Pork Quality Research at the University of Guelph

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Inferior pork quality affects profitability across the Canadian pork industry due to deleterious effects on product yields, appearance of the product in the meat case, and eating quality. Changes in production practices ranging from pig management to swine nutrition has the potential to decrease the amount of poor quality pork being produced, and increase demand for the product and returns for producers, packers, and processors in the Canadian pork industry. A multidisciplinary team at the University of Guelph is currently examining behavioural, nutritional and genetic interactions contributing to the variability in quality of pork being produced in Ontario. The goals of this project are to investigate basic mechanisms contributing to the variability in pork quality through proteomics, genomics and the biochemical conversion of muscle to meat, and ultimately identify management strategies to improve the quality of pork produced in Ontario. To date, data have been collected from approximately 700 pigs with on-farm and in-plant behavioural data collected for each pig, along with comprehensive carcass and meat quality analyses.

We have also examined the impact of nutrition on pork quality using two approaches. One approach has been aimed to decrease production costs for the producer with the goal to not affect or improve meat quality. Limit or restricted feeding of pigs during the growing phase was examined to decrease the amount of feed required to attain market weight. This approach is based on limit-fed pigs exhibiting compensatory growth (higher than normal gains) with lower feed to gain when the pigs are switched to full feeding of the finishing diet. In pigs limit-fed to 70 or 85% of feed intake by pigs on full feed during the growing period, the 70% limit-fed pigs outgained and had better feed efficiency (less feed required per kg gain) than pigs on full feed. There were no differences in days to market with limit versus full feeding. An added benefit with limit feeding was increased meat tenderness (lower Warner Bratzler shear force) in pork from limit-fed pigs versus pigs on full feed throughout the growing and finishing phases of production. The response to limit feeding may have significant ramifications to pork producers given current and future increases in feed grain costs due to the high demand of cereal grains for ethanol production. The added benefit of increased pork tenderness with limit feeding may help producers in the production of consistently tender pork. Current research is being conducted at the U of G to understand the mechanisms involved for improving pork tenderness with limit feeding.

Our second approach in examining nutritional effects on pork quality is to develop nutritional strategies to reduce stress in pigs going to slaughter. Elevated stress in pigs may impact pork quality such as the incidence of PSE and DFD which decreases returns to packers and processors and may result in pork of inferior eating quality for consumers. Studies were conducted examining the effects of adding the amino acid tryptophan to finishing diets in an attempt to reduce stress before slaughter. Since tryptophan is an expensive feed ingredient, the study examined amount and duration of feeding supplemental tryptophan on pork quality. Regardless of the amount or duration of feeding supplemental tryptophan, there were no effects on pork quality when examining subjective or objective measures of lean color and water holding capacity or pork tenderness. Trials were then conducted removing supplemental protein from the diets for one or 3 days prior to slaughter in an attempt to increase concentrations of specific amino acids in the brain at slaughter. Similar to the tryptophan work, protein withdrawal did not have any effects on pork quality. Work is continuing on nutritional programs to enhance pork quality with current trials examining the impact of feeding beet pulp and ractopamine (Paylean) on stress and meat quality in finishing pigs.