

Selecting Beef Bulls

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Careful sire selection contributes more to genetic improvement in a beef herd than any other practice. Continued use of poor sires can result in a decline in genetic merit and, as a result, lower production. Bull breed selection should be based on a planned crossbreeding program designed to take advantage of the production increase caused by hybrid vigor.

Regardless of breed, EPDs [Expected Progeny Difference] or performance records of various traits that can be readily and accurately measured (weighed), and are of economic importance in your herd should be emphasized. Examples of such traits are weaning weight and/or yearling weight.

Heritability is that portion of the variation observed in a trait, such as yearling weight, that is a result of genetic factors and is passed on to offspring. The larger the heritability value, the more easily a trait may be changed through selection of breeding animals. In general, the best policy is to make your selection based on economically important traits that complement the traits in your present cow herd and that have a relatively high heritability. Reproductive traits have a low heritability, but are of such economic importance that they must be an important consideration when selecting a bull. Among unselected populations with low reproductive rates, the heritability of reproductive traits may be somewhat higher than the 10 percent usually reported (Table 1).

The cow/calf producer should be most concerned with fertility, birth weight (because of its relationship with calving difficulty), weaning weight, and feedlot performance as indicated by yearling weight. These traits, except for reproduction/fertility, are moderately to highly heritable, so that considerable progress can be made through selection. EPDs are available for these traits from most of the breeds with enough performance records to enable them to generate EPDs. Most breeds also generate an estimate of the milking ability of future female progeny, measured in pounds of calf weaned, which can be a useful tool, since bulls contribute both growth and milk production genes to their daughters. It is important to carefully analyze your herd and feed resources so that enhanced milk production does not exceed what the environment can support.

Table 1. Heritability Estimates of Some Economically Important Traits in Beef Cattle ¹

Trait	Heritability
Calving interval	10
Birth weight	40
Weaning weight	30
Cow maternal ability	40

Feedlot gain	45
Efficiency of gain	40
Final feedlot weight	60
Carcass traits:	
Carcass grade	30
Ribeye area	70
Tenderness	60
¹ From Agricultural Information Bulletin No. 286 U.S.D.A., A.R.S.	

Choosing Breeds

When selecting a breed to use in your program, consider the availability of superior bulls, the type of animal for which you have a market, and the compatibility of the breed and its crosses to your climatic and management conditions. Once you have chosen a breed, the next step is to locate breeders who have management programs and environmental conditions similar to yours, with good business reputations. Now you are ready to select a superior bull. The most effective way to do this is through the proper use of EPDs, or performance records when EPDs are not available.

Selecting Breeders

When buying bulls, find an established breeder who has a good reputation and who manages his cow herd much the same way as you manage yours. For example, if you don't creep feed, don't buy bulls that were raised on a creep feeder. The bulls which are most likely to produce superior progeny under your system are those who were superior performers under a similar system.

When you arrive at the breeder's ranch, ask to see the cow herd because this will give you an opportunity to see both the quality of his brood cows and how he manages them. Look over his facilities. Are they well-used? Does he have a set of scales and do they look well-used? EPDs are based on production records, so look for indications of dedication to accurate record keeping. If you are still interested, ask to see the production records on dams of all bulls he has for sale in the price range you are willing or able to pay. Examine the production records carefully, noting whether or not each dam produced a calf every 12 months. A superior cow will never have failed to wean a satisfactory calf each year throughout her productive lifetime. At least one breed association is producing an EPD for longevity or stayability, which is another way of evaluating fertility. After this, ask to see the EPDs and performance records of the bulls whose dams had satisfactory production records.

If you plan to purchase your bulls at sales sponsored by a breed association or a group of breeders, contact the breed representative/sale manager ahead of time and request his evaluation of the management program of the consigning breeder(s). It would also be a good investment to contact the breeders for a description of the herd and a copy of the EPDs and performance records of the sires and dams of the sale bulls, since most sales supply very little performance evaluation.

Evaluating Traits

EPDs and production and performance records often contain a lot of information that is confusing to those not familiar with them. If you are in this category, concentrate on one trait at a time, eliminating unsatisfactory animals from further consideration. As an example, start with birth weight. Desirable EPD values will vary between breeds so it is necessary to find out the current breed average and stay near or below that. Many breeds will have recommendations on a range of birth weights or birth weight EPDs for their breed that will minimize the incidence of calving problems in heifers. Satisfactory weights will vary with breeds, but as a rule of thumb English and Brahman bulls for use on mature cows should not have birth weights more than 80 pounds, and the continental breeds not more than 90 pounds. Bulls for use on virgin heifers should have birth weights at least 10 pounds less than the above weights.

Weaning Weight

Weaning weight, which is moderately heritable, is an important trait since it reflects the milk production of the dam and since most calves are sold at weaning. Weaning weight EPDs are a measure of the individual's potential genetics for early growth. A separate EPD is calculated for milk production potential as measured by daughter's calf weaning weight. The adjusted weaning weight (Table 2), usually listed as 205-day weight, is the bull's actual weight at weaning corrected to a standard age (usually 205 days) and adjusted for known variables such as age of dam. The adjusted weaning weight can be used to compare individuals within the herd on a common basis just like an EPD. The power of an EPD lies in its ability to be used to compare between herds of the same breed. The weight ratio or index (Table 2) reflects how the individual performed relative to the average of his contemporary group (animals that were born at roughly the same time and raised under the same conditions). A ratio or index over 100 indicates an animal above the average, while an index or ratio less than 100 indicates below average. The larger the number of contemporaries the more accurate the index or ratio becomes, with 20 being a minimum for good accuracy. EPDs and performance records should be similar in direction and magnitude, i.e., the bull with the high weaning weight EPD should also have one of the higher 205 day weights and a weight ratio near or at the top of the group.

Yearling Weight

Yearling or 365-day weight (Table 2) is an important and useful trait. The heritability of 365-day weight is higher than weaning weight, and is influenced less by the dam's milk production. Research has shown that selection for yearling weight is equal to selection for weaning weight when the results are measured by weaning weight of their offspring. Yearling weight is also indicative of feedlot performance. EPDs for yearling weight provide a convenient way to rank animals both within and between herds of the same breed on a reliable basis. Thus, yearling weight EPD is a powerful selection tool.

Table 2. Evaluating traits

Animal	Sex	Sire	Dam	205 Wt ¹	Wean Index	Final Wt	Age	Days Test	ADG	Gain Ratio	365 Wt ²	365 RTO ³	Score	Birth Wt ⁴	365 Index
98	1400	1	95 20 91 3900	527	107	1075	377	140	3.9	100	1032	107	12 3	56	108
98	1600	1	95 20 93 5900	568	113	1110	379	140	3.8	91	1106	113	13 3	76	114
98	1700	1	95 20 94 19700	517	103	1030	377	140	3.6	82	994	102	12 3	48	103
98	1900	1	95 20 92 8800	492	96	1010	379	140	3.7	85	971	98	12 3	79	99

¹ Weaning Weight

² 365 day or yearling weight

³ Weight ratio

⁴ Birth Weight

Scrotal Circumference

Another trait that merits consideration in your selection process is scrotal circumference. Differences in scrotal circumference between animals of the same age and breed have been related to both fertility of the individual and the age at which their daughters reach puberty. Indications are that by selecting bulls with greater testicular development, we are indirectly selecting for early sexual maturity.

Ultrasound Technology

The use of real-time ultrasound technology offers beef producers a new tool to make genetic improvement in body composition traits within their herds and better selections in purchasing new herd sires. Ultrasound (scan) measurements for fat thickness, ribeye area (REA), and intramuscular fat percentage (marbling) are taken between the 12-13th rib of each animal. Ribeye area and marbling measurements are adjusted to 365 days of age. This data may be used by both breeders and bull buyers to make decisions relative to carcass merit of a particular animal. Ribeye area and fat thickness are two traits that are highly related to retail product yield of a beef carcass; however, fat thickness and percent retail product are inversely related. As fat thickness increases, percent retail product decreases.

One may ask, how accurate are these ultrasound measurements? Research from Iowa State University has indicated that the relationship between ultrasound measurements and actual carcass measurements is very high, although the accuracy of the measurement still depends on the skill and concentration of the technician. In addition, scan measurements should be taken at 365 days of age or as close as possible. It is not known how useful the data is if measurements are taken at 18 or even 24 months of age.

If a beef producer is going to utilize ultrasound data, one must decide how much emphasis should be put on the scan measurements versus growth, reproductive and other production measurements. If scan measurements are going to be used for bull selection, how should producers use these ultrasound measurements? Do not select those individuals that are below average for that trait. Secondly, look at REA/CWT (ribeye area per hundred weight), not just the actual REA measurement. Some breeds are now producing EPDs for carcass traits based on either carcass data from designed tests or ultrasound measurements. Lastly, consider growth and reproductive traits as well as body composition traits. Each producer must decide how much emphasis will be given to each trait depending on the needs and goals for a particular herd.

Other Traits

After ranking the bulls on their EPDs and performance records, evaluate them for conformation, structural soundness, and temperament. After eliminating those that are unsound or have other physical disqualifications, such as small testicles, bad eyes, lack of masculinity, or small frame, you can make your selection on the basis of EPDs and/or performance records. In view of the market demand for 1050 to 1200 pound slaughter animals, some attention should be given to frame size and composition of the bulls. Post-yearling growth can be evaluated by comparing sale weight with yearling weight and evaluating the animal for frame size and composition. Preference should be given to those animals which have continued to grow, and are producing muscle rather than fat.

Using Data Sheets

Table 3 is a sample of a data sheet from a bull sale that is representative of the information you should expect to have available. In addition, sale catalogs will usually have a copy of a three generation pedigree available which is helpful if you are a breeder or fan of that breed and know the bloodlines represented in the pedigrees. For most commercial cattlemen, the pedigree is not very helpful because they are unfamiliar with the bloodlines. None of the information presented is anybetter than the integrity of the breeder, for he is responsible for reporting the sire and dam and the performance data which is the basis of the EPDs. For most bull buyers, the best tools they have available are the EPDs with performance data (their current weight, age and scrotal circumference), as well as visual appraisals of structural soundness and composition.

Evaluating bulls from a data sheet is a matter of deciding how you want to use the bull and what your important needs are. If we were looking for a bull to use on heifers from Table 3, birth weight EPD would limit our consideration to lots 2,6,7 and 8. Lot 9 is difficult to evaluate because he was born a twin, so you don't have a birth weight or a birth weight EPD. Lot 9 is one of the better growth rate bulls on the list, and because high growth rates tend to be associated with heavier birth weights; he is not a good risk for heifers.

If looking for a bull to use on mature cows running in a limited nutrition (poor pasture) environment, good growth rate with low milk and moderate frame size should be the goal. Lots 7 or 8 meet this criteria, with 8 having some preference because of smaller frame size (but still large enough to produce very acceptable carcass weights on his progeny). Lot 4 might work but his small scrotal circumference and low performance and growth EPDs would keep him from the head of the list. Lot 1 probably has too large a frame and growth rate for our limited nutrition environment. Lot 6 may be too small-framed for his progeny to reach acceptable weights at desirable finish levels, particularly if the cow herd is also lacking in frame.

If we are looking for a bull for a productive cow herd in a favorable environment, lots 1,5,7,9,10 and 11 are good candidates. Concerns are: lot 1, weaning (weight and EPD) and milk; lot 9, scrotal circumference; lot 11, frame and milk. These all must be evaluated in regard to the characteristics of the cow herd they will be used on. These are examples of a thought process that might be used to evaluate a sale list.

Lot #	Mo. Age	11-05-99 Weight	Frame Score	Scrotal Circum.	Weaning Weight	Weaning Ratio	Yearling Wt.	Yearling Ratio	Birth Wt. EPD	Weaning Wt. EPD	Yearling Wt. EPD	Milk EPD	M+G EPD
1	26	1916	6.8	37	586	100.3	1090	109.4	4	25	51	11	24
2	25	1633	5.9	39	607	103.9	877	88.1	1.9	24	28	16	28
3	25	1685	5.5	37.5	573	98	960	96.4	5.6	22	38	16	27
4	25	1675	5.1	33	561	96	965	96.9	3.6	19	34	10	20
5	25	1769	5.9	40	604	103.4	1071	107.5	4.7	25	47	16	28
6	25	1748	4.9	38.5	599	102.5	994	99.8	1.3	26	43	11	24
7	24	1649	6.1	38	660	112.9	--	--	1.6	33	52	12	29
8	25	1680	5.7	37	582	99.6	1076	108	1.4	23	48	11	22
9	26	1780	6.3	34.5	582	TWIN	1062	TWIN	TWIN	34	57	13	29
10	26	1769	6.0	38	572	102.9	1076	101.6	3.7	27	49	19	33
11	26	1727	5.1	38.5	582	104.7	1066	100.7	5.2	29	49	16	30
12	26	1832	7.2	43	562	101.1	1149	108.5	8.9	23	46	18	29

Visual Evaluation

The importance of visual evaluation after reviewing the data and prior to making a final ranking or decision cannot be overlooked or over-emphasized. Structural soundness has not been reduced to a number, nor is any compositional data available, so the purchaser will have to rely on visual evaluation for these important traits.

Final selection should be contingent on the bulls having a satisfactory score on a breeding soundness evaluation performed by a qualified specialist. Then you can be confident that the bull is sexually mature, producing semen capable of settling cows, and that his calves will receive the superior genes needed to help improve your herd in the traits you have identified as most important. If two prospects are equal in respect to the economically important traits, are structurally sound, and possess ample masculinity, use personal preference to make the final selection. Be careful to avoid extremes.

Summary

To the beef producer, satisfactory weaning weight is the most economically important trait in a calf. Effective bull selection and elimination of open and poorly producing cows govern genetic improvement in the herd. Bulls should be selected which are sexually mature, structurally sound, producing semen capable of settling cows, and whose calves will be moderate in birth weight, high in genetic potential for reproduction and growth, and desirable in composition. Base your selection on traits such as yearling weight, which will contribute to the economic success of the beef enterprise. EPDs and production records are a good source of objective information. The following list summarizes the traits that should be used for screening and the traits that should be used to make your selections.

Screening

- Dam's reproductive history
- Birth weight
- Structural soundness
- Breeding soundness evaluation
- Ribeye area

Selection

- Yearling weight EPD + yearling weight
- Weaning weight EPD + weaning weight
- Post-yearling growth
- Size and frame EPD
- Marbling and fat EPD



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