Journal of Engineering and Applied Sciences 12 (13): 3315-3318, 2017
ISSN: 1816-949X

Fatty ACID Composition of Biological Active Additive

Gulmira Kenenbay, Urishbay Chomanov, Tamara Tultabaeva, Gulzhan Zhumalieva,
Torgyn Zhumalieva and Aruzhan Shoman
The Kazakh Research Institute of Processing and Food Industry, Gagarin Avenue 238 "G",
050060 Almaty, Republic of Kazakhstan

Abstract: The researchers of the study developed the formulation of biological additives for sausages, based on the cake of wheat germ, pumpkin, linseed and sesame seeds. The production of biological additives from the cake of wheat germ, pumpkin, linseed and sesame seeds makes it possible to obtain products with increased biological value. Each oilcake type of wheat germ, pumpkin, linseed and sesame seeds has its own peculiarities of chemical composition.

Key words: Fatty acid composition, biological active additive, cake of wheat germ, pumpkin, linseed and sesame seeds

INTRODUCTION

Now a days, food products serve not only to meet human needs in proteins, fats, carbohydrates, micro and macro elements but also to increase immunity, improve the functioning of the intestine, heart, reduce or increase body weight, regulate numerous functions and human responses. In general, it contribute to the preservation and strengthening of public health (Alekseeva, 2013).

Potential raw materials for the production of products riched by nutritional and biological value may be oil cakes and meals that are formed during the processing of oil seeds (Bochkarev and Egorova, 2015).

Utilization and integrated use of waste generated during processing of plant raw materials is one of the most important tasks in the fat and oil industry. On the one hand, its solution allows improving the technical and economic indicators of enterprises, creating wasteless technologies and improving the environmental situation on the other hand it makes possible to use a new non-traditional resources in food production.

Oilcakes are distinguished according to the method of production of vegetable oils. During theoil production by pressing the seeds, gets cake. In cakes, the amount of raw fat is 5-10%. Their feature is the presence of a large amount of protein (up to 50%) with a high energy value of 220-280 kcal.

Pumpkin seed cake is a valuable protein additive. Using of pumpkin fiber is in the content of group vitamins such as A, B, C, K, PP, F. In the chemical composition of the product. Pumpkin cake contains over 50 different biologically active components. The leading place among the minerals of pumpkin flour are zinc, phosphorus and calcium. Pumpkin fiber has bactericidal androgenic, anti-inflammatory as well as antitumor and antiallergic effects on humans (Ivanova and Nikulina, 2006).

Linen cake is the source of most vitamins-B1, B2, B6, niacin, pantothenic acid, folic acid, biotin, tocopherols (vitamin E). Especially high content of thiamine (vitamin B1) and folic acid. In 100 g of oilcake is contained a half daily requirement for these vitamins for cattle.

The linen cake contains a whole range of macro and microelements-calcium, phosphorus, potassium, sodium, magnesium, iron, manganese, zinc, copper, aluminum, cadmium, chromium, cobalt, lead, molybdenum, nickel. The highest content of linen seeds are potassium, phosphorus, magnesium (Manshesov and Trukhman 2010).

The fats remains in the linseed meal after the distillation of oil have all the useful properties as linseed oil. The uniqueness of linseed oil is in a high content of alpha-linolenic (omega-3) fatty acid as well as other unsaturated fatty acids. Linseed oil have content of unsaturated fatty acids in 2 times than fish oil.

The composition of sesame seeds includes fatty oil (up to 65%), proteins (up to 25%), carbohydrates (up to 16%).The amount of fiber increases with germination from 10.5-28.8%. Sesame seeds are rich in various macro and microelements-potassium (497 mg/100 g), phosphorus (616 mg/100 g), magnesium (540 mg/100 g), iron (10.5 mg/100 g) are a source of

Corresponding Author: Gulmira Kenenbay, The Kazakh Research Institute of Processing and Food Industry, Gagarin Avenue 238 "G", 050060 Almaty, Republic of Kazakhstan

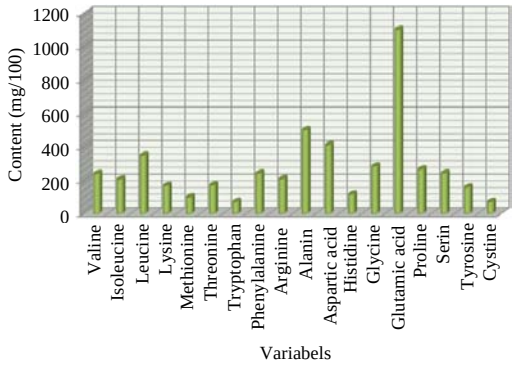

Fig. 1: Amino acid composition of a biologically active additive

manganese and zinc. But the main thing that distinguishes sesame seeds from all other seeds is a huge amount of calcium. In the sesame seeds calcium is (according to different data) from 1160-1474 mg/100 g what puts it on by this feature in first place among all other products. Specifically of the record amount of calcium sesame seedlings need to be included in the diet of pregnant women and nursing mothers, since calcium contributes to the strengthening of bone tissue (Tahmassebpour, 2016).

Wheat germ cake, obtained after extraction of wheat grain from oil by cold pressing from germ, completely preserves the biologically active substances of the initial germ. The digestibility of these substances in the body as much higher than the initial germ because as a result of shear deformation at high pressures in the wheat germ, these active and biologically valuable products are in a form more accessible to the body. Wheat germ cakes contain vitamins E, D, B1, B2, B6, PP, pantothenic and folic acids, carotenoids as well as 21 μ and microelements, among them such important as phosphorus, calcium, potassium, magnesium, selenium, zinc (Tahmassebpour, 2016).

Wheat germ pomace is a source of high-grade protein and biologically active substances, it has a high content of essential amino acids, unsaturated omega-3, 6-fatty acids, vitamins E, D, B1, B2, B6, PP, pantothenic and folic acids, carotenoids and rich by macro-and micronutrients (Fig. 1). The application of wheat germ oil cake is indispensable as a vitaminized fast food for people working in extreme conditions as well as for athletes and tourists (Tahmassebpour, 2016).

The cake of wheat germ, pumpkin, linseed and sesame seeds, obtained after extraction by the cold pressing method of oil, completely preserves the biologically active substances of the initial products. The digestibility of these substances in the body is much higher than in the initial germ because as a result of shear deformation at high pressures in grain, these active and biologically valuable products are in a more accessible form (Atafar *et al*., 2013; Grigorieva, 2007).

Thus, oilcakes are characterized by a sufficiently high-grade product in terms of the quantity and quality of protein containing fats, minerals and dietary fiber what makes using them to expand the raw material base of the food industry.

MATERIALS AND METHODS

The researchers of the study developed a formula for the biological additive for sausages, based on the cake of wheat germs, pumpkin, linseed and sesame seeds (Chomanov and Kenenbay, 2016). The production of biological additives from the cake of wheat germ, pumpkin, linseed and sesame seeds makes it possible to obtain products increased by biological value. Each type of oilcake of wheat germ, pumpkin, linseed and sesame seeds has its own peculiarities in chemical composition.

Determination of the amino acid, fatty acid, vitamin and mineral composition of the meat mass spectrometer ion cyclotron resonance Fourier transform (Germany) and Gas Chromatograph Shimadzu GC-Series 2010 and Series liquid chromatograph Shimadzu LC-2010 (Japan).

RESULTS AND DISCUSSION

The formulation of the biological additive was prepared from wheat seed meal, linseed, sesame and pumpkin seeds (Table 1).

The qualitative indices (amino acid and vitamin composition) of the biological additive from the secondary plant material (wheat germ seed meal, linseed, sesame and pumpkin seeds) were studied (Fig. 2). Research were conducted in the “expert-test”, Ltd., testing laboratory.

Analysis of the conducted studies of the amino acid composition showed that the content of the biological additive is greater than valine, isoleucine and leucine. The content of vitamins in the dietary additive are more than vitamin E-260.16, vitamin B1-0.673, B6-0.393, PP-2.743 mg/100 g.

The qualitative indices (fatty acid and mineral) of the biological additive from secondary plant raw materials (cake of sesame seeds, pumpkin seeds, flaxseeds) have been studied (Fig. 3-6). An analysis of the studies of fatty acid composition showed that the content of the biological additive have more than polyunsaturated fatty acids -49,187 and monounsaturated fatty acids -33, 0, 34 and there are also necessary micro and macro elements-zinc -0.961, iron -2.09 a nd copper 0.113.

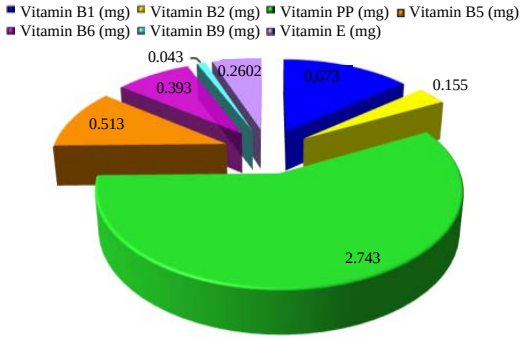

Fig. 2: Vitamin composition of the biologically active additive

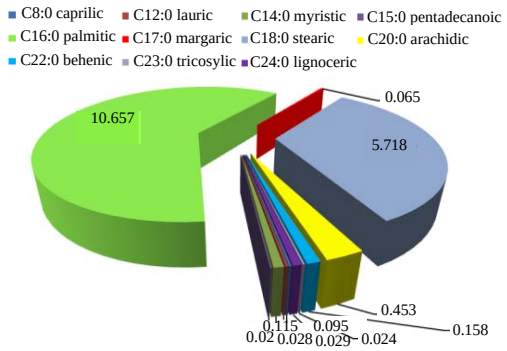

Fig. 3: Composition of saturated fatty acids of a biologically active additive

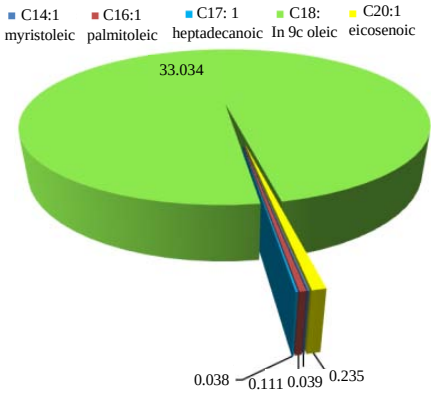

Fig. 4: The composition of monounsaturated fatty acids of a biologically active additive

Table 1: Formulation of the biological additive from the wheat germ meal, linseed, sesame and pumpkin seeds

Product name	Formulation (g)
Wheat germ cake	5
Linseed cake	5
Sesame cake	10
Pumpkin seeds cake	10
Water	70
Total	100

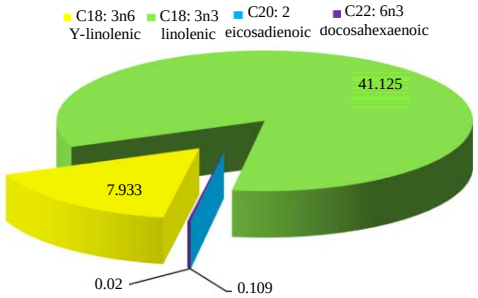

Fig. 5: The composition of polyunsaturated fatty acids of a biologically active additive

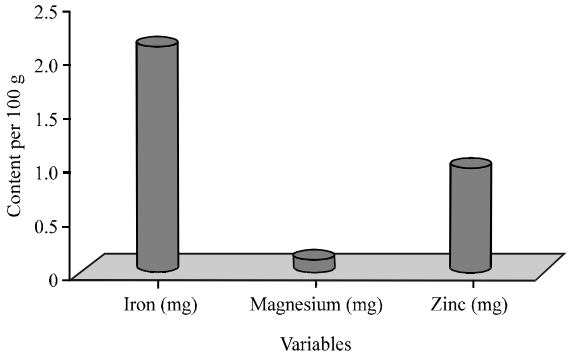

Fig. 6: Mineral composition of the biologically active additive

CONCLUSION

Thus, the production of the biological additive from the cake of linen, pumpkin, wheat germ and sesame with a residual content of 4.5% obtained by cold pressing does not contain impurities is a natural product has a unique chemical composition and high value for the organism. That allows to develop the assortment of products with wide therapeutic properties to create diets containing ω-6 and ω-3 acids, essential components-vitamins of group B, iron, zinc and copper.

Analysis of the experimental data showed that the use of oilcake sesame seeds, pumpkin seeds and linen seeds in the production of functional food products is promising and allows to adjust the technological and nutritional properties of the final products.

REFERENCES

Alekseeva, T.V., 2013. Prospects for the use of wheat seed meal in the formulations of curd and vegetable culinary products. Fundam. Res., 10: 253-256.

Atafar, A., M. Shahrabi and M. Esfahani, 2013. Evaluation of university performance using BSC and ANP. Decis. Sci. Lett., 2: 305-311.

Bochkarev, M.S. and E.Y. Egorova, 2015. Quality and potential of food using of oil cake oil cakes, processed in the Altai territory. Oversized Slider Newspaper, 2: 19-22.

Chomanov, U. and G.S. Kenenbay, 2016. Amino acid composition of the oil cake, pumpkin seeds, wheat germ and sesame. News NAS. RK. Ser. Agrar. Sci., 1: 95-97.

Grigorieva, A.L., 2007. The study of the biochemical composition, biological value and structure of protein products obtained from seed cakes of flax seed. Msc Thesis, University of Oxford, Oxford, England.

Ivanova, G.V. and E.O. Nikulina, 2006. Use of dietary supplements in the production of functional foods. Food Technol., 2: 52-53.

Manshesov, V.I. and S.P. Trukhman, 2010. Prospects of using non-traditional plant raw materials in the aspect of obtaining food enriched with dietary fiber. Oil Fat Ind., 6: 27-28.

Tahmassebpour, M., 2016. Methods, algorithms of capacity calculation and increase throughput in wireless sensor networks base of zigbee: A survey. Indian J. Sci. Technol., Vol. 9, 10.17485/ijst/2016/v9i26 /97259.