By Alaina Osborne, Alexandra Sawatzky, Anna Wasserman, and Rebecca Wilson

HISTORY OF INNOVATION

The University of Guelph's top five dairy research projects from the past 50 years

The University of Guelph's (U of G) rich history of dairy research and innovation, dating back to the early days of the Ontario Agricultural College and Ontario Veterinary College, has led to significant advancements along the entire value chain of Ontario's dairy industry. Producers and consumers continue to benefit from new discoveries of better production techniques and improved nutritional quality of dairy products.

STRENGTHENING IMMUNE SYSTEMS

Ontario dairy farmers can easily identify cows and sires with naturally strong and balanced immune response systems, thanks to development of High Immune Response (HIR) technology at the U of G.

Bonnie Mallard, department of pathobiology, developed the HIR technology. It helps identify animals as high, average or low immune responders. High responders are more capable of defending against various pathogens that commonly infect dairy cows. They also have up to 50 per cent lower incidence of disease, such as mastitis and pneumonia, compared with low immune responder cows. This can greatly reduce veterinary treatment costs for producers.

Results of the HIR technology have enabled producers to select more appropriate bulls, known at Immunity+ sires, for breeding based on enhanced immune profiles of the sire and dam. High immune response genes are passed to the cow's offspring, continuing to improve overall herd health.

The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), the Natural Sciences and Engineering Research Council (NSERC), and the Canadian Dairy Network (CDN) sponsored Mallard's research.

GENOMIC EVALUATIONS IMPROVE DAIRY CATTLE SELECTION

Genomic evaluations have revolutionized the dairy cattle breeding industry by accurately identifying specific parts of chromosomes, or markers in a cow's DNA that relates to diffe ent traits.

For example, testing for diffe ent heritable traits, such as milk production, disease resistance, longevity and fertility, lets researchers select animals with optimum genes. In fact, researchers can estimate the value of more than 50,000 markers for an individual animal.

Professor Filippo Miglior, department of animal and poultry science, says the dairy industry's genetic progress has doubled over the last fi e years of genomic evaluations.

"The outstanding research in dairy cow

RESEARCH FINDINGS were used to develop Neilson's Dairy Oh! milk, one serving of which provides one-third of an individual's daily DHA requirements.

SPARK

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These student writers for the University of Guelph's office of research provided these highlights.

genetics has allowed Canada to maintain its status as a world leader for so many years," says Miglior.

NSERC and the DairyGen Council of the CDN support this research.

ENHANCING MEASUREMENT TECHNIQUES

Dairy producers have access to highly accurate genetic information on milk production traits due to the development and widespread adoption of test day models (TDMs). Developed by Larry Schaeffer, professor emeritus, department of animal and poultry science, TDMs have replaced the need to infer information from 305-day lactation yield estimations.

Producers and breeders can select cows with higher milk, fat and protein yields, using the results from the TDMs. This has improved overall productivity levels and lets producers evaluate lactation curves of individual cows. The use of TDMs also lets researchers account for environmental effects on each test day, eliminating much of the variability seen with traditional 305-day records.

TDMs are vital to the dairy industry today, at home and abroad. Researchers worldwide have verified using TDMs have drastically improved the accuracy of genetic evaluations on cows and bulls.

Schaeffer worked closely with post-doctoral candidate Dr. Janusz Jamrozik, and received support from researchers in Germany, Slovakia, the Czech Republic and the Netherlands.

OMAFRA, NSERC, and the Cattle Breeding Research Council provided funding for this research.

DAIRY OH! MILK

Although cow's milk is a great source of many nutrients, it contains zero to trace amounts of docosahexanoic acid (DHA), an essential nutrient often lacking in many people's diets. Natural sources of DHA are limited mainly to fish.

To address this issue, professor Brian McBride and then-graduate student Tom Wright, department of animal and poultry science, developed a customized DHA feed supplement for dairy cows. McBride and Wright teamed up with professor Bruce Holub, department of human health and nutritional sciences, to evaluate the effects of this supplement on DHA levels in milk fat.

They discovered herds consuming this supplement produced milk with naturally high levels of DHA.

These findings were used to develop Neilson's Dairy Oh! milk, one serving of which provides one-third of an individual's daily DHA requirements. Dairy Oh! recently celebrated its 10th anniversary of being commercially available.

NSERC and OMAFRA sponsored this research.

DAIRY RESEARCH CENTRE OPENING SOON

The U of G will soon open a new state-of-the-art dairy research innovation centre to enhance its already exceptional research capabilities.

The facility will have the ability to address a multitude of research themes, including cow health, reproduction, nutrition, welfare, lifecycle analysis, and value-added milk products. The centre will use resources such as feed, water and energy more efficiently, and will spur development of new rural knowledge centres for bio-based products and green technologies.

Professor Vern Osborne, department of animal and poultry science, and design and research lead for the centre, says the new centre will focus on next generation management development and cow-side technology.

The research centre is funded by OMAFRA, DFO and other dairy industry partners.