ALBERTA INNOVATES

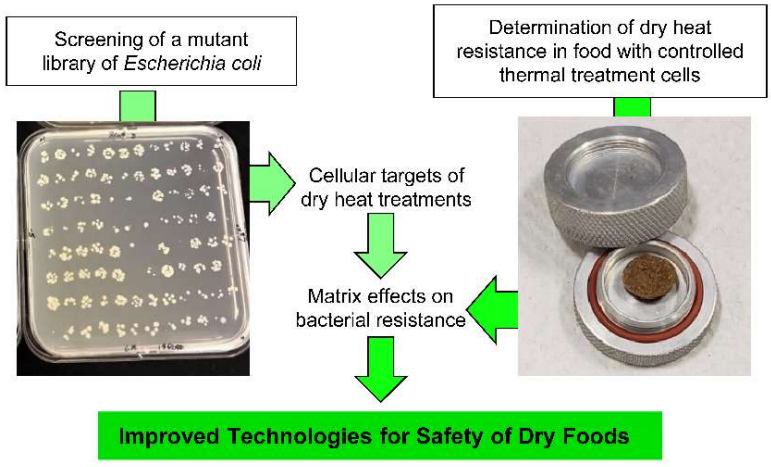
Clean Resources

Smart Agriculture and Food Innovation

Food Innovation

Mechanism of Survival of Enteric Pathogens in Dry Environments

Foodborne illness related to dry foods is an increasing threat to food safety. Dry powders, nuts, seeds and spices that are used as ingredients in other food products are susceptible to contamination by *Salmonella* and *E. coli*. Unfortunately, these pathogens are difficult to eliminate with current food processing technologies. This project aims to determine the synergistic activity of antimicrobials and dry heat to reduce these pathogens on food contact surfaces and in dry foods. Data on the mechanisms of dry heat resistance in *Salmonella* and *E. coli* will be used to improve pathogen intervention technologies for dry foods. This research will help the food industry in Alberta and Canada reduce the risk of foodborne illness in dry products.



FUNDING DETAILS

RECIPIENT:

University of Alberta

PARTNERS:

Alberta Agriculture and Forestry

Champion Pet Foods

Deacon Devices & Griffiths Foods

TOTAL BUDGET:

$550,885

AI FUNDING:

$50,000

PROJECT DATES:

March 2018 – February 2021

PROJECT TRL:

Start: 2

End: 5

APPLICATION

The projects will help the food industry to understand how mechanisms of resistance to wet heat relate to dry heat resistance. This information will help to select appropriate time-temperature conditions to reduce the *Salmonella* and *E.coli* populations in low-moisture foods by dry heat treatment. This will help reduce unnecessary experimentation at the industrial level, reduce operational costs, and reduce quality changes, while ensuring food safety.

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PROJECT GOALS

- Explain the mechanisms of dry heat resistance in *Salmonella* and *E. coli* by screening a mutant library of *E. coli* to identify genes that relate to resistance to dry heat.
- Assess whether genes related to dry heat resistance in *E. coli* also increase resistance in *Salmonella*.
- The mechanistic information will be used to improve current technologies for elimination of pathogens in dry food. These technologies will enable Alberta's food industry to eliminate enteric pathogens in foods and to establish food safety without compromising quality.

BENEFITS TO ALBERTA

- The recognition that dry foods cause foodborne illness has increased due to an increasing number of outbreaks of enterohaemorrhagic *E. coli* and *Salmonella* related to these foods.
- The project directly responds to an increasing threat in the food industry. It provides cutting-edge and economically feasible solutions to Alberta's food industry to control the risk associated with dry foods.
- The project contributes to the improvement of current thermal processes for pathogen reduction in dry foods and develops alternative non-thermal processing methods. It combines the expertise related to microbial physiology and genetics, meat microbiology, and food engineering to create solutions for the food industry.
- Industry segments in the province that will benefit from this line of research include processors of dried meats, spices, seeds for sprout production, and pet foods.

2 Conference Publications

3 Students Trained

2 New Products/Services

CURRENT STATUS

June 2020

The team evaluated the resistance of a library of 4,000 mutant strains of *E. coli* to identify cellular targets that relate to dry heat resistance. Current and future work will validate the differential resistance of selected mutants, and compare *E. coli* to *Salmonella*. The team also completed the assessment of the thermal resistance of *Salmonella* to heat after drying on pet food pellets, skim milk power and a meat binder. The food matrix and the water level have a decisive impact on resistance. Future work will assess the synergistic role of antimicrobials and dry heat.