

Production and quality of Šuica cheese

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Original scientific paper - Izvorni znanstveni rad

UDC: 637.3.05

Summary

Šuica cheese belongs to the group of soft, white, full fat cheeses, produced from fresh, non-pasteurised sheep milk, or a combination of sheep's and cow's milk, used immediately after milking. The high acidity level, naturally present in sheep's milk, allows it to curdle without maturing. A total of 50 samples of sheep's milk cheese were taken from 10 family holdings (5 from each), which were subsequently chemically analysed and sensory assessed.

The results of chemical analyses enabled us to determine the average values of the following parameters: water 49.18 %, dry matter 50.82 %, milk fat 26.35 %, protein 16.28 %, NaCl 3.62 %, ash 4.57 %, Ca 0.55 % and P 0.18 %. The acidity (pH) of cheese reached 4.69. According to its chemical composition, Šuica cheese closely resembles to Travnik cheese. The sensory properties of the cheese were assessed at 15.85 points from a maximum of 20 points.

Key words: cheese, Šuica, chemical composition, sensory assessment

Introduction

Considerable varieties of cheese are produced by many individual home-steads, although our knowledge about them is extremely limited. Such cheeses are produced in different, often in non-adequate conditions, with poor hygienic standards - starting from milking to cheese production stages. Lack of appropriate equipment and facilities as well as insufficient knowledge all lead to very erratic characteristics, very often of low quality, as well as to various errors in the final product. This paper focuses on one such type of production in the Republic of Bosnia and Herzegovina where, due to different geographical and climatic conditions, traditions and customs, specific properties of soil and vegetation, a significant number of various indigenous cheeses are produced. Throughout history, cheese has been one of the most important staple foods for the population of this area and, as such, a subject of many scientific research projects. Some authors (Filipović, 1925.; Zdanovski, 1942.; Filjak and Dozet, 1953.; Bajčetić, 1955.; Ilačić, 1955.; Tahirović, 1974.; and Dozet, 1969.) analysed the production technology, chemical composition and characteristics of different indigenous types of cheese on the territory of Bosnia and Herzegovina.

Šuica cheese is produced in homesteads around the village of Šuica, at an altitude of 900 meters. The cheese is produced either from sheep's milk or from a mixture of sheep's and cow's milks. The first records on sheep farming date back to Illyrian times. The dominant breed of sheep is the indigenous pramenka, characterised by its pronounced resilience, sturdiness and modest dietary needs, which is primarily bred for meat and milk production. During the lactation period of 200 days, sheep produce about 90 litres of milk (Pavić et al., 1996.) The majority of family homesteads have been producing meat and milk for their own needs only. Lately, however, following the war in B&H and the devastation inflicted upon nature, the number of those who are opting for serious sheep farming, and commercial lamb production is increasing.

In order to make their production as economically viable as possible, some sheep farmers are milking their flocks and producing cheese, thereby making milk a secondary source of income, in addition to meat. The two basic types of cheese produced from sheep's milk are hard, full-fat, and soft, full-fat pickled cheeses.

Šuica cheese falls into the category of white, soft cheese produced from fresh sheep's milk, or a combination of sheep's and cow's milks. The milking of sheep being a very hard and demanding task (performed manually), fewer and fewer sheep breeders are opting to milk their animals, with the inevitable consequence that traditional production of pickled sheep's milk cheese survives only in some homesteads. Most often, that production satisfies personal needs only, and only the occasional surplus is sold, although at fairly favourable prices. The cheese is exceptionally high in demand, not only on the local market, but to a wide-domain as well. It is highly regarded as a good quality cheese and is served on special occasions to honourable guests.

Bearing in mind the fact that wealth of a nation can also be reflected through the variety and quality of its indigenous products, the aim of this paper is to present the production technology and quality of pickled Šuica cheese.

Materials and methods

Cheese production

The production technology of Šuica cheese, which is based on long-standing tradition and experience handed down from one generation to another, has been monitored in ten homesteads. After milking the milk is passed through a strainer and, since the sheeps are milked manually, the procedure is often repeated. Next, while the milk is still warm, rennet is added and the mixture is then thoroughly stirred. Curdling takes between 1-2 hours, depending on the strength of the rennet and the temperature of both the milk and the environment. As soon as the curd attains a more solid consistency it is cut into 3-4 cm cubes and allowed to rest until the appearance of a greenish-yellow whey. The curd is

then packed in cloth bags which, in most cases, are hung and allowed to drain under their own weight. Some small-scale producers place the bags containing curds into strainers (plastic or metal) until drain. The desired ball-shaped form of the curds, and a more efficient extraction of whey, is achieved by tying the bag immediately above its contents. The draining process lasts 6 - 10 hours on average. With draining being complete, the cheese curds are carefully taken out of the bag and are cut into characteristic slices. The ball is first cut into half and then each half is cut into three slices. The size and weight of the slices depend, of course, on milk quantity, but the standard weight is between 0.5 and 0.8 kg. If not thoroughly drained, the slices are left on the cheese table for a certain period of time, covered with a clean cloth, and then carefully packed into small wooden tubs, taking care to leave as little empty space as possible. Lately, plastic and metal containers of different shapes and sizes are being used for that purpose. The slices are packed in layers and each layer is sprinkled with salt, the quantity of which amounts to 3-5% of cheese weight. Once the tub is filled to the top it is closed with a lid, weighted down most usually with a stone. This aids the separation of whey and compresses the cheese. Two weeks after the initial filling the tub is topped up with fresh cheese curds. The brine poured over the cheese during the maturing period must be made from boiled water containing a minimum of 10-15% of salt. Šuica cheese goes through two phases of maturing. The first phase is aerobic and takes place while the tubs are being filled, that is to say, while the layers are packed and salted. This phase lasts a few days, depending on the size of the tub and the speed at which it is being filled. The second phase involves maturing in anaerobic conditions, when the surface of the cheese is covered by whey. The maturing period of Šuica cheese is 1-2 months at a temperature of 13-15°C and it is stored at a temperature of 6-8°C. About 3.5 - 4.0 l of sheep's milk is needed to produce 1 kg of fresh cheese.

Sampling procedure

From 10 family holdings a total of 50 samples of Šuica cheese, produced from pure sheep's milk, were collected (5 from each holding). The samples were taken together with whey, marked by numbers and kept in a refrigerator (10 hours) at a temperature of 4°C until analysed.

Chemical analyses

The following methods were used to establish the chemical composition of Šuica cheese:

Dry matter - gravimetric method by drying at 102°C (FIL-IDF, 1982.)

Water - calculating the differences (100 - % of dry matter)

Fats - butyrometric method (FIL-IDF, 1997.)

Protein - total nitrogen content by the Kjeldahl method (FIL-IDF, 1979.)

Chlorides - (FIL-IDF, 1988.)

Calcium - atomic absorption spectrophotometric method (AOAC, 991.25)
Phosphorus - (M e n g e b i e, 1969.)
Fat in dry matter - by calculation
pH - electrometric method (FIL-IDF, 1982.)

Sensory assessment of cheese

Sensory assessment of cheese was carried out by the 5-member assessment commission, on a 5-20 point system basis. The properties assessed were as follows: outward appearance (2 points), consistency (2 points), cross-section (3 points), colour (1 point), smell (2 points), and taste (10 points). The range of assessment for a single property was 0,25 point. Commission members described the sensory properties in terminology and standards defined by FIL-IDF (1997.).

Data evaluation

Statistical data processing was carried on the basis of the SAS STAT (1990.) statistical package which involved a determination of the mean arithmetic value (\bar{x}), standard deviation (s), variation coefficient (C), minimum (min) and maximum (max) values.

Results and discussion

1. Chemical composition of Šuica cheese

According to the established average water content (49.18%), the consistency and texture of its mass, Šuica cheese belongs to the group of soft cheeses. The average chemical composition of the cheese is presented in Table 1.

The results of chemical analyses clearly show that, Šuica cheese contains more water, less protein, and about the same amount of fats in dry matter, ash and salt compared to Travnik cheese, also produced from sheep's milk using a very similar technology. Zdanovski (1942.), Dozet (1969.) and Dozet et al. (1979. i 1980.) state that Travnik cheese contains 46-48% of water, 19-22% of protein, 46-51% of fat in dry matter, 4-7% of ash and 3-5% of salt. Table 1. shows that chemical composition of Šuica cheese varies greatly from one homestead to another, which can be explained by the different chemical composition of milk (Micev, 1969.). The variabilities in the water content (from 44.76 to 51.51%) also point out the different maturity of the samples. Ostojić and Mesner (1978.) state that dry matter content in soft white cheeses increases by 6% within a period of two months. The high fat content in dry matter (52%) is attributed to the high fat content in sheep's milk. Changes in the composition of sheep's milk have influenced the high level of variability with regard to fat content in cheese dry matter (10%). Salt content in cheese varied from 2.8 to 4.55%. Some samples were found to be too salty, which was the result of an effort to prevent cheese decay, and this

was reflected unfavourably on both the taste (Table 2.) and the maturing process of the mentioned samples (excessive acidity, crumbly texture). Salt has an influence on the brine and therefore on the quality of cheese. Cheese with too low salt content, however, is more prone to decay, has a bitter taste and a soft consistency.

Table 1: Chemical composition of cheese (%) - average values

Tablica 1: Kemijski sastav sira (%) - prosječne vrijednosti

	n	\bar{x}	s	C	Min.	Max.
Water Voda	50	49.18	2.190	4.45	44.76	51.51
Total solids Suha tvar	50	50.82	2.190	4.31	48.49	55.24
Solids non-fat Suha tvar bez masti	50	21.63	1.868	8.64	18.62	24.44
Milk fat Mliječna mast	50	26.35	2.001	7.59	24.00	30.50
Fat in total solids Mast u suhoj tvari	50	52.00	5.280	10.15	44.35	60.85
Protein Proteini	50	16.28	0.772	4.75	15.39	17.75
Salt Sol	50	3.62	0.621	17.16	2.76	4.46
Ash Pepeo	50	4.57	0.776	16.98	3.11	5.54
Ca	50	0.55	0.228	41.46	0.17	0.93
P	50	0.18	0.026	14.77	0.15	0.24
pH	50	4.69	0.400	8.52	4.27	5.40

The average overall assessment of the sensory properties of Šuica cheese totaled 15.85 points of the maximum 20 points. Table 2. shows a high variability rate of smell (30%), consistency (24.5%) and cross-section (24%), which suggested the need for the corrections of the production process itself. Individual samples of the cheese were treated with excessive amounts of salt, which resulted in their crumbly texture. This led to an average assessment for taste being 8 out of the maximum 10 points.

Conclusions

Šuica cheese is produced from non-pasteurised sheep's milk, or a combination of sheep's and cow's milks and is distinctly white in colour. Its water content ranks it as a soft cheese, while its fat content makes it a full fat cheese. The

lack of uniformity in both the chemical composition and the sensory properties of the cheese make corrections of the technological process of production and standardization of the Šuica cheese essential.

Table 2: Sensory properties of the Šuica cheese

Tablica 2: Senzorska svojstva Šuičkog sira

	n	\bar{x}	s	C	Min.	Max.
Outward appearance Opći dojam	50	1.68	0.206	12.288	1.50	2
Colour Boja	50	0.90	0.129	14.344	0.75	1
Consistency Konzistencija	50	1.48	0.362	24.562	1.00	2
Cross-section Presjek	50	2.38	0.568	23.927	1.75	3
Smell Miris	50	1.43	0.426	29.876	1.00	2
Taste Okus	50	8.00	0.943	11.785	7.00	10
Total score Ukupno bodova	50	15.85	2.215	13.974	13.50	20

PROIZVODNJA I KAKVOĆA ŠUIČKOG SIRA

Sažetak

Šuički sir pripada skupini bijelih, mekih, punomasnih sireva koji se proizvodi od nepasteriziranog ovčjeg mlijeka, ili od mješavine ovčjeg i kravljeg mlijeka. Prirodno visok stupanj kiselosti ovčjeg mlijeka omogućava sirenje bez zrenja. Ukupno 50 uzoraka ovčjeg sira, uzeto je od 10 obiteljskih gospodarstava (5 od svakog), kemijski je analizirano i senzorski ocjenjeno.

Na osnovu rezultata kemijskih analiza ustanovljene su prosječne vrijednosti sljedećih parametara: voda 49,18%; suha tvar 50,82%; mliječna mast 26,35%; bjelančevine 16,28%; NaCl 3,62%; pepeo 4,57%; Ca 0,55% i P 0,18%. Kiselost sira (pH) dosegla je 4,69. Senzorskim ocjenjivanjem sir je, od maksimalnih 20 bodova, dobio 15,85 bodova.

Ključne riječi: sir, Šuica, kemijski sastav, senzorska svojstva

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Received - Prispjelo: November 15, 2000

Accepted - Prihvaćeno: December 07, 2000