

## Vegetable oils utilization in the recipes of meat pates

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### ABSTRACT

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**Introduction.** Modern nutritional science examines functional foods as products created by nutritionists in order to give them certain properties aimed at maintaining of vital functions. The new functional meat products, containing active ingredients as well as their physicochemical and sensory properties is an objective of active research.

**Materials and methods.** Sensory quality was observed on a group of 10 people. Physical and chemical properties were determined by standard methods, fatty acid composition of fats by gas chromatography according to EN ISO 5509-2002.

**Results and discussion.** It has been found, that the addition of vegetable oils in an amount of 7-10% has positive effect on sensory and functional and technological characteristics of the finished meat patties. Consistency becomes unguent structure, becomes more tender. The comparative analysis of the fatty acid composition of vegetable oils, allowed to justify their use of technology of pates. Enhanced meat pates and defines a rational replacement of animal fats with vegetable oils in the formulations, which is 7-10%, in order to balance the products developed by the fatty acid composition.

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### Introduction

The most pressing problems in feeding of the population of Ukraine is the lack of fiber, micronutrients (vitamins, minerals, fatty acids, etc.), unbalanced diet for the nutrients and energy. Abnormality in the structure of nutrition suggests the need for food, including functional meat products.

Modern nutritional science examines functional foods as products created by nutritionists in order to give them certain properties aimed at maintaining of vital functions. The basic principle of creating functional products can be considered as promoting human health by exposure to certain physiological reactions.

Research aimed at improving technologies that intensify and modify the process of food production with high quality features are of scientific and practical interest.

Key issues are to create foods with high nutritional and biological value. Pates production is not an exception. Manufacturing process involves the usage of various pates

in its properties raw materials of animal and vegetable origin, which determines the diversity of methods, used processing. Combining cooking, blanching, sauté, roasting, homogenization and other thermal and mechanical effects, are gentle product pasty consistency that differs by pleasant taste, odor and color.

One of the promising areas of research is to improve the technology and develop recipes of pates with addition of vegetable fats increased biological value, in order to improve the balance of amino acid and fatty acid composition, qualitative characteristics of the finished product and increase digestibility and expand the range of pates [1-3].

One of the advantages of using vegetable oils in the production of pates has a large content of polyunsaturated  $\omega$ -3,  $\omega$ -6 fatty acids, which perform a number of essential functions in the body [3-5].

Over the past 10 years, scientists proved useful properties of vegetable oils. At the same time, argue that the proceeds of these components are insufficient, because the diet of an adult receiving polyunsaturated  $\omega$ -3 and  $\omega$ -6 fatty acids is only 50-60% of the vital. In addition, the body is unable to produce them. That is why it is necessary for them to be obtained from food [5].

## Materials and methods

The object of our study was technology of pates of increased biological value. Subject of research: flax, pumpkin, sunflower oil and walnut oil. Organoleptic tasting study was conducted by a group of 10 people. Physical and chemical properties were determined by standard methods, fatty acid composition of fats by gas chromatography according to EN ISO 5509-2002 «Fats and vegetable oils of animal and plant origin. Preparation of methyl ester fatty acid (ISO 5509:2000, IDT)» at gas chromatograph Hewlett-Packard NR6890.

## Results and discussion

The aim of our work is the theoretical basis and experimental proof of the possibility of using oils of high biological value in the production of pates, improving production technology and shaping the quality of finished products.

The developed formulations of pates include chicken and turkey meat, beef liver (previously blanched), eggs, carrots, onions, bread (pre-soaked in broth) or semolina and oils of high biological value.

The main raw material we chose was poultry, including chickens and turkeys, not only due to the fact that it is invalid and relatively cheap raw materials, but also because this market segment is the largest in Ukraine and is constantly expanding. But as a source of exogenous bioantioxidants we used flax, pumpkin, sunflower oil and walnut oil. As for control pates made from classic recipes, that with the addition of animal fats were taken.

Pre-represent analyze the fatty acid composition of selected oils, determination of saturated, mono-and polyunsaturated fatty acids, particularly families  $\omega$ -3 and  $\omega$ -6. The results are given in Table 1.

Analyzed the fatty acid composition of the oils studied we found that the most optimal for  $\omega$ -3 fatty acids is flaxseed oil, and for  $\omega$ -6 fatty acids are preferred sunflower, pumpkin and peanut butter (table 1). Comparative analysis of the content of components in various vegetable oils, suggests that sunflower, flax, pumpkin and peanut oils have the most favorable for the replacement of animal fats properties. Rationale oil components used in recipes, due to their properties and functions in the human body that served as the basis for creating a product with the desired properties.

**Table 1**

**Fatty acids composition of some kinds of oils**

| Fatty acid   | Type of oil |       |         |        |
|--------------|-------------|-------|---------|--------|
|              | Sunflower   | Flax  | Pumpkin | Walnut |
| Myristinic   | 0,08        | 0,03  | 0,09    | 0,02   |
| Palmitic     | 6,73        | 4,70  | 12,7    | 6,06   |
| Stearic      | 3,55        | 5,2   | 6,47    | 2,02   |
| Linoleic     | 62,58       | 14,31 | 58,40   | 61,36  |
| Linolenic    | 0,1         | -     | 0,14    | 13,6   |
| Palmitoleic  | 0,13        | 0,05  | 0,11    | 0,1    |
| Arachidonic  | 0,23        | 0,18  | 0,43    | 0,08   |
| Geneykozanic | 0,17        | -     | 0,08    | 0,18   |
| SFA          | 11,34       | 10,24 | 19,80   | 8,20   |
| MUFA         | 25,98       | 17,90 | 21,66   | 16,84  |
| Omega 6 PUFA | 62,58       | 14,57 | 58,40   | 61,36  |
| Omega 3 PUFA | 0,10        | 57,26 | 0,14    | 13,60  |

From the above analysis, it was suggested pate recipe using vegetable oils of high biological value. Favorite's ratio of components gives a product with high organoleptic, functional and technological indicators and a balanced chemical, fatty acid and amino acid composition.

The suggested method of developing recipes based on meat content of reducing fat phase by increasing the proportion of sources of polyunsaturated fatty acids decrease cholesterol raw materials, increasing the biological value, to prevent oxidation and microbial spoilage of the product, increasing shelf life by maintaining of natural antioxidants. Introduction to recipe vegetable oils in an amount of 3-10% due to high biological value, which is provided in vegetable oils containing vitamins A, D and high in PUFA. Options prescription compositions pates presented in the following Table 2.

**Table 2**

**Recipe formulations of some kinds of meat pates**

| Ingredient           | Amount, % |     |     |     |
|----------------------|-----------|-----|-----|-----|
|                      | №1        | №2  | №3  | №4  |
| Meat of chicken      | 20        | 22  | 20  | 20  |
| Meat of turkey       | 19        | 20  | 20  | 19  |
| Beef liver           | 20        | 20  | 20  | 20  |
| Egg                  | 3         | 3   | 3   | 3   |
| Onion                | 5         | 5   | 5   | 5   |
| Oil                  | 3         | 5   | 7   | 10  |
| Carrot               | 5         | 5   | 5   | 5   |
| Semolina             | 10        | 10  | 10  | 10  |
| Water                | 15        | 10  | 10  | 8   |
| <b>TOTAL</b>         | 100       | 100 | 100 | 100 |
| Salt                 | 1,5       | 1,5 | 1,5 | 1,5 |
| Pepper               | 0,1       | 0,1 | 0,1 | 0,1 |
| Spices Italian herbs | 0,1       | 0,1 | 0,1 | 0,1 |

The complex parameters by which we determine the quality of food, along with the physical-chemical and microbiological, one of the important places are indicators of quality, determined by organoleptic evaluation (appearance, form and color of the cut, aroma, taste, texture).

The results of organoleptic evaluation are often decisive in determining the final quality of the product, especially new products. Tasting score pates, which is shown in Table 3, showed the feasibility of using in recipes pate vegetable oils of high biological value. The test samples of vegetable oils differ by more delicate texture, had more intense color, while in samples from animal fats showed uneven concentration, “fat concentration”, more dense texture that affected the overall organoleptic evaluation in points.

**Table 3**

**Sensory scores of functional patties with different types of oil**

| Indicators  | Samples of researched pates |                                  |                                 |                                   |                                |
|-------------|-----------------------------|----------------------------------|---------------------------------|-----------------------------------|--------------------------------|
|             | Control                     | Sample №1<br>(with flaxseed oil) | Sample №2<br>(with pumpkin oil) | Sample №3<br>(with sunflower oil) | Sample №4<br>(with walnut oil) |
| Appearance  | 4,6±0,01                    | 4,8±0,01                         | 4,7±0,01                        | 4,7±0,01                          | 4,9±0,01                       |
| Color       | 4,7±0,013                   | 4,7±0,01                         | 4,7±0,01                        | 4,7±0,01                          | 4,8±0,01                       |
| Odor        | 4,7±0,012                   | 4,9±0,01                         | 4,9±0,01                        | 4,9±0,01                          | 4,9±0,01                       |
| Taste       | 4,5±0,013                   | 4,9±0,01                         | 4,8±0,01                        | 4,8±0,01                          | 4,8±0,01                       |
| Tenderness  | 4,4±0,01                    | 4,9±0,012                        | 4,9±0,01                        | 4,9±0,01                          | 4,9±0,013                      |
| Consistence | 4,5±0,013                   | 4,7±0,01                         | 4,8±0,01                        | 4,8±0,01                          | 4,9±0,012                      |
| Overall     | 4,65±0,012                  | 4,86±0,01                        | 4,81±0,01                       | 4,81±0,01                         | 4,81±0,01                      |

Analysis of finished products manufactured by the developed formulas can recommend the optimum amount of vegetable oil that can be entered into pates without compromising their quality is 7...10%. Making more is a slight deterioration of organoleptic characteristics.

As a result of studies found a positive effect of selected oils to water content, water holding capacity (WHC), the yield of the finished product and its rheological and sensory characteristics (table 4). Based on the behavior of vegetable oil in the experimental samples is recommended to use them in new kinds of pates functionality. This is a moderate-temperature processing of data products, which ensures the formation of delicate structure of the product.

**Table 4**

**The attributes of functional patties, formulated with different oils**

| Characteristics           | Control   | Samples   |           |           |           |
|---------------------------|-----------|-----------|-----------|-----------|-----------|
|                           |           | 1         | 2         | 3         | 4         |
| pH                        | 5,99±0,03 | 6,07±0,01 | 6,08±0,02 | 6,13±0,01 | 6,14±0,03 |
| Water content, %          | 62,5±0,6  | 62,3±0,3  | 63,2±0,3  | 64,5±0,5  | 64,7±0,5  |
| WHC, %                    | 67,7±0,5  | 70,6±0,6  | 71,3±0,5  | 71,7±0,6  | 71,9±0,8  |
| Degree of penetration, mm | 5,4±0,2   | 6,6±0,3   | 6,6±0,2   | 6,6±0,2   | 6,7±0,2   |
| Yield (w/w)               | 104,8±2,1 | 108,5±2,8 | 110,7±2,1 | 112,4±2,2 | 113,5±2,3 |

Thus, from the above mentioned results, we can conclude that the addition of vegetable oils in an amount of 7-10% has positive effect on sensory and functional and technological characteristics of the finished product. Consistency becomes unguent structure, becomes more tender.

As a result of our work has improved the quality of pates using in their composition of vegetable oils of high biological value. We showed the theoretical possibility of generalization and meat products using exogenous bioantioxidants oilseeds, focused on the implementation of the concept of healthy eating.

## Conclusions

The comparative analysis of the fatty acid composition of vegetable oils, allowed to justify their use of technology of pates. Enhanced meat pates and defines a rational replacement of animal fats with vegetable oils in the formulations, which is 7-10%, in order to balance the products developed by the fatty acid composition.

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