

Studies regarding the influence of natural extracts on nutritional characteristics of cold cuts meat products

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Abstract

The aim of the research was to study the use of natural extracts as additives to produce salami and improve the nutritional value. The novelty of research is the study of the influence of natural extracts on the nutritional properties of cold cuts meat products by substituting synthetic additives (NaNO₂) with natural extracts (Kombucha). The products (classic salami and salami with Kombucha extract) were obtained at a meat products company from Timisoara (Romania). The quality control of the obtained products involved physic-chemical and microbiological analyzes performed at the official laboratory for physic-chemical and bacteriological analyzes at the same company. The physic-chemical analyzes were done according to ISO 1442/1997 (water content), SR ISO 1444/2008 (fat content), STAS 9065/5-1973 (sodium chloride content), SR ISO 937: 2007 (nitrogen content), SR ISO 17025 (Kreiss reaction), STAS 9065/9-74 (nitrites content). Method for detecting Salmonella spp in food and feed has been achieved according to SR EN ISO 6579 / AC, ISO 6887-2/2003 and SR EN ISO 6887-4/2005.

The results show that by substituting chemical additive (sodium nitrite) used in manufacturing recipe of cold cuts meat products with natural extracts (spices mixture with Kombucha extract), it can be obtained safe products with high nutritional value, without chemical additives.

Keywords: salami, natural extract, nutritional characteristics, food safety

1. Introduction

Most foods contain additives (known under the generic name of “E”-s) which conserves, give colour, form, foams and especially give flavour in an artificially way, to make the product attractive and marketable for a long time [23].

Ecological, safety food products are produced according to standards that take into account environmental and animal welfare with minimal use of chemicals at any stage (cultivation, growing, processing, packaging). In the EU, from the 370 authorized additives (E numbers), 49 are allowed in organic products. Nitrate (nitrate) sodium (E251) has no direct effect on the meat colour, but is a

source of nitrite, sodium nitrite (E250) in concentrations of 0.4 – 0.5% mixed with salt being used to preserve meat products. It contributes to meat flavour, it is a gentle antioxidant, preventing the development of stranger taste and smell and acts as an antimicrobial agent [4, 22].

Cold cuts are minced, seasoned and matured products inserted into natural or artificial casings and subjected to different heat treatments (pasteurization, smoking, drying) that varies based on the manufactured type and assortment. The main physical-chemical characteristics of salami, raw and smoked or dried are 30-35% water content, 40-50% fat content and 15-18% protein substances. Nitrite

can be safely used in low concentrations, to conserve and colour the meat products. According to expert studies traces of nitrite are not poisonous, in addition to the reddening effect, has a number of additional benefits, so that the meat industry depends very much on this substance. Normally a level of 150 mg / kg (0.015%) of nitrite is sufficient in the meat product, but in order to reduce the risk of nitrite over dosage is carried out a reliable dosage in a homogeneous mixture formed of sodium chloride in a proportion of 99.5% and 0.5% nitrite [3, 21].

In Romania, the researchers were able to find substitutes for hazardous ‘E’-s in food products, so were successfully used cinnamon extracts and herbs that have the same properties as chemical preservatives. One of the researches that were conducted at the Institute for Food Research (ICA) in Bucharest, was to replace ‘E’ preservatives with cinnamon extracts, which has by far better conservation effects and not changes at all the taste. The studies consisted in using extracts of cinnamon, rosemary, herbs that can successfully replace synthetic chemical food additives, with obtaining of very good results, as if it would have been used nitrates and sulphites [20].

Traditional function of food antimicrobial substances is to prolong shelf life and keeping quality by inhibiting alteration microorganisms. Antimicrobial ingredients are added to meat products to reduce or inhibit pathogens or spoilage, prolonging the shelf life of the product and maintaining the quality. At international level the studies conducted by Hayam M. I. et al. in 2011, highlighted that the natural plants are considered a new source of natural antioxidants and/or antimicrobial agents that can be used in meat products. The optimum concentration for natural plant extracts (jojoba, jatropha, ginseng and ginger) were studied by adding in various meat products. The addition of these extracts had a significant effect on products throughout the storage period. Following the studies on the effectiveness of natural extracts tested in meat products, it results the following order: ginger, jojoba, jatropha, ginseng. Other studies showed antioxidant and antibacterial effects of extracts from grape seed and pine bark that functions better than synthetic preservatives preventing the growth of harmful microorganisms and oxidation development of meat [5, 6, 19].

Kombucha fungus is not a singular organism but a colony of microorganisms that live in symbiosis, forming a complex biological system composed of bacteria and fungi (yeast), which converts sugar in which are growing and the active principles of black tea, in substances with remarkable healing effects. Although the chemical analysis of the fungus has not been fully elucidated, is already know that Kombucha contains large amounts of vitamin C and B vitamins (B1, B2, B3, B6, B12), which largely justifies its rejuvenating properties and stimulate the body's natural resistance [18].

In this sense, within this research was pursued the obtaining meat products (salami), in which were used natural extracts (Kombucha) for their conservation and have been characterized from a nutritional perspective. The results were compared with the results of nutritional characteristics for classic salami with chemical additives.

2. Materials and methods

The salami studied belongs to the meat products group - boiled and double smoked.

The main raw and auxiliary materials that enter the manufacturing recipe of **classic salami** are: beef meat, pork meat, bacon, black pepper, garlic, coriander, polyphosphates, sugar, vitamin C, salting mixture 2 kg (salt nitrite 99.5: 0.5), membranes (Faser Ø45 BE), staples (09). The main materials that enter in the manufacturing recipe of **premium salami with Kombucha extracts** are: pork meat, pork pulp, bacon, flake ice, Pure Herba (Kombucha extract), WIENER HP gluten-free spices, non-iodized rock salt, artificial membranes (Ø45); clips (09), rope.

The technological process for manufacturing premium salami with kombucha extract is identical to the process for obtaining classic salami. The technological operations applied to obtain classic and kombucha salami are: raw material preparation, spices preparation, cutting, cauterizing, filling, binding, putting on sticks, thermal processing, packaging, labeling, storage and transportation of meat products, minimum durability, shelf life.

The products (classic salami and with Kombucha extracts) were obtained at a meat producing company in Timișoara and the physico-chemical and microbiological analysis for quality control of studied meat products were performed at the Laboratory for physico-chemical and bacteriological analysis in the same company.

Determination of water content in meat and meat products, of free fat content, of sodium chloride, of nitrogen content, of the oxidation stage of fats through Kreiss reaction, of nitrites were done according to ISO 1442/1997, SR ISO 1444/2008, STAS 9065/5-1973, SR ISO 937: 2007, SR ISO 17025, STAS 9065/9-74. Method for detecting Salmonella spp in food and feed has been achieved according to SR EN ISO 6579 / AC, ISO 6887-2/2003, SR EN ISO 6887-4/2005 [12, 13, 14, 15, 16, 17].

The physic-chemical properties of meat products (boiled and double smoked) have been established according to the Order 210/2006 regarding the admissibility conditions of the physic-chemical properties of cold cuts meat products type (Table 1). [24]

Table 1. Admissibility conditions for the physic-chemical properties of cold cuts meat products type according to the Order 210/2006 [24]

Indicator	Conditions of admissibility
Water, (% max.)	50
Lipids, (% max.)	40
NaCl, (% max.)	3
Total protein, (% minim)	15
Nitrites, (mg NO ₂ /100 g) max	7
Kreiss reaction	negative

Regarding the water content (%) in the studied samples of classic salami, the lowest annual average was determined in 2014 ($48.19\% \pm 2.8393$) and the highest annual average in 2015 ($49.91\% \pm 0.0735$) (Table 2).

Annual average values of water content (%) in studied premium salami with Kombucha extract were recorded between $48.77\% \pm 0.6103$, in 2014 and $49.38\% \pm 0.5856$, in 2013, not being registered high differences compared with water content of the classic salami samples studied (Table 2) and in accordance with Order 210/2006 regarding the admissibility conditions of maximum 50% (Table 1).

Annual average values of protein content (%) in studied salami samples (classic and premium salami with Kombucha extract) registered slight differences due to meat quality used in the manufacturing recipes of the two types of studied salami. The annual average values for the classic salami samples range between the $15.42\% \pm 0.5010$, in 2015 and $15.59\% \pm 0.7072$, in 2014, and for the premium salami with Kombucha extracts between $17.58\% \pm 0.9064$, in 2014 and $18.59\% \pm 2.6730$

3.Results and discussions

Classic salami and premium salami with Kombucha extract samples were obtained and analyzed quarterly (January, April, July and October) in three experimental years 2013, 2014, 2015. There are scientific studies that claim that the most important properties of Kombucha mushroom, are antimicrobial, hepatoprotective and antioxidative [1, 2, 8, 10, 11].

Knowing the antioxidant and antimicrobial properties of Kombucha extract, in this study it has been followed to replace nitrite used in manufacturing recipe of cold cuts meat products with mixed spice with Kombucha extract in order to obtain a product with high nutritional value and without chemical additives.

The main physic-chemical characteristics pursued in classic salami and premium salami with Kombucha extract studied was: water content %, fat %, sodium chloride %, protein %, nitrites (mg NO₂ / 100 g), the Kreiss reaction and microbiological analysis (Salmonella / 25 g).

The results are shown as mean values quarterly (January, April, July, October) \pm SD (standard deviation) in the tables 2-6.

(Table 3).The values obtained for the studied salami samples (classic and premium) in the three experimental years (2013-2015) were in accordance with Romanian law that established a minimum protein content in salami of 15% (Table 1).

The annual mean values of fat content (%) in analyzed samples are between $19.13\% \pm 0.8573$, in 2013 and $29.12\% \pm 2.9161$, in 2014 for classic salami samples, lower range of fat content being registered for *premium salami with Kombucha extracts* samples, between $17.66\% \pm 0.4455$, in 2014 and $20.78\% \pm 2.0506$, in 2015 (Table 4).

From the data presented in Table 5, it is noted that in samples of premium salami with Kombucha, the annual values of sodium chloride content are between $2.33\% \pm 0.03\%$ in 2013 and 2.42 ± 0.1793 in 2015, lower than the mean of annual values in the classic salami samples, which ranged from $2.39\% \pm 0.2002$ in 2015 and $0.0714 \pm 2.77\%$ in 2013 (Table 5).

The NaCl (%) content for all studied samples of classic and premium salami are below the maximum admissible limit of 3% established by Romanian law and in accordance with other studies carried out

by Romanian researchers, who showed a range of NaCl content in salami samples, between 1.99 to 2.50% [9].

Regarding the nitrites content (mg/100 g), they were not present in the samples of premium salami with Kombucha extract studied because in the manufacturing recipe we didn't use synthetic additives to preserve the product, which would cause nitrites. In the manufacturing recipe for premium salami, synthetic additives were replaced with natural extracts (Kombucha) and their influence on the nutritional properties were monitored quarterly in three experimental years.

The spice mixture with Kombucha extract used in manufacturing recipe of premium salami, successfully replaces sodium nitrite or E250 which is commonly used. Sodium nitrite, even though it has some positive properties, namely prevents the growth of bacteria that causes botulism, increases during the life of the product, stabilize the red color of processed meat, has many negative effects as slowing the transport of oxygen in the blood, which makes it particularly toxic to infants, associated with egg yolk components, at temperatures above 130°C, can form carcinogenic nitrosamines. The annual values of nitrite content in classic salami samples, were between 4.10 mg/100 g ± 1.1518 , in 2015 and 4.85 mg/100 g ± 1.1561 , in 2014 (Table 6), not exceeding the maximum admitted limit of 7 mg /100 g established by Order 210/2006 regarding the admissibility conditions for the physico-chemical properties of meat products cold cuts type [7, 24].

The *Kreiss* reaction which establishes the freshness of fats of animal origin in food, as follow of measurements performed, all studied samples of classic salami and premium salami with Kombucha extract had a negative reaction, the results being in accordance with SR ISO 17025 - General Requirements for Laboratory Competences for the testing and calibration [15].

The results of microbiological analysis ut (Salm./25 g) meet the criteria of food safety established by Regulation EC 2073/2005 on microbiological criteria for foodstuffs, microorganisms being absent in all samples of classic salami and premium salami with Kombucha extract studied in three experimental years 2013-2015 [17].

4. General Conclusion

The obtained results demonstrate that through replacing chemical additive (sodium nitrite) used in

manufacturing recipe of cold cuts meat products with natural extracts (spices mixture with Kombucha extract) it can be obtained safe products with high nutritional value and without chemical additives.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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