

THE EFFECT OF FAT AND MEAT CONTENTS ON PERCEIVED SALTINESS IN MEAT PATTIES

Marita Ruusunen^a, Jukka Vainionpää^b, Marika Lyly^b, Liisa Lähteenmäki^b, Markku Niemistö^c and Eero Puolanne^a^aDepartment of Food Technology, PO Box 27 (Viikki E), FIN-00014 University of Helsinki, Finland^bVTT Biotechnology, PO Box 1500, Tietotie 2, FIN-02044 VTT, Finland^cMeat Research Centre, PO Box 56, Luukkaankatu 8, FIN-13101 Hämeenlinna, Finland**Background**

The saltiness perception of NaCl in meat products is produced by Na⁺ cations together with Cl⁻ anion (Miller and Bartoshuk 1991). Salt is also a flavour enhancer increasing the flavour intensity of the product (Gillette 1985; Matulis *et al.* 1995). Fat and salt together contribute to many of the sensory properties that are characteristics of cooked sausage. When salt level rises it is more noticeable in fatty products than in lean ones (Matulis *et al.* 1994). However, Ruusunen *et al.* (2001) have shown that fat content of cooked sausages affects the perceived saltiness in different ways depending on the composition of the formulation. By replacing lean pork with pork fat, thus increasing the fat content and simultaneously reducing the meat protein content, perceived saltiness of sausages increases but by replacing water with fat on an equal weight basis, the perceived saltiness of the sausage does not change. Therefore, the increase of meat protein content was supposed to have a reducing effect on perceived saltiness.

Objectives

The objective of this study was to evaluate the perception of saltiness in meat patties containing different sodium and fat contents and which were made with or without phosphate and with two different meat contents. The variation in sodium content was achieved by varying the NaCl content.

Methods

Meat patties were made from beef trimming (18.8% fat), pork trimming (44.8% fat), water, textured soy protein, breadcrumbs, potato flakes, seasonings, wheat protein and maltodextrin. Meat patties 90 mm in diameter, 15 mm in thickness were cooked in a contact grill for 2 min 45 s at 150 °C to the endpoint temperature of 80 – 83 °C. Two series of 2³ full factorial designs were done at two meat contents (50 and 60%) both series comprising of 10 trials. The studied variables were fat content (10, 15 and 20%), sodium content (300, 450 and 600 mg Na/100 g) and the addition of phosphate (with or without). Both series were replicated thus resulting in 40 trials in total. The target fat content in the recipes was achieved by varying the proportions of beef and pork trimmings. The target meat content was achieved by increasing the amount of beef and pork trimming and decreasing the amount of added water. The amount of salt to reach the target sodium content, 300, 450 and 600 mg Na/100 g, was evaluated based on earlier studies and they were 0.04, 0.42 and 0.8% NaCl, respectively. The target sodium content is total sodium content of the product containing also sodium from other ingredients as from NaCl.

Saltiness of hot meat patties was evaluated by a trained sensory panel (N=10). The intensity of saltiness was rated on 10-unit graphical intensity scales, which was anchored from its both ends (0=weak, 10=strong). Only the grand means of the evaluations of the panellists were used as the final score in each of 40 trials in the calculations of the response surface models. The models were computed using the general linear regression. The computed models consisted of the linear terms of meat content, sodium, fat and phosphate concentrations as well as the pairwise interactions of sodium, fat and phosphate concentrations.

All the computational work, including the graphical presentations of the response surface models, was performed using a Statistica for Windows software package (version 5.5, edition 99, Statsoft, Inc., Tulsa, OK, USA).

Results and discussion

There was found a weak indication that in meat patties made without phosphate (Figures 1 a, c) the increase of fat content increased the perceived saltiness in both meat contents. In meat products made with phosphate (Figures 1 b, d) this was not found. Fat content had a lower effect on perceived saltiness than meat content and their effect on perceived saltiness was opposite. The increase of meat content had a reducing effect on perceived saltiness. E.g. in meat patties made with 50% meat the saltiness value of 5 was reached when sodium content was 480 mg/100 g (analyzed salt content 0.99%) and in meat patties made with 60% meat when sodium content was 580 mg Na/100 g (analyzed salt content 1.28%) when fat content was 10% (Figures 1 a, c). The same saltiness value 5 was reached with 430 mg Na/100 g (analyzed salt content 0.89%) in meat patties containing 50% meat and in meat patties made with 60% meat with 520 mg Na/100 g (analyzed salt content 1.15%) when fat content was 20% (Figures 1 a, c). The trend was similar in meat patties made with phosphate (Figures 1 b, d). These results confirm our earlier results where the increase of meat protein content in cooked sausages was supposed to have a reducing effect on perceived saltiness (Ruusunen *et al.* 2001).

Conclusions

Fat content had a lower effect on perceived saltiness than meat content and their effect on saltiness is opposite. More salt is needed in meat products with high meat content to achieve the same saltiness as in products with lower meat content.

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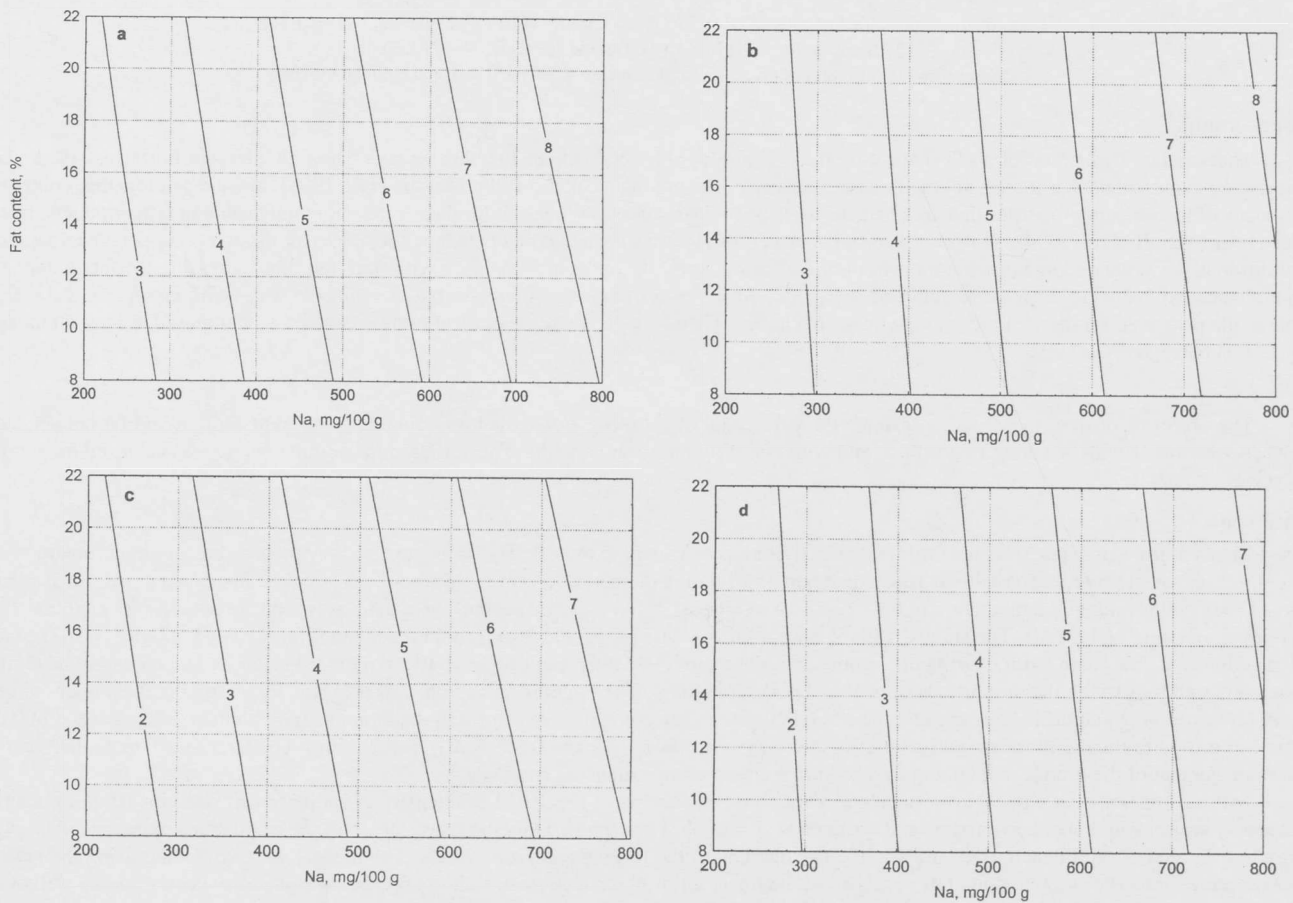


Figure 1. Sensory saltiness of meat patties made with 50% (a and b) and 60% (c and d) meat. a) and c) are made without phosphate; b) and d) contain 0.176% P₂O₅.