Scientific Works of University of Food Technologies

Proceedings of the 64th Scientific Conference with International Participation

"Food Science, Engineering and Technology – 2017"

VOLUME LXIV

ISSUE 1

2017

EDITORIAL BOARD

Prof. Eng. Stepan Akteryan, 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

CONTENTS

I. FOOD SCIENCE AND TECHNOLOGY

Makarijoski Borche, Stefche Presilski, Sasho Trajchevski, Biljana Trajkovska

7. **The effect of different starter cultures on sensory properties of probiotic yogurt** Makarijoski Borche, Stefche Presilski, Sasho Trajchevski, Biljana Trajkovska

8. **Determination of Use of Fenugreek (Trigonella foenum-graceum L.) as Food and Some Morphological Characteristics**

   Belgin C. Senkal, Kursat Bucak, Hulya Dogan, Cuneyt Cesur, Tansu Uskutoglu

9. **A study on the effect of mineral substances and lactic acid starter cultures on the properties of bread of wheat flour type 500 Denka**

   Denka Zlateva, Dana A. Stefanova

10. **Filtration drying of grinded artichoke stems for extraction process**

    Kindzera D.P., Atamanyuk V.M., Hosovskyi R.R., Ivashchuk O.S.

11. **Coeffiicient of diffusion of tannins in extracts from laurel leaves (Laurus nobilis L.)** Galina L. Stefanova, Stanislava T. Tasheva, Stanka T. Damyanova , Albena S. Stoyanova

12. **CHEMICAL COMPOSITION, MICROBIOLOGICAL QUALITY AND SENSORY CHARACTERISTICS IN DIFFERENT TYPES OF PATES**

    Darko Andronikov , Kiro Mojsov, Aco Janevski, Aco Kuzelov, Elenica Sofijanova, Dijana Indzhelieva

13. **Effects of goji berries on a qualitative properties of semi durable sausages**

    Aco Mitev, Aco Kuzelov

НАУЧНИ ТРУДОВЕ НА
УНИВЕРСИТЕТ ПО ХРАНИТЕЛНИ
ТЕХНОЛОГИИ - ПЛОВДИВ
2017г.
ТОМ 64,КНИЖКА 1

SCIENTIFICWORKSOF
UNIVERSITY OF FOOD
TECHNOLOGIES
2017
VOLUME 64ISSUE 1

Effect of goji berry on the qualitative properties of semi durable sausages

Aco Mitev[1], Aco Kuzelov[2]

Running title: **Quality, Properties, Semi Durable Sausages**

Abstract

The objective of this study was to determine the influence of dry minced goji berry fruits on the lipolytic (acid valuel) and oxidative (peroxide value) changes and microbiological status of vacuum-packed semi-durable sausage storaged 35 days at 4°C. Therefore, four types of sausages' samples were examined. The first group was control sample (without addition of dry minced goji berry fruits). To the receipt of the rest three samples of bacon-folk sausage were addited 0.1%, 0.3% and 0.5% dry minced goji berry fruits, resp. The experiments were done on the 1st, 10th, 25th and 35th day of the stored vaccum packed sausages. The acid value of all studied sausages' samples was increased, but the highest increase was determined in the control sample (2.08, 2.19, 2.39, and 2.65 resp.). A steady increase in the peroxide value of the examined samples sausage was found during their 35 day storage. The highest was the rase of peroxide value in the control group of sausages (1.02, 0.40, 1.04, 0.71) while the lowest in sausages with addition of 0.5% dry minced goji berry fruits (0.76, 0.47, 1.09, and 0.74). The microbiological status of the sausages were done on the 1st, 10th, 25th, and 35th day of the storage. At all the examined samples of bacon-folk sausage was not identified presence of *Listeria monocitogenes*, *Salmonella spp.*, *Escherihia coli*, and *Staphulococys aureus*. In none of the analyzed sausages'samples the number of aerobic bacteria was not exceed the recommended level of 7 log cfu/g. During the sausages' storage the number of aerobic bacteria increased from 2.08 to 2.93 log cfu/g. Based on the results obtained, the conclusion was made that the low acid and peroxide velues are probably due to the low antioxidant effect of goji berry fruits. The fact that the patogenic bacteria have not been identified in no one of studied sausages groups is probably the result of good hygiene practices in the plant where the sausages were produced and are unaffected by the antimicrobial effect of goji berry additives

Key words: Goji berry, Acid value, Peroxide value, Microbiological status, Bacon-folk sausage

Introduction

Recently, many authors did a research on the influence of various plants and their extracts (garlic, onion, basil, sage, green tea, pumpkin seeds and their extracts) over the oxidative changes and the microbiological status of the meat products (Prasad and Saharma 1981; Ankri and Mirelman, 1999; Burt 2004; Bozkurt 2006; Ashok Kumar et al. 2011; Savic and Danon 1985; Dragoev 2004; Nguefack et al. 2004; Nebedum et al. 2009; Sanchez et al. 2010; Viuda-Martos et al. 2009; Rohlik and Pipek 2011; Rohlik and Pipek 2012).

Studies were carried out on the influence of the fruits of goji over the resistance of the human organism and in general the improvement of the health of people. The fruits of goji berry as freshly squeezed fruit juices, concentrated drinks or in a dry form have been used for thousands of years in the traditional Chinese medicine. Studies show that fruits of goji berry contain a wide spectrum of phytocompounds, vitamins B1, B2 B6, minerals Fe, Zn, and Cu, amino acids (proteins), fatty acids and specific antioxidants so that many health experts call them “super food of berries”.They increase the resistance of the organism and influence on better food digestion (Bucheli et al. 2011; Bone et al. 2003; Potterat et al. 2008; Cucud and Sanlier 2017). There is a little data for the influence of the goji berries over the quality of meat (Serikaisai et al 2014; Bulambaeva et al. 2014). Since there is very little data in the literature on the influence of the fruits of the plant over the oxidative changes and the microbiological state of the meat products, the objective of our research was to investigate the influence of different concentrations of goji berries on the oxidative changes and the microbiological status of the semi-permanent roughly sliced bacon-folk Sausage.

Materials and Methods

As a material of research a semi-durable bacon-folk sausage was used. According to the requests for the quality of minced meat, preparations of meat and meat products (*Official Gazette of RM* No 63/29.04.2013) the bacon-folk sausage belongs to the group of semi-durable roughly minced sausages. The sausage was produced according to the sanitary veterinary regulations of Republic of Macedonia.

The sausage receipt was given in Table 1.

The goji berry dried fruits were minced with a mixer with an adding of natrium chloride as a bearer before they were applied. The so minced fruits of goji berries were applied during the preparation of the mixture. The mixture was filled in narrow pig entrails. For the experiment four groups of bacon-folk sausage were made.

I - group without adding of goji berry(control group)
II - group with adding of 0.1% goji berry
III - group with adding of 0.3 % goji berry
IV - group with adding of 0.5% goji berry

After the filling and draining of the sausage, its thermic processing was started.

The thermic processing was made according to the following formula:

- drying 35 min,
- smoking 20 min at 62°C,
- boiling 35 min at 78°C or until the temperature inside the product doesn’t reach 69-72°C.

Following the thermic processing the sausages were vacuumed with a vacuum measure -Vebomak. After the vacuum packing the sausages were kept at 4°C.

Methods of analysis

The samples preparation

After the production, the sausage was stored at 4°C. The sampling for analysis was carried out according

officially recognized methods of analysis recommended by AOAC International (Latimer 2012).
Medium sized samples of mulching two times over an electric mixer.
Followed by any mildew, careful mixing was carried out.
Separate parts from the staple medium laboratory sample were taken for the analysis of chemical indicators.

Acid and peroxide values determination

The acid value was determined according to the MKC EN 1410:2007 method (2007). The peroxide value was examined according to the MKC ISO 27107:2011 method (2011).

Microbiological status

Within the microbiology analyses it was examined the presence of: *Listeria monocytogenes* according to the method MKC EN ISO 11290-1:2008;
Salmonela species according to the method MKC EN ISO 6579:2008; *Escerihia coli* according to the method MKC EN ISO 16649-2:2008; *Staphylo-coccus aureus* according to the method MKC EN ISO 6888-2:2008; the number of aerobe bacteria according to the method MKC EN ISO 4833-1:2013.

Statistical analysis

The received results were statistically processed by determining a mean value, variation measures, variation analysis, factor of the variation and statistic importance, Anova single factor (Excel MS Office 2003). Results were given as a average ± standart divistion (SD). For the acidic level and the peroxide number, they were made after three repetitions (n=3). The microbiological status of the sausages samples was deterrmined after five repetitions (n=5).

Results and Discusion

Determination of acid and peroxide value

The the acid value and peroxide value changes in the groups of folk-bacon sausage are presented on Figures 1 and 2. The acid value at all the groups of studied sausages was increased with the highest increase at the control group of sausages (2.08 - 2.65). The peroxide value at the beginning of the control test was 1.02 mmol/kg ± 0.07 at the control group and 0.76 mmol/kg ± 0.04 at group IV with an adding of 0.5% minced goji berry fruit. During 35 days sausages' storage at 4°C the peroxide value increases. The highest increase was found in control groups (1.02, 0.40, 1.04, 0.71) and the lowest - in group IV (0.76, 0.47, 1.09, 0.74). According to Matiasevic Biserka (1963) the sensor changes of the sausages are perceptible only when the peroxide value was higher than 5 mmol/kg. It can be concluded that oxidation process in the examined samples was not expressed. The determined lower acid and peroxide values probably are in a result of the small antioxidative activity of the applied minced fruits of goji berries and the vacuum packed sausages.
Seirkaisai et al. (2014) studied the influence of dry goji berry fruits and pumpkin seeds powder on the tability of smoked beef with decreased nitrites content. The addition of 1.0% goji berry and 0.5 % pumpkin seeds improved the sensory determined color of the smoked beef meat was determined (Seirkaisai et al. 2014). Thus it allows decreasing the nitrites content in a finish product characterized with very slight oxidative changes in whole meat product. Bulambaeva et al. (2014) found the use of goji berry and pumpkin seeds in the sausage production influences on the improvement of the sensory evaluated characteristics of the coocked sausages. Yu et al. (2006) determined that the goji berry extract influenced on the people stress decreases.

Determination of microbiological status

The results for microbiological status of the samples were given in Table 2. The results show that at all stages of research at none of the examined sausages it is not found the presence of *Listeria monocitogenes, Salmonela species, Escherihia coli, Staphylococcus aureus*. Only a number of aerobic bacteria is determined. Regarding the microbiological status there is no significant difference between five examined groups of sausages. At none of the analyzed groups of sausages the total number did not exceed the recommended level of 7 log cfu/g. During 35 days of refrigeration the total number of aerobic bacteria ranged from 2.08 ± 0.10 to 2.93 ± 0.18 log cfu/g which is probably due to the good hygiene practice at the production plant where the sausages were made.

Conclusions

The obtained results indicate that the low acid and peroxide values were probably a result of the small antioxidant activity of the applied minced goji berry fruits and the vacuum packing of the sausages. The fact that at none of the examined groups the bacteria mentioned above were not determined is due to the good hygiene practice in the plant production where the groups of sausages were produced, but not as a result of anti-microbial effect of the goji berries fruits.

Reference

Ankri, S., Mirelman, D. (1999). Antimicrobial properties of allicin from garlic. *Microbes and Infection*, 1(2): 125-129.

Ashok-Kumar, K., Narayani M., Subanthini A., Jayakumar M. (2011). Antimicrobial activity and phytochemical analysis of Citrus fruit peels - utilization of fruit waste. *International Journal of Engineering Science and Technology*, 3(6), 5414-5421.

Burt, S. (2004). Essential oils; their antibacterial properties and potential applications in foods – a review. *International Journal of Food Microbiology*, 94(3), 223-253.

Bulambaeva, A.A., Vlahova-Vangelova D.B., Dragoev S.G.,. Balev D.K., Uzakov Y.M. (2014). Development of new functional cooked sausages by addition of goji berry and pumpkin powder. *American Journal of Food Technology*, 9(4), 180-189.

Bozkurt, H. (2006). Utilization of natural antioxidants: Green tea extract and Thymbra spicata oil in Turkish dry-fermented sausage. *Meat Science*, 73(3), 442-450.

Bucheli, P., Vidal K.; Shen L.; Gu Zh.; Zhang Ch., Miller L. E., Wang J. (2011). Goji berry effects on macular characteristics and plasma antioxidant levels. *Optometry and Vision Science*, 88(2), 257-262.

Bone, R. A., Landrum J. T., Guerra L. H., Ruiz C. A. (2003). Lutein and zeaxanthin dietary supplements raise macular Pigment density and serum concentrations of these carotenoids in humans. *The Journal of Nutrition*, 133(4), 992-998.

Dragoev, S. (2004). Development of technology in the meat and fish industry, *Academic Publishing of UFT*, Plovdiv (Bulgaria), pp. 96-112.

Kocyigit, E., Sanlier N. (2017). Areview of composition and helath effects of *Lycium barbarum. International Journal of Chinese Medicine*, 1(1), 1-9.

Nguefack, J., Budde B. B., Jakobsen M. (2004). Five essential oils from aromatic plants of Cameroon: their antibacterial activity and ability to permeabilize the cytoplasmic membrane of Listeria innocua examined by flow cytometry, *Letters in Applied Microbiology*, 39(5), 395-400.

Latimer, G. W. Jr. (2012). Official Methods of Analysis of AOAC International. 19th Edition, *AOAC International*, Gaithersburg, Maryland (USA).

Nebedum, J., Ajeigbe K., Nwobodo E., Uba C., Adesanya O., Fadare O., Ofusori D. (2009). Comparative study of the ethanolic extracts of four Nigerian plants against some pathogenic microorganisms, *Research Journal of Medicinal Plant*, 3(1), 23-28.

Ostrić-Matijašević, B. (1963). Relationhips between the results of an objective method and organoleptic changes fat meats, *Technology*, 1(1), 5-6.

O'Keefe, S. F. and Wang H. (2006). Effects of peanut skin extract on quality and storage stability of beef products. *Meat Science*, 73(2), 278-286.

Prasad, G., Saharma V. D. (1981). Antifungal property of garlic (*Allium sativumLinn*.) in poultry feed substrate. *Poultry Science*, 60(3), 541-545.

Potterat, O. and Hamburger M. (2008). Goji juice: a novel miraculous cure for longevity and well being? A review of composition, pharmacology, heallth-related claims and benefits. *Schweiz. Zschr. Ga99nzheitsMedizin*, 20(7/8),399-405.

Rohlik, B.-O. and Pipek P. (2011). The effect of rosemary extract on meat products'properties. *Mitteilungsblatt der Fleischforschung Kulmbah*, 50(192),77-85.

Rohlik, B.-O. and Pipek P. (2013). Rosemary extract and its affect of on meat products' properties. *Fleischwirtschaft*, 93(1): 98-104.

Savic, I. and Danon J. (1982). *Spices of the Meat Processing*, Veterinary Faculty in Belgrade, Belgrade (Serbia), pp. 25-27.

Sánchez, E., García S., Heredia N. (2010). Extract of edible and medicinal plants damage membranes of *Vibrio cholerae, Applied and Environmental Microbiology*, 76(20), 6888-6894.

Serikkaisai, M. S., Vlahova-Vangelova D. B., Dragoev S. G., Uzakov Y. M., Balev D. K. (2014). Effect of Dry Goji Berry and Pumpkin Powder on Quality of Cooked and Smoked Beef with Reduced Nitrite Content. *Advance Journal of Food Science and Technology*, 6(7): 877-883.

Yinda-Martos, M., Fernández-López J., Sayas-Barbera E., Sendra E., Navarro C., Pérez- Alvarez J. A. (2009). Citrus co-products as technological strategy to reduce residual nitrite content in meat products. *Journal of Food Science*, 74(8): R93-R100.

Yu, M.S., Ho Y.S., So K.F., Yuen W.H., Chang C.C. (2006). Cytoprotective effects of *Lycium barbarum* against reducing stress on endoplasmic reticulum. *International Journal of Molecular Medicine*, 17(6), 1157-1161.

.

Table 1. Recipe of bacon-folk sausage

Raw materials	**Group 1 Control sample** without addition of dry minced goji berry fruits, **%**	**Group 2 Sample of bacon-folk sausage** with addition of 0.1%, dry minced goji berry fruits, **%**	**Group 3 ple of bacon-folk sausage** with addition of 0.3% dry minced goji berry fruits, **%**	**Group 4 Sample of bacon-folk sausage** with addition of 0.5% dry minced goji berry fruits, **%**
Chicken MDM	3	3	3	3
Chicken over a duck	12	12	12	12
Pork trimmings	35	35	35	35
Hard fatty tissue	40	40	40	40
Lean meat	3	3	3	3
Dry minced goji berry fruits	0	0.1	0.3	0.5
Nitrite salt	1.7	1.7	1.7	1.7
Apice mixture Koleks	0.400	0.400	0.400	0.400
Sodium polyposphate	0.500	0.500	0.500	0.500
Emulsiffier	2.0	2.0	2.0	2.0
Hard water- frost	5.0	5.0	5.0	5.0

Table 2. Microbiological status of four examined groups of vacuum packed bacon-folk sausage during 35 days of storage at 4°C

Day of storage at 4°C	**The number of aerobic bacteria, log cfu/g**				**Significance**
	Group 1 Control sample without addition of dry minced goji berry fruits, **%**	**Group 2 Sample of bacon-folk sausage** with addition of 0.1%, dry minced goji berry fruits, **%**	**Group 3 Sample of bacon-folk sausage** with addition of 0.3% dry minced goji berry fruits, **%**	**Group 4 Sample of bacon-folk sausage** with addition of 0.5% dry minced goji berry fruits, **%**	
1	2.93±0.18	2.53±0.12	2.18±0.20	2.76±0.28	NS
10	2.86±0.10	2.08±0.10	2.82±0.40	2.50±0.42	NS
25	2.52±0.14	2.11±0.12	2.68±0.48	2.72±0.20	NS
35	2.76±0.28	2.70±0.40	2.76±0.10	2.85±0.18	NS

Notes: In the cells are resented Means ± SD (standart diviation). NS – not significant

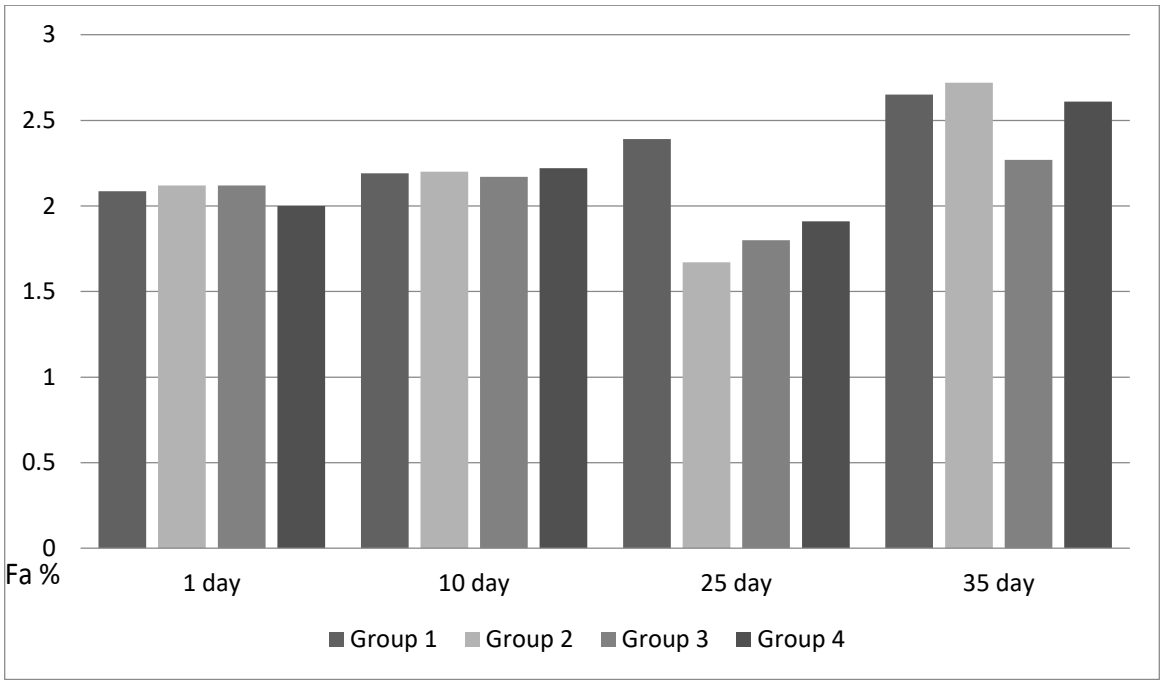

Figure 1. Changes of the acid value of four examined groups of vacuum packed bacon-folk sausage during 35 days of storage at 4°C

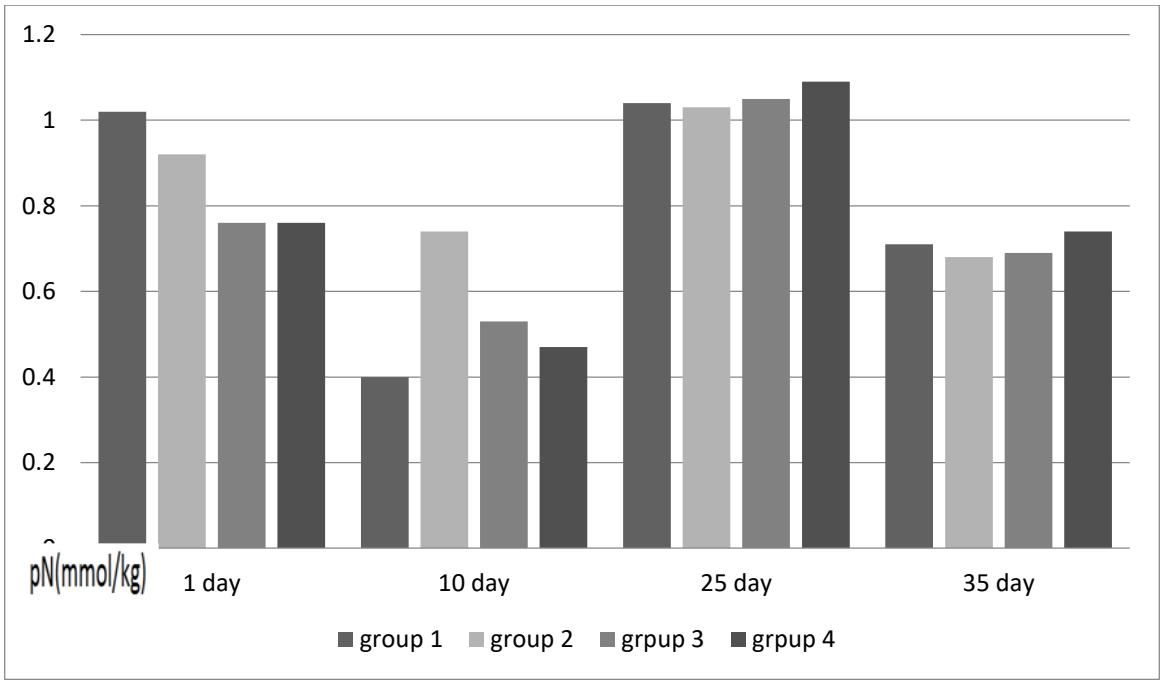

Figure 2. Changes of the peroxide value of four examined groups of vacuum packed bacon-folk sausage during 35 days of storage at 4°C