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Development of Technology for Multicomponent Brine.

Abzhanova Sholpan A*, Baibolova Lyazzat K, Matibaeva Ainur I, Zhetpisbaeva Bagila Sh, Rskeldiev Berdan A, and Mukhtarkhanova Rauan B

Almaty Technological University, Almaty, Tole bi street 100, The Republic of Kazakhstan, +7 (727) 396 71 33

ABSTRACT

This article describes the development of the technology of multi-component brine from soy and pumpkin juice. To create a new recipe sausages and meat semi-finished products used supplements that have a beneficial effect on the human body. In conditions of economic crisis the use of herbal supplements in the production of meat products is the best measure to increase their biological value. It is also cost-effective is the fact that these products have a high content of vitamins, minerals and other essential human body of biologically active elements, their production requires less consumption of expensive raw meat. Thus, the introduction of new formulations in a crisis to create new formulations and semi-finished meat products should be used additives from vegetable raw materials, which have a beneficial effect on the human body.

Keywords: soybeans, soy isolate, pumpkin juice, multicomponent brine, amino acid composition, nutritional value, minerals, semi-finished meat product.

Corresponding author:

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INTRODUCTION

Soybeans because of its advantages, also depending on the high nutritional and technological adequacy used in many sectors of the food industry in the form of refined products, there are a large number of items (meal, flour, isolate, concentrate, protein-fat product, "milk" and etc.). They contribute to both improving the quality of manufactured products, and improve the economic efficiency of enterprises. Indicators characterizing nutritional value from soy protein-containing products shown in Table 1 and 2.

The protein content of the isolate and soybeans varies significantly, so a comparison of the content of the main macronutrients in the analyzed products is not appropriate. However, soy protein isolate in the presence of significant amounts of iron and other hematopoietic cells is of particular interest. The amino acid composition of protein analytes ingredients presented all essential amino acids, including methionine + cystine limited, and for protein isolate, additionally, threonine and valine.

It should be noted that in soybeans contain a significant amount of fat, represented mainly polyunsaturated fatty acids.

Features of the chemical composition of soybean processing products predetermined the further study of the adequacy of the food after the establishment of these fortifier product.

Table 1 - Contents of the nutrients in soybeans and the protein isolate

Products of soybean	Protein isolate	Beans
Chemical composition, %		
Moisture	5,98±0,12	11,90±0,20
Protein	89,60±3,29	32,95±0,33
Fat	1,33±0,01	17,53±0,37
Carbohydrates	-	32,27±0,52
Ash	3,09±0,09	5,35±0,17
Macroelements, mg/g		
Potassium	13,89±0,42	15,85±0,58
Calcium	2,72±0,07	3,85±0,11
Phosphorus	5,15±0,14	5,77±0,19
Chlorine	0,35±0,01	-
Microelements, mg/g		
Iron	80,85±2,00	161,45±5,81
Zinc	18,31±0,50	22,25±0,73
Copper	13,63±0,37	50,76±1,79

Table 2 - Contents of essential amino acids in the soybeans and the protein isolate

Content of AA, g/100 g	Protein isolate	Beans
Isoleucine	4,85±0,13	4,95±0,12
leucine	8,01±0,29	7,38±0,15
Lysine	6,25±0,18	5,61±0,17
Methionine + cystine	2,57±0,07	3,15±0,05
Phenylalanine + tyrosine	7,35±0,25	7,01±0,24
Threonine	3,65±0,09	3,78±0,15
Tryptophan	1,35±0,04	1,15±0,05
Valine	4,85±0,17	5,48±0,15
The amount of non-essential AA	38,88	38,51

Assessment of the adequacy of the soy isolate process was to study its microstructure, hydro- and lipophilic properties.

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The data presented in Figure 6, is characterized by the dynamics of the influence exerted by the liquid phase temperature on the value of active acidity. Whereas the feasibility, under industrial conditions the hydration of soy isolate is performed with tap water at a temperature in the range of 15-20 °C.

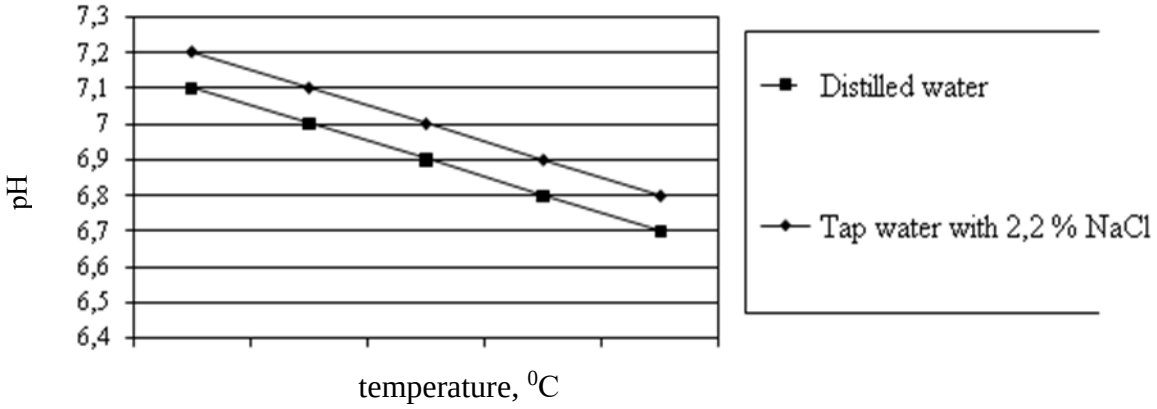

Figure 1 - The change in pH of the aqueous dispersion of the soy protein isolate

Since the value of active acidity of minced meat often does not exceed 6.0, logical to assume that the introduction of soy isolate it should increase the total value of this indicator.

Analysis of hydro- and lipophilic properties of the protein isolate (Table 3) shows that, thanks to the fine structure (mean diameter counting 6,42 ± 0,25 • 10-6 M), this product is able to bind moisture almost as much as raw meat, wherein the moisture absorption occurring at rest surface provides spontaneous absorption layers isolate the water particles in a ratio of 1: 4, which allows to evaluate the prospect of its use in combined meat-based food technology.

The lipophilic properties of soy protein isolate to sufficiently manifest its high ability to adsorb on their surface fat.

Table 3 - Functional properties of soy protein isolate

Object	MRC, % to dry matter	FRC, % to dry matter
Soy protein isolate	465,7±8,08	132,1±4,78

Thus, a plurality of processing results of the adequacy of soy protein isolate suggests that its use in foodstuffs technology combined on a meat basis the most promising in the production of finely divided meat products. In this case they will be provided with high quality characteristics of the finished product while saving raw meat.

According to the content of medicinal substances pumpkin surpasses many other vegetables. It has sugar, carotene, vitamins C, B1, B2, B5, B6, E, PP and a rare vitamin T help to speed up the metabolic processes in the body, vitamin K, necessary for blood clotting, fats, proteins, carbohydrates, cellulose, pectin, minerals, including potassium, calcium, iron.

Carotene in pumpkin five times more than in carrots and three times more than beef liver. Therefore, ophthalmologists recommend that people with visual impairments to use pumpkin and pumpkin juice.

Fruit pulp and juice drink for metabolic disorders as a diuretic for heart disease and liver disease. For this reason, take 0.5 kg of grated raw pumpkin pulp, or 0.5 cups of juice from the pulp of a day.

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Pumpkin pulp improves motor function of the intestine, is effective for constipation, colitis with inadequate bowel movement, enhances diuresis and excretion of salts from the body.

Thus, the research findings of qualitative characteristics pumpkin agreed with previously obtained, and indicate that the pumpkin has enough food and biological value. Pumpkin is a valuable product in the prevention of anemia, cardiovascular, gastrointestinal and renal diseases. Given the healing properties of pumpkin, developed the technology and formulations designed molded meat products functional purpose set forth in the experimental section. For the development of molded meat products using fresh pumpkin juice.

MATERIALS AND METHODS

The objects of study in this paper is the following soybean products - soy protein isolate and pumpkin juice.

The following parameters:

- The total chemical composition (protein, moisture, fat, ash) raw materials and products were determined from a sample of a test sample;
- Determination of water binding capacity of the meat compositions and finished products was carried out using a compression method developed by R. Grau and R. Hamm, modification by V. Volovinskaya and B. Kelman;
- Determining moisture retention (MR) performed on samples weighing 250-260 g, whose humidity was 70-80% after thermal treatment in sealed containers to a temperature of 72 in the center of the sample + 20 ° C and cooling. In the presence of the separated broth poured its determined weight broth and the mass fraction of its moisture.

$$MRC = \frac{m_0 x_0 - \{m_h \cdot m_b + [m_0 - (m_k + m_b)]\}}{m_0 \cdot (1 - x_0)} \cdot 100, \quad (1)$$

where MRC - moisture retention capacity,% dry matter;
M_b - the mass of the separated broth, g;
M_h - initial mass of banks and it is in the test sample, g;
m_0 - mass of the test sample, pledged to the bank, g;
M_K - plenty of banks with the test product after the heat treatment and separation of the broth, g;
x_0 - the mass fraction of moisture in the sample, the proportion of units;
100 - coefficient of proportionality.

- Determination of fat retention capacity (FRC) was performed on the samples, the humidity of which is determined in advance, and the fat content was about 30% (if necessary the missing amount of fat added). Prepared samples were heated in sealed containers to a temperature in the center of the sample 72 ± 2 0 C, the separated broth with melted fat was poured into graduated test tubes, incubated at 60 ± 10 °C for 15 min, cooled and the volume was determined visually exuded fat.

FRC of the samples was determined by the formula:

$$FRC = \frac{0{,}3 \cdot m_0 - 0{,}975 \cdot V_1}{(1 - X) \cdot m_0 - 0{,}3 \cdot m_0} \cdot 100, \quad (2)$$

where, FRC - fat retention capacity,% dry matter;
m_0 - initial mass of the test sample, g;
V_l - the volume of the separated when heated fat ml;
X_0 - the mass fraction of moisture in the sample, the proportion of units;
0,975 - coefficient taking into account the average fat density, g / cm3;

100 - coefficient of proportionality.

- Determination of protein was performed by Kjeldahl method, taking into account the conversion ratio of nitrogen to protein ratio of 6,25;

RESULTS AND DISCUSSION

To study the effect of salting raw multicomponent (experience) and traditional (control) brines salted conditions on the properties of muscle. multicomponent brine (MCB) was prepared from the following components: vegetable oil, soy isolate, dissolved in skim milk and pumpkin juice, mixed well and added to a solution of calcium chloride, starch. The resulting protein-fat mixture was diluted with a traditional brine.

For the production of protein-fat mixture of pumpkin juice (15%), soy isolate in skimmed milk (55%) and oil (30%) is heated to 25-30 ^{0}C, then added starch (0.2%) and an aqueous solution of $CaCl_2$ (600 g per 100 kg) and subjected to intensive mixing. Thus $CaCl_2$ destabilizer protein fraction is a mixture of proteins as coagulator in skimmed milk is used potato starch.

After a homogeneous liquid mass is diluted with traditional brine containing water (82.925%), sodium chloride (15.5%), sugar (1.5%) and sodium nitrite (0.075%) in a ratio of 3:7 by adding missing the number of curing ingredients (Figure 19), multi-cooled brine to 18-20 ^{0}C for syringed and up to 10-12 ^{0}C to pour the brine.

Brine extruded injections into muscle tissue using a perforated needle in an amount of 15-18 wt. %.

Brine spraying directly into the raw meat significantly accelerates the duration of salting process. As a result of the forced introduction of the brine ingredients in meat raw material thickness is their uniform distribution in the product. It creates the conditions for the use of components (polysaccharides, protein products, spices coarse particles), which are difficult to penetrate in the distribution on the surface of raw meat. The injection of brine into the thickness of the meat is carried out in two ways. Brine distribution in the meat raw material for salting through the circulatory system occurs by penetration of the brine through natural blood vessels and capillaries of micro and macro. One of the major advantages of this method is rapid penetration into the body of meat brine without violating the integrity of tissues. The method can be used for salting carcasses, half-carcasses, parts of cuts in the production of high quality meat products by traditional technologies. For the salting is advisable to use chilled raw materials. Important is the quality of bleeding and butchering carcasses as salting similar manner should be possible to maintain the integrity of the circulatory system. Ambassador draining and ripening is carried out at a temperature of 3-4 ^{0}C. Extruded meat brine into the femoral artery. Brine is introduced under pressure in the feed in an amount of 2.3 atm. 15-18 % by weight of meat. Carrying out such operations requires special training and qualifications of staff.

Through injection, having a hole, a hollow metal needle, introduced into the raw meat for a particular scheme, provides uniform distribution of the brine in the product column. Curing the mixture is introduced into the interior of the raw material without regard to its morphological structure and orientation of the muscle fibers. Because in the process of introduction of the brine comes the dissection of muscle tissue needles, raw meat additionally softened. In order to more evenly distribute the brine in the thickness of a piece of meat stuffing can be performed at a different angle.

Table - 4 Sensory evaluation test and control samples

Index	Appearance	The color and taste	Smell	Consistency	Overall, scores
Roll control	good	good enough delicious	aromatic enough	gentle enough	4,8
Roll	very good	Very good, delicious	delicious	gentle	5,0

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Table 5 - Results of the analysis of finished meat products (roll)

Designation of the indices unit	Acceptable norms by technical document	Actually received	Technical document for test methods
Nutritive value g / 100g;			
Proteins	-	22,6	P №09-41-99
Lipids	-	3,9	P №09-41-99
carbohydrates	-	0,8	Skurikhin, 1984 Skurikhin,
Water	-	71,5	1984 Skurikhin 1984
Ash	-	1,2	
Energy value, kcal	-	149,52	Sanitary norm 4.01.071.03

CONCLUSION

Thus, the results indicate high taste advantages of the developed products. Use multicomponent and brine modes of intensive raw materials processing techniques make it possible to reduce the duration of the process and enhance the biological and nutritional value of finished products. On the basis of these theoretical and experimental research in the production environment has been developed and tested the technology development of products made of mutton.

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