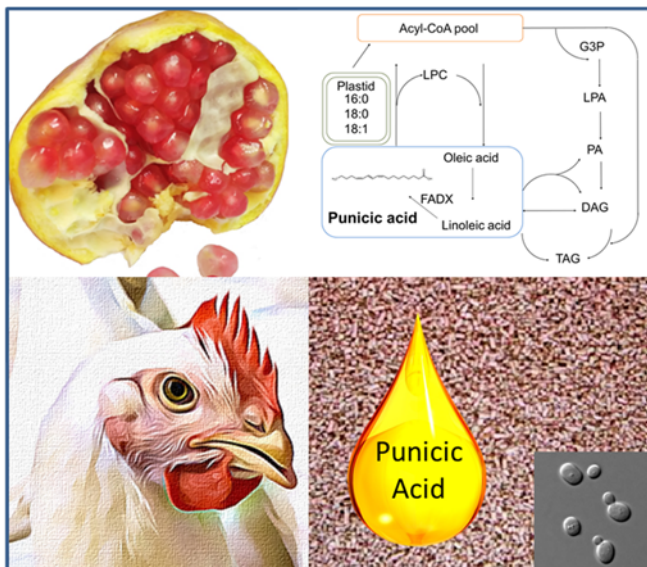


Development of Functional Yeast Enriched in Punicic Acid for the Reduced Use of Antibiotics in Poultry

Antibiotics have been widely used to promote the growth of broiler chickens, and their use in Canada is being dramatically reduced 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:
**MAR 2019 – JUN 2024
(Extended by 2 years)**

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.

ALBERTA INNOVATES CLEAN RESOURCES

SMART AGRICULTURE AND FOOD
AGRI-FOOD INNOVATION – AGRICULTURE BIOTECHNOLOGY

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 to determine the cost of yeast-derived PA for use in the industry.

BENEFITS TO ALBERTA

- The outcome will be the 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

APR 2022

Studies to generate yeast strains with the ability to produce PA together with the optimization of the fermentation process to increase yeast biomass and PA content as well as broiler feed trials to demonstrate the efficacy of PA in the form of pomegranate seed oil have been completed. So far, PA-producing strains of yeast with an accumulation potential of 3.4% PA, a 10-fold increase from the starting concentration of 0.3% but lower than the anticipated 20% have been generated. While oleaginous yeast strains showed much higher lipid content, only 1.5% of this was PA. The project will continue to work on increasing the PA content in the yeast strains. Additional broiler trials will be conducted to demonstrate the impact of PA from the yeast strains on broiler performance.