

EFFECTS OF L-ARGININE, L-LYSINE AND GLUTAMINASE ON THE WATER-HOLDING CAPACITY AND EATING QUALITY OF SMOKED AND COOKED SAUSAGES

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I. INTRODUCTION

Excessive phosphate intake can impact kidney and bone health, and its accumulation in vivo is significantly associated with the incidence of cardiovascular disease [1]. With the increasing consumers' attention to dietary health, how to reduce the phosphate content in meat products while ensuring product quality has become an urgent problem for the meat industry to solve. To address the above challenges, meat researchers have attempted to replace phosphates with natural ingredients such as cellulose and fungal extracts, but none of them have been able to achieve the full functionality of phosphates [2]. Therefore, the aim of this experiment is to develop a phosphorus-free water-retaining agent that can improve water holding capability while ensuring the quality and flavour of meat products.

II. MATERIALS AND METHODS

A phosphorus-free water retaining agent composed of L-arginine (1.0%), L-lysine (1.0%), and glutaminase (0.6%) was added during the pork chopping process. After stuffing and cooking, the finished smoked and cooked sausage was obtained. The cooking loss and sensory evaluation were measured and compared with the phosphate control group (added 0.4% composite phosphate) and the blank control group (without water retaining agent). The pre-cooking weight of the sausage was set as M1, and the post-cooking weight was set as M2, then the cooking loss was calculated using the following equation: $\text{cooking loss (\%)} = (M1 - M2) / M1 \times 100$. The sausages were cut into 1.5 cm thickness slices and were placed in a tray, and randomly numbered. The three groups of samples were handed over to 10 trained assessors to evaluate the elasticity, compactness, chewiness, juiciness, flavor, and overall acceptability of the samples, with a total score of 7 and 4 as the threshold of acceptance. The data for the quality parameter of smoked and cooked sausages were analyzed using the general linear model variable analysis on SPSS 21.0.

III. RESULTS AND DISCUSSION

Compared to the control and phosphate groups, the production rate of the phosphorus-free water retaining agent group increased by 1.57% and 1.06% respectively. These results indicated that adding phosphorus-free water retaining agent can significantly improve product production rate, and the phosphate-free water retaining agent was superior to phosphate in improving production yield. L-arginine and L-lysine can increase the pH of the protein system and enhance the solubility of myosin, thus improving the water holding capacity of meat products [3]. Glutaminase promotes the cross-linking between proteins, making the gel state of proteins more compact and stable [4].

Fig. 1 indicates that the sensory scores of the smoked and cooked sausages with phosphorus-free water retaining agents are significantly higher than those of the blank group, and are significantly better in terms of elasticity, chewability, flavor, and overall acceptance than those of the phosphate group sausages. The phosphorus-free water retaining agent can enhance the edible quality of the

product, and the effect is better than phosphate. L-arginine and L-lysine can improve meat flavor, in which lysine is involved in the Maillard reaction, and can generate 10 kinds of volatile [5].

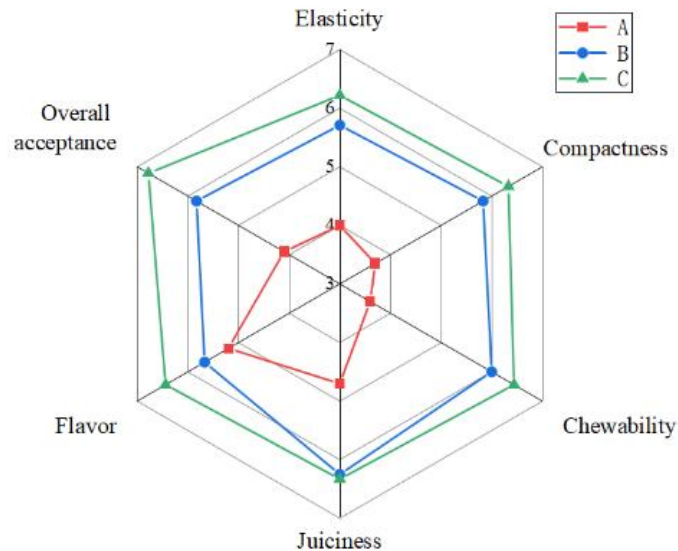


Figure 1. Effects of different water retaining agent treatments on the sensory evaluation of smoked and cooked sausage. A represents the blank group; B represents the phosphate group; C represents the phosphorus-free water retaining agent group.

IV. CONCLUSION

The phosphate-free water retaining agent composed of L-arginine, L-lysine, and glutaminase can replace the complex phosphate in smoked and cooked sausages while improving the water retention and edible quality of the product.

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