

Increasing Canadian pork consumption, market share and competitiveness through enhanced nutritional values and overall quality with a functional molecule in pork meat

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Overview

The functional molecule studied in this project is carnosine, a naturally-occurring molecule found in meat, poultry and in certain fish but not in foods of plant origin. Carnosine possesses many interesting qualities such as antioxidant and anti-aging properties.

In this project, levels of carnosine have been measured in purebred pigs in Canada and the effects of this molecule on meat quality traits have been studied. Further analyses are being carried out to identify genetic reasons as to why some animals have a higher content of this molecule. It is also being tested if levels of carnosine can be enhanced through feeding pigs. Meat quality as well as sensory analyses are being done on pork samples from these animals.

In addition, work has been done to better understand the public's perception and interest in this new product (for example, carnosine-enhanced pork). The information gathered will be used to create strategies to motivate the consumption of enhanced pork by health-conscious consumers.

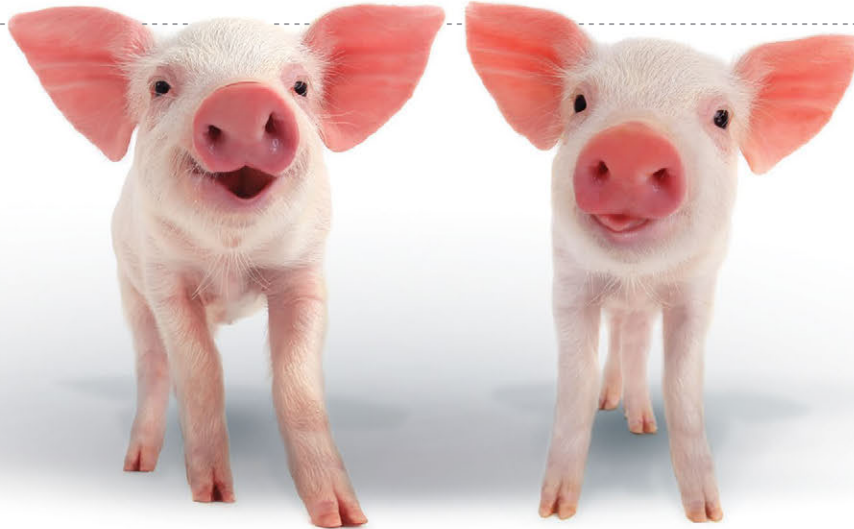
Highlights

Feeding trial with pigs

To see if carnosine levels could be enhanced in pork meat through feeding, a nutritional test was conducted on 80 pigs. Starting at body weights of 65 kg, pigs received a supplement of beta-alanine in varying amounts in their diets over an eight-week period (carnosine is formed of beta-alanine-L-Histidine). The meat from these pigs was analyzed and showed that the supplement did not increase carnosine content, but decreased lipid and protein oxidative damage. These results will be useful in identifying alternative dietary strategies to increase carnosine in pork.

Identification of polymorphisms

Twenty-seven polymorphism (SNP) were identified in different carnosine-related genes with the most promising associations observed for SNP SLC15A4 c.658A>G. For this polymorphism, animals with the AA genotype had higher muscle carnosine content and pH 24 h values and lower color b*, color L*, drip loss, cooking loss and glycolytic potential values when compared with AG pigs. Therefore, the SLC15A4 c.658A>G SNP could potentially be used in selection programs to increase carnosine content and improve pork meat quality. However, the high frequency of the c.658A allele in Duroc (0.99) and Landrace (0.91) would limit potential meat quality improvements for these breeds. Additional work is needed to determine allele frequencies and confirm associations in other breeds.



Surveys to gage public perception

Given the publicity on the possible links between red meat consumption and health risks, it is unclear whether the idea of increasing the healthiness of pork (thus creating a 'functional food') would be well received by the public. We know that pork can be made into such a functional food by increasing its carnosine content. However, it is important to know whether the public understands the benefits of functional foods and whether they are interested in buying functional foods. It is also necessary to understand the consumer characteristics, such as individual attitudes towards health, which would influence decisions to purchase a functional pork product and thus help establish market potential. Therefore, a survey was conducted in Canada where 992 participants responded.

Preliminary results suggest that consumers who have a higher knowledge about nutrition and are more health conscious are more interested in consuming carnosine-enhanced pork. Being female, having no children in the household, earning a higher income, living in the city, and holding a positive attitude towards biotechnology all contribute to a higher probability of purchasing carnosine-enhanced pork.

Implications for the swine industry

- While the supplement beta-alanine did not increase carnosine content in pork, results from this experiment will help identify other alternative feeding strategies to increase carnosine levels.
- The SLC15A4 c.658A>G SNP is associated with an increase in carnosine content and improved pork meat quality.
- Certain health-conscious segments of the population are more likely to purchase carnosine-enhanced pork. More analysis will be done to determine the market potential for such a product.

Collaborators

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