

MODERN BIOTECHNOLOGIES IN MEAT PRODUCTS PRODUCTION

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Introduction, background

Today the main task of meat industry in this country is the production of ecologically safe products. In the state concept concerning healthy nutrition of Russian population for the period till 2005 the main direction of activities is to raise the importance of biotechnological processes during processing of agricultural raw material, including development of new kinds of meat products for general and special purpose using enzymic preparations (EP) and biologically active matters (BAM). In this connection it is expedient to use without-needle injection of multicomponent brines in combination with a needle method that provides deeper penetration and better distribution of curing ingredients. The scientists of the Chair of meat technology and meat products of MGUPB are developing qualitatively new technologies for low-calory products, with directed alterations of chemical composition and with high content of vitamins and minerals, that brings the product nearer to physiological needs of a human being. As a rule, properties of initial, especially collagen-containing, raw meat are modified by heat treatment in media where pH is regulated by injections of organic acids (acetic, citric and ascorbic acids). Sensory characteristics, histological analysis and structural and mechanical properties of samples are evidence of loosening and exfoliation of connective tissue, disaggregation of fibres, raise of plasticity. Processing with the help of these methods allows to get raw material from which the finished product with improved sensory and functional-technological characteristics can be obtained.

Objective. Methods

The purpose of our generalized research was to study the use of enzymic and bacterial preparations for biotechnological modification of collagen-containing raw material and its application as the main component of cured formed meat products, sausages and half-finished products. At each stage there were three samples for research: sample treated with brine, containing enzymic preparation; sample cured with brine containing starter microorganism (MO) cultures and 1 % of enzymic preparation; control sample cured with traditional brine.

Results and discussion

It was shown that the effect of an enzymic preparation and a complex of bacterial cultures becomes apparent during curing at the temperature 2-4 °C. The addition of complex of starter microorganism into the brine, containing an enzymic preparation, intensifies their mutual influence on collagen of connective tissue in comparison with the sample, treated only with the brine containing enzymic preparation. The sample of the whole muscle piece cured in this way has soft and plastic consistency and light-pink colour.

Table 1.

Object of research	Moisture, %	Fat, %	Ashes, %	Protein, %
Control	71.9±1.2	4.2±0.1	3.45±0.2	21.5±0.3
Brine + 1 % EP	74.0±1.1	4.0±0.1	3.40±0.1	18.6±0.8
Brine + 1 % EP + MO	73.0±1.3	4.1±0.1	2.90±0.2	20.0±0.5

As seen in the table, the addition of starter cultures of microorganisms and an enzymic preparation slightly increases the content of moisture in the product in comparison with control sample. Since the enzymic preparation causes splitting of organic compounds and accumulation of products of deep breakdown in meat, which are a good nourishing medium for microflora development, it is necessary to begin research to determine sanitary-hygienic condition of raw meat and finished products. Data of this microbiological research are presented in table 2.

Table 2.

Name	Initial raw meat	Meat after curing		Finished product
		1 version	2 version	
Total count of microorganisms, CFU/g	2.5·10 <sup>5</sup>	7.3·10 <sup>5</sup>	8.8·10 <sup>6</sup>	2.1·10 <sup>2</sup>
Count of lactic-acid microorganisms, CFU/g	1.2·10 <sup>2</sup>	3.2·10 <sup>3</sup>	6.7·10 <sup>6</sup>	-
Presence of sanitary-indicative microflora:				
E. Coli	+++	+	-	-
Pr. vulgaris	++	-	-	-

During curing the quantity of microorganisms in the raw meat is increasing through the increase of useful salt-resistant microflora (bacteria of type *E. coli*, *Pr. vulgaris*).

When curing is finished the number of lactics reduces slightly and in the 1 version (brine + 1 % EP) makes 45 % and in the 2 version (brine + 1 % EP + MO) – 75 % of the total quantity of microorganisms.

Sanitary indicative microflora is either absent completely, as in the version 2, or makes single colonies, as in version 1.

Thus, injection of the enzymic preparation and the complex of bacterial cultures allowed to reduce duration of heating of fermented raw meat from 6-8 to 3-4 hours. The obtained product acquires a specific pleasant taste, aroma and consistency.

Analysis of published materials and results of our own research, presented in this paper, testify to necessity to manufacture a wide range of products with the addition of enzymic preparations and biologically active matters. Working out of these products must be based on the principles of balance of food allowance and provide normal vital activity of people.

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