

Newly discovered cattle genes could be keys to more sustainable beef industry

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A newly discovered series of genes related to feed efficiency could pave

the way to making cattle farming cheaper and more sustainable, according to a new study by University of Alberta researchers.

U of A ruminant biologist and microbiologist Le Luo Guan and her research team showed that of the 20,000 [genes](#) expressed in bovine rumen, liver, muscle and back fat—key tissues involved in [energy metabolism](#)—19 seem to be associated with [feed efficiency](#).

Hui-Zeng Sun, a post-doctoral fellow in Guan's lab, made the discovery by using functional genomics and computational statistics to shed some light on the mechanics involved in feed efficiency, a complex biological process that remains poorly understood.

"This is laying the groundwork for us to use these genes when doing genomic selection for feed-efficient animals in cattle breeding programs," said Sun, the study's lead author.

Toward a more sustainable beef industry

In 2016, Alberta boasted the country's largest cattle herd: 4.9 million head, or about 42 percent of Canada's total cattle population. Though the beef industry still plays an important role in the province's economy, it's been the target of rising scrutiny because of its contribution to climate change.

A single bull or cow, explained Sun, can produce up to 500 litres of methane—a potent greenhouse gas—when it digests its daily meals. The more an animal eats, the more methane it produces.

Scientists are therefore trying to lessen the carbon footprint of cattle farming by maximizing feed efficiency.

"Two people who eat the same amount of food might not gain the same

weight because of differences in their metabolism," said Sun. "It's the same with animals. Efficient animals need less feed to extract an equivalent amount of energy and, ultimately, produce the same amount of meat. It also means savings for [cattle](#) farmers."

With world population projections pushing 10 billion by 2050 and food demands rising, Sun thinks the appetite for feed-efficient livestock will steadily increase in coming years.

Guan's lab is now validating their work in larger, industry-based experiments, a step they hope will confirm that the 19 identified genes show up in animals known to display higher feed efficiency.

The researchers also hope to figure out the molecular mechanics involved in turning each gene on or off. If they succeed, Sun thinks they could be building the foundation of a sustainable, energy-efficient Alberta beef industry.

The research was funded by the Alberta Livestock and Meat Agency, Alberta Agriculture and Forestry, and the Natural Sciences and Engineering Research Council of Canada.

The study, "Landscape of Multi-tissue Global Gene Expression Reveals the Regulatory Signatures of Feed Efficiency in Beef Cattle," was published in *Bioinformatics*.

More information: Hui-Zeng Sun et al. Landscape of multi-tissue global gene expression reveals the regulatory signatures of feed efficiency in beef cattle, *Bioinformatics* (2018). [DOI: 10.1093/bioinformatics/bty883](https://doi.org/10.1093/bioinformatics/bty883)

Provided by University of Alberta

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