

CLEAN RESOURCES

SMART AGRICULTURE AND FOOD

AGRI-FOOD INNOVATION – FOOD INNOVATION

FUNDING DETAILS

Rapid Pathogen Detection

It takes very low numbers of some pathogenic bacteria in food to cause illness, which presents a challenge for food safety surveillance. To detect contaminants, a long enrichment, often over 18-24 hours, is needed to allow cells to multiply to observable amounts. This can result in significant costs and delays for food processors and hamper trace-back investigations and food recalls. In recent work, the research team developed and validated a short enrichment procedure (5-8 hours) and a simplified sampling process for three major foodborne pathogens, *E. coli*, *Listeria* and *Campylobacter*. The current project is aimed at improving and applying the rapid enrichment and sample clean-up protocols to reduce the time necessary for detection of pathogens in food, feed, and animal feces.



RECIPIENT:
University of
Alberta
PI: Dr. Lynn
McMullen



TOTAL BUDGET:
\$393,856



PROJECT DATES:
MAR 2021 –
JAN 2023



PARTNERS:
3M
RDAR



AI FUNDING:
\$149,000



PROJECT TRL:
Start: 6
End: 7

APPLICATION

The project is targeted at commercial pathogen detection instruments and test kit manufacturers. The sample clean-up protocol resulting from this study will be applied to feed and fecal samples from cattle, swine and poultry. This will reduce total testing times, thereby ensuring quick identification of contaminated food products, faster release of food products to the market, reduced food storage costs and avoidance of costly recalls.

ALBERTA INNOVATES CLEAN RESOURCES

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PROJECT GOALS

- Determine the impact of increased sample volume for the 3M Molecular Diagnostic System (MDS) on enrichment times needed for reliable detection of low numbers of Shiga Toxin producing *Escherichia coli* (STEC) in various food matrices.
- Apply the sample clean-up protocol to animal feed and fecal samples from cattle, swine, and poultry to determine efficacy for rapid pathogen detection.
- Determine the ability of the sample clean-up protocol to shorten enrichment times required for Polymerase Chain Reaction (PCR) detection of low numbers of *Campylobacter* spp.

BENEFITS TO ALBERTA

- Reduced economic loss for food processors through timely identification of contaminated food and faster release of food products to the market.
- Avoidance of outbreaks of foodborne diseases.
- Avoidance or minimizing of expensive food recalls and delays in shipping food products.
- Rapid pathogen detection also meets an important food industry need to rapidly test animals prior to slaughter, and grains immediately after harvest, reducing the risk of pathogens being carried into food processing facilities.
- Improvements in pathogen detection sensitivity will not result in additional cost to food processors and companies producing pathogen detection kits as it will be incorporated into existing assay tubes.



2 Publications



2 Patents



1 Project Job

CURRENT STATUS

APR 2022

Application of the sample clean-up protocol to animal feed and fecal samples from cattle and poultry to determine efficacy for rapid pathogen detection was completed. The protocol also showed high accuracy in detecting specified pathogens in fecal samples from beef cattle and poultry and promising results for the rapid detection of these pathogens in feed samples at low levels of contamination. Research will continue on the use of the protocol for swine fecal samples. The impact of increased sample volume on the enrichment times needed for reliable detection of low numbers of specific pathogens in food matrices on project partner's system will also be determined in the next reporting period.