# HELPING FARMERS

# UNDERSTANDING SENSITIVE SOILS TO IMPROVE WATER QUALITY

Researchers from the Swedish University of Agricultural Sciences used the SXRMB beamline at the CLS to study the impact of phosphorous on sensitive soils and local aquatic systems. Phosphorous runoff increases nutrients within aquatic systems that feed algal blooms. Algal blooms can impact human health and wildlife as well as the economies of affected communities reliant on fishing and tourism. Synchrotron imaging enabled the researchers to identify important compounds that govern phosphorus absorption or release. The study could lead to better agricultural practices, ensuring that special attention is given to phosphorous use, especially on sensitive soils.

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# FINDING THE FERTILIZER SWEET SPOT

Farmers walk a fine line when it comes to adding phosphorus fertilizer to their fields. If they don't use enough, they risk lower yields. If they add too much, the excess can be lost to runoff and lead to potentially toxic algae blooms in nearby lakes. With the help of the CLS, researchers moved science one step closer to finding the "sweet spot" for phosphorus fertilizer use. The team gathered highly detailed information about how fertilizing with nitrogen and phosphorus changes the chemistry of soils and the availability of phosphorus for crops.

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# **BETTER VACCINES FOR PORK PRODUCERS**





Porcine reproductive and respiratory syndrome virus (PRRSV) causes severe disease in pigs, leading to significant economic losses for pork producers across the globe. It's estimated that PRRSV costs the Canadian pork industry \$130M annually. Using the CMCF beamline, researchers from the University of Manitoba and the Leiden University Medical Centre (Netherlands) were able to see the structure of the PRRSV protease, a type of protein the pathogen uses to suppress a host's immune system. The vital information they uncovered can be used to develop new vaccines against PRRSV and could also help inform development of vaccines against emerging human viruses.

D0I: 10.1371/journal.ppat.1011872

### DEVELOPING CRAVE-WORTHY VEGAN MEATS

Scientists with the University of Guelph used the CLS to improve vegan meats and get them to taste more like the real thing. The researchers have developed solid plant-based fats and a vegan meat prototype with a texture similar to meat products. They demonstrated that by rearranging molecules they were able to turn different types of liquid oils into solids without adding saturated or hydrogenated fat, and create vegan fats with characteristics similar to those of pork, beef, and lamb. The researchers believe this work could create an opportunity for Canada to become a leader in plantbased protein production.

# FIGHTING FOOD WASTE

Spoiled grain represents a huge pool of potential food that could help feed a growing global population. Researchers from the University of Manitoba used the CLS to peer inside the grains of different varieties of hard durum wheat, to identify signs of spoilage and resistance. The synchrotron enabled them to study not only the external markers of spoilage, but also internal changes in structure and nutritional value. Their work will help plant breeders develop better varieties that resist spoilage and maintain nutritional content longer, and help farmers and storage managers maintain the longevity of harvested wheat.



# SUSHI FOR COWS

Cattle on the Prairies are hundreds of kilometres from the coast and yet it's possible that seaweed could make its way into their diet as an additive. Seaweed is a sustainable feedstock. It grows rapidly, and doesn't require arable land or fresh water to grow, so scientists at Agriculture and Agri-Food Canada's Lethbridge Research and Development Centre, want to use the rare sugars like seaweed glycans to promote specific bacteria growth that has beneficial properties in the intestines of cattle. If more livestock feed came from seaweed, less would have to be produced from traditional crops, such as corn.

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## GROUND-BREAKING Soil Research

Researchers from the University of Saskatchewan collected and analyzed soil from across the prairies-- including samples from one of the researcher's own farm. Using chemical analysis and synchrotron techniques on the HXMA and VLS-PGM beamlines, the team looked at soil micronutrients in samples from Alberta, Saskatchewan, and Manitoba. The study, which offers recommendations for improving fertilizer use and increasing crop yields for farmers, builds on previous studies conducted using the CLS.

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