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Incorporating *Allium odorum* as a Vegetable Ingredient of Processed Cheeses.

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ABSTRACT

Allium odorum of the "Onion" family, a widespread perennial on the territory of the Republic of Kazakhstan, was used as a vegetable ingredient for increasing the biological potential of processed cheeses. The dry *Allium odorum* is characterized by: a high-protein content – (23.00±2.30) g·100g^{-1}; a content of biologically active substances including vitamin C – 460 mg·100g^{-1}; microelements –Zn – 8.87 mg·100g^{-1}, Fe – 0.58 mg·100g^{-1}, with a rich amino acid composition, including the whole range of essential amino acids – 3.124 g·100g^{-1} and a content of unsaturated fatty acids including oleic ($C_{18:1}$) – (4.51±0.02) g·100g^{-1}; linoleic ($C_{18:2}$) – (12.93±0.03) g·100g^{-1}; linolenic ($C_{18:3}$)– (9.63±0.03) g·100g^{-1}; tetracosenoic ($C_{24:1}$) – (22.96±0.02) g·100g^{-1}. Added to the milk mixture for processed cheese in a quantity of 5 g·100g^{-1}, *Allium odorum* improves the organoleptic properties of cheese and increases its biological value. In the processed cheese there was determined a content of vitamin C in a quantity of – (1.90±0.05) mg·100g^{-1}; vitamin A – (4.31±12) mg·100g^{-1}, vitamin E (7.33±0.96) mg·100g^{-1}, a high total concentration of amino acids – (591.00±1.97) mg·100g^{-1} processed cheese and of unsaturated fatty acids – oleic ($C_{18:1}$) – (25.57±0.02) g·100g^{-1}; linoleic ($C_{18:2}$) – (2.05±0.04) g·100g^{-1} and linolenic ($C_{18:3}$) – (0.93±0.03) g·100g^{-1} in comparison to the control sample of processed cheese. *The purpose of the current research* is to incorporate dry *Allium odorum* as a vegetable ingredient for improving the biological potential of processed cheese.

Keywords: vegetable ingredients, *Allium odorum*, processed cheese, amino acids, fatty acids, biologically active substances.

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INTRODUCTION

The technology of processed cheeses enables the incorporation of precious ingredients (of vegetable and animal origin) in their composition, which achieve an increase of their nutritional and biological potential, provide processed cheeses with a functional purpose, and diversify the assortments of processed cheeses. In order to increase the biological value of processed cheeses, high-protein products are used, like wheat gluten – 20 %, soy protein–10 %, mushroom spawn–15 %, sodium caseinate–10 %, added to the milk mixture for melting – Kashkaval cheese from cow's milk. An increase is observed of the concentration of soluble nitrogen with 68 %, of amino nitrogen – 1.5 % and of free amino acids. In the given concentrations, these ingredients do not change the organoleptic properties of processed cheese [Mladenova I.D., 1977].

The possibility is studied of the obtaining of processed cheese with an increased biological value by the addition of wheat germ with a quantity of 3 %. A better emulsifying ability is determined, with respect to milk fat, of the wheat germ in comparison to the emulsifying salts used in practice Solva 85 and Solva 115 in a ratio of 1:1 [Seydoux S., 1987.].

Bran of cereal vegetables containing cellulose and pectin substances have used for increasing the biological and nutritional value of processed cheeses [Zaharova L.M., 2005].

The obtaining is reported of processed cheeses with taste and nutritional supplements, which increases the content of amino acids, macro- and microelements, fat-soluble vitamins [Shingareva I.T. and I.R. Ramanauskas, 2008].

Blueberry puree is included in the composition of the processed cheese. It contains a large quantity of anthocyanin´s, organic acids and food fibers, which means a considerable influence on the sensory characteristics, pH and microstructure of processed cheese. The results show that the increase of the content of blueberry puree lowers pH of the cheese, changes the texture profile and microstructure of the processed cheese. The food fibers contained in blueberry modifies the structure of casein gel [Zhang, X., at al., 2011.].

An emulsion of fish oil is used for the enrichment of processed cheeses with $[omega]_3$ fatty acids. It is determined that the direct addition of fish oil in the mixture for melting causes oxidation of the unsaturated fatty acids during the processing and storage of processed cheese and increases the "fish" flavor of the cheese. Aiming to eliminate this shortcoming, the authors implement encapsulation of the fish oil with a surface layer of milk-protein complexes, which reduces the percentage of oxidation of [omega]–3–long-chain fatty acids and preserves the rheological properties of the processed cheese [Ye, A.at al., 2009].

The composition and properties of five types of vegetable raw materials are studied – pumpkin, nettle, garlic, rose hips and sorrel, rich in water-soluble vitamins, organic acids and sugars and a technology is developed for processed cheeses using a suspension and concentrate from these materials in a quantity correspondingly – 20 % and 40 % and 10 % and 20 % at a temperature of cheese melting 70–90 °C. It is found that the organoleptic properties of processed cheese manufactured with a suspension of these vegetable raw materials depend on the melting temperature (51.3 %), the fat content in the dry matter (38.4 %), and for processed cheese with a concentrate of these raw materials these dependencies are respectively 55.4 % and 30.3 %. Ascorbic acid content depends on the quantity of the added suspension (72.0 %) or on the quantity of the added concentrate (69.0 %) [Azolkina, L.N., 2007].

A technology have been developed for the preparation of processed cheeses based on curd and carrot puree. It is determined that dietary fiber of carrots have high hydrophilic properties capable of influencing the texture of processed cheese, while the maximum score has been received by processed cheese with the addition of 10 % carrot puree. It is determined that the resulting product meets the daily need fat with 22 %, of protein – 20 %, carbohydrates 2 %, minerals and vitamin C – 5.5 % [Vorobieva N.V., 2004].

Many opportunities for the production of processed cheese are also revealed with the use of seafood. In this respect, a great perspective in the production of processed cheese represents Cucumaria, a demersal sea animal used as food in Japan, Korea, China and other countries, as well as for therapeutic purposes. It has been found that medicines made from it have a fungicidal and antimicrobial effect, leading to a reduction in blood pressure and used as an immune stimulator. The resulting processed cheese is characterized by a

specific taste and aroma and supple texture. Regarding the content of essential amino acids, processed cheese meets the requirements of the "ideal protein". Compared to the processed cheese analogues, the new product contains 57.2 % more phospholipids, linoleic acid ($C_{18:2}$) – 26.6 %, linolenic acid ($C_{18:3}$) – 125 %, potassium – 176 % [Ledin E.V.,2006].

There is no data available about the obtaining of processed cheeses with the use of *Allium odorum*. It is used in cooking and mainly in medicine, because it is rich in phytonutrients useful in the treatment or prevention of various diseases.

Lanzotti V (2006) indicates in their researches that such general food plants as onions and garlic, are a rich source of phytonutrients and are used in treatment and prevention of a number of diseases, including a cancer, coronary heart disease, diabetes, disorders of a digestive tract, etc.[Lanzotti, V., 2006].

The study of saponins as a part of Allium minutiflorum and classification of saponin in vegetable raw materials did Sparg, S. G. et al., 2004; Vinchen, J.P. et al., 2007; Barile, E. et al., 2007.

Plants of Allium family study recently in connection with their antimicrobic activity [Kyu Hang Kyung, 2012]. Studying of references showed that Allium odorum used at preparation of national meat dishes [Alimardanova M.K.& Tlevlessova D.A., 2013].

However, Allium odorum never been used in combination with dairy products earlier.

MATERIALS AND METHODS

Processed cheese manufacture

Experimental processed cheese samples were obtained under laboratory conditions at the Department of Technology of milk and milk products of the UFT – Plovdiv, Bulgaria and the Department of nutrition products in Almaty Technological University, Almaty, the Republic of Kazakhstan.

The following raw materials were used: hard cheese made from cow's milk, albumin curd, whey butter, skimmed cow's milk, emulsifier – potassium citrate and water mixed in a certain ratio. As a vegetable ingredient was used dry *Allium odorum*, added to the mixture for melting in a quantity of 5 $g \cdot 100g^{-1}$. For this purpose, the green foliage of *Allium odorum* was finely cut, mixed and dried in an oven at 36–38 ºC to dry matter content – 89 $g \cdot 100g^{-1}$. A classical technology was applied for the obtaining of processed cheese. The vegetable ingredient was added while cooling the mixture.

The processed cheese samples were analyzed on the day of manufacture and during the refrigerated storage at 4–6 °C.

Physicochemical analysis

The dry *Allium odorum* and the experimental samples of processed cheese were analysed for the following physicochemical parameters: dry matter (IDF Standard 4:2004); total protein by the Kjeldahl method (A.O.A.C, 2005); fat content by the Gerber method (ISO 2446–2008); carbohydrates – using HPLC analysis in the following processing of the samples:

Extraction of carbohydrates from Allium odorum

1 g of dry *Allium odorum* is extracted twice with 10 ml of water acidified with HCl to pH 2. The combined extracts were filtered through a filter with a pore size 0.45µm and chromatographed.

Extraction of carbohydrates from processed cheese

In a test tube of 15 ml with screw, 2 ml Carrez I (3.6 % solution of potassium hexacyanoferrate II ($K_4Fe(CN)_6 \cdot 3H_2O$), 2 ml Carrez II (7.2 % solution of $ZnSO_4 \cdot 7H_2O$) and 4 ml 0.1M NaOH are added sequentially to 1g of processed cheese, after which the tubes are filled up to 10 ml with distilled water. The sample thus

prepared is centrifuged at a speed of 6500 min^{-1} for 15 min. The supernatant is pipetted into a new tube, and then extracted twice with hexane at a ratio of 1:3. The aqueous fraction is filtered through a filter with a pore diameter of 0,45 mm and chromatographed.

The chromatographic analyses were carried out in a Schimadzu high-performance liquid chromatograph equipped with LC–20AD pump with a 20 mL loop, a RID–10A Shimadzu refractive index detector, using software LC solution version 1.24 SP1 (Shimadzu Corporation, Kyoto, Japan). The chromatography was performed with Pb^{2+} Column Sugar SP0810 using deionised water as mobile phase at flow–rate 0.5 $mL.min^{-1}$, column temperature 85 ºC and 30 ºC temperature of detector.

Total ash (IDF Standard 27: 1964).

Vitamin C (as L+ ascorbic acid) using a liquid chromatograph Lyumahrom (Russia) with spectrophotometric detector at a wavelength [lambda] = 265nm (GOST PEH 14130–2010).

Vitamin A (as retinol) using a liquid chromatograph Milihrom (Russia) with UF (ultraelectrophotometric detector) at a wavelength [lambda] = 328nm (GOST P50928 – 96).

Vitamin E ([alpha]–tocopherol) using high-performance liquid chromatography HPLC, according to ISO 9936:2006 EN. The fat extraction was performed with diethyl and petroleum ether. 0.1 g of the extract was diluted with 2 ml hexane and methanol at a ratio of 1:1. The analysis was performed at a wavelength of 288 nm. The identification was carried out with the use of a standard.

Active acidity (pH) potentiometric with the use of pH meter inoLab720 (with a hard electrode – SenTix Sp80, Germany)

Amino acid composition – by HPLC using an apparatus Shimadzu 17A (Japan). The samples preparation includes: precipitation of the protein matter with sulfosalicylic acid (3 %). The supernatant is ultrafiltrated through a UF system 3000Da (SIGMA). The pH of the ultrafiltrate is adjusted to pH 2.0 with phosphate buffer. The ultrafiltrate is purified through a cation exchange system (Phenomenex). The purified ultrafiltrate is derivatized with the help of a derivatization kit for amino acids EL–faast of the company Phenomenex. The amino groups, as well as the carboxyl groups of amino acids, are derivatized. The method of internal standard (norvaline) was used in the analysis.

Fatty acid composition- The analysis of fatty acid composition of the fatty matter of the dry *Allium odorum* and the samples of processed cheese was performed on capillary gas chromatography with an apparatus Shimadzu (Japan) column DB–WAX, with length 30 m, internal diameter 0.25 mm. The total lipids are extracted by the method of Rose–Gothlib, then the fatty matter was derivatized with MeOH/BF_3 (methanol containing 14 % boron trifluoride BF_3). Fatty acids are analyzed as methyl esters in the following conditions of chromatography. Temperature program 50 °C for 2 min, an increase of the temperature to 200 °C at a rate of 10 ºC·min^{-1}, an increase to 218 ºC at a rate of 2 ºC·min^{-1}, an increase to 250 ºC at a rate of 10 ºC·min^{-1}, retention at 250 ºC for 10 min.

Zinc content – according to GOST R5130-99 by inversion – voltamperometric method.

Iron content - by colorimetric method with colour filter with [lambda] = (490±10) nm according to GOST 26928-86.

Statistical analysis

The statistical analysis of the data is carried out by determining the standard deviation (±SD), with triple repetition of the analyses. It is performed with the Excel 2007 software application of the Microsoft Office 2007.

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RESULTS AND DISCUSSION

The results regarding the physicochemical characteristics of dry *Allium odorum* used as a vegetable ingredient are given in Table 1.

The vegetable ingredient is characterized by high protein content and high carbohydrates and fructose. It is worth noting the high content of vitamin C – (460±46) mg·100g^{-1}, vitamin E –(3.3±0.96) mg·100g^{-1} and of zinc – (8.87±0.55) mg·100g^{-1}. The iron content amounts to (0.58±0.12) mg·100g^{-1}. The presence of Allium odorum vitamins C, E, zinc evidence of its antioxidant properties.

Table 1 – Physicochemical composition of dry *Allium odorum*

Indicators	Content, g·100g^{-1}
Dry matter	89.70±1.95
Fat	0.60±0.06
Total protein	23.00±1.30
Total carbohydrates	56.25±2.60
Minerals	9.85±0.98
Saccharose	5,6±0,23
Glucose	60,3±0,1
Galactose	5,8±0,081
Fructose	4,6±0,08
Vitamin C (mg·100g^{-1})	460.00±46.00
Vitamin E (mg·100g^{-1}	3.33±0.96
Microelements (mg·100g^{-1})	
Iron	0.58±0.12
Zinc	8.87±0.05

In analysing the amino acid composition of *Allium odorum*, 20 free amino acids were detected in a total concentration of product (3124±1.43) mg·100g^{-1} (Table 2). There were found high concentrations of asparagine – (572.2±0.08) mg·100g^{-1}, glutamine – (486.3±0.01)mg·100g^{-1}, alanine – (250.9±0.03) mg·100g^{-1}.

Table 2 – Amino acids contents of dry *Allium odorum*

Amino acid	Content, mg·100g^{-1}	Amino acid	Content, mg·100g^{-1}
Alanin (Ala)	250.90±0.03	Methionine (Met)	17.30±0.02
Glycine (Gly)	33.30±0.01	Glutamic acid (Glu)	242.10±0.28
Valine (Val)	149.40±0.09	Phenylalanine (Phe)	103.00±0.08
Leucine (Leu)	148.40±0.08	Glutamine (Gln)	486.30±0.01
Isoleucine (Ile)	75.00±0.06	Lysine (Lys)	99.50±0.17
Threonine (Thr)	119.70±0.03	Histidine (His)	133.90±0.01
Serine (Ser)	217.40±0.01	Tyrosine (Tyr)	65.40±0.15
Proline (Pro)	105.00±0.08	Tryptophan (Trp)	29.00±0.07
Asparagine (Asn)	572.20±0.08	Cysteine (Cys)	2.20±0.08
Aspartic acid (Asp)	257.30±0.08	Arginine (Arg)	16.40±0.01
Total content	**3124.00±1.43**		

It is proved that the glutamine plays a key role in the regulation of synthesis glutation4–tripeptid consisting of a glutamate, cysteine and glycine. Glutathione protects cells from oxidizing damage. The glutamine is an intracellular source of a glutamate, and also regulates through a membrane exchange synthesis of the glutamate formed intracellularly of a glutamine, and extracellular cysteine. At a stress in some tissues the maintenance of the free radicals damaging cages is raised, and the need for a glutamine increases [Lozhkin S.N., at al., 2003]. Glutamic acid is the only acid that supports the respiration of brain cells.

Allium odorum contains all the essential amino acids. The limiting acid is methionine and cysteine 55 %, amino acid near superior to other amino acid near perfect protein 2 times. Index of essential acids of vegetable raw Allium odorum equal to 2.03, indicating its high biological value. In the composition of the fatty

matter of the dry *Allium odorum* were determined high molecular weight saturated and unsaturated fatty acids (Table 3).

Table 3 – Fatty acid composition of dry *Allium odorum*

Fatty acids	Content, g•100g^{-1}
Saturated fatty acids	
Palmitic acid ($C_{16:0}$)	30.55±0.01
Heptadecanoic acid ($C_{17:0}$)	2.41±0.01
Stearic acid ($C_{18:0}$)	4.08±0.06
Arachinic acid ($C_{20:0}$)	8.33±0.03
Behenic acid ($C_{22:0}$)	0.88±0.01
Monounsaturated fatty acids	
Oleic acid ($C_{18:1}$)	4.51±0.02
Gadoleic acid ($C_{20:1}$)	0.36±0.01
Docosenoic acid ($C_{22:1}$)	1.47±0.01
Tetracosenoic acid ($C_{24:1}$)	22.96±0.02
Polyunsaturated fatty acids	
Linoleic acid ($C_{18:2}$)	12.93±0.03
Linolenic acid ($C_{18:3}$)	9.63±0.03
Docosadienoic acid ($C_{22:2}$)	1.20±0.10
Tetracosadienoic acid ($C_{24:2}$)	0.69±0.01

Of the high molecular weight saturated fatty acids in the lipid composition of the *Allium odorum* the highest concentration was detected in palmitic ($C_{16:0}$) fatty acid of the total content of fatty acids. High concentration was detected in tetracosenoic fatty acid ($C_{24:1}$), which is part of the [omega]–9. Of the essential fatty acids ([omega]–6) there were identified linoleic ($C_{18:2}$) fatty acid ; linolenic ($C_{18:3}$) fatty and docosadienoic ($C_{22:2}$) fatty acid.

While incorporating the dry vegetable ingredient into the milk mixture for processed cheese, an increase is observed in the content of protein and minerals in the test sample of processed cheese, respectively (18.32±0.10) g·100g^{-1} and 3.20 g·100g^{-1} in comparison with those in the control parameters – (16.80±0.10) g·100g^{-1} and 2.80 g·100g^{-1} (Table 4).

Table 4 – Physicochemical composition of experimental samples processed cheese

Indicators	Content, g·100g^{-1}	
	Sample type	
	Control Sample	***Experimental Sample***
Dry matter	46.00±0.80	48.00±0.45
Fat	26.00±0.20	25.50±0.10
Total protein	16.80±0.10	18.32±0.10
Minerals	2.80±0.07	3.20±0.07
pH	5.90±0.07	5.95±0.05
*Carbohydrates mg•100g^{-1}**		
Lactose	0.58±0.02	0.42±0.02
Glucose	ND	4.85±0.15
Galactose	ND	ND
Fructose	ND	0.15±0.01
*Vitamins, mg•100g^{-1}**		
Vitamin C	ND	1.90±0.05
Vitamin A	0.20±0.01	4.31±0.12
Vitamin E	0.30±0.01	7.33±0.96

**ND - Not Detected*

No changes were observed in the active acidity of the experimental sample of processed cheese, pH was within pH (5.5±0.05).

With respect to the content of carbohydrates, the experimental sample of processed cheese is characterized by the presence of glucose –and fructose, which are absent in the control. Galactose was not detected either in the control or in the test sample of processed cheese. Minor quantities of lactose were detected in the control and test sample of processed cheese respectively: (0.58±0.02) mg·100g^{-1} and (0.42±0.02) mg·100g^{-1} due to their presence in the composition of the initial milk mixture and mainly to the involvement of albumin curd and skimmed milk powder in the milk mixture for melting. The higher biological value of the test sample of processed cheese is evident by the presence of vitamins having pronounced antioxidant effect, namely vitamins C, A and E. While vitamin C was not detected in the control, even in small concentrations – 1.90 mg·100g^{-1}, it was found in the test sample. The low concentration of vitamin C in the finished product is mainly due to its thermal sensitivity, although the dry *Allium odorum* was added after heat treatment – 80 °C, during the cooling of the melted milk mixture – 60–65 ºC. In comparison with the control, a high concentrations was found of vitamin A (retinol) – 4.31 mg·100g^{-1} and vitamin E ([alpha]–tocopherol) – (7.33±0.96) mg·100g^{-1} processed cheese. The presence of these vitamins in the experimental processed cheese has a positive influence on its biological potential. The high levels of concentration of free amino acids in the vegetable ingredient substantially affect the amino acid profile in the experimental cheese, in which there was found a total concentration of free amino acids – (591±1.97) mg·100g^{-1}, compared to the control – (299.20±9.85) mg·100g^{-1} product (Table 5). Of the essential amino acids in the experimental processed cheese, significantly higher concentrations were found in comparison with the control in the following amino acids: lysine, leucine , valine, isoleucine, tryptophan.

In developed melted cheese with additive Allium odorum scor of lysine amounted to 243 %. The content of lysine in proteins of processed cheese was 133,7 mg·100g^{-1} whereas the ideal protein contains 55 mg·100g^{-1}. It is known that a deficiency in the body leads to growth disorders, disorders of blood circulation, reduction of hemoglobin in human blood. Need of the adult for a lysine – 3-5 g per day, so a new kind of processed cheese provides all needs of the body in lysine.

The limiting acid is threonine, near which in the experimental processed cheese was 19.75, in control limiting amino acid is isoleucine to 10.5. An index of all the essential amino acids in the experimental cheese was 0.55, and in the control was 0.31, coefficient of rationality of proteins in the experimental sample was 6,77, and in control – was 2.27.

Table 5- Amino acid composition of experimental samples processed cheese with dry *Allium odorum*

Amino acid	**Content, mg•100g^{-1}**	
	Control Sample	***Experimental Sample***
Alanin (Ala)	13.90±1.00	30.90±0.03
Glycine (Gly)	15.10±0.83	5.30±0.15
Valine (Val)	14.20±0.35	16.90±0.03
Leucine (Leu)	29.50±0.64	61.00±1.07
Isoleucine (Ile)	4.20±0.25	13.20±0.01
Threonine (Thr)	10.10±0.25	7.90±0.08
Serine (Ser)	8.30±0.95	25.90±0.01
Proline (Pro)	11.70±0.31	15.80±0.05
Asparagine (Asn)	2.90±0.63	35.30±0.01
Aspartic acid (Asp)	4.90±0.63	14.60±0.01
Methionine (Met)	5.50±0.39	6.90±0.01
Glutamic acid (Glu)	24.10±0.35	35.90±0.05
Phenylalanine (Phe)	22.00±0.80	44.40±0.03
Glutamine (Gln)	63.00±0.42	83.40±0.01
Lysine (Lys)	43.50±0.31	133.70±0.08
Histidine (His)	5.61±0.25	29.70±0.08
Tyrosine (Tyr)	10.50±0.31	14.00±0.22
Tryptophan (Trp)	4.20±0.52	10.20±0.02
Cysteine (Cys)	0.20±0.05	0.40±0.01
Arginine (Arg)	5.75±0.61	5.40±0.01
Total content	**299.20±9.85**	**591.00±1.97**

The limiting acid is threonine, near which in the experimental processed cheese was 19.75, in control limiting amino acid is isoleucine to 10.5. An index of all the essential amino acids in the experimental cheese was 0.55, and in the control was 0.31, coefficient of rationality of proteins in the experimental sample was 6,77, and in control – was 2.27.

The incorporation of dry *Allium odorum* leads to an increase in the concentration of free fatty acids including the essential linoleic ($C_{18:2}$), and linolenic ($C_{18:3}$) fatty acids, respectively: (2.05±0.04) g·100g^{-1} and linolenic ($C_{18:3}$)– (0.93±0.03) g·100g^{-1} compared with the control, respectively (0.08±0.01) g·100g^{-1} and (0.25±0.02) g·100g^{-1}. In the experimental sample of processed cheese there were found smaller concentrations of high molecular weight unsaturated fatty acids eicosatrienoic ($C_{20:3}$)– (0.11±0.02) g·100g^{-1}; behenic ($C_{22:0}$)– (0.09±0.01) g·100g^{-1}; docosenoic ($C_{22:1}$)– (0.11±0.01) g·100g^{-1} and docosadienoic ($C_{22:2}$) fatty acids – (0.13±0.01) g·100g^{-1} (Table 6).

Table 6- Fatty acid composition of experimental samples processed cheese with *Allium odorum*

Fatty acids	Content, g•100g^{-1}	
	Control Sample	***Experimental Sample***
Saturated fatty acids		
Butyric acid ($C_{4:0}$)	1.70±0.05	3.50±0.08
Caproic acid ($C_{6:0}$)	2.60±0.02	2.57±0.01
Caprylic acid ($C_{8:0}$)	3.40±0.04	1.43±0.01
Capric acid ($C_{10:0}$)	3.40±0.05	3.09±0.01
Lauric acid ($C_{12:0}$)	3.20±0.06	3.46±0.01
Myristic acid ($C_{14:0}$)	8.80±0.21	10.21±0.01
Palmitic acid ($C_{16:0}$)	21.5±0.07	30.10±0.08
Margaric acid ($C_{17:0}$)	0.15±0.01	0.61±0.01
Stearic acid ($C_{18:0}$)	3.60±0.04	11.05±0.04
Arachidic acid ($C_{20:0}$)	0.05±0.01	0.21±0.02
Behenic acid ($C_{22:0}$)	ND	0.09±0.01
Monounsaturated fatty acids		
Palmitoleic acid ($C_{16:1}$)	1.25±0.05	1.58±0.01
Oleic acid ($C_{18:1}$)	11.60±0.25	25.57±0.02
Gadoleic acid ($C_{20:1}$)	0.12±0.02	0.25±0.01
Docosenoic acid ($C_{22:1}$)	ND	0.11±0.01
Polyunsaturated fatty acids		
Hexadecadienoic acid ($C_{16:2}$)	ND	0.02±0.01
Linoleic acid ($C_{18:2}$)	0.08±0.01	2.05±0.04
Linolenic acid ($C_{18:3}$)	0.25±0.02	0.93±0.03
Eicosatrienoic acid ($C_{20:3}$)	ND	0.11±0.02
Docosadienoic acid ($C_{22:2}$)	ND	0.13±0.01

**ND - Not Detected*

These fatty acids were not found in the control of processed cheese.

CONCLUSION

Dry *Allium odorum* is characterized by high protein and carbohydrate content and low fat, rich in vitamin C and microelements – zinc and iron. High levels of concentrations are detected of free amino acids and high molecular weight saturated and unsaturated fatty acids. Added to the milk mixture for processed cheese, this vegetable ingredient leads to an increase of the content of vitamins C, A and E, with a marked anti-oxidant effect and to an increase of the concentration of free amino acids, including the essential amino acids. The biological potential of the experimental processed cheese is also increased as a result of the higher levels of concentrations of some representatives of [omega]$_6$-fatty acids.

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