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Control parameters used in quality and safety analysis of traditional meat products

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Abstract

Food has always been represented through a varied assortment of ways. Meat and meat products are essential for a balanced diet, and they can further be modified to give them a "healthier" appearance by adding ingredients considered beneficial for health or by eliminating components that are considered harmful.

The main objective of the study is the obtaining of a traditional meat product-smoked sausage, establishing some correlations between storage conditions and product shelf-life and physico-chemical characterization of the product. The product storage stability was monitored by following some physico-chemical and microbiological parameters like: moisture content (Drying-oven at 105 ºC), protein (Kjeldahl method) and fat (Soxhlet method) content, pH, ammonia (quantitative and qualitative-Eber reaction), nitrite content (Griess method), sodium chloride content (Mohr method). The meat samples were analyzed during a 3 months period of time.

Keywords: smoke sausage, physical-chemical quality indicators, maximum admitted limits.

1. Introduction

Nowadays, food industries apply an important part of their resources to ensure the quality of their manufactured products, mainly with regard to the hygienic-sanitary quality, due to the great economical losses produced as a consequence of the microbiological alteration, both in the foods and the consumers [4].

Food has always been represented through a varied assortment of ways [7]. Meat and meat products are essential for a balanced diet, and they can further be modified to give them a "healthier" appearance by adding ingredients considered beneficial for health or by eliminating components that are considered harmful [5].

Meat is considered the highest quality protein source not only due to its nutritional characteristics but also for its appreciated taste. The role of meat proteins is two-fold. On one hand, meat proteins contain all the essential amino acids closely resembling the human body making them highly nutritious [8]. Many consumers believe meat and meat product consumption is unhealthy, because of their high animal fat, cholesterol, synthetic antioxidants and antimicrobials contents which may be associated with the several degenerative diseases. Food technologists and nutritionists have been making great efforts to develop novel meat products with low fat and low sodium contents containing natural antioxidants and antimicrobials and enriched with dietary fibre and ω-3 and ω -6 fatty acids [3].

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Smoked sausage have an important place in humans nutrition, because they are available in a large variety and could be consumed fresh, without any thermal processing [10]. The traditional product means the product that must be produced from traditional raw materials, that must have a traditional composition or a mode of production and/or processing reflecting a technological process of production and/or traditional processing that distinguishes clear of similar products of the same category [11]. Quality is a set of characteristics of a product or service which gives it the ability to meet user expressed or implied requirements [12].

Chemical analysis along the whole food chain downstream (tracking) from primary production to the consumer and upstream (tracing) from the consumer to primary production is an important prerequisite to ensure food safety and quality [1,2].

In fact, the increasing concerns of consumers about safety and quality stimulated meat industries to migrate from its traditional and invasive testing methods of meat and poultry products to rapid, nondestructive, and noncontact techniques as a more reliable alternative. Currently, the meat processing industry is one of the largest agricultural and food-processing industries in the world. Thus, there is clearly an urgent need for cost-effective, nondestructive online quality control systems that enable measurements to be made quickly, accurately, and easily. Therefore, researchers are recently eager to develop an intelligent eye with high-wavelength resolution to capture information beyond the visible spectrum to visualize invisible information such as constituent distribution, internal microstructure of food, and food responses to environmental stress or invasion of contamination. Indeed, determination of quality, safety and authenticity has always been essential for the industry because consumers are constantly demanding superior quality meat and meat products, for which they are willing to pay relatively high prices.

In reality, high quality is a key factor for the modern meat industry in today's hypercompetitive marketplace. On the other hand, with improvements in lifestyle, consumer demands have changed in the last decades for safe, high-quality products. In this digital era, consumers have greater access to information, thus they are now more concerned about the meat that they eat, especially their quality, safety, and authenticity [6].

2. Materials and methods

The analyzed samples (pork meat) were purchased from local butchery (Cluj-Napoca, Romania) and the finally product were produces after a traditional recipe. The physico-chemical analyses were performed at the Faculty of Food Science and Technology, Cluj-Napoca, Romania.

Determination of fat content (Soxhlet extraction methods)

Standard SOX extraction method keeps the sample in contact with the solvent for a longer time. The used solvent was petroleum ether, fraction 40–60 ^{0}C and the parameters for extraction were 6 hours. The volume of solvent was 80 ml during the extraction process. Before the solvent extraction step can begin the sample must be dried. Three g of sample were weighed into the thimble and 1 - 1.5 g of sand were added and mixed with a glass rod. The glass rod was wiped with a piece of cotton wool and this was placed in the top of the thimble. After the thimble was inserted in a Soxhlet liquid/solid extractor a clean, dried 150 mL round bottom flash was accurately weighed and about 80 mL of solvent were introduced into the flask. The assembled extraction unit was heated over an electric heating mantle until the solvent in the flask boils. The extraction continued for 6 hours.

% Crude fat = (W2 – W1) x 100/ S

Determination of protein content (Kjeldahl method)

The amount of protein present is then calculated from the nitrogen concentration of the food. The Kjeldahl method is divided into three steps: digestion, neutralization and titration. The food sample (1g) analyzed was weighed into a *digestion flask* and then digested by heating it in the presence of concentrate sulfuric acid (20 ml), copper sulphate (1g) and potassium sulfate (10g). After the digestion has been completed the digestion flask is connected to a *receiving flask* by a tube. The solution in the digestion flask is then made alkaline by addition of sodium hydroxide 30%. The ammonia gas that is formed is liberated from the solution and moves out

of the digestion flask and into the receiving flask - which contains an excess of sulfuric acid 0.1 N and indicator phenolphthalein. The nitrogen content is then estimated by titration of sodium hydroxide 0.1 N. *(Muste.S., et.al., 2011*[9]*)*

$P\% = V_{H2SO4} - V_{NaOH} * 0.0014 * 5.7 * 100/ml.$

Determination of Moisture content

Determination of moisture content consists in drying 5g of sample in the moisture can at 103±2 ^{0}C until it reaches constant weight.

$DW = G_2\text{-}G/G_1\text{-}G * 100$

$MC = 100 - DW$

Determination of Chloride by the Mohr Method

Individual samples (10g) were weighed into 250 mL Erlenmeyer flasks and dissolved in about 100 mL of distilled water. Small quantities of $NaHCO_3$ were added until effervescence ceased. About 2 mL of K_2CrO_4 was introduced and the solution was titrated to the first permanent appearance of red $Ag_2Cr_2O_4$. An indicator blank was determined by suspending a small amount of chloride free $CaCO_3$ in 100 mL of distilled water containing 2 mL of K_2CrO_4.

3. Results and discussion

Results of the correlations between storage conditions and product shelf-life and physico-chemical characterization of the product are given in Tabel 1.

Table 1. Pysico-chemical characterization of the traditional smoked sausage

Traditional smoked sausage	Period	Moisture content %	Fat content g%	Protein content g%	NaCl content
	1 week	34,38	23.94	16.81	2.28
	2 week	28.12	26.52	18.72	2.32
	3 week	25.92	29.73	20.99	2.80

The pysico-chemical analyzes of the traditional smoked sausage showed that with the increase of storage period, the protein, fat and NaCl content increased and the humidity content of the product decreased.

The higher content of fat is 29.73%, follow the concentration of proteins 20.99% and the NaCl content is 2.80%.During storage period (3 weeks), all of the quality parameters comply with the limits stipulated by STAS.

4.Conclusion

Giving the fact that the traditional meat products don't contain food additives which can be harmful for our health it can be observed recent trend regarding consummers orientation towards this kind of products as for stability, the smoked sausage showed good sensorial quality being fit for human consumption, therefore met the requirements of the legislation.

However, their shelf life was limited by decrease in sensory attributes like texture and overall impression. With respect to the physico-chemical characteristics, the storage time had a significant effect on the product stability, leading to a reduction in moisture content and a slight increase in protein, fat and NaCl content parameters. Thus, the storage period had a greater effect on the quality of smoked sausage than storage system.

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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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