Study of a protein-containing and keto-dietary product based on local raw materials

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Abstract. An urgent task of our era is the development of such compositions of innovative multifunctional products that take into account the effect of mutual enrichment of products of animal and vegetable origin, physiological substances, the ability of dietary fiber to remove harmful substances from the body and the ability of prebiotics to maintain microecological balance in the gastrointestinal tract.

1 Introduction

When evaluating culinary merits on a hundred-point scale, rabbit meat occupies one of the first places (83 points) in the world, second only to turkey meat; and surpasses the meat of broiler chickens (50 points), bacon pork (60 points), beef (75 points). Rabbit meat is perfectly combined with various types of meat and other products, which expands the possibilities of its industrial application and rational use. At present, a large specialized industry with a promising development program, both in Uzbekistan and abroad, is the production of semi-finished meat products. With regard to semi-finished meat products, the actual problem is the creation of functional products, as well as a keto diet for the consumption of the population. Functional foods are food products containing ingredients that benefit human health, increase its resistance to diseases, improve many physiological processes in the human body, allowing it to maintain an active lifestyle for a long time [1-6].

In this regard, this work, aimed at developing recipes for semi-finished products from rabbit meat, can be considered timely and relevant.

Rabbit breeding is an important branch of the national economy, designed to solve not only the food problem, but also provide the population with high-quality dietary products. Its relevance has especially increased in connection with import substitution.

Rabbit breeding is one of the branches of livestock breeding, which breeds the most precocious animals and produces meat and other products using low costs of feed, labor and funds.

The nutritional value of rabbit meat sets it apart from other types of meat. The possibility of all-season use of freshly chilled rabbit meat increases its dietary significance.

As you know, the productive indicators of rabbits and the quality of their meat to a greater extent depend on a complete, balanced diet in terms of energy, nutrients and

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minerals. However, at present, the breeding and keeping of these animals is best studied in rabbit breeding, and the issues of feeding are studied even less, the use of various feed additives in feeding rabbits is even less studied. Among all types of animal origin, rabbit meat contains the least cholesterol and collagen, the minimum amount of fat, and a large amount of protein. In terms of protein nutrition, juiciness, tenderness, taste and digestibility, the rabbit carcass occupies one of the first places, yielding to the turkey [7-9].

First of all, the chemical composition, in the structure of which essential substances is identified, primarily amino acids and fatty acids, as well as essential micronutrients and biologically active substances. It is very important that most of them are in a balanced ratio, and provide the metabolic activity of the body. Due to the low content of fat and cholesterol, given the high biological value, tenderness of rabbit meat, nutritionists recommend using rabbit meat in their diet for various diseases of the gastrointestinal tract, stomach, biliary tract, liver, allergies, hypertension and others.

Rabbit refers to white meat. It is a complete source of protein, minerals and vitamins. The amount of protein in it is greater than in lamb, beef, pork, veal. Rabbit meat is a low-calorie product. Rabbit meat is poor in sodium salts. In terms of digestibility, rabbit meat occupies one of the first places, since the human body absorbs it by 90%, and beef only by 62%.

We have developed a pate based on rabbit meat enriched with amaranth oil and meal.

The aim of the work is to study the effect of herbal supplements on the quality of minced meat. When performing this work, modern, standard, generally accepted research methods were used that correspond to the solution of the tasks set.

2 Objects and methods of research

The objects of research are rabbit meat of local origin, as well as sprouted grain, linen seeds and amaranth cake. The chemical composition of rabbit meat bred in Uzbekistan, as well as linen seeds and amaranth cake, including sprouted grain, were studied. It is advisable to use the above-mentioned vegetable raw materials as a biologically active additive in the production of products of animal origin. The expediency of the indicated vegetable raw materials in the technology of production of products of animal origin is substantiated. In order to control and identify the functionality of products, critical control points were identified, such as: preparation and dosing of functional raw materials, distribution of components. The conditions and methods of cake of olive and amaranth seeds of local origin have been established. The maximum allowable levels of herbal additives have been determined, which have a positive effect on the functional and technological properties of semi-finished products and finished products, in particular, improve the water-binding and water-retaining abilities of minced meat, increase the yield of the product, and also improve the organoleptic indicators of its quality; compared to the reference sample.

3 Results and their discussion

To determine the physico-chemical properties of amaranth and olive fruits of local origin, several series of laboratory work was carried out.

It is known [10-16] that one of the main ingredients of functional groups are protein-rich products. Certain physico-chemical compositions of the used additives gave us the opportunity to develop products for the ketogenic direction.

For development, we chose local raw materials, amaranth seeds and olive oil cake.

It is very important to note that amaranth seeds contain a high concentration of squalene: 6.73% in black seeds and 6.37% in white seeds.

Squalene belongs to triterpenes, a natural component of human skin (up to 12-14%); therefore, it is easily absorbed and enters the body. The biological activity of squalene is very diverse. Squalene is a derivative of vitamin A and during the synthesis of cholesterol it turns into 7 of its analogues - dehydrocholesterol, vitamin D in sunlight, which provides the most radioprotective properties. The ability of squalene to release oxygen from water allows us to consider it an antitumor factor that can increase immunity in several ways, thereby ensuring the body's resistance to various diseases [8, 17-19].

The high amount of squalene in our skin proves it is essential for this organ. Squalene helps the skin retain moisture and makes it smooth and supple. But its main advantage is the ability to protect the skin from ultraviolet radiation, and if we take into account its anti-cancer and immunostimulating properties, then skin cancer. Undoubtedly, squalene is widely used in medicine, cosmetology and dietary nutrition, and the expansion of the range of its application is directly related to the available sources of isolation or chemical synthesis. The following are fatty acid analyzes of amaranth oil of local origin.

The results of the study of the components of the extracted amaranth oil (local raw material).

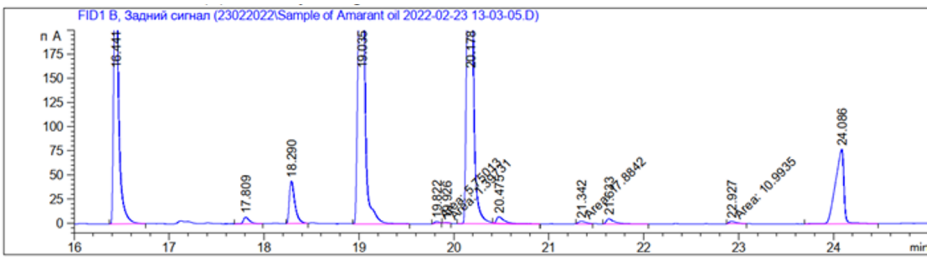

Fig.1. Acid analysis graphic with the range of 16 to 25

The results of the study of the components of the extracted amaranth oil (local raw material).

Table 1. Relation between Fatty acid and Uzbek amaranth sample

Fatty acid	Sample (uzbek amaranth)
Tetradekon 14:0	0.21
Geksadekon 16:0	20.91
Geksadetsen 16:1	0.17
Geptadekan 17:0	0.15
Oktadekan 18:0	4.05
Oktadetsen + Oktadekartriyen 18:1 + 18:3	33.51
Oktadekadetsen 18:2	39.08
Eykozan 20:0	0.91
Eykozen 20:1	0.31
Dokozan 22:0	0.38
Tetrakozan 24:0	0.32
$\sum$ unsaturated fa	26.98
$\sum$ saturated fa	72.6
Reichert Meisel number mg KOH	0.2-1.0

Olive oil is obtained from the pulp of the olives (olives) of the European Oleaeuropea L., containing up to 55% oil. In our country, there is no state standard for olive oil. For olive oil there is a specific Codex Alimentarius standard “Codex Standard for Olive Oils and Olive Pomace Oils (CODEX STAN 33-1981, REV. 2-2003)”, which defines all types of

olive oils. The requirements for the composition and quality parameters for oils of each category are described in detail in the Standard.

Antioxidants enter into a chemical bond with the destroyed cells of our body, and at this point the process of their further destruction stops. Antioxidants paralyze the action of free radicals that destroy the cells of the human body. The more cells are destroyed, the faster a person ages.

Liquid chromatography is increasingly being used as an analytical method in pharmacopoeial analysis. We also studied the fatty acid composition of olive oil using GLC and mass spectrophotography.

The results of the study of olive oil (local raw materials).

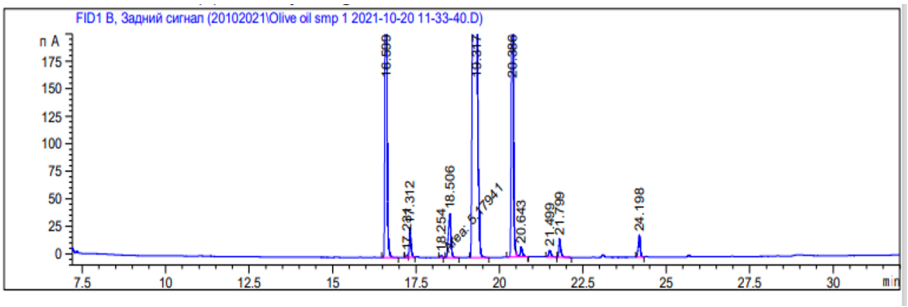

Fig. 2. Acid analysis graphic with the range of 7.5 and 35

The results of the study of the components of the olive oil (local raw material).

Table 2. Element comparison between the sample and Uzbekistan olive oil

Name of existing elements in olive oil	The resulting olive oil from the Uzbekistan
Fats:	100 g
- unsaturated	14g
-monounsaturated (oleic acid)	77g
- polyunsaturated (omega-6)	9g
Vitamin Ye	20mg
Vitamin K	21 mkg
Squalene	0.8% (80.0 mg./g)
Unsaponifiablesubstances%;	1.5
Nutritional value for100 g	900kkal
Smoke temperature (Celsius) - unrefined - refined	106-216 242
Taste and smell:	Peculiar to olive oil, without foreign smell and taste
Iodine number%;	75-85
Reichert Meisel number mg KON	0.2-1.0
Pourpoint	-2 to -6

And also determined the mass fraction of the protein of two samples. The response of the analyzes are presented in the table 3.

Table 3. Protein and fat mass fraction test results

The name of indicators	Test results	
	amarant flour, %	olive cake, %
Mass fraction of protein, %	16.8	13.9
Carbohydrates	67.8	15.8
Dietary fiber	1.1	1.3
Mass fraction of fat, %	6.4	5.6

To improve the particular tenderness and moisture-binding capacity for functional and technological properties, studies were carried out on the processing of rabbit meat with wine vinegar, which is approved for use in food production.

And also presented are the indicators of rabbit meat (Table 4) not processed and the indicators of the mineral composition, as well as finished processed minced rabbit meat, which is practically incomparable with any other meat.

Table 4. Moisture, fat, protein and ash contents in rabbit meat in different modifications

Name of indicator	Indicator value %			
	Indicators of rabbit meat (not processed)	minced rabbit	minced rabbit with amarant flour	minced rabbit with olive cake
Moisture	70.7	65.7	40.1	40.7
Fat	12.0	10.0	11.5	9.8
Protein	20.4	20.4	25.8	23.7
Ash content	1.2	1.2	0.9	0.7

Analysis of the data obtained allows us to conclude that the greatest increase in moisture-binding capacity occurs when the secondary product olive oil meal and locally produced amaranth flour are added.

The presence of a large amount of collagen fibers in the raw material makes it difficult to use it for the production of functional food products and prevents insufficient impregnation. To improve the functional and technological properties (in particular, tenderness and moisture-binding capacity), in our work, we considered the method as a biological additive for minced rabbit with a mixture of two components, this is amaranth flour and olive oil cake of local production.

4 Conclusions

From the results of the above analyzes conducted by us, we can say that in order to improve the particular tenderness and moisture-binding ability for functional and technological properties, additives to minced rabbit meat using non-traditional additives such as amaranth flour and olive oil cake gave good results in the food production of pies from ring meat. As well as the enrichment of the pate with non-traditional oils rich in unsaturated fatty acids. The product will serve those suffering from cholesterol in the blood, as well as diabetes, including to maintain energy balance.

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