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Modern Technological Solutions In The Production Of Restructured Ham.

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ABSTRACT

Based on the research conducted, a number of technological solutions are substantiated, which contribute to obtaining high-quality ham restructured products. The effect of the joint use of Lact-OH concentrate and the protein preparation AproPORK HF85 on the functional and technological indicators of the finished product is shown.

Keywords: restructured ham, protein preparations, sodium citrate, quality indicators.

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INTRODUCTION

Ham restructured meat products are highly popular among buyers, which leads to their significant place in the total production of meat products. This is facilitated by the high taste qualities of the products, which make it a delicacy product. However, the current trend towards intensification of the process, increasing the yield of the finished product, as well as the instability of the technological characteristics of raw materials, often causes problems associated with obtaining the desired quality characteristics of finished products. In this case, most often, it concerns the process of restructuring - the reconstruction of the monolithic structure of meat from small pieces, which is decisive in shaping the consumer characteristics of the finished product.

One of the ways to solve this problem is the use of technological additives that increase the adhesive-cohesive interaction in the stuffing system. From the standpoint of assessing the impact of additives made on the nutritional and biological value of the final product, the most rational is the use of protein preparations of animal origin, due to their high adhesive properties, which will certainly have a positive impact on the process of restructuring stuffing system. In addition, the expediency of their use is justified by the full value and balance of the amino acid composition and the ability to organically fit into the composition of the product, due to its good compatibility with muscle proteins [3].

Today, the concept of food quality in general, and meat in particular, means not only that it has the desired sensory characteristics, but also ensuring its safety and high biological value. Therefore, issues of the development of meat products free of food phosphates, as well as enriched with functional components, are topical.

MATERIAL AND METHODS

To study the possibility of improving the quality of restructured meat products through the use of modern protein preparations, a number of studies were conducted in the conditions of scientific and technological laboratories of the department of agricultural production technology and processing at the Stavropol State Agrarian University. Milk protein-carbohydrate concentrate "Lact-OH", protein preparation AproPORK HF85, model stuffing systems and finished restructured products were chosen as objects of research. Samples were prepared as follows: chilled boneless pork (NOR) from the hip portion with an autolysis period of 48 hours was ground ($d = 16-24$) and salted in a massager, with added salt to it (2.2 kg per 100 kg minced meat), sodium nitrite, protein additives (instead of part of raw meat), sodium citrate and ice water in the amount of 30% (over the mass of minced meat). Protein supplements were made within: for MPCC "Lact-OH" - from 2 to 6%, for the drug AproPORK HF85 - from 1 to 3%. Sodium citrate trisubstituted in an amount of 0.3% by weight of the raw material was introduced into the model systems as a functional component. Based on previous studies, it was found that, at this dosage, sodium citrate does not affect the taste of the finished product, and although the effect of sodium citrate is weaker compared to food phosphates, it can have a significant positive effect on the functional and technological characteristics of meat systems. This creates prerequisites for its use in the development of healthy food products, the concept of which creation is aimed at obtaining a useful and safe product, without striving to make it as cheap as possible [1].

The duration of the mechanical processing of raw meat in the salting was carried out according to the cyclic scheme of 20 minutes active phase, 20 minutes rest for 6 hours.

After massaging, the salted raw material was sent to ripen at a temperature of 2-4 ° C for 24 hours. The ripened salted raw material was molded into a polyamide casing and was subjected to heat treatment (cooking) in a thermal smoke chamber at a temperature of 80 °C until reaching the center of the button 72 °C. The control sample was made according to a similar recipe with the introduction of sodium citrate, but without replacing raw meat, with the same duration of massaging.

When conducting research used standard and special techniques, with 3-5 replicates. Processing of the experimental results was carried out using the program Statistica 6.

RESULTS AND DISCUSSION

Among the large range of protein supplements on the market of functional ingredients, milk protein-carbohydrate concentrates (MPCC) deserve special attention. These concentrates are favorably distinguished by high biological value, good functionality and low cost, which leads to the possibility of their use in the technology of meat products, including the functional orientation. The creation of a new generation of MPCC is carried out by scientists of the North Caucasus Federal University (formerly North Caucasian State Technical University), where, under the guidance of Academician A.R. Khramtsov developed a line of dairy concentrates in which a part of lactose is isomerized into a powerful prebiotic, lactulose. One of the latest developments is the milk protein-carbohydrate concentrate "Lact-OH", the characteristics of which are presented in table 1.

Table 1: Chemical composition and functional - technological properties of the concentrate "Lact – OH"

Indicator	Value
Content%	
- dry matter	96.2
- squirrel	26.3
- carbohydrates, including:	61.4
- lactulose	14.2
- mineral substances	not determined
pH value, units	6.76
Water absorption capacity,%	168.0
Fat-absorbing ability,%	not determined
Solubility index, cm3 of crude sediment	0.29
Emulsifying ability, g fat per 1 g of protein	not determined

Introduction to the composition of the meat product concentrate "Lact-OH" can improve its nutritional status, giving it a functional focus due to enrichment with lactulose [2]. At the same time, lactose and lactulose contribute to improving the taste characteristics of the product by softening and masking the salty taste.

However, it should be noted that the introduction of milk protein does not allow to obtain the desired consistency of the restructured meat product, due to the absence of milk proteins display the gel-forming ability during heat treatment. In this regard, it is advisable to apply the concentrate "Lact-OH" in conjunction with other protein preparations that are effective builders.

Collagen protein preparations based on pork skins, as well as cattle hides and tendons, are becoming increasingly popular among meat producers. This is primarily due to their high functional properties and wide use possibilities. However, collagen proteins are inferior, in the light of which promising is their use in combination with high-grade proteins, in particular, blood plasma proteins.

One of these protein preparations is AproPORK HF85, produced by Proliant Meat Ingredients, based on collagen protein and porcine blood plasma (Table 2).

Table 2: Characterization of the protein drug AproPORK HF85

Indicator	Content, %
Mass fraction:	79,71
- protein	5,59
- moisture	2,9
- fat	0,95
- carbohydrates	10,85
- ash	7,71
PH value (1% dispersion), units	9,35
Critical concentration of gelation (CCG),%	0,63

This preparation is characterized by full value and a good balance of the amino acid composition of the total protein, due to the content of all essential amino acids, which compares favorably with the preparations of pure collagen proteins. A relatively high value of active acidity (pH) will contribute to an increase in the similar indicator in the meat system, which will favorably affect the hydrophilic properties of muscle proteins.

The magnitude of the critical concentration of gelation (CCG), which amounted to 9.35%, led to the conclusion of the good gel-forming ability of the drug AproPORK HF85.

To study the nature of the effect of the considered protein supplements on the adhesion of the stuffing system and the indicators of the finished product, an experiment plan was implemented.

As a result of processing the experimental data, response surfaces were constructed, which are the graphical interpretation of the identified dependencies. The study of the values of the ultimate shear stress of model samples of salted semi-finished product showed that with the introduction of MPCC "Lact-OH" from 1.5 to 5.0% and AproPORK HF85 from 1.4 to 1.8%, this value is increased to level 5, 8-6,2 kPa, due to the strengthening of the adhesive interaction in the stuffing system through the introduction of protein adhesives (Fig. 1).

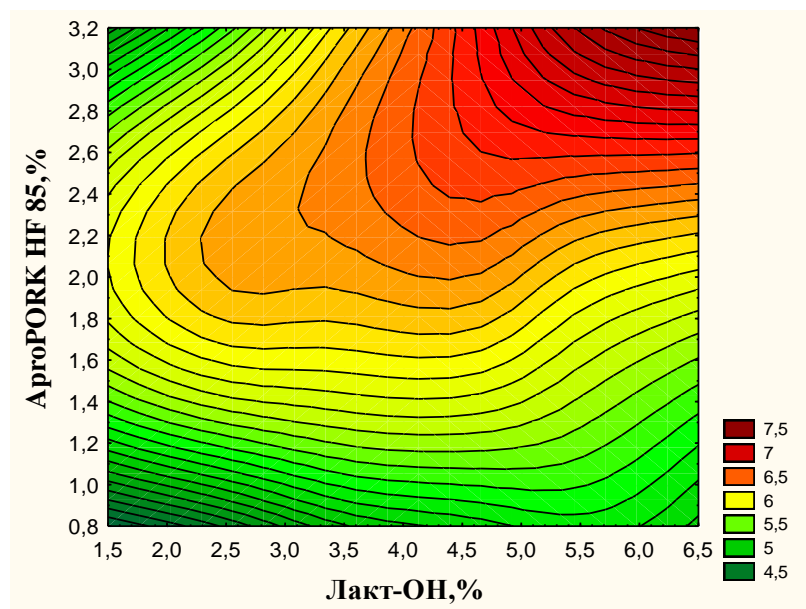


Figure 1: Response surface section for SSL, kPa salted semi-finished product, describing the dependence of this indicator on the introduction of MPCC Lact-OH product and AproPORK HF85 product

A generalized analysis of the isolines of the response surface sections (Figure 2 a-d) showed that with the Lact-OH concentrate application range - 4.5–4.8% and AproPORK HF85 - 1.6–1.9%, the finished product is obtained with the best quality characteristics, significantly superior to the control sample (Table 3).

Table 3: Comparison of technological indicators of control and experimental samples of restructured ham

Indicator	Control	Experienced
Water-holding capacity,%	85,3	90-92
Organoleptic evaluation score	6,8	8-8,2
Cutting force, kg / cm ²	11,4	9-9,5
Losses during heat treatment,%	23,2	8-9

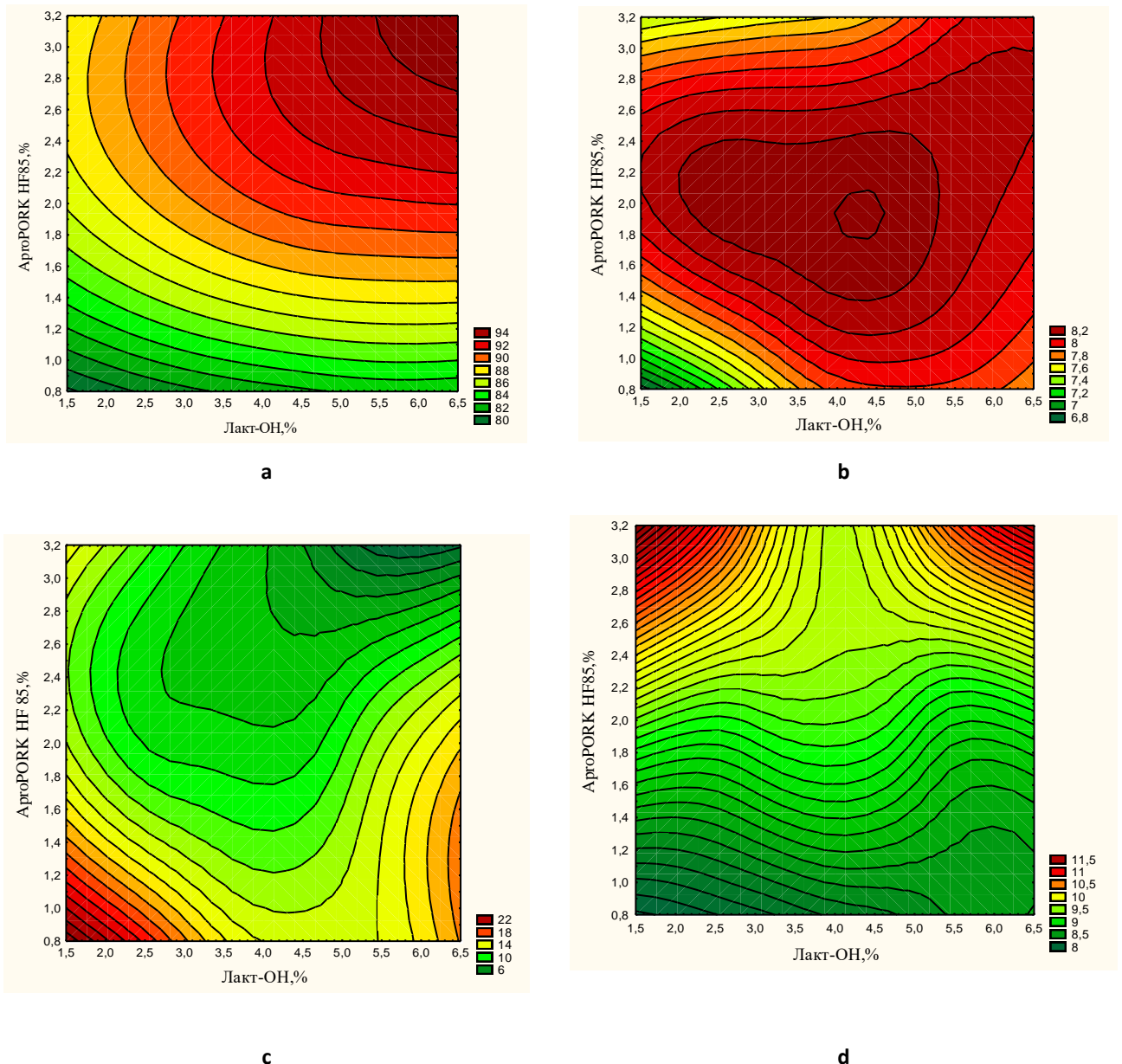


Figure 2: Section of response surfaces for: a - water-holding capacity, b - organoleptic evaluation, c - losses during heat treatment, d - cutting effort of samples of restructured meat product

The high value of the water-holding capacity in the test sample indicates a stronger bond between moisture in the product, which will favorably affect the stability of product quality during storage, making it possible to minimize the manifestation of syneresis. Preliminary studies have shown that the value of cutting effort at the level of 9-9.5 kg / cm² provides optimal structural and mechanical characteristics of the restructured meat product from the standpoint of an overall assessment of its consistency and biting sensations.

The high level of losses during the heat treatment of the control specimen determined its hard consistency, the high value of the cutting effort and, as a result, the reduced organoleptic evaluation.

CONCLUSION

Thus, the combined use of Lact-OH concentrate and AproPORK HF85 allows to obtain a product with high quality characteristics, which opens up prospects for further research on the in-depth study of the developed product.

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