

Genetic Selection for the Commercial Cattleman
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The perfect cow for any ranch is one that makes the most money. This cow suits her environment and produces calves that suit the ranch marketing scheme and management practices. Obviously there are endless combinations of these three factors and so the *perfect cow* is hard to define and just as hard to create --or is it? Perhaps the best way to determine what the perfect cow for you may be, is to evaluate where your herd is now in regards to production and profit.

Evaluating Cow Production

One of the most important numbers to look at is your reproductive rate. It is neither realistic nor economical to get a 100% reproduction rate. However, if you ended up with greater than 15% open this fall, you may need to reevaluate your management practices. Reproductive failure can be a result of a variety of factors including disease, poor nutrition or bull failure. However, it may very well be that your cow is not suited for her environment. Perhaps too much emphasis has been placed on maximizing performance such as weaning weights, yearling weights and milk production. The amount of production will directly affect her nutritional requirements and her ability to rebreed with minimal inputs.

Do you know the mature weight of your cows? Most producers underestimate the actual weight of their cows by 200-300 lbs. I challenge you to weigh your cows this fall and prove me wrong. Take it a step further and calculate the amount of calf weight (lbs) weaned per pound of cow body weight. This of course requires all individuals to be identified, cows and calves alike. To make this comparison, cows and calves need to be weighed within a few days of each other. Adjust the calf weights to 205 day weights either by actual birth date and weight or an approximate birth date and weight.

Table 1. Beef Improvement Federation Adjustment Factors for Birth and Weaning Weights

Age of Dam at Birth of the Calf	Birth Weight	Weaning Weight	
		Male	Female
2	+8	+60	+54
3	+5	+40	+36
4	+2	+20	+18
5-10	0	0	0
11 and Older	+3	+20	+18

Note:

- 1) Standard birth weights are 75 lb for males and 70 lb for females
- 2) Breed specific adjustment factors have been developed by individual breed associations from breed data. Factors used by individual breed associations are subject to change. Contact the respective breed association for more information about their birth and weaning weight adjustment factors.

Let's calculate the % Body Weight Weaned:

Steer Calf: 190 days old, 450 lbs Birth Wt: 75 lbs
Cow: 1200 lbs, 3 years old

Adjusted 205-day weaning weight is computed on the basis of average daily gain from weaning:

$$\text{Adj. 205 d WW} = \frac{\text{Actual Weaning Wt} - \text{Birth Wt}}{\text{Weaning Age}} \times 205 + \text{Birth Wt} + \text{Age-of-Dam Adj.}$$

$$519 \text{ lbs} = \frac{(450 \text{ lbs}) - (75 \text{ lbs} + 5 \text{ lbs})}{190 \text{ days}} \times 205 \text{ d} + (75 \text{ lbs} + 5 \text{ lbs}) + 40 \text{ lbs}$$

$$\% \text{ Body Weight Weaned} = \text{Adj 205 d WW} / \text{Cow Weight}$$

$$43.3\% = \frac{519 \text{ lbs}}{1200} \times 100$$

These calculations obviously leave out many variables such as sire variability, and are not meant for seedstock producers for calculations of EPDs. They do, however, give the commercial producer a tool in which to evaluate his herd using fairly simple calculations and comparisons. It is also an indicator of how efficient your cow herd is in your environment. If a cow can not wean at least 40% of her own body weight you may need to evaluate the performance you are demanding of her (i.e. Cows sire's EPDs for weaning weight, yearling weight, and milking ability) given your environment. Keep in mind that you will not want extremes in this trait either. A cow that can wean 65% (i.e. 1200 lb cow 780 lb calf) of her body weight may not be storing enough energy to breed back the next season without additional supplementation. We already know that the cattle industry is not a cookie cutter business, but these calculations will give you another tool for your toolbox.

A fantastic way to sort this data is to group the cows by age, even though you already adjusted for age. You will be able to compare how you have managed the genetics of cow herd over time. Study these numbers and document any change in management, for example, you have moved away from supplemental feed and are forcing cattle to survive on less inputs. Other changes may be that you have been chasing weaning weights on calves for the past 10 years and now you mature cow size is too large. Create a second spreadsheet sorting the data according to calving dates (i.e. 1st, 2nd, and 3rd 1/3 of the calving season). Identify trends of phenotypes, ages and management differences of cows that seem to be falling into the bottom third of your calving season. Use these numbers and trends to help you determine how to select your next bulls and replacement heifers or adjust management schemes.

Making Genetic Progress with EPDs

Expected Progeny Differences (EPDs) have been around for quite some time. The first data sets included a few traits with small accuracies. Over the past decade or so, EPD data has made leaps and bounds in both the accuracies and the number of traits that are reported. Genetic information is expanding more now than ever before with the capability of tracing particular genes and gene sequences. Many of us still feel overwhelmed with the data we see in bull catalogs and are still depending on only a couple of traits to make decisions on the bulls we purchase. In order to produce a balanced calf crop and a productive cow herd, we need to understand that maximum production is not always favorable and selection of single traits can result in undesirable cow.

Selection of quality sires requires an understanding of the relationships between maternal, growth, and carcass traits.

The following is an excerpt from the Guidelines for Uniform Beef Improvement Programs, *Eighth Edition* by the Beef Improvement Federation (www.beefimprovement.org):

Traits have intermediate optima:

1. **Birth weight.** Calves that are too heavy at birth experience increased dystocia, require higher management input, and suffer higher mortality. Conversely, calves that are too light at birth are more prone to starvation and thermal stress, with similar consequences.
2. **Leanness.** Concerns about the relationship between diet and health have led consumers to favor leaner beef. However, cows that lack the ability to conserve energy as fat are at risk of impaired fertility during lactation and may require increased supplemental feeding in harsh environments. When fed cattle are marketed, premiums are paid for increased levels of intramuscular fat or marbling, but increased levels of intermuscular fat are discounted.
3. **Age at puberty.** Heifer calves that reach puberty at extremely young ages may become pregnant before being weaned and require increased managerial intervention to assure survival of the heifer and her calf. However, heifers reaching puberty at too advanced an age are at increased risk of not becoming pregnant as a yearling to calve first at two years of age, thereby reducing lifetime productivity.
4. **Mature size.** Increasing growth rate and mature size result in greater throughput in a beef production system and allow producers and processors to capture economies of scale. However, faster growing and larger cattle have greater feed requirements and thus cost more to maintain than smaller cattle.

Notable genetic antagonisms:

1. **Milk production and body weight vs maintenance requirements.** Selection for increased productivity through increased milk production or growth rate results in increased proportions of metabolically active tissues that must be maintained. This requires additional feed energy. Thus, gains from selection for additional productivity must be more than sufficient to offset the correlated increases in feed cost.
2. **Growth rate vs calving ease.** Selection for increased growth rate generally results in increased size at all ages, including birth. Particularly in temperate regions, birth weight is a major determinant of calving ease. Thus, selection for increased growth rate may also result in deterioration of calving ease.
3. **Leanness vs fertility.** Increased carcass leanness is desired in many situations. However, daughters of sires selected for reduced fat trim or steer progeny may reach puberty later, require more services per conception, and have a longer first gestation, resulting in a heavier calf a birth being born with greater difficulty.

It is important to note that these genetic antagonisms are not absolute. It is possible, for example, to identify sires with desirable genetic merit for both carcass quality and lean

yield. However, identifying sires with favorable EPDs for genetically antagonistic traits will be challenging to the breeder.

Environmental Factors Should Determine Sire Selection

The environment, in terms of forage availability and degree of stress, determines the level of production your cow herd can sustain. For example, low quality forage and extreme fluctuations in temperature will require a cow that has smaller mature size and small to moderate milk production. A cow that is mismatched to this environment, for example, a large frame size and high milking potential, may not be able to find enough forage to maintain body weight and fulfill her genetic potential for milking without supplemental feed or failure to rebreed over time. Likewise, in areas of abundant high quality forage, higher milk production and mature size can be supported by the environment. Environmental factors are less influential on genetic decisions if you are using a terminal cross system in which all offspring are sold. The following table attempts to summarize optimal genetic potentials for cattle in various production environments and breed roles.

Optimal Genetic Potentials for Cattle in Various Production Environments and Breed Roles.¹

Production Environment		Traits					
Feed Availability	Stress ²	Milk Production	Mature Size ³	Ability to Store Energy ⁴	Resistance to Stress ⁵	Calving Ease	Lean Yield
High	Low	M to H	M to H	L to M	M	M to H	H
	High	M	L to H	L to H	H	H	M to H
Medium	Low	M to H	M	M to H	M	M to H	M to H
	High	L to M	M	M	H	H	H
Low	Low	L to M	L to M	H	M	M to H	M
	High	L	L	H	H	H	L to M
Breed role in terminal							
Maternal		M to H	L to H	M to H	M to H	H	L to M
Paternal		L to M	H	L	M to H	M	H

ADAPTED FROM: BIF Guidelines for Uniform Beef Improvement Programs, 2002.

¹L = Low; M = Medium; H = High.

²Heat, cold, parasites, disease, mud, altitude, etc.

³Mature Size L = 800 to 1,000 lb M = 1,000 to 1,200 lbs H = 1,200 to 1,400 lb

⁴Ability to store fat and regulate energy requirements with changing (seasonal) availability of forage.

Before going to the next bull sale, create a cheat sheet for the optimal EPDs that will suit your cow herd according to your goals and environment. Study the sire summaries and bull catalogs in advance. Identify the bulls that will fit your program before you go to the sale. Visually assess the bulls you have identified as having acceptable EPDs for structural soundness and eye appeal. But, do not get caught up in eye appeal alone if the EPDs do not fit your criteria.

Profit Driven Success

The perfect cow is one that puts the most money in the bank. You can never truly evaluate your system on production alone. Be sure to look at break-even figures and annual cow cost. Tack these figures over time and evaluate whether your genetic changes are making financial sense.

Creating genetic improvement does not have a specific set of instructions. This article was written to encourage management based on a “systems” approach (ie. past performance, profitability, environmental conditions and EPDs...). This article may have generated more questions than it answered. Should you like to visit more about this subject (questions and comments welcome) please contact Barbi Riggs at Crook County OSU Extension Service: 541-447-6228 or email barbi.riggs@oregonstate.edu.