Alberta Innovates Bio Solutions

CCEMC
Climate Change & Emissions Management Corporation

FEATURED PROJECT

Performance validation of cattle selected for feed efficiency under extensive cow/calf production systems

FUNDING:

CCEMC Funding: $168,000

Alberta Livestock and Meat Agency Funding: $245,000

Total Project Value: $413,000

PRINCIPAL INVESTIGATOR:

Edward Bork, University of Alberta

PROJECT LOCATION:

University of Alberta Mattheis Research Ranch, Duchess AB

Improving beef cattle production efficiency under open-range grazing conditions and reducing the beef industry's environmental footprint

The objective of this project is to test whether beef cattle production efficiencies – identified by residual feed intake (RFI) and genetic selection – are associated with cow/calf performance under open-range grazing production systems. The long-term objective is to explore the performance of current selection methods and the need for alternative approaches to optimize feed efficiency and RFI for cow/calf herds grazing on extensively managed rangelands in Alberta.

"This project will provide much needed information on how current genetic improvement programs for beef cattle may impact cow/calf production under open-range grazing, and the associated profitability and greenhouse gas emission reductions. Results from this project will support the development of environmentally sustainable beef production."

DR. EDWARD BORK
Lead Principal Investigator

Cow herds produce methane from the natural digestive processes. In Alberta, one of North America's largest beef-producing regions, reducing cow herd GHG emissions is crucial to improving the environmental footprint of beef production. The most practical and rapid GHG-mitigation procedure may be to reduce the per-cow methane emission through animal breeding and genetic selection for feed efficiency or low RFI.

Previous research has found improvements in RFI are possible in a controlled feedlot context where young animals are fed a finishing diet high in grain and energy. However, it is unclear if animals with low RFI under these conditions would be similarly efficient in an extensive cow-calf system under open-range grazing. This collaborative project will link genetic information with animal performance and environmental information (e.g. variation in vegetation composition-condition and forage biomass availability), to provide greater insight and improved selection metrics that increase or decrease cow/calf performance, and validate existing RFI selection criteria under open-range grazing.

PROJECT TEAM:

Edward Bork, University of Alberta
Graham Plastow, University of Alberta and Livestock Gentec
Colin Coros, Delta Genomics
John Basarab, University of Alberta
Tom Lynch-Staunton, Livestock Gentec/Delta Genomics

Benefits

Increasing the efficiency of cow-calf production systems will help ensure the long-term sustainability of the beef industry. For example, a one percent increase in efficiency could translate into a $13-million increase in calf crop value each year (assuming 1.6 million calves and a one-per-cent increase on an $850 weaned calf). More efficient cow-calf production systems also will reduce the industry's environmental footprint, including greenhouse gas (GHG) emissions.

This project will provide a comprehensive picture of the grazing behaviour of cattle with different RFI efficiencies, thereby increasing our understanding of the role of rangelands in storing carbon and reducing GHGs. The project will be integrated with other research focused on the impact of cow/calf production systems in altering GHGs within extensively managed rangelands, including grassland carbon storage. This integration has the potential to support development of innovative policy to encourage GHG reductions on grazed rangelands, including on the 7 million hectares of native grassland in Alberta.

Project activities

The project will utilize cattle currently grazing on the University of Alberta Mattheis Research Ranch in southeast Alberta. Some cattle with RFI information are already present, and this information will be combined with genomic information for RFI. Additional bulls will be tested by the project's grazing collaborator, Arno Doerksen, a purebred and commercial cattle producer.

In summer 2014, stratified breeding will create a range of low- and high-RFI cow-calf pairs for the upcoming breeding season. In summer 2015, measurements will be done on cow-calf performance (e.g. calf birth weight and growth rate, cow condition after calving and at weaning, calving interval, etc.) and on cow behaviour and forage intake in pasture. Animal movement and spatial distribution will be monitored (using pedometers and GPS ear tags) on a subset of animals, to determine energy expenditure and habitat use patterns, with fecal analysis used to assess dietary preferences. In spring 2016, a subset of low- and high-RFI replacement heifers (drawn from calves born in 2015) will be identified as representing extremes of performance and behaviour within the RFI group. This subset of replacement heifers will be monitored for intake on pasture (using alkane marker techniques) and in drylot pens (using GrowSafe Systems feed 'bunks'), to validate the efficiencies of low- and high-RFI progeny animals.

For more information about the project:

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About CCEMC

The CCEMC is a not-for-profit, independent organization with a mandate to establish or participate in funding initiatives to reduce GHG emissions and improve our ability to adapt to climate change. Every year the CCEMC provides millions of dollars in funding for projects that reduce GHG emissions.

ccemc.ca

About AI Bio Solutions

Alberta Innovates Bio Solutions is a Government of Alberta corporation dedicated to investing in research and innovation for the benefit of the province's agriculture, food and forestry sectors.

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