

## ASSESSMENT OF HONEY AS A FUNCTIONAL INGREDIENT IN COOKED PORK MEAT

O'Connell, M.<sup>1</sup>, Kerry, J.P.<sup>2</sup>, Fanning, S.<sup>1</sup> and Gilroy, D.<sup>1</sup><sup>1</sup>Department of Biological Sciences, Cork Institute of Technology, Cork, Ireland and <sup>2</sup>Department of Food Science and Technology, University College Cork, - National University of Ireland, Cork, Ireland.**Keywords** Honey, Pork, Antioxidant, Antibacterial, TBARS numbers and Sensory evaluation.**Background**

Honey is a sweet thick supersaturated sugar solution manufactured by bees to feed their larvae and for subsistence in winter. Sweetness, functional advantages and natural appeal are some of the reasons that honey is a valued food ingredient. Researchers are discovering new uses for honey in food processing and identifying components of honey with the potential to improve human health (Chen *et al.*, 1998). Lipid oxidation and microbial growth are major deteriorative factors in meat systems during storage. Traditional methods of food preservation have included utilising synthetic agents. However, consumers discriminate against food products containing synthetic food additives while preferring the addition of more natural, and in particular, health promoting substances. In addition, food manufacturers actively seek multifunctional food ingredients for ease of use and in order to eliminate the necessity for the use of a wide number of individual food ingredients.

**Objective**

The overall objectives of this study were to evaluate the antioxidative and antimicrobial effects, as well as sensory attributes associated with the use of Australian eucalyptus honey added at a variety of concentrations to a pork meat model system.

**Materials and Methods**

Freshly minced pork was obtained from a local retail outlet. Salt (1%, w/w) was added to pork treatment groups (1.3kg x 4) and blended at low speed for 2 min using a Braun Combi Max 700 food processor. A variety of honey concentrations (0, 5, 10 and 15%, w/w) were added to each treatment group and blended at low speed for 5 minutes. The ground meat mixture was randomly formed into patties (70g, 9.2cm diameter) using a hand operated patty maker. Patties were pan-fried (with 0.5ml of pure vegetable oil) in a preheated teflon-coated electric pan to attain an internal temperature of 72°C. Cooked patties were cooled, overwrapped with cling film and stored under simulated retail display conditions (4°C, 616 lux) for the duration of the trial. Samples from each treatment group were tested on days 0, 2, 5, 7 and 9. Evaluations performed included microbiological analysis (standard plate count), lipid oxidation (2-thiobarbituric acid reactive substances test according to the method of Ke *et al.*, 1977 with minor modifications as described by Hoyland and Taylor, 1991) and sensory evaluation (visual and organoleptic).

All samples used for lipid oxidation and bacteriological analysis were assessed in duplicate using triplicate samples. Sensory evaluations consisted of using a non-trained sensory panel (n=12). Thiobarbituric acid reactive substances (TBARS numbers) were expressed as mg malondialdehyde per kg meat (mg MDA/kg meat) and bacterial counts were expressed as cfu/g.

**Results and Discussion**

The addition of honey to the cooked pork meat model used in this study improved oxidative stability, reduced bacterial counts and enhanced sensorial attributes. Control patties consistently had higher TBARS numbers than all other treatment groups. Levels of lipid oxidation over the storage period decreased as follows: control > 5% > 10% > 15% honey (Fig. 1). These results are in accordance with the findings of Mathew *et al.* (1998) who reported that honey treated turkey samples had the greatest effect on delaying oxidation. No bacterial growth was observed in control samples until day 5 and increasing concentrations of honey delayed the onset of microbial growth (Fig. 2). Microbial growth was observed in the 5 and 10% honey treated groups on days 7 and 9, respectively, while no growth occurred throughout the entire retail display period in patties containing 15% honey. Overall, sensory analysis revealed that panellists preferred the 10% honey treatment in terms of appearance (Fig. 3) while most preferred the flavour (Fig. 4) and texture (Fig. 5) of the 15% honey group. In general, meat samples with added honey had equal to, or greater acceptability in comparison to samples containing no honey. Using honey as a natural antioxidant may result in greater acceptability of cooked meat products and avoid the negative quality and health implications of oxidised meats. The outstanding antioxidant capability of honey in this study indicates the potential for more widespread use. The beneficial results observed in this study could be largely contributed to the production of antioxidative and antibacterial compounds produced during cooking via the Maillard reaction and/or may be attributed to the presence of other components such as natural antioxidants/antimicrobial agents contained within the honey. In this study, honey has been shown to be a useful processing ingredient in cooked meat products.

**Conclusion**

Results showed that meat containing honey had less oxidative rancidity, lower bacterial counts and greater acceptability in relation to appearance, flavour and texture than meat containing no added honey.

**References**

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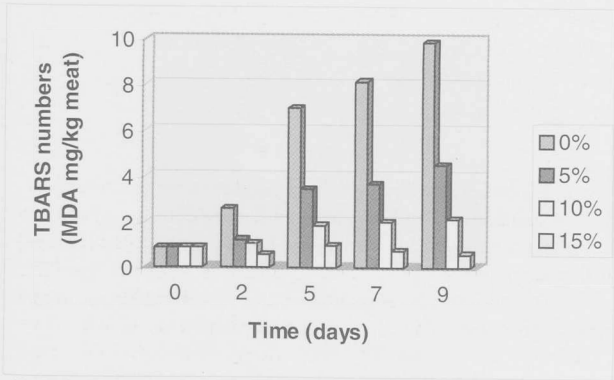


Figure 1. Effect of honey on the oxidative stability of cooked pork patties overwrapped and held under refrigerated display for 9 days.

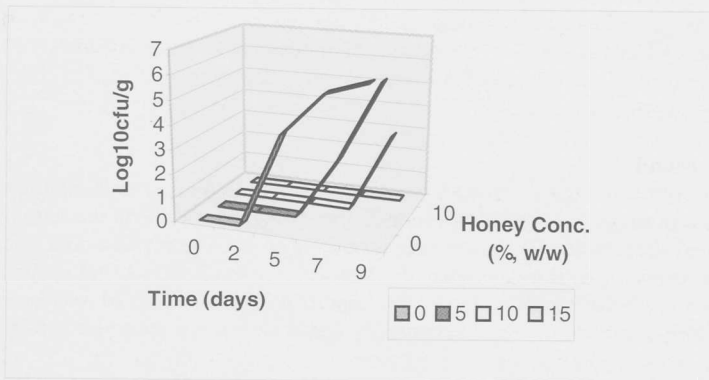


Figure 2. Total plate counts of cooked pork patties overwrapped and held under refrigerated display for 9 days.

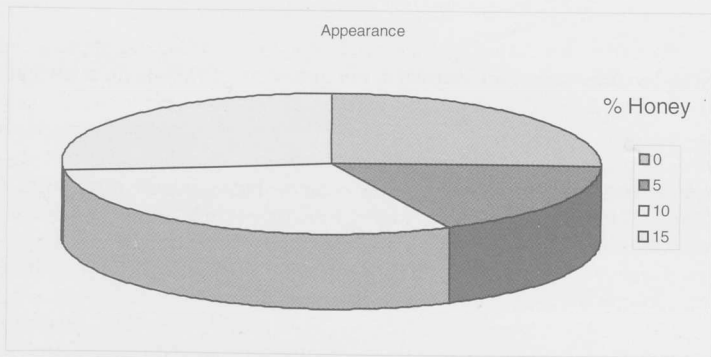


Figure 3. Overall percentage preference values of appearance attributes.

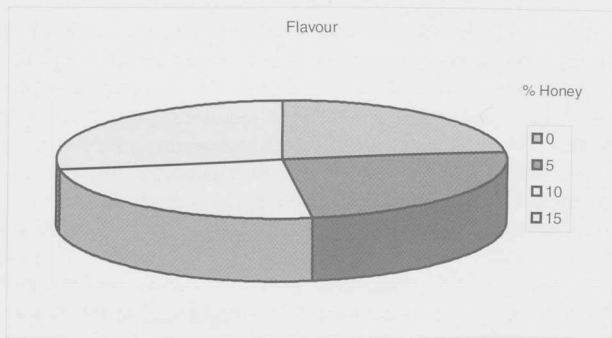


Figure 4. Overall percentage preference values of flavour attributes.

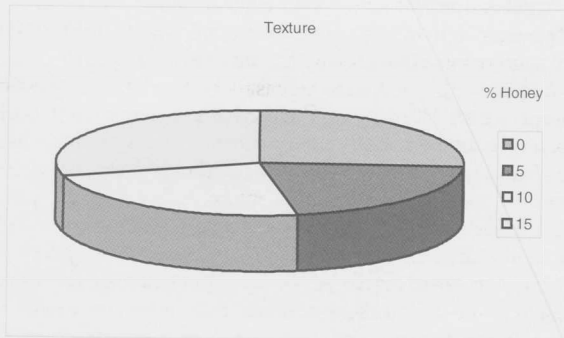


Figure 5. Overall percentage preference values of textural attributes.