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**THE EFFECT OF INTERNAL AND EXTERNAL ROASTING
TEMPERATURES ON PORK SENSORY PROPERTIES, PHYSICAL
MEASUREMENTS AND CONSUMER LIKING**

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ABSTRACT

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The objectives of this research were twofold. Initially it was to quantify the effects of external (roasting) temperature and meat internal (end-point) temperature on the sensory and physical characteristics of selected cuts of pork. Secondly, to investigate Australian consumer preferences to selected cut and cooking condition combinations, and determine the sensory attributes that are most important for preference formation. A two factor central composite rotatable design with independent variables external temperature (120°C-200°C) and internal temperature (65°C-100°C) was used in this trial. A trained sensory panel evaluated the sensory differences of selected cuts (C-loin chop; F-fillet; LE-leg; LO-loin, SH-shoulder, SC-scotch) of cooked pork. Using response surface analysis the effects of these cooking conditions on pork sensory properties (initial and sustained juiciness, pork flavour, hardness, cohesiveness, chewiness) and physical measurements (evaporation loss (%), drip loss (%), cooking time (min/kg), Instron shear force (N), Hunter colour L*, a*, b*) were studied. Sensory attributes initial juiciness (C, F, SC), sustained juiciness (C, F, LE, SC), pork flavour (C, F), hardness (LE, LO, SH), cohesiveness (LE, LO, SH, SC), and chewiness (LO) showed a significant linear relationship with internal temperature. Except for hardness (C) and pork flavour (C, F) all the other sensory attributes showed no significant linear relationships with external temperature. Relationships were also observed between physical measurements and relevant temperatures depending on the cut used. The second stage of consumer evaluation (degree of liking) of selected pork samples was done in Brisbane, Australia and internal preference mapping was used to correlate the trained panel data with consumer data. The results from preference mapping indicated tenderness (hardness) to be the most important sensory attribute driving consumer liking. This segment of Australian consumers primarily liked tender meat that was also flavourful and juicy. Tenderness of pork is achieved at lower internal temperatures for smaller cuts and at higher

internal temperatures for larger cuts. Increasing internal temperature also significantly increases cooking time. Therefore, the recommended internal temperatures for smaller cuts should be within the range 68-70°C and for larger cuts within the range of 80-85°C to optimise the sensory properties in accordance with the liking of this segment of Australian consumers.

The recommended external (ET) and internal (IT) temperatures from this research are: **Chop Roast- ET 160°C-170°C, IT 68°C-70°C; Fillet Roast- ET 160°C-170°C, IT 68°C-70°C; Leg Roast- ET 180°C-190°C, IT 80°C-85°C; Loin Roast- ET 180°C-190°C, IT 80°C-85°C; Shoulder Roast- ET 180°C-190°C, IT 80°C-85°C; Scotch Roast- ET 160°C-170°C, IT 68°C-70°C.**

Acknowledgments

The world of sensory science has always fascinated me. After completing my first degree in nutrition in 1989, further studies in any area was not an option. Living in a developing country meant that finding local institutions which offered courses in specialised areas such as sensory science was virtually impossible. Therefore it has taken me over a decade to fulfill my dream. This work has taken me from "ground zero" to the well established realms of sensory science. The experience I have gained has been well worth it. Not only has my knowledge increased, but I have been enabled to face new challenges and ride the waves of change with the correct attitude. I will always be grateful to my teachers, family and friends who helped me achieve this goal. I wish to take this opportunity to thank some of them by name.

I would often go adrift studying the various statistical methods used to analyse sensory data, and the different methodologies that are practiced in sensory evaluation. Managing both my studies and a full time job also meant difficulty in adhering to a strict schedule. Carol Pound, my supervisor, has always kept me on track which enabled me to complete this thesis. She provided constructive criticism and guidance over an extended period of time.

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