Breeding climate-resilient cattle

Cattle genetics point to climate-resilient, disease-resistant cows

By Mya Kidson

As climate change concerns mount, a new University of Guelph study may help dairy producers to breed cattle that are more resilient to frequent heat waves.

Dr. Bonnie Mallard, a professor in the Department of Pathobiology, and PhD student Shannon Cartwright are using a technology developed by Mallard to identify cows with a naturally higher immune response. Research suggests these cows also have a higher tolerance for increased temperatures, meaning that this research may allow dairy producers to breed cattle that better withstand heat stress.

Climate change is an ongoing issue that likely will not be resolved anytime soon. This is why it's important to identify animals that are resilient to heat stress.

Working at the Ontario Dairy Research Centre, the researchers used Mallard's High Immune Response (HIR™) technology to determine which cows had high, average or low immune responses.

Then, after taking blood samples from the cows, they applied heat to determine changes in function of immune cells in blood. In an additional study, researchers also subjected the cows to higher temperatures.

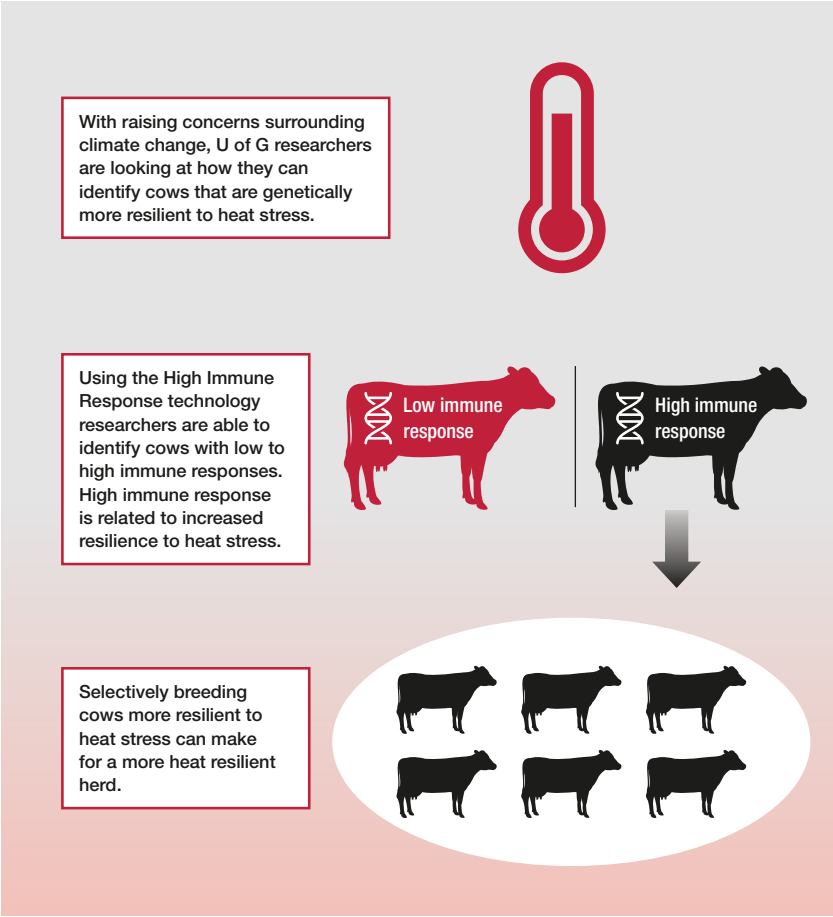
The results suggest that immune response is linked to heat tolerance, says Cartwright.

"Cows that have been identified as high immune responders also have a greater production of molecules that protect cells during heat stress," she says. "Heat stress leads to an increase in body temperature that can result in cell death, but cows that produce higher concentrations of protectant molecules can better resist cell death."

High immune responder cattle were also found to have more molecules that help with vasodilation of the skin—the widening of blood vessels to cool the body—and increased cell proliferation, when exposed to heat.

"These high immune responders seem to have better cooling mechanisms," says Cartwright. These findings may help to select for cows that are more resilient to heat stress.

The researchers plan to look at how heat stress impacts physiological responses and respiration rate in cattle identified as high immune responders.



Cartwright's research team includes Dr. Alexandra Livernois, a post-doctoral researcher in the Department of Animal Biosciences, and Dr. Julie Schmied, a post-doc in the Department of Pathobiology.

This research is supported by the Canada First Research Excellence Fund and Dairy Farmers of Ontario.