

A DNA based test for evaluating and improving pork colour in Canadian pigs

Project supported by Alberta Funding Consortium

Background information

Meat color is one of the most important visual characteristics of pork affecting the choice of consumers domestically and internationally. Darker pork usually has lower cooking loss and better tenderness, but the color preferences vary among different markets. Visual characteristics are considered to be the main factors governing consumer choice of pork. International cross-cultural comparison of consumer preference have highlighted significant differences in consumer choice of pork chops based on four appearance characteristics (colour, amount of fat cover, marbling and drip loss). Among them, color preferences were the most consistently chosen. More recently, a survey of consumer preferences by Canada Pork International (CPI) has revealed that pork colour is one of the most important characteristics for Gold markets such as Japan, where meat colour was considered more important in purchasing fresh pork from a retailer, before origin of pork and price. Pork colour was mentioned by 92% of surveyed Japanese female consumers asked to provide the three first criteria for their choice of pork. Pork quality attributes are quite highly correlated among each other. An exhaustive study has shown that darker meat had a greater propensity to be firmer, have less drip loss, be more tender, and have a higher ultimate pH. Meat colour is favourably correlated with fresh and processed meat characteristics.

Meat quality traits including pork colour have been identified as special group of traits where DNA information is especially useful for the Canadian swine industry (Mathur, 2003). So far, there has been limited use of selection on meat quality traits in Canadian swine mainly because the measurements are collected on slaughtered animals which are therefore not available for breeding anymore.

Comparative mapping with human and pig genome has indicated that the SLC44A3 gene may be associated with meat color. This provides an opportunity for genetic evaluation of pork colour on live pigs using a blood sample, tissue such as ear notch or even hair root. If the gene has similar effects in major pig breeds used in Canada, the gene test can be used to select pigs and adapt the meat colour to the desired levels. Therefore, the project is designed to estimate the frequency and effects of the SLC44A3 gene on pork colour in Canadian pigs.

Objectives and Deliverables

The ability to adjust meat colour according to consumer preferences using a DNA test rather than sacrificing the pig can be highly valuable for the Canadian swine industry. The SLC44A3 gene has been found associated with meat color in crosses between

Berkshire and Yorkshire pigs in the US. If the gene has similar effects in the Duroc, Yorkshire, Lacombe and Landrace pigs used in Canada, the gene test can be used by Canadian producers to select pigs and adapt the meat colour to the desired levels. Therefore, the proposed project has the following objectives:

1. Estimate the current levels of pork colour in Canadian pig breeds
2. Estimate the frequency of the SLC44A3 gene
3. Evaluate its effect on pork colour in Canadian pigs.

The deliverables are as follows:

1. Estimates of the frequency and magnitude of the effects of SLC44A3 gene on meat colour in Canadian pigs
2. Recommendations and guidelines for use of the gene test by the swine industry

Project Design and Methodology

The project will be a joint effort of Western Swine Testing Association and its members; researchers from the AAFC Research Centre in Lacombe, Alberta; Lab Services Division, University of Guelph and Canadian Centre for Swine Improvement.

Representative pigs from three major Canadian breeds, including Duroc, Yorkshire, Lacombe and Landrace, will be contributed by breeders and producers on the Canadian Swine Improvement Program. A total of 500 pigs will be used in the project. The pigs will be slaughtered at the Olymel plant in Red Deer. The loin samples will be extracted from the carcasses and sent to the Lacombe Research Centre for subjective and objective evaluation of meat colour. Meat tissue samples from the pigs will be sent to the University of Guelph for genotyping.

The data will be analysed by Canadian Centre for Swine Improvement using the genotyping data, meat colour data and pedigree records of the pigs tested.