Australian Government
Department of Industry, Innovation and Science
Business Cooperative Research Centres Programme
Pork CRC
CRC for High Integrity Australian Pork

Project Number & Title: 3A-111/3A-113: Establishing the critical control points for improving fresh pork meat quality. A post mortem metabolism investigation and the impact of enzymatic glycolytic/oxidative potential.

Project Leader: Cameron Jose

Project Participants: Murdoch University; DAFWA

Aims and Objectives: This study aimed to randomly select commercial entire male carcasses that represent the Australian retail product, to test the following hypothesis

1. Low ultimate pH is a result of increased glycolytic and decreased oxidative potential in entire male pigs.
2. Fast post-mortem (PM) metabolism rates, as measured by the production of lactate and pH decline, will result in pork that does not benefit from aging.

The intention of investigating these hypothesis was to identify a number of points along the supply chain in which could be used to control or manipulate the quality of pork meat. Furthermore, this project aimed to identify the rates of PSE pork while discussing the use of a quality grade to decrease variation in Australian Pork.

Key Findings

- Two meat quality defects were identified in a modern Australian herd; “Acid meat” (32.8% of carcasses) and “PSE-Like” (16% of carcasses)
-“Acid meat” (Low ultimate pH of below 5.4) had lower water holding capacity, protein solubility and was paler in colour
-“PSE-Like” carcasses expressed fast early metabolism and resulted in no improvement in tenderness once aged
- Oxidative/glycolytic potential did not predict “acid meat” of “PSE-Like” carcasses
- “Acid meat” was a result of high glycogen levels at slaughter
- “PSE-Like” conditions were the result of elevated temperature shortly after slaughter, indicating enhanced metabolism and likely caused by increased stress or stress susceptibility

Application to Industry

This work illustrates two possible metabolic defects that result in poor meat quality and that the occurrence is very regular (43.9% of 198 carcasses sampled). Since “acid meat” is due to excessive glycogen storage and is a result of a highly glycolytic genotype associated with good efficiency and growth rate, the only real means of control would be to change the genotype, or find a balance between eating quality and efficiency. However, if these carcasses could be identified by routine pH measures then the industry could make informed choices to maintain market integrity and decrease the risk of a poor eating experience. This would involve downgrading or value adding to the product.
The current study has identified that PSE like conditions occur in the modern supply chain, however it is not known if this is a genetic effect (such as the Halothane gene) or simply by increased stress prior to slaughter. Carcasses that present PSE-like conditions would have a greater core temperature shortly after slaughter and a technology would need to be developed to identify these carcasses. Furthermore, PSE-Like carcasses that had a high pH would likely hold moisture infusion and could be value added, while the remainder would need to be downgraded due to the lack of tenderness development.