

INFLUENCE OF ACIDITY REGULATORS ON SWELLING ABILITY OF MUSCLE FIBERS

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Abstract - to choose a right quality composition of stabilizers for meat injection, a selection of an acidity regulator in terms of the degree of its effect on swelling ability of muscle fibers during salting is important. The paper presents results of the investigations of different kinds of food-grade phosphates and sodium citrate on muscle fibers diameter and strength properties of meat.

I. INTRODUCTION

Modern production of smoked-cooked products from pork caters for the use of intensive methods of salting using the technologies of multi-component brines injection. This allows improving both sensory characteristics of products from pork (tenderness, consistency) and economical indices of production efficiency. A necessary recipe component of multi-functional brines is acidity regulator – food grade phosphates. Meat industry specialists face the problem of selection of a most efficient acidity regulator among a large diversity of phosphate-containing food grade phosphates for use in production of whole-piece meat products. Moreover, the negative opinion formed in recent time about food phosphates, related to their unfavourable effects on health poses the task of searching for alternative solutions. Thus, some research workers consider that citrates are capable to substitute phosphates, especially in the case of frozen meat, because as a result of freezing/defrostation processes the actomyosin complex in muscle tissue decomposes into actin and myosin, and the role of phosphates in this case is just to increase pH.

To validate the choice of a more efficient acidity regulator being a part of multi-component brines for pork injection, the institute has conducted complex investigations of functional properties of food phosphates and citrates with regards to the degree of their effects on swelling of muscle fibers during salting.

II. OBJECTS AND METHODS OF INVESTIGATIONS

Model samples of muscle tissue injected at 50% to meat mass with brines containing cooking salt in the amount 5.0% and different acid regulators in the amount 0.45% (in terms of P_2O_5 or anhydrous citrate) served as the objects of investigations. They were kept during 6 hours, the diameter of muscle fibers and physical and chemical properties of meat were determined and then they were subjected to structural-mechanical tests using the all-purpose unit “Instron”, to measure breaking stress.

III. RESULTS AND DISCUSSION

There is no common opinion regarding selection of acidity regulator. Therefore, microstructure investigations of muscle tissue samples salted with different added acidity regulators were carried out. The results of the investigations have shown that sodium citrate and different kinds of phosphates have an impact on swelling of muscle fibers in different degree. Thus, the largest impact on swelling of muscle tissue evaluated by the diameter of muscle fibers (Fig. 1) had a complex phosphate preparation, containing a mixture of di-, tri and polyphosphates.

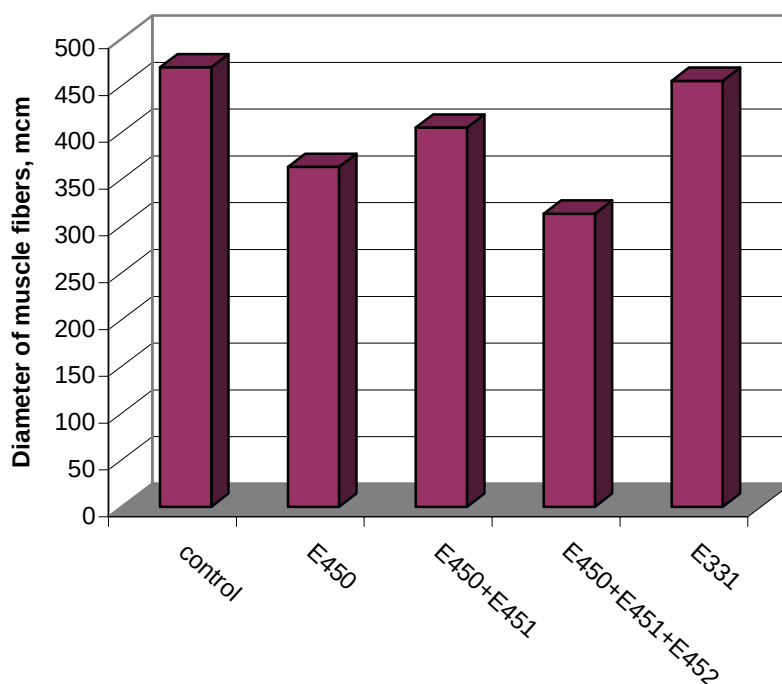


Fig. 1. Influence of phosphates and sodium citrate on muscle tissue diameter

Structural-mechanical tests (Fig.2) allowed to establish that the control sample and the sample injected with the brine added with sodium citrate had the highest values of breaking stress, and at the same time the improvement in structural and mechanical properties of the sample, containing the mixture of di-, tri and polyphosphates was observed.

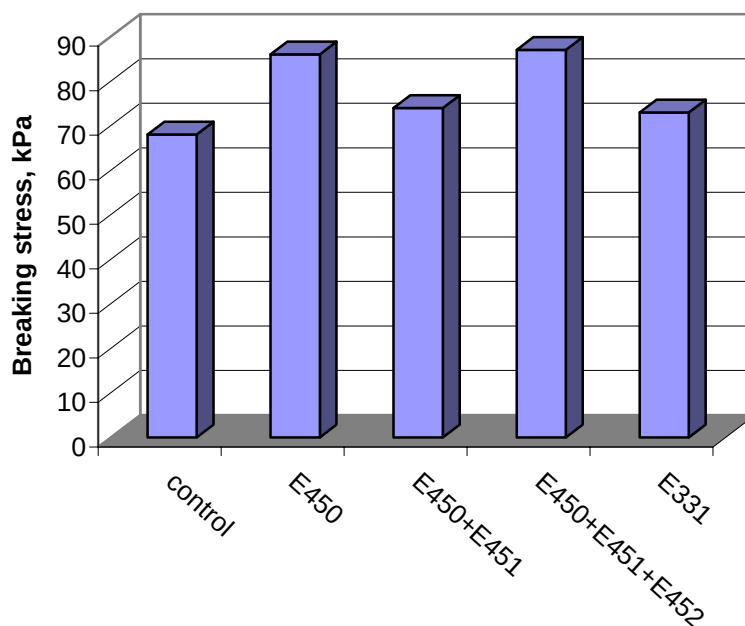


Fig. 2. Influence of phosphates and sodium citrate on breaking stress of meat

The results of pH investigations have shown that its highest increase was observed in the samples injected with brines, containing two-component and three-component phosphates-bearing preparations which in their turn had high pH value of the 1% solution. Thus, the results of investigations on the influence of different kinds of phosphates and sodium citrates on swelling of muscle fibers, structural-mechanical and physico-chemical characteristics of meat have shown that complex phosphate-bearing preparations, containing the mixture of di-, tri and polyphosphates have the largest impact on meat raw materials.