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Effect of Electrical Stimulation on the Fresh-Killed Meat and On Quality Smoked Sausages.

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ABSTRACT

The study of the use of electrical stimulation of meat and bacterial preparation of propionic acid bacteria on the quality of smoked sausages. Established improved sensory indicators and the reduction of the residual sodium nitrite in the experimental samples of products. An increased amount of vitamin B₁₂ in the samples with the bacterial preparation.

Keywords: electrical stimulation of meat, meat products, bacterial preparations

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INTRODUCTION

To speed up the ripening process of meat and increase its tenderness in the practice of meat production using different processing methods. Wide application finds a way to impact on the meat of pulses of alternating electric current - electrical stimulation (ES).

Using ES largely accelerates the ripening process, improves the tenderness of meat. As a result, the directional growth of microflora in the process of manufacturing raw sausage acquires new qualitative characteristics. To accelerate this process allows the introduction of the raw material of lactic ferments and denitrifying bacteria. For starters the most common mixture of lactobacilli and micrococcus. As a result of studies on the use of propionic acid bacteria in the meat industry it established that these bacterial preparations have a positive effect on quality parameters of minced meat for sausage. Propionic bacteria synthesize significant quantities of vitamin B₁₂, fatty acids, amino acids, phospholipids, and others [1,2].

Thus, the perspective is seen research aimed at developing the production technology of smoked sausages with meat electrical stimulation (ES) and introducing concentrate propionic acid bacteria (CPB) at the stage of salting and assess the quality of finished products.

MATERIALS AND METHODS

Investigations were carried out in the laboratories of the university and at a meat processing plant. Beef carcasses were collected in doubles able within 30-40 minutes after the electrocution. The left half carcasses were subjected to electrical stimulation for 3 min: 36 V, 50 Hz. Of right and left carcasses semitendinosus isolated, comminuted in a meat grinder (diameter 5-6 mm apertures of the lattice), was added sodium chloride in an amount of 3% by weight of the feedstock. The following samples were studied for minced smoked sausages: control - from the right side without treatment; experienced one - in the right half-carcasses, with the addition of the CPB in the amount of 3 units. activity of 100 kg of raw material and experienced 2 - from the left half-carcasses are subjected to ES, with the addition of the CPB in the amount of 3 units active per 100 kg of raw material.

Samples were kept in a salting at 3 ± 1 ° C: the control - 24 hours, 1 prototype - 8 hours, 2 experienced - 6 hours. Once the stuffing all the samples was formed into sausage casings and sent to survive at 6 ± 2 ° C: control sample - 24 hours; experienced 1 - for 6-8 hours; 2 - for 8-10 hours. Composition for smoked sausages included beef (60%), pork fat (40%), spices, salt and sodium nitrite. Further operations were performed according to the technological instruction for production of smoked sausages.

RESULTS AND DISCUSSION

Qualitative evaluation of the finished product were carried out on organoleptic, physical and chemical parameters by standard methods [3,4].

When the organoleptic studies made sausages on a nine-scale test samples get better grades (Table 1).

Table 1: Sensory analysis of samples

Sample sausages	Sensory evaluation, scores						Total organoleptic evaluation, score
	Appearance	Type and color of on a cut	Smell	Taste	Texture	Juiciness	
Control	7,1	6,7	6,8	6,4	6,4	6,1	6,6
Test sample 1	7,5	7,4	7,4	7,4	7,0	6,6	7,2
Test sample 2	7,7	7,5	7,5	7,8	7,3	7,3	7,5

Tasting Commission noted that sausages made with ES of raw meat and add bacterial concentrate differed more dense texture, a pronounced taste and aroma. Test samples of sausages were on the section more vivid and saturated color, a monolithic structure of meat.

Spectrophotometric method with a spectrophotometer SF-18 were determined integral color characteristics of sausages: index of grace, saturation, and brightness of pinkness (Table 2).

Table 2: The spectral characteristics of the samples

Sample sausages	Index of color			
	Light shade	Rich color	Pink shade	Brightness
Control	57,23	11,16	41,05	0,125
Test sample 1	57,23	11,95	57,52	0,145
Test sample 2	57,23	11,95	58,26	0,155

These sensory evaluation are consistent with the results of spectral analysis of the color characteristics of sausages. Test samples had higher index values of brightness, saturation and pink color than the control. The results of the physico-chemical studies smoked sausage showed a decrease in the residual sodium nitrite in test samples as compared with controls (Table 3).

Table 3: Physical and chemical parameters

Sample sausages	Physical and chemical parameters		
	Salt, %	Moisture, %	Sodium nitrite, mcg / 100 g product
Control	3,47	46,70	0,0028
Test sample 1	3,46	45,02	0,0009
Test sample 2	3,46	45,03	0,0007

This is probably due to the action of propionic acid bacteria that contribute to the formation of nitric oxide involved in the synthesis of nitrosomyoglobin. Moisture content and salt samples sausages slightly different from each other.

It is known that propionic acid bacteria synthesize significant quantities of vitamin B₁₂, which is contained in the meat, but partially destroyed by cooking. The content of vitamin B₁₂ in the sausages was determined by spectrophotometry. In test model 1 vitamin content of 2,1 micrograms per 100 g of product, test model 2 – 2,9, whereas in the control – 1,5 micrograms.

The data indicate that the test samples smoked sausage vitamin B₁₂ content exceeds the content of control in 1,3-1,9 times. The ability of propionic acid bacteria synthesize vitamin B₁₂ partial fills his loss in the meat during processing.

On the basis of researches the technology of production of smoked sausages with pre-treatment of raw materials and the addition of electrical stimulation of the CPB, which has been tested in a production environment, and received a positive assessment.

CONCLUSION

Thus, the use of biotechnological methods and electrophysical effects on raw materials can reduce the duration of the production process and ensure high quality smoked sausages.

REFERENCES

- [1] Vladimir Vsevolodovich Sadovoy, et a. Res J Pharm Biol Chem Sci 2014;5(5):1530-1537.
- [2] Vladimir Ivanovich Trukhachev, Vladimir Vsevolodovich Sadovoy, Sergei Nikolayevich Shlykov, and Ruslan Saferbegovich Omarov. Res J Pharm Biol Chem Sci 2015 6(2):1347-1352.
- [3] Shaliko Zhorayevich Gabriyelyan, Igor Nikolaevich Vorotnikov, et al. Res J Pharm Biol Chem Sci 2015;6(3):1345-1350.
- [4] Natalja Jurevna Sarbatova, Vladimir Jurevich Frolov, Olga Vladimirovna Sycheva, and Ruslan Saferbegovich Omarov. Res J Pharm Biol Chem Sci 2015;6(4):962-965.