



Market Beef Performance Measures and Values

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This NebGuide explains how to properly calculate and interpret basic market beef cattle performance measures and provides typical industry values compared to youth market beef project cattle.

Introduction

Participation in a market beef project provides youth an excellent opportunity to learn how proper nutrition, health care, and management affect animal performance. When cattle weights and feed records are accurately collected, recorded, and maintained, basic performance measures including average daily feed intake, average daily gain, feed efficiency, and cost of gain can be calculated. However, because goals and timeline restrictions may differ between youth projects and commercial beef production, performance of youth project cattle may not emulate commercial beef industry values. It is important for youth to not only know how basic performance measures are calculated, but they should also understand how calculated performance values of their projects relate to the goals and expectations of the commercial cattle feeding industry. While the market beef project can serve as a catalyst to stimulate interest and a desire to learn more about the beef industry, it also facilitates the development of personal standards, a sense of responsibility and accountability, and other life skills important for youth to be successful as they grow into adults.

Youth Project Cattle vs. Commercial Cattle: Differential Goals and Timelines

When initiating a market beef project, the primary goal of most youth is to raise an animal that will be competitive at various shows culminating at the county or state fair. Provided steers will achieve a minimum live weight appropriate for market viability, some youth may change their feeding

focus from optimizing performance to targeting a more desirable, compositionally correct, and competitive show weight, typically 1250 to 1400 pounds. According to the USDA National Weekly Cattle and Beef Summary Report, dated December 12, 2022, the estimated live weight of steers being marketed was 1389 lbs, down slightly from an average weight of 1394 lbs in 2021. Once the desired show weight and finish are achieved, it's not uncommon for project cattle to be fed a less nutrient dense diet that functions to maintain that competitive show weight for extended periods of time. Similarly, commercial cattle feeders commonly target finished weights that function to optimize quality and yield grades of cattle when sold on a grid basis. However, the commercial cattle feeder continues to feed for maximal gain until cattle reach their optimal marketing endpoint. Higher levels of gain are typically associated with enhanced feed efficiency, greater turnover and usage of feedlot space, and lower costs of gain which is critical to sustained profitability given that feed represents more than 60% of the total costs of production. Similarly, youth should recognize the cost of holding cattle, given that bagged show feeds may cost two to three times that of commercial feeds. Because the show animal may be the only connection that some youth have to the livestock industry, those youth may associate performance values of show cattle as representative of the industry. In reality, significant differences exist between show and commercial cattle, but it is commonly a function of differing goals and associated marketing (show) timelines.

Dry Matter Intake

The "bunk reader" of a commercial feedlot is one of the most important positions in the yard. This person is responsible for monitoring feed intake and determin-

ing when feed offerings should be adjusted to maximize cattle performance. If cattle are “short-fed”, or if they run out of feed prior to the next feeding, growth rates may be compromised. Conversely, too much feed may result in wastage or digestive upset (acidosis) that may slow growth and reduce overall health of the animal. Thus, it is important to monitor daily feed intake relative to expected feed consumption values. As a rule of thumb, market cattle consume 2–3% of their body weight in dry matter daily dependent upon current body weights. Lighter-weight cattle who are depositing more muscle and less fat will typically consume a higher percentage of their body weight in dry matter than heavier cattle who are closer to their optimal marketing endpoint. For example, a 700-lb steer may consume 3% of his body weight in dry matter (21 lbs) daily, whereas a 1400-lb steer may be expected to consume only 2% of his body weight in dry matter (28 lbs) daily.

So, how can a typical feedlot steer fed a typical Nebraska finishing diet potentially consume 50 pounds of feed? It’s the water. Cattle feeds vary significantly in moisture content, and while water is extremely important for the animal, the nutrients (protein, energy, minerals, and vitamins) important for growth and normal body function are found in the dry matter fraction of the feedstuff. For example, dry rolled corn may be 88% dry matter (12% water), whereas high-moisture corn is 75% dry matter (25% water). Because of the greater moisture content, a steer must and will consume more high-moisture corn than dried rolled corn to receive the same quantity of energy. Other feeds commonly fed in Nebraska including wet distillers grains or corn silage may contain 60–70% water. Today, most commercial feedlot diets fed in Nebraska are 40–50% water (50–60% dry matter). If the diet is 50% dry matter (50% water), and the feedlot steer consumes 50 pounds of feed (as-fed), the steer consumes only 25 pounds of dry matter (50 lbs as-fed * 0.50 = 25 lbs dry matter). This would be considered the steer’s daily dry matter intake (DMI). Because diets can vary significantly in moisture content, it is most meaningful to compare daily consumption values on a dry matter basis, but this requires an accurate estimation or evaluation of the moisture content of your feed.

Average Daily Gain

Average daily gain (ADG) is a simple calculation: **ADG = (Ending Weight—Starting Weight) / Days on Feed**. However, what is a typical average daily gain for youth project cattle, and how does that compare to commercial feedlot cattle? The average ADG of market cattle shown at the 2009 Nebraska State Fair was 2.66 lbs/day, ranging from 1.46 to 3.88 lbs/day. In comparison, a sum-

mary of finishing cattle research trials reported in the 2010 Nebraska Beef Report representing, in aggregate, more than 60 pens and nearly 3800 head of cattle had an ADG of 4.07 lbs/day! Although ADG is rarely used as a criterion for live show placings today, some county fairs and educational programs including the Nebraska Fed Steer Challenge will use ADG as a performance parameter and provide related awards. However, ADG can be manipulated. If a “shrunk” starting weight is used in combination with a “full” ending weight, the calculated ADG will be artificially inflated. If available, carcass weights combined with a standard dressing percentage may be used to back-calculate the ending live weight and average daily gain. For example, let’s assume a steer produces an 882-lb carcass. Using a standard dressing percentage of 63%, the ending weight used to calculate ADG would be 1400 lbs (882 ÷ 0.63 = 1400). This procedure for determination of ending weight reduces the practice of “filling up” cattle prior to final weights being collected because additional live weight, due to water, will not affect the carcass weight, and hence will not impact ADG.

Feed Efficiency

Feed efficiency reflects the amount of feed (units) required to produce one unit of gain. The term “feed conversion” is commonly used synonymously with feed efficiency. Because cattle feeds vary significantly in dry matter content, as previously discussed, feed efficiency or feed conversion values are commonly reported as pounds of dry matter required to produce one pound of weight gain. This is known as the feed to gain ratio (F:G). To calculate, **F:G = Daily DMI / ADG**. For example, if a steer has an average daily DMI of 24 lbs/day and an ADG of 4.0 lbs/day throughout the feeding period, the F:G is 6:1. Six pounds of feed (dry matter) were required for every one pound of gain. Lower F:G values imply greater efficiency of production. Often, the beef industry is scrutinized because of perceived poor efficiency of production. However, F:G values less than 6:1 are common in today’s commercial cattle feeding industry. The average F:G ratio of all finishing steer trials and treatments reported in the 2022 Nebraska Beef Report was 5.6:1 on a dry matter basis. In contrast, an average F:G ratio of 7.4:1 was calculated from yearling finishing implant trials published in the 1996 Nebraska Beef Research Report.

As cattle approach their compositional marketing endpoint, feed efficiency decreases as the amount of feed required to put on a pound of live weight increases as they deposit a greater percentage of their weight as fat. Similarly, because a greater percentage of the total weight gain is

associated with adipose (fat) tissue deposition compared to muscle, cattle started on feed as yearlings will typically have less desirable feed conversion rates than cattle started on feed as calves.

Cost of Gain

With all livestock projects, youth are encouraged to maintain records of their expenses. In addition to the original purchase cost of the animal, obvious expenses include feed and veterinary costs, but you may also have entry fees and show supply costs. Not so obvious expenses would include interest on your money, labor charges, and utilities.

When banks loan money, they charge interest. After a specified timeframe, the borrower is required to return the original quantity of money plus interest. For example, you need to borrow \$2,000 to purchase a show steer. The money is to be repaid within 1 year, and the interest rate is 5%. That means that within one year of taking the loan, you are required to return the original \$2,000 plus an additional \$100 in interest. The additional \$100 represents an expense, but what if you didn't have to borrow the money? There's still an interest expense because if you hadn't spent the money, you could have placed it in a savings account where it would have earned money for you, perhaps 2%. Over the course of one year, you could have earned an additional \$40 for doing nothing but placing the money in a savings account. Effectively, you borrowed money from yourself so that \$40 should be considered an interest expense. Because of the large number of cattle on feed and the extended time required to finish cattle, commercial feeders borrow and loan money on a regular basis.

For the market beef project, should you account for labor charges? Again, it's not an "out of pocket" expense, but if you weren't feeding, training, clipping, and showing cattle, you could take another job so there is an "expense" associated with your labor. Obviously, there are numerous non-monetary reasons for engaging yourself in a youth livestock project, but labor is a very real expense for commercial cattle feeders.

Finally, there are utility expenses associated your cattle. It costs money to keep fans running and clippers clipping. Again, it's a relatively minor cost compared to other

expenses associated with your show cattle, and it is unlikely that parents or guardians will charge a utility or yardage fee. In the real world of cattle feeding, however, utility expenses required to pump water, grind feed, and light the yard can become quite large given the masses of cattle that may be fed.

A common performance measure used in the cattle feeding industry is cost of gain which equals total feedlot related costs (feed, veterinary, interest, labor, utilities, yardage, death loss) divided by total salable gain. Obviously, feed typically accounts for the greatest portion of cost of gain, but all other expenses can be significant. When corn is relatively inexpensive (< \$3/bushel), feedlot cost of gain may run \$0.40 to \$0.50/lb, but when corn is expensive (>\$5/bushel), it's not uncommon for feedlot cost of gain to approach and exceed \$1.00/lb.

Summary

The market beef project is a valuable instrument for teaching responsibility and basic management principles, and for enhancing enthusiasm of youth for production animal agriculture. However, it's also important for youth to realize that there are differences in the performance expectations of commercial feedlot cattle and the performance levels of most youth project cattle. Cattle used in association with youth projects are handled on a regular basis, transported to various venues for exhibition, and fed to maintain a competitive show weight and finish. While some may consider those animals to be models of the beef industry, their primary function is youth development. The steer functions to ignite interest and involve youth in the beef industry. Then, as the youth become more engaged in their projects and the beef industry, it's important for them to realize there are differences between their projects and the commercial cattle industry. Today's commercial cattle may commonly gain 4.0 lbs/day requiring less than six pounds of feed (dry matter) per pound of gain because of enhanced genetics and improved feeding and health care management functioning to reduce our cost of gain so the beef industry can continue to provide an inexpensive, wholesome protein product for the consumer.

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