Study of the possibility of increasing the shelf life of meat pates

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Abstract. The article discusses a method for increasing the shelf life of meat pates by adding a natural antioxidant. Numerous studies show that the most popular and competitive food products are products that are convenient and easy to prepare in a short amount of time, easy to take with you as a snack, and products with a high-quality and safe composition that can be stored for a long time. The release of new pate products that do not require cold storage will significantly reduce production space, costs for the purchase and operation of equipment, and make such products universal for use in long-distance transport crossings and air travel.

1. Introduction

The production of ready-made meat products is currently a major specialized industry, since it allows you to reduce the time for cooking, expand the product range and improve the production culture. The diagram of the most popular meat products is shown in figure 1 [1].

![Figure 1. Percentage of finished meat products by popularity.](image-url)
Meat pates are popular among the population of different financial income, so the producers are faced with the task of significantly increasing their production [2, 3].

It is known that antioxidants in the food industry play a common role-they prevent oxidation. Adding antioxidants to fat-containing products, including meat products, helps prevent rancidity of the fat fraction. Fruit and vegetable products do not darken under the influence of these additives, and most beverages do not oxidize. The key problem for food producers, especially dairy, meat and confectionery products, is to preserve the quality of the products produced as much as possible. As a result of hydrolytic and oxidative changes that occur in products during storage, not only their quality decreases, but also a toxic effect on the human body is manifested. The limiting indicators of storage of meat and meat products are qualitative and quantitative composition of its lipids and products of their hydrolysis and oxidation. Triglycerides found in meat affect, first of all, its consistency, taste, but most importantly, its storage capacity.

In recent years, there has been a growing interest in the use of biologically active substances of natural origin as food additives. It is, first of all, safe and natural, and it is also well combined with other poly-components of food additives introduced into food meat products [4, 5, 6].

To prevent oxidative spoilage of lipid-containing foods, plant extracts containing antioxidants-flavonols, Tocopherols and phenolic acids are used [7].

The aim of this work is to establish the effectiveness of using natural antioxidants to prevent oxidative damage of lipids in meat pates.

2. Research methods

Dihydroquercetin is of practical interest for use in the production of meat pates. Resolution of the Chief state sanitary doctor of 14.11.01 No. 36 "on the introduction of SanPiN 2.3.2.1078-01" classifies dihydroquercetin as an antioxidant [4]. The objects of the study were: Lavitol (dihydroquercetin, extracted from Larix Dahurica).

In food products, dihydroquercetin is used as an antioxidant to increase the shelf life of the product, and as a food additive to give the product therapeutic properties. Lavitol prevents the process of self-oxidation of food, which helps to increase the duration of their storage period.

To conduct the experiment, two groups of samples were formed from the main raw materials—a control and an experimental one. The prototype was with the addition of an antioxidant. Dihydroquercetin is added in the amount of 0.025 kg per 100 kg of minced meat. This concentration was confirmed by studies confirmed in the far Eastern state UNIVERSITY. Control, respectively, without adding Lavitol to the meat mass. A detailed recipe for the product with the addition of dihydroquercetin is shown in table 1.

| Ingredient          | Weight, kg |
|---------------------|------------|
| Turkey meat         | 70         |
| Pork liver          | 30         |
| Carrot              | 7.5        |
| Vegetable oil       | 4.5        |
| Dihydroquercetin    | 0.025      |
| Table salt          | 1.9        |
| Ground black pepper | 0.15       |

The obtained experimental samples were stored in a polymer film at a temperature of +4±2°C for 14 days. In order to determine the degree of influence of dihydroquercetin on the storage capacity of meat paste, studies were conducted on a number of indicators. So, on the 7th and 14th days of storage, organoleptic parameters (color, smell, consistency) were studied. This analysis was performed according to GOST R 51447-99. Physical and chemical methods were also used to determine the acid
number and the amount of free fatty acids (the method is based on titration of free fatty acids with an aqueous solution of alkali).

All studies were carried out and confirmed by the accredited complex analytical laboratory of the Volga research Institute for the production and processing of meat and milk products.

Table 2. Organoleptic evaluation of meat pate with dihydroquercetin.

| Indicators       | Samole | Control                        | Experimental                               |
|------------------|--------|--------------------------------|--------------------------------------------|
| Appearance       | light pink mass | light brown mass with carrot inclusions |
| Consistency      | pasty, homogeneous | pasty, homogeneous                 |
| Smell            | characteristic of this type of product, expressed the smell of spices | characteristic of this type of product |
| Taste            | moderately salty, characteristic of this type of product, a slight taste of spices | moderately salty, characteristic of this type of product |

3. Results and discussion

Results of the analysis of the characteristics of the control and experimental samples of meat paste on day 7 are shown in tables 3 and 4. After applying the antioxidant, the control sample remained light brown, had a pleasant smell, and the consistency characteristic of this type of product. Organoleptic evaluation of the control sample on the 7th day of storage showed that the pate had an unpleasant smell, dark color with a loose consistency. Experienced – had better characteristics and was relatively fresh.

Studies have confirmed that the established standard values of oxidative damage (acid number - 4 mg/kg) during 7 days of storage were not exceeded in any of the samples. The pate in which dihydroquercetin was added showed the lowest value of the acid number equal to 0.93 mg/kg, as well as a lower percentage of free fatty acids, which was 0.47%.

On the 14th day of storage capacity determination, the control sample had a musty, slightly putrid smell. Experienced, on the contrary, had a slightly acidic, barely perceptible smell and a more acceptable consistency. Studies have shown that after 14 days, none of the samples exceeded the acid number, although there was an active accumulation of oxidation products, especially in the control sample.

According to microbiological parameters, pate with dihydroquercetin fully meets the requirements of TR CU 034/2013. The data is shown in table 3.

Table 3. Microbiological parameters of the control and experimental samples on day 14.

| Acceptable levels, mg/kg, no more | Control | Experimental |
|-----------------------------------|---------|--------------|
| QMAFA nM                          | 1×10³   | 1×10³        |
| Weight of the product in which it is not allowed | Control | Experimental |
| CGB                               | 1.0     | 1.0          |

Table 4. Physical and chemical parameters of the control and experimental samples on day 14.

| Indicator                  | per 100 g of pate |
|----------------------------|------------------|
| Product yield, %           | Control | Experimental |
| Mass fraction of proteins, %| 16±0.5 | 16±0.1       |
4. Conclusion
Studies of changes in the quality of lipids of meat pates with the addition of dihydroquercetin have demonstrated the effectiveness and feasibility of using this antioxidant in the production of food products, specifically meat pates. The expediency of using antioxidant complexes in the production of meat and vegetable pates to inhibit the process of peroxidation of the fat fraction of the product has been experimentally confirmed. The dynamics of acid numbers, as well as the content of free fatty acids, indicate that the use of dihydroquercetin will improve the quality of products. Studies have objectively established that the food additive has a compensatory and corrective effect, since it not only increases the nutritional and biological value of the pate, but also prolongs the shelf life.

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