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SALT REDUCTION IN COOKED SAUSAGES

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Introduction

High salt intake can increase the risk of cardiovascular diseases for salt-sensitive individuals. Therefore salt reduction in processed food is an important challenge also for the meat industry. The present study evaluated four levels of salt concentration (19, 17, 15 and 12 g NaCl/kg) and three levels of salt substitution with KCl (3, 6, 9 g KCl / kg) in cooked sausages regarding food safety, sensory perception and technological issues.

Materials and Methods

Cooked sausages (Lyoner standard formulation) were produced at the Education Centre of the Swiss Meat Industry (ABZ), Spiez. Curing salt and potassium chloride content varied as shown in the table 1.

Table 1:

Alter-native	NaCl [g/kg]	potassium chloride [g/kg]
1	19	-
2	17	-
3	15	-
4	16	3
5	13	6
6	10	9
Additional	12	-

All samples were analyzed for the following parameters:

- •total count of aerobic mesophile germs after 1 day and 21 d (AMG)
- •Na-, K- and Cl- contents
- •batter consistency (visual evaluation during fabrication)
- •jelly percentage
- •firmness (Warner-Bratzler)
- •descriptive analysis (attributes salty, bitter, spicy and firm on a 10-point intensity scale) by a trained sensory panel (n=9)
- •hedonic evaluation on a 9-point scale (additional alternative 12 g NaCl / kg) by untrained consumers at 3 sites in Switzerland (n=290)

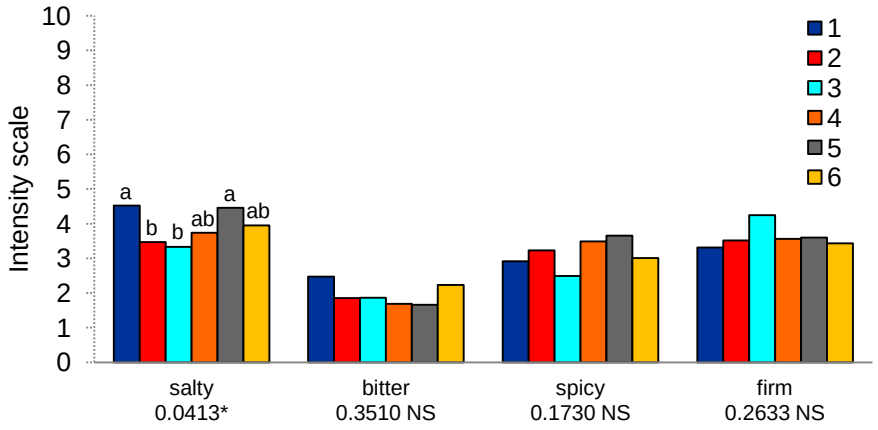

Fig. 1 Descriptive analysis of the 6 alternatives on a 10-point scale by a trained sensory panel (n=9); *significant differences only for salty (p<0.05)

Results and Discussion

All products were of acceptable microbiological quality (after 1 day and 21d, AMG $<10^2$ cfu/g) except alternative 4 (21 d, AMG $<10^4$ cfu/g).

Firmness slightly decreased (shear force: 11.1N → 9.9N) and jelly formation increased in samples with lower salt content. Batter consistency of additional alternative (12 g NaCl/ kg) was critical due to insufficient protein solubilisation. The weak binding resulted in a softer consistency of the end product (not measured instrumentally).

Standard formulation and the formulation with 6 g KCl (alternative 5) were rated significantly saltier ($p<0.05$) than the two alternatives with reduced NaCl-content (Figure 1). For the attributes bitter, spicy and firm differences between the samples were not significant (NS). Expected bitter taste of alternative 6 due to high KCl-concentration was not confirmed by the panel.

In hedonic evaluation (Fig. 2) overall liking decreased with reduced salt content, but only Lyoner 3 (12 g NaCl/kg) was significantly less appreciated than Lyoner 1 and 2. Significant differences in salty taste between the alternatives 19 and 15 g NaCl / kg seemed not to have a significant impact on overall liking.

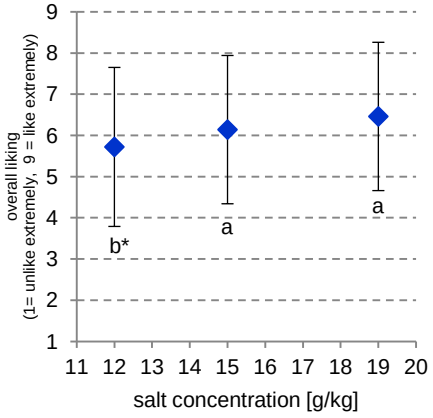

Fig. 2 Means of overall liking (1= dislike extremely; 9= like extremely) of standard and salt reduced Lyoner (n= 290). *significance level p<0.05

Conclusion

Sodium chloride reduction to 12g/kg leaded to insufficient protein solubilisation and reduced water-binding capacity of the batter. This alternative also was significantly less appreciated than the standard formulation in hedonic evaluation (overall liking). A reduction to 15g NaCl / kg seems to be attainable regarding food safety, technological issues and hedonic rating. The reduction limit has to be verified and a stepwise reduction is suggested.

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