10 TEN STEPS TO Beef Cattle Genetics

Understanding of beef cattle genetic principles provides greater insight into decision-making processes.

By Ron Bolze, Ph.D.

Step 1
Know what you are.

In other words, are you a seedstock producer or are you a commercial producer? Seedstock producers sell genetics, whereas commercial producers buy genetics and sell pounds or a specialty produce like replacements. Know what you are so that you can be goal-oriented and plan accordingly.

Step 2
Know the Basic Principles of Beef Cattle Genetics.

An understanding of a few basic principles helps the decision-making process. First, beef cattle production traits are heritable — calves inherit characteristics from their parents. Heritability of 0% indicates a trait is not inherited, while a heritability of 100% indicates an offspring's performance is completely determined by its parents' performance.

Another basic beef cattle genetic principle is correlation. A correlation measures the relationship between two variables and has a numerical range between -1 and +1. A correlation of +1 is considered "perfect" and indicates that an increase in one variable is associated with a perfectly predictable increase in a second variable. A correlation of -1 is also "perfect," only an increase in the first variable dictates a decrease in the second variable. A correlation of 0 is no correlation, or no relationship. An understanding of genetic correlation allows producers to make genetic progress in one trait with known, directional change in correlated traits.

Step 3
Emphasize Trait Selection.

Historically, commercial cow-calf producers have singled out one of a few traits that needed improvement within their cowherds and have attempted to improve these traits through their next bull purchases. Little regard has been given to the bigger picture, wherein the entire cowherd must fit through numerous trait windows of acceptability simultaneously.

Step 4
Be Goal Oriented.

Critically evaluate your current position and where you want to be at some future point in time. Critically evaluate your cowherd and where you want it to be at some future point in time. Critically evaluate the current demand for your product and where you want the demand to be at some future point in time.

Think about and write down the steps necessary to achieve your goals. Think about and write down an achievable time frame for achieving the various steps. Constantly reevaluate your goals and steps. Remember, success is a journey, not a destination. It matters not as much where you are as in what direction you are moving. Plan your work and work your plan.

Step 5
Reduce Genetic Variation.

Too many herds are characterized by excessive ranges in mature cow size, genetic potential for milk production, nutritional requirements, cost of production, and managerial constraints. The resulting offspring are anything but uniform and predictable when it comes to feedlot performance and carcass characteristics. This is not a breed issue. This is an individual sire issue.

Progressive cow-calf producers, both seedstock and commercial, are seeking out individual sires that show tremendous promise in making valuable genetic contributions to the constraints imposed by the cowherd, feedlot and packing house enterprises. Widespread use of these sires via artificial insemination (AI) has unlimited potential. However, in extensive environments, wherein AI is not practical, the use of full sibling sons of these individual superior sires, produced via embryo transfer (ET) of superior cows, also with proven track records, would also greatly reduce genetic variation.

Step 6
Use Crossbreeding and F1/ Hybrid/Composite Bulls Carefully.

Significant genetic change can result from selection both between and within breeds. However, breed differences are more easily exploited than genetic variation within breeds because they are more highly heritable. Because of trade-offs resulting from antagonistic genetic relationships within breeds, it is not possible for any one breed to excel in all characteristics of economic importance to beef production.

Breeds can be selected to optimize performance levels for economically important traits with a higher level of precision much more quickly than within-breed selection. Therefore, use of crossbreeding systems that exploit complementarity by terminal crossing of sire breeds noted for lean tissue growth efficiency, with crossbred cows of small to medium size and optimum milk production, provides an effective means of managing trade-offs resulting from genetic antagonisms.

Step 7
Put Milk Production in Perspective.

As producers have increased cow size and/or milk production, stocking results have remained the same. This may have contributed to a gradual decline in range condition over time. Larger, heavier milking cows stocked at traditional rates are likely to be in poorer body condition requiring additional higher-priced supplementation to maintain the same level of reproductive efficiency over time. Emphasis should shift from average calf weaning weights to "How many cows can I run on a given forage resource base at what cost?"

Step 8
Use Genetics to Target a Value-Based Carcass Market.

a. Targeting the high-quality market. Those producers that target high-quality markets can make rapid genetic change in their current cowherds through the use of individual, progeny-proven, high accuracy Angus (red and black) sires which excel in marbling EPDs.

b. Targeting the red meat yield market. According to the 1991 National Beef Audit, most of the lost economic opportunity is due to excessive fat production. Therefore, the most immediate response to reduced fat production can be derived by producers targeting the red meat yield target. The primary focus logically becomes decreased external fat cover and increased REA, while at the same time maintaining acceptable levels of quality grade. Numerous entities currently offer pricing structures that reward beef carcasses that excel in red meat yield.

Step 9
Maintain Flexibility.

Cow-calf producers cannot be expected to constantly change the genetics of their cowherd with hopes of hitting some carcass specification target, which may or may not exist at some point in time in the future. Flexibility appears to be the key. Producers are advised to maintain the kind of cowherd genetics that they can shoot for and hit, with some degree of accuracy, whichever carcass target appears economically viable in the short term (two to three years). Producers must become students of beef cattle genetics and use the right individual sires, or develop an excellent working relationship with a progressive, forward-thinking seedstock producer who does.

Step 10
Seek an Alliance With the Right Seedstock Producer.

The "right" seedstock producer raises cattle the way you do — you have similar philosophies. The right seedstock producer does not just want to sell you bulls. He/she provides additional services, including assistance in merchandising your cattle. The right seedstock producer is responsive to your needs and plans his/her breeding program accordingly.

The right seedstock producer may come in various forms with registered purebreds, F1s, hybrids, composites or some combination. The right seedstock producer has probably withstood the test of time. However, do not overlook the younger, aggressive producers who are actively seeking opportunities for alliance formation for increased marketing clout. The right seedstock producer is dedicated to the long term success of your operation and to the sustained future of the beef cattle industry.

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Summary.

It appears that beef cattle genetics will play an increasingly significant role in the profitability of beef production over time, particularly in light of evolving best-cost production systems, alliance formations and value-based markets. Greater understanding of beef cattle genetic principles may provide greater insight into the diverse decision-marking process. ◆

Editor's Note: *This article first appeared in the November 1996 issue of the Register. Dr. Ron Bolze was the Beef Cattle Extension Specialist for Kansas State University (KSU) at the time he authored the article. A former Executive Director of the Beef Improvement Federation and a graduate of Penn State University, he earned his Ph.D. in Reproductive Physiology from KSU. Bolze presently serves as Executive Vice President of the Braunvieh Association of America, Lincoln, NE.*