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Veterinary And Sanitary Assessment Of Semi-Finished Products From Poultry Meat Using A Multifunctional Additive And Dry Extract Of Echinacea.

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ABSTRACT

This article presents the results of studies on the determination of organoleptic, functional - technological and physic-chemical parameters of minced meat chopped semi-finished products with the addition of a multifunctional food additive and a dry extract of echinacea. The conducted researches show that the combination of a multifunctional food additive and a dry extract of echinacea contribute to the moisture-binding ability and the increase in the length of storage of minced meat for chopped semi-finished products.
Keywords: poultry meat, quality, expertise, echinacea

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INTRODUCTION

Meat chopped semi-finished products are well-deserved recognition of the consumer and every year they occupy an increasingly strong place in the food ration of the population [1,2,3].

These semi-finished products are particular value for public catering establishments because it would be impossible to satisfy without them even the most limited quantity demands of visitors for such widely popular and favorite dishes as steak, beef stroganoffs and others [4,5,6].

The advantage of meat chopped semi-finished products is that they allow increase the capacity of the enterprise by facilitating and reducing the work of billets, reducing the time required for cooking hot meat dishes or snacks. Meat processing plants produce semi-finished products in conditions that fully guarantee freshness, a good quality, cleanliness and hygiene of products [7,8]. The technological process and the recipe are constructed in such way that for this kind of semi-finished product is used only that portion of meat which is strictly corresponds to the product in accordance with the structure of the fabric, fatness, quality and culinary properties [9].

In recent years the demand for semi-finished products that do not require a significant time for cooking at home and at public catering enterprises is significantly increased. Meat semi-finished products, as a rule, produce in packaged and packed forms, which also determine their high consumer qualities [10].

The assortment of meat chopped semi-finished products is constantly expanding as a result of using different combinations of meat raw materials with vegetables, cereals, flour and other protein components. Through the use of flow-mechanized lines in the development of meat semi-finished products, their external design improves, the packaging is improved too [11].

Minced meat of various formulations is more and more common from which it is possible to prepare a large variety of dishes [12,13].

MATERIALS AND METHODS

As you know nowadays there are various food additives and ingredients directed technological applications, which have different penetration and distribution in raw meat to increase the volume of the production. In this work we consider the use of a multifunctional food additive which contains: a fiber, acidity regulator E451 (15.82% P_2O_5), stabilizer E450, dextrose, spice extracts, flavor enhancer E621 (13%), salt, and also the use the echinacea.

The echinacea is a valuable medicinal raw material for obtaining many medications. Plants contain polysaccharides (heteroxylans, arabinoramnogalactans), essential oil (0,15-0,50%), flavonoid, oxycoric (chicory, ferula, coumaric, coffee) acids, tannins, saponins, polyamines, echinacea (amidopoline-satiated acids) , echinolone, echinacoside (glycoside which contains caffeic acid and pyrocatechol), organic acids, resins, phytosterols; rhizomes and roots - inulin (up to 6%), glucose (7%), essential and fatty oils, phenol carboxylic acids, betaine, resins. All parts of the plant contain enzymes, macro- (potassium, calcium) and trace elements (selenium, cobalt, silver, molybdenum, zinc, manganese, etc.), which favorably stimulate the immune system. Preparations from the echinacea are immunostimulating agents of vegetable origin.

The purpose of this work is the development of recipes for chopped semi-finished products from poultry meat with the use of a multifunctional food additive and dry extract of the echinacea.

The object of research is the broiler chicken meat of the 1st category.

Experimental studies were carried out in the conditions of the laboratories of the Federal State Budget Educational Institution of Higher Education "Mari State University" in a 3-fold sequence.

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RESULTS AND DISCUSSION

There were considered several variants of the recipes of chopped semi-finished products to determine the amount of multifunctional additive and dry extract of the echinacea. They are given in table 1.

The technology of the production of the developed semi-finished products consists of series of sequential operations. Chilled thighs of broiler chickens undergo a boning along with the skin without cuts muscle. Bumper raw materials are inspected; the remains of cartilage and possible bone inclusions are removed. Then obtained after deboning meat is ground and ingredients are added according to the recipe. The next step is the forming the prototypes and their exposure to heat treatment. After bringing the product to cooking readiness, it is subjected to an organoleptic evaluation.

Table 1: The recipe for chopped meat semi-finished products

The name of raw materials	Norms of consumption for 100 kg of finished product, kg				
	Control	Experiment №1	Experiment №2	Experiment №3	Experiment №4
Chicken fillet	24,94	24,94	24,94	24,94	24,94
Thigh chicken boiler	46,3	46,3	46,3	46,3	46,3
Bread	8,75	6,35	4,54	2,57	-
Oil	6,25	6,25	6,25	6,25	6,25
Milk	5,5	5,5	5,5	5,5	5,5
Salt	1,25	1,25	1,0	0,75	-
Pepper	0,125	0,125	0,094	0,063	-
Nutmeg	0,125	0,125	0,125	0,125	-
Dry extract of the echinacea	-	0,15	0,25	0,5	0,75
Multifunctional additive	-	2	4	6	9,25
Water	7	7	7	7	7
Total:	100	100	100	100	100

An organoleptic evaluation was conducted in accordance with State Standards 9959-91. Organoleptic indicators of finished products have a decisive influence on a consumer demand. Organoleptic indicators are shown in figure 1.

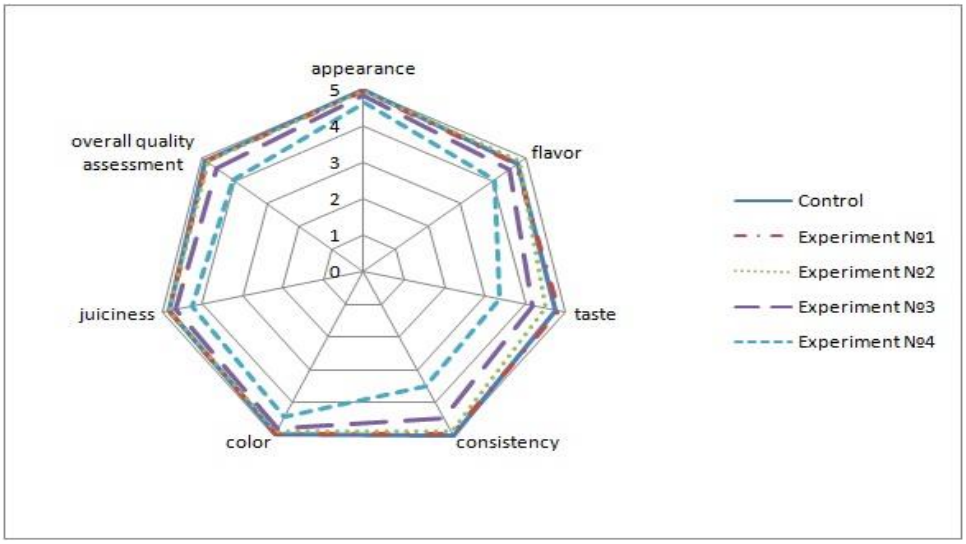

Figure 1: Organoleptic characteristics of prototypes

According to the results of the tasting assessment the tasters noted there were differences between the prototypes of the medallions in all evaluated indicators.

The experimental samples №1 and № 2 are the most acceptable for organoleptic indices. However, tasters noted that addition a dry echinacea extract in an amount of 0.25 kg per 100 kg of the finished product gives a specific flavor to the product. On the basis of a complex organoleptic evaluation it can be concluded that the dry extract of the echinacea in the finished product should not exceed 0.15 kg per 100 kg (experiment № 1). The use of a multifunctional additive in the finished product was not felt in any of the prototypes by organoleptic indices.

Studies were also carried out on the effect of a multifunctional additive and dry extract of the echinacea on the moisture binding capacity (MBC) of control and experimental samples of minced meat.

The obtained data for definition of functional and technological properties of raw mince meat chopped semi-finished products are presented in table 2 and 3.

Table 2: Functional and technological properties of raw materials

Indicators	Filet	Thigh
Ph	6,2	6,7
MBC	55,31	58,64

Table 3: Functional and technological properties of mince

Indicators	Control	Experience № 1	Experience № 2	Experience № 3	Experience № 4
MBC	53,01	55,60	57,06	56,84	55,31

On the basis of obtained results it can be concluded the introduction of a multifunctional additive and dry extract of the echinacea into the formulation affects the change of MBC. According to the table 3, the test samples № 2 and № 3 have the highest water-binding abilities.

In parallel there were conducted studies to determine the physic - chemical properties of minced meat semi-finished products. After 1, 7, 14 and 21 days of a sample storage at the temperature of 3 ± 1 ° C the content of the oxidation products, acid and peroxide, was determined (in 3-fold repeatability) in the control and test samples (in accordance with generally accepted State Standards P 50457-92 (ISO 660-83) Animal and vegetable fats and oils. The determination of acid number and acidity and State Standards 51487 - 99 Vegetable oils and animal fats. The method of determining the peroxide number.) The obtained results are processed by methods of mathematical statistics and are presented in table 4.

Table 4: The influence of multifunctional food additive and the dry echinacea extract on acid and peroxide numbers

	Control	1	2	3	4
The first day of storage					
Acid number, mg KOH / g	0,9356±0,0263	0,8283±0,0007	0,7831±0,0011	0,7180±0,0006	0,6995±0,0004
Peroxide number, mmol (1/2O_2) / kg	2,3459±0,1920	2,2344±0,0157	2,1931±0,0074	2,1534±0,0053	2,1328±0,0017
The 7^{th} day of storage					
Acid number, mg KOH / g	1,3281±0,0316	1,2198±0,0142	1,2027±0,0312	1,1525±0,0159	1,1298±0,0174
Peroxide number, mmol (1/2O_2) / kg	3,4563±0,0934	3,2714±0,1237	3,2326±0,0552	3,1834±0,0757	2,9728±0,0762

The 14th day of storage					
Acid number, mg KOH / g	2,1927±0,0425	2,0652±0,0238	1,9816±0,0126	1,8312±0,0637	1,6592±0,0783
Peroxide number, mmol (1/2O_2) / kg	4,6218±0,0816	4,4217±0,0954	4,2982±0,0668	4,0219±0,0535	3,9692±0,0395
The 21st day of storage					
Acid number, mg KOH / g	2,5423±0,0218	2,4190±0,0129	2,3050±0,0690	2,1252±0,0439	1,9651±0,0438
Peroxide number, mmol (1/2O_2) / kg	5,7197±0,0312	5,5680±0,0912	5,3918±0,0272	5,2117±0,0917	4,8695±0,0218

A comparative analysis and a complex evaluation of the content of oxidation products in the control and test samples objectively indicate to the inhibitory effect of the multifunctional additive and dry extract of the echinacea on the intensity of the oxidative processes of minced meat.

The increase in the acid number confirms the appearance in the raw material of free fatty acids formed as a result of hydrolytic damage to fats. During the 21 days of storage in the test samples, the highest value of the acid number reached in the control sample on 4.7841 mg KOH/g.

It was also found, when the greatest concentration of the multifunctional food additive and dry extract of the echinacea were added to the test samples, it significantly reduced the degree of its hydrolytic damage, so during the storage for the 21st day these samples were subjected to hydrolytic changes that did not significantly reduce their microbiological value.

During the study of the activity of food additive and the echinacea extract peroxide numbers in the control and test samples were determined in parallel.

Peroxide number is an indicator characterizing it as fresh, but not subject to storage. However samples containing additives were evaluated as fresh and subject to storage. With the addition to the test sample №1 of a multifunctional additive in the amount of 2 kg per 100 kg of raw material and dry extract of the echinacea in the amount of 0.15 kg per 100 kg of minced meat after 7 days of storage the peroxide number was lower on 0.185 mmol (1/2 O_2) / kg compared with the control sample. Therefore when adding a multifunctional additive in the amount of 0.25, 0.5 and 0.75 kg per 100 kg of raw material and adding dry extract of the echinacea in the amount of 4, 6 and 9.25 kg per 100 kg of minced meat the peroxide number was even lower on 0.22, 0.27 and 0.48 mmol (1/2 O_2) / kg, respectively. And after 21 days of storage the peroxide number in the test samples was even lower on 0.15, 0.32, 0.5 and 0.85 mmol (1/2 O_2) / kg compared with the control.

The obtained results indicate the rather effective action of the multifunctional food additive due to the fact that it contains the additive E451 which besides an acid regulator serves as an antioxidant, and there is also E450 additive which is used not only as a stabilizer, baking powder, emulsifier and complexing agent, but also the additive is used for the natural deceleration of oxidative processes, extending the shelf life and preservation of the product fresh for a long period. Also dry extract of the echinacea contains a flavonoid that due to its antioxidant properties significantly increases the shelf life of the products.

CONCLUSION

On the basis of experimental studies the optimal amount of introduction of multifunctional food additive and dry extract of the echinacea in the recipe of developed chopped semi-finished products from poultry meat was determined. Also based on the findings by the determination of functional - technological and physic-chemical properties we can conclude that the introduction of a multifunctional food additive and dry extract of the echinacea favorably affects to the moisture binding capacity and the duration of storage of minced meat due to the content of acidity regulators in their composition.

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