



BEEF IMPROVEMENT FEDERATION FACT SHEET
Commercial Beef Sire Selection

Bull selection is the foundation for building a profitable beef herd. In most commercial herds, bulls are purchased and replacement heifers are selected from within the herd. The sire and dam each contribute 50 percent to the genetic make up of each calf. One-half of a dam's contribution to her calf comes from her sire and one-fourth comes from her dam's sire. Thus, 87 1/2 percent of a calf's genetic material comes from three bulls that were brought into the herd. Sire selection is the major tool available to producers for changing the genetic potential of a herd.

Sire selection can and should be more accurate today than ever before. Beef breed associations have developed programs that use performance information on a bull's relatives in addition to his own records to produce Expected Progeny Differences (EPDs). This fact sheet discusses methods of using this data and considerations involved in selecting bulls to be used in natural service.

Selecting Bulls

There are two basic ways to bring about genetic improvement in a commercial herd, crossbreeding and selection. The purpose of crossbreeding is to produce heterosis (hybrid vigor). A good crossbreeding program is important in improving reproductive traits and production traits like rate of gain. Selection of superior breeding stock is most effective in changing production traits and carcass traits. A good breeding program for a commercial herd will include both a designed crossbreeding system and selection of superior bulls within the chosen breeds.

The crossbreeding system used will affect the type of bull that is needed. In a rotational system, heifer calves are kept for replacements. General purpose breeds of comparable size are normally used. Disposition, calving ease, moderate size, fertility, maternal ability and gain are all important criteria for bull selection. In a terminal crossbreeding system bulls from larger, growth breeds are typically used on

smaller cows and all calves are sold as market animals. Growth and carcass traits are very important while maternal traits are not important since no heifers are kept for replacements. Plan the crossbreeding system before individual bulls are selected.

With a planned crossbreeding system established, the next step is to critically evaluate the cow herd. Look at the cows in terms of how they fit available resource such as feed, labor, facilities and environment. Look at how calves fit market demand. Determine the weak points and strong points of the herd. This will help in describing the type of bull that is needed. It is almost impossible to find a bull that is superior in every trait. The goal is to find a bull with an acceptable combination of traits that compliments the strengths and weaknesses of the cow herd.

After a crossbreeding system has been established and the type of bull has been determined, it is time to decide where to buy. Only consider reputable sources that can provide complete performance records. Performance records and pedigrees are only as good as the integrity of the breeder. Sellers should make results of breeding soundness examinations available and guarantee the quality and fertility of bulls. Herds that are actively involved in their breed association performance program are excellent sources for bulls. Bulls from these herds can be bought by private treaty, at production sales, at central test station sales or at consignment sales. Whether bulls are purchased at auction or by private treaty, be sure the information needed to make a wise decision is provided. If it is not presented, ask for it. If performance information is not available, look elsewhere for bulls.

Prepared by Ronnie Silcox, The University of Georgia; and Roger McCraw, North Carolina State University. Reviewed and edited by Keith Bertrand and Charles McPeake, The University of Georgia.

Growth and Calving Ease

Birth, weaning and yearling weights are normally used to evaluate breeding animals. Actual or adjusted weights may help in making comparisons between bulls in the same contemporary group (a group of animals from the same herd, year and season, raised together under the same conditions.). Since environmental factors like feed and weather affect weights, actual or adjusted weight can be misleading if bulls come from different contemporary groups. Within a herd, weight ratios help account for some of the environmental differences between contemporary groups. A ratio of 100 means a bull's weight was average in his contemporary group. A ratio of 110 means a bull's weight was 10% heavier than average. Ratios can also be misleading if bulls come from different herds. EPDs, on the other hand, are calculated across herds. A bull's EPD for a trait is a more accurate estimate of his genetic worth than his weight, adjusted weight or ratio. EPDs not only account for contemporary group and herd differences, they also include information on a bull's relatives as well as his individual performance.

Most major breed associations have National Cattle Evaluation programs. Breeders who are involved in their breed's performance program should have birth, weaning and yearling weight EPD's available on yearling bulls. In all of these breeds, EPDs are expressed in pounds of calf. For example, if bull A has a weaning weight EPD of +15 and bull B has a weaning weight EPD of +5, the calves produced by Bull A are expected to weigh, on the average, 10 pounds more at weaning than those of bull B, assuming the bulls are bred to comparable cows.

Rapid growth rate of calves is of obvious importance in a commercial herd. But, there are genetic correlations between birth, weaning, yearling and mature weight. Selection for high weaning and yearling EPDs without regard for other traits will result in increased calving problems and larger cows that require more feed for maintenance. While rate of gain is very important, maximum growth is rarely achieved without sacrificing other important traits. Set reasonable minimum standards for growth and look for bulls that combine acceptable growth with other traits that are needed in the herd.

Potential calving ease can best be evaluated with birth weight and calving ease EPDs. Birth weights account for the major share of variation in calving difficulty in cows of the same age and size. Because birth weight is influenced by age of dam and nutrition, actual birth weights can be misleading. Birth weight EPDs are much more accurate for across herd comparisons. A few breeds report calving ease EPDs in addition to birth weight EPDs. The range of birth weight and calving ease EPDs that is acceptable depends on the size of cows to be bred. Selecting bulls with low birth weight EPDs is most important when they are to be used on

small cows or first calf heifers. Since weights at all points in the life of cattle are positively correlated, some sacrifices in growth may have to be made to stay within a workable range of calving ease or birth weight for a particular herd.

Advances in National Cattle Evaluation have made estimating a bull's genetic worth more accurate than ever before. EPDs allow valid comparisons of all bulls of the same breed, but they do not allow you to compare bulls from different breeds. Since breeds have different average performance, base years and evaluation procedures, direct comparison of EPDs from different breeds can be extremely misleading. It should also be noted that a bull with an EPD of zero is rarely average. In most breeds zero is the average of some base group of animals. Since breeds change over time, in some breeds it is possible to find bulls with positive weaning and yearling weight EPDs that are several pounds below the average of all yearling bulls in that breed. Current breed averages and information on how to use EPDs are included in breed association sire summaries. Sire summaries are available at no charge from most major breed associations.

Maternal Performance

Maternal performance is generally expressed in terms of milk production. In a broad sense, maternal performance takes into account more than just milk production of cows. Traits such as calving instincts and behavior are also included. Since there are tremendous differences between beef breeds in their maternal ability, design of the cross-breeding program and selection of breeds is very important. Within a selected breed there are also differences in maternal ability of daughters by different bulls.

Maternal ability within a breed can best be evaluated with milk EPDs. Milk is not measured directly in beef cattle performance programs. It is measured in terms of how it affects weaning weight. A milk EPD on a bull is an estimate of pounds of calf at weaning produced by the bull's daughter due to her milking ability. For example, Bull A has a milk EPD of +5 and Bull B has a milk EPD of +2. All other things being equal, bull A's daughters should produce calves that wean 3 pounds heavier than those from daughters of bull B due to extra milk production. There is some variation in the terminology used by different breed associations in reporting maternal EPDs. An explanation of maternal EPDs is included in a breed's sire summary.

As a cow's milk production increases, her protein and energy requirements increase. Maximizing milk without supplying adequate feed can result in a decline in conception rate. Producers must decide the desirable range of EPDs that will fit within their feed and forage environment.

Frame and Muscle

USDA Feeder Calf Grades are based on frame and muscle scores. Frame and muscle are highly heritable and they both have a major effect on feeder calf prices. Frame and muscle in the bull should be matched with that of the cow herd to produce calves that will be acceptable in the marketplace and replacements that will perform in the herd's environment.

Frame size provides an estimate of rate of maturity, mature size and carcass cutability at a given live weight. Frame size is generally appraised visually by bull buyers or measured in terms of hip height adjusted to a standard age. Some breeders provide adjusted hip height or frame score on their sale bulls. Larger framed steers gain more efficiently and are leaner than small framed steers at a given weight. Packing plants discriminate against carcasses that are too light or too heavy. For these reasons feeder calves that are at the upper end of USDA Medium or the lower side of USDA Large generally bring the best prices. While larger framed market animals may be preferred, larger framed females in the herd may reach sexual maturity later and require more feed for maintenance. Increasing frame size in the cow herd without increasing the level of nutrition will generally result in a decline in reproductive efficiency.

Adequate muscling is usually determined by visual appraisal. Feeder calves that are not thick enough to grade USDA Number 1 muscle are generally discounted heavily. While light muscled bulls can affect the marketability of calves and carcass cutability, extreme heavy muscling may be associated with structural and reproduction problems. Evaluate the cow herd and determine the amount of muscling required before selecting a bull.

Some breeds are developing carcass EPDs; however, these are not generally available on most yearling and 2 year old bulls. As more carcass data is collected these EPDs will become more available.

Structural Soundness

Any consideration of a bull's potential genetic contribution to a herd is meaningless if he is not structurally sound and physically fit to seek out cows in heat and service them. Structural soundness is not an all-or-none trait. It usually occurs in various degrees. Bad feet, pigeon-toed, straight hocks and loose sheaths are examples of some of the more common structural problems. It is especially important to critically evaluate young bulls since these problems tend to get worse as bulls get older and heavier. 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.

Many structural problems are heritable and should be particularly discriminated against in bulls whose daughters will be kept for replacements. Minor structural problems can be tolerated in a terminal sire as long as they do not effect his longevity or ability to service cows. The tolerance level for structural problems should be determined beforehand, not while looking at prospective herd bulls.

Visually evaluating a bull for structural soundness also affords an excellent opportunity to evaluate disposition or temperament. Disposition is heritable. A bull with poor disposition not only causes problems himself, he also produces daughters that can make the cow herd more difficult to work.

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 (12 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 is not conclusive. 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 their daughters as measured by earliness of puberty. Bulls measured at 1 year of age should have a scrotal circumference of at least 30 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 breeders' 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 fewer calves and are economic liabilities to cow-calf producers.

Putting It All Together

Bull selection depends on the type of cows to be bred and the objectives of the producer. The best bull for one herd will not necessarily be a good choice for another herd. Following are three examples of how the herd situation can affect bull selection.

Producer 1 has a small herd of crossbred cows. He works in town during the day and has a limited amount of time to spend with the cattle. He has at best average pastures with limited facilities and needs to use the same bull on both heifers and mature cows. For producer 1, calving ease would be of major importance, so low birth weight EPDs would be necessary. This producer may have to accept somewhat lower weaning and yearling weight EPDs to find

a low birth weight bull. With his pasture situation, average milk to moderately low milk production would be acceptable. Producer 1 would want to avoid extremes in frame. With limited facilities, disposition would also be a major consideration.

Producer 2 has an average size herd of medium frame crossbred cattle that works well under his management situation. He has good pastures and needs a bull to breed to mature cows in a rotational crossbreeding program. Producer 2 would balance moderate birth weight EPDs against higher weaning and yearling EPDs. He would be willing to accept somewhat higher birth weight than Producer 1 in order to get higher weaning and yearling EPDs. With good pastures, moderately high milk EPDs may be desirable. Since his cows are working well in their environment, a bull of similar frame and muscle would be chosen.

Producer 3 has a large herd of medium frame cattle and plans to breed some of his mature cows to a terminal sire. All of these calves will be placed in the feed lot. Producer 3 will want to maximize weaning and yearling weight EPDs. He will have a higher tolerance for birth weight than either Producer 1 or 2, but he will still avoid bulls with extremely high birth weight EPDs. Since all heifers are going into the feedlot, milk EPDs are not a factor. A larger framed bull may be desirable to produce a specific carcass weight. A heavy muscled bull would also be desirable.

In the above examples these different producers with three different herds and objectives would choose three different bulls. Setting goals and evaluating the cow herd are important first steps in bull selection.