On Using Wild Berries in the Production of Sausages

M V Osipova
Yaroslav-the-Wise Novgorod State University, ul. B. St. Petersburgskaya, 41,
Veliky Novgorod, Russian Federation

E-mail: sampaz@list.ru

Abstract. The production of sausages in Russia has been always in high demand. The guarantee of providing the Russian Federation population with high quality food products that meet all the requirements of food safety and healthy nutrition is a priority direction of the state policy in regards to Russian citizens. The aim of the animal and poultry meat processing industry is the production of food that provides the human diet with proteins of animal origin [1]. Products must always be of high quality and in the required quantities. In the people’s diet, the consumption of sausages occupies one of their priority positions, yielding in demand only to dairy products, bakery products, vegetables and fruits. Increasing the range of products and expanding the spices composition of sausages remains one of the most important tasks not only for the meat processing industry, but also for the food industry in general. The introduction of new food additives into the recipe of traditional sausages, such as dried or fresh wild berries, can help to solve this problem. The use of new food additives for the production of sausages will not only enrich the product assortment, but also change the nutritional value of products. Wild berries are rich in vitamins, trace elements, antioxidant properties and have low calorie content.

1. Introduction

At present, almost every medium and large enterprise produces a wide assortment of products. These businesses are trying to meet the demands of a significant number of potential buyers. Sausages are the most popular among consumers of meat products. Boiled sausages occupy a special group among the popular meat products. Over the past two decades, the boiled sausage market has grown significantly, with a quick increase in the range and volume of products. There is a noteworthy tendency towards a shift in the demand of purchasing activity towards high-quality and healthy food products that meet all food safety requirements [2].

Sausages are meat-containing products with the addition of spices, salt, and food additives, placed into a natural or artificial casing, processed by a mechanical or physical-chemical method [3].

Boiled sausages are subjected to heat treatment: boiling for a certain time at a temperature of about 80 °C. Boiled sausages are the most popular sausages not only among Russians, but also in other countries of the world.

The traditional raw materials for boiled sausages include pork, poultry, lamb, beef, bacon, milk protein, cow’s milk cream, dry cream, dry milk, as well as raw materials of plant origin – flour, starch. Also, according to the recipe for the production of sausages, spices and herbs are used: salt, sodium nitrite, and various types of peppers, nuts, dried garlic and other seasonings. In the production of sausages, salt is not only a flavoring additive, but also a preservative. Sodium nitrite is necessary to give sausages an attractive look [4].
Currently, there are more than two hundred kinds of sausages on the market. But most of them are made according to a recipe, where, besides the major raw meat materials, food additives based on proteins, there are flour and starch.

When developing a new recipe composition, one should make a thorough qualitative and quantitative chemical analysis of raw materials and manufactured products with the help of the latest methods of analysis and innovative laboratory equipment. Chemical and physical-chemical methods of laboratory analysis are used to study the structure of raw materials and the qualitative characteristics of the products obtained [5, 6].

Food additives in the recipe composition of sausages provide additional economic benefits to manufacturers. At the same time, it is necessary to ensure that the introduction of food additives does not worsen the taste and aroma properties of sausages; they should keep high quality and stay safe. The amount of food additives introduced to the product depends on its composition, on the expected organoleptic characteristics: taste, color, and aroma. Presently, sausage manufacturers use food additives to increase the moisture-fat bonds in meat and plant mince [7].

2. Results
When developing new products, it is important to take into account the fact that the new product, carrying a certain amount of novelty, should be balanced in terms of proteins, fats, macro and microelements content, should be distinguished by better taste and external characteristics, and meet food safety requirements [8].

One of the current trends for improving the quality of products and the products assortment is the use of non-traditional raw plant materials in the recipes of sausages.

The comparative research on the production of boiled sausage with the addition of wild berries was carried out in a small meat processing enterprise. A recipe and technology for the production of boiled sausages with the addition of lingonberries were developed. The prototype was the recipe and production technology of the “Russkaya” boiled sausage. Its recipe includes two types of meat: beef and pork, as well as bacon, spices and herbs.

Lingonberry is a shrub belonging to the genus Vaccinium, the Heather family, mainly growing in the forest. Abroad, lingonberry is cultivated industrially. Its berries are used in the food industry. The berries contain iron, manganese, vitamins A, groups B, PP, C, E, organic acids, flavonoids, tannins, sugars [9, 10].

Boiled sausages are sausage products made from minced meat, bacon, placed in a casing, subjected to boiling. They are subdivided into grades: premium, first and second. Premium sausages do not contain such plant ingredients as starch and flour in the recipe, they are lighter in color. They are made from beef of the highest grades, lean pork and bacon. When determining the physical-chemical indicators, it was revealed that the moisture content in the prototypes is 53–65%.

All types of sausages differ in organoleptic characteristics, the content of meat ingredients: cut pattern, shape and size of the loaf, the nature of the knitting.

Boiled sausages are in the highest consumer demand. They make up about 75% of the total assortment of sausage products.

The assortments of enterprises which produce sausages are quite large, but among the products on the market, there is no sausage with an exquisite taste. A novelty could be boiled sausage, the recipe of which includes wild berries. It is not without reason that such a product can be considered a novelty on the sausage market; it is not produced by any of the enterprises, including those of the Novgorod region.

Technologically, boiled sausage production takes quite a long time since it occurs in several stages.

Raw meat materials supplied for processing must be accompanied by documents confirming the permission of the veterinary sanitary service to use them. When accepting raw materials, their appearance, color, smell and consistency are assessed. In case of doubt about the degree of its freshness, meat samples are sent for laboratory tests. If there is contamination on the surface of the raw material, mechanical cleaning is carried out, and, if necessary, some areas could be treated with water, then the stamps and brands are cut off. Along with the organoleptic assessment, selective control of the
temperature of the inner layers entering the meat processing is carried out. Fresh meat should have a 35 – 36 °C temperature in the thickness of the thigh, cooled down meat temperature should be no higher than 12°C. The temperature of the chilled raw material should be within 0 – 4 °C, thawed material - not lower than – 1 °C. Raw materials with an elevated temperature, but without deviations in organoleptic parameters, are immediately sent for processing and placed in rooms with a temperature not exceeding 5°C. When using fresh meat, the time interval between the slaughter of animals and the preparation of minced meat should not exceed 2.5 hours. Frozen meat received for processing is sent for defrosting. Compliance with the raw material defrosting regimes is monitored daily.

For the products made of pork, raw materials cooled to 4 °C, obtained from pigs’ half-carcasses of bacon, meat and fatty fatness (after removing the skin and excess fat) are used. Boars’ meat and pork with the greasy consistency bacon is not allowed for use.

Beef products are made from carcasses of I and II fatness categories in a chilled or defrosted state.

At the first stage, deboning of raw meat takes place. The meat carcass is cut; the meat is manually separated from the bones. At the next stage, the meat goes through the trimming stage; tendons, blood vessels, cartilage tissues, small bones, etc. are removed from it. At the same stage, animal fat is removed, since it negatively affects the quality of sausages and impairs their taste.

The grades differ in the percentage of connective tissue, tendons, fat, and lymph nodes in the ready product. And the cleaner the meat was used for production, the higher the quality of the boiled sausage is, the better and more expensive it becomes. The percentage of visible captivity, adipose tissue in premium boiled sausages should not exceed 6%. If this percentage is higher, then the sausage falls into the first or second grade.

The next stage in the production of sausages is grinding. In automatic mode, the meat is cut into small pieces, cubes, and then loaded into a meat grinder to obtain coarse minced meat - meal. After that, the minced meat passes through a meat grinder to obtain a finer grind. The meat grinder must have sharp blades to avoid blockages. Chopping devices are constantly being improved, as is the shape of the knives.

The next stage is salting. For this, raw meat is placed in stainless steel containers, salted with sodium nitrite and kept at low temperatures for two days to ripen the meat. Moreover, the higher the degree of salting, the denser the sausage will be.

Cutting is the process of fine or structural grinding of meat to obtain a meat mass. In order to prevent raw meat materials from infection during cutting, ice is added to it. It allows cooling the surface of the meat mass, preventing microorganisms from entering. At this stage, forest berries should be added to the raw meat for uniform chopping and mixing.

Lingonberries are introduced fresh into the composition. The berries are washed under a shower of cold water with a temperature of 10–15 °C, then they are added to the cutter, where the minced meat has already been placed. Then the cutter operation is performed again within a few minutes.

Sausage casings are filled with the homogeneous in composition and appearance mixture. Both natural and non-natural (paper, cellophane, etc.) casings are used.

Then the sausage is knitted and transferred to the final stage of making boiled sausage – boiling which is carried out in steam chambers.

The result is boiled sausage with lingonberries which has new interesting properties, i.e. the taste and aroma characteristic of lingonberries; on the cut, the lingonberry pieces are evenly mixed in the minced meat.

3. Conclusion
An express review of the consumer market for sausages and meat-containing products showed that at the end of 2020, there was a stable growth in production. Active investment has been recorded on the market and the annual increase in the production of sausage and meat-containing products is 5–7%.

During the coronavirus pandemic, difficult situation in many sectors of the economy, including food industry, has not significantly affected production volumes; an increase has been noted for all categories of meat and meat-containing products.
Taking into account the noticeable production growth, an increased number of competing enterprises and a significant range of products, the most correct decision is to manufacture products with new types of food additives – forest berries.

The production of new types of boiled sausages will make it possible to obtain products with slightly changed consumer properties – the taste and aroma of wild berries. Boiled sausage with lingonberries has the best consumer qualities.

Also, for Russia, it is important to increase the nutritional and biological value of manufactured food products. When using wild berries in the food production, boiled sausages in particular, a new type of natural raw material will be used, previously not developed. It will provide, among other things, an influx of new jobs. There will be a need for employees to pick berries, for logistics to bring berries to a processing plant, to ensure their safety.

In addition, lingonberries contain a large range of beneficial nutrients [11].

It is important for consumers that food products are not only inexpensive, not only have pleasant taste and aromatic properties, but also bring health benefits. Therefore, healthy ingredients should be added to diversify the assortment of sausages.

For sausage manufacturing enterprises, the use of herbal ingredients in the recipe composition can increase economic efficiency.

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