlier or later compared with average animals.

Environmental factors can also alter an animal's growth performance. Nutritional level is a major factor. Cattle that do not receive adequate nutrition will be below average in growth rate, while cattle fed extremely high levels will grow faster.

Figure 1. Hip Height



Muscling Score

When the calves are weighed, they are also graded, or evaluated, for muscling or conformation (Figure 2). Muscle score is a visual evaluation of the amount of natural thickness and muscling a calf possesses. These scores are used to identify the more heavily muscled calves for retention as replacements or for herd sires. These values can be used to identify dams and sires that are producing lighter muscled calves.

Number 1 (muscle code 14 to 16): Cattle that possess minimum qualifications for this grade usually show a high proportion of 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; however, cattle eligible for this grade may carry varying degrees of fat.

Number 2 (muscle code 12 to 13): Cattle that possess minimum qualifications for this grade 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 slightly thin covering of fat; however, cattle eligible for this grade may carry varying degrees of fat.

Number 3 (muscle code 10 to 11): 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; however, cattle eligible for this grade may carry varying degrees of fat.

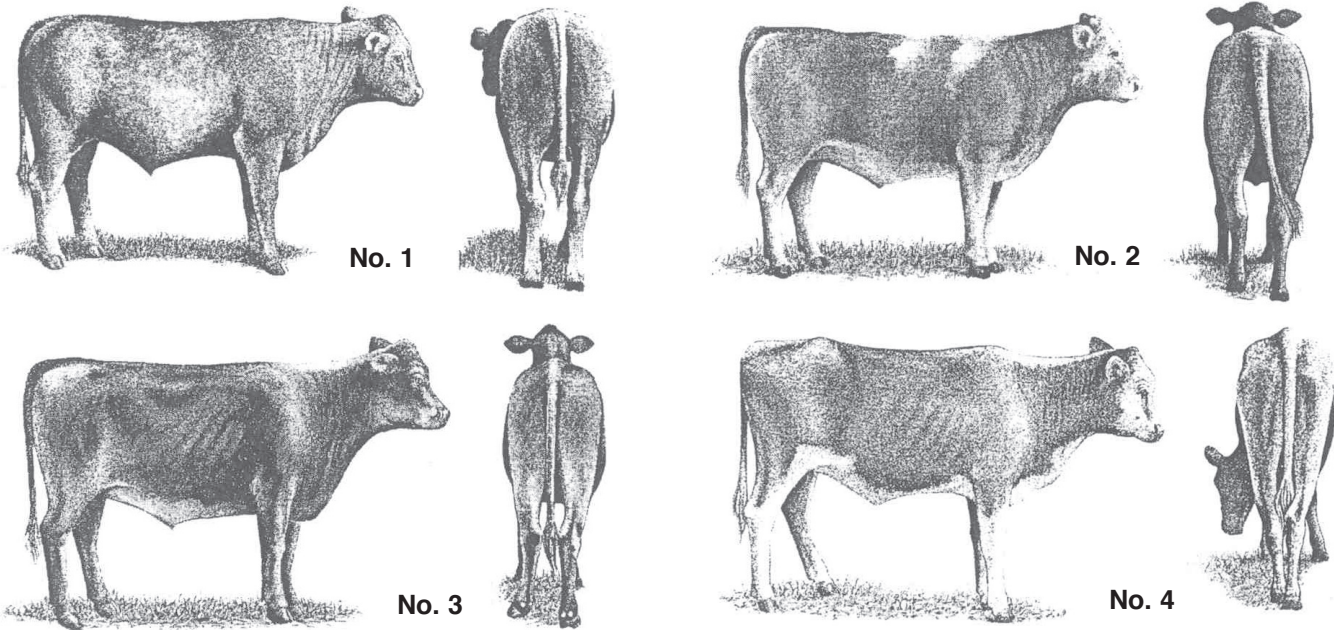
Number 4 (muscle code 7 to 9): Cattle in this grade are thrifty animals that have less thickness than the minimum requirements specified for the No. 3 grade.

Dam's Body Condition and Hip Height

A Body Condition Score (BCS) is an appraisal of the energy reserves (degree of fatness) of a beef cow. The most commonly used scale to score body condition is based on a scale of 1 to 9, with body condition of 1 indicating an emaciated animal and 9 indicating a very fat animal.

The cow's hip height measurement is measured in the same method as described for the calf (Figure 1).

Figure 2. Muscle Thickness



No. 1, No. 2 and No. 3 thickness pictures depict minimum grade requirements. The No. 4 picture represents an animal typical of the grade. Source: USDA - Agricultural Marketing Service.

Calf Crop Record Work Sheet

All of this information (calf sex, calf birth date, calf weaning weight, etc.) should be recorded on the Calf Crop Record Work Sheet (CES410) provided by your local county Extension agent. The calf identification number (No.), sex, birth date, birth weight, sire and dam identification numbers (No.), dam's birth date and last calving date should be recorded on the calf crop record work sheet before weighing the calves and cows. With this information already recorded, time will be saved and confusion reduced.

It's important to include the management code (Mgt. Code). Management codes are listed on the back of the Calf Crop Record Work Sheet (Figure 3, page 4).

Cow Herd Performance Results

Once all the information is collected (cow weight, calf weight, etc.) and recorded on the Calf Crop Record Work Sheet (CES410), a computer program is used to calculate the results. Your local county Extension agent or a livestock specialist can input the information into the computer. The following is the list of results provided by the Cow Herd Performance Testing Program.

Adjusted 205-Day Weight

From actual calf weights, adjusted 205-day weights and weight ratios are calculated.

Each actual calf weight is:

1. Adjusted to 205 days of age
2. Adjusted for age of dam

Under performance test guidelines, calf weights are not adjusted for sex of calf. Adjustment for calf sex is not needed because adjusted calf weights and weight ratios are reported within sex groups (bulls, heifers and steers). Adjusted weights allow calves within a sex group to be reported on an equal basis. When adjusted weaning weights are calculated, calves (within the same sex group) can be compared for preweaning growth, cows can be compared for maternal qualities and sires can be compared for growth of offspring.

Adjusted 205-Day Ratios

Weight ratios are calculated for adjusted 205-day weights. A weight ratio is calculated by dividing a calf's adjusted 205-day weight by the average adjusted 205-day weight of the calf's sex group and multiplying by 100.

Weight ratios show an animal's relationship to its group average in percentage points. The group average will have a ratio of 100. If a calf has a weaning weight ratio of 105, it could be said that this calf was 5 percentage points above the group average. Weight ratios will show the same comparisons seen with adjusted weight.

Figure 3. CES410, Calf Crop Record Work Sheet

CALF CROP RECORD WORK SHEET

Herd No. _____ Name _____ County _____
(Owner, Farm, or Ranch Name)





(Assigned by State Livestock Specialist) Address _____ / _____ / _____
(Street, Route, or P. O. Box) (City) (State) (Zip Code)

Date Weighed _____ Breed _____ Breed Code _____
 Purebred / Commercial Records certified by: _____

Calf				Dam			Calf				Dam			
No.	Sex	Birth Date M/D/Y	Birth Wt.	Sire No.	No.	Birth Date M/D/Y	Last Calving Date M/D/Y	Mgt. Code	Weaning Wt.	Hip Height	Muscle Code	Dam Wt. at Weaning	Dam Body Condition Score	Dam Hip Height

CODES TO BE USED IN REPORTING WEANING INFORMATION

<p>Beef Breed Codes</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Breed</th> </tr> </thead> <tbody> <tr><td>1</td><td>Hereford</td></tr> <tr><td>2</td><td>Angus</td></tr> <tr><td>3</td><td>Charolais</td></tr> <tr><td>4</td><td>Shorthorn</td></tr> <tr><td>5</td><td>Polled Hereford</td></tr> <tr><td>6</td><td>Red Poll</td></tr> <tr><td>7</td><td>Santa Gertrudis</td></tr> <tr><td>8</td><td>Simmental</td></tr> <tr><td>9</td><td>Red Angus</td></tr> <tr><td>10</td><td>Brahman</td></tr> <tr><td>11</td><td>Chianina</td></tr> <tr><td>12</td><td>Limousin</td></tr> <tr><td>13</td><td>Maine-Anjou</td></tr> <tr><td>14</td><td>Gelbvieh</td></tr> <tr><td>15</td><td>White Park</td></tr> <tr><td>16</td><td>Pinzgauer</td></tr> </tbody> </table>	Code	Breed	1	Hereford	2	Angus	3	Charolais	4	Shorthorn	5	Polled Hereford	6	Red Poll	7	Santa Gertrudis	8	Simmental	9	Red Angus	10	Brahman	11	Chianina	12	Limousin	13	Maine-Anjou	14	Gelbvieh	15	White Park	16	Pinzgauer	<p>Beef Breed Codes</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Breed</th> </tr> </thead> <tbody> <tr><td>17</td><td>Murray Grey</td></tr> <tr><td>18</td><td>Norwegian Red</td></tr> <tr><td>19</td><td>Galloway</td></tr> <tr><td>20</td><td>Brangus</td></tr> <tr><td>21</td><td>Beefmaster</td></tr> <tr><td>22</td><td>Red Brahman</td></tr> <tr><td>23</td><td>Belted Galloway</td></tr> <tr><td>24</td><td>Red Brangus</td></tr> <tr><td>25</td><td>Crossbred</td></tr> <tr><td>26</td><td>South Devon</td></tr> <tr><td>27</td><td>Simbrah</td></tr> <tr><td>28</td><td>Barzona</td></tr> <tr><td>29</td><td>Devon</td></tr> <tr><td>30</td><td>Normande</td></tr> <tr><td>31</td><td>Salers</td></tr> <tr><td>32</td><td>Other</td></tr> </tbody> </table>	Code	Breed	17	Murray Grey	18	Norwegian Red	19	Galloway	20	Brangus	21	Beefmaster	22	Red Brahman	23	Belted Galloway	24	Red Brangus	25	Crossbred	26	South Devon	27	Simbrah	28	Barzona	29	Devon	30	Normande	31	Salers	32	Other	<p>Calf Sex Codes</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Sex</th> </tr> </thead> <tbody> <tr><td>B</td><td>Bull</td></tr> <tr><td>H</td><td>Heifer</td></tr> <tr><td>S</td><td>Steer</td></tr> </tbody> </table> <p>Calf Management Codes</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Management</th> </tr> </thead> <tbody> <tr><td>1</td><td>Dam only</td></tr> <tr><td>2</td><td>Dam and creep feed</td></tr> <tr><td>3</td><td>Nurse cow, no creep feed</td></tr> <tr><td>4</td><td>Nurse cow and creep feed</td></tr> <tr><td>5</td><td>Foster mother</td></tr> <tr><td>6</td><td>Sick calf</td></tr> <tr><td>7</td><td>Orphan or weaned early</td></tr> <tr><td>8</td><td>Twins, both on dam</td></tr> </tbody> </table>	Code	Sex	B	Bull	H	Heifer	S	Steer	Code	Management	1	Dam only	2	Dam and creep feed	3	Nurse cow, no creep feed	4	Nurse cow and creep feed	5	Foster mother	6	Sick calf	7	Orphan or weaned early	8	Twins, both on dam	<p>Calf Muscle Score Codes</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>USDA Feeder Calf Grade (Thickness)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>No. 1</td> </tr> <tr> <td colspan="2">Moderately thick throughout, rounded through back and loin, moderate width between front and rear legs</td> </tr> <tr> <td>2</td> <td>No. 2</td> </tr> <tr> <td colspan="2">Slightly thick throughout, rounded through back and loin, slight width between front and rear legs</td> </tr> <tr> <td>3</td> <td>No. 3</td> </tr> <tr> <td colspan="2">Thin through the forequarter and round, thin forearm and gaskin, sunken back and loin, legs set close together</td> </tr> <tr> <td>4</td> <td>No. 4</td> </tr> <tr> <td colspan="2">Thrifty animals which have less thickness than the minimum requirements specified for the No. 3 grade</td> </tr> </tbody> </table>	Code	USDA Feeder Calf Grade (Thickness)	1	No. 1	Moderately thick throughout, rounded through back and loin, moderate width between front and rear legs		2	No. 2	Slightly thick throughout, rounded through back and loin, slight width between front and rear legs		3	No. 3	Thin through the forequarter and round, thin forearm and gaskin, sunken back and loin, legs set close together		4	No. 4	Thrifty animals which have less thickness than the minimum requirements specified for the No. 3 grade	
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BODY CONDITION SCORES (BCS) FOR BEEF CATTLE

<p>Thin</p> <p>1 Emaciated – extremely emaciated, no palpable fat, tail head and ribs prominent</p> <p>2 Poor – somewhat emaciated; tailhead, ribs, and spine somewhat prominent; some tissue cover over ribs</p> <p>3 Thin – ribs individually identifiable, palpable fat along spine and over tailhead, some tissue cover over ribs</p>	<p>Borderline</p> <p>4 Borderline – individual ribs not visibly obvious, spinous processes individually palpable but feel round, some fat cover over ribs and hip bones</p>	<p>Optimum/Moderate</p> <p>5 Moderate – generally good overall condition, spongy fat cover over ribs and pins</p> <p>6 High Moderate – firm pressure required to feel spine, considerable fat cover over ribs</p> <p>7 Fleshy – cow appears fleshy, considerable fat cover, pones somewhat obvious</p>	<p>Fat</p> <p>8 Fat – cow very fat, over conditioned, large fat deposits over ribs, around tailhead, pones obvious</p> <p>9 Extremely Fat – extremely wasty, patchy, blocky; extreme pones; impaired mobility</p>
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Average Daily Gain

Average daily gain (ADG) is calculated by subtracting the calf's birth weight or a standard birth weight from the calf's actual weaning weight and then dividing by the calf's age in days. Average daily gain is used to calculate the adjusted 205-day weaning weight. Average daily gain represents the rate of gain for a calf from birth to the day the calf was weighed without the influence of birth weight.

Adjusted Hip Height

As with muscle scores, hip height will receive added emphasis due to packer specifications for slaughter cattle. The packer emphasis will be average-medium frame (42 inch for steers at 205 days of age; frame score 4.0) up to average-large frame (46 inch for steers at 205 days of age; frame score 6.0) cattle. Packer interest is toward more "moderate" frame size cattle that fit the majority of available market outlets. Calves out of this size range will probably become increasingly difficult to market as packers continue the move to boxed beef and possibly to prepackaged retail cuts (Table 1).

Table 1. 205-Day Frame Scores

FRAME SCORE	MALE	FEMALE
2	38.0	37.1
3	40.0	39.2
4	42.1	41.2
5	44.1	43.3
6	46.1	45.3
7	48.1	47.4
8	50.1	49.4

Beef Improvement Federation

205-Day Hip Height Ratios

The 205-day hip height ratio is calculated and used just like the 205-day adjusted weight. That is, the individual calf's adjusted 205-day hip height is divided by the average 205-day hip height of the calf's sex group and multiplied by 100. Any calf with a ratio above 100 is taller than the average within sex group and any calf with a ratio below 100 is shorter than the average within sex group.

Muscle Score

The muscle score for each calf is printed. The amount of muscling carried by a calf will receive more emphasis in the future. This will be in response to packer emphasis on purchasing heavily muscled cattle. The more heavily muscled cattle will yield a higher percentage of lean

muscle in relation to fat and bone than thinner or lighter muscled cattle.

Efficiency Percent

The efficiency percent is the calculation of the calf's adjusted 205-day weight divided by the cow weight times 100 (for example: $(525/1,100) \times 100 = 47.7$ percent). Mature cows should wean 50 percent of their body weight when their calves are 205 days of age. As cows have increased in size, it has become harder to accomplish that goal. A 1,000-pound cow will more likely wean a 500-pound calf than a 1,400-pound cow will wean a 700-pound calf (205-day adjusted weight).

Most of the time as cow size increases, the efficiency percent decreases. There also is a negative relationship between efficiency percent and calf breakeven. As efficiency percent goes down, calf breakeven (cost of producing a pound of beef) goes up. The efficiency percent calculation is very important. A cattle producer would more likely want to keep a replacement heifer from a cow that weaned 50 percent of her body weight rather than 38 percent of her body weight.

Other Records and Performance Traits

Birth weight is a performance trait. Actually, birth weight is an item that is part of the weaning performance records. Birth weights are used in calculating adjusted weaning weights. Where a breeder is not securing birth weights, a standard birth weight is used to calculate adjusted weaning weights.

Under field conditions, birth weights are of great importance to both purebred and commercial breeders as an indicator of calving ease or potential calving problem.

The purebred breeder should know the birth weights on their cattle and use this information in marketing cattle and advising buyers. A primary concern and goal of commercial operators is to have a very high percentage of their cattle calve unassisted. Problems arise when a bull is used that sires calves with birth weights heavy enough to cause calving difficulties. This problem can be intensified even more if the bull is used on heifers or on small cows. The result will be a commercial cattleman that does not return as a repeat bull buyer.

Use of the Cow Herd Performance Information

Performance information or records should be used to:

1. Evaluate the status of the herd.
2. Set goals for the herd.
3. Give direction to the herd's genetic program.

Performance records are very useful in evaluating the production level of the herd. The most easily used

value is the average adjusted 205-day weight for the herd. Under field conditions, this is the primary indicator of herd performance. Other values that should receive consideration are conformation or muscling score, calf weight/cow weight and hip height.

These records define growth rate in the herd, muscling of calves, frame size or composition of growth and efficiency of the cow in producing pounds of calf.

Evaluation of herd performance records allows the cattleman to set goals for the herd and, in turn, determines the direction of the herd breeding program. Some standards for performance are listed in Table 2. The standards can be considered initial goals for the herd. These standards can be changed as herd performance increases and as industry needs change.

Table 2. Performance Standards - Herd Averages

PERFORMANCE TRAIT	GOAL
Weaning Weight	500 lbs.
ADG	2.1 lbs.
Muscle Score	13
Calf Weight/Cow Weight	50%
Birth Weight	75-85 lbs.
Frame Scores	4.0-6.0

In general, the herd breeding program should be directed toward improving or increasing the level of performance in the herd. From a breeding standpoint, the breeding program will focus on the bull, the cow herd and replacements selected. In respect to the bull, herd sires should be selected that will increase performance in the herd. In respect to the cow herd and replacement heifers, the breeding program will be directed in two areas. The first area is culling cows from the herd that do not meet herd performance standards. The second area is selecting replacement heifers from the calf crop. Replacement heifers are the heifers that exhibit good growth and other desirable traits such as structural soundness.

Table 3. Herd Improvement from Using Cow Herd Performance Records

YEAR OF PROGRAM	COW EFFICIENCY	205-DAY ADJ. WT.	PREWEANING ADG
1	41.5%	438 lbs.	1.76 lbs.
2	44.5%	462 lbs.	1.84 lbs.
3	46.5%	445 lbs.	1.69 lbs.
4	49.2%	493 lbs.	1.82 lbs.
5	50.2%	519 lbs.	2.00 lbs.
6	49.3%	502 lbs.	1.93 lbs.
7	49.7%	501 lbs.	1.97 lbs.
8	49.6%	482 lbs.	1.87 lbs.
9	48.7%	516 lbs.	2.05 lbs.
10	50.1%	557 lbs.	2.28 lbs.

Results From Using the Cow Herd Performance Records

Many Arkansas cow-calf producers use the cow herd performance records to help them make cattle genetic management decisions. Table 3 summarizes the progress of one of those producers. From year 1 to year 10, cow efficiency, 205-day adjusted weights and average daily gain increased by 8.6 percent, 119 pounds and 0.52 pound, respectively.

As you can see from this example, there are some years where efficiency, 205-day adjusted weights and ADG don't increase. This can be attributed to environmental conditions. Overall, however, the genetic quality of this cattle herd is improving.

Summary

Improving the genetics of a cow herd takes time. The Cow Herd Performance Program is a tool to help determine genetic changes and monitor genetic improvement. For more information about the Cow Herd Performance Program, contact your local county Extension agent.

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