THE POSSIBILITIES FOR DECREASING OF SODIUM CONTENT IN COOKED HAMS

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Background

Diets and nutrition do influence significantly functioning of human organism. It is a reason why food can be considered as a medicine. Diets are worked out and used for healing and prevention of growing more vehement of some diseases. The aim of the diet may be also reducing or increasing of certain components in the organism what are dangerous or unuseful for it, for example reducing of NaCl content, amount of sugar, fats etc (Teesalu and Vihalemm, 1998).

Common salt (NaCl) consists of sodium and chlorine ions, both of them are necessary for human being in certain amounts. Physiological need for common salt is 2 – 3 grams per day and recommended amount 5 grams per day, but real consumption in Estonia is 11 – 13 grams (Sool, 1995) or even 15 – 23 grams per day. In Estonia the main quantity of common salt is ingested with black bread (41.6%) and ca 25.1% as the component of meat products.The sources of common salt in the food are usually as follows: 10% is received from native foodstuffs (meat, vegetables etc), 50% is added during the processing in the food industry and 40% is added by consumer before or during having meal. Therefore: the sodium content in diet can be influenced in 90% by explanation to consumers and by production of products with decreased salt content in industries. In the recent time there are no meat products with low salt content (less than 2% NaCl) produced in Estonia. One reason for that is the habit to use meat products what taste salty.

Flavonoids are components of plenty of plants, fruits, berries and beverages (green tea, red wine etc). Flavonoids have effect on the colour, taste and shelflife of foods, the antioxydative effect of flavonoids is also known. Regular consumption of flavonoids can decrease the risk of falling ill with heart and blood-vessel diseases.

The Finnish company Osakeyhtio Six has worked out the mixture Flavomare what consists flavonoids (green tea, onion powder, apple powder), wheat flour, fosfates 8.4%, flavour enhancer, hydrolized plant protein, regulators of acidity, fermented rice (Osakeyhtio, 1998). The main effect of Flavomare is to enhance and emphasize salty taste of products what makes possible to decrease salt content to 1.2% and the product tastes more salty (Selako, 1998). Flavomare can be used as an component of cooked hams or sausages.

Objective

The objective of this study was to investigate the possibilities for decreasing the content of common salt in cooked ham by partial replacing it with mixed salts and using taste relieve spices or components.

Methods

The experimental work was carried out in Filee Meat Processing Plant. Pork for cooked ham was of the best quality – no visible adipose tissues in meat, the experimental batches were in 25 kg. The technology included preparation and injecting of brine, tumbling of meat (15 minutes tumbling, 45 minutes pause, total tumbling time - 14 hours), hams were stuffed into net (diameter 117 mm) having collagen film under it. Hams were cooked to internal temperature 71 °C and chilled. The increase of weight of salted experimental meat by brine injection was 25% and 50%. The brine of control batches consisted 2.2% on nitrite salt, in comparison tests was added the same amount of Pansalt and Natusal-583, in the Flavomare 1st series tests was added nitrite salt and in the Flavomare 2nd series tests -- additionally 0.5% of sodium glutaminate. From every batch three samples were taken for testing and analysing, the results indicate the average of three tests of three samples.

Tested versions were marked as follows:
version 1: control 25 – 2.2% of nitrite salt in brine, increase in weight 25%;
version 2: Pan-salt 25 – 2.2% of Pan-salt in brine, increase in weight 25%;
version 3: Natusal 25 – 2.2% of Natusal in brine, increase in weight 25%;
version 4: Flavomare 25 – 1.2% of nitrite salt in brine, 3.2% of Flavomare, increase in weight 25%;
version 5: Flavomare+NaGl 25 – 1.2% of nitrite salt and 0.5% of sodium glutamate in brine, 3.2% of Flavomare, increase in weight 25%;
version 6: control 50 – 2.2% of nitrite salt in brine, increase in weight 50%;
version 7: Pan-salt 50 – 2.2% of Pan-salt in brine, increase in weight 50%;
version 8: Natusal 50 – 2.2% of Natusal in brine, increase in weight 50%;
version 9: Flavomare 50 – 1.2% of nitrite salt in brine, 3.2% of Flavomare, increase in weight 50%;
version 10: Flavomare+NaGl 50 – 1.2% of nitrite salt and 0.5% of sodium glutamate in brine, 3.2 % of Flavomare, increase in weight 25%.

The chemical composition of added salts was as follows. Chemical composition of nitrite salt (Dansk Salt A/S, 1997): sodium chloride 99.7%, sodium nitrit 0.057% and other components 0.243%; Pan-salt content (Oriola OY Reform-center, 1988): sodium chloride 57%, potassium chloride 28%, magnesium sulphate 12%; Natusal (Lihel OY Maustetehdas, 1997): sodium chloride 58.3%, potassium chloride 33.1 and glukose 8.6%.

The chemical parametres were determined in the Food and Veterinary Laboratory in Tartu and used methods were as follows: protein content (g/100 g) – Hach method, colorimetrically (Hach, 1997); fat content (g/100 g) – AOAC 991.36, Official methods of analyses of AOAC International (Official); moisture content , %, -- ISO 1442:97 (E) (International); common salt content, %, -- Lihateollinen Tutkimuskeskus K 29/.12.67 (Lihateollinen); energetical value – arithmetically; sensory characteristics – by sensory panel of 10 persons according to the modified method of DLG (Deutsche, 1997), 5 points – expected result, 3 points – conciderable faults, 0 points – unfit for consumption.

Results and discussion

It can be seen from the results of analyses that all test samples had common salt content lower than 2% in comparison with control samples what contained 2.59% of NaCl in control 25 and 2.26% in control 50. The lowest salt content was in version 4 (Flavomare 25) – 1.26%.

From the viewpoint of chemical composition (table 1) all products were in accordance with requirements of specifications because there are no minimum limits for common salt in meat products specifications in Estonia.

Table 1. The results of experiments

No of version	Experimental product and weight growth, %	Indexes							
		NaCl, %	Total protein content, g/100 g	Fat content, g/100 g	Energy content, kcal/100 g	Moisture content, %	Flavour, points	General mark, points	Net cost, EEK/kg
1	Control 25	2.59	18.0	1.9	90.9	77.3	5.0	4.9	40.15
2	Pan-salt 25	1.82	19.7	2.5	103.2	76.3	4.8	4.1	42.28
3	Natusal 25	1.93	19.2	2.9	104.8	76.1	4.7	4.5	43.45
4	Flavomare 25	1.26	12.4	10.1	145.3	74.3	2.7	3.4	43.96
5	Flavomare+NaGl 25	1.34	12.1	3.9	86.0	72.8	3.5	3.8	44.08
6	Control 50	2.26	17.0	2.0	87.9	78.7	4.3	4.2	37.93
7	Pan-salt 50	1.71	14.9	3.5	92.0	79.5	2.2	3.1	37.87
8	Natusal 50	1.87	14.2	2.8	82.8	80.5	3.7	3.8	37.73
9	Flavomare 50	1.38	13.9	4.8	101.8	78.0	2.1	2.6	40.57
10	Flavomare+NaGl 50	1.40	12.6	2.5	75.1	77.5	3.8	4.0	40.19

Comparing the influence of quantity of injected brine to sensory parameters it is seen, that mostly were preferred the versions with less brine injection (25%). Our evaluations were not connected with the price of products. Maybe consumer prefers to buy hams with higher water content if the price for them is substantially lower. The problem of healthyness, technology, price and consumer attitude has to be considered as a whole.

The problems appeared with sensory characteristics. The evaluation gave the best result to the version 1 (control 25) were traditional technology for this product. was used. The conclusion may be, that although assessors were informed that they are given a specific product, our sensory panel had certain expectations to products, they are got used to certain quality characteristics and changes in technology or recipe can result in the negative opinion. It is obvious that a great explanation work has to be done to consumers to explain them that they have a choice: either to use traditional product with traditional flavour or healthy meat product with different flavour. It is also obvious that the meat products which consist of untraditional components have to be labelled so the consumer is informed and knows what he is going to buy.

Conclusions

1. The average content of sodium was lowered in cooked hams compared with control tests (the Na content 0.97%) in Natusal tests till 0.76%, in Pan-salt tests till 0.71%, in Flavomare+sodium glutamate tests till 0.55%, and in Flavomare tests till 0.53.
2. Adding Flavomare to cooked hams enhances common salt taste and it makes possible to reduce common salt content in products.
3. Cooked hams with Flavomare have specifical off-taste and it can be improved by adding flavour enhancers, 0,5% sodium glutamate eclipses the untypical taste of the product.
4. There has to be done advertising and explanation of specifics meat products consisting Flavomare before the large scale production of hams with reduced sodium content is introduced.

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