Canada’s dairy sector is vital to the nation’s health, sustainability and economy, and to the University of Guelph.

Canadian dairy products meet the highest standards, and come from cows that are productive, healthy and well cared-for. Modern Canadian dairy farmers and processors invest in new technology and equipment, and support research at Guelph to ensure continuous improvement in animal welfare, genetics, product quality and sustainable productivity.

That’s where Dairy at Guelph comes in. As a network of more than 60 faculty members and other researchers, Dairy at Guelph fosters collaboration and synergies in discovery, development and implementation. This global leadership has earned us the title of Canada’s Dairy University.

Dairy at Guelph strives to increase awareness of the tremendous dairy research capacity and output at the University of Guelph. The following pages outline that expertise.
Product development and food safety
Improving dairy products and understanding consumers
A multi-departmental team of researchers at the University of Guelph is working 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. Safety and functionality of these products can be improved by influencing the bacterial communities in them. Studies at the U of G Food Innovation Research Lab aim to understand consumer decision-making and product labelling.

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Engineering
Towards safer, more modern facilities
Investigators at the School of Engineering are conducting research in several areas relevant to the challenges facing the dairy industry. These areas include reducing milk delivery costs through the application of advanced logistics, developing new technologies to support safer, easier delivery, the use of 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, environmental sciences — are exploring many perspectives on the environmental 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.

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 key for many nutritional research projects at U of G. Other research investigates best practices for on-farm nutrition and feeding programs. These practices can be identified by analyzing feeding behaviour, milk yield in relation to diet composition and specific nutrient concentrations, such as fat or protein, in milk. Another important area of research is the nutritional physiology and management of cows vulnerable to disease during calving.

Animal Health
Connecting with producers to address industry challenges
Producers play a key 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 in cows 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 transfer 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**

Using probiotics and nutraceuticals, researchers are finding ways to bring more nutritious food products into the Canadian market. Adding probiotics and nutraceuticals to already-healthy foods can further improve consumer health. Key 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 for nutritional health, ultimately informing research needs in animal and food sciences.

**Economics, Consumer Choices and Marketing**

**Understanding relationships among 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 policy-makers, 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 demands for specialized products is key for securing market growth. The pillars of sustainability include economic viability, stewardship of natural resources and social licence. Researchers have identified conflicts, potential resolutions, and the economic benefits to maintaining environmentally friendly production.

**Behaviour and Welfare**

**Globally recognized excellence in animal welfare research**

Improved dairy cow welfare is supported by understanding how to effectively meet animals’ needs, which can improve cow 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.

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 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 improved dairy welfare by selecting for cows with higher immunity, lowering their chance of experiencing disease, and breeding to improve cow and calf health as well. Research avenues continue to open with rapidly advancing technology and data sources.