Beef Logic

by R.A. "Bob" Long

Basic genetics for cattlemen — Part III

Last month's "Beef Logic" column referred to the fact that a great many different pairs of genes are involved in the control of each performance trait. Furthermore, when an egg or a sperm cell is formed, only one gene of each pair is transferred, that one being determined at random.

For example, at a certain location on a specific chromosome the gene pair may be AA, Aa or aa. If both genes of the pair are alike (AA or aa), they are said to be homozygous; if different (Aa), they are termed heterozygous.

Obviously, when an egg or a sperm is formed by an animal carrying AA, only A can be transferred. If the gene pair is Aa, the reproductive cells can carry either A or a. Therefore, the sperm cells from a heterozygous bull are not uniform nor is the resulting progeny. Such a heterozygous gene pair explains the variation that can occur within a breed, a herd or a group of half brothers and sisters.

An accurate, complete selection program will increase the number of desirable genes in a herd and decrease the undesirable ones.

Similarly, the ovum produced by the cow contributes half of the gene pair in the fertilized egg for further uncertainty.

Not only does a heterozygous gene pair result in variation, but a homozygous bull (AA) mated with a homozygous cow (aa) produces offspring different from either parent.

A trait controlled by a single pair of genes can be easily manipulated. Dealing with only four gene pairs is much more complex, as illustrated by the following possible combinations or genotypes.

AABBCCDD, AaBBCCDD, AaBbCCDD, AaBbCcDD, AaBbCcDd, aabbccdd, AabbCCdd, aaBBccDD and so on for every possible combination.

Imagine the problem of dealing with a performance trait controlled by hundreds of gene pairs with each combination resulting in a different level of performance. Now, multiply by several different traits — such as reproductive efficiency, milk production, growth rate, fat deposition patterns, muscularity, frame size, structure, soundness, longevity, heat or cold tolerance, and all their interactions — and the problem seems overwhelming.

Don't be discouraged. An accurate, complete selection program will increase the number of desirable genes in a herd and decrease the undesirable ones, resulting in improved performance, more uniformity and more predictability.

Such a program is established as follows:

1. Establish an ideal.
2. Consider the environment.
3. Select a management and nutritional program.
4. Compare animals of the same age and sex at the same time and place.
5. Measure performance completely and accurately.
6. Select only the superior performers that most closely fit your ideal.
7. Inbreed with selection.

This is an ambitious and long-term program. It requires knowledge, hard work and considerable financial investment. It can be very rewarding, however, both personally and economically. Therefore, each of the steps is worthy of detailed discussion and justification.

Establishing an ideal

This is still a relatively free country, so a breeder may select whatever ideal is desired. It's quite logical to choose an ideal capable of producing high-quality beef most efficiently and most profitably. Therefore, a logical ideal under current marketing conditions would be a uniform herd of purebred, registered beef cattle maintained under the same management and nutrition program prevailing in commercial herds in the area.

The replacement heifers in this herd should, when mated with herd mates, conceive and calve without assistance close to their second birthday and repeat for the next 10 years. The resulting steer calves should have the genetic potential to weigh 1,200 pounds (lb.) at 13 or 14 months of age and produce a USDA Choice, Yield Grade (YG) 2.0 carcass (not 2.99 or better, but 2.0 or better).

True, this is a difficult goal, but it is not unachievable. A few cattle with this capability already exist, so they must be identified and their numbers increased.

Next month's column will discuss the importance of climate, nutrition and management in selection programs.

We Welcome Your Input!

Our Beef Improvement section includes information for today's performance-minded breeder. Both "Beef Logic" by Bob Long and "What's Your Beef?" serve as forums for Angus breeders and industry experts to express their opinions on current issues and topics of breed improvement and performance programs.

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