



Scientific Works of University of Food Technologies

Proceedings of the 66th Scientific Conference with
International Participation
“Food Science, Engineering and Technology - 2019”

**VOLUME LXVI
ISSUE 1**

2019

ORGANIZING COMMITTEE

Chairman:

Prof. Kolyo Dinkov DSc. (Eng)

Rector of UFT-Plovdiv

Deputy Chairman:

Corresponding Member of Bulg. Academy of Sciences Prof. Eng. Stefan Dragoev, DSc

Vice-Rector of the UFT on Research and Business Partnership

Members:

Prof. Eng. Albena Stoyanova, DSc

Prof. Eng. Nikolay Menkov, DSc

Prof. Eng. Iordanka Alexieva, PhD

Prof. Eng. Violeta Rasheva, PhD

Assoc. Prof. Eng. Venelina Popova, DSc

Assoc. Prof. Eng. Galin Ivanov, DSc

Assoc. Prof. Eng. Georgi Kostov, DSc

Assoc. Prof. Atanaska Teneva, PhD

Assoc. Prof. Eng. Georgi Dobrev, PhD

Assoc. Prof. Eng. Radoslava Gabrova, PhD

Assoc. Prof. Eng. Kremena Nikovska, PhD

Assoc. Prof. Petya Nestorova, PhD

Assoc. Prof. Eng. Borislav Milenkov, PhD

Technical Assistants:

Eng. Adelina Bogoeva, PhD

Daniela Atanasova

Gergana Velcheva

Ivanka Kuneva

Eng. Annie Sarahosheva

Magdalena Damyanova

Eng. Daniel Hristozov

Eng. Rumens Stoilov

SCIENTIFIC EDITORIAL BOARD

Editor-in-chief:

Prof. Eng. Stefan Dragoev, DSc., Corresponding Member of Bulgarian Academy of Sciences – University of Food Technologies – Plovdiv, Bulgaria

Honorary editors:

Prof. Eng. Maria Baltadjieva, DSc., Academician of Bulgarian Academy of Sciences - Applied Scientific laboratory for milk and milk products LB Lact - Plovdiv, Bulgaria

Prof. Tsvetan Tsvetkov, DSc., Academician of Bulgarian Academy of Sciences - Institute of Cryobiology and Food Technologies, Agriculture Academy - Sofia, Bulgaria

Prof. Atanas Atanasov, DSc., Academician of Bulgarian Academy of Sciences - Selection Genome Center - Sofia University St. Kliment Ohridski - Sofia, Bulgaria

Prof. Ivan Ivanov, DSc., Academician of Bulgarian Academy of Sciences – Institute of Molecular Biology "Roumen Tsanev" – Sofia, Bulgaria

Foreign Members of the Editorial Board:

Prof. Romyana Cenkova, PhD – Kobe University – Kobe, Japan

Prof. Wolfram Schnaackel, PhD, D.H.C. – The Anhalt University of Applied Sciences – Köthen (Bernburg), Germany

Prof. Anna Lante, PhD – University of Padova - Padova, Italy

Prof. Pascal Degraeve, PhD - University "Claude Bernard" Lyon1 - Lyon, France
Prof. Marek Sikora, PhD - Agricultural University - Krakow, Poland
Prof Edward Pospiech, PhD - Poznań University of Life Sciences - Poznań, Poland
Prof. Paraskevi Mitliagka, PhD - Trakia University of Western Macedonia - Cuzani, Greece
Prof. Eugene Bitus, DSc. - Moscow State University of Technology and Management "C.G. Razumovskii" - Moscow, Russia
Prof. Alexander Akulich, DSc. - Mogilev State University of Nutrition and Food Supplies - Mogilev, Belarus
Prof. Yassin Uzakov, DSc., Academician of Kazakhstan Academy of Sciences - Almaty Technological University - Almaty, Kazakhstan
Prof. Dimche Kitanovski, PhD - University "St. Kliment Ohridski ", Faculty of Biotechnical Sciences - Bitola, Macedonia
Prof. Aco Kuzelov, PhD - University "Goce Delchev", Faculty of Agriculture - Shtip, Macedonia
Prof. Marina Mardar, DSc. - Odessa National Academy of Food Technologies- Odessa, Ukraine
Bulgarian Members of the Editorial Board:
Prof. Eng. Atanas Pavlov, DSc., Corresponding Member of Bulgarian Academy of Sciences – UFT - Plovdiv
Prof. Eng. Albert Krastanov, DSc. - UFT- Plovdiv
Prof. Eng. Stepan Akterian, DSc. - UFT- Plovdiv
Prof. Eng. Radka Vlaseva, PhD - UFT- Plovdiv
Prof. Eng. Katya Valkova-Jorgova, PhD - UFT- Plovdiv
Prof. Vyara Ivanova-Pashkulova, PhD - UFT- Plovdiv
Prof. Eng. Marianna Baeva, PhD - UFT- Plovdiv
Prof. Eng. Stefan Stefanov, PhD - UFT- Plovdiv
Prof. Eng. Lena Kostadinova, PhD - Plovdiv UFT- Plovdiv
Assoc. Prof. Eng. Georgi Kostov, DSc. - UFT- Plovdiv
Assoc. Prof. Eng. Venelina Popova, DSc. - UFT- Plovdiv
Assoc. Prof. Eng. Hristo Spasov, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Cyril Mihalev, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Hristo Nikolov, PhD - UFT- Plovdiv
Assoc. Prof. Vesela Chalova-Jekova, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Maria Dushkova, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Veselin Nachev, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Plamen Nikovski, PhD - UFT- Plovdiv
Assoc. Prof. Eng. Nenko Nenov, PhD - UFT- Plovdiv

© 2019 UFT Plovdiv

© 2019 UFT Plovdiv

CONTENT

I. FOOD SCIENCE AND TECHNOLOGY

1. Effect of pig's feed phytonutrients supplementation on the free amino nitrogen and water holding capacity of pork

Dessislava Vlahova-Vangelova, Dessislav Balev, Stefan Dragoev, Sonya Ivanova, Jivko Nakev, Tanya Nikolova

2. The gradual development of quality complex of Bulgarian dry-cured ham during aging under natural climatic conditions

Daniela Mitreva, Dilyana Gradinarska-Ivanova, Katya Valkova-Yorgova

3. Influence of various cold-pressed oils on the chemical composition and microbiological quality of sausages

Boban Malinov, Aco Kuzelov, Elena Joshevska, Verica Ilieva, Elizabeta Barbareeva

4. Effect of refrigeration temperature on the fermentation process in kashkaval cheese

Atanaska Markova, Galin Ivanov

5. Comparative characteristics of milking systems in ZK Pelagonija and legally standardized adopted norms

Vangelica Jovanovska, Ivan Baloski, Dimitra Jovanovska, Darko Veljanovski, Mila Arapceska, Elizabeta Hristovska



Research Article

Influence of various cold-pressed oils on the chemical composition and microbiological quality of sausages

Boban Malinov¹✉, Aco Kuzelov¹, Elena Joshevska² Verica Ilieva³ Elizabeta Barbareeva¹

¹Department of Food Technology and Processing of Animal products. Faculty of Agriculture, „Goce Delchev”, University – Shtip, Krste Misirkov 10 – A, 2000 Shtip, Republic of N. Macedonia

²Department of Food Technology. Faculty of Biotechnical sciences, “St. Kliment Ohridski”, University -Bitola, Partizanska b.b. 7000 Bitola, Republic of N. Macedonia

³Department of Crop Production. Faculty of Agriculture, „Goce Delchev” University - Shtip, Krste Misirkov 10 – A, 2000 Shtip, Republic of N. Macedonia

Abstract

This paper presents the results from examination on impact of cold-pressed sunflower and pumpkin oil on the chemical composition and microbiological quality of Bacon Folk sausages. For this purpose, eight groups of Bacon Folk sausages have been produced. The first group was produced without addition of sunflower oil (control group), the second one with addition of 3g/kg, and the third one with addition of 4g/kg and the fourth group with addition of 5g/kg olive oil. According to the same order were produced the sausage groups with the addition of pumpkin oil. Sausage groups with cold pressed sunflower oil and pumpkin, have a slight decrease in the water content on the sixtieth day of production compared to the first day of production. The water content of the first day of production was (52.86% to 54.73% for sunflower sausages group; 52.24% to 54.61% for sausages with addition of pumpkin oil) and (52.71% up to 54.48%; 51.59% to 53.58%) on the sixtieth day of production. Protein content in cold pressed sunflower oil and pumpkin sausages group ranged from (10.85 to 11.54%; 11.65 to 11.95) on the first day and (11.52% to 12.01%; 11.52% to 12.01%) sixtieth day of production. The content of fats and minerals in both produced sausage groups were increasing to the end of production. Pathogenic bacteria were not detected. Used concentrations of cold-pressed sunflower and pumpkin oil in the groups of sausages do not have statistically significant impact on the chemical composition and microbiological quality of the sausages.

Keywords: Bacon Folk sausages, sunflower oil, pumpkin oil, quality

✉ Corresponding author: Boban Malinov, MSc Student ¹Department of Food Technology and Animal Products Processing. Faculty of Agriculture, University „Goce Delchev”, 2000 Shtip, Republic of Macedonia, [tel:++38971793860](tel:+38971793860);
E – mail: bobanmalinov@yahoo.com

Article history:

Received: 30 September 2019

Reviewed: 29 October 2019

Accepted: 3 December 2019

Available on-line: 16 March 2020

© 2019 The Authors. UFT Academic publishing house, Plovdiv



Introduction

The meat industry is one of the most important branches in the food industry, which requires the continuous introduction of new products, either due to market needs or pressure from competition in the given area (Grujić et al. 2012). The development of the meat industry and the ever-increasing consumer demand for healthy meat products that will have an extremely positive effect on the human body has led to the production and marketing of meat products in which different types of vegetable products and their extracts and different types of refined and cold pressed vegetable oils are applied. The production of meat products with increased content of polyunsaturated fatty acids in recent years has been a constant tendency due to the ever-increasing demands of consumers to consume quality and safe meat products (Maminokyan 2010; Pryanishnikov 2010 quoted by Miteva Daniela et al. 2015). Sunflower (*Helianthus annuus L.*) besides soybeans, rapeseed and peanuts is one of the four most important oilseed crops worldwide. It is believed that the cultivation of sunflower in North America was performed by Native Americans (Indians) in Arizona and New Mexico. In Europe the sunflower was brought by the Spaniards (Putt 1997) quoted by Vračarić et al. 2004. The sunflower seed oil was first produced in Russia in 1835. Cold pressed sunflower oil is produced by cold pressing without the use of chemical solvents and heat, producing an oil that preserves the nutritional value, taste and aroma of the seed. The color of the oil is golden - yellow. This oil has a high biological-nutritional value because of its beneficial effect on the functioning of the heart and cardiovascular system and on the maintenance and improvement of the general health of the body (Škorić et al. 2000; Lepšanić and Lepšanić 2000) quoted by Premović et al. 2015. It contains a high percentage of linoleic and oleic acid, vitamin E, choline, phenolic acids which are useful for the cardiovascular system. Cold pressed sunflower oil is increasingly present in the cold pressed oil market (De Leonardis et al. 2001; Dimić 2005; Bendini et al. 2011) quoted by Dimić et al. 2016.

Pumpkin (*Cucurbita pepo L.*) is used for human and livestock nutrition. The pumpkin family (*Cucurbitaceae*) includes about 800 species of

plants and 125 genera. Pumpkin seeds are a source of protein, phytosterols, vitamins, glyceride oil, carotenoids, tocopherols, microelements (K, Mg, Mn, Zn, Se, Co, Cr, Mo); (Applequist et al. 2006; Glew et al. 2006; Philips et al. 2005) quoted by Petkova and Antova 2014. Pumpkin seeds are rich in biologically active substances and are used in human nutrition and medicine, (Jiao et al. 2014) quoted by Petkova and Antova, 2014. Oil made from pumpkin seeds was first produced in the XVIII century in south-eastern Austria by cold pressing. The oil has dark green and characteristic sweetness. It is mostly used to enhance salad taste but is also used as a cure in shape of gelled capsules as it is rich in unsaturated fatty acid minerals and vitamins, (Petkova and Antova 2014). According to Dimić et al. 2008; Fruhwirth and Hermetter 2008; Siger et al. 2008; Lončar et al. 2009, Dimić et al. 2009, the main carriers of many of the positive nutritional and pharmacological characteristics of pumpkin seeds and oils are essential fatty acids, tocopherols, phenolic compounds, phytosterols, seeds and pumpkin oil. As a medicament it has effect on prostate diseases and has a beneficial effect on the cardiovascular system.

The purpose of our research was to investigate the effect of different concentrations of cold pressed sunflower and pumpkin oil on the chemical composition and microbiological status of sausages.

Materials and Methods

Samples collection. Eight groups of Bacon Folk Sausages were produced by complying with all the sanitary veterinary regulations applicable in the Republic of North Macedonia in the domestic meat industry. The sausages were produced according to the following recipe: 3kg chicken MDM; chicken drumstick 12 kg; pork trimming 35 kg; solid fat 40 kg; leek 3 kg; nitrite salt 1.7 kg; spice mix 0.400 kg; polyphosphate 0.500 kg; emulsifier 2.0 kg; hard water - ice 5kg. The first group of sausages was produced without the addition of cold pressed oils the second group with the addition of 3 g / kg cold pressed sunflower oil, the third group with 0.4 g / kg, the fourth with 0.5 g / kg cold pressed sunflower oil. In the same order the other four groups was made in which cold pressed pumpkin oil was



applied. After filling and draining, the sausage groups were thermally processed by the following recipe: Drying - 35 minutes; Smoking - 20 minutes at 62°C; Boiling - 35 minutes at 78 ° C, or until the center of the product reaches a temperature of 69-72 ° C. After heat treatment, the sausages were showered with cold water for 5 minutes and then transported to the cooling chamber for 24 hours. The groups of sausages were then vacuumed. Samples for the necessary examination were taken from the sausage groups on the 1st day and on the 60th day of production. As a material research were produced eight groups.

Examination of the chemical composition. For the required chemical examinations, samples were taken from all produced groups of Bacon Folk Sausages on the 1st day and on the 60th day after production. The chemical composition was tested using standard test methods commonly used in the chemical composition: Water by drying method at 105 °C; fats by the Gerber method; proteins was tested by the Kjeldahl method; mineral substances

Results and Discussion

Chemical composition and microbiological status are one of the most important indicators of the quality properties of the product. The chemical parameters and microbiological quality of the

(ash) by the burning method. Three repetitions were made (n=3).

Microbiological analysis. The microbiological analysis was done on the 1st, and the 60th day of production, in accordance with the Rulebook on the special requirements for food safety in relation to the microbiological criteria in the Republic of Macedonia. For the microbiological analysis the presence of *Listeria monocitogenes* by the method MKC EN ISO 11290-1: 2008 was investigated. Salmonella species by method MKC EN ISO 6579: 2008; *Escherichia coli* by the method MKC EN ISO 16649 - 2: 2008; *Staphylococcus aureus* by method MKC EN ISO 6888-2: 2008; Total number of aerobic bacteria by the method MKC EN ISO 4833 - 1: 2013 . Five repetitions were made (n=5).

Statistical processing . . The obtained results were statistically elaborated with the computer program Microsoft Excel 97/2003. The results are presented with a mean value \pm Sd.

groups of sausages produced with the addition of different amounts of cold pressed sunflower oil and pumpkin are given in (Table 1, 2 and 3).

Table 1. Chemical composition of sausage groups produced by applying cold pressed sunflower oil

1st day of production				
Chemical composition %	Group I Mean \pm SD	Group II Mean \pm SD	Group III Mean \pm SD	Group IV Mean \pm SD
Water	54.73 \pm 0.18	54.77 \pm 0.40	52.86 \pm 0.58	53.53 \pm 0.20
Fat	29.50 \pm 0.80	28.00 \pm 0.52	28.50 \pm 0.28	30.00 \pm 0.48
Proteins	11.54 \pm 0.18	11.18 \pm 0.12	11.54 \pm 0.10	10.85 \pm 0.18
Ash	4.03 \pm 0.22	3.14 \pm 0.48	3.29 \pm 0.22	3.65 \pm 0.12
60th day of production				
Chemical composition %	Group I	Group II	Group III	Group IV
Water	54.48 \pm 0.10	54.39 \pm 0.18	53.70 \pm 0.40	52.71 \pm 0.20
Fat	28.00 \pm 0.22	27.00 \pm 0.58	27.50 \pm 0.42	30.25 \pm 0.58
Proteins	11.50 \pm 0.12	11.51 \pm 0.20	11.44 \pm 0.42	11.02 \pm 0.18
Ash	3.27 \pm 0.10	3.37 \pm 0.18	3.34 \pm 0.22	3.18 \pm 0.08



Table 2. Chemical composition of groups of sausages produced with cold pressed pumpkin oil

1st day of production				
Chemical composition %	Group I Mean±SD	Group II Mean±SD	Group III Mean±SD	Group IV Mean±SD
Water	54.61±0.12	53.35±0.42	52.24±0.72	52.83±0.20
Fat	26.50±0.08	29.75±0.18	30.25±0.48	30.00±0.22
Proteins	11.86±0.12	11.95±0.52	11.65±0.42	11.88±0.18
Ash	4.46±0.52	4.37±0.48	4.24±0.20	4.32±0.40
60th day of production				
Chemical composition %	Group I	Group II	Group III	Group IV
Water	51.59±0.12	50.57±0.28	50.98±0.18	53.58± 0.48
Fat	26.50±0.10	28.00±0.40	29.50±0.70	28.50±0.40
Proteins	11.52±0.20	11.70±0.48	12.01 ±0.40	12.00 ±0.18
Ash	4.46±0.52	4.37±0.22	4.44±0.78	4.57 ±0.42

Table 3 Microbiological quality of Bacon Folk Sausages produced by applying cold-pressed oils (log CFU/g)

Sausage groups produced by applying cold pressed sunflower oil								
Production Groups	Gup I Mean ± SD		Group II Mean ± SD		Group III Mean ± SD		Group IV Mean ± SD	
Day of Production	1 st	60 th	1 st	60 th	1 st	60 th	1 st	60 th
<i>Total number of microorganisms</i>	1.47± 0.10	2.57±0.20	2.66±0.18	2.90±0.25	2.54±0.42	3.30±0.28	3.00±0.50	3.59±0.12
Sausage groups produced by applying cold pressed pumpkin oil								
Production Groups	Group I Mean ± SD		Group II Mean ± SD		Group III Mean ± SD		Group IV Mean ± SD	
Day of Production	1 st	60 th	1 st	60 th	1 st	60 th	1 st	60 th
<i>Total number of microorganisms</i>	1.90±0.18	2.47±0.25	2.36±0.28	2.95±0.40	2.25±0.58	2.95±0.48	2.81±0.22	3.17±0.40

From the results of the Table 1 and 2 it can be seen no statistically significant difference between the chemical composition of the Bacon Folk Sausages produced by applying cold pressed sunflower and

sunflower and pumpkin oil, on the 1st and 60th days after production in terms of protein and mineral content. On the first day of production at the groups of sausages produced with cold pressed sunflower oil, there was a greater variation in the water and fat content between the



first (54.73 ± 0.18) and third (52.86 ± 0.58), the second (54.77 ± 0.40) and third group (52.86 ± 0.58), (in terms of the water content) and the second (28.00 ± 0.22) and fourth (30.00 ± 0.48), the third (28.50 ± 0.28) and the fourth group (30.00 ± 0.48), (in terms of fat content). While on the 60th day of production, there are differences in water and fat content between the first (54.48 ± 0.10) and third (53.70 ± 0.40), first (54.48 ± 0.10) and fourth group (52.71%), and the second (54.39%) and fourth group (52.71 ± 0.20), (in terms of water content), and between the first (28.00 ± 0.22) and fourth (30.25 ± 0.58), second (27.00 ± 0.58) and fourth (30.25 ± 0.58), and third (27.50 ± 0.42) and fourth group (30.25 ± 0.58), (in terms of fat content).

On the first day of production of the sausage groups produced with cold pressed pumpkin oil, a greater variation in water and fat content was observed between the first (54.61 ± 0.12) and fourth (52.83 ± 0.20), second (53.35 ± 0.42) and fourth group (52.83 ± 0.20), (in terms of water content), and the first (26.50 ± 0.08) and second (29.75 ± 0.18), first (26.50 ± 0.08) and the third (30.25 ± 0.48) and first (26.50 ± 0.08) and fourth group (30.00 ± 0.22), (in terms of fat content). While on the 60th day of production there are differences in water and fat content between the second (50.57 ± 0.28) and fourth (53.58 ± 0.48) and third (50.98 ± 0.18) and fourth group (53.58 ± 0.48) (in terms of water content) and between the first (26.50 ± 0.10) and third (29.50 ± 0.70) and first (26.50 ± 0.10) and fourth group (28.50 ± 0.40) (in terms of fat content). This finding is due to the higher fat content and hard water (ice) added during the product cutting, or as a result of the packaging of insufficiently drained sausages.

The microbiological quality of each product is one of the most important criteria for quality and safety, according to the Regulations for a particular production series of meat, dairy or confectionery products.

The results in Table 3 indicate that no presence of *Listeria monocytogenes*, *Salmonella spp*, *E. coli* has been established, thus indicating that the produced sausages meet the criteria of the Rulebook on Specific Food Safety Requirements

of the microbiological criteria in the Republic of Macedonia (Criterion for Biological Food Safety, Official Gazette of the Republic of Macedonia No. 100/2013), ie the entire production process in all five iterations, meets the requirements of good hygiene and manufacturing practice. Based on the results for the total number of aerobic bacteria, it can be concluded that their number in the sausage groups are within the permissible limits.

Conclusions

From the results obtained we can conclude that the used concentrations of cold pressed sunflower and pumpkin oil have no effect on the chemical composition of the sausage groups. The results we obtained regarding the microbiological status of the products are most likely the result of high hygiene and the antibacterial effect of the cold pressed oils used. Research is continuing to determine the antioxidant effect of these cold pressed oils in order to produce functional meat products in our meat industries.

References

- Applequist W. L., Avula B., Shaneberg B. T., Wang Y.-H., Khan I. A. Comparative fatty acid content of seeds of four *Cucurbita species* grown in a common (shared) garden. *Journal of Food Composition and Analysis*, 2006, 19 (6-7): 606-611.
<https://doi.org/10.1016/j.jfca.2006.01.001>
- Bendini, A., Berbieri S., Valli E., Buchecker K., Canavari M., Toschi T. G. Quality evaluation of cold pressed sunflower oils by sensory and chemical analysis. *European Journal of Lipid Science and Technology*, 2011, 113(11): 1375-1384.
<https://doi.org/10.1002/ejlt.201100095>
- Dimić, E. Cold pressed oils, Monograph. Novi Sad: University of Novi Sad, Faculty of Technology. 2005, pp. 208-211, 221- 225,
- Dimić E., Vujasinović V., Romanić R., Berenji J. Stability of cold pressed naked pumpkin seed oil *Cucurbita pepo L.* *Journal of Edible Oil Industry Uljarstvo*, 2008, 39 (1-2): 17-25.
<http://www.tf.uns.ac.rs/publikacije/uljarstvo/uljarstvo-2008-vol-39-broj-1-2.pdf>
- Dimić E., Premović T., Vujasinović V., Takači A. Influence of seed quality on acidity and moisture content of cold – pressed sunflower oil, *Journal of Edible Oil Industry Uljarstvo*, 2016, 47(1): 15 -24.



- <http://www.tf.uns.ac.rs/publikacije/uljarstvo/uljarstvo-2009-vol-40-broj-1-2.pdf>
- De Leonardis A., Mcciola V., De Felice M. Chemical and commercial characteristic of cold pressed sunflower seed oils. *Italian Food & Beverage Technology*, 2001, (25): 46 -52.
- Fruhwrth G. O., Hermetter A. Seeds and oil of the Styrian oil pumpkin: Components and biological activities, *European Journal of Lipid Science and Technology* 2007, 109(11): 1128 -1140.
<https://doi.org/10.1002/ejlt.200700105>
- Glew R. H., Glew R. S., Chuang L.-T., Chuang Y.-S., Millson M., Constans D., Wandejagt D. J. Amino acid, mineral and fatty acid content of pumpkin seeds (*Cucurbita spp*) and *Cyperus esculentus* nuts in the Republic of Nigeria. *Plant Foods for Human Nutrition*, 2006, 61(2): 49 -54. <https://doi.org/10.1007/s11130-006-0010-z>
- Grujić R., Grujić S., Vujadinović D. Functional meat products. *Food in Health and Diseases, Scientifically – Professional Journal for Nutrition and Dietetics*, 2012, 1(1): 44-54. [In Croatian]
<https://hrcak.srce.hr/87446>
- Jiao J., Li Zh.-G., Gai Q.-Y., Li X.-J., Wei F.-Y., Fu Y.-J., Ma W. Microwave-assisted aqueous enzymatic extraction of oil from pumpkin seeds and evaluation of its physicochemical properties, fatty acid compositions and antioxidant activities. *Food Chemistry*, 2014, 147(3): 17 -24.
<https://doi.org/10.1016/j.foodchem.2013.09.079>
- Lončar E., Malbaša R., Perić D., Kolarov Lj. Changes in the chemical composition of oil seeds during the baking process, 50th Oil Industry Consulting: Production and Processing of Oil Plants, Proceedings, Herceg Novi. 2009, pp. 157-165.
- Lepšanović, L., Lepšanović Lj. *Clinical Lipidology Contemporary Administration*: Belgrade. 2000.
- Mamikonyan M. L. Analysis and forecast of the situation in the meat market of Russia. *Poultry and poultry products*, 2010, (4): 38-40. [In Russian]
<https://elibrary.ru/item.asp?id=15341241>
- Miteva D., Nacheva I., Tsvetkova V., Petrunov P., Valchkov A., Loginovska K. Creating of innovative meat foofds with high content of polyunsaturated fatty acids. *Scientific Works of University of Food Technologies*, 2015, 62(1): 145-148.
https://uftplovdiv.bg/site_files/file/scienwork/scienworks_2015/docs/01
- Petkova Zh., Antova G. Oxidative stability of pumpkin seed oil and possibilities of stabilization. *Scientific Works of Univerzity of Food Technologies*, 2014, 61(1): 259-264.
https://uftplovdiv.bg/site_files/file/scienwork/scienworks_2014/docs/part_1/1
- Philips K. M., Ruggio D. M., Ashraf-Khorassani M. Phytosterol composition of nuts and seeds commonly consumed in the United States. *Journal of Agriculture and Food Chemistry*, 2005, 53(24): 9436-9445.
<https://pubs.acs.org/doi/full/10.1021/jf051505h>
- Pryanishnikov V.V. Innovative technologies for the production of canned poultry meat. *Poultry and poultry products*, 2010, (5): 21-23. [In Russian]
<http://www.vniipp.ru/images/statya/0510/21mog.pdf>
- Putt. E. D. Early History of Sunflower. In: *Sunflower Technology and Production* (A. A. Schneitered Ed.) Wisconsin, Madison: ASA.CSSA.SSSA, *Agronomy*, 1997, (35): 1 -19.
- Siger A., Nogala-Kalucka M., Lampart-Szczapa E. The content and antioxidant as tivity of phenolic compounds in cold-pressed plant oils. *Journal of Food Lipids*, 2008, 15(2): 137-149.
<https://doi.org/10.1111/j.1745-4522.2007.00107.x>
- Vracaric M., Jurković D., Ivezić M., Pospišil M., Košutić S., Sudarić A., Josipović M., Čosić J., Madar S., Raspudić E., Vrgoč D. *Sunflower (Helianthus annuus L.) Monograph*. Osijek: Agricultural institute R. Croatia. 2004.
- Škorić, D., Marinković R., Jocić S., Jovanović D. Contribution of sunflower refining to food production. *Proceedings, Eco – Conference, Novi Sad*, 2010, pp. 311-316.
- Web site: http://filla.com.mk/mk/ladno-cedeno-maslo-od-semki_od-tikva-250ml-100/
- Web site: <http://filla.com.mk/mk/maslo-od-soncogledovo-seme/>