

# USE OF FLAX SEEDS IN TECHNOLOGY OF CHOPPED SEMI-FINISHED PRODUCTS

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Studied food and biological value of flax seeds grown in the central region of Ukraine. As evidenced by the results of experimental studies, experimental flax seed is characterized by increased protein and fat, the total amount of which is in the range 66-68% by weight.

***Keywords:** flax seeds, nutritional value, the biological value, fatty acid composition, chopped semi-chain polyunsaturated fatty acids.*

Among the problems of our society there are several key problems: to provide the world's population with food, energy, raw materials, including water, environment, environmental and radiation safety of people in the world, slowing the consequences of intense industrial activity and people protection from its results.

However, one of the most important and challenging is to provide the world's population with food. They must not only meet basic human needs in nutrients and energy, but also to perform proactive and medical functions. One way to improve the quality of food and the structure of nutrition improvement is the introduction of new unconventional plant substances to the diet in which the food complex of proteins, lipids, minerals, ballast substances, vitamins, nutritional and taste quality is formed.

Significant actuality has the possibility of the production of meat products consisting of grain crops, with various modified methods, due to their high nutritional value, functional and technological properties. These cultures as a source of dietary fiber, help to increase the resistance of human body to harmful environmental influences. Corn contains almost all of the major substances necessary for normal human life.

The current trend in improving the structure of a diet is aimed to creating a range of products enriched with biologically active substances (vitamins, minerals, dietary fiber) as a result of the use of plant substances that are becoming more widely used in various foods, including chopped meat semi-finished products.

One of the ways to improve the nutritional value of chopped meat semi-finished products is using alternative materials in its production. The use of native raw materials of plant origin, which has high potential of biologically active substances can deliberately create products with functional properties, as well as expand the range of products, increase their nutritional, biological value. One of these raw materials is flax seed, a source of biologically active substances. In the seed a significant amount of protein is found (about 25%), fat (30-48%), which contains 35-45% glycerides of linolenic acid, 25-35% linoleic, 15-20% oleic acid and a small amount of glycerides of palmitic and stearic acids. Unsaturated fatty acids - linoleic and linolenic are the source of biologically active substances formation - prostaglandins in the human's body. They have a great importance in the regulation of various physiological functions and maintaining of homeostasis. Flax seeds are a source of valuable proteins used in the form of flour, protein isolates and concentrates. Also carbohydrates (12-262%), organic acids and amino acids, glycoside linamaryn (1.5%), vitamins A, E, mucus (up 5.12%) are found in flax seed [1, 3, 4].

Whole flax seeds with water are used in constipation and diabetes. Swelling in the gastrointestinal tract, it mechanically irritates the gut wall receptors, which increases peristalsis. Mucus of the seed has a covering function, covers with a membrane the food supply and the lining of the alimentary canal, creating extra mucous surfaces and reduces the irritation of the mucous membranes of the mouth, esophagus, stomach, and intestines. Decoction of seeds is recommended for food poisoning (mucus prevents absorption of toxic substances from the digestive tract into the bloodstream), gastric ulcer and duodenal ulcer, enteritis, colitis. Secretory and motor function of the gastrointestinal tract is increased by linamaryn alkaloid contained in the shell of the seed. Linseed oil, like other vegetable oils contains

minimal amounts of cholesterol and plenty of unsaturated fatty acids. According to animal experiments and clinical studies it was established that consumption of unsaturated fatty acids with food reduces cholesterol and increases the concentration of phospholipids in the blood and the index phospholipids/cholesterol. The higher the index, the less opportunity of postponement of cholesterol on the walls of blood vessels.

In addition, vegetable oils and fatty acids have laxative and cholagogic action. Combination of factors of biliary excretion increasing, acceleration of food supply promotion and enhanced binding of cholesterol in the intestines with unsaturated fatty acids creates optimal conditions for removing cholesterol from the body [3, 4].

Thanks to valuable chemical composition, flax seed is a promising raw material in the production of food stuffs, used as a functional ingredient in food bakery and confectionery industries. In particular, S. Kraus and L. Akzhyhitova are developing baking operations using flax seed [2].

S. Bojat and E. Monarov have found that the nutritional value of bread has increased when making flour with addition of 8-16% flax seed [5]. Most popular recently cereals - multi-grain mixtures from wheat flour which contain flax seeds in their composition.

The use of flax is known in the confectionery industry too. The authors has made [1] the cookie recipe "Trio", containing flour and flax seed.

Thus, flaxseed as a valuable protein supplement source of polyunsaturated fatty acids, is used in food production. However, nowadays there are no experimental data on the use of raw materials in the production of chopped meat semi-finished products that`s why the development of new recipes of this kind of products with the addition of grain raw materials, enriched with flax seed is an important task because it makes it possible to widen the range of products and create a product with high nutritional value and health properties.

**The aim of the study** was to examine the chemical composition of flax seed for use in the production of meat products production, especially in chopped semi-finished products.

**Materials and methods of study.** The study was conducted in the laboratory of the department of the meat, fish and seafood department of National University of Life and Environmental Sciences of Ukraine.

Indexes were determined according to Russian and Ukrainian National standards, in particular: the moisture content was determined by ДСТУ ISO 1442:2005, fat content by ДСТУ 4941:2008, proteins according to ГОСТ 25011-81, and ash by ГОСТ 15113.8-77, organoleptic evaluation of the samples was performed using a five-point rank, given the appearance, color, flavour, aroma, taste (ДСТУ 4823.2:2007).

For research samples flax seeds of different varieties were taken.

**Study results.** At present, the production of meat products in Ukraine is characterized by worsening of safety and quality of raw meat. The increasing of production of quality meat products and improving the efficiency of their production may be done due to efficient use of raw materials and the application of advanced technologies [1,3]. The results of experimental studies of flaxseed shows that there is a little extra protein and fat, the total number of which is 66-68% of the total mass:

Chemical composition of flax seed, %		Fracture composition of flax seed lipids,%		Fatty-acid composition of flax seed lipids, % from sum	
Moisture	9,26 ±0,08	Triglycerides	97,83±2,32	Saturated:	11,90±1,12
Fat	36,55 ±0,09	Phospholipids	0,83±0,074	miristic	Signs
Protein	30,65 ±0,22	Free fatty acids	0,08±0,002	palmitinic	7,31±0,47
Sugar	4,43 ± 0,11	Sterols	0,46±0,01	stearinic	4,10±0,12
Pentosans	7,80 ± 0,15	Sterol esters	0,12±0,02	arachidonic	0,49±0,19
Cellulose	13,30 ±0,22	Mono- and diglycerides	0,11±0,04	Unsaturated:	88,10±4,32
Ash	4,18 ± 0,32	Tocopherols, mg %	49±3,44	palmitoleic	0,22±0,13
				olein	21,40±1,11
				linoleic	12,40±1,03

Also, there is a relatively high content of cellulose and pentozans in flax seed, which content is 7.8% and 13.3% proportional.

Special food and physiological significance seed lipids have that can be used as a natural source of physiologically active ( $\omega$ -3 and  $\omega$ -6) polyunsaturated fatty acids. Tocopherols of flax seeds are also essential functional components that have a positive effect on human health.

Results of experimental studies of the lipid composition of flax show that neutral lipids dominate in flax seeds that make up 98% of its total quantity.

In phospholipid fractions phosphatidholins, phosphatidletanolamins and phosphatidilinoziols dominate.

Study of fatty acid composition of flaxseed lipids showed that among high fatty acids (about 88%) unsaturated fatty acids as oleic, linoleic and linolenic dominate there.

Among saturated fatty acids palmitic dominates, its content is 7.31%.

High content of linolenic acid (54.08%) is one of the factors that give oil from flax seeds functional properties.

### **Conclusion**

1. Flax seeds are a valuable source of various biologically active substances. It contains 30.65% protein, 36.55% lipid, 25.53% carbohydrate, 4.18% ash.
2. Flax seeds are a rich source of polyunsaturated higher fatty acids ( $\omega$  - 3;  $\omega$  - 6;  $\omega$  - 9), the dominant of which is linoleic acid.
3. Given the results of experimental studies on food and biological efficiency of flax seed, it was found that the development of chopped semi-finished products technology using flaxseed is relevant and has a practical value.

### **Literature**

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## **ВИВЧЕННЯ ХІМІЧНОГО СКЛАДУ НАСІННЯ ЛЬОНУ ДЛЯ ВИКОРИСТАННЯ В ТЕХНОЛОГІЇ ВИРОБНИЦТВА СІЧЕНИХ НАПІВФАБРИКАТІВ**

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Вивчено харчову та біологічну цінність насіння льону, вирощеного в Центральному регіоні України. Як свідчать результати експериментальних досліджень, піддослідне насіння льону характеризується підвищеним вмістом білків та жиру, сумарна кількість яких становить у межах 66-68% від загальної маси.

***Ключові слова:** насіння льону, харчова цінність, біологічна цінність, жирнокислотний склад, січені напівфабрикати, поліненасичені жирні кислоти*

## **ИСПОЛЬЗОВАНИЕ СЕМЯН ЛЬНА В ТЕХНОЛОГИИ РУБЛЕННЫХ ПОЛУФАБРИКАТОВ**

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Изучена пищевая и биологическая ценность семян льна, выращенного в Центральном регионе Украины. Как свидетельствуют результаты экспериментальных исследований, семена льна характеризуются повышенным содержанием белков и жира, суммарное количество которых составляет 66-68% общей массы.

***Ключевые слова:** семена льна, пищевая ценность, биологическая ценность, жирнокислотный состав, полиненасыщенные жирные кислоты*