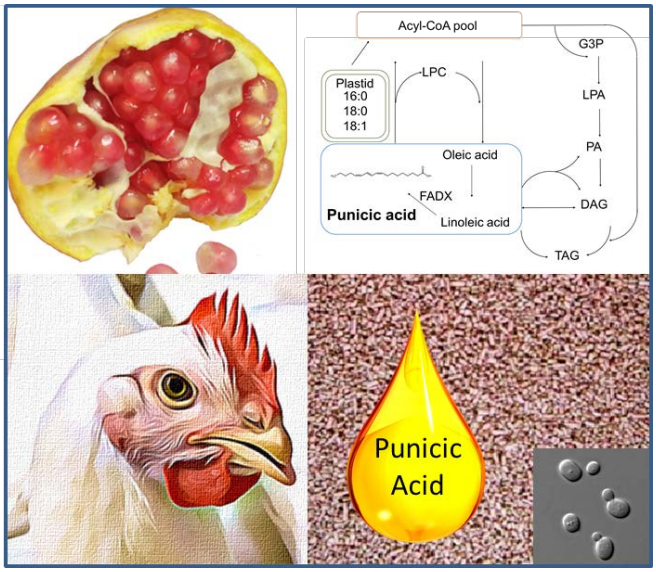
ALBERTA INNOVATES

Clean Resources

Smart Agriculture and Food

Development of Functional Yeast Enriched With Punicic Acid for Reduced Use of Antibiotics in Poultry

The wide use of antibiotics to promote the growth of broiler chickens is being dramatically reduced in Canada due to regulation and societal pressures. It is therefore necessary to develop cost-effective and environmentally friendly alternatives to antibiotics, while maintaining current production levels of broiler chicken. Punicic acid (PA) has strong anti-inflammatory properties and could be a potential antibiotic alternative. However, its main natural source, pomegranate oil, is too expensive for feeding broilers. This project proposes to evaluate the efficacy of PA to promote broiler growth and to develop a functional yeast strain enriched with PA via biotechnology and fermentation. The results will lead to the development of an innovative, cost-effective and environmentally friendly alternative to growth-promoting antibiotics.



FUNDING DETAILS

RECIPIENT:

University of Alberta

PI: Dr. Guanqun (Gavin) Chen

PARTNERS:

Alberta Agriculture and Forestry

Alberta Chicken Producers

Canadian Poultry Research Council

Diamond V

TOTAL BUDGET:

$621,561

AI FUNDING:

$60,000

PROJECT DATES:

March 2019 – February 2022

PROJECT TRL:

Start: 2

End: 4

APPLICATION

Currently, PA is mainly obtained from pomegranate seed oil, which is too expensive to be used as feed supplement (approximately $25/kg). The knowledge generated through this project will be applied in the production of PA in baker's yeast (*Saccharomyces cerevisiae*) with the aim to develop affordable and alternative growth-promoting antibiotics for the poultry industry. In addition, PA produced by yeast can be potentially used in nutraceutical (e.g. anti-cancer components) and industrial (e.g. industrial oil and biopolymer) applications.

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PROJECT GOALS

- Evaluate the efficacy of PA from pomegranate seed oil to replace growth-promoting antibiotics in broiler chicken.
- Generate a PA-producing yeast strain and optimize the fermentation process to increase the productivity of PA.
- Evaluate the efficacy of PA to replace growth-promoting antibiotics in broiler diets and determine the cost of yeast-derived PA for use in the industry.

BENEFITS TO ALBERTA

- Gain first-hand knowledge of the efficiency of PA as an alternative to growth-promoting antibiotics in broiler chicken, and a new baker's yeast strain producing commercially relevant levels of PA with an optimized lab-scale fermentation process.
- Directly using PA-rich yeast biomass in poultry feeds can increase the performance of animals and the market value of the chicken. PA-rich yeast biomass would have a higher market value than regular yeast and can benefit both biotechnology and poultry industries in Alberta.
- Provide information to Alberta producers regarding possible alternatives to growth-promoting antibiotics for broiler chicken. Consumer demand for the use of alternatives to antibiotics keeps increasing and will impact marketability of poultry products.

8 Publications

1 Patent

2 Students Trained

2 New Products/Services

2 Future Jobs

2 Project Jobs

CURRENT STATUS

April 2021

In addition to generating yeast strains with PA via biotechnology and optimizing the fermentation process to increase yeast biomass and PA content, the team completed broiler feed trials to demonstrate the efficacy of PA in the form of pomegranate seed oil. Feed containing 0.1% of PA resulted in the greatest average bird weight. While this was not significantly different from the positive control (with antibiotics) and negative control (without antibiotics) it indicates the possible effect of PA in improving bird performance. Further trials will be conducted to test the efficacy of PA from baker's yeast on broiler performance. This is outside the scope of the present funding. The final phase of the project is generation of PA from a rapid-growing and oleaginous yeast strain and optimization of its fermentation parameters.