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FUNCTIONAL PURPOSE RABBIT MEAT ROLL

The article presents the results of the development of a new type of rabbit meat product - meatloaf. The consumption of healthy and nutritious foods rich in macro- and micronutrients, low in lipids and cholesterol, as well as various nutritional supplements, is preferable for the modern consumer. One of the promising types of meat as a dietary raw material is rabbit meat. As a result of the studies, a physicochemical analysis was carried out, the amino acid composition of rabbit meat was determined, and an organoleptic and tasting assessment of rabbit meatloaf was given. The technological scheme, the recipe is developed and the technological parameters of the meatloaf preparation are determined. It is recommended to store meatloaf no more than 10 days at a temperature of 0–2 °C with a humidity of 85-90 %. Meatloaf from rabbit meat has functional properties, contains a large number of vitamins PP – 174.3 mg, potassium minerals – 5052.8 mg, magnesium – 382.4 mg, phosphorus – 2875 mg, sodium – 8598.7 mg. The results of the nutritional and biological value of rabbit meatloaf allow us to make an informed conclusion about the high level of their nutritional value, which clearly illustrates the values of quality indicators.

Keywords: rabbit, meat, diet food, meat product, nutritional value, biological value, functional product, sensory assessment, amino acid composition.

Introduction

One of the main tasks of the concept of state policy in the field of healthy nutrition of the population of the Republic of Kazakhstan for the period up to 2021 is the task of expanding the assortment and increasing the output of products using local raw materials [1]. Modern consumers are interested in functional meat food products that provide the body with complete proteins, essential amino acids, mono- and polyunsaturated fatty acids, bioavailable vitamins, and also have a low content of cholesterol and lipids, salt, nitrates and nitrites. They improve health and prevent certain diseases. Therefore, the production of dietary meat products is becoming very important.

A functional food product is a food product intended for systematic use in the diets of all age groups of a healthy population, which has scientifically substantiated and proven properties, reduces the risk of developing nutrition-related diseases, prevents deficiency or replenishes nutritional deficiencies in the human body that preserve and improving health due to the presence of physiologically functional food ingredients in its composition [2].

Therefore, special importance is the problem of use as sources of nutrients underutilized animal raw materials, one of which is rabbit meat.

Rabbits have valuable qualities of meat productivity: high breeding rate, early maturity, meatiness. Today, raising rabbits for meat is an established industry in many countries around the world. The global production of rabbit meat in 2018 reached 1.8 million tons per year, with China being the leading producer – 735 021 thousand tons, which is 40 % of world production, while the EU produces about 500 thousand tons, which corresponds to 30 % of world production [3].

Currently, there are about 700 species of rabbits. All rabbits are classified by size and weight, coat length and productivity. Breeds are divided into groups according to the following characteristics: normal-wool, short-wool, long-wool, large, medium, small and dwarf, meat, fur, meat-skin, down and sports. To large are rabbits with a living host more 6 kg Medium-size breed have a mass of from 3 until 6 kg, small-from 2 until 3.25 kg Dwarf rabbits typically have the most a small mass of – about 1 kg.

In Kazakhstan, according to the Ministry of National Economy of the Republic of Kazakhstan, the dynamics of the rabbit meat market declined from 2014 to 2017. Moreover, if in the first three years the decrease was 2 %, then in 2017 it was 13 %, and only in 2018 there was a positive shift: production and consumption volumes increased by 5 % [4]. Unfortunately, the consumption of rabbit meat is not yet popular in the food culture of the population of Kazakhstan; however, this drawback may become an opportunity for the domestic market by reorienting the supply of rabbit meat as «new products».

The natural and economic conditions of our country, the experience of rabbit breeding farms, as well as data from foreign practice show that with the proper organization of production, meat rabbit breeding is profitable and is a promising livestock industry.

Despite the insignificant share occupied in the volume of the Kazakhstani meat market, rabbit meat has its consumers, the number of which is growing every year. One of the reasons for the low level of production of rabbit meat products is the unconventional nature of the raw materials. This implies the urgent task of a deeper study of the specific features of rabbit meat and its processed products.

According to studies, the chemical composition of rabbit meat compares favorably with beef, pork and poultry with a significant amount of protein (21.0 ± 0.1 %), water (72.5 ± 2.5 %), and low-fat content (5.0 ± 3.3 %), cholesterol (59 mg/100 g), the number of minerals (1.2 ± 0.1 %). The ratio of omega 6/omega-3:5.9, high phosphorus content (277 mg/100 g), vitamins PP, C, B6, B12 makes rabbit meat almost indispensable in dietary and therapeutic nutrition [5]. Rabbit meat has a moderately high energy value (from 603 kJ/100 g in loin meat to 899 kJ/100 g in foreleg meat) that essentially depends on its elevated protein content, which accounts for 80 % of its energy value [6].

The meat of rabbits is small-fibre and is highly digestible [7]. The chemical composition of meat depends more on the age of the animal and the quality of feeding. Rabbit meat tastes like poultry such as turkey, pheasant, guinea fowl or chicken.

The color of rabbit meat is white with a pink hue, soft and dense in consistency, non-greasy, with fine fiber muscles, thin bones, and highly binding water [8].

Muscle tissue is the main part of the meat that has the greatest nutritional value. Therefore, the more muscle tissue in the carcass, the higher its nutritional value. On average, rabbit carcass contains 84–85 % of muscle tissue.

Rabbit meat retains its taste and nutritional benefits not only in fresh but also in smoked and canned forms. Rabbit meat is a valuable food product for the manufacture of semi-finished products, pastes, soups, broths, sausages, stews.

Nutritionists advise people with gastritis and gastric ulcer, colitis and enter colitis, hypertension and atherosclerosis, kidney disease and diabetes to eat tasty, easily digestible, low-calorie rabbit meat. Pure rabbit meat is sometimes the only meat diet for people with allergies that are contraindicated in animal meat [5]. It is especially recommended for pregnant women and nursing mothers, young and old, and even sports enthusiasts. According to the same characteristics, its consumption was recommended for children by the World Health Organization (WHO) [9].

Another advantage of rabbit meat is its very low uric acid content, recommended even for people with gout; also, it has low purine content [10].

Nutritional value and safety have gained great importance among the factors determining the quality of meat. The results of studies of rabbits showed a low number and incidence of pathogenic bacteria – *E.coli* and *Salmonella* [2]. A low number and incidence of pathogenic bacteria of public health (*E. coli* and *Salmonella*) have been shown. Thus, the composition of rabbit meat can most fill the needs of the human body in nutrients, which is the basis for its use in the production of products with high requirements for biological value.

Materials and methods

The studies described in this article were conducted based on the experimental-production workshop for meat processing and production of meat products of S. Seifullin Kazakh Agro Technical University. The main raw material for research was used rabbit meat from a training experimental mini-farm for growing rabbits at the department «Technology of production and processing of animal products».

At present, breeds are being bred at the farm of university: the white giant and the Soviet chinchilla, since these breeds are more adapted to outwardly cellular content in the conditions of our region. Both breeds are of a meat-and-pellet direction of productivity and when slaughtered at the age of 4–4.5 months, the mass of carcasses is 2.0–2.2 kg. The production of rabbit meat per rabbit per year is on average 30-34 kg.

The main unsalted raw materials used are rabbit fillets, shelter and fat. The addition of starch enhances moisture-binding ability. Fermented rice dye, diluted with water, gives the sausage a characteristic color when ready. The Shinken 5 Spice Mix is added to add flavor and aroma. As a shell, a natural shell is used - a lamb bung.

The technological scheme for the production of meatloaf consists of the following steps: receiving, stripping and cutting carcasses of a rabbit; boning, trimming of meat raw materials; grinding meat raw materials; Ambassador, 2 % per 100 kg of minced meat; the addition of spices, 6.6 % per 100 kg of minced meat; filling the shells and knitting loaves; roasting at a temperature of 110 °C for 20 minutes; cooking at a temperature of 80–85 °C for 45–90 minutes; cool at 0–2 °C for 10–15 minutes; quality

control; packaging; storage at 0–2 °C, not more than 10 days at an air humidity of not more than 85 %. The yield of finished products amounted to 2.2 kg, i.e. 146 %. This type of sausage product should be stored in refrigerators at a temperature of 0–4° C for no more than 10 days.

During the research the following analysis methods were used:

- Determination of the mass fraction of moisture in accordance with SST 9793-2016 Meat and meat products. Methods for determination of moisture content (with Amended);
- Determination of the mass fraction of fat by the Soxhlet method according to SST 23042–2015 Meat and meat products. Methods of fat determination (with Amended);
- Determination of the mass fraction of ash by ashing;
- Determination of protein content by the Kjeldahl method in accordance with SST 25011–2017 Meat and meat products. Protein determination methods;
- Amino acid content in accordance with SST 34132–2017 Meat and meat products. Method for determining the amino acid composition of animal protein;
- Definition of organoleptic indicators. For a comprehensive and objective assessment of the taste, color, appearance, smell and texture of the finished product, we used the traditional point assessment of competent professionals;
- The determination of the biological value of raw materials and the finished product was carried out by the calculation method according to Academician N. Lipatov.

Results and discussion

During the work it has been studied and optimized raw material for making rabbit roll stuffed in natural casings. Table 1 shows the results of the analysis of the nutritional value of rabbit meat used to obtain a new product.

Nutritional value of rabbit meat: water – 69,9 %; protein – 22,4 %; fat – 6,5 %; ash – 1,2 %.

It can be concluded that rabbit meat is healthier than other types of meat often used in human nutrition, high in protein and low in fat.

The amino acid composition of beef and rabbit meat is sharply different in some indicators: lysine, proline, glycine and valine in rabbit meat are much larger, and isoleucine, phenylalanine and cystine predominate in beef (Table 1) [11].

Table 1 – The amino acid composition of the beef and rabbit meat

Essential amino acids	Beef	Rabbit	Nonessential amino acids	Beef	Rabbit
Lysine	4,7	10,3	Alanine	5.3	6.7
Leucine	7,3	7,9	Aspartic acid		9.1
Isoleucine	7,1	4,0	Glutamic acid		16.4
Phenylalanine	5,1	2,7	Proline	2.1	3.6
Methionine	2,1	2,4	Oxyproline		
Valine	2,5	4,1	Serine	3.6	4.0
Threonine	4,7	4,4	Cystine	0.6	0.1
Arginine	7,9	6,8	Norleucine		3.8
Histidine	3,3	3,4	Glycine	2.8	4.2

Composition of the meat product was compiled (Table 2). An experimental product was developed using traditional technology.

Table 2 – Recipe for «Astana Delicious» meatloaf

Name of raw materials, spices and materials	%	The raw material consumption rate
Unsalted raw materials per 100 kg		
Rabbit fillet	89,8	1,348
Rabbit housing	5,5	0,083
Rabbit fat	4,7	0,069
Spices and materials, g/100 kg unsalted raw materials		
Salt	0,020	0,020
Nitrite salt	0,002	0,002
Spice mix «Shinken 5»	0,100	0,100
Starch	0,100	0,100
Fermented Rice dye diluted with water	0,010	0,010
Water	0,5	0,5

In connection with the goal, special attention was directed to the study of physicochemical, organoleptic characteristics of products. The table shows the results of physicochemical indicators and the nutritional value of rabbit meatloaf.

Table 3 – Physico-chemical composition and nutritional value of rabbit meatloaf, per 100 g

Indicators	Value
Calories, kcal	198,5
Protein, g	26
Fats, g	10,5
Vitamin B1, mg	1,81
Vitamin B2, mg	2,71
Vitamin PP, mg	174,3
Vitamin E, mg	7,5
Potassium, mg	5052,8
Magnesium, mg	382,4
Phosphorus, mg	2875
Sodium, mg	8598,7
Iron, mcg	50,2

From table 3 it was proved that rabbit meatloaf has functional properties, contains a large number of vitamins PP – 174.3 mg, potassium minerals – 5052.8 mg, magnesium – 382.4 mg, phosphorus – 2875 mg, sodium – 8598.7 mg.

To assess the quality indicators, rabbit meatloaf was provided for a tasting assessment by the faculty of the department «Technology of food and processing industries». The product was recognized as a dietary, gourmet, delicate, tasty meat product and was praised. Figure 1 shows the results of a meatloaf tasting.

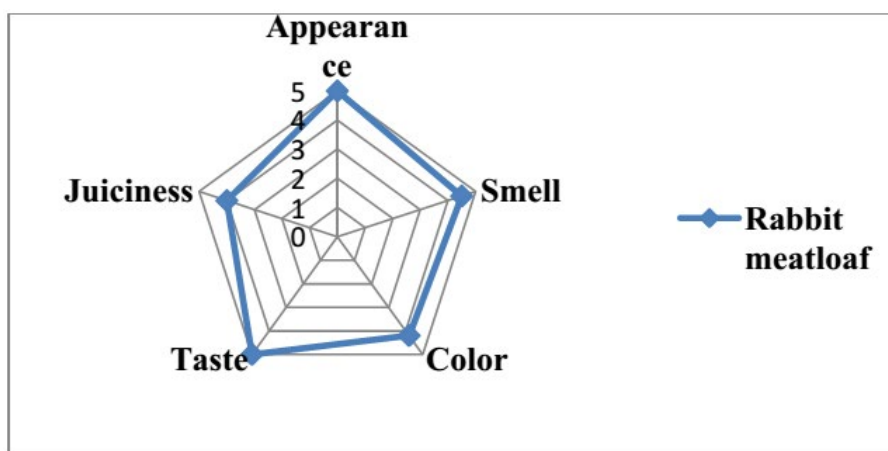


Figure 1 – Results of a tasting assessment of rabbit meatloaf

Figure 1 shows that the prepared meatloaf from rabbit meat satisfied the tastes of tasters and received approval for its introduction into production.

Conclusions

Thus, the results of assessing the totality of organoleptic, physicochemical characteristics, evaluating the nutritional and biological value of boiled rabbit meat roll allow us to make an informed conclusion about the high level of their nutritional value, which clearly illustrates the values of quality indicators.

Rabbit breeding in Kazakhstan is in its infancy, as it is a young agricultural industry. Despite its status, this industry is rapidly gaining momentum, and already has its end users who focus on useful products of easy processing.

There is a need to find appropriate strategies for adapting rabbit meat to the consumption of a wide range of consumers. This is the production of various kinds of products like burgers, nuggets, sausages, turning them into convenient products and extending their shelf life [12].

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ФУНКЦИОНАЛДЫ МАКСАТТА ҮЙ ҚОЯН ЕТІНЕН ЖАСАЛЫНҒАН ЕТ ОРАМАСЫ

Мақалада қоян етінің жаңа өнім – ет орамасын әзірлеу нәтижелері келтірілген. Заманауи тұтынушы үшін макро және микроэлементтерге бай, төмен липидтер мен холестерин, сондай-ақ әртүрлі тағамдық қоспаларға бай пайдалы және қоректік тағамдарды тұтынған жөн. Диеталық шикізат ретінде еттің келешектегі түрлерінің бірі - қоян еті. Зерттеу нәтижесінде қоян етінің физика-химиялық талдау жасалды, аминқышқыл құрамы анықталды, ал қоян етінің орамасына органолептикалық және дәмдік баға берілді. Ет орамасының технологиялық сұлбасы, рецептурасы жасалып, оның дайындаудың технологиялық параметрлері анықталған. Қоян етінің қоректік және биологиялық құндылығының нәтижелері сапа көрсеткіштерінің мәндерін нақты көрсететін олардың қоректік құндылығының жоғары деңгейі туралы негізделген қорытынды жасауға мүмкіндік береді.

Кілтті сөздер: қоян, ет, диеталық тағам, ет өнімі, тағамдық құндылығы, биологиялық құндылығы, функционалды өнім, сенсорлық бағалау, аминқышқылдарының құрамы.

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МЯСНОЙ РУЛЕТ ФУНКЦИОНАЛЬНОГО НАЗНАЧЕНИЯ ИЗ КРОЛЬЧАТИНЫ

В статье представлены результаты разработки нового вида изделия из крольчатины – мясного рулета. Потребление здоровой и питательной пищи, богатой макро- и микронутриентами, с низким содержанием липидов и холестерина, а также разных пищевых добавок является предпочтительным для современного потребителя. Одним из перспективных видов мяса в качестве диетического сырья является мясо кролика. В результате исследований были проведены физико-химический анализ, определен аминокислотный состав мяса кролика, дана органолептическая и дегустационная оценка мясного рулета из мяса кролика. Разработана технологическая схема, рецептура и определены технологические параметры приготовления мясного рулета. Результаты пищевой и биологической ценности мясного рулета из крольчатины позволяют сделать обоснованное заключение о высоком уровне их питательной ценности, что наглядно иллюстрируют значения показателей качества.

Ключевые слова: кролик, мясо, диетическое питание, мясной продукт, пищевая ценность, биологическая ценность, функциональный продукт, сенсорная оценка, аминокислотный состав.

Теруге 25.03.21 ж. жіберілді. Басуға 05.04.21 ж. қол қойылды.

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