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The Use of Milk Protein-Carbohydrate Concentrate "LACT-ON" in the Technology of Delicatessen Meat Products.

Anatoliy Georgievich Molchanov*, Valeriy Georgievich Zhdanov, Aleksandr Valentinovich Ivashina, Alexey Valerevich Efanov Sergei Nikolayevich Shlykov and Ruslan Saferbegovich Omarov.

Stavropol State Agrarian University, Technological Management Department, Zootekhnicheskiy lane 12, Stavropol 355017, Russia Federation.

ABSTRACT

Through theoretical and practical studies proved the usefulness of milk protein-carbohydrate concentrate "LACT-ON" in the technology of delicatessen meat products, the main qualitative characteristics of the experimental whole-muscle samples produced with the use of concentrate "LACT-ON". Based on modern methods of statistical data processing was developed optimal formulated composition using a concentrate "LACT-ON".

Keywords: meat products, cut meat delicacies, brines, lactulose, milk proteins.

Corresponding author

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INTRODUCTION

Today, among not only specialists but also ordinary consumers, no doubt about the fact that human health is directly related to the food that he consumes daily. In the evaluation of food quality limiting factor usually is the lack of protein in the diet or inferiority. Doctors recommend including in the diet of meat, as it contains large amount of protein, vitamins, minerals and other necessary substances to the body.

However, the quality of meat products does not meet the requirements of nutrition. This is due primarily to the use of many substitutes for raw meat to reduce the cost of production as low-cost production demand among consumers.

In modern industrial conditions, the percentage of the injection of brine into meat raw materials is in the range from 20-30 up to 50-80% by weight of raw materials. At a high percentage of injection significantly reduced the palatability and nutritional value, and increases the content in the final product water and thus reduce the protein content [1].

One of the real ways of solving this problem is to use as meat-substitute ingredients proteins from recycled raw milk - whey and skim milk.

Milk proteins possess valuable functional and technological properties, such as high water-binding and gel-forming ability, thereby increasing the yield. The special significance it has because the meat processing industry has a large share frozen meat at different storage time in the frozen state. This raw material has a low water-holding capacity, and taste qualities. Currently, the processing goes a considerable quantity of pork with signs of PSE. The use of PSE meat in meat production leads to an increased loss of moisture during the heat treatment and deterioration of the taste of the finished products (sour taste, hard consistency, reduced juiciness). It is quite natural that the use of such raw materials also requires the introduction in the formulation of additional functional ingredients. In addition, milk proteins not only have indifferent taste and smell, but also contribute to the improvement of senses characteristics. They make meat tender milk products taste, as well as to eliminate undesirable flavors of other ingredients [2, 3].

Increasing importance of functional food with pronounced preventive healing properties, which also determines the need to expand the range this category of products. By far the most popular functional ingredient in meat products is a lactulose. It is a powerful prebiotic, stimulating the growth of beneficial microflora in the gut. The increase in the number of bifidobacteria and lactobacilli produces a clearly positive effect in reducing inflammatory processes of the intestinal mucosa. On the recommendations of physicians and calculations for biochemists in maintaining normal intestinal microflora, everyone should consume 3 to 5 grams of lactulose per day.

The important point is that during heat treatment the diffusion of lactulose in the protein system without chemical reaction, and wherein the lactulose keeps its structure and bifidogenic activity. Also of note is the ability of lactose and lactulose to have a significant impact on the transformation mechanism of sodium nitrite and the decrease in its residual content in the finished product.

METHODS

In the experiments, the concentrate of milk protein-carbohydrate raw materials "LACT-ON". This concentrate from a mixture of concentrated whey with a mass fraction of dry substances of 20-25% and condensed skim milk with a mass fraction of dry substances of 40-45%.

Main physic-chemical characteristics of the concentrate "LACT-ON" and experienced whole muscle sample was determine by the following methods: – mass fraction of moisture was determined by drying to constant weight at 105 °C;

- Mass fraction of protein it was determined by the Kjeldahl method;
- Determination of the degree of isomerization of lactose to lactulose was performed polarimetry method, based on the specific optical activity of carbohydrates;
- Determination of the mass fraction of dry substances was carry out on the Refractometer;

- The pH value was determine by the potentiometric method using a laboratory pH - meter;
- Definition of fat, collagen and salt in the finished cut product was performe on an automatic analyzer FoodScan food Lab;
- organoleptic characteristics of whole-muscle samples were evaluated on a 5-point scale, determining the appearance, smell, taste, texture (tenderness, stiffness), juiciness and overall quality score.

To determine the effect of concentrate "LACT-ON" on the quality parameters of whole-muscle products, conducted a series of experimental workings. For these purposes, used muscle L. dorsi taken from chilled pork with a term of 48 hours of autolysis. Formulated composition of the brine was taken without the inclusion of gel-forming and water-retaining agents, and contained only sodium chloride, sodium nitrite and concentrate " LACT-ON" (absent in the control sample) in predetermined amounts.

The organization of experimental studies conducted on the plan of the Greco-Latin squares. Control pattern was brine in the amount of 40% by weight of unsalted raw materials and was kept in the Ambassador 16 hours.

Mathematical planning and processing of experimental data was carry out using by Statistic v.8.0 Statistic and Neural Networks v.4 [2, 3, 4]

MAIN PART

The results of the research prototypes cut products produced from concentrate "LACT-ON" displayed in table 1.

Table 1: Quality indicators of control and test samples cut products E.P.C. < 0,05

The Indicators	Patterns					
	1	2	3	4	5	Control
The Yield, %	106,13	97,25	87,91	117,90	103,14	81,62
Mass fraction of protein, %	18,31	22,23	21,16	20,97	20,45	20,55
Mass fraction of moisture, %	67,72	58,96	59,14	68,38	65,49	57,06
Mass fraction of fat, %	7,05	10,34	11,02	6,57	7,86	14,18
Mass fraction of salt, %	2,35	2,67	2,64	2,23	2,41	2,74
Mass fraction of collagen, %	0,83	1,78	1,84	1,29	1,37	1,66
The pH, units	6,83	6,74	6,71	6,89	6,86	6,71
Organoleptic score, score	4,4	4,7	4,6	4,7	4,9	4,5

The table 1 to shows that the grade of the concentrate "LACT-ON" in the product directly affects the value of the finished product. The results agree with the literature data about the presence of milk proteins with high functional properties.

Conducted sensory evaluation of the samples indicates that the samples had a more delicate texture and higher organoleptic evaluation. At a high percentage of injection brine and a small proportion of the content of the concentrate had lower indices of product type on the cut (the looseness and the presence of unbound water). Samples No. 2, No. 4 and No. 5 had a more intense pink color which, apparently, is connected with a higher content of the concentrate, consisting of reducing sugar is lactose and lactulose. Due to the action of these sugars in the finished product increases the number of nitrosophenol, and reduced content of residual quantity of sodium nitrite.

Development of the optimal prescription of the composition using a concentrate "LACT-ON" was conduct by creating a neural network architecture in the software package STATISTIC NN v.4, which structure is presenting in figure 1.

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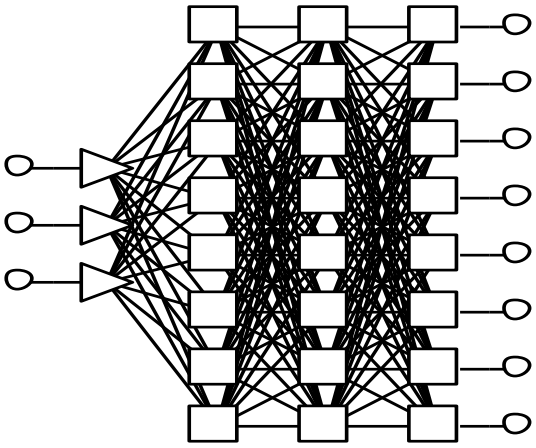

Figure 1: Neural network characterizing qualitative indicators of prototypes

The result of mathematical processing of experimental results were obtained the following optimal values varied factors: the amount of injection of the brine to the weight of unsalted raw materials (44 percent), the dwell time of the feedstock in the Ambassador - 16 hours, the grade of the concentrate "LACT" in brine - 27 %. According to the results of the optimization was carry out the experimental output with the specified process parameters. Quality characteristics of experimental and control samples of pork tenderloin smoked summarized in table 2.

Table 2: Qualitative characteristics of experimental and control samples E.P.C. < 0,05

The Indicators	The prototype	Control
The Yield, %	105,52	85,64
Mass fraction of protein, %	20,52	20,49
Mass fraction of moisture, %	65,08	59,67
Mass fraction of fat, %	7,25	13,87
Mass fraction of salt, %	2,41	2,63
Mass fraction of collagen, %	1,19	1,60
The pH, units	6,87	6,72
Organoleptic score, score	4,9	4,5

SPECULATION

The results showed that effectively implemented the optimization of the composition of the formulation. The prototype had significantly higher yield compared to the control (105,52 % against 85,64 % by weight of raw materials) and sensory evaluation (to 4.9 vs 4.5). The protein content in the experimental sample is identical to the rate in the control, produced on classic technology. It is also important to note that the prototype contains about 0.87 to 0.88 g of lactulose per 100 g of finished product that can attributed to this product to functional products with prebiotic properties.

Modern conditions of production of meat products requires the use of highly profitable ingredients with the aim of increasing the profitability of production, but the company manufacturers also understand the need for the production of tasty and healthy products. In light of this kind of compromise in the resolution of this issue may be the use of concentrate "LACT-ON", the use of which improves the yield of the finished product by about 20% without reducing the content in the product valuable animal protein and the use of additional additives. In addition, the use of this concentrate will improve the taste characteristics of delicatessen products, as well as to make the product more safe and useful. Thus, the use of milk protein-carbohydrate concentrate "LACT-ON" can be an alternative to the currently used protein preparations of animal and vegetable origin.

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CONCLUSION

Based on the conducted researches it is possible to draw a conclusion on expediency of use of milk protein-carbohydrate concentrate "LACT-ON" in the technology of delicatessen meat products. The use of this concentrate has a positive effect on organoleptic parameters and output of the finished product, but also allows us to give whole-muscle product of the functional status of the product due to the presence in its composition of lactulose. Was developed optimal formulated composition whole muscle deli meat product with the content in the brine 27% of the concentrate "LACT-ON" when the value of injections of 44% by weight of unsalted raw materials and exposure to the Ambassador for 16 hours.

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