

11th International Congress on Engineering and Food (ICEF11)

Cholesterol content and atherogenicity of fermented sausages made of pork meat from various breeds

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Abstract

Three batches of the Sremska sausage (traditional Serbian fermented sausage) were made: control variant (C) of a Landrace and the other two of primitive breeds: Mangalica (A) and Moravka (B), with the aim of determining the cholesterol content and the content of fatty acids. The cholesterol content in meat, fatty tissue and sausages was determined, in the case of the latter at the beginning of production (day 0), at the end of production (day 14) and after a storage period of the vacuumed product (day 60). The fatty acids content was determined at the beginning and at the end of production. Values were considered significantly different when $p < 0.05$. The cholesterol content in meat (mg/100 g of a sample) ranged from 40.58 (B) to 51.54 (C), indicating a significant discrepancy in all samples. As for back fat, there was a notable disparity in cholesterol content between control and primitive breed samples (47.15 (C), 35.54 (B) and 36.41 (A)). The cholesterol content in sausages at the conclusion of the production ranged from 40.41 (A) to 43.33 (B), with no significant difference between the samples. After storage (day 60), the cholesterol content ran from 42.75 (A) to 52.41 (B), with no significant difference only between samples C and A. Fatty acids content was monitored via the index of atherogenicity, and the polyunsaturated/saturated fatty acids ratio. The index of atherogenicity at the end of production was the highest in sample A, 0.61, and significantly differs from other samples, while the lowest value was recorded in sample C, 0.46. PUFA/SFA at the end of production was the lowest in sample A (0.20), with none of the samples exceeding 0.4. No significant advantages of the use of the meat of primitive breeds were noted.

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Selection and/or peer-review under responsibility of 11th International Congress on Engineering and Food (ICEF 11) Executive Committee.

Keywords: index of atherogenicity; primitive breeds; cholesterol; fatty acids; Sremska sausage

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1. Introduction

It has been a recommendation of international medical institutions for several decades that the best way to monitor dietary fat intake is through the quantity of calories and type of fats consumed. In this context, it has been commonly assumed that pork meat and fat have a negative impact on human health, primarily in terms of a higher cholesterol content and the unfavourable composition of fatty acids, which is why consumers were broadly encouraged to enhance their everyday diet by reducing their animal fat intake. It is further advised that cholesterol consumption should not exceed 300 mg per day [1, 2].

Cholesterol levels in blood depend not only on dietary cholesterol, but also on the amount of fat and the fatty acid composition of the diet [3]. More specifically, it appears that saturated fatty acids of 12–16 carbon atoms increase blood total (LDL and HDL) cholesterol concentration and the LDL/HDL ratio, while polyunsaturated ω -6 fatty acids tend to decrease LDL-cholesterol levels, and mono-unsaturated ones are probably essentially neutral with respect to cholesterol [1].

Bearing the above said in mind, the impact of fat on cholesterol concentration can also be observed through the index of atherogenicity (AI), which includes those fatty acids that affect the change of cholesterol (in terms of both increase and decrease).

Obesity and some other chronic diseases of the circulatory system may be prevented by limiting the intake of fat and cholesterol. There also seems to exist a relationship between a high-fat intake, especially of saturated fat, and an increased risk of some cancers (especially colon, breast and prostate cancer) and coronary heart diseases [1, 4].

Man has been making fermented sausages for centuries [5]. From the nutritional viewpoint, sausages are a significant source of proteins of high biological value [4] and of caloric value [1].

Fermented sausages are made of comminuted meat and fatty tissue, with the addition of sugar, salt, nitrates/nitrites, ascorbic acid and various spices (black pepper, paprika, garlic...). The mixture is stuffed into casings of various diameters and then smoked, fermented and dried (ripened) in uncontrolled or controlled conditions (climate chambers) for several weeks. The process is characterised by a series of biochemical transformations related to the development of microflora, the consequences of which are sliceability, structure, colour and flavour of the final product [6].

The most commonly used meats are pork and beef, while countries with Muslim population use sheep, goat and other meats, in addition to beef. Fermented sausages in Europe are mostly made from pork meat and fat and may contain over 40 % of fat, wherefore they are potentially harmful to human health.

The chemical composition of meat and fatty tissue depends on the animal's gender, nutrition, age and breed [7]. Certain data indicates that meat and fat from primitive breeds contain less cholesterol than those of modern breeds. There is also a trend to use the meat of autochthonous breeds (grown in the area where the product is made) for the production of traditional products.

Sremska sausage is an autochthonous traditional sausage home manufactured in the northern, low-lying part of Serbia (Srem region), made of ground (about 8 mm) pig meat and back fat, and mixed with common salt and spices. The mixture is filled in natural pig casings made from small intestines. After being smoked for several days, the product is dried 14–21 days, depending on the conditions in the environment. Traditionally, Sremska sausage was made from the meat of fat pigs of the Mangalica breed, weighing from 160 to 180 kg and up to 12 months of age. This practice was discontinued in the 1960s when this pig breed was completely marginalised by white pigs.

This research aims to determine whether the use of meat and fat tissue of primitive breeds can affect the content of cholesterol and fatty acids in fermented sausages.

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