

Will Genetic Technology Change the Seedstock Industry?



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After 40 years of the beef industry advancing the technological curve for genetic selection, comments from geneticists at the 2007 Beef Improvement Federation (BIF) Annual Research Symposium and Annual Meeting in Ft. Collins, Colo., implied the seedstock industry could face more technological change in the next five years than it has in the last 40.

That's not a stretch when you consider that in just the last

seven years the Hereford breed has incorporated: 1) whole-herd inventory based reporting; 2) five new expected progeny difference (EPD) traits; 3) four economic indexes; 4) online data submission and reporting; and 5) a Web-based data search engine that could soon link to Hereford databases from countries outside North America through global evaluation efforts.

There are some who say the new genetic technological explosion could threaten the existence of breeds and breed associations. There are those companies are investing a wealth of capital into bovine genome sequencing and gene discovery that may even be banking on the fact that they could take from breed associations the entire process of genetic evaluation through genome scanning technology.

Some might ask, "Why do you need breeds or even pedigrees if you can characterize an animal

for all the traits you're interested in with one gene scan test?" This sounds somewhat "Star Wars," but it wasn't too long ago when very few of us carried a cell phone and none of us communicated through e-mail.

AHA Board action

The American Hereford Association (AHA) Board of Directors met at the Harris Ranch resort, Coalinga, Calif., April 16-17. The following key items were discussed:

1) Harris Ranch research project. Dave Daley, California State University, Chico, updated the Board on the heterosis research project that is being done in cooperation with Harris Ranch Beef Co., Lacey Land and Livestock, and AHA. Daley gave an update on the project. Data will be available this fall after the first set of steers has been harvested and data is analyzed. Board members had the opportunity to visit with Harris Ranch key management and discuss the business objectives of the company and management expectations out of a genetic specification from an economic standpoint.

2) Idiopathic epilepsy. Jon Beever, University of Illinois, gave an in-depth update on an abnormality found in Hereford cattle. Based on the written recommendations provided to the Board by Dave Steffen, University of Nebraska and AHA genetic consultant, and endorsed by Beever, the Board officially declared the defect creating an epileptic-like condition in young calves a genetic abnormality called idiopathic epilepsy (IE). For more about IE, see Page 70.



Dave Daley, animal science department program coordinator for California State University (CSU), Chico, is the lead researcher in the Harris Ranch research project. The AHA and CSU are creating a refresher course in heterosis by testing the effects of using Hereford bulls versus Angus bulls on the Angus-based Lacey Livestock cow herd of central California. Pictured here, during the AHA Board Meeting in April, the steers were on feed at the Harris Ranch Feedlot, Coalinga, Calif.

3) Marketing plan. The AHA Board began working on the 2007-2008 marketing plan that would include advertising ideas and placement, a National Hereford Tour in 2008, and the need to hire a director of communications and personnel to fill the vacant field service territories. The marketing committee requested staff begin to build a national marketing budget to include all aspects of communications, media relations and advertising. Staff will present a suite of options at the August Board meeting. **HW**

The technology shift

This new technology shift resembles the changes that occurred 30 years ago and have been steadily evolving since. Until the late 1970s, breed improvement was basically determined by phenotypic or visual characteristics as evaluated by the thought leaders of the time. The Denver champion was the benchmark for genetic greatness and breeders would spend 10s and sometimes 100s of thousands of dollars to own breeding rights to the title winner even before EPDs were established.

There were those few early pioneers within the Hereford breed in the

continued on page 40...

mid 1950s and early 1960s who began to use scales to weigh and calculate within-herd ratios on birth, weaning and yearling weights; but it wasn't until the early 1980s that EPDs were established and formalized into a National Cattle Evaluation (NCE).

BIF's role

BIF was the major driver of modern-day EPDs. Its founding members believed that the old way of genetic selection — strictly visual appraisal — could be quickly out innovated by collecting measures of economically relevant traits. Then using those traits to establish breeding values that predicted the economic differences among a sire's progeny and using these breeding values in conjunction with phenotype. Time proved them right, and we've seen amazing genetic progress in the last 20 years.

For the last 40 years, BIF has been an organization loosely managed by a federation of university and U.S. Department of Agriculture (USDA) scientists, animal breeding Extension specialists, breed association executives, breed improvement directors, and innovative breeders elected by their peers from various regions of the country.

BIF has set the bar, so to speak, in developing standards for animal breeding technology. Ronnie Green, renowned animal geneticist and national program leader of food animal production for USDA's Agriculture Research Service, spoke at the BIF conference and outlined what appear to be incredible advancements that are forthcoming in the area of bovine genome sequencing. Billions of dollars have been spent since the mid 1990s to develop the infrastructure for what many proclaim to be the most significant scientific breakthrough of mankind, "the human genome project."

Green explained that the cattle industry is in a position to reap huge rewards in discovering genes that affect traits in beef cattle because of the groundwork laid in the human genome project. He also said there is strong global competition within the field. We have already seen companies launch products that claim their genetic tests identify major differences in beef quality such as marbling or

tenderness, and there will soon be gene tests launched that claim they can detect and explain differences amongst cattle in feed efficiency.

The new technology seems to be extremely raw at this point, and the American Hereford Association (AHA) has not endorsed many of these products because they either have been found to be an unreliable test within the Hereford breed or are too expensive for its benefit. This situation could change very quickly according to several USDA geneticists.

The platform of technology that sequences the DNA code of cattle is advancing at a rate so fast that it is often difficult for those of us involved in genetic evaluation to comprehend. Furthermore, scientists have not been able to synchronize this new technology with our current EPD system, making the two technologies out of step with one another and confusing.

For example, bulls with high accuracy EPDs for intramuscular fat may have very low scores from the gene test for marbling and vice versa. There is simply the potential for many more undiscovered genes other than the one or two the company is marketing that attribute to marbling differences in cattle. Currently, our ultrasound technology does a much better job of ranking cattle for marbling than the gene tests. Other risks associated with the new technology may be unknown biological antagonisms that a gene or gene-marker test may have with other important traits.

Imagine, hypothetically, that you decide you must find the bull with the highest rating for a genetic test for a beef-quality trait and that you spend hundreds, if not thousands, of dollars selecting for that gene test result only later to find that the gene marker is antagonistic with fertility or maternal ability. My point is we just don't know today but our understanding may evolve very rapidly in the future.

Breed association's role

For those entrepreneurial scientists who want to advance this new platform of technology in a way that threatens or seeks to take the place of breed associations, I have a few thoughts:

- It will always be important to have breeds in order to sustain genetic

diversity amongst our beef cattle population. The proposed move from breeds to gene specifications could inadvertently promote the elimination of diversity.

- Breed associations are important because they are owned and directed by people with a common passion, common goals, pride of ownership, and loyalty toward a breed and its breed improvement program. It will be much better to cooperate with breed associations as opposed to circumventing them.
- Breed associations create competition and drive innovation, making all of us better. If you have a number of private labs providing breed improvement services to independent, unassociated breeders, you may lose the passion and drive for the industry that we have enjoyed for more than a century.
- It will be more productive to work with breed associations rather than around them. Adoption rate will be "light speed" faster if organizations are involved in the education process and the technology is coordinated with current NCE systems.
- Private laboratories will have to validate the efficacy of new genetic tests, and it will be far easier to work with breed associations in testing new products for efficacy. Without validation and a proof of value, adoption will be slow, if not impossible.

In closing, I want Hereford breeders to know that AHA is not sitting on the fence with regard to these issues. Your staff is integrally involved on the BIF board, U.S. Beef Breed committees and the emerging technology oversight committee. In addition, we're working with several universities to develop research populations that can be used for gene discovery and gene validation. We'll keep you informed as we learn more. **HW**

Editor's Note: Watch for more highlights of the 2007 BIF Annual Research Symposium and Annual Meeting in the August Hereford World.