Trait Leaders

California-based MMI Genomics Inc. is developing the genetic selection tools of the future.

by ***Kindra Gordon***

DNA. Gene markers. Genetic mapping. These are words not common in current cowboy lingo. But that's changing.

As the industry continues on its course to identify the genes that affect traits such as marbling, tenderness, composition and palatability, the beef producer of tomorrow will need to be well-versed in the genetic makeup of a bovine. The ultimate goal is to make information about genetic markers available as a selection tool for producers.

And it's not as far-fetched as one may think. At the 2003 Cattle Industry Annual Convention and Trade Show in Nashville, Tenn., a partnership was announced between MMI Genomics Inc. and the beef checkoff.

The purpose of this alliance is to develop and offer producers a selection tool to genetically determine marbling in beef cattle — which could be available within a few months.

Through the arrangement, MMI Genomics, based in Davis, Calif., will conduct validation studies from information collected during the past decade through the checkoff-funded National Carcass Merit Project. The new studies will genetically test for marbling. Then, a commercial DNA test will be developed using these gene markers, and it will be offered for sale to cattle producers.

Beef producers are expected to benefit both from utilization of the selection tool and through royalties to the checkoff provided through its sale.

To learn more about this selection tool of the future and the company that is developing it, the *Angus Journal* sat down for a question-and-answer session with Bridger Feuz, who is in business development at MMI Genomics.

***Q:** Who is MMI Genomics?*

A: MMI Genomics was originally known as PE AgGen (and briefly Celera AgGen) before it was acquired by the privately held life sciences company MetaMorphix Inc. in March 2002.

MetaMorphix is dedicated to discovering and commercializing multiple technology platforms to naturally improve the food supply and human health. The company currently has two subsidiaries, MetaMorphix Canada in Saskatoon, Sask., and MMI Genomics.

The company's overall mission with its animal program is to help develop innovative livestock and companion animal products that enhance animal health and improve livestock quality and productivity.

***Q:** What services does MMI Genomics presently offer to animal owners?*

A: As part of our diagnostic tests we currently offer DNA identification and parentage genotyping services for cattle, dogs and horses.

The parentage genotyping services allow owners to confirm the sire and/or dam of individual animals. This provides pedigree verification for breed registrations, which enhances the ability of a breed association to certify the integrity of its herd records.

A second benefit of this service to seedstock producers is the ability to breed their animals in multisire pastures and still be able to individually identify the sire for registration purposes. This allows the seedstock producer to take advantage of commercial management efficiencies, while maintaining the ability to make seedstock-level genetic improvement. Commercial cattlemen can also benefit from DNA testing. One simple application is to identify sires that produce large-birth-weight — or other problem — calves.

Additionally, commercial cattlemen can use DNA testing as a tool to help them be more successful with retained ownership. For example, when commercial producers receive individual carcass data on their animals, they can use DNA testing to match their premium carcasses, as well as discounted carcasses, to the genetic source. This allows them to identify sires that are providing value in their current marketing program and sires that are not. By utilizing this information, commercial producers can become more profitable (i.e., increase premiums and decrease discounts) in their retained-ownership programs.

***Q:** In the future, could the beef industry utilize DNA for auditing quality control of beef products and for tracking sources for food safety?*

A: DNA provides a unique feature for use in animal-tracking systems. Even after an animal is processed into consumer products and separated from its electronic identification (ID), DNA is still able to uniquely identify that animal. It is our opinion that as reliable, positive-trait diagnostic tests become available to the cattle industry, the same samples that will be used for the diagnostic testing will also be used in quality control audit programs to enhance existing traceability systems.

***Q:** What are some of the future products or services MMI Genomics hopes to provide?*

A: We are involved in a number of gene-mapping and gene-discovery research programs to identify key commercial genes in livestock and companion animals. The beef cattle traits we are focusing on include meat quality, growth and feed efficiency.

One of our current gene-mapping projects is the National Carcass Merit Project. In this long-term project that involves many different industry segments, we expect to validate genetic markers associated with carcass quality traits.

Future products that may result from our research collaborations would be diagnostic tools that allow breeders, producers, feeders and processors to utilize a DNA evaluation

to select for desired traits or characteristics and/or manage the production variables of their animals more efficiently.

Our aim is to develop diagnostic assays, which are DNA tests, that accurately account for enough of the genetic variation associated with the tested trait(s) in an animal to be highly predictive of that animal's phenotypic performance for the tested trait(s).

For instance, as a breeding tool, MMI Genomics' gene-specific selection will enable producers to select individual sires and dams with favorable combinations of genes for their trait(s) of interest. This process will improve traditional methods of selection and produce improved genetics.

As a management tool, feedlots will be able to use MMI Genomics' diagnostic assays to identify and sort animals with similar genetic potential for traits such as meat quality, growth and feed efficiency. This tool will significantly enhance the ability of a feedlot to produce a uniform product, while also increasing its efficiencies.

Q: ***Do you think the beef industry will eventually have the ability to create "designer" beef cattle through DNA-assisted selection? How is this process different from genetically modified plants?***

A: This new technology of precise genetic selection permits the cattle industry to improve breeding stock *without* genetic manipulation or modification of the animal — whereas grains like Bt corn and Roundup Ready® soybeans are genetically modified.

Instead, as genes are mapped, the beef industry will be able to utilize MMI Genomics' DNA tests to identify the cattle that have the genetics that are desired.

Thus, the industry will be able to move toward "designer" beef cattle through the natural identification and selection of desired genetics rather than relying solely on the traditional method of phenotypic selection. The accuracy of the DNA tests will allow the industry to dramatically improve genetic progress, reducing the time it takes to "lock in and fix" desired traits. The utilization of these diagnostic assays simply provides to breeders levels of information that were never before available in the selection process. AJ

Editor's Note: *In January 2003 the American Angus Association selected MMI Genomics as the organization's provider of DNA-based parent verification services.*