

# Reducing salt and monosodium glutamate in frankfurters using a natural flavor enhancer from shiitake byproducts

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**Objective:** This study aimed to evaluate the effect of salt replacement by shiitake stipe extract (SSE) in the development of frankfurters with reduced salt and monosodium glutamate (MSG). To that end, composition, color, texture, saltiness and overall acceptance were evaluated in the reformulated products.

**Materials and Methods:** The SSE was obtained according to Harada-Padermo et al. [1]. Three frankfurter formulations were pre- pared as reported by Pintado et al. [2]: 1) Control (C), with 1.5% salt and 0.5% seasoning; 2) 50% salt and MSG reduction (R50), with 0.75% salt, 1% SSE and 0.25% seasoning, and 3) 75% salt and MSG reduction (R75), with 0.375% salt, 1.5% SSE and 0.125% seasoning. The seasoning contained 5% MSG. Pork meat (58%), pork back fat (20%), sodium tripolyphosphate (0.3%), sodium nitrite (0.012%), sodium erythorbate (0.05%) and water (19.64%) were used in all formulations. The composition was determined by the moisture [3], ash [3], fat [4], protein [2] (Nitrogen Determinator LECO FP-2000), and Na content [2] (ContrAA 700 High-Resolution Continuum Sour spectrophotometers Analytik Jena AG, equipped with a Xenon short-arc lamp GLE). The technological properties evaluated were processing loss, as the weight loss after heat processing and chilling overnight at 2 °C [2], color [2] (CIELAB parameters, Chroma Meter CR- 400, Konica Minolta) and texture, trough texture profile analysis (TPA) (TA- XT.plus Texture Analyzer, Texture Technologies Corp) as described by Bourne [5]. In the sensory analysis, 32 participants used 10- cm unstructured scales to evaluate saltiness (0=little salty; 10=very salty) and overall acceptance (0=dislike extremely; 10=like ex- tremely). Results were evaluated by ANOVA followed by Tukey's test (p<0.05).

**Results and Discussion:** Processing loss was significantly higher in R75. This may have occurred due to the low amount of salt in the formulation (0.375%) since it advantages the extraction of myofibrillar proteins, important for emulsion formation and retention of water in the product [6]. The moisture, protein, and fat contents seem to have been conditioned by the behavior of the sausages during processing. R75 showed significantly lower moisture content and higher levels of protein and fat compared to the other samples, which can be related to the processing loss found in this sample. On the other hand, the ash and Na content was lower (p<0.05) in R75, probably due to the NaCl substitution by SSE. Regarding technological properties, color and texture were little affected by the formulations. For the color parameters, only the L\* value of R75 was significantly lower, indicating that this sausage was darker than the others. In the TPA, the only parameter affected was the springiness in the R75, which was significantly lower than the control sample. Even with 50% salt reduction, the R50 did not differ from the control in terms of saltiness, which may be attributed to the presence of SSE (1%) acting as a flavor enhancer in the sausage. However, when the salt was reduced to 75%, the saltiness dropped significantly. This result certainly influenced the overall acceptance of these frankfurters since R75 samples were poorly (p<0.05) accepted by the panelists.

**Conclusions:** The use of SSE in frankfurters with a 50% reduction in salt and MSG contents showed positive results since the tech- nological properties, saltiness and overall acceptance were similar to traditional frankfurters. Thus, the shiitake stipe can be trans- formed into a value-added product to be used as a natural flavor enhancer in the development of healthier frankfurter, in relation to Na content.

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**Key words:** Shiitake stipes, Frankfurters, Salt reduction, Technological properties, Sensory analysis