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**INNOVATIVE
TECHNOLOGIES
OF PRODUCTION OF RAW
DISHED ALL-MUSCLE
PRODUCTS BASED
ON POULTRY MEAT**

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Topicality. The new product technology development requires special attention to the raw materials which is used. Promising for processing and valuable in its composition poultry meat is not adapted to standard technologies and production modes and requires careful study. The study of these factors will expand the range of food meat products and provide the consumer market with high quality poultry products. **Purpose and research methods.** The purpose of the research is to develop the technology of a new raw all-muscle product from poultry meat of guaranteed quality. The methodological basis of the research is a comprehensive approach both when setting tasks for the production of meat products, and during the conduct and analysis of research results. **Research results.** The course of changes in samples (control and experiment) during production of crude all-muscle products on physicochemical, microbiological, organoleptic indicators has been investigated. It was found that in the process of production in all samples there was a change in chemical composition, which was associated with a decrease in the quantitative moisture content and an increase in dry matter - protein, fat and minerals. On day 11, the moisture content in the test sample was lower by 9.3% than in the control. A similar dynamics of decrease was observed for pH and water activity throughout the production time of the product. The required, safe level of water activity (0.816) was achieved on the 11th day of drying-fermentation. In the test sample, the amount of lactic acid microflora gradually increased and at the end of the drying process was 1.3 times higher than at the beginning of fermentation. The safety of the test product was determined in the absence of BGKP. On the 11th day of manufacture in the prototype BGKP were absent, in the control - on the 14th day. According to organoleptic parameters, the product using bacterial preparations had a significant number of advantages over control. **Conclusions and discussions.** The influence regularities of non-traditional raw materials (poultry meat, functional taste and aromatic ingredients and bacterial preparations on the process of production of raw whole muscle product based on poultry meat) have been studied. It has been established that their complex application contributed to the intensification of production processes and the manufacture of a safe product of guaranteed quality in 11 days.

Keywords: poultry meat, flavoring ingredients, bacterial preparation, cured whole muscle product, technology, production.

The topicality of the problem

Formulation of the problem. Poultry consumption worldwide is growing every year. Recently, domestic poultry supplies the market with a significant amount of meat, which today, due to its profitability, is an alternative to traditional raw materials.

In addition to economic feasibility, the widespread use of poultry meat in the production of various foods is due to its nutritional and biological value and dietary properties, namely: high content of protein and unsaturated fatty acids; balanced amino acid composition, high digestibility and low cholesterol. The specificity of poultry raw materials does not allow to automatically transferring the existing technologies of production of delicatessen products to the production of poultry products. The small amount of scientific information in Ukraine on the use of this raw material and the actual technology of cured whole muscle products encourage the new technologies development and the creation of high quality products.

State study of the problem. The technology of dried whole muscle products production involves the regulation of microbiological, chemical, temperature and humidity processes throughout the production and storage cycle. To prevent spoilage of the product, various methods and protective components are used - barriers that guarantee the quality of the final product (Bekhit, 2017; Rebezov et al., 2016; Leistner & Gould, 2006). In this regard, it is necessary to find effective and reliable barriers, processing methods of raw meat, which will ensure the guaranteed quality and the product safety.

Recently, to reduce the risk of technological shortages in the manufacture of delicatessen use various barrier technologies, the main barriers of which are: salt, water activity and pH, competing microflora, antioxidants, preservatives, vacuum, spices or their extracts, packaging and etc. Directed use of them ensures a safe and high quality product.

Raw smoked and cured products occupy a significant place in the total volume of meat products produced. They are in high demand among the population due to their nutritional value, attractive appearance, specific aroma and taste. Domestic and foreign scientists (Prianishnikov, 2016; Petrova et al., 2015; Bosse et al., 2018; Menéndez et al., 2018) have shown the relevance of developing technology for the production of delicacies from animal meat.

Unresolved issues. Ukraine has created and is developing a wide range of poultry products, but there are no delicious raw whole muscle products on the country's market. It is known that the process of their manufacture is long, time consuming and requires special attention, because the technology does not provide high heat treatment.

Purpose and research methods

The purpose is to develop the technology of a new raw all-muscle product from poultry meat of guaranteed quality using modern technological solutions.

The methodological basis of the research is a comprehensive approach both when setting tasks for the production of meat delicacies from poultry, and when conducting research and analysis of results.

Information base of the research: scientific articles, materials of international congresses and symposiums, scientific and practical conferences, normative and technical documentation, patents, copyright certificates, statistical data.

Research methods. Mass fractions were determined: moisture - according to DSTU ISO 1442: 2005; protein was by the Kjeldahl method; fat was according to DSTU ISO 1443: 2005; mineral substances were according to DSTU ISO 936: 2008; water activity index a_w was measurement by a portable high-speed device of the AquaLab model of

the 3TE series (USA) according to DSTU ISO 21807: 2007; concentration of hydrogen ions (pH) - according to DSTU ISO 2917: 2001; MAFAM was for GOST 10444.15-94; BGKP - for GOST 7702.2.2-93; ICD - for GOST 10444.11-89.

Characteristics of the research object. There is innovative technology for making raw all-muscle poultry products.

The subject is white meat of broiler carcasses, bacterial preparations, functional taste and aromatic ingredients, bacterial preparation, finished product.

Research results

To assess the effectiveness of the proposed technology, a study was conducted on two samples: a control and a prototype. The control sample was made according to the traditional recipe of the product «Basturma» from beef. The test sample has been made with an improved formulation using functional taste and aromatic ingredients and a bacterial preparation.

The studies were performed on mature white boneless meat of broiler chickens. Meat was subjected to salting dry. Focused on the existing experience it has been used in the technological process of making raw whole muscle products from traditional types of meat.

The main operations of manufacturing products were as follows: pickling, washing, processing of tea dough, drying-fermentation. Particular attention was paid to the need to preserve the characteristic organoleptic, technological, microbiological and physicochemical parameters of finished products. It should be noted that the duration of production of cured whole muscle products from traditional types of meat (beef, pork) is up to 30 days.

It was found that in the production process in all samples there was a change in chemical composition, which was associated with a decrease in the quantitative moisture content (Fig. 1) and an increase in dry matter - protein, fat, minerals (Fig. 2, 3, 4). At the beginning of the process, the amount of moisture changed due to the treatment of raw materials with hygroscopic substances, especially table salt, as well as the ingredients of the salt mixture and chaman dough.

Thus, in the control the amount of moisture decreased by 5.2%, in the experimental sample - by 7.0% compared to the raw material (Fig. 1). It should be noted that the most intense dehydration was observed on the 5th day of drying. On day 11, the moisture content in the test sample was lower by 9.3% than in the control. The presence of a bacterial preparation in the formulation affected the final moisture content of the product.

The required moisture level is no more than 40%, typical for this group of products, on the 11th day of drying had only a test sample, while in the control this level was reached on the 14th day. The difference in 3 days of drying between the samples is due to the biochemical activity of the added bacterial preparation.

With a decrease in the mass fraction of moisture there was a redistribution of mass fractions of the main chemical components of the product. In particular, during the drying process in the test sample the mass fraction of protein increased more intensively. A special difference between the samples was noted on the 8th day of drying, which was 10% (Fig. 2).

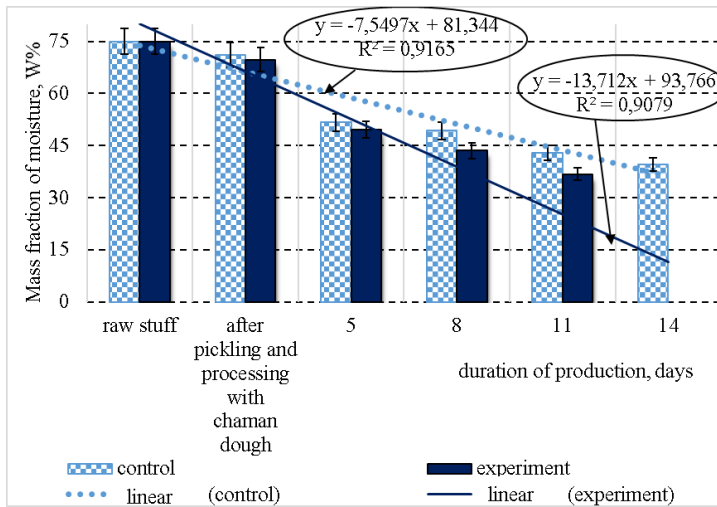


Fig. 1. Dynamics of change in the index of mass fraction of moisture in the manufacture of raw whole-meat products from poultry meat
Source: own development

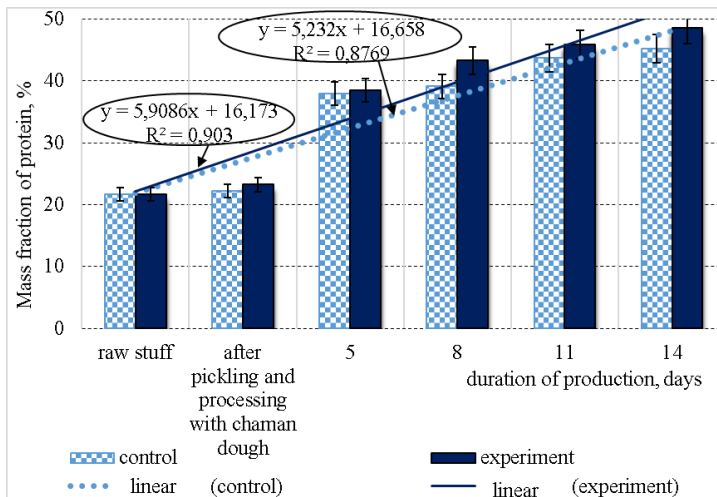


Fig. 2. The dynamics of the indicator of the mass fraction of protein in the manufacture of dried whole muscle products from poultry
Source: own development

During the entire manufacturing period, the amount of fat in the experimental sample was 2.1–2.2 times higher than in the control variant (Fig. 3).

The dynamics of changes in the mass fraction of minerals in the manufacture of raw whole muscle products from poultry meat had a similar upward trend as in the mass fraction of protein and mass fraction of fat. In particular, in the experimental sample the amount of minerals was 1.0–1.3 times higher compared to the control at all stages of product production (Fig. 4).

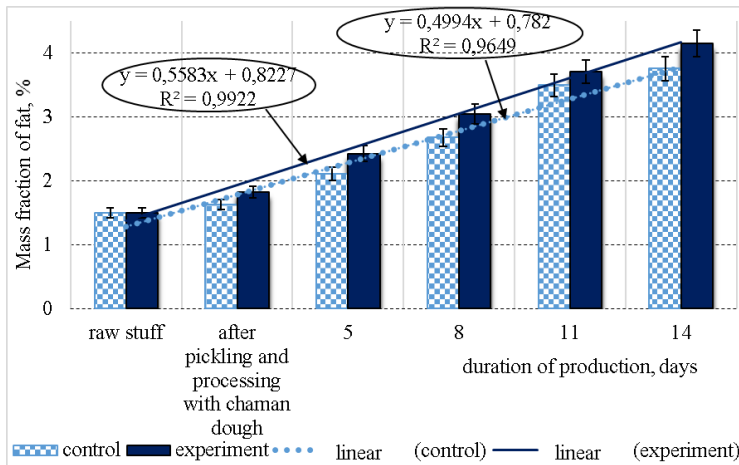


Fig. 3. The dynamics of the change in the mass fraction of fat in the manufacture of dried whole muscle products from poultry meat
 Source: own development

This pattern of the difference between the samples of the product is due to the fact that the microorganisms that are part of the bacterial preparation, in greater or lesser quantities produce lactic acid, reducing the level of active acidity of the environment, which activates the moisture of the product during dryingp.

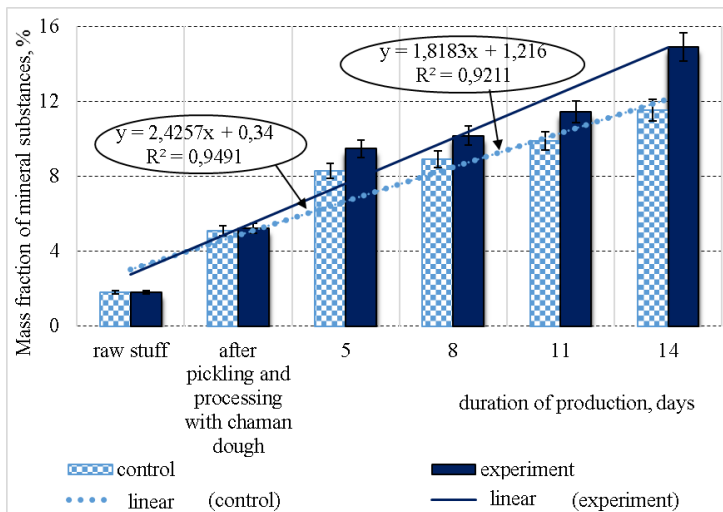


Fig. 4. The dynamics of the change in the mass fraction of mineral substances in the manufacture of dried whole muscle products from poultry meat
 Source: own development

As a result of the activity of bacterial microorganisms in the test sample there was a change in the active acidity of the medium (Fig. 5), which gradually decreased and on the 8th day of drying reached the level of 5.45, close to the isoelectric point of muscle proteins, which, in turn, contributed to the reduction of moisture content during drying.

Similar to the change in pH and moisture content, the water activity index changed (Fig. 5).

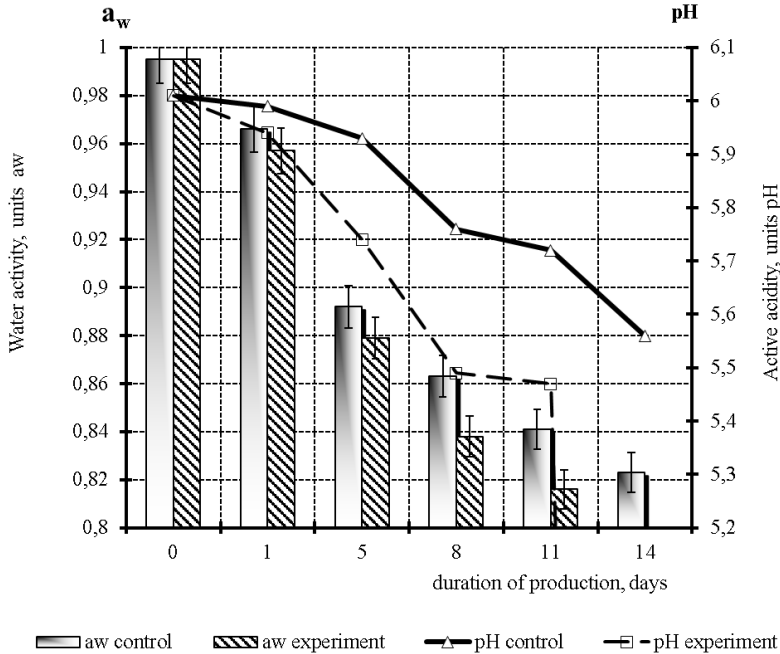


Fig. 5. Change in water activity and active acidity during the production of dried whole-muscle dried products from poultry meat
0 – feedstock; 1 – salted semi-finished product after salting and processing with a chaman dough; 5, 8, 11, 14 – drying, days.
Source: own development

The addition of saline ingredients helped to bind moisture by redistributing free moisture. In the raw material, the value of water activity was 0.995, and after salting and processing with chaman dough, the water activity in the samples decreased to the level of 0.966–0.957. The test sample with the bacterial preparation reached the required safer level of water activity (0.816) on the 11th day of drying faster than the control (0.845).

To ensure stability and storage capacity for dried products, the value of water activity should be at the level (0.780–0.820). At such values of water activity, the growth of unwanted microorganisms is inhibited, as evidenced by microbiological studies in the manufacture of samples of meat products.

The microflora study of the product revealed that the initial content of the total microflora in the raw material was $5.2 \cdot 10^3$ CFU / g. Both at the beginning and at the end of the technological process in all samples there were no coagulase-positive *Staphylococcus* ssp., *Salmonella* ssp. and *Proteus* ssp., and sanitary-indicative microflora was represented only by bacteria of the *Escherichia coli* group, the initial content of which in the raw material was $3.1 \cdot 10^2$ CFU / g.

During fermentation, the composition of the microflora in all samples of products changed both qualitatively and quantitatively. In the experimental sample at the initial stages of fermentation, the number of lactic acid bacteria was 1.5 times higher than in the control, in which the active development and accumulation of spontaneous lactic acid bacteria was observed after 5 days of drying-fermentation. At the end of the drying process, their number increased 1.8 times compared to the initial number.

In the experimental sample, the amount of lactic acid microflora gradually increased and at the end of the drying process was 1.3 times higher than at the beginning of fermentation.

The microorganisms included in the preparation provided stability and the desired direction of fermentation of raw meat in the test sample. This is confirmed by the absence of BGKP on the 11th day of drying, which in the control sample disappeared only on the 14th day of fermentation. The experimental and control products in the finished form were evaluated by the tasting commission. This is confirmed by the absence of BGKP on the 11th day of drying, which in the control sample disappeared only on the 14th day of fermentation.

The experimental and control products in the finished form were evaluated by the tasting commission. Organoleptic analysis showed that the product, made using a bacterial preparation and functional flavoring ingredients, had a more pronounced spicy, slightly sour taste with the aroma of dried meat and spices, a delicate texture and a richer color than the control.

Based on the obtained experimental data, a technological scheme for the production of an innovative raw whole muscle product from poultry meat was developed, which is shown in Fig. 6.

It should be noted that subject to the establishment of the prescription composition for the production of the product, the sequence of developed and indicated in Fig.6 stages of technology and temperature-humidity modes of its production, the manufacturer will receive a product of guaranteed quality.

Conclusions and discussion of results

According to the results of the performed researches the regularities of influence of non-traditional meat raw materials, namely: white poultry meat (fillet), of natural taste and aromatic functional ingredients of the recipe, a bacterial preparation for the process of production of cured whole muscle product based on poultry meat. It has been established that the selected raw materials and selected recipe ingredients contributed to the intensification of processes: salting and drying, inhibited the activity of sanitary-indicative microflora, positively influenced the formation of taste, aroma and nutritional qualities of the finished product during production.

The proposed technology and the use of selected recipe ingredients have reduced the duration of production of poultry products by 3 days. And in comparison with similar products from traditional raw meat it is from 30 days to 11-14 days (from poultry meat).

The practical significance of the obtained results is manifested in the expansion of the range of high-quality, biologically valuable and safe delicatessen meat products from poultry meat of guaranteed quality with a production period of 11 days.

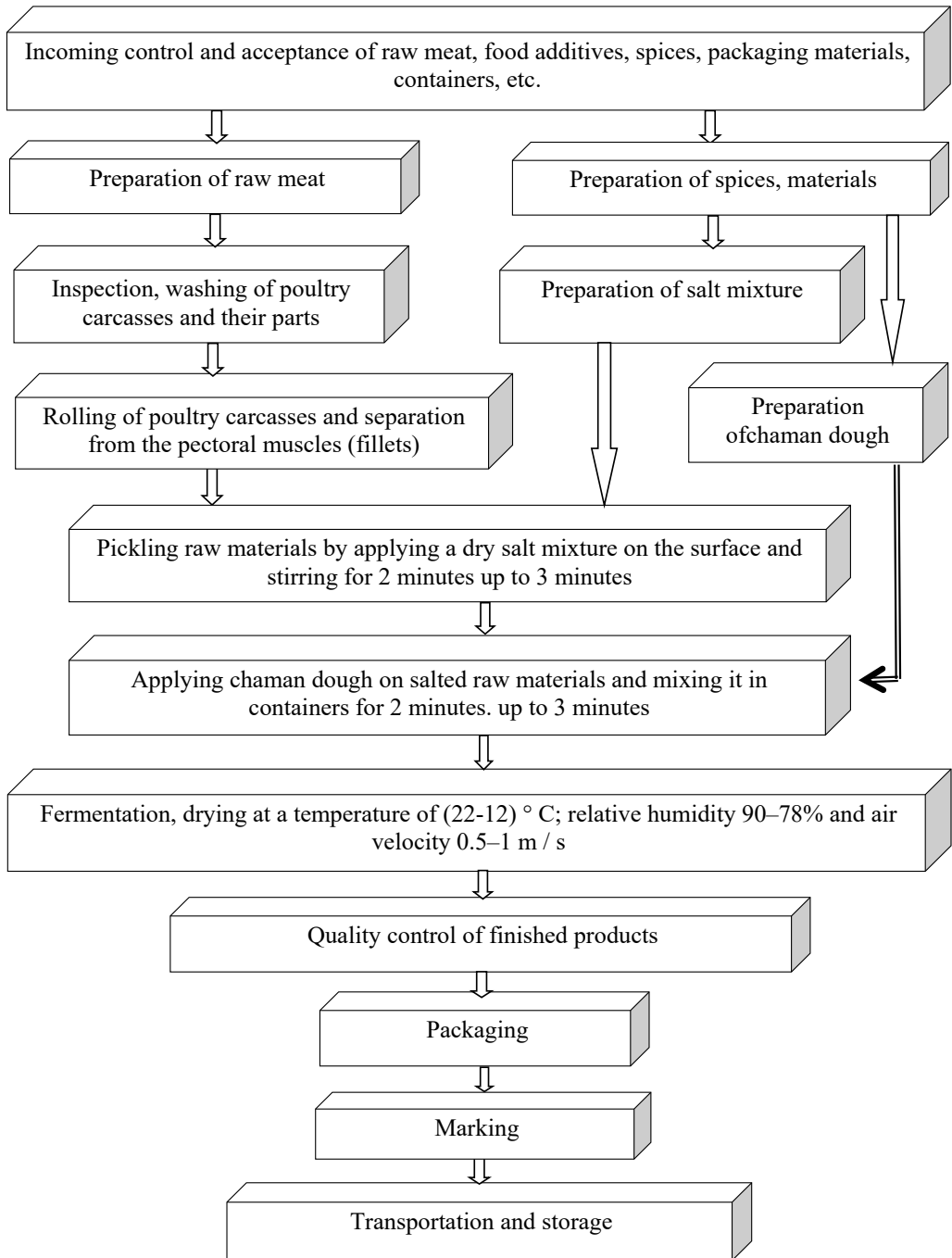


Fig. 6. Flow diagram of the production of raw whole-meat poultry meat products
Source: own development

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ІННОВАЦІЙНІ ТЕХНОЛОГІЇ ВИРОБНИЦТВА СИРОВ'ЯЛЕНИХ СУЦІЛЬНОМ'ЯЗОВИХ ПРОДУКТІВ НА ОСНОВІ М'ЯСА ПТИЦІ

Актуальність. Розробка технології нових продуктів вимагає особливої уваги до сировини, що використовується. Перспективне для переробки та цінне за своїм складом м'ясо птиці не пристосоване до стандартних технологій і режимів виробництва та потребує ретельного вивчення. Дослідження вказаних чинників дозволить розширити спектр харчової м'ясної продукції та забезпечити споживчий ринок високоякісними продуктами із м'яса птиці. **Мета і методи дослідження.** Метою дослідження визначено розробку технології нового сиров'яленого суцільном'язового продукту із м'яса птиці гарантованої якості. Методологічною основою дослідження є комплексний підхід як під час постановки завдань виготовлення м'ясопродуктів, так і під час проведення і аналізу результатів досліджень. **Результати дослідження.** Досліджено перебіг змін у зразках (контролі та досліді) під час виготовлення сиров'ялених суцільном'язових продуктів за фізико-хімічними, мікробіологічними, органолептичними показниками. Встановлено, що в процесі виробництва в усіх зразках відбувалася зміна хімічного складу, яка була пов'язана зі зменшенням кількісного вмісту вологи і збільшенням сухих речовин – білка, жиру, мінеральних речовин. На 11 добу вміст вологи в дослідному зразку був нижче на 9,3 %, ніж у контрольному. Аналогічну динаміку зниження спостерігали і для показників рН та активності води протягом усього часу виробництва продукту. Необхідного, безпечного рівня активності води (0,816) було досягнуто на 11 добу сушіння-ферментації. У дослідному зразку кількість молочнокислої мікрофлори поступово зростала і наприкінці процесу сушіння була в 1,3 рази вище, ніж на початку ферментації. Безпечність дослідного продукту визначали за відсутності БГКП. На 11 добу виготовлення у дослідному зразку БГКП були відсутні, у контролі – на 14 добу. За органолептичними показниками продукт із використанням бактеріальних препаратів мав значну кількість переваг порівняно з контролем. **Висновки та обговорення.** Досліджено закономірності впливу нетрадиційної сировини (м'яса птиці), функціональних смако-ароматичних інгредієнтів та бактеріальних препаратів на перебіг процесу виробництва сиров'яленого суцільном'язового продукту на основі м'яса птиці. Встановлено, що їх комплексне застосування сприяло інтенсифікації процесів виробництва та виготовленню безпечного продукту гарантованої якості за 11 діб.

Ключові слова: м'ясо птиці, смако-ароматичні інгредієнти, бактеріальний препарат, сиров'ялений суцільном'язовий продукт, технологія, виробництво.

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ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ ПРОИЗВОДСТВА СЫРОВЯЛЕННЫХ ЦЕЛЬНОМЫШЕЧНЫХ ПРОДУКТОВ НА ОСНОВЕ МЯСА ПТИЦЫ

Актуальность. Разработка технологии новых продуктов требует особого внимания к используемому сырью. Перспективное для переработки и ценное по своему составу мясо птицы не приспособлено к стандартным технологиям и режимам производства, поэтому требует тщательного изучения. Исследование указанных факторов позволит расширить спектр пищевой мясной продукции и обеспечить потребительский рынок высококачественными продуктами из мяса птицы. **Цель и методы исследования.** Целью исследования стала разработка технологии нового сыровяленого цельномышечного продукта из мяса птицы гарантированного качества. **Методологической основой исследования** является комплексный подход как при постановке задач изготовления мясопродуктов, так и во время проведения и анализа результатов исследований. **Результаты исследования.** При изготовлении сырокопченых цельномышечных продуктов в образцах (контроле и опыте) были исследованы изменения физико-химических, микробиологических, органолептических показателей. Установлено, что в процессе производства во всех образцах происходили изменения химического состава, связанные с уменьшением количественного содержания влаги и увеличением сухих веществ – белка, жира, минеральных веществ. На 11 сутки содержание влаги в опытном образце было ниже на 9,3 %, чем в контрольном. Аналогичную динамику снижения наблюдали и для показателей pH и активности воды в течение всего времени производства продукта. Необходимый безопасный уровень активности воды (0,816) был достигнут на 11 сутки сушки-ферментации. В опытном образце количество молочнокислой микрофлоры постепенно росло и в конце процесса сушки было в 1,3 раза выше, чем в начале ферментации. Безопасность опытного продукта определяли отсутствием БГКП, которые на 11 сутки изготовления отсутствовали в нем. По органолептическим показателям продукт с использованием бактериальных препаратов имел значительное количество преимуществ по сравнению с контролем. **Выводы и обсуждение.** Исследованы закономерности влияния нетрадиционного сырья (мяса птицы), функциональных вкусо-ароматических ингредиентов и бактериальных препаратов на ход процесса производства сыровяленых цельномышечных продуктов на основе мяса птицы. Установлено, что их комплексное применение способствовало интенсификации процессов производства и изготовлению безопасного продукта гарантированного качества за 11 суток.

Ключевые слова: мясо птицы, вкусо-ароматические ингредиенты, бактериальный препарат, сыровяленый цельномышечный продукт, технология, производство.