Using Weaning and Cow Weight to Make Production-Based Culling Decisions

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Weaning is an excellent time for producers to make decisions to cull or keep cows. Culling is a management decision in which animals with substandard production performance or potential are removed from the herd. Culling open cows or cows with a bad temperament is the easiest decision. Open cows are obvious candidates to cull. Poor disposition (temperament) of a cow is also a clear sign to cull. Docility is a trait that is moderately to highly heritable (0.36-0.45) in cattle, and from a behavioral standpoint, cows will exhibit a fight-or-flight response to people. If a cow is calving, fight-or-flight behavior is understandable; otherwise, aggressive behavior should not be tolerated.

After disposition, age-related factors that have a significant impact on production should be considered. For example, check the teeth of older cows to determine if the cows can effectively maintain condition with forages. Cows with a history of mastitis, pink eye, foot rot, or other mobility issues require careful evaluation to determine if they should remain in the herd. Cows with mobility problems have difficulty getting to food or water and would be likely to lose weight (or condition). This loss of weight may result in difficulty rebreeding or lactating, or it could result in aborting the calf.

Weight

After culling cows due to pregnancy status, disposition, and health issues, some producers will need to cull additional cows. From a management standpoint, performance data should be used to aid in the decision to cull cows. Recordkeeping is essential to determine which cows should be culled based upon performance characteristics. At the minimum, producers should be recording calf birth date, calf identification (ID), cow ID, sire ID, birth weight, weaning weight (WW), and weaning date.

Weight is an important measurement for cow-calf producers since animals are bought, sold, and treated on a weight basis. Commercially available scales can be cost prohibitive for some producers to obtain. Prior publications demonstrated how to build low-cost scales options: Constructing a Platform Alley Scale System (AEN-140) and Setting up a Cattle Scale System from a Kit: Underneath a Squeeze Chute (AEN-156). The weaning weight of the calf will help producers ascertain how productive the cow was at raising her calf. However, another factor rarely considered is the weight of the cow. Large cows that are underperforming may be “flying under the radar.” Without a scale, producers might underestimate the weight of the cow and overestimate the weight of the calf. Therefore, measuring both the cow weight and the calf weaning weight is advisable.

Cow Weight vs. Calf Weaning Weight Relationship Decision Aid

Another decision-making tool that could help with the culling decision is to develop a cow weight versus calf weaning weight chart. Statistically it has been shown that the larger cow will have the larger calf at weaning (Figure 1). However, it is very important to note that cow weight does not always account for all the variation in calf weight, as shown in Figure 2. The final phenotype of the calf will be a combination of the genetic potential of the dam and sire and the environmental conditions (Phenotype = genetics + environment, or P=G+E).

General questions to answer for production potential:
- Is there the genetic potential for the calf to gain weight quickly?
- Does the dam have enough energy intake and milk to support a high-performing calf?
- Are the calves getting supplemental feed?
- Do the cows have enough hay/nutrients to both support their calves and breed?

![Figure 1. Increase in calf weaning weight relative to increased cow weight.](image-url)
Inputting Data

Maintaining records for a given year on a given farm provides interesting insight into the relationship between cow weight and calf weaning weight. An Excel spreadsheet listed under the “Website” section of the UK research webpage [https://www.engr.uky.edu/directory/jackson-joshua](https://www.engr.uky.edu/directory/jackson-joshua) allows a producer to develop a scatterplot containing the calf ID, calf weaning weight, cow ID, and most recent cow weight (Figure 3). The producer enters the data on the “Data Input” sheet. At a minimum, the producer should enter the calf birthdate (column A), calf sex (column B, heifer, bull, or steer), calf ID (column C), calf weaning weight (column D, in pounds), cow ID (column E), and cow weight (column F, in pounds).

The 205-day weaning weight can be calculated if additional data is entered in column G (birth weight, in pounds), column H (age of dam, in years), and column I (calf sire). Birth weight, dam age, and sex of the calf are used to calculate the 205-day weaning weight. Immediately after calving, the cow’s instinct to protect the calf may present a challenge in obtaining this weight. If unable to obtain a birth weight, assume an average birth weight of 75 to 80 pounds (if predominately Angus). The relationship between the 205-day weaning weight and cow weight is plotted if data is available (under “Cow&205dCalf_RelationshipChart” tab.) Similarly, the “Cow&CalfADG_Relationship” tab shows the cow weight in relation to calf average daily gain (ADG). However, a limitation of the 205-day WW and ADG is that calves born later in a group get a boost from the ADG calculation when compared to calves born earlier in the group. Future publications will discuss this further.

Under the “Cow&Calf_RelationshipChart” tab, a scatterplot is produced that shows the cow and calf weight. The average cow weight (vertical dashed line) and average calf weight (horizontal dashed line) are automatically calculated.

Interpreting the Chart

The cow weight versus calf weaning weight relationship shown conceptually in Figure 4 can be interpreted by reviewing the four quadrants. The top left is most desirable, as lighter than average cows are producing heavier than average calves. In the bottom left quadrant, lighter than average cows are producing lighter than average calves. In the top right quadrant, heavier than average cows are producing heavier than average calves. The bottom right quadrant is the least desirable, as this group possesses heavier than average cows producing lighter than average calves.

Several factors should be considered when interpreting the data. The four quadrants represent a visual tool to aid in the culling process. If a cow is in the bottom right quadrant, she should be evaluated closely for culling. Numerous variables could influence why she is not very efficient in raising a calf relative to her body weight. These could include late calving or poor milk production. These cows would be good candidates for culling since they are heavy and likely in a good condition that would be desirable for marketing as a cull cow.

The bottom left quadrant possesses animals that the producer has to evaluate carefully. A light cow and a light calf would most likely describe heifers or cows younger than 5 years old. These animals have not reached their most productive period and may not need to be culled. However, it could also include old cows that are losing condition, cows with poor milk production, or cows that are late calving.

Numerous factors influence the decision to cull cows in the top right quadrant (heavy cows/heavy calves). These cows would sell well due to their size but are not the most efficient

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**Figure 3.** Required data shown in the leftmost columns. Calf ID, calf weaning weight, cow ID, and cow weight are essential.

**Figure 2.** Cow weight and calf weaning weight relationship displays a lot of variation. Data from 181 cow-calf pairs on three different Kentucky farms. The average cow weight and calf weight are shown by the vertical and horizontal lines respectively.
cows in the herd. Animals in the top left quadrant are likely the best cows, assuming they have no other major issues, such as poor disposition, physical condition, or difficulty in breeding or calving.

**Considering the Economics**

Typically, a larger cow requires more feedstuffs than a smaller cow. Consider a 1,200-pound cow and a 1,600-pound cow, and the amount of feedstuffs that it will take to get each through the winter. The 33% increase in body weight (1,200 → 1,600 pounds) will not result in a 33% increase in dry matter intake but an approximately 21% increase in feed consumption (based upon North Dakota State University 1996 NRC Beef Cattle Requirements Table Generator). Nonetheless, the additional 400 pounds of body weight will typically result in additional hay consumption.

In 2019, Central Kentucky had a drought from late July/August through October. Therefore, the need to feed hay for 150 days, from November through the end of March, was not unrealistic. Over this timeframe, the larger cow would potentially require another five-foot-by-six-foot bale. For the 2019-2020 winter, this additional bale was priced at more than $70, an added cost to maintain this cow. Throughout the year, this 1,600-pound cow will consume more feed, mineral, dewormer, and antibiotics (if she gets sick).

Culling larger, heavier cows would also benefit the bottom line as larger, well-conditioned cows sell for more per pound than very thin cows. Culled cows can account for 15% to 20% of a beef operation’s income; therefore, choosing which animals and when to sell can be beneficial to the bottom line.

**Case Studies**

This publication describes one possible use of cattle weights to make management decisions. The focus is on culling cows after the obvious ones (open cows, poor health, or poor disposition) have been culled. Data from three different farms is presented. Results vary based on bull used, age, and environment. Environmental factors are a huge variable. For instance, September 2018 was the hottest and wettest on record, while September 2019 was the hottest and driest September in Kentucky on record. The difference in rainfall would dramatically impact the availability of forages and therefore management strategies of the operations.

**Case Study – Farm 1**

**Description**

The data for this operation was captured over a four-year period (2017-2020). The farm is a fall-calving, Angus seedstock operation with a 60-day window for calving (September to October) and 40 head of cattle. Cow weight was measured during the November synchronization of the herd prior to artificial insemination. The cows would generally be described as well fed, with body condition score (BCS) of 7-8 for most of the cows. For this operation, the minimum size for heifers at breeding was 700 pounds at 14-15 months of age. Heifers unable to meet this threshold were culled. Approximately five months after breeding, cows were pregnancy-tested and open cows were sold.

Calf weights were obtained at weaning in late February/early March and cow weights in late November. Calves were creep-fed with ad libitum (free choice) intake from late November or December to weaning. Depending on labor availability, bulls were castrated either before or after weaning. The best bulls were kept and marketed as replacement yearling bulls.
Analysis

As shown in Figure 5, there was considerable variation among the years, with calves weaned in 2018 typically outperforming the other years. The largest cow in 2017 produced the largest calf that year, but this occurrence was not the case for any other year. The average cow weight over a four-year period (2017-2020) was 1,379 pounds, and the average weaning weight was 479 pounds. For some animals, tendencies can be seen when analyzing across years, as shown in Figure 6. Cows #21 and #34 would be on the potential cull list. Cow #21 is consistently above average on her body weight and below average on her calf weaning weight in three out of the four years shown. Cow #34 was also underperforming in three out of four years for her weaning weight but was not above average for her body weight in three out of four years. Cows #7 and #20 would remain in the herd, as these cows typically produced calves at or above average at weaning. However, #7 did have one below-average calf.

Looking within the year may be more beneficial as some of the environmental variation can be reduced. In evaluating the calves weaned in 2020, the early fall drought is assumed to have reduced potential performance. An additional contributing factor is that the producer did not use the creep feeder until late December instead of November. From the raw weaning data shown in Figure 7, cow #1, an older female demonstrating diminished performance, quickly established herself as one that should be culled. Cow #30, a large cow producing a below-average calf, was another on the potential cull list. If deeper cuts to this herd had to be made, cows #39, #21, and #25 would also be on the watch list. The two-, three-, and four-year-old animals were given a "pass," as they were younger animals that were still growing.

Case Study – Farm 2

Description

This 2019 spring-calving, commercial cow-calf operation used two registered Angus bulls for breeding. Both bulls were classified as heifer acceptable. Most cows were older (10 years or more); replacement heifers were being raised to grow the herd and replace the mature cows. The producer targeted 40 bred animals going into winter and kept as many potential replacement heifers as possible for breeding in May. The management level would be considered high (including vaccinations, ample supplemental nutrition, good hay, and mineral).

Cows were pregnancy-checked in the fall, along with vaccinations and deworming prior to weaning the calves. Cow and calf weights were recorded in mid-October. All cows were verified pregnant by a veterinarian and were within a reasonable calving window. Hay supplies were relatively low, and four to seven cows were therefore evaluated for culling. The producer also identified underperforming heifers to market with the steers.
Analysis

Figure 8 shows the four quadrants based on the average calf (530-pound average heifer and steer weight) and cow weight (1,170 pounds). Using the quadrant rationale, anything in the bottom right corner could be a good candidate for culling. The steer from cow #9 obviously underperformed due to poor milk production and was sold. Cow #29 was an old cow (more than 10 years old) and calved late relative to the herd, however she was sold due to late calving and small calf. Cow #26 was very fleshy, appeared to be a good cow, and had a calf that looked OK relative to the other calves. However, her calf was less than the average weight, and the cow was nearly twice the weight of cows #52 and #62 (Both first-calf heifers). Cow #24 was also culled due to a combination of age, mobility, and late calving. Cows #52, #55, #59, #61, and #62 were kept because these were their first calves, even though these animals weaned light calves.

In terms of replacement heifers, the heifer calf from cow #26 was sold. The cow was large and did not raise a good calf. Therefore, why keep her calf as a replacement? Two additional heifer calves from cows #24 and #62 were sold due to their small size relative to the average.

Case Study – Farm 3

Description

This commercial cow-calf operation has approximately 85 head of spring-calving cows. The herd is relatively young, with nearly 80% of the stock five years old or younger. The cows are all exposed to one round of artificial insemination (AI) and then cleaned up with black bulls (both Angus and Limousin have been used). A tight calving window is maintained, with over 90% of the herd calving in 45 days (March 1-April 15). The herd is well managed — vaccinated/dewormed three times per year, steers castrated and implanted, heifers retained and developed as replacements. Cattle are pregnancy-checked in the fall and all open cows are sold. After weaning, steers and heifers are managed separately, with heifers managed as replacements and steers backgrounded for a minimum of 90 days and sold as heavy feeder calves.

The farm raises all of its own hay, including renovated mixed grass hay fields (BarOptima novel endophyte fescue, with orchard grass and red clover; and 60% alfalfa mixed with 30% orchard grass and 10% fescue). Winter feeding infrastructure has been incorporated into the management at the farm to maximize the nutrient value of the hay and to minimize the environmental elements on the cattle.

Analysis

The average cow size is 1,183 pounds, with average calf size of 472 pounds. At weaning, none of the cows weighed over 1,500 pounds. Any cows that produced calves weighing less than 300 pounds at weaning would be under the greatest degree of scrutiny for culling. For this set of cows, #726 and #1009 would be animals to market for producing underperforming calves. In this young herd, a fair number of light cows with light calves were present. These first-calf heifers are still growing and should produce better calves in future years. Younger heifers should have the most desirable genetics, as the selection of both cows and bull should be focused upon continuing improvements. Similar
to the other case studies, heavy cows with lighter-than-average calves would be evaluated more thoroughly. Cows #479, #716, and #607 would need to be examined more closely (Figure 9).

Limitations

Numerous variables influence the relationship between cow weight and calf weight. **DO NOT use cow weight as the sole reason for marketing cows.** Some of the limitations are listed below:

- Bull selection has a major impact on herd performance.
- Calf age and sex are not considered, nor is cow age.
- However, producers in these case studies were adamant that if the cow calved late, that is a negative.
- All farms in these studies had a limited calving window.
- Year-round calving would require the use of the 205-day weight for an equitable comparison among calves/cows. This will be discussed further in future publications.
- Frame size of calf must be maintained.
- Make sure calves will achieve USDA feeder cattle frame scores of “medium” and “large” and USDA feeder cattle muscle scores of 1 or 2.
- Watch body condition scores (BCS), as rebreeding and lactation are essential.
- Consider calving problems with smaller cows.
- Calving ease is still essential. Dystocia, or calving difficulties, must be avoided.
- Weights will vary by year, farm, calving seasons, forage availability, and milking potential.
- **Weaning weight is just one important indicator of efficiency.** The scatterplot developed should be used to determine which animals to evaluate more closely.

Conclusion

From a production standpoint, most of the herds in this study used pregnancy testing to determine which animals should be initially culled due to their pregnancy status (open cows). From there, production data related to calf and cow weight can be used to help evaluate which cows should be sold. Most farms in the study used the raw calf weaning weight and cow weight; the seedstock operation also used 205-day weaning weight and cow weight to solidify further which animals should be culled. Culling larger cows producing smaller-than-average calves may help the operation become more efficient in resource utilization. Beef cattle are bought and sold on a weight basis, therefore knowing the weights of the cows and the weaned calves can be essential to the economic viability of an operation.

References

American Angus Association. 205 Day Weigh Adjustments. Available at: https://www.angus.org/performance/Links