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Studies into factors responsible for the acceptability of pork on the Singaporean market

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JASMINE LEONG WOON YING

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ABSTRACT

The thesis reports the results of a series of studies looking into the acceptability of pork on the Singapore market. Anecdotal comments have indicated that pork from some countries had a less acceptable flavour than that produced locally, so a survey was conducted to clarify the situation. This indicated that imported pork, including that from New Zealand, had an undesirable mutton-like flavour. Using pork from female pigs fed either a plant only diet (NZP) or one that included some animal products (NZA) it was shown that Singapore consumers favoured the former due to a lower mutton note. The use of garlic essential oil (GEO) to improve the acceptability of NZ pork either by adding it directly to pork or feeding it to pigs was demonstrated. With increasing GEO, garlic flavour strength increased and mutton flavour strength decreased even when diets of the pigs included animal products.

Concentrations of indolic compounds (indole and skatole) in backfat increased with increasing dietary garlic concentration ($P < 0.001$), and were higher in backfat from the NZA group ($P < 0.05$), but were unaffected by different dietary lipid sources (fish oil, tallow, and a mix of linseed oil and soya oil).

A highly acceptable low-fat (<10%) and low-salt (<450 mg/100 g) pork ball with an n-6/n-3 ratio of <4 was developed as a premium product, and effects on its acceptability were assessed using pork from pigs on different diets. A supplement containing selenium, vitamin E, vitamin C and CLA fed to pigs led to pork and pork balls with increased levels of these items. Inclusion of fish oil in the diet (4.4%) increased the levels of the long chain n-3 fatty acids (LCN3FA) in the pork and pork balls, but also increased measures of oxidation (TBARs), especially after a period of storage, and decreased the acceptability of the product due to increased off-flavours (rancid and aftertaste). This occurred when fish oil was removed from the diet either 28 days or 49 days (early and late feeding stage) before slaughter. Further research into ways of improving the flavour aspects of these products is required.

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LIST OF PUBLICATIONS AND CONFERENCE PRESENTATIONS

Chapter 3

1. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2008). A survey of the perception of pork by Singapore consumers. Poster presented at the NZIFST Annual Food Conference at Rotorua, New Zealand, June 2008.
2. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2008). The survey of perception of pork by Singapore consumers. *Singapore Institute of Food Science and Technology Annual, 2008*, 53-56.
3. Leong, J. (2007). Factors affecting pork flavour. *Singapore Institute of Food Science and Technology Annual, 2007*, 27-32.

Chapter 4

1. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2010). The effects of excluding animal products from the diet on sensory properties of pork from pigs grown in New Zealand as assessed by Singaporean panellists. *Asian - Australasian Journal of Animal Sciences*, 23(1), 122-130.
2. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2009). A comparison of sensory properties of pork from New Zealand and Indonesia using Singaporean panellists. Paper presented at the NZIFST Annual Food Conference at Christchurch, New Zealand, June 2009.
3. Purchas, R. W., Leong, J., Morel, P. C. H., & Wilkinson, B. H. P. (2009). Pork flavour and composition. Paper presented at Advancing Pork Production seminar, Palmerston North, New Zealand, June 2009.

Chapter 5

1. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2008). Attitudes and behaviour of Singapore consumers regarding the use of natural-flavoured plant materials during cooking or consumption of pork: Empirical evidence based on a consumer survey. Poster presented at the World Food Congress in Shanghai, October 2008.

Chapter 6

1. Leong, J., Morel, P.C. H., Purchas, R. W., & Wilkinson, B. H. P. (2010). The production of pork with garlic flavour notes using garlic essential oil. *Meat Science*, 84, 699–705.

2. Leong, J., Purchas, R. W., Morel, P. C. H., & Wilkinson, B. H. P. (2009). Using garlic oleoresin to modify the flavour of pork - from the perspective of Singapore and New Zealand consumers. Poster presented at the World Congress on Fats and Oils at Sydney, Australia, September 2009.

Chapter 7

1. Leong, J., Morel, P. C. H., Purchas, R. W., & Wilkinson, B. H. P. (2010). Effects of dietary components including garlic on concentrations of skatole and indole in subcutaneous fat of female pigs. *Meat Science*, 88, 45–50.
2. Leong, J., Morel, P. C. H., Purchas, R. W., & Wilkinson, B. H. P. (2009). Detection thresholds and odour profiles of skatole and indole in a model system using a Singapore panel. Poster presented at the NZIFST Annual Food Conference at Christchurch, New Zealand, June 2009.
3. Leong, J., Morel, P. C. H., Purchas, R. W., & Wilkinson, B. H. P. (2010). Effects of dietary garlic essential oil on indole and skatole concentration in New Zealand pork. Poster presented at the NZIFST Annual Food Conference at Auckland, New Zealand, June 2010.