

Pork CRC digesting eating quality research findings

Pork CRC has invested a lot in improving the eating quality of pork and I believe eating quality is more variable than almost any biological indicator of pig performance, including reproduction.

Eating quality varies across cuts, with the loin and silverside being generally the 'worst'. It varies considerably across supply chains and there is little consistency across studies for the effects of sex, carcass weight or diet.

We have, however, generated an extraordinary amount of information on all these aspects and this is being developed into an eating quality pathway for the Australian industry.

The good news is eating quality, as judged by consumers, can be markedly improved, largely by processing interventions. In one very large study conducted across three supply chains, our researchers, led by Heather Channon, showed that without intervention the fail rates for the different cuts across supply chains were as high as 35%-40%. That is 35% to 40% of consumers considered some of the cuts to be unacceptable or below average and their repurchasing intentions were even higher/worse than those for eating quality. This is unacceptable and certainly a challenge, given increasing the demand for Australian pork domestically and internationally is crucial for the future success of our industry.

The good news was that the eating quality of the worst cuts across the three supply chains was markedly improved and, in most cases, the fail rate reduced to 10% or below by intervention. The interventions included electrical stimulation, aitchbone hanging and moisture infusion.

The worst cuts differed across supply chains, as did the interventions, which most improved eating quality so there is no single strategy/technology for improving eating quality, but the supply chains know where their problems are and have methods for improving eating quality and pork demand. It is up to individual companies to review the economics and then implement the relevant technologies. We know some have implemented the technology most appropriate to their situation and from personal experience, I can tell you the eating quality of the products, especially the loin, is excellent.

More recent

The results of two recently completed studies demonstrated the effects of farm factors affecting eating quality and also the effects of packing on eating quality. Findings from the latter are somewhat concerning, but again a message for all involved in the supply chain.

Farm factors

Pork CRC Project 3A-112 aimed to establish a benchmark dataset that compared the multiple pre-slaughter factors of housing (conventional vs deep-litter housed), carcass weight, light (66kg HSCW) supermarket carcasses through to heavy carcasses (84 kg HSCW) and sex (females vs immunocastrates) within the same genotype, nutritional regimen, slaughter day and post-slaughter conditions. The effects were compared across three cuts – loin, rump and silverside.

The research was conducted by Dr Rob Smits and Pork CRC Masters student Amy Lealiifano, both from Rivalea Australia. The project also involved Professor Frank Dunshea, University of Melbourne and Dr Darryl D'Souza, SunPork Farms.

I take this opportunity to commend Frank, who recently received the American Society of Animal Science Meats Research Award during the 2017 ASAS-CSAS Annual Meeting. The Meats Research Award recognizes research excellence in meat science and was sponsored by Elanco Animal Health. ASAS is a professional organisation serving more than 7000 students, animal scientists, allied industry and producers around the world.

Housing effect

Housing had the biggest effect on objective measures of eating quality. Carcasses from deep litter were fatter at all carcass weights and based on Warner Bratzler shear force, produced cuts that were more tender than those from conventional housing. Shear force also declined with increasing carcass weight, but like previous studies, the results differed across cuts, with housing having no effect on the shear force values for the silverside. Drip loss was higher from deep litter housing for the loin and silverside.

Results for shear force drip loss and lightness (L*) are shown in Table 1.

Table 1. Housing effects on objective meat quality measurements shearforce (kg), drip loss (%), and colour in the loin, rump and silverside

Muscle	Least square mean \pm S.E					
	Loin (L)		Rump (R)		Silverside (SS)	
Housing (H)	Ecoshelter	Conventional	Ecoshelter	Conventional	Ecoshelter	Conventional
Shearforce kg	4.66 \pm 0.2	5.11 \pm 0.2	3.95 \pm 0.1	4.20 \pm 0.1	4.66 \pm 0.1	4.77 \pm 0.1
Drip loss (%)	6.71 \pm 0.003	5.92 \pm 0.003	3.75 \pm 0.002	3.67 \pm 0.002	3.69 \pm 0.002	3.14 \pm 0.002
L*	49.07 \pm 0.3	49.44 \pm 0.3	46.94 \pm 0.3	47.77 \pm 0.3	44.94 \pm 0.3	46.42 \pm 0.3

The findings show that on-farm factors affect eating quality and will contribute to the eating quality model being developed by Pork CRC.

Packaging problem

Pork CRC has conducted two studies comparing the effects of high oxygen modified atmosphere (MAP) and vacuum packaging (VAC) on the ageing and eating quality of pork. Both conducted by students and researchers at University of Melbourne.

The first study suggested that pork aged better in VAC than MAP and that the differences were detectable by consumers. Results after seven days ageing showed significant differences in consumer preferences for eating quality, overall likeness and for repurchasing intentions for the vacuum-packed pork.

The results of a larger study (Pork CRC Project 3A-118) confirmed the results. The research, led by Dr Minh Ha, looked at packaging pork loins in MAP and VAC on numerous objective measures of eating quality and chemical changes of the loin aged for one, five and 10 days in both packaging types and loins aged for 10 days in VAC followed by a further 10 days in MAP packaging.

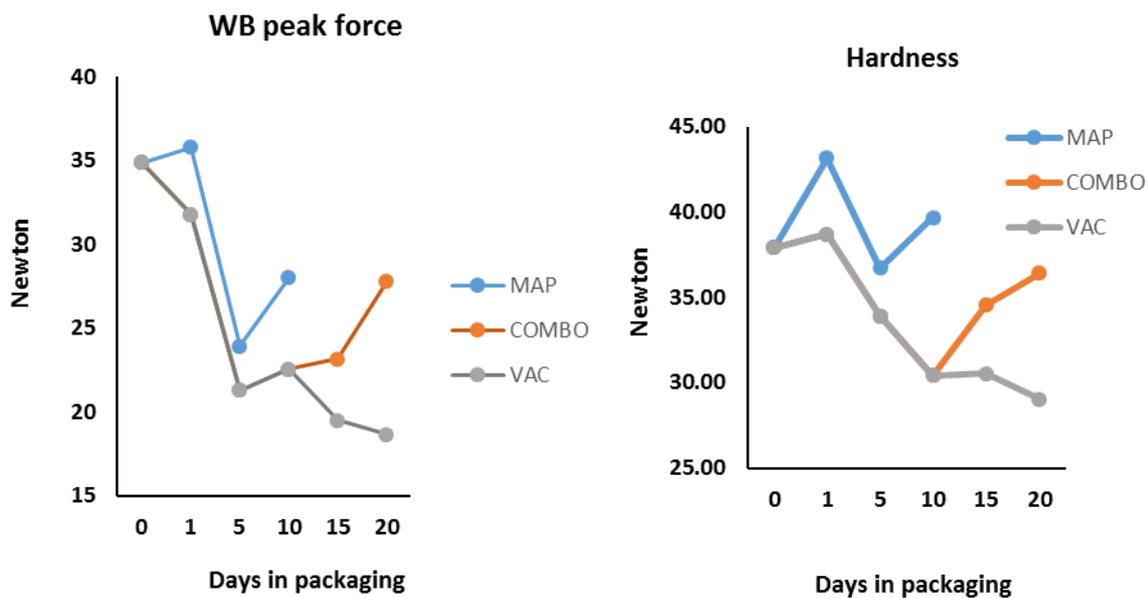
The bottom line was MAP, which is commonly used by retailers, adversely affected most aspects of objective eating quality and this was most obvious for shear force and hardness, which are indicators of tenderness and chewiness respectively. The results are shown in the figures below.

There was little difference in packaging on the indicators of tenderness and hardness up to five days. There was a marked difference in favour of VAC at day 10 and when packaging was changed from VAC to MAP at day 10. At day 10, there was a 22% reduction in tenderness and a 33% increase in the hardness of the loin packaged in high oxygen modified packaging compared to vacuum packaging

HiOxMAP had a negative impact on overall colour, shear force, texture and water holding capacity of Australian pork loins compared to VAC. The adverse effects of MAP were associated with increased lipid and protein oxidation.

The results suggest that the use of hiOxMAP should be limited to pork cuts with a high turnover to reduce storage time to less than five days. Ideally, the results suggest retailers should increase the use of alternative packaging methods such as vacuum packaging and the more recent innovation vacuum skin packaging.

It seems a pity to invest, as we have, in on-farm and more costly processing interventions to improve the eating quality of Australian pork, only to have this eroded by how pork is packed and displayed.



Figures: Effects of high oxygen modified packaging (MAP) and vacuum packaging (VAC) or a combination of VAC followed by MAP on the Warner Bratzler (WB) shear force and hardness of pork loins aged for up to 20 days.

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