



Genetic Tracking Could Become a Major Tool for Commercial Cattlemen in the Near Future

By Taylor Greenstreet

The American-International Charolais Association co-hosted, along with the University of Illinois and the National Program for Genetic Improvement of Feed Efficiency in Beef Cattle, the Charolais on Feed Field Day on August 22, 2013, in Champaign, Ill. The event was attended by cattle breeders representing multiple breeds across the United States along with visitors from Mexico. The group toured the University's beef farm and heard presentations from the leading researchers working to improve the feed efficiency and profitability of beef cattle.

"Producers need to be engaged and incorporate technology to be successful in the beef industry nowadays," said Dr. Douglas Parrett, Extension Specialist and Interim Head of the Animals Sciences Department at the University of Illinois, illustrating the ever changing world of research and technology that cattle producers need to adapt in order to be successful. This proved to be the theme of the day.

The morning began with a tour of the University of Illinois's beef research farm, which opened in 2004. Producers were shown the Metabolism Research Barn where researchers are able to take samples directly from the rumen of fistulated cattle in order to conduct digestibility and nutrition trials. Dr.

Dan Shike, Assistant Professor of Animal Sciences at the University of Illinois, explained they are then able to pair the digestibility trials with feedlot growth to answer changes in the performance of the animals.

Dr. Shike also stressed the importance of good documentation. "We need good data! We must collect good information, document practices, look for profit opportunities, and be ahead of the curve."

One of the interesting features of the farm is its GrowSafe System. This system allows researchers to collect individual

feed intake data on 900 head of cows or feedlot calves. Each animal has its own marker tag allowing individual intake data to be electronically transferred into a computer system and analyzed.

Other highlights of the tour included a feedstuff discussion with University of Illinois farm manager, Tom Nash, and an overview of the working facilities. After the tour was over, producers had a chance to look at the Charolais-sired calves and examine the data being collected at the farms.

The second half of the day consisted of presentations by leaders of the \$5 million, multi-institutional feed efficiency project. The goal of the project is to look at the genetic merit of cattle for feed efficiency to create genomic enhanced EPDs to give to breeds, according to Dr. Jerry Taylor, the Animal Science Wurdack Chair of Animal Genomics and Professor at the University of Missouri-Columbia.

Dr. Jon Beever, Animal Sciences Professor at the University of Illinois, explained to producers the art of animal breeding as a science. Dr. Beever said the main tools for selection are phenotype, in terms of measured performance and uniformity, breeding values (EPDs) for targeted performance, and the relatively new tool, DNA genotypes. This new tool allows producers to look at the DNA of a specific animal and try to predict its genetic merit, possibly accelerating producers' chances of creating the best offspring. Dr.

Beever stated that commercial cattle producers will have to be familiar with these technologies in order to take full advantage of them as well as understand the relation between these traits and phenotype when it comes to picking sires and dams.

Dr. Matt Spangler, Associate Professor and Beef Extension Specialist for the University of Nebraska-Lincoln, presented the results of the Weight-Trait Project (WTP), an integrated outreach project that began in 2009. This project includes participation from 24 seedstock producers



Dr. Doug Parrett welcomes cattlemen from 15 states and Mexico.

representing seven major beef breed associations. This resource, which now includes over 30,000 DNA samples, has been used to evaluate the efficacy of this technology and to advance statistical methodology for the inclusion of genomics into EPDs. Dr. Spangler emphasized that the benefit of this technology is through the incorporation of molecular breeding values (MBV) into EPDs in order to increase the accuracy of EPDs, particularly for young animals.

Dr. Spangler also added that visualization aids in technology adoption. That is why the WTP began with weight traits, as producers can visualize them. He went on to emphasize that even in the context of genomic selection, routine phenotypes are critical to collect.

The project also has educational benefits, according to Dr. Spangler, because it allows the producer to make more informed decisions. "Some of the future directions," he said, "include feed intake/efficiency, sequence data, and marker assisted management."

Genomically enhanced EPDs and selection indexes were the topics of the presentation by Dr. Bob Weaber, Associate Professor and Extension Specialist at Kansas State University. He explained to the producers that by averaging the dam's EPD and the sire's EPD you get the pedigree estimate EPD. This is a good starting point, but Dr. Weaber emphasized that we want to get the estimate closer to the true progeny difference. Data collection, whether from phenotypic records or genomic information, helps to inform the EPD predictions thereby adding accuracy.

DNA markers can be a helpful source of information for improving the accuracy values of EPDs especially for traits that are hard or expensive to measure, such as disease, stayability, and reproduction. DNA markers are very useful for parentage ID and pedigree validation for seedstock producers, as well as when working with qualitative traits with an economic impact, such as horned versus polled, color, etc.

"Commercial producers want accuracy," Dr. Weaber emphasized. He explained that a DNA marker test only provides information on part of an animal's genetic merit for a trait since not all genomic regions that contribute to variation in a trait are identified. On the other hand, an EPD tells the cumulative effect of all genes and their inter-

actions on a trait. A genomic enhanced EPD (GE-EPD) uses both of these technologies together, giving producers integrated information at the same time, increasing the accuracy of the EPD and subsequent selection indexes.

Dr. Shike talked to the attendees from a different angle, sharing the findings from feed efficiency studies at the University of Illinois. He explained how variation in feed efficiency leaves room for selection opportunities and improvement.

"Producers and feeders are interested in profit, and the traditional focus has been on outputs. However, we need to look at inputs and see where there is room to improve," he said

According to Dr. Shike, the best measure for feed efficiency depends on whether you are talking about a feedlot or a cow herd and whether you are focusing on selection or research. Dr. Shike agreed with the other presenters that there is a need to continue to collect phenotypes in order to understand the relationship of traits and then geneticists will determine the best tools for selection.

Dr. Taylor was the final presenter of the afternoon. He explained that through genomic selection, one can take a group of animals with an economically important phenotype and can then genotype them with an assay and try to estimate their genetic value/merit. So far, they have genotypes for 2,400 animals from six breeds with a high density single nucleotide polymorphisms (SNP). By the end of 2013, they hope to have a total of 9,000 animals genotyped. This information provides data for building models which will, in turn, be given to the breed associations to aid producers. In the future, the project could become an international tool by exchanging data with other countries.



The GrowSafe System is being used to collect individual feed intake data on Charolais-sired calves.

