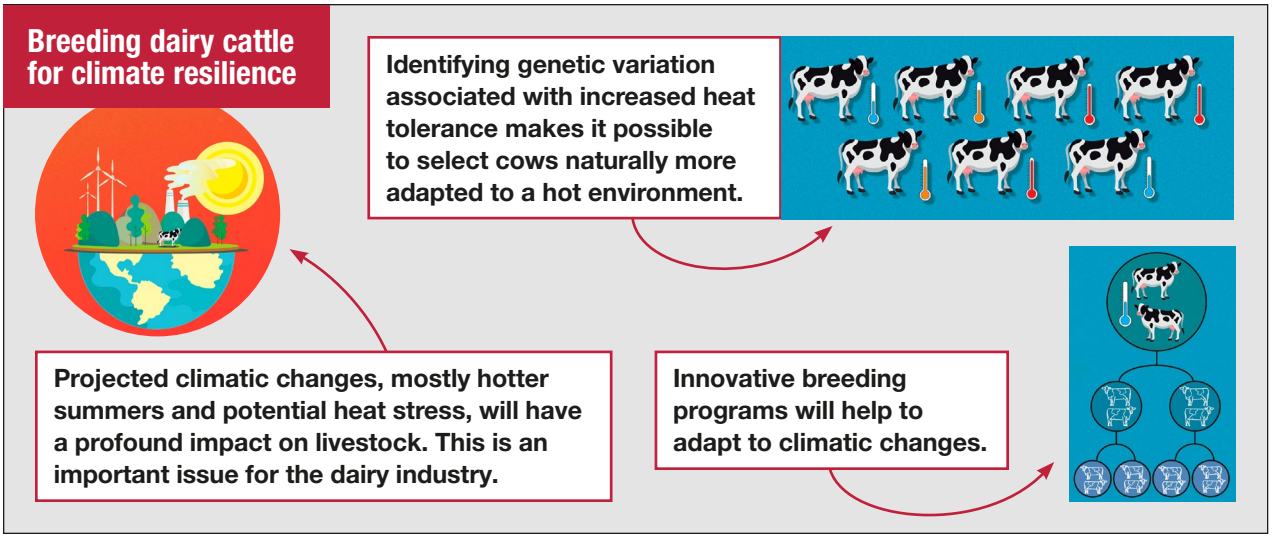
research

Breeding dairy cattle for climate resilience

Association of milk production traits with weather data helps to identify heat-tolerant dairy cattle



By Vanessa Virgo

Rising global temperatures cause heat stress in dairy cows, resulting in reduced milk production. Now, University of Guelph researchers are looking at breeding solutions to tackle this problem.

A team from the Department of Animal Biosciences, including professor Dr. Flavio Schenkel, PhD student Ivan Campos and former graduate student Paige Rockett, investigated the association of milk production traits with weather data to identify heat-tolerant cows that can be selectively bred to create more heat-tolerant herds.

"The dairy industry takes at least $44.6 million in economic losses each year due to decreased milk production from heat stress," says Schenkel. "Our research aims to prevent these losses."

Using both Canadian weather stations and NASA's Prediction of Worldwide Energy Resources satellites, Schenkel and his team examined temperature and relative humidity across Ontario, Quebec, British Columbia, the Prairies and the Maritimes.

With these data, the researchers were able to calculate a temperature-humidity index (THI), which measures the combined effects of air temperature and humidity. By associating the THI values with the cows' daily milk, fat and protein yields, the team was able to assess the onset and magnitude of the heat stress.

Researchers used the THI to determine whether the cows had surpassed the comfort threshold, meaning the THI had risen above a certain level in the three days before the milk test, putting the cows into heat stress.

With higher THI comes heat stress and lower milk production. A lower THI value is associated with greater ability to dissipate heat and maintain milk production, says Schenkel.

By measuring a cow's ability to produce milk at a higher THI, Schenkel and his team were able to evaluate the genetic merit for heat tolerance. Researchers were able to predict a heat tolerance breeding value for all cows and their sires, indicating their ability to maintain milk production at higher THI values.

Choosing sires and cows with high heat tolerance genetic merit enables heat tolerance to be passed down to future generations; this would increase overall heat tolerance and optimize milk production in the future.

"This project points to how dairy cattle can be selectively bred for heat tolerance," said Schenkel. "This reduces heat-induced discomfort in dairy cattle and prevents revenue loss due to a heat-related decrease in milk production."

This research project was funded by Food from Thought, the Canada First Research Excellence Fund, and is continuing within The Resilient Dairy Genome Project.

For more information, contact Dr. Flavio Schenkel, Department of Animal Biosciences, at schenkel@uoguelph.ca.

Published by Dairy at Guelph
University of Guelph
ON N1G 2W1
dairyatguelph.ca

Written and produced by
Students Promoting Awareness of Research Knowledge (SPARK)
uoguelph.ca/research/spark

UNIVERSITY of GUELPH
IMPROVE LIFE.

DAIRY at GUELPH
CANADA'S DAIRY UNIVERSITY