# MANAGEMENT ROADMAPS TO HIT PRODUCTION TARGETS IN THE BEEF INDUSTRY

*L.R. Sprott, Stephen P Hammack, Ron J. Gill,*
*Joe C. Paschal,* and *Bruce B. Carpenter*
Texas Agricultural Extension Service
Texas A&M University

For years the beef industry has identified "targets." In the 1960s and 1970s, efforts were made to get more frame, muscling, and growth in cattle. That was accomplished and resulted in faster gaining animals that reach more desirable carcass weights. In the 1980s, concerns about fat in the human diet and the resulting difficulty in disposing of waste fat from over-finished cattle created the need to produce leaner animals. That, too, has occurred, but unfortunately some of these cattle were later maturing with lower USDA quality grades. The 1990s have brought new targets which require that cattle have more predictable performance and less variation in carcass value. The National Beef Quality Audit and Texas A&M Ranch to Rail are two programs that have identified the following areas where appropriate changes can be used to enhance the predictability, consistency, and profitability of beef animals.

## CARCASS VALUE

**1) Yield grade -** Eliminate cattle that grade 4 or 5 (excessively fat). This is a major concern of packers because they are left with managing and merchandising excess fat from these animals. Both the cow-calf operator and feedlot manager must cooperate to achieve this goal. If possible, cattle should not be held on feed beyond the period when a practical degree of fatness is achieved. Feedlot managers are occasionally forced to overfeed cattle because of expected near term positive moves in market prices. In other cases, only a few calves with expected unacceptable yield grades from a large pen of cattle does not justify sorting into perhaps more manageable groups. Occasionally, cattle are overfed as a means to increase live weight on calves that would otherwise receive carcass discounts for being too small at slaughter. Cow-calf operators who produce calves that are genetically predisposed to excess fatness should consider a terminal crossbreeding system using sires from breeds that are characteristically leaner than other breeds. It is not difficult to produce calves whose carcasses will have acceptable yield grades as long as they are not overfed. The real challenge, which can be overcome, is to produce such calves that also have the genetic ability to marble and achieve desirable weights after a reasonable amount of time on feed.

**2) USDA quality grade** - Eliminate cattle that grade USDA Standard or lower. Quality grade is partly determined by the degree of marbling and, like yield grade, is affected by time on feed and genetics. Calves with the genetic potential to marble require a certain amount of time on a high energy diet before a sufficient amount of marbling is achieved. On the other hand, calves with low genetic potential for marbling may not achieve acceptable marbling, regardless of length of time on feed. In other instances, calves arrive at the feedlot weighing over 900 pounds and reach an acceptable degree of fatness long before they have time to deposit marbling. Extending the feeding period on these particular cattle in order to enhance marbling results in excessively heavy carcasses with large primal cuts, both of which are difficult to manage in the packing and retail meat industries. To avoid producing calves that grade USDA Standard, choose sires from breeds that have average to above average marbling ability. Without question, some breeds have less than adequate marbling. An alternative is to use individual sires, regardless of breed, who have sufficient progeny data that give proof of above average marbling. Just as there are breed differences for marbling, there are also individual differences for marbling within a breed.

**3) Carcass size** - Eliminate calves that produce carcasses weighing less than 550 pounds and over 900 pounds. Such carcasses will receive significant price discounts. There simply is not a good market for carcasses under 550 pounds, and those over 900 pounds often require unusual fabrication procedures to satisfy meat industry specifications. Carcasses that move easiest through the beef industry come from moderate to slightly large frame calves. Cow-calf producers can create these calves by assessing frame size and mature weight in their cows and mating them to sires of appropriate size that either increase or decrease frame size in the resulting offspring. If only a few cows in the herd are producing excessively small or large frame calves, it will be easier to eliminate these particular cows than it will be to find one sire type that equally complements all cows. When enough large and small frame cows are present in the herd to justify separate breeding groups, different sires with appropriate frame size can be assigned to separate groups of females.

**4) Muscling -** Light muscled calves have low cutability, produce small primal cuts, and are of less value. Improvement is made by using adequately muscled sires. This responsibility lies entirely upon the cow-calf producer. If the feeder calf does not have the genetic potential to produce muscle tissue, it cannot be developed through any kind of feeding program. Some

breed associations are currently reporting ribeye area EPD (expected progeny difference) for their registered sires. Although ribeye area is a good indicator of ribeye muscle size, it is not an absolute measure of overall muscling which is the major factor affecting lean meat yield. Packers and consumers do not want extremely large or small cuts of meat. The desired ribeye area is 1.7 square inches per hundred weight of carcass. Ribeye area is targeted at 11.5 to 14 square inches. This translates to acceptable carcass weights ranging from 675 to 825 pounds. Currently, discounts are only being given to carcasses less than 550 and over 900 pounds, but as cattle numbers increase, discounts will be given on animals outside a narrower window of acceptability. If the desired carcass weights, based on appropriate ribeye area per hundred weight, are calculated back to live weights, an estimate of the desired live weight can be obtained. Assuming a dressing percent of 63%, it requires a slaughter animal weighing between 1070 (675/.63) and 1310 (825/.63) pounds.

**5) Blood splash and dark cutters -** Prevent stress just prior to slaughter. Blood splash is characterized by spots and streaks of blood in the muscle, and dark cutters produce cuts of meat that have a dark, almost purple, color. Carcasses displaying these problems often receive discounts of up to $200 because they have an unappealing appearance and are difficult to merchandise. Stress just before slaughter is thought to cause these problems, and cattle with bad disposition are usually the first to be impacted. Significant environmental changes prior to slaughter may also be involved, but whatever the cause, these problems appear directly related to pre-slaughter management. Cow-calf producers can help the situation by eliminating calves with bad dispositions and by handling the remainder easily so that bad disposition is not developed. The rest appears to be up to mother nature and to handlers at the feedyard, trucking companies, and packing plants.

**6) Bruises -** Handle cattle easily. Approximately 17% (in extreme cases, up to 40%) of slaughter cattle have some degree of bruising that occurred either at the ranch or elsewhere, and excessively bruised tissue must be removed at slaughter. Again, disposition of the animal and handling are the main causes of bruising. Cattle that are gentle and easy to handle can be produced, but it is the responsibility of handlers at the terminal end to see that cattle are handled slowly and quietly as they leave the feedyard and enter the packing plant.

## FEEDLOT PERFORMANCE

**1) Average daily gain (ADG) -** Low ADG usually results in poor feed efficiency and increased cost of gain. Crossbreeding systems can increase ADG provided that sires from breeds that have average to above average growth potential are selected. Some of these breeds have less than average marbling ability resulting in low USDA quality grade; therefore, a balance between growth and marbling should be targeted. Using EPD to choose sires with above average weaning weight, yearling weight, and marbling can increase success. In some breeds, EPD for marbling are not available, and among those breeds, it is important to know differences in breed averages (see section entitled "Breed-type Differences").

**2) Illness in the feedlot -** Protect calves from disease before they arrive. Calves that get sick in the feedlot have decreased gain and feed efficiency, higher medicine cost, and potentially reduced carcass value. A high illness rate can increase death loss and the number of calves that are railed due to unacceptable performance. A well developed immune system to protect against disease is the responsibility of the cow-calf producer and the feedlot manager. Calves born to malnourished dams often have low immunity at birth, and inadequate preweaning nutrition can also suppress the immune system. Research suggests that immunity may also be affected by genetics. However, adequate preweaning nutrition and preventative vaccination programs are known to strengthen the immune system, and these two factors should be addressed at the ranch. This makes receiving procedures at the feedyard much more effective, thereby further reducing illness rate.

## ANIMAL MANAGEMENT

**1) Brand placement -** Brands should not be placed across the ribs since this greatly reduces hide value. Brands are a vital identification tool and one of only two means of providing proof of ownership. The other recognized method is tattooing. Brand size, design and placement can impact the severity of hide damage, and freeze brands can also reduce leather quality in the brand area. The current recommendation is to place brands only on the animal's extremities (upper hip next to the tail head, lower legs).

**2) Injection sites -** Choose the neck region for vaccine injection sites and avoid injecting into the hip, rump, and round where the more valuable cuts of meat originate. Lesions caused by injections must be trimmed out either by the packer or at the retail chain because their appearance is unappealing and complicates merchandising. Removing these lesions slows fabrication procedures, reduces lean yield, and eventual value of the carcass. If cleared on the drug label, use the

subcutaneous injection method. Read all drug labels and follow directions for proper administration.

The conclusion of the National Beef Quality Audit was that achieving these changes might decrease potential losses to the beef industry by a value of approximately $280 per head. Many of these changes can be accomplished at the ranch level. The amount of payback to individual producers depends largely on their commitment to implement these changes and the degree to which they are achieved.

## SATISFYING CONSUMER NEED

Consumer research reveals that beef customers characterize quality meat as being flavorful, juicy, and tender. Unfortunately, these characteristics do not always come in a single package, and the result is that the same cuts of beef from different carcasses may vary dramatically in eating quality. The problem is that consumers more clearly remember their bad eating experiences compared to those when they were satisfied. Studies indicate that eating satisfaction is affected by USDA quality grade. Cuts from USDA Prime and Choice carcasses are less variable and normally have more desirable eating quality than cuts from USDA Select and especially, Standard carcasses.

Tenderness, a factor not well related to USDA quality grade, is a third desirable character which is influenced by a natural muscle enzyme known as calpastatin. Animals with a low level of calpastatin produce beef that is more tender than those with a high level of calpastatin. Fortunately, USDA quality grade and tenderness can be influenced by genetic selection procedures.

## USING GENETICS TO INCREASE CONSISTENCY IN EATING QUALITY

Perhaps the most powerful tool to affect genetic change is the use of EPD. Purebred associations accumulate data for various production traits. These traits are used to calculate EPD for each individual animal in the breed. Some breeds are now measuring carcass variables such as marbling ability, ribeye area, and carcass weight. Thus, sires can be chosen that have the genetic ability to produce progeny with more desirable carcass characteristics. To achieve a high proportion of progeny with desirable carcasses, the more desirable sires (or their close relatives) would necessarily be mated to a large proportion of the females in a breeding herd. Classically, easy access to such sires and the ability to mate them to a large number of females can be achieved through artificial insemination. Producers may use such sires in natural service, but the proportion of females to which they are mated will be limited compared to when artificial insemination is employed.

Most importantly, deciding on the choice of sires would require producers to study carcass EPD for each potential sire. In a recent study by the Texas Agricultural Extension Service, using this approach and selecting sires with above average EPD for marbling not only improved USDA quality grade but also increased carcass gross revenue by an average of $127.61 per head. This resulted in increased net returns of $88.46 per head favoring those calves sired by the high marbling bull. In a second trial, using a high marbling bull increased net returns by $41.19 per head. Therefore, it is reasonable to assume that increased consistency in eating quality could potentially be achieved by using sires with proven ability to marble with the added benefit of higher profits.

As stated earlier, eating satisfaction is also impacted by tenderness which is not well related to USDA quality grade, but perhaps more impacted by the presence of calpastatin in the meat. Research in this subject is relatively new, but there is evidence that calpastatin levels are genetically influenced. These studies showed that within a breed and between breeds, there were differences in calpastatin activity in carcasses from progeny by different sires. Furthermore, almost 80 percent of the variability in tenderness was explained by calpastatin activity. Currently there are no EPD for calpastatin activity, although there is likely to be an effort to begin collecting such data in the near future. Until then, producers may want to collect tenderness data on progeny from their own herd sires. Currently, tendemess data can be obtained on cuts of meat using the Warner-Bratzler shear force test. Identifying desirable sires and using them more extensively can have a positive impact on tenderness. Often times producers say that, "I'll take such steps but only when packers are ready to pay the premiums that superior cattle deserve." That day may not be too far away. Ultrasound probes are currently being developed to measure marbling on live animals, and this may bring the industry one step closer to the information systems required for value based marketing. When this occurs, producers who have selected their cattle for superior carcass value will be first in line to capitalize on this new marketing concept. Furthermore, geneticists are attempting to identify the genes which affect carcass quality grade and tenderness. The eventual outcome may be that a blood test used at birth can help identify potentially valuable herd sires. Nevertheless, no one will be very successful at improving carcass value in their cattle until their current value is measured and recorded. Those records must then be traced back to the parents so that the truly superior sires can be more widely utilized to create a larger population of offspring with acceptable carcass value.

Even if we are able to meet the challenges of the National Beef Quality Audit and meet consumer needs, we still must maintain production efficiency. Some discussion about how genetics can be used to achieve this may be warranted.

## USING GENETICS TO MAINTAIN PRODUCTION EFFICIENCY

Efficient production is sometimes defined as creating a product with only the minimum of required inputs. However, this definition does not account for the intrinsic worth of the inputs, and because of that, the inputs may positively or negatively affect efficiency, in other words, irrespective of their price, some inputs have unexpected value. This is particularly true when considering the long term impacts of using superior herd sires. Progeny retained from these sires will carry half of the genetics from each parent, thereby helping to stack the deck in favor of creating cattle with a particular characteristic. As always, be cautious of single trait selection, since such an approach can negatively affect performance in other genetically correlated traits.

Obviously, the females play an important role in herd efficiency, and they should be selected first for fertility. After all, low calf crop is one of the first things that reduces profitability in a cow-calf operation. Females should also have acceptable milking ability as reflected in weaning weight of their offspring. Remember that the highest producing females may not be the most desirable in those operations where grazing is historically limited by lack of rainfall. In this case, moderate production may be more desirable so as to avoid reproduction failures associated with high nutrient demand that would be needed in the case of high producing females.

Another important criterion in the female is her calving ease. This is negatively affected by heavy birth weights, and perhaps females should be selected from genetic lines where birth weights are moderate. More importantly, using calving ease sires will also keep calving problems to a minimum.

Finally, collecting and studying performance records of females while also comparing progeny records from different sires will clearly make selection decisions more accurate. This is perhaps the most correct way to use genetics as a way to maintain production efficiency. However, progeny testing and maintaining an extensive set of performance records is not always possible. In this case, it is important to understand expected breed-type differences and how these differences can be used to select, or create, a more predictable animal.

## BREED-TYPE DIFFERENCES

There are at least 60 currently active cattle breed registry associations in the United States. Of these, perhaps 12 to 15 breeds contribute significantly to the nation's cattle numbers. Beef breeds can be divided into several broad functional groupings based primarily on genetic background (Bos taurus-Bos indicus) and breed averages of body size, milking potential, and body composition as follows:

1) **British,** characterized by Angus, Hereford, Polled Hereford, Red Angus, and Shorthorn. This group averages moderate in size, milk, and cutability, above average in rate of sexual maturity and fleshing ability, and average (Hereford, Polled Hereford) to above average (Angus, Red Angus, Shorthorn) in marbling.

2) **Bos indicus,** characterized by American Brahman. These cattle tend to be moderate in milking potential, cutability, and fleshing ability, above average in size, less than average in marbling and rate of sexual maturity, and high in adaptability to hot climate and insects with some degree of resistance to disease.

3) **American,** characterized by Beefmaster, Braford, Brangus, Red Brangus, Santa Gertrudis, and Simbrah. These composite breeds were developed originally in this country by crossing Brahman and one or more Bos taurus breeds. Depending on what other breed is included with Brahman, the group averages moderate in most production traits. (Simbrah tend to be above average in milk and size), except for being high in hot climate tolerance.

4) **Heavier milking Exotic or Continental,** characterized by Gelbvieh, Maine-Anjou, Salers, and Simmental. This group averaged high in body size, milk, and cutability and moderate in most other traits. The combination of large size and high milk can be a mismatch with poor or extensive forage conditions.

5) **Lighter milking Exotic or Continental,** characterized by Charolais, Chianina, and Limousin. This group averages high in body size, highest in cutability, below average in marbling (except average for Charolais) and average to below average in most other traits.

What is the "ideal" breed-type combination for commercial production? Various ideas exist. If producers can select and document genetic content and merchandise true merit, especially through retained ownership all the way to the carcass, then breed-type formulas are less important. But for producers who sell through traditional or non-traditional live animal marketing channels, attention to preferred breed-types is important. In such cases, significant price discounts can generally be avoided by

producing crossbred cattle that are at least 1/4 British, no more than *1/2* Exotic or Continental, and no more than 3/8 Bos indicus. Numerous possibilities exist within these ranges including, but not limited to:

- crosses of British breeds,
- crosses of British and Exotic (Continental) breeds,
- crosses of Exotic breeds and part Bos indicus-part British crosses or American,
- crosses of British breeds and part Bos indicus crosses or American breeds, and
- appropriately constituted crossbred-base composite breeds.

Producers should keep these preferences in mind when planning genetic management programs, while continuing to place primary emphasis on efficiency of production to weaning.

## GENETIC VARIABILITY IN FEMALES

Many times the variable, or unpredictable, performance in calves is due to the variability in breed composition among their dams. Herds which have not used a systematic approach to crossbreeding usually have a wide array of breeds represented in the herd with some of the females representing breeds and crosses that are dramatically different than the average genetic base within the herd. It is difficult in such herds to choose a sire breed that by itself, will create consistent and predictable offspring. In these particular instances, it may be necessary to eliminate those females whose breed composition is greatly different, or perhaps unknown, compared to the average of the herd. By doing so, variability among the females is reduced which results in less variability and more predictability in offspring performance.

## SUMMARY

Producers can increase performance and profits in their herds by working to correct those problems identified in the National Beef Quality Audit and in the Texas A&M Ranch to Rail program. Using sires with proven genetics for growth and marbling ability can improve feedlot performance and perhaps eating quality of the beef product. Using EPD values in sire selection may be the most correct approach to create predictable performance. Without EPD information, consider breeds for particular characteristics and use those differences to their best advantage. Herds that have not followed a systematic approach to crossbreeding may have too much genetic variability among their females, and eliminating those females that are greatly different from the average genetic base can improve predictability in the offspring.

Certain breeds have industry reputations for predictably low rates of gain, low marbling scores, poor disposition, excess frame size and mature weight, low eating quality, and low feed efficiency. Luckily, all these are not associated with one particular breed. Because of this, crossbreeding systems can be used to produce offspring with, at least, an improved appearance of predictability.

To make improvements in beef cattle production systems, a starting point is needed. Few producers know the performance of their calves after they leave the ranch. Programs such as Texas A&M Ranch to Rail and other breed-sponsored opportunities are designed to give producers a benchmark from which to make change. These programs may also show some ranchers they are on target and no changes are needed. If changes are needed and eventually implemented, be realistic about expected results because environmental and managerial constraints may limit potential outcomes. Make changes where possible and produce cattle that will not be a drain on the industry, but rather provide a positive contribution.