

CHEMICAL AND SENSORY CHARACTERISTICS OF SVRLJIG WHITE CHEESE¹

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Contents: The aim of this paper was to signify the main characteristics of Svrlijig white cheese in brine. Svrlijig white cheese is producing from ewe's, cow's or mixed milk and differs with high fat in dry matter content (47.44% and 54.04%), which ranks it in group of full fat cheeses. According to water content in solids non fat, this cheese belongs to group of soft cheeses (69.40% and 67.99%). Cheese had good sensor characteristics such as taste, aroma and color were typical for cheeses made from cow's and ewe's milk. High acidity and low pH are characteristics for white cheese in brine group, in which Svrlijig cheese belongs.

Key words: white cheeses in brine, ewe's milk, cow's milk

Introduction

Milk production in mountain area is related to a production of autochthonous milk products beside all. The production of these cheeses in mountain area of Serbia territory is running in domestic households and cottages on mountains by summer (*serb.* bačije, katuni, stanovi), which is the characteristic of trade milk production. Autochthonous milk production can give quite contribution to animal husbandry development and geographical regions animation. Besides, autochthonous milk products may be a good basis for assortment expansion of quality, original cheeses.

White cheeses in brine are large group of cheeses world wide. The characteristic of these cheeses is ripening in brine, in which not only ripening occurs, but cheese preservation as well. The general characteristics of these cheeses are higher acidity, sharp salty flavour as well as compressed, monolith and fragile consistency.

The autochthonous production of Svrlijig white cheese in brine imply raw ewe's milk usage, while the production of white cheese in brine in type of Svrlijig white cheese imply mixed cow's and ewe's milk usage. The ewe's white cheese in brine production is characteristic, especially in period of April till the end of October, during ewe's pasture.

Materials and methods

For chemical composition of Svrlijig white cheese in brine determination 13 samples (7 cow's cheese samples and 6 ewe's cheese samples) has been taken. The following analyses were made:

- Determination of total solids by standard drying method at 102±2°C (*Carić et al., 2000*);
- Determination of milk fat according to van Gulik method (*Carić et al., 2000*);
- Determination of total nitrogen content with Kjeltex system by Kjeldahl method (*Carić et al., 2000*);
- Determination of soluble nitrogen content according to Van Slyke and Hart method (*Pejić and Đorđević, 1963*);
- Determination of primary and secondary nitrogen content according to Đorđević modified method (*Pejić and Đorđević, 1963*);
- Determination of salt according to Mohr (*Carić et al., 2000*);
- Determination of ash content by standard method at 550°C (*Carić et al., 2000*);
- Determination of titratable acidity according to Soxhlet-Henkel method (*Carić et al., 2000*);
- Determination of pH with pH-meter Sentron 1001

Determination of Svrlijig white cheese in brine sensor characteristics was performed with scoring rating method – 5 level scale (*Radovanović and Popov-Raljić, 2001*). The commission was composed of 5 experts from the field of milk technology. Sensory evaluation is given as mean value and as a percent of total

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possible quality. For determination of percent of maximal possible quality the following coefficients of importance are used: general appearance – 2; cut – 3; colour – 2; aroma – 2; consistency – 3 and taste – 8.

Results and discussion

The Svrlijig white cheese in brine production is running in domestic households or cottages in the mountain by summer. According to *Dozet et al., 1996.* in region of Niš, where Svrlijig belongs, white cheeses in brine are most produced among the autochthonous dairy products. They carry different names as Beli, Sirenje, Velija, Kriška etc.

There are varieties in production process, but they have no relevant influence on cheese characteristics, principally the colour and cheese curd, which is closed and has a small number of holes and milky acid taste due to ripening in brine or whey.

Chemical composition of Svrlijig white cheese in brine

Chemical composition of Svrlijig white cheese in brine is given in table 1.

Table 1. Chemical composition of Svrlijig white cheese

Investigated parameters	Statistical parameters				
	min.	max.	X (n=7)	S _d	Cv (%)
CHEESE MADE OF COW'S MILK					
TS (%)	42.10	51.40	46.75	3.3893	7.25
Moisture (%)	48.60	57.90	53.25	3.3893	6.36
MFFB (%)	61.90	76.89	69.40	5.1501	7.42
Fat (%)	16.00	27.50	21.75	4.7845	22.00
FTS (%)	33.33	61.55	47.44	9.9162	20.90
Total nitrogen (%)	1.9053	2.3862	2.1458	0.1562	7.28
Proteins (%)	12.16	15.22	13.69	0.9965	7.28
Soluble nitrogen matter (%)	0.0561	0.0098	0.0771	0.0174	22.57
Primary decomposition products of nitrogen matter (%)	0.0376	0.0735	0.0556	0.0147	26.53
Secondary decomposition products of nitrogen matter (%)	0.0185	0.0277	0.0231	0.0033	14.28
Coefficient of ripening (%)	2.59	4.76	3.67	0.7206	19.62
Ash (%)	1.18	5.98	3.58	1.7575	49.09
NaCl (%)	0.79	4.80	2.80	1.5425	55.19
Acidity (⁰ SH)	66.72	75.26	70.99	2.7204	3.83
pH	4.17	4.40	4.29	0.0870	2.03
Investigated parameters	Statistical parameters				
	min.	max.	X (n=6)	S _d	Cv (%)
CHEESE MADE OF EWE'S MILK					
TS (%)	46.72	57.16	51.94	3.6213	6.97
Moisture (%)	42.84	53.28	48.06	3.6213	7.54
MFFB (%)	63.00	72.99	67.99	3.0706	4.52
Fat (%)	24.00	32.50	28.25	3.0236	10.70
FTS (%)	49.06	59.02	54.04	3.3862	6.27
Total nitrogen (%)	2.1947	2.9223	2.5585	0.2465	9.64
Proteins (%)	14.00	18.64	16.32	1.5728	9.64
Soluble nitrogen matter (%)	0.0841	0.1542	0.1192	0.0222	18.65
Primary decomposition products of nitrogen matter (%)	0.0564	0.1111	0.0838	0.0167	19.90
Secondary decomposition products of nitrogen matter (%)	0.0246	0.0431	0.0339	0.0063	18.73
Coefficient of ripening (%)	3.67	6.93	5.30	1.1235	21.20
Ash (%)	1.77	6.34	4.06	1.6257	40.09
NaCl (%)	0.46	3.98	2.22	1.3319	60.00
Acidity (⁰ SH)	19.40	90.77	55.09	27.7291	50.34
pH	4.29	5.58	4.94	0.5376	10.89

Legend

TS-total solids * MFFB-moisture on a fat-free basis * FTS-fat in total solids

Based on results in *table 1*, according to cheese firmness cheese made of cow's milk belongs to group of soft cheeses with 69.40 % MFFB. According to FTS content (47.44%) it belongs to group of full fat cheeses with wide range of variety from 33.33% (full fat cheeses) to 61.55% (extra fat cheeses). According to cheese firmness, cheese made of ewe's milk belongs to group of soft cheeses with 67.99 % MFFB. According to FTS content it belongs to group of full fat cheeses (54.04 %) (*Codex alimentarius, 2000*).

Table 2. Sensory evaluation of Svrlijig white cheese in brine

Number of sample	Statistical parameters	Investigated parameters					Sensory evaluation		
		Appearance	Cross section	Colour	Aroma	Flavour	Consistency	X	% max. qual.
CHEESE MADE OF COW'S MILK									
1	X (n=5)	5.00	5.00	5.00	4.67	5.00	4.83	4.94	98.83
	Sd	0.0000	0.0000	0.0000	0.2887	0.0000	0.2887		
	Cv (%)	0.00	0.00	0.00	6.19	0.00	5.97		
	% max	100.00	100.00	100.00	93.33	100.00	96.67		
2	X (n=5)	4.83	4.50	5.00	4.83	4.67	4.67	4.71	94.17
	Sd	0.2887	0.0000	0.0000	0.2887	0.2887	0.2887		
	Cv (%)	5.97	0.00	0.00	5.97	6.19	6.19		
	% max	96.67	90.00	100.00	96.67	93.33	93.33		
3	X (n=5)	4.83	4.33	5.00	4.67	5.00	3.67	4.65	93.00
	Sd	0.2887	0.2887	0.0000	0.5773	0.0000	0.2887		
	Cv (%)	5.97	6.66	0.00	12.37	0.00	7.87		
	% max	96.67	86.67	100.00	93.33	100.00	73.33		
4	X (n=5)	5.00	4.83	5.00	4.67	4.17	5.00	4.61	92.17
	Sd	0.0000	0.2887	0.0000	0.2887	0.2887	0.0000		
	Cv (%)	0.00	5.97	0.00	6.19	6.93	0.00		
	% max	100.00	96.67	100.00	93.33	83.33	100.00		
5	X (n=5)	4.17	4.17	4.83	4.67	4.50	4.00	4.39	87.83
	Sd	0.2887	0.2887	0.2887	0.2887	0.0000	0.0000		
	Cv (%)	6.93	6.93	5.97	6.19	0.00	0.00		
	% max	83.33	83.33	96.67	93.33	90.00	80.00		
6	X (n=5)	4.33	4.67	4.83	4.33	4.17	4.33	4.37	87.33
	Sd	0.2887	0.2887	0.2887	0.2887	0.2887	0.2887		
	Cv (%)	6.66	6.19	5.97	6.66	6.93	6.66		
	% max	86.67	93.33	96.67	86.67	83.33	86.67		
7	X (n=5)	3.83	4.50	4.83	4.17	3.83	4.83	4.22	84.33
	Sd	0.2887	0.5000	0.2887	0.2887	0.2887	0.2887		
	Cv (%)	7.53	11.11	5.97	6.93	7.53	5.97		
	% max	76.67	90.00	96.67	83.33	76.67	96.67		
CHEESE MADE OF EWES MILK									
1	X (n=5)	4.50	4.83	4.83	5.00	4.50	5.00	4.71	94.17
	Sd	0.5000	0.2887	0.2887	0.0000	0.0000	0.0000		
	Cv (%)	11.11	5.97	5.97	0.00	0.00	0.00		
	% max	90.00	96.67	96.67	100.00	90.00	100.00		
2	X (n=5)	4.83	4.83	5.00	4.50	4.50	4.50	4.63	92.67
	Sd	0.2887	0.2887	0.0000	0.5000	0.5000	0.0000		
	Cv (%)	5.97	5.97	0.00	11.11	11.11	0.00		
	% max	96.67	96.67	100.00	90.00	90.00	90.00		
3	X (n=5)	5.00	5.00	5.00	4.17	4.17	4.83	4.51	90.17
	Sd	0.0000	0.0000	0.0000	0.5773	0.2887	0.2887		
	Cv (%)	0.00	0.00	0.00	13.86	6.93	5.97		
	% max	100.00	100.00	100.00	83.33	83.33	96.67		
4	X (n=5)	3.50	4.50	4.33	3.33	4.33	4.17	4.15	83.00
	Sd	0.0000	0.0000	0.2887	1.1547	0.2887	0.2887		
	Cv (%)	0.00	0.00	6.66	34.64	6.66	6.93		
	% max	70.00	90.00	86.67	66.67	86.67	83.33		
5	X (n=5)	4.83	4.00	5.00	4.17	4.00	3.50	4.13	82.50
	Sd	0.2887	0.0000	0.0000	0.7638	0.0000	0.5000		
	Cv (%)	5.97	0.00	0.00	18.33	0.00	14.29		
	% max	96.67	80.00	100.00	83.33	80.00	70.00		
6	X (n=5)	4.33	3.83	4.67	4.00	4.00	4.17	4.10	82.00
	Sd	0.2887	0.7638	0.2887	0.0000	0.0000	0.2887		
	Cv (%)	6.66	19.92	6.19	0.00	0.00	6.93		
	% max	86.67	76.67	93.33	80.00	80.00	83.33		

Cow's cheeses had a wide range of salt content (0.79 % – 4.80 %) with average 2.80 %. This wide range of salt content was present also in ewe's cheeses (0.46% - 3.98%), with average 2.22 %. It showed a big influence on ripening process, so coefficient of ripening of cow's cheese has been varied from 2.59 % to 4.76 %, with average 3.67 %. The ripening process in ewe's cheese was more intensive, with average coefficient of ripening 5.30 %.

Based on basic quality parameters, Svrlijig cheese in brine is not much different than Zlatar, Sjenica or Homolje cheese (Dozet *et al.*, 2000, 2002, Jovanović *et al.*, 2004, 2005, Mačej *et al.*, 2004a, 2005b, Savić *et al.*, 2002).

Sensor evaluation includes the following characteristics: appearance, consistency, taste and aroma. Results are given in *table 2*

Among 7 white cow's cheese samples 57.14 % had excellent value, and 42.86% were very good. The sample 1 was best evaluated, with 98.83 % of maximal quality. Among 6 white ewe's cheese samples 50 % had excellent value, and 50% were very good. The best evaluated sample had 94.17 % of maximal quality. Evaluated cheeses had characteristic colour depended on used milk, closed curd with more or less holes and typical milky-acid taste and aroma.

View of Svrlijig white cheese slice was illustrated in *figure 1*.

Conclusion

From all the above the following can be concluded:

1. Svrlijig white cheese is produced from ewe's milk, and white cheese in type of Svrlijig cheese is produced of cow's or mixed cow's and ewe's milk. Both cheeses belong to a group of white cheeses in brine.
2. Both Svrlijig white cheeses made of cow's and ewe's milk belong to group of soft cheeses according to curd firmness, with average moisture on a fat-free basis content 69.40 % and 67.99 % respectively.
3. According to fat in total solids content, cow's and ewe's milk cheeses belong to a group of full fat cheeses (47.44% and 54.04% respectively).
4. Both cheese varieties had acid curd (pH 4.29 and 4.94 respectively), which is specific for white cheeses in brine.
5. Evaluated cheeses had good sensor characteristics (taste, aroma, color and consistency) proper to milk kind (cows and ewes) from which were made.
6. Concerning quality and good sensor characteristics of Svrlijig white cheese the detailed production research can be done. It can make the basis for geographic protection and protection of origin of this cheese.

HEMIJSKE I SENZORNE KARAKTERISTIKE SVRLJIŠKOG BELOG SIRA

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Rezime: Cilj ovog rada je bio da se istaknu najvažnije karakteristike Svrlijškog belog sira u salamuri. Svrlijški beli sir se izrađuje od ovčijeg, kravljeg ili mešanog kravljeg i ovčijeg mleka i odlikuje se visokim sadržajem masti u suvoj materiji (47.44% i 54.04%) i prema tom parametru kvaliteta spada u grupu punomasnih sireva. Prema sadržaju vode u bezmasnoj materiji sira pripada grupi mekih sireva (69.40% i 67.99%). Senzorne karakteristike sira bile su dobre, ukus, miris i boja bili su tipični za sireve izrađene od kravljeg i ovčijeg mleka. Visok stepen kiselosti i niska pH vrednost su karakteristični za grupu belih sireva u salamuri, u koju spada i Svrlijški sir.

Ključne reči: beli sirevi u salamuri, ovčije mleko, kravlje mleko

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Figure 1. View of Svrlijg white cheese slice