



Left to right:
James Squires,
Tina Widowski,
Andy Robinson,
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Kees de Lange,
and Ira Mandell.

On-farm behaviour management is one of the keys to improving meat quality, concludes a three-year study. Another is proper nutrition

How pigs are handled on the farm can affect

Proper nutrition and proper on-farm handling affect meat quality.

Those are two firm outcomes of a three-year study led by Prof. Peter Purslow, acting Associate Dean (Research and Innovation) for the Ontario Agricultural College and Professor, Department of Food Science, University of Guelph.

The study, which will be completed this summer with a final look at nutrition, included 648 slaughter pigs from 27 groups of pigs representing a large number of commercial operations and processing days, as well as some pigs from research farms.

"We looked at different measures of meat quality and a wide range of factors that could affect meat quality," Purslow says. "The total list came down to 47 different factors – everything from on-farm behaviour of the animals through to gene expression in tissue samples we took at the point of slaughter."

The researchers were looking for ways to positively improve quality, in part by paying close attention to the

lowest quality animals. "Occasionally, you get meat samples that are obvious outliers and really unacceptable for most people, because of poor flavour or extreme dryness. We were looking for those sorts of combinations of circumstances," Purslow says.

Among the measures of meat quality, they found a two to 12 per cent variation in drip loss. The "big factors" identified in the study were differences between producers and packing plant conditions on different kill dates.

Looking for ways to limit variation and raise the overall standards, Purslow and others involved in the project, took a look at behaviour management.

"Behaviour management is a bit of a strange thing for most people," Purslow notes, "but it is quite clear that stress in animals just prior to slaughter is a big determinant of meat quality. It's not just porcine stress syndrome and all the work done to eliminate the Halothane gene that is responsible for this syndrome. In animals that are stressed at or around the

The study was undertaken by Purslow and T. M. Widowski, I. B. Mandell, E. J. Squires, C. F. M. de Lange and J. A. B. Robinson, all of the University of Guelph. Funding was provided by the Natural Sciences and Engineering Research Council of Canada (NSERC) and Ontario Pork.

by MIKE MULHERN

point of slaughter, muscle metabolism and ultimately meat quality are influenced negatively."

Researchers first looked at the attitude of individual pigs to environmental stimulus. "We developed an approach to classify pigs as (being either) really bold, curious or fairly shy animals."

"We were expecting that shy animals would be the ones that suffered from stress most. Curiously, in the early part of the survey, we found that it was the bolder animals that showed most effects of stress on subsequent meat quality," says Purslow. He says that meat from those pigs was of lower eating quality, with greater drip loss, poorer colour and more toughness.

To tackle the problem, researchers found that producers who walked pens daily and did some chute training with their animals had better outcomes.

"Some animals have very little interaction with humans and, when they do, they are herded into trucks for the packing plant," Purslow says, adding that the more accustomed they are to humans, the easier it is on them when they are moved.

Researchers also evaluated tryptophan, an amino acid which helps the body produce serotonin to see whether that would improve the packing plant experience for pigs. Serotonin acts as a calming agent in the brain and plays a key role in inducing sleep.

"Eating tryptophan is meant to make us and other animals a little more sleepy. In fact, we didn't find a big change and now we're looking at high-fibre diets from beet pulps as a potential modifier of animal behaviour," Purslow says.

He believes that "it is quite clear that the state of nutrition

meat quality

is another big factor that determines post-mortem metabolism in muscle and thus meat quality." The nutrition side of the study won't be complete until this summer.

The research group is also looking at genetics. "We're trying to follow all of these multiple studies by actually looking at gene expression. In animals that have high drip loss, high toughness and poor colour, we're finding hundreds if not thousands of genes that are expressed differently," says Purslow.

"The challenge scientifically is to find the candidate pathways, which reflect the pig's genetics and environment.

"We've recognized for some time," Purslow concludes, "that variation in meat quality is about one-third genetics and about one-third post-mortem handling of pigs and carcasses in the packing plant. The other factors are unknown."

Purslow says that behavioural studies have shown you can positively improve meat quality by on-farm behaviour management such as pen walking. "Now we're just trying to tweak the animals' diets to see how good we can get that."

researcherprofile



MARTIN SCHWALBE

Peter Purslow

by MIKE MULHERN

Since his days as a Leverhulme Postdoctoral Research Fellow in Biomechanics at the University of Reading in the United Kingdom, Dr. Peter Purslow has moved through a number of progressive posts leading to his current work in Canada.

Now a professor in the Department of Food Science at the University of Guelph and acting associate dean (research and innovation) for the Ontario Agriculture College, Dr. Purslow earned an Honours B.Sc. in applied zoology from the University of Reading in 1976 where he was also awarded the Colin Morley Prize in zoology.

After his postdoctoral work was completed in 1981, he became projects leader for the Agricultural and Food Research Council, Bristol, UK.

In 1991, he began work as a research fellow in the muscle and collagen research group at the University of Bristol. He moved to the University of Wales College of Cardiff School of Molecular and Medical Biosciences in 1995 where he was a lecturer in anatomy and a member of the Connective Tissue Biology Laboratory Research Group.

From 1996 to 2001, Dr. Purslow was a professor of meat sciences in the Department of Dairy and Food Science at the Royal Veterinary and Agricultural University, Copenhagen, Denmark. From there, he moved to Scotland and the University of Stirling where he worked as a professor of molecular and cellular biology in the Department of Biological Sciences. He was also coordinator of EU 5th Frame Program Research: Mechanisms of Normal and Pathological Aging in Extracellular Matrices. He began work at the University of Guelph in 2003 in the Department of Food Sciences.

Dr. Purslow is currently a member of the agricultural advisory board of the Ontario Centres of Excellence/Centre for Earth & Environmental Technologies, Agricultural.