ALBERTA INNOVATES

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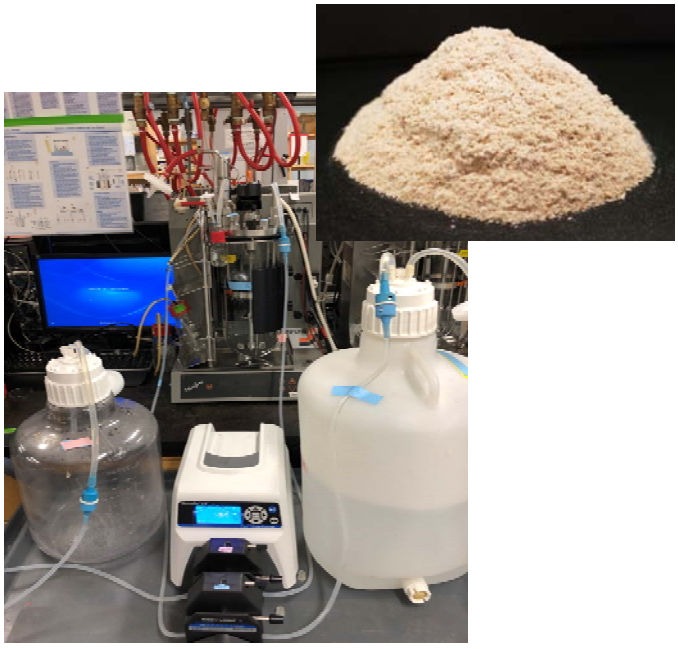
BIOENERGY & CIRCULAR ECONOMY – CIRCULAR ECONOMY

Producing Animal Feed from Methanol Generated from In-Situ Gasification of Coal

A critical challenge facing the growing global population is to ensure sufficient animal feed supply to meet the growing demands for livestock and aquaculture products. Working with Cvictus Inc., Dr. David Bressler's team aims to commercialize single cell protein (SCP) animal feed grown from methanol. The project will optimize fermentation strategies to increase productivity, and thus strengthen the environmental benefits and economics for the overall process. This project is part of a much larger vision that aims to utilize Alberta's abundant coal resources to generate methanol and hydrogen with ultra-low CO_2 emissions, and lead to substantially reduced GHG emissions associated with animal feed production.



FUNDING DETAILS

RECIPIENT:
University of Alberta

PARTNERS:
Cvictus Inc.
Mitacs

TOTAL BUDGET:
$567,000

AI FUNDING:
$200,000

PROJECT DATES:
MAR 2020 – JUN 2022

PROJECT TRL:
Start: 3
End: 6

APPLICATION

The global protein feed market is estimated at $400 billion, with aquaculture feed accounting for $60 billion. The aquaculture industry, which is predicted to grow at a compound annual growth rate of 7%, is already constrained by the limited availability of feed. The Business Development Bank of Canada has concluded that 'there is a large and ready market waiting for high-quality alternative protein producers that can provide a cheap substitute for fish meal'.

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PROJECT GOALS

The key goals of the project are to:

- Develop a continuous fermentation system as a baseline for all fed-batch experiments, the latter of which involves adding specific nutrients to an ongoing fermentation to promote cell growth;
- Develop a fed-batch fermentation system and methanol feeding strategy that results in the production of a protein-rich SCP at high yields;
- Develop downstream strategies for the efficient processing of the SCP to a high quality, protein-rich animal feed; and
- Train two postdoctoral fellows and a research associate in the production of SCP through fermentation and downstream processing.

BENEFITS TO ALBERTA

The successful implementation of this technology or use of the knowledge generated could result in:

- Development of an integrated animal feed production facility that could supply Alberta's livestock sector with a cheap and sustainable replacement for fishmeal and soymeal, with lower greenhouse gas, land, biodiversity and water resource impacts than conventional feed protein production.
- Commercial uses of Alberta's vast coal resources with an ultra-low carbon footprint to generate a value-added animal feed, hydrogen and other products to create additional jobs and positively impact the Province's GDP.
- Partnerships between the energy sector and the growing aquaculture and livestock industries that would help facilitate self-sufficiency at a Provincial level.

2 Publications

3 Students Trained

7 Project Job

30 Future Jobs

1 New Product/Service

<10 kt/yr Project GHGs Reduced

100 to 100,000 kt/yr Future GHGs

CURRENT STATUS

JUN 2022

The Bressler lab has successfully designed and commissioned a 5-liter continuous fermentation system that has operated multiple times for up to 15 days with average SCP productivity of 22 kg/m^3/h. Feeding experiments were carried out to optimize culture medium composition and methanol utilization. The resulting material has been spray dried to generate an SCP powder with 83.4% protein, which was subjected to compositional analysis.