



Post Project Review - Executive Summary

3A-102 - Nutritional strategies to increase the selenium and iron content in pork and promote human health

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Benefits: not applicable to this project

Participating Organisations: Feedworks Pty Ltd

Objectives

- Determine Se and Fe bio-availability and incorporation into pig plasma, muscle and visceral tissues
- To determine the bio-availability of Se and Fe from pork in a rat model
- Apply molecular techniques and histological/immunohistological examination to determine tumour progression and development
- To develop and validate analytical methods that are capable to extract, identify and determine levels of the major and important forms of selenium in mammalian tissue, these being selenomethionine and selenocysteine

Outcomes achieved

- Dietary Se supplementation of pigs increased the Se content of pork in a linear manner compared with control and non Se-diet treatments
- Selenium enriched pork was found to be effective in preventing pre-neoplastic lesions in rats, an early biomarker of colorectal cancer
- Demonstrated that the bioavailability and efficacy of muscle-bound selenium resulted in reduced incidence of early stage bowel cancer compared with supplementing rats with inorganic or organic Se
- This observation is significant as the incidence of colorectal cancer is a significant problem in Australia and other Western populations
- Se supplementation of pigs did not impact on growth performance, carcass characteristics or meat quality attributes
- Supplementing diets with organic iron did not alter muscle iron levels which were found to be significantly higher in the muscles from female compared to male pigs

Project Issues

It took a longer time than anticipated with DPI Victoria to set up and provide necessary infrastructure for undertaking the rat study than initially expected (eg. small animal house, availability of willing and trained staff to handle carcinogens). However, this project has been completed within 3 years of duration except a small part of analysis and reporting involved with Dhammika Jayasooya's PhD thesis.

Financials

	Budgeted	Actual	%
Cash	\$228,041	\$211,590	92.8%
Inkind	\$531,300	\$143,776	27.1%

Adoption and Commercialisation

This work was a proof of concept study and only included early stage cancer development in the rat. Further work is required to identify both the level and duration of Se pork consumption required for prevention of early stage colonic cancer as well as other forms of cancer, including prostate, in rat and human studies. Also, it may also be of interest to determine whether there are other forms of organic Se that can be included as a supplement into pig diets to maximise the Se content of pork muscle from supplemented pigs.

Lessons learned & Future Research Opportunities

This project required staff at DPI Werribee to work in a new area, develop new skills and establish new facilities to undertake the rat study. The background tasks required to obtain DPI approval to conduct the project at DPI Werribee, including establishing a small animal house, train staff in management and care of cancer-induced rats, build links with other organisations (eg. Prof. Graeme McIntosh - UniSA) to assist with training and development of experimental methodologies. Although taking additional time, these links resulted in significant learnings and establishment of expertise in this area. Additional time required to obtain internal OH&S approval to conduct this work although delaying the project, provided significant learnings if further work of this type is undertaken in the future.