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Development of the technology of combined meat product using biomass from the spleen of horses

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ABSTRACT

In this paper the technology and formulation of biomass from the spleen of horse and new type of boiled sausage is presented. The chemical composition of biomass is as follows: water content - 68,62 ± 0.20 %, protein - 8.89 ± 0.10 %, fat - 12.73 ± 0.12 %, carbohydrates - 7.70 %. Introduction of biomass to the formulation of boiled sausage improves the organoleptic indicators (consistence, color and taste of the finished product), amino acid and vitamin compositions.

Keywords: spleen, horse, biomass, boiled sausage, technology.

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INTRODUCTION

At the present stage in the field of new technologies in the meat industry, the main task is the need to develop food products, which are focused on boosting the immune protection of an organism of the person. The scientists of different countries and the Republic of Kazakhstan for many years carried out scientific research on the development of new technologies for the production of medicines from animal products containing biologically active substances. In particular, biologically active substances raising cellular and humoral immunity, see the bodies immune system of animals, including the spleen [1].

In the famous developed the technology of production of wide range of meat products, providing a complete recycling of secondary raw materials slaughter of animals for food and medicinal purposes, insufficient attention is paid to the spleen horses. The traditional technology of processing of the spleen envisages mainly the production of it technical products and fodder flour. Meanwhile, it is known that in the spleen contains all the necessary for a human organism biologically active substances: vitamins, amino acids, enzymes, hormones, immune and mineral substances [2, 3]. Targeted food fortification these components can be made by the proper use of the spleen horses.

The aim of this work is the research and development of technologies of biomass from the spleen horses for meat products.

First developed rational use spleen horses in the form of biomass, increases the immune status of the organism. On the basis of comprehensive studies have established a pattern of connection soluble globulin protein and albumen faction, lipids, that have enabled the development of compounding and technology of preparation of biomass consisting of the spleen, bone fat, rice flour, egg melange and extract. The proved possibility of introduction of biomass in meat products in order to enrich them with proteins, lipids, carbohydrates, bioactive substances. Optimal dose are made of biomass in meat products. The use of biomass contributes to increased moisture-tie capacity, guarantee improvements flavoring, biological and immunomodulating properties of the finished product [4, 5].

In recent years a great attention is drawn to the biologically active substances of peptide structure, providing immunological action and having the ability to restore immunity in case of oppression that increase the body's resistance to infections, and adverse environmental factors [6].

It is known that for medicinal biological products peptide that enhance the body's immune defenses, can serve as animal bodies. Such bodies include the spleen slaughter of animals [7]. Given the high efficiency spleen slaughter of animals in medicine for the treatment of a large number of pathologies, it should be assumed that the spleen will also find wide application in the meat industry. The analysis of literary sources to be able to conclude that the spleen is slaughtered animals are not widely used for food purposes, although in the modern view, and food and biological value, it has the properties that makes it usable in the production of special products. Therefore, these circumstances have caused a targeted research spleen horses and find ways of using them in the production of special products [8, 9].

RESULTS AND DISCUSSION

In this paper we have chosen exactly spleen horses, because in recent years in Kazakhstan develops herd horse breeding, and the livestock industry is becoming high-value and cost effective. Therefore, special attention is paid to the rational use of locally available animal - horse-flesh.

In experimental studies spleen used directly after slaughter from healthy animals and higher secondary fatness.

The complex study of security spleen horses (table 1.) The results of the research showed lack of pesticides and bacteria group Escherichia coli, Proteus, Staph.aureus, and Salmonella in the spleen, which testifies to the ecologically clean raw materials. On the basis of the received results it is proposed to use the spleen horses for producing biomass.

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Table 1: Content of pesticides in the spleen of slaughtered animals

Toxic chemicals	MPL (maximum permissible level)	The content of toxic chemicals in the spleen, mg/kg		
		Cattle Pigs Horses	Cattle Pigs Horses	Cattle Pigs Horses
DDT	0,1	not found	not found	not found
DDE	0,1	not found	not found	not found
DDD	0,1	not found	not found	not found
HCH	0,1	not found	not found	not found
ldrin	not allowed	not found	not found	not found
Heptachlor	not allowed	not found	not found	not found
Karbofos	not allowed	not found	not found	not found
Metaphos	not allowed	not found	not found	not found
Chlorophos	not allowed	not found	not found	not found
DWF	not allowed	not found	not found	not found

When compiling recipes biomass and new product came from the fact that the product is enriched with bioactive components, must be accessible to the mass consumer, so it was necessary to optimize a prescription mixture. As a result of mathematical modeling formulas, optimal ratio of ingredients:

1) mass fraction of biomass from the spleen, %: spleen - 52.5; extract - 30.0; melted bone fat - 6,0; rice flour - 10,0; melange - 1.5;

2) mass fraction of boiled sausages of the I grade, %: horse meat of the 1st category - 60.0; pork bold - 16.5; pork bacon - 10,0; biomass - 13.5.

On the basis of experimental researches by definition of technological modes of production of biomass from the spleen (BMS) proposed the following technological scheme (figure 1).

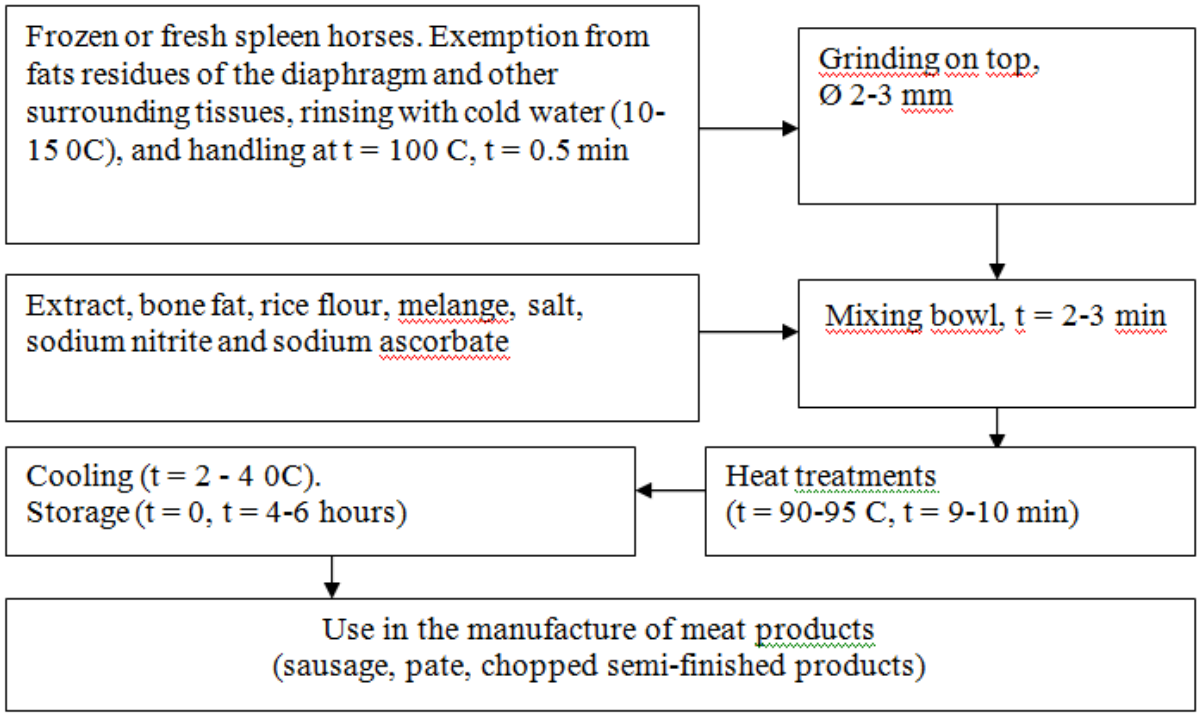

Fig. 1: Technological scheme of production of biomass from the spleen

With the purpose of substantiation of possibility of use of BMS in the production of meat products in return for the main raw materials (pork bold) some research. Comparative evaluation of chemical composition showed that BMS on the water content - 68,62 ± 0.20 %, protein - 8.89 ± 0.10 %, fat - 12.73 ± 0.12 %, carbohydrates - 7.70 % not inferior pork bold. Data analysis of amino acid composition shows the balance of essential amino acids BMS relative to the reference scale FAO/who and the high content limiting biological value of irreplaceable amino acids, mg/100 g: lysine - 726, isoleucine, 368, leucine - 708, threonine - 414, tryptophan - 104. Fatty acid composition of BMS: saturated acids - 5.32 g/100g, monounsaturated acids - 6,12 g/100g, polyunsaturated fatty acids - 1.07 g/100g. According to the obtained data the content of polyunsaturated fatty acids in biomass is 8.55 % of the total number of fatty acids and similarly pork bold, indicating the high biological value of the lipid fraction of biomass. The content of mineral substances in BMS, mg/100 g, calcium - 36.0±7.2, iron - 13.6 + 2,7. As well as vitamins, mg/100g: B1 - 0.36, B2 - 0.54, PP - 3.82, C - 3.15 And - 0.051, E - 0.58.

Based on the results of the research proved the possibility of the introduction of biomass in meat products with the purpose of enrichment of bioactive components that enhance the immune status of an organism of the person.

To confirm the obtained results we studied the influence of biomass (BMS) on changes in the qualitative indicators of meat and finished product. During product manufacture with the use of BMI as a reference standard adopted recipe and technology of boiled sausage I grade of "Almaty". Replacement of the basic raw biomass from the spleen varied from 5 % to 20 %.

Introduction of biomass instead of the raw material composition sausage meat leads to the change of physico-chemical and structural-mechanical properties of meat and finished product.

With increasing doses adding biomass pH and SCD meat increases, as the ARIA of meat is in direct dependence on pH and from time cutting. Thus, we have established the optimal time cutting samples, the maximum moisture-tie ability is achieved by entering into a product about 15 % of the biomass and time cutting 6 minutes.

With the increase of the ARIA meat output of pilot samples of meat products increased compared to the control at 3-4 %.

The dose increases, adding biomass to sausages leads to the reduction of structural-mechanical properties (TNC) and increased levels of soluble proteins and share firmly bound moisture. This circumstance is confirmed by the quantitative increase of the share of soluble proteins in the continuous phase, a positive influence on the formation of a tighter framework in the structure of the finished product.

Introduction of biomass up to a certain point contributes to the improvement of organoleptic indicators (structure (consistence, color and taste of the finished product. On the basis of the conducted studies on physico-chemical, structural-mechanical properties of meat stable quality indicators at 15 % biomass content at a 6-minute cutting, this is confirmed by organoleptic indicators.

Research of food and biological value of the prototype combined meat product conducted with the established dose of biomass to 13.5 %. The chemical composition analysis shows a significant content of protein and mineral metabolism in experimental models of new meat product, compared with controls (table 2 and figures 3, 4)

Table 2: Chemical composition of sausage

Name	I grade cooked sausage	
	"Almaty" (control)	prototype model
Mass fraction of moisture, %	64,00±0,53	65,28±0,62
Mass fraction of protein, %	11,60±0,24	15,94±0,18
Mass fraction of fat, %	22,10±0,12	15,18±0,20
Mass fraction of ash, %	2,30±0,11	2,49±0,13
Mass fraction of carbohydrates, %	-	1,11±0,25

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The analysis of amino acids evidence of the rich set of essential amino acids in the proteins of pilot samples of the new product. They are characterized by the increase of tryptophan, lysine, methionine, valine, leucine, phenylalanine (table. 2). It is important to emphasize that the total number of essential amino acids unchanged, having a tendency to increase. On this indicator the prototype is at a higher level in comparison with the control.

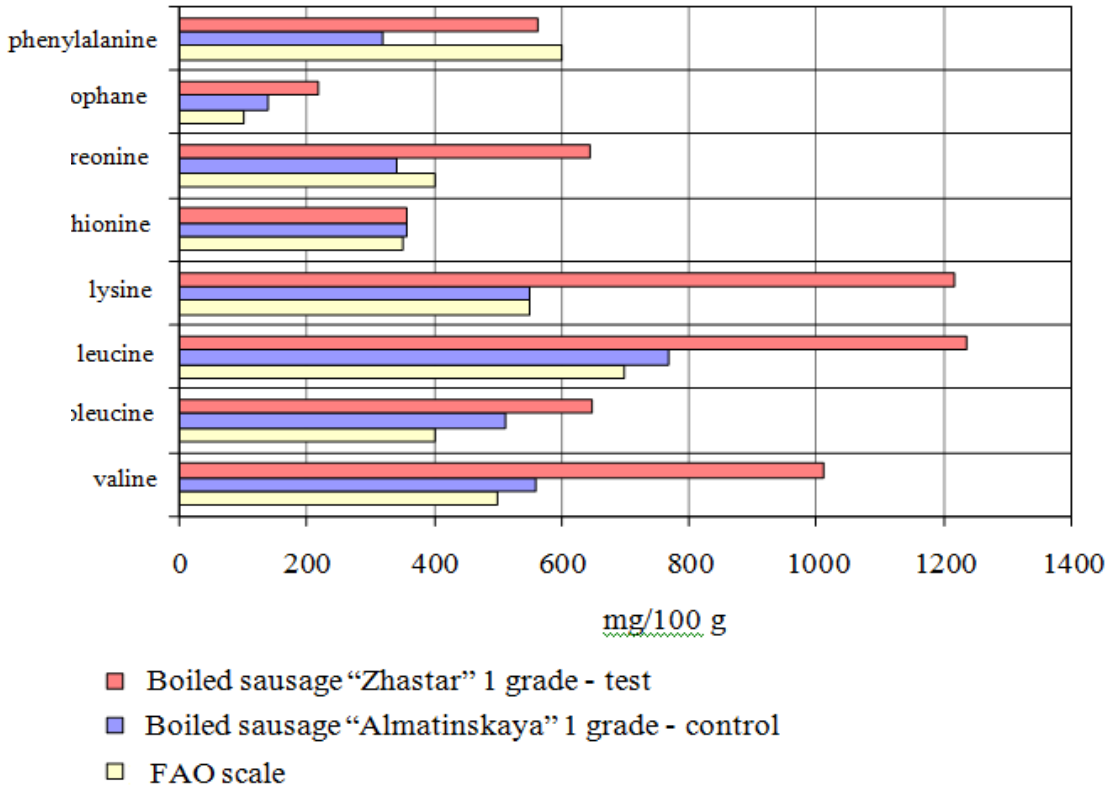

Fig. 2: Content of essential amino acids in the product, in mg per 100 g of the product

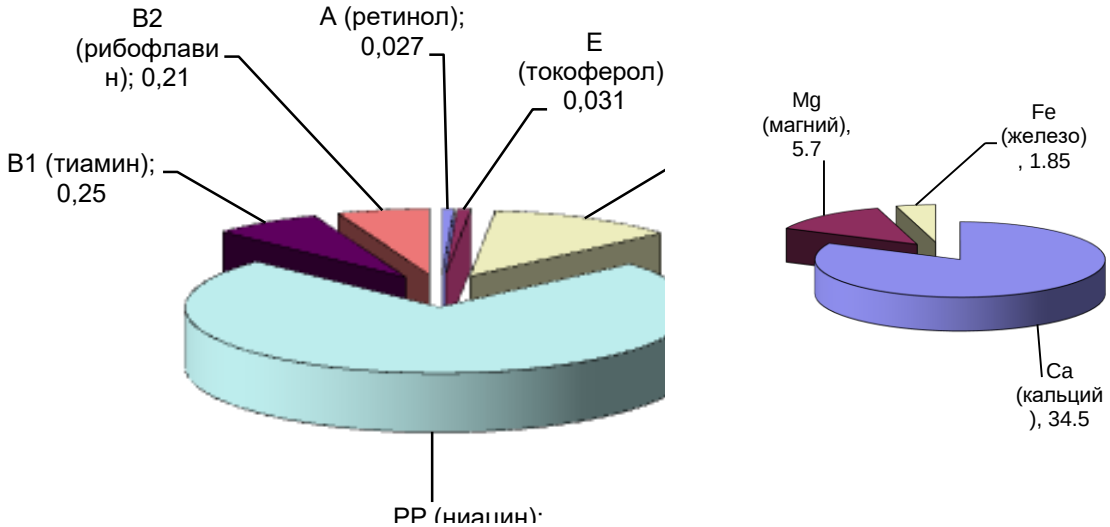

Fig.3. Content of minerals and vitamins in the product, mg/100 g

To control for the sanitary condition of the finished product were determined microbiological indicators of boiled sausage with a prescribed dose of biomass. In the result data set that bacterial semination when storing cooked sausage of the I grade biomass for six days at a temperature of 4 OC lies within the regulations for cooked sausages grade I to j microorganisms.

Thus, the analysis of the experimental data allowed to make a conclusion about the positive impact of biomass on quality indicators of finished product. Biomass use is accompanied by accumulation potential precursors of aroma and taste, which are formed at thermal processing of the product. To this group of compounds include nitrogen and nitrogen-free extractive substances, muscular tissue of the spleen.

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