

A New 'Space Race' in Cattle Genomics — or Is It?



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Today the beef industry is entering uncharted territory as it relates to genomic technology. In this month's column, I am going to attempt to discuss where the Hereford breed is positioned relative to what products are available, what products are not, what the American Hereford Association (AHA) is doing to remain relevant and attached to what is going on with new corporate-level genetic test product launches, and why the risk of sitting idle is extremely great.

The life cycle for the development and implementation of new technology can sometimes seem like a lifetime. The truth is not all new technology is warranted nor does it have the proper real or perceived return on investment for the targeted customer and sometimes it never reaches a maturity of understanding to allow for a business to ride out the start-up cost before the designed product makes it's mark in the marketplace. However, in the case of animal genomics, I believe we will see the integration of this new technology in the years to come.

Since the completion of the human genome map in 2003, the technological advancements and knowledge base in the bovine genome has begun to take off as scientists identify the genes or mutations that are causative for those things we perceive to be good such as growth, carcass quality or

health and those things that we perceive to be bad such as genetic abnormalities, which include dwarfism, epilepsy and a host of other defects across the bovine population.

Hundreds of millions of dollars have been directed toward better sequencing technology and computing power to attack human disease and, in turn, the beef industry, and for that matter all of agriculture benefits in the global investment and advancements in biotechnology.

Two giant health companies, Pfizer and Merial, have invested heavily into the purchase of discovered tests, research and development, and commercialization of products that, to a degree, currently have a benefit to the industry.

These companies have had some success in purchasing discoveries of genetic abnormalities from academia and then commercializing DNA tests for these genetic abnormalities. But up to this point, limited results have come from tests that are used to predict those things that drive cow-calf profitability such as health, feed efficiency, fertility and, to a lesser degree, beef quality.

Recently, Merial announced the beginning of a relationship with the American Angus Association (AAA) in offering tests that could augment the AAA's current genetic evaluation whereby the

Association could generate what geneticists call marker-assisted expected progeny differences (EPDs).

Last May, some of the original data from a joint project between AAA and Merial was released at the Beef Improvement Federation (BIF) meetings. Preliminary results suggested that the current gene markers discovered in the Angus population could increase the accuracy of a bull calf's marbling EPD by three-hundredths (.03) compared to the same bull calf with pedigree information and a marbling ultrasound scan.

Today, it could be argued by most that such a slight enhancement in the information of an animal is not worthy of the cost of a \$50 to \$100 test. However, what can be said of this technology is that so long as researchers and large companies are willing to invest heavily in the discovery of genes that affect traits of interest in the industry, then at some point there will be a value proposition for the average Hereford breeder.

The disadvantage that most breeds have today is that up to this point the majority of genomics research conducted in the beef sector in North America is being done on the largest population — Angus. Furthermore, scientists have determined that the gene markers that

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have an effect on Angus traits do not necessarily have the same effect on other breeds of cattle — it stands to reason because breeds are different and that difference explains why hybrids consistently have higher production levels than the average of their straightbred parents.

So in order to be included in this new “space race,” the Hereford breed is going to have to get more involved in the discovery of these production genes.

Plans for remaining on the cutting edge

AHA has invested heavily in research projects in recent years and will continue to organize sire evaluation tests for the purpose of measuring traits, proving young sires, identifying unique individuals and collecting genetic population information for future genome discovery projects. Below is a list of a few ideas that we should consider as we advance:

- AHA must coordinate with our member breeders in continuing to build a large national Hereford research population of sire progeny and to collect all economically relevant traits including feed efficiency on the progeny while building a databank of DNA tissue on these populations.
- AHA should capture all of the information we currently have scattered among breeders that have properly formed contemporary groups, excellently measured production trait data including feed intake data and a DNA sample on those individuals tested and include all information in a databank.
- AHA should address those functional defect problems that the commercial industry may still have a poor perception of such as cancer eye and determine their frequency in the breed, whether the defect is really a

problem, and if so, whether genetic markers can be identified that predict the risk of occurrence that might be incorporated in a stayability EPD.

- AHA should consider establishing research agreements with university research institutions or companies that have the resources to make such discovery and are willing to work with the AHA in improving the current system of genetic evaluation.
- AHA members should collect DNA samples on every animal in their operations and securely store that properly identified DNA in the event we may need it for whatever reason.

In conjunction with the most recent AHA membership meeting, the AHA Board, along with a few selected breeders and scientists, discussed areas of importance in an effort to develop a strategy for moving forward. In addition, the Hereford Research Foundation, a newly formed entity within the Hereford Youth Foundation of America, has been established to determine how to fund such conceptual research plans so that the AHA and the Hereford breed are organized with priorities that will give the breed the most “bang for its buck.” Reports on those discussions will be in future *Hereford World* issues.

The Hereford breed is too valuable to be lost in corporate prioritization plans. The packing industry seems to have gone in this direction as its members all compete with one another to market black-hided cattle. I’m certain that the value of the Hereford breed within the industry is extremely bullish as scientists work to identify those traits that drive real profitability to the industry and as we get away from some of the single-trait selection the industry is enamored with today. **HW**