

## Conference Paper

# Development of meat snack production technology using herbal ingredients

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**Abstract**

The relevance of the topic is obvious: snacks are very common in Russia as a product which is used to satisfy hunger on the go. But their market can be filled with both high and low-grade quality products. To be sure in the type of product, you need to know about raw materials, manufacturing technology, and methods of product identification. Moreover, modern people try to monitor their nutrition. This is evidenced by the development of such areas as functional nutrition. Therefore, snacks should not just be properly prepared, they should meet the standards of healthy nutrition. The aim of the article was to study the composition and properties of pumpkin oil, mustard cake and starter cultures of microorganisms, their influence on the quality indicators of meat snacks, the development of recipes and technologies of meat snacks with vegetable components, and the assessment of their quality, taking into account consumer preferences. Literature sources were analysed and patents were searched. This work will allow us to create competitive meat snacks that combine high consumer and functional properties, and recommend their implementation on an industrial scale at meat processing enterprises.

**Keywords:** meat snacks, meat and vegetable products, herbal ingredients, mustard cake, pumpkin seed oil, starter crops.

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## 1. Introduction

Snacks are products used to satisfy hunger, they are consumed on the go. They occupy an increasingly strong position in the Russian market. [1]

Regular consumption of pumpkin seed oil strengthens the immune system, stimulates metabolism, helps to lose weight, improves skin and hair condition.

Mustard oil cake is a high-protein product, it contains from 38 to 50% of crude protein, it is similar in amino acid composition to sunflower and soybean meal. [2]

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Studies have shown that the partial addition of raw materials fermented with lactic acid microflora to meat contributes to a better consistency of the final product and its greater storage stability. [3, 4]

## 2. Methods and Equipment

### 2.1. Methods

To determine the qualitative descriptions, we use standard methods [5]. In order to study the chemical composition, we use generally accepted methods [6, 7]. To evaluate the properties of research objects, we use standard methods [8,9].

It was found that pumpkin oil is a very useful product and its use in the production of meat products will make it possible to produce high-quality products.

Mustard cake has high functional and technological properties that can have a significant impact on the technological process of production of meat products [10].

Therefore, it is very important to establish a mustard meal introduction regimen, in which the greatest amount of moisture is bound to vegetable raw materials and is essential when producing meat products.

To establish a rational dose of pumpkin oil under laboratory conditions, several samples were produced: control (without adding oil), with the addition of different doses of pumpkin oil (1.0%; 2.0%; 3.0%), mustard cake (3%, 7%, 10%) and starter cultures of microorganisms. Their organoleptic characteristics were evaluated.

Experimental studies show that a suitable dose of pumpkin oil which favorably affects organoleptic characteristics of meat products is 1.0%.

For comparison, a control sample was produced without the use of plant components and starter cultures of microorganisms. Then, organoleptic indices were evaluated.

## 3. Results

The studies allowed us to develop a technology for producing meat snacks with mustard cake, pumpkin seed oil and starter crops.

When making mincemeat, the raw material is loaded into the cutter in the following order: beef, lean pork, salt, spices, fatty pork. Then pumpkin oil is introduced into the meat raw material, massaged for 5 min, after which powdered mustard cake is added and massaged for another 10 minutes. The last thing to add is liquid bacterial starter

TABLE 1: Organoleptic characteristics of meat products with herbal ingredients

	Organoleptic indicators		
	Appearance and Consistency	Taste and smell	Colour
Control sample	fibrous, elastic	pronounced characteristic of meat products	Brown-brown uniform throughout the mass
Prototype No. 1 (TM - 1.0%)	elastic	pronounced characteristic of meat products	Brown, uniform throughout the mass
Prototype No. 2 (TM - 2.0%)	elastic	pronounced characteristic of meat products, with a slight aftertaste of pumpkin	Brown, uniform throughout the mass
Prototype No. 3 (TM - 3.0%)	elastic	pronounced characteristic of meat products, with an oily flavor	Brown, uniform throughout the mass
Prototype No. 4 (GJ - 3%)	fibrous , elastic	pronounced taste and smell characteristic of meat products with a mild flavor of mustard cake	Brown, uniform throughout the mass
Prototype No. 5 (GJ - 7 %)	fibrous , elastic	pronounced taste and smell characteristic of meat products with a pleasant aftertaste of mustard meal	Brown, uniform throughout the mass
Prototype No. 6 (GJ - 10 %)	fibrous, elastic with single impregnations of mustard cake	pronounced taste and smell characteristic of meat products with a pronounced flavor of mustard meal	Brown with single interspersed mustard

culture. The end of the cutting process is determined by the figure. Slices of fatty pork, no larger than 4 mm, should be evenly distributed in the meat.

The shell is filled with minced meat with a hydraulic syringe at a pressure of 1.0-1.3 MPa. The shell is filled with minced meat tightly, avoiding voids. After extrusion, the loaves are sent to the sediment, which is carried out on the frames at a temperature of  $(22 \pm 2)^\circ\text{C}$ , and humidity of 90-95%. The duration of precipitation is 6 hours. Then the product is subjected to heat treatment: cooking, smoking. To achieve residual moisture (43-38)%, drying is carried out at a temperature of  $12^\circ\text{C}$  and humidity of  $(76 \pm 2)\%$  for (24-36) hours.

Organoleptic indicators of the finished product are checked and presented for evaluation.

The bacterial analysis of meat snacks is carried out periodically (at least once a month). Sausages are stored for no more than 1 month at a temperature of 0 to 4 ° C; at a temperature of -1 to -9 °C, they are stored for no more than 4 months.

The meat snacks (sausages) were evaluated by the following quality indicators: organoleptic, physico-chemical, microbiological indicators, vitamin-mineral and amino acid composition.

TABLE 2: Nutrition and energy value of meat snacks with herbal ingredients

Name of the indicator	Control, g / 100 g	Product, g / 100 g
Mass fraction of fat, g	43	38
Mass fraction of protein, g	14	14
Mass fraction of carbohydrates, g	-	4
Mass fraction of water, g	34.6	38.3
Mass fraction of minerals, g	4.3	4.6
Energy value , kcal	415	318

As can be seen from the data in Table 2, the nutritional and energy value of meat snacks with the addition of vegetable ingredients exceeds the control one. In particular, the product has a lower fat content and calorie content, which is a positive factor, since we position it as a functional food product. In addition, the mass fraction of moisture and minerals is higher, which indicates the best organoleptic characteristics, such as juiciness of the product.

TABLE 3: Microbiological indicators of the product

Name of the indicator	Actual value	
	Control	Developed product
Sulfite-reducing clostridia	not detected	not detected
staphylococci S.aureus	not detected	not detected
pathogenic	not detected	not detected
BGKP ( coliforms )	not detected	not detected

No pathogens, such as bacteria of the Escherichia coli group, Staphylococcus aureus, sulfite-reducing clostridia, and bacteria of the genus Salmonella were found in the samples.

Table 4 shows that the product contains vitamins A, E ( $\alpha$ -tocopherol), K and C is noted, which indicates the enrichment of its composition.

Vitamins B take part in almost all metabolic processes; vitamins PP, B1, B2 - in energy metabolism; B6 and B12 - in protein metabolism; B9 - in the exchange of nucleic acids; B5 - in fat metabolism, formation of coenzymes and prosthetic groups.

TABLE 4: Vitamin composition of meat products

Name of the indicator	Control	Product	Deviation
Vitamin B1, thiamine mg	0.2	0.05	0,03
Vitamin B2, Riboflavin mg	0.2	0.25	0.05
Vitamin PP, NE mg	5	5	0
Niacin mg	2,3	2,4	0.1
Vitamin B9, folates , mcg	0.12	1.14	1,02
Vitamin C, ascorbic, mg	-	0.63	0.63
Vitamin A, RE, mcg	-	0.16	0.16
Vitamin E, α-tocopherol, TE, mg	-	0.70	0.70
Vitamin K, phylloquinone ,	-	1,62	1,62

The content of macronutrients and trace elements was determined.

The results of the mineral composition are presented in Table 5.

TABLE 5: Mineral composition of meat products

Indicator	Control	Product	Deviation, +/-
<b>Macronutrients</b>			
Potassium, K mg	309	320	11
Calcium, Ca mg	9	9,2	0,2
Magnesium, Mg mg	25	38	13
Sodium, Na mg	1467	1327	-140
Sulfur, S mg	162	112,3	-49,7
Phosphorus, Ph mg	204	208	4
<b>Micronutrients</b>			
Iron, Fe mcg	230	230,17	0,17
Iodine, I mcg	7	7,41	0,41
Copper, Cu, mcg	122,6	162,2	39,6
Selenium, Se, mcg	0,001	0,021	0,02
Zinc, Zn, µg	370,4	370,594	0,20

In the human body, the content of macronutrients is constant; however, when there are serious deviations from the norm, various pathologies can occur. As can be seen from the table, the product has a high concentration of minerals.

## 4. Discussion

It was found that the meat snacks with plant components have a higher nutritional value compared to the control samples. No pathogens were found in the test samples, which complies with the requirements of regulatory documents and current legislation. The high content of carbohydrates, including plant polysaccharides, contributes to the growth of bifidobacteria bacteria. The low energy value suggests that the product can be consumed under the dietary nutrition.

## 5. Conclusion

The possibility of using mustard meal, pumpkin seed oil and starter cultures of microorganisms in the manufacture of meat product was substantiated and practically proved.

Organoleptic indicators, safety indicators and chemical composition of mustard cake, pumpkin seed oil and starter cultures of microorganisms were studied. It was found that they are safe, have a high nutritional value, lack a pronounced aftertaste and flavors, which allows their use in the production of meat products. The doses of plant ingredients were determined: mustard cake - 7%, pumpkin oil -1% and starter cultures of microorganisms - 5%. A comprehensive quality assessment was carried out. It was found that in comparison with the control samples, the enriched product has better organoleptic characteristics and nutritional value; a higher content of vitamins, minerals, amino acids and unsaturated fatty acids can compensate for the lack of essential nutrients.

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## Conflict of Interest

The authors have no conflict of interest to declare.

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