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Influence of Parameters of Marinating Meat Semi-Finished Products on the Quality of the Finished Product

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Abstract. Improvement and introduction of modern technologies in the creation of new types of meat semi-finished products, the study of promising components and the development of new recipes for marinades, improving the organoleptic and taste properties of the final product is a relevant and promising area of research. Therefore, this study is focused on the influence of marinating parameters in the technology of meat semi-finished products, namely on the organoleptic, physicochemical, and functional-technological properties of the finished product. To solve the tasks, generalisation, comparison and the following research methods were used: organoleptic evaluation of appearance, cut section, taste, smell, colour, consistency, and juiciness; moisture content – by drying samples in a drying oven at a temperature of 103 ± 2 °C to a constant mass; fat content – by the Soxhlet method; ash content – by the conventional weighing method; determination of protein content – by the Kjeldahl method; the yield of the finished product was determined by weighing before and after heat treatment; moisture binding and moisture retention capacity was determined by pressing. The studies found that the effect of the duration of marinating significantly affects the organoleptic characteristics. Thus, the organoleptic characteristics and taste and aroma properties of the finished product when using honey in marinades improve, and the appearance becomes more attractive. According to the results of the organoleptic evaluation, the finished product, after 24 hours of marinating, received a score of 4.9 points. Also, in these samples were observed greater water retention and water binding capacity, which contributes to increased hydration and solubility of muscle tissue proteins. The influence of marinating parameters on the consumptive properties of the product has been established. Thus, the yield of finished baked beef after 24 hours of ageing in the marinade was the highest in sample No. 1 (marinade based on citrus honey – 10 g) and amounted to 84.96%, while the average weight yield of other samples was in the range of 73.18-77.5%. The obtained research results make it possible to expand the range of semi-finished products, correct organoleptic properties and enrich the finished product with biologically active substances

Keywords: baking process, organoleptic assessment, physicochemical indicators, functional and technological indicators, sensory analysis, muscle tissue

Introduction

The combination of meat raw materials and the characteristic components of the marinade makes it possible to create new products with high consumer properties. The functional and technological properties of honey and spices allow for diversifying products and increasing their biological value.

Honey possesses many useful properties due to the fact that it contains such microelements as zinc, iron in

large quantities, B vitamins and vitamin C, antioxidants and other trace elements. Therefore, the expediency of its use as one of the ingredients for marinating meat products before the heat treatment process is quite promising [1; 2].

The introduction and improvement of the latest technological techniques for food production provide an opportunity to produce new meat products that will positively

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affect the accumulation of biologically active components to ensure a high level of quality of the finished product. All the above-mentioned techniques with partial improvement of the technological processes of the full cycle of processing meat raw materials, starting with the development of new recipes or their improvement and obtaining innovative products at the output.

One of the main factors that should be considered is the speed of the cooking process, which will contribute to

the creation of new organoleptic properties of the finished product and ensure microbiological safety [3; 4].

During 2017-2021, the structure of meat production underwent drastic changes, the share of poultry meat reached 53.3%, pork – 29.7% and beef – 15.2% [5].

According to the data given in the study [6], poultry meat (chicken) makes up 50% of the diet of each resident of Ukraine, and its share has been increasing over the past few years (Table 1).

Table 1. Structure of annual poultry meat consumption

No.	Year	Per person, (kg)	Total consumption for the year, (%)
1	2019	24.34	49.7
2	2020	25.15	51.9
3	2021	8.24 (January-April)	54.3

Therefore, the provision of the population with meat and meat products, especially high quality with good presentation, taste, culinary and technological properties, and significant nutritional value requires in-depth studies of the properties of raw materials and culinary products by modern chemical and physicochemical methods [7].

In the range of meat products, semi-finished products play a significant role – products that are maximally prepared for culinary processing. The desire of the population to reduce the time for cooking and at the same time eat high-quality and diverse products has led to a significant increase in demand for natural semi-finished meat products, quick-frozen and chilled, and ready-made fried products that have high nutritional value and are affordable [8]. Today, the development of innovative technologies for the preparation of semi-finished products for baking, and optimisation of the ingredient components of the marinade, to increase the nutritional value of the finished product, remains quite relevant.

The quality of finished products processed in ovens largely depends on the technological process, which in turn is determined by the dynamics of adjusting the set parameters, the uniformity of temperature heating and the speed of the coolant in the working chamber. Raw meat depends on the amount of connective, adipose and muscle tissue, thermal state, storage duration, and other factors. In muscle fibres, fibrils are connected by an interfibrillar basic substance; under the action of alkali, this substance liquefies, and the fibre breaks up into separate fibrils. Therefore, in the process of production of semi-finished products, it is advisable to subject the products to marinating, which allows you to get juicy products [9].

The duration of heat treatment of meat and its tenderness largely depends on the ratio of collagen fibres in muscle tissue. Muscle tissue, freed from adipose tissue and largely from connective tissue, contains approximately 70-75% moisture. Moisture is retained in the tissues due to osmotic pressure and the adsorption capacity of proteins and fills the macro- and micro-capillaries. Most of it (50-70%) is in a weakly bound state and is a solution of organic and inorganic substances. Some of the water (0.6 g per 1 g of protein) is firmly held by protein substances [10].

The purpose of the study is a development and substantiate the parameters of marinating meat semi-finished products with their subsequent heat treatment. Following the objective, the next tasks were solved: substantiation of the choice of components of the marinade recipe to give the desired structure of the finished product; study of the influence of technological parameters of marinating and culinary processing on the quality indicators of the finished meat product.

Literature Review

For frying in natural form, semi-finished products are made from tender and soft parts of the carcass (tenderloin, loin, ham). To soften the meat, enzyme preparations of plant, animal and microbiological origin are used. They allow for more or less proteolytic cleavage of connective tissue proteins and muscle fibre proteins [11].

In the process of maturation, which occurs during exposure after the slaughter at a temperature of 1-4 °C, the meat acquires a delicate texture, pleasant smell, and taste. This is due to various biochemical processes caused by the present enzymes. Proteolytic enzymes such as papain, ficin, bromelain, etc., are widely used to improve the consistency of meat [12].

Bacterial and fungal proteolytic enzymes are known to affect only muscle fibre proteins. In this case, there is a softening of the sarcolemma; destruction of the muscle fibre led to the loss of muscle tissue of transverse striation. Proteolytic enzymes of plant origin mainly affect connective tissue fibres [13].

In culinary practice, various marinades are used to soften meat. In addition to softening, marinade imparts flavour to meat and can eliminate or reduce unwanted odour, which is achieved by adding various spices and seasonings. Marination is also widely used as a method of preserving meat products, as it allows to prolong the shelf life and storage of chilled meats.

The authors of scientific papers [14; 15], conducted a number of studies in which the formulations of marinades with the addition of honey of different varieties were used, and the results showed that such mixtures were quite effective and reduced the formation of heterocyclic amines (HCA) in the finished products during the cooking process.

Traditional marinades contain rapeseed oil and plant extracts of paprika or garlic. Emulsion-based marinades contain vegetable oils, water, spices, spice extracts, and salt [15]. The authors of the study [16] found that changing the colour of semi-finished products marinated in various marinades without adding honey reduces the attractiveness of the product, but when it is used, finished products have a more natural colour. The aforementioned changes in colouration may be associated with an enhanced binding reaction of myoglobin and myofibrillar protein [17].

Over the past 10 years, there has been an active development in the use of chilled semi-finished instant meat products, despite the fact that sometimes their price can be higher by 25-30% compared to frozen ones. This trend is observed all over the world [18]. The production of chilled meat products is carried out both by food enterprises and chain stores that have their own shops for the production of semi-finished products.

The main priorities of modern food are fullness, variety, and speed in preparation. Very often each family member has different preferences in food, and rather than cook multiple dishes every day, modern people prefer to buy ready-made meat products and instant meals [19].

Materials and Methods

The research was conducted in 2019-2020 in the laboratory of the Department of Meat, Fish and Seafood Technology, the Department of Anatomy, Histology and Pathomorphology of Animals named after Academician V.G. Kasyanenko and the Department of Ecobiotechnology and Biodiversity of the National University of Life and Environmental Sciences of Ukraine; at the Institute of Food Resources of the National Academy of Agrarian Sciences of Ukraine, the Palladin Institute of Biochemistry of the National Academy of Sciences of Ukraine, the Ukrainian Laboratory of Quality and Safety of Agricultural Products (Chabany).

For research, a hip part of beef weighing 1.5-2 kg was selected, which was cooled and stored for three days at a temperature of 2-4 °C.

According to the scheme of the experiment, the following technology was performed: preparation of marinade – a mixture of herbs (chopped onions, garlic, basil, coriander, ground paprika, ground tomatoes, ground black pepper, ground ginger, ground red pepper, ground paprika, rosemary, parsley, marjoram, nutmeg, ground allspice, salt); refined oil; honey of two varieties – golden and citrus. Salt was included in the marinade recipe at the rate of 2% by weight of raw materials. 5 marinades for beef were proposed, which are shown in Table 2.

Table 2. Methods of marinating beef meat

Marinade	Components			
	A mixture of herbs, g	Oil, g	Honey variety	Honey, g
1	6	16	–	–
2	6	16	Citrus	10
3	6	16	Citrus	20
4	6	16	Goldenrod	10
5	6	16	Goldenrod	20
6	6	16	Citrus + goldenrod	20 (10 each)

At the same time, the following basic technological operations were included in the methods of marinating: cutting beef meat, and preparation of marinade, namely mixing oil, spices, and honey in the prescribed amount. The marinade was poured into the raw materials and mixed thoroughly.

Then the product was kept at a temperature of 2-4 °C in the refrigerator for 2 hours and throughout the day. Also, a control sample of beef was marinated without adding honey (No. 1). The next step was baking the semi-finished product in an electric oven with hot air convection at a temperature of 180 °C for 2 hours. 1 control and 5 experimental samples were examined according to the formulation given in Table 1 [20]. To obtain reliable experimental data, all studies were conducted at least five times, with two repetitions for each experiment.

Sampling for organoleptic and physicochemical studies and their preparation for analysis was carried out in accordance with DSTU 4437:2005 Semi-finished meat and meat-vegetable cut. Technical specifications [21].

The organoleptic assessment was performed using a five-point system. Five points were given to a sample that fully complied with the recipe and production technology and in terms of organoleptic characteristics corresponded to a high-quality product. Minor deviations from the established requirements are allowed for a product rating of 4 points. A score of 3 points indicates a violation of the cooking technology. If during the evaluation at least one of the indicators receives 2 points, the product is not subject to further evaluation (Table 3).

Table 3. The scale of organoleptic evaluation of semi-finished meat products

Indicator	Characteristics	Points
Appearance	The semi-finished product has a regular oval shape. After baking, the surface of the product has a uniform ruddy crust. The colour in the section is dark grey, there may be particles of marinade components, which does not reduce the positive impression	5

Table 3, Continued

Indicator	Characteristics	Points
Appearance	The semi-finished product has a regular oval shape. The surface is crack-free. After roasting, a ruddy crust appears on the surface of the product. The presence of heterogeneous marinade components reduces the positive impression	4
	The semi-finished product has an irregular shape. Damaged surface. After baking, the surface is unevenly crusted	3
	The semi-finished product has an irregular shape and is deformed. Damaged surface. After baking, there is no crust on the surface, or there are areas with burns	2
	The semi-finished product has an irregular shape and is deformed. The surface is covered with significant burns. After baking, the product has an unrepresentable appearance	1
Smell	Pleasant, appetizing, harmonious, inherent in this type of food, no extraneous odor	5
	Pleasant, appetizing, dominated by one of the components of the product (spices, honey), too intense or neutral	4
	Pleasant, but specific, honey-like	3
	Unpleasant, unappetizing, smell of oxidized fat	2
	Very unpleasant, sharp, oxidized fat, putrid	1
Consistency	Dense, juicy, the product retains its shape well after baking	5
	Slightly dense, juicy, tender, the product retains its shape after baking	4
	Very dense, or loose, crumbly, dryish or soft	3
	Crumbly, brittle, too soft or rubbery	2
	The product does not retain its shape, dry	1
Taste	Pleasant, fresh, appetizing, sweetish, unobtrusive, light, bouquet-like, harmoniously combining the taste of the components of this product (beef, honey, spices), moderately salty	5
	Pleasant, appetizing, but dominated by one component of the product, very intense or neutral, light meat, moderately salty	4
	Pleasant, but specific, honey taste, salty or slightly salty	3
	Unpleasant, sweet, pronounced taste of spices	2
	Very unpleasant, spoiled meat raw materials, oxidized fat	1

To obtain objective results of the organoleptic assessment of the quality of the finished product, each of the indicators – appearance, colour, smell, taste, consistency, juiciness, and sectional appearance – is given appropriate ratings. Based on the scores for each indicator, the product score is determined in points (as arithmetic mean, the result is calculated to one decimal place).

Physicochemical and functional-technological studies were carried out according to generally accepted methods: moisture content was determined by the arbitration method, which is based on drying samples in a drying oven at a temperature of 103 ± 2 °C to a constant mass according to DSTU ISO1442:2005 [22]; fat content was determined by extraction of a pre-dried sample in a Soxhlet extractor according to DSTU ISO1443: 2005 [23]; ash content was determined by burning the sample in a muffle furnace at a temperature of 400 °C in accordance with DSTU ISO 936:2008 [24]; moisture binding and moisture retention capacity were determined by pressing the samples and separating free moisture, subsequently calculated using the appropriate formulas.

$$MBC = \frac{(A-B \times 8.4)}{A} \times 100 \quad (1)$$

where, MBC – moisture binding capacity, %; A – total moisture content in suspension, %; 8.4 is a constant indicating the amount of moisture retained by the filter paper 1 cm²; B – wet spot area, cm².

Moisture retention capacity (%):

$$MRC = \frac{(A-B \times 8.4)}{m} \times 100 \quad (2)$$

where, MRC – moisture retention capacity of meat, % A – the total amount of moisture in the meat sample, mg; 8.4 is a constant indicating the amount of moisture retained by the filter paper 1 cm²; B – wet spot area, cm²; m – the mass of the sample, g.

After pressing, a pencil contour was drawn around the pressed meat (meat spot – MS) and the total spot (TS) along the boundary of moisture spread (Fig. 1). The area of a wet spot (WS) is the difference between the areas of a total spot and a meat spot.

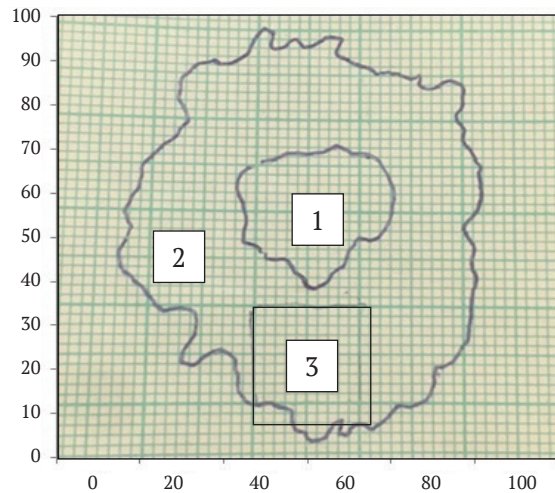


Figure 1. Control sample: 1 – meat spot (MS); 2 – total spot (TS); 3 – standard image with an area of 1 cm²

According to organoleptic indicators, the varieties of honey met the requirements of DSTU 4497:2005 “Natural honey. Technical specifications”, according to the type of plants from which they were collected, had the aroma, and taste inherent in this variety, and did not contain mechanical impurities and signs of fermentation [20].

Results and Discussion

According to the previous author’s research, all the quality indicators of the marinade and marinated portioned semi-finished products were determined [20].

During heat treatment, physicochemical (moisture content, fat, ash) and functional technological (moisture binding, moisture retention capacity and plasticity) changes in the product occur, as well as certain organoleptic properties (appearance, taste, smell, colour, consistency) characterising the finished product are formed [20].

As a result of baking portioned semi-finished products, with ageing in the marinade for 2 hours, the organoleptic score was somewhat lower compared to the 24-hour marinade, especially samples No. 4 and No. 5 (Goldenrod honey – 20 g and citrus + goldenrod – 10 g each, respectively) and amounted to 4.27 points. Sample number 1 (control without adding honey) scored only 4.23 points at 2 hours and 4.51 points at 24 hours of marinating.

Also, for a visual representation of the organoleptic evaluation of baked samples of marinated beef for 24 hours, a profilogram of quality assessment of finished meat products was formed [20].

As can be seen from Figure 2, the taste of the semi-finished products after 24 hours of marinating had the highest number of points, namely the sample No. 2 marinated with citrus honey (20 g), and sample No. 3 with goldenrod honey (10 g).

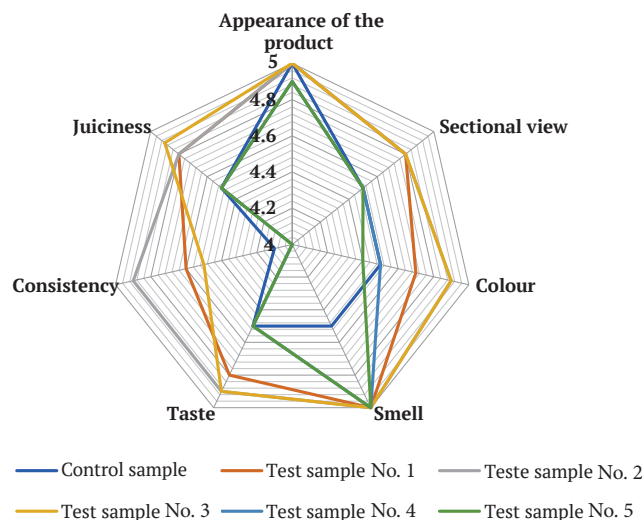


Figure 2. Profilogram of organoleptic quality assessment of portioned semi-finished products

Functional and technological indicators of finished products, namely the moisture content (%), total and meat spots (TS and MS), the area of the wet spot, moisture-retaining

and moisture-binding abilities, the mass of samples after baking, and the determination of meat plasticity are given in Table 3.

Table 3. Functional and technological indicators of the finished product

sample number	TS, cm ²	MS, cm ²	WS, cm ²	MRC, %	MBC, %	Plasticity of meat, cm ² /g
2 hours of marinating						
1	6.45	1.08	5.37	43.44	22.86	17.9
2	6.44	1.28	5.16	46.39	28.76	17.2
3	5.23	1.09	4.14	43.14	36.46	13.8
4	5.44	1.45	3.99	40.25	34.83	13.3
5	5.2	1.08	4.12	48.30	42.16	13.73
6	5.04	1.76	3.28	41.11	45.22	10.93
24 hours of marinating						
1	4.76	1.13	3.63	50.65	49.86	12.1
2	4.15	1.63	2.52	49.43	62.52	8.4
3	4.01	1.11	2.9	44.84	54.00	9.66
4	4.23	1.02	3.21	48.38	53.00	10.7
5	4.03	1.79	2.24	46.82	64.56	7.46
6	4.25	1.10	3.15	46.82	52.44	10.5

Thus, the process of marinating increases the hydration and solubility of muscle tissue proteins, due to the accumulation of free myosin (the most moisture-binding protein of meat) [20].

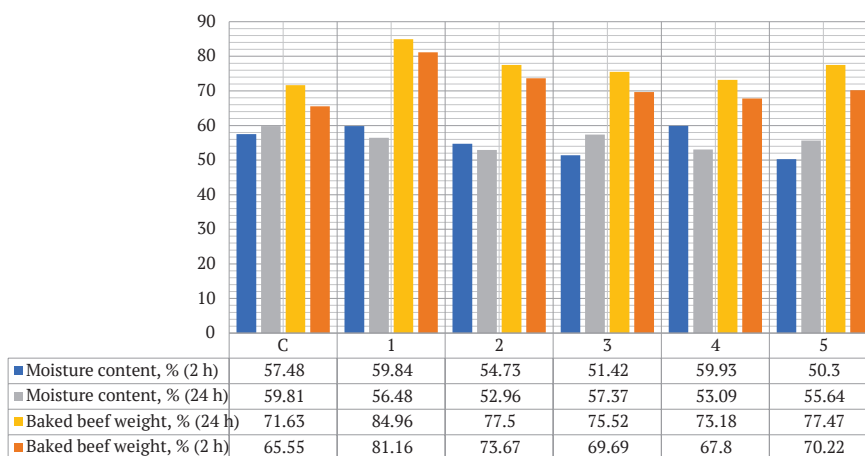
During 24 hours of marinating, the MRC was 1.09 times higher compared to the samples marinated for 2 hours on average, while the MBC was 1.6 times higher. Consequently, meat with increased moisture binding and moisture retention capacity acquired improved consistency and juiciness. Also, as a result of the research, it was found that the moisture-binding capacity at 24 hours of exposure in the marinade of beef meat without the addition of honey (control sample No. 1) was 49.86%, which is 1.15 times less than the average value of other samples. When marinated for 2 hours, the control sample (without adding honey) was 1.64 times lower in terms of WBC values compared to samples marinated with honey added. Consequently, with the addition of honey, the moisture-binding and moisture-retaining ability increase in comparison with the control, which gives the finished product taste, smell, and colour.

The plasticity of the meat of the experimental samples marinated with the addition of honey for 2 hours

averaged 13.79 cm²/g, while after 24 hours of exposure – 9.35 cm²/g, which characterises the ability of the finished product to irreversible deformation and indicates its quality.

A similar result is described in [17], where the influence of mustard-honey marinade, apple cider vinegar, white wine vinegar and kefir-sour marinades on the properties of pork was studied. Accordingly, it was established that the pH of pork changes when aged in white wine vinegar (pH 3.0), apple cider vinegar (pH 3.1), mustard honey (pH 3.9) and kefir marinade (pH 4.5) with a marinating duration of one, three and seven days. It was found that heat treatment had a lesser effect on the weight loss of samples marinated in a mustard-honey marinade (25.43-27.41%), while samples marinated in kefir lost weight almost as much as the samples of the other two groups. The prepared samples marinated with white wine and apple cider vinegar were tougher than the other two marinades. The data obtained showed that marinating in kefir and mustard honey marinade makes the samples softer after baking.

The dynamics of moisture content of ready-made portioned semi-finished products and mass yield (average weight of raw materials and marinated product) after baking are shown in Figure 3.

**Figure 3.** Dynamics of moisture content and mass yield of finished products

Thus, as can be seen in Figure 3, the moisture content in the experimental samples marinated for 2 hours, namely in No. 1 and No. 4, was higher compared to the 24-hour exposure, while No. 3 and 5 samples were higher compared to the 2-hour marinating.

Also, the output of finished baked beef after 24 hours of ageing in the marinade was the highest in sample number 1 (marinade based on citrus honey – 10 g) and amounted to 84.96%, which is 10.7% more than the average yield after baking of other samples – 75.9%. At the same time, the mass yield of baked beef after 2-hour exposure was also the highest in sample number 1 and amounted to 81.16%, which characterises this marinade as effective to be applied. Unmarinated samples showed significantly higher losses compared to other samples, which is explained by the direct contact of meat raw materials with heat and caused by the loss of moisture from the meat [25; 26]. Similar findings were obtained by the authors of scientific work [14], who argue that the addition of honey to the marinade mixture is effective, which leads to a reduction in weight loss of the finished product as a result of baking. The percentage of losses of grilled beef samples ranged from 28.10% to 35.38%.

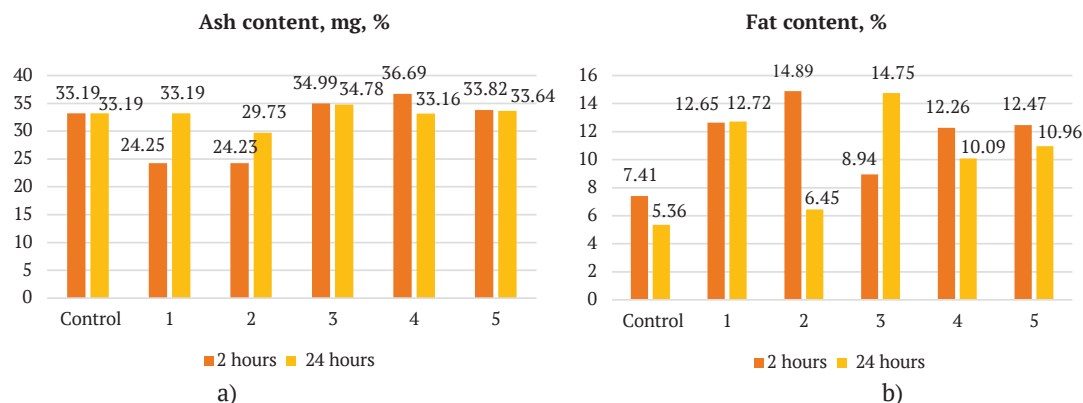


Figure 4. Ash (a) and fat (b) content in the test samples

Thus, in the control sample (without adding honey), both after 2 and 24 hours of marinating, the fat content was 7.41% and 5.36%, respectively. At the same time, sample No. 4 (2 hours of marinating – goldenrod marinade 10 g) and No. 3 (24 hours of marinating – citrus 20 g) had a lower fat content by 1.4 and 1.7 times, according to the marinating time. Regarding the ash content, the average value of the indicators, with the addition of honey to the marinade, at 2 and 24 hours of marinating was 30.79% and 32.83%, respectively, excluding the control sample, which was 33.19% for 2 periods of marinating.

In studies of the effect of various marinades made on the basis of bee honey, pineapple and their combination on the physicochemical and sensory properties of smoked chicken meat, Edema, W.N. *et al.* [29] found that bee honey increased the physicochemical and sensory properties. Thus, based on sensory estimation, smoked chicken jerky with 5% and 15% bee honey were chosen as the best marinating methods ($p < 0.05$). The results also showed that 15% of bee honey had the highest amount of protein and lower ash content. The highest moisture content (66.87%) and losses during baking (54.55%) were obtained in smoked chicken jerky with 5% bee honey.

Losses observed during the roasting of marinated beef meat may be the result of different pH values of the marinades used. In the studies presented in [27], it was found that reducing the weight loss of pork cutlets during cooking can be achieved by adding antioxidants to the ingredient composition.

Additionally, it was found that antioxidants play a protective role against protein denaturation and thus their addition can avoid weight loss during cooking [28]. Due to the introduction of honey into the marinade recipe, which is enriched with antioxidant compounds, it was found that such a technological solution will minimise the loss of the finished product by weight during baking in the range of 5-15%.

Since the taste qualities and technological properties of marinated beef largely depend on the physicochemical properties of raw materials, which are influenced by such factors as breed, age, feeding conditions and others, the content of ash, fat and protein of baked meat marinated in a honey marinade (of own preparation) was investigated. The ash and fat content of the experimental samples of marinated meat for 2 and 24 hours is shown in Figure 4.

Conclusions

The expediency of using honey in combination with the main ingredients of the marinade to provide the structure of the finished product has been substantiated and experimentally confirmed. It is established that the type and percentage of honey added to the marinade significantly affects the main physical, chemical, structural and mechanical parameters of the finished product.

The sensory analysis found that under different modes of marinating the finished product after 24 hours of ageing was characterised by better organoleptic characteristics compared to 2-hour ageing, namely sample No. 2 (marinade with citrus honey in the amount of 20 g) and sample No. 3 (with goldenrod – 10 g). It has been practically proven that the process of marination increases the hydration and solubility of muscle tissue proteins due to the accumulation of free myosin. The studies have shown that the samples at 24-hour marinating moisture retention and moisture binding capacity of the finished products were 1.1 and 1.6 times higher, respectively, compared to other samples.

It was found that by caramelising the top layer of the semi-finished product during baking, the finished baked beef output after 24 hours of ageing in the marinade

was 84.96%, while the average weight of other samples was in the range of 73.18-77.5%. The results obtained confirm the expediency of using honey as a marinade for semi-finished

products. Further research is aimed at studying the shelf life of beef semi-finished products subjected to marinating which contains honey.

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Вплив параметрів маринування м'ясних напівфабрикатів на якість готового продукту

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Анотація. Удосконалення та впровадження сучасних технологічних прийомів при створенні нових видів м'ясних напівфабрикатів, дослідження перспективних складових та розробка нових рецептур маринадів, покращення органолептичних та смакових властивостей кінцевого продукту є актуальним та перспективним напрямом досліджень. У зв'язку з цим дана робота спрямована на дослідження впливу параметрів маринування в технології м'ясних напівфабрикатів, а саме на органолептичні, фізико-хімічні та функціонально-технологічні властивості готового продукту. Для вирішення поставлених завдань використовували узагальнення, порівняння та такі методи досліджень: органолептичну оцінку проводили за зовнішнім виглядом, видом на розрізі, смаком, запахом, кольором, консистенцією, та соковитістю; вміст вологи – методом висушування зразків в сушильній шафі при температурі 103 ± 2 °C до постійної маси; вміст жиру – методом Сокслета; зольність – загальноприйнятим ваговим методом; визначення вмісту білка – методом К'ельдаля; вихід готового продукту визначали методом зважування до та після термічної обробки; вологозв'язуючу та вологоутримуючу здатність встановлювали методом пресування. В результаті досліджень встановлено, що вплив тривалості маринування суттєво впливає на органолептичні показники. Так, органолептичні показники та смако-ароматичні властивості готового продукту при застосуванні меду в маринадах покращуються, зовнішній вигляд стає привабливішим. За результатами органолептичної оцінки готовий продукт, після 24-годинного маринування отримав 4,9 бала. Також у цих зразках спостерігалися більша вологоутримуюча та вологозв'язуюча здатності, що сприяє збільшенню гідратації та розчинності білків м'язової тканини. Встановлено вплив параметрів маринування на споживчі властивості продукту. Так, вихід готової запеченої яловичини після 24-годинної витримки в маринаді був найбільшим у зразку №1 (маринад на основі цитрусового меду – 10 г) та становив 84,96 %, тоді як середній показник виходу маси інших зразків знаходився в межах 73,18–77,5 %. Отримані результати досліджень дають змогу розширити асортимент напівфабрикатів, відкоригувати органолептичні властивості та збагатити біологічно-активними речовинами готовий продукт

Ключові слова: процес запікання, органолептична оцінка, фізико-хімічні показники, функціонально-технологічні показники, сенсорного аналіз, м'язова тканина