

# Summary

*Daryl Strohbehn, Iowa State University*

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As discussed throughout this manual, a producer's decision-making skills in herd genetics can greatly impact bottom-line economics. Through the dedicated hard work and immense economic investment of countless seedstock producers, university geneticists, and breed association staffs, our current generation of cattle producers has at their disposal the greatest tools for selecting bulls ever imagined. The work at hand is the incorporation of these tools into beef herd management schemes.

Genetic change in the past has been slow due to selection technique methodology with low accuracy. However, in today's beef systems, directional and actual change can come about quickly because of improved accuracy of breeding value prediction. The key element for cattle producers is to be certain of the direction taken with selection decisions. This correct direction is ascertained by within-herd measurement and realization of attaining market goals while utilizing farm/ranch resources in an optimal and sustainable manner.

Genetic and economic research has shown that cattle producers are working with an animal that has heritable and economically important traits that will respond to the general principles of genetic selection. Additionally, research clearly shows that production traits vary in their level of heritability, so traditional methods of culling and selecting superior animals, while working in certain lowly heritable trait areas, will yield very limited gains. Fortunately, Mother Nature and dedicated breeders of the past have given us breed diversity, which allows us to utilize crossbreeding programs for strengthening trait areas through complementarity and hybrid vigor.

Professional sire selection is not going to be done with the same technique and with the same emphasis of traits by every producer in this country, nor in a state or, for that matter, within a rural community. Each producer has his or her own: 1) type of operation (seedstock versus commercial), 2) unique micro-environment to deal with, 3) unique set of economic circumstances, 4) marketing plan, 5) end product customer needs, and 6) unique set of family and operational goals. All of these unique factors call for different methods in defining a product for the marketplace and approaches in genetic selection. Would one expect a commercial producer selling calves right off the cow to have the same selection goals as a commercial producer retaining ownership all the way to the harvest plant? Would one expect a commercial producer in the desert southwest or in the humid, high rainfall area of the southeast United States to have the same selection goals and methodologies as one in the Corn Belt? In addition, would one expect seedstock producers to have the same selection goals if they are servicing commercial operations with this type of variation?

As pointed out in this manual, there are economically relevant traits for all operations and the selection of seedstock for superiority in a trait area can and will impact performance and economic returns within the operation. Keep in mind that for every selection action, there is a performance reaction. While

our intention is that this first performance reaction is profitable, we may find some negative performance reactions may occur that may reduce or completely eliminate any economic gain. For instance, selection for superior growth can lead to increases in mature size and females too large for the forage resources existing on the operation. This in turn leads to either greater supplementation needs or lowered reproductive rates, which potentially have negative connotations to an operational bottom line. Our only solution to improving the likelihood of moving the operation ahead economically is to incorporate decision-making tools into the selection process, thus reducing judgment errors. With the proliferation of EPD availability, producers will be utilizing economically weighted selection indexes that incorporate many EPD and the economic relationships that exist on their operation.

While we can get completely wrapped up in assessing genetic performance in reproduction, growth, and end product traits, it is imperative that we not forget that beef cattle are a means of harvesting forages and manufacturing co-products for the production of a high-quality protein source for human consumption. This can only be done efficiently if cattle are structurally sound, have longevity, and are easy to handle. The culling of females or bulls early in their lives due to disposition problems, lameness, unsound udders, or other abnormalities is too costly. Critical judgment in this area is important.

The beef industry has an exciting genetic future. As one reflects on what has happened in DNA-based technology and genetic marker additions to the selection tool chest, one has to be excited for what lies in our future. At the end of the first decade of the new millennia enormous breakthroughs have occurred with the addition of a 50,000 plus SNP chip panel which is allowing advancements in whole genome prediction of molecular breeding values for currently utilized traits with other traits being added at this writing. Just as computers have advanced at a rapid pace it is likely that much larger and more economical SNP panels will be developed allowing scientists to better define breeding values with this advanced DNA technology. Will these new technologies muddy selection decisions or enhance them? A role of the National Beef Cattle Evaluation Consortium (NBCEC) is to assist breed associations in incorporating DNA technology into their genetic predictions; thus, the end product of future genetic evaluations will be EPDs enhanced with DNA technology allowing for more accurate genetic predictions earlier in an animal's life. Our future in beef cattle selection and mating will definitely be changing; it is our challenge to learn to make wise decisions and capitalize on these advancements.

Sire selection is one of the most important and economical activities in a beef operation. This will not diminish in the future. Producers need to continuously improve their knowledge base in herd evaluation, nutrition and health management, and genetic selection for improved economic returns. Reading and understanding information from this NBCEC Beef Sire Selection Manual is a significant step in achieving an improved knowledge base for managing the beef operation.