INVESTIGATION OF THE PROPERTIES OF BOILED SAUSAGES FROM THE BIOMODIFIED STUFFING DURING STORAGE

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Abstract. The results of the investigation of influence of the bacterial ferment entry, namely Lactobacillus sakei, on changes of functional and technological and microbiological characteristics during storage, have been given in the article. The investigation of the dynamics of changes of protein, fat component and accumulation of residual microflora, has been conducted in this paper. Confirmed that the introduction of this culture inhibits the development of undesirable microflora, which guarantees high quality and safe products. Also economically justified the use of innovative development for the production of sausages, compiled by the technological scheme of production of boiled sausage making starting microflora. As objects of research were used poultry. It is also proved that the use of Lactobacillus sakei positive effect on sensory characteristics of cooked sausages, improving the consistency, taste, odor, color of cooked sausages.

Key words: poultry meat, bacterial ferments, starting cultures, meat products, sausage.

ДОСЛІДЖЕННЯ ВЛАСТИВОСТЕЙ ВАРЕНИХ КОВБАС ИЗ БИОМІДИФІЦИРОВАНОГО ФАРШУ ПРОТИВ ОБЗЕРВАГІНЕНИЯ

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Анотація. У статті представлено результати дослідження впливу бактеріального закваски, яка складається з Lactobacillus sakei, на властивості незалежних і забезпечуючих характери варених ковбас протягом зберігання. Проведено дослідження динаміки змін білкової, жирової складових варених ковбас і накопичення залишкової мікрофлори. Підтверджено, що внесення даної культурниці призводить до зниження небажаної мікрофлори, що гарантує безпечну та високоякісну продукцію. Також встановлено, що використання Lactobacillus sakei позитивно впливає на органолептичні показники варених ковбас, покращуючи консистенцію, смак, запах, колір варених ковбас.

Ключові слова: м’ясо, бактеріальні закваски, стартові культури, м’ясні продукти, ковбаса.

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Introduction

Different methods of increasing of the terms of meat and meat products storage have been investigated up to now. In ordinary conditions sausages are kept comparatively for a short period of time, that's why they are attributed to the perishable products.

During storage different undesirable changes, connected with the activity of biochemical, microbiological and chemical processes can occur in the meat products. In fresh meat these processes are stipulated by the natural way of autolysis, in thermally treated – by residual microflora and secondary contamination. Every product, under fixed storage conditions, has its time-limit of storage, determined on the basis of physical and technological investigations [1,13].

Time-limit of meat products storage corresponds to the phase, under which the activity of microflora doesn't reveal. The most frequent reason of meat spoiling is microflora, especially putrefactive, as well as influence of its own tissue enzymes. With a purpose of preventing from spoiling and increasing of storage terms, meat and meat products are immediately canned, using one of the methods.

Raising the problem

Extended storage of sausages is relevant due to the fact that more than 10 – 15 % of meat products subjected to a return of trading networks in the enterprise. The use of preservatives, antibiotics, various gases for lengthening the storage time although to solve the issue, but is dangerous to human health. In this work it is assumed

prolong the period of storage of cooked sausages from poultry through the use of biotechnological technique. It is proposed to introduce a hand-picked starting microflora in cooked sausages, this is a fundamentally new approach to address this issue.

Literary review

Microbiological stability and safety of the majority of food products is based on combination of some canning factors (“barriers”), which can’t overcome microorganisms, present in them. On this basis the conception of “barrier effect” was proposed for the first time. Application of the “barriers” is quickly developed all over the world, because it provides microbiological stability, safety as well as stable organoleptic properties of the products. The most important “barriers” for food products are: low value of pH and values of water activity, application of the means which counteract to the growth of bacteria (preserving substances) and gas means. Packing, in its turn, allows to protect the product from the secondary contamination of microflora [11-12].

The most efficient way of food protection from spoilage can be achieved with the help of “barrier conception”. The additional barrier is bioprotection. In particular the conducted investigations included: using of milk-sour bacteria for limiting of the development of undesirable flora in meat products; improvement of the quality at the expense of decreasing of microflora amount leads to spoiling; providing of stability and invariability of organoleptic indices [2].

The technological activity of microorganisms is connected with formation of the specific biologically active compo- nents: organic acids, bacteriocins, enzymes, vitamins, that contributes to improvement of sanitary and microbiological, organoleptic indices of the finished product and also allows to intensify the production process.

On the whole, lactic acid bacteria which possess the ability to split easily assimilated proteins of muscular tissue intensively and simultaneously to split proteins, assimilated with difficulty, of connective tissue, are mainly used in production; moreover, the products of growth of bacteria vital functions in condition of exoenzymes are isolated, also stable dynamics of pH reduction testifies to accumulation of lactic acid [2,14].

Boiled sausages are unstable products, which are usually widely used by population without the additional thermal treatment. So, strict sanitary-bacteriological demands are produced to sausage, and the primary raw material at the stages of the technological process as well as the finished raw material are subjected to the bacteriological investigation.

During the production of boiled sausages according to the traditional recipe, the terms of storage according to Government standards 4436:2006 don’t exceed 48 hours under storage in the refrigerator (+5...+8°C). Boiled sausages are in great demand and, in the condition of possible storage of 48 hours, the largest share of them is returned to the production – it’s actual to increase the expiration date of the boiled sausages by the method which was offered, namely by using “starting” cultures. With this propose the complex investigations which cluturate the dynamics of fatty, protein fraction changes and the amount of residual microflora as well as the peculiarities of structural-mechanical and organoleptic indices changes in the product in the process of storage, have been carried out.

Materials and methods

The experimental part of the scientific-research work has been carried out in the laboratories of the chair of meat, fish and seafood biochemistry, microbiology and nutrition physiology of ONAFT. The poultry meat of different producers, namely “Nasha Ryba”, “Gavrylivs’ky kurchat” and the meat of the foreign producer “K Oukle” (France), has been used as an object of investigation; with the purpose of obtaining objective results of the investigation “starting” cultures of Hr. Hansen (Denmark) [3]. The investigations have been carried out at the stage of obtaining the raw material, at the stage of salting and storage by the following indices: organoleptic, physical-chemical and microbiological.

Results and discussion

The first checking point-determining of the sanitary condition of the product immediately after conducting the thermal treatment cycle. According to the results of the conducted investigations, one can point out that applying of bacterial fermentation does terminate bacterial action. It’s known that the microorganism, which was applied with Lactobacillus sakei additive, produces a num-
The amount of mesophilic and optional-anaerobic microorganisms, colony-generating items in 1 g. of the product, no more then

- Lactobacillus sakei
- Bacterium of intestinal bacillus group (koliforms) in 1 g. of a product
- Sulfite-reducing klostridii in 0,01 g. of a product
- Bacteria of Proteus type in 0,1 g. of a product
- Bacteria of intestinal bacillus group (koliforms) in 1 g. of a product
- Sulfite-reducing klostridii in 0,01 g. of a product
- Bacteria of intestinal bacillus group (koliforms) in 1 g. of a product

The amount of heat-stable bacteriocynes, which reveal their anti- 

- Lactic acid bacteria contain constitutive nitrite reductase and restore nitrates and sulfides as final acceptors during utilization of lactate. Applying of lactic acid bacteria increases formation of nitrosogroups and favourably influences durability of painting. That’s why weak-sour medium and restoring conditions, which are created under development of lactic acid bacteria, contribute to forming of nitrosomoglobin and improves col- 

- It should be noted that lactic acid bacteria can regulate and stabilize pH by changing of correlation of me- 

- According to figure 4 sodium nitrite is fully de- 

- Storage of the sausages is accompanied by active acidity change as a result of lactic acid influence. The PH reaction of meat which depends on glycogen content in the muscular tissue has a great influence on the degree of nitrate reduction. In the process of maturing and storage of meat, glycogen decomposes occurs with lactic acid formation, as a result pH of meat reduces. An-

<table>
<thead>
<tr>
<th>The name of the index</th>
<th>Standard</th>
<th>Results</th>
<th>Checking methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass share of moisture, % no less than</td>
<td>70,0</td>
<td>70,0</td>
<td>According to Government standards 9793</td>
</tr>
<tr>
<td>Mass share of sodium chloride, % no more than</td>
<td>2,5</td>
<td>2,5</td>
<td>According to Government standards 9957 or ISO 1841-1, ISO 1841-2</td>
</tr>
<tr>
<td>Mass share of sodium nitrite, % no more than</td>
<td>0,005</td>
<td>0,005</td>
<td>According to Government standards 8558-1 or ENV 12014-3, ENV 12014-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The amount of colony-generating items/1 g. of the product after conducting of thermal treatment of boiled sausages depending on storage duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
</tr>
<tr>
<td>The amount of colony-generating items/1 g.</td>
</tr>
</tbody>
</table>

According to fig. 1 the amount of colony-generating items decreases depending on storage duration. From the scientific point of view it can be explained by the fact that Lactobacillus sakei is a part of bacteria which affects the lactic acid fermentation and have a pernicious effect on putrefaction residual microflora. The more lasting storage isn’t expedient through negative influence on organoleptic indices (drying).
As a result of the conducted investigations it can be noted that VFA increase in the control sample occurs more intensively than in the sample with the additive. The comparative analysis allows us to state that the main role in their accumulation is connected with proteolytic enzymes, which Lactobacillus sakei produces. The results of the organoleptic estimation are given in table 4.

The results of the organoleptic estimation are shown in Fig. 5 and Table 4.

Table 4 – Organoleptic characteristics of boiled sausages

<table>
<thead>
<tr>
<th>Samples of sausages</th>
<th>Mark by 5 –ball scale</th>
<th>sight on the section</th>
<th>colour</th>
<th>odour</th>
<th>taste</th>
<th>consistence</th>
<th>general</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (without ferments)</td>
<td></td>
<td></td>
<td>4,5</td>
<td>3,9</td>
<td>4,0</td>
<td>3,8</td>
<td>4,0</td>
</tr>
<tr>
<td>The investigated sample “Nusha Ryaba” with Lactobacillus sakei</td>
<td></td>
<td></td>
<td>4,9</td>
<td>4,7</td>
<td>4,55</td>
<td>4,65</td>
<td>4,7</td>
</tr>
<tr>
<td>The investigated sample “Gryvolivski kharhata” with Lactobacillus sakei</td>
<td></td>
<td></td>
<td>4,85</td>
<td>4,6</td>
<td>4,7</td>
<td>4,65</td>
<td>5,0</td>
</tr>
<tr>
<td>The investigated sample “K Okule” with Lactobacillus sakei</td>
<td></td>
<td></td>
<td>4,9</td>
<td>4,85</td>
<td>4,6</td>
<td>4,75</td>
<td>4,85</td>
</tr>
</tbody>
</table>

References:

Conclusions

- The appropriateness of the bacterial ferments of Lactobacillus sakei has been offered and it allows to prolong the term of a product storage from 2 to 7 days;
- The technology of the boiled sausage from poultry meat with application of the starting culture Lactobacillus sakei has been offered and it allows to prolong the term of a product storage from 2 to 7 days;
- The complex of the scientific research has been carried out and the technology of production of the boiled sausages from poultry meat with bifidobacterial treatment has been offered.

ИССЛЕДОВАНИЕ СВОЙСТВ ВАРЕНЫХ КОБАЛЯЙ ИЗ БИОМОДИФИЦИРОВАННОГО ФАРША В ТЕЧЕНИЕ ХРАНЕНИЯ

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Аннотация. В статье представлены результаты исследования влияния внесения бактериальной закваски, в именно Lactobacillus sakei на изменении функционально-технологических и микробиологических характеристик в течение хранения. В работе проведено исследование динамики изменения белковой, жировой составляющей вареных колбас и накопления остаточной микрофлоры. Проведен комплекс исследований, который проявил высокую значимость для производства мясных изделий, что гарантирует высококачественную и безопасную продукцию. Также экономически обосновано использование инновационных разработок для производства колбасных изделий, составленная технологическая схема производства вареной колбасы с внесением стартовой микрофлоры. В качестве объектов исследования были использованы мясные птицы. Вид мясных птиц - качественный, богатый беликом продукт с низкой заразимостью в сравнении со свининой и говядиной. В нём
ВИБОР ОПТИМАЛЬНОГО СПОСОБА "ВІДСЛАДЖУЮЧЕГО ВИПИНАННЯ" ХЛІБОБУЛОЧНИХ ВИРОБІВ ЛІКУЮЧИ-ПРОФІЛАКТИЧНОГО ПРИЗНАННЯ

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Анотація. У роботі здійснено вибір оптимального способу "відсладжувального" випиання при виробництві хлібобулочних виробів лікуючо-профілактичного призначення. Досліджено вплив випиання на органолептичні властивості теста, а також на органолептичні властивості готових виробів.

Ключові слова: відсладження, частичне випиання, лікарський звук, заморозка, заморожені шаффарети, добавки.

ВИБОР ОПТИМАЛЬНОГО СПОСОБА "ОТЛОЖЕННОГО ВЫПЕКАНИЯ" ХЛѢБОБУЛОЧНЫХ ИЗДЕЛИЙ ЛЕЧЕБНО-ПРОФИЛАКТИЧЕСКОГО НАЗНАЧЕНИЯ

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Аннотация. В работе осуществлен выбор оптимального способа "отложенного выпекания" при производстве хлебобулочных изделий лечебно-профилактического назначения. Исследовано влияние добавок: порошка листьев и экстракта плодов зверобоя в количестве 5% к массе муки, а также добавок различных физико-химических и структуро-механических свойств готовых изделий. Тесто готовили безопарным и опарным (жидким и густым опары) способом. Один образец теста помещали в холодильную камеру при температуре -8 °С и после дефо-}