UNIVERSITY of GUELPH

IMPROVE LIFE.

DAIRY at GUELPH

Canada's Dairy University

research

Ontario Dairy Research Centre at the Elora Research Station. PHOTO: RICHARD SECK

Global leaders in advancing dairy

Canada's dairy sector is vital to the nation's health, sustainability and economy, and the University of Guelph is proud to be a significant contributor across the entire dairy value chain. Canadian dairy products meet the highest standards, which begin with healthy, productive and well-cared-for cows.

Canadian dairy farmers and other partners support research at the University of Guelph to ensure continual improvement in animal welfare, genetics, product quality and sustainable productivity.

That's where Dairy at Guelph comes in. Dairy at Guelph—The Centre for Dairy Research and Innovation is a network of over 60 faculty and 120 graduate students and postdocs from various disciplines across the university. Dairy at Guelph fosters collaboration and synergies in the discovery, development and implementation of knowledge about dairy production and foods. This global leadership has earned U of G the title of Canada's Dairy University.

Dairy at Guelph enhances the accomplishments and recognition of dairy-related research at the University of Guelph. The following pages outline that expertise.

Using nutrition to support health and production
PAGE 2

Understanding consumer choices and behaviour
PAGE 3

Globally recognized excellence in animal welfare research
PAGE 4

Animal nutrition
Using nutrition to support health and production

Dairy researchers at the University of Guelph have been innovators in animal nutrition for decades. They have developed nutritional advancements that improve cattle health, productivity and milk quality. Understanding biological mechanisms through molecular biology and mathematical modelling is central to many nutritional research projects at U of G. Other research investigates best practices for nutrition and feeding programs. These practices can be identified by analyzing feeding behaviour, milk yield and milk composition. Other areas of research include nutritional physiology and management of cows vulnerable to disease around calving.

Engineering
Towards safer, more modern facilities

Research from the School of Engineering addresses various challenges within the dairy industry, including reducing milk delivery costs by applying advanced logistics, developing new technologies to support safer, easier delivery, using spectral imaging to assist in quality assessment and the ergonomic design of safer, more modern dairy facilities.

Environment
Improving the environmental footprint of dairy farms

Developing and implementing best management practices is crucial for improving environmental sustainability and productivity on dairy farms. University of Guelph researchers from multiple disciplines—engineering, economics, animal sciences and environmental sciences—explore many perspectives on the ecological footprint of producing milk and dairy foods. Researchers study agricultural greenhouse gas emissions, the effects of climate change on water systems, agri-environmental policy, optimizing the digestibility of feeds and genetic differences in animals' feed efficiency. The overarching goal of these projects is to strengthen agri-environmental policy and improve practices on farms that will make them more sustainable while maintaining or improving productivity.

Product development and food safety
Improving dairy products and understanding consumers

A multi-departmental team of researchers at the University of Guelph works to create innovative dairy products and improve dairy processing. Dairy processing analysis ensures that consumer products are safe and high-quality. Researchers are also developing strategies to enhance the taste and texture of dairy products, such as ice cream, yogurt and cheese, while maintaining nutritional quality. Influencing products' bacterial communities can improve their safety and functionality. Studies at the U of G Food Innovation Research Lab aim to understand consumer decision-making and product labelling.

Animal health
Connecting with producers to address industry challenges

Producers play a fundamental role in helping direct dairy herd health research at the University of Guelph. Through dialogue and connections with producers, researchers understand industry challenges and work to create science-based solutions: novel vaccines, genetics-based disease resistance, infection control, biological modelling and much more. Dairy at Guelph researchers have developed ways to diagnose, monitor, treat and ultimately prevent metabolic and reproductive health problems during the all-important calving period. In a five-year national dairy study, researchers acted on needs identified by the industry by collecting data on lameness, disease prevalence, biosecurity and calf health. Other projects have focused on improving the health of transition cows, which are particularly at risk for health complications. Researchers also trans-

fer knowledge into practice through the Dairy Health Management Continuing Education Program, which provides advanced skills for progressive dairy veterinarians in private practice.

Human health and nutrition
Evidence-based information from farm to table

Researchers are finding ways to bring more nutritious food products into the Canadian market using probiotics and nutraceuticals. Adding probiotics and nutraceuticals to already-healthful foods can further improve consumer health. Research investigates variations in dietary composition among dairy products. Researchers have discovered that certain compounds in milk, cheese, and yogurt help ensure a healthy human gut microbiome and should be included as part of a healthy diet. Other research under the Guelph Family Health Study looks at how consumer opinions influence family food choices, ultimately informing research needs in animal and food sciences.

Economics, consumer choices and marketing
Understanding relationships between farm economics, government policy and consumers

Dairy and business economics experts provide tools that help producers effectively manage their businesses, help inform industry associations and government policymakers, and improve understanding of consumer choices. This field is crucial for keeping the dairy industry economically sustainable, meeting consumer demands and ensuring that producers maintain their livelihood. Understanding consumers' behaviour, their views of new technologies and the demand for specialized products is key to securing market growth. The pillars of sustainability include economic viability, stewardship of natural resources and social license. Researchers have identified conflicts, potential resolutions, and the economic benefits of maintaining environmentally friendly production.

Genetics and genomics
Leading the way with genetic knowledge and innovation

The University of Guelph has long been a recognized international leader in the field of genetics and genomics, from using breeding selection methods

Former summer research student Josh DeVos. PHOTO: RICHARD SECK

Behaviour and welfare
Globally recognized excellence in animal welfare research

Improved dairy cattle welfare is supported by understanding how to effectively meet animals' needs, which can improve their wellbeing and productivity. The University of Guelph has dedicated itself to improving animal welfare for nearly 30 years, with initiatives such as the Campbell Centre for the Study of Animal Welfare (CCSAW). Researchers associated with this centre study dairy cows, identifying ways to improve welfare using feeding and milking behavioural data, maintaining welfare during transportation, and developing pain management techniques. The research excellence of these faculty members has been recognized by Saputo, one of the world's top dairy processors. Saputo has partnered with CCSAW and the Ontario Veterinary College to improve veterinary dairy welfare training and continuing education for farmers and veterinarians.

based on visible traits to developing world-leading mathematical models deciphering complex genomic relationships and novel traits. The expertise in this field is housed in the Centre for Genetic Improvement of Livestock (CGIL). CGIL and other U of G research teams have used genomics to optimize agricultural production through projects improving feed conversion efficiency, health traits, DNA barcoding and lowering methane emissions. They've also enhanced dairy welfare by selecting cows with higher immunity, reducing their chance of experiencing disease and breeding to improve cow and calf health. Research avenues continue to open with rapidly advancing technology and data sources.

Reproduction
Reproductive research improves health and productivity in the dairy industry

Dairy cow fertility is fundamental for the dairy industry, supported by basic and applied research into reproductive health and management. University of Guelph researchers from different departments work on fundamental aspects of reproduction, such as embryo survival and development, biotechnology, and male fertility. Dairy at Guelph researchers are leaders in validating and optimizing the application of precision technologies to support reproductive management. Other important areas of investigation look at genomic variation in bovine embryo development and better detection, prevention and treatment of reproductive diseases.

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