

AGRICULTURAL GUIDE

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Beef Breeding

Modern commercial beef sire selection

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Bull selection is the foundation for building a profitable beef herd. Approximately 88 percent of the genetic makeup of a herd after 10 years of breeding will have come from the bulls used. The sire and dam each contribute 50 percent to the genetic makeup of each calf. One-half of the dam's contribution comes from her sire and one-fourth of her contribution comes from the sire of her dam. Thus, the contribution of these three sires to the calf totals 87½ percent. Clearly, sire selection is the major tool available to producers for changing the genetic potential of their herds.

Sire selection can and should be more accurate today than ever before. Beef breed associations have developed programs that use performance information on a calf's relatives in addition to its own record to estimate its breeding value for different traits. This fact sheet discusses methods of using this data and considerations involved in selecting bulls to be used in natural service.

Selecting Bulls

When selecting a bull for natural service, first the buyer must know the kind of bull that will meet the breeding program's needs. The kind of bull needed will depend upon available resources, such as feed, labor, facilities, cow herd, environment, market demand, and the breeding plan followed. The goal is to find a complete, functional bull capable of siring calves that will contribute to herd profitability. Producers can no longer afford to try to maximize any single trait.

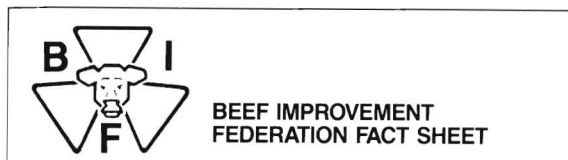
The effect of the breeding plan can be illustrated by comparing rotational and terminal crossbreeding systems. In rotational systems, general-purpose breeds of comparable size are usually used and maternal traits must be considered since heifer

calves will be kept for replacements. On the other hand, a bull from a large, growth breed is used on smaller-sized cows in terminal crossbreeding systems. Maternal traits of the terminal sire would not be important in this case since heifers are not retained as replacements.

Once the type of bull needed has been determined, the second step in sire selection is to decide where to buy. Only consider reputable sources that can provide complete performance records on their bulls. Sellers should have results of breeding soundness examinations available. They should also guarantee the quality and fertility of bulls and guarantee that ancestors are not known carriers of genetic defects. Excellent sources are herds actively involved in performance testing. Bulls may be bought either by private treaty or at production sales, central test station sales, or consignment sales. Be sure the information needed to make a wise decision is provided. If it is not presented, ask for it. If this information is not available, look elsewhere for performance-proven bulls.

After sources have been identified, it is time to evaluate the bulls available and their performance data. This step involves evaluating structural soundness, fertility, growth, calving ease, frame size, and maternal performance.

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Structural Soundness

Any consideration of a bull's potential genetic contribution to a herd is meaningless unless he is structurally sound and physically fit to seek out cows in heat and service them.

Structural soundness in bulls is not an all-or-none trait. It usually occurs in various degrees. Structural soundness is of great economic importance. Bad feet, pigeon toes, long toes, straight hocks, and loose sheaths are examples of some of the more common structural problems. Cattle producers often observe so-called "structural problems" that may affect the esthetic beauty or symmetry of a bull, but in reality have little to do with his function. Structural soundness in bulls is best evaluated from the ground up. Inspect the bull's feet, toes, heels, pasterns, knees, hocks, sheath, and testicles and study his movement carefully to see that he moves freely and strikes the ground evenly with each hoof. The tolerance level of structural problems should be determined beforehand and not decided while looking at prospective herd bulls.

Many structural problems are heritable and should be particularly discriminated against in maternal and general purpose breed bulls whose daughters will be kept for replacements. On the other hand, some structural problems can be tolerated in bulls of terminal sire breeds if those problems do not affect longevity or ability to settle cows.

Visually evaluating a bull for structural soundness also affords an excellent opportunity to evaluate his disposition.

Fertility

A good prediction of bull fertility can be made by a complete breeding soundness exam that includes a semen test, scrotal measurement, and a physical examination of the reproductive tract. Commercial bull buyers should not hesitate to ask seedstock breeders for a breeding soundness examination on all prospective herd bulls.

Although the importance of producing viable semen in ample quantities is obvious, semen evaluation of yearling bulls (11 to 15 months of age) can be

misinterpreted. Certainly the production of live sperm cells is meaningful, but failure to produce good semen at the first collection of a yearling bull should not be considered damning. Young bulls should be rechecked after a few days rest (or weeks if they are less than 13 months old). Often they will produce acceptable semen when rechecked. Normal extension of the penis (free of adhesions) and absence of pus in the ejaculate are positive, meaningful observations, which by themselves are sufficient reasons to semen check young bulls.

A minimum scrotal circumference for bulls should be established as a selection goal. Avoid bulls failing to meet the minimum standard. Scrotal circumference is easily measured and is an excellent indicator trait since a significant, positive correlation exists between scrotal circumference and both volume of semen and percent normal sperm cells. Furthermore, research has also found a strong genetic relationship between scrotal circumference in bulls and the fertility of his daughters as measured by earliness of puberty. Bulls measured at 1 year of age should have a scrotal circumference of at least 30 centimeters. For some breeds, such as those with heavy Brahman influence, the minimum may be 28 centimeters.

Sex drive or libido is also a vital part of bull fertility, although it has little association with other fertility traits such as semen quality or scrotal circumference. Libido testing of yearling bulls in research stations has revealed sizable differences in libido test scores of bulls that were later verified by significant differences in actual conception rate. While libido testing is still in the experimental stage, it may soon be a useful part of some seedstock breeder's bull evaluation programs. It would be particularly advisable to expose bulls to a few cycling females prior to turning them in with the cow herd. Close observation at this time will permit identification of shy breeders, fighters, bulls that form a bond with one particular cow while ignoring others in heat, and bulls that have poor mounting orientation. Such bulls sire few calves and are economic liabilities to cow-calf producers.

Growth and Calving Ease

Growth is evaluated through adjusted weights, ratios, and estimated breeding values for weaning and yearling weights. Weaning and yearling weights and ratios are adequate for simple within-herd comparisons of young bulls, but are not as useful as breeding values that combine the individual's own record with those of relatives. When making between-herd comparisons of growth on young bulls, bull buyers should be careful to use weight ratios or breeding value ratios rather than weights, since absolute or adjusted weights produced in different environments cannot be directly compared. More accurate comparisons can be made when ratios are based on 10 or more contemporary animals. Use caution when comparing yearling records on bulls from central bull test stations because these records are affected by differences in pretest environment.

Rapid growth rate of calves is of obvious importance to commercial profitability. However, because of positive genetic correlations between birth, weaning, yearling, and mature weights, selection for growth usually results in more calving problems and bigger cows to maintain. Establish a range of optimum growth levels to fit your management system and resources. Judicious use of a crossbreeding system can help avoid some of these genetic antagonisms, but rarely is "maximum" growth achieved without making sacrifices in other important traits, particularly calving problems, fertility, and maintenance costs.

Potential calving ease can best be evaluated with birth weight and calving ease records. Birth weight accounts for the major share of variation in calving difficulty in cows of the same age. Birth weight is about 40 percent heritable. Thus, a bull's own birth weight, adjusted for age of dam, is the best indicator of what to expect in his calves. Careful consideration of the birth weight and calving difficulty range that can be tolerated in cows and especially in first-calf heifers is imperative. Since weights at all points in the life of cattle, including birth weight, are positively correlated, some sacrifices in growth may have to be

made to stay within a workable range of calving ease and birth weight for particular breed types, environment, facilities, and labor. Remember, the first economic priority is a live, healthy calf and an undamaged cow that resumes her normal cycle within 35 to 40 days after calving.

Although individual birth weight of a prospective bull is very important and useful, do not stop there. Ask the breeder for the average birth weight of the bull's paternal half-sibs plus the other calves out of the bull's dam. National sire evaluation summaries are currently being published annually for most major beef breeds. These reports can be effectively used by commercial bull buyers. Calving ease, birth weight, or both are generally reported for individual bulls in these sire summaries. Obviously, young bulls being considered for purchase by commercial cattle producers will not be listed in these sire summaries. If the sire of the young bull(s) in question is listed, some very valuable information can be gleaned. Also, the maternal grandsire may be listed. Reviewing the progeny performance for calving ease and birth weight of the sire and maternal grandsire can give a handle on 75 percent of the genetic merit of the young bull being considered.

Frame Size

Frame size provides an estimate of rate of maturity, mature size, and carcass cutability at a given live weight. The two determining factors in the USDA feeder grade standards for calves are frame size and muscling score. Frame size is generally appraised visually by bull buyers or measured in terms of hip height adjusted to a standard age. Some seedstock breeders provide adjusted hip height measurements or frame score data on their sale bulls. Frame size is useful in evaluating and describing the composition of growth in young bulls. Visual appraisal of fat is the most practical method of evaluation of this trait for most bull buyers. Fat bulls are not only poor risks in terms of carcass cutability of their progeny, but also in terms of reproductive function. The selection emphasis given to frame size and leanness traits will vary depending on breed type and intended use. Frame size of the bull should be matched with that of the cow herd to produce offspring that will be the most acceptable in the marketplace. The emphasis on these traits should be much greater in terminal sires than in dual purpose or maternal sires.

Maternal Performance

In a broad sense, maternal performance takes in more than just milk production of cows. Traits, such as calving instincts and other important behavioral traits, are important but seldom measured so they can be used. Thus, maternal performance is generally evaluated as milk production. Obviously, tremendous differences exist between beef breeds in their milk producing ability. Perhaps not quite so obvious are the significant differences found between bulls of the same breed in milk production of their daughters. If selecting bulls for maternal or general purpose breed types, attention to potential milk production of the bull's daughters is very important. Milk production potential can best be evaluated by maternal breeding value (MBV) or expected progeny differences for milk listed in national sire summaries and performance pedigrees generated by breed associations.

Whether selection should be for the highest MBV bull available depends on the environment and the average milking ability of the cow herd. MBV simply describes genetic potential. Producers must decide the desirable range of MBV within each breed type for their feed and forage environment.

If a bull survives these three selection steps and can be purchased at a reasonable price, he should be added to the battery of herd sires. Genetically superior bulls contribute to the profitability of an operation.