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Quality of the Polish traditional mountain sheep cheese "oscypek"

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SUMMARY – The traditional technology of oscypek production was analysed in three shepherd's huts. Particular cheese production phases were examined, the acidity of milk and whey was defined for particular production phases as well as curd yield and chemical composition of the cheese. 6.0 litres of milk are needed to produce 1 cheese of 800 g. Oscypek from various shepherd's huts do not differ in form or mass, but in the amount of water and acidity. The most stable elements of the cheese are salt and protein. Average oscypek contains 30-35% of water, 30% of fat, 29% of protein, 2-3% of salt and about 10% of mineral substances. Both milk and the cheeses do not always meet the official micro-biological standards. In the future the producers will have to mark their products with permanent marks that will allow for their identification.

Key words: Sheep cheese oscypek, traditional technology, quality.

RESUME – "Qualité du fromage traditionnel polonais "oscypek" provenant de brebis de montagne". La technologie traditionnelle de fabrication de fromage de brebis "oscypek" a été analysée dans 3 bergeries. Chaque phase de fabrication a été analysée, le degré d'acidité du lait et "petit lait" a été déterminé pendant chaque phase de fabrication ainsi que le rendement de transformation du lait en fromage et la composition chimique des fromages. Pour 1 fromage de 800 g il faut 6,0 l de lait. Les fromages provenant de différentes bergeries présentent la même forme et masse, mais ils ont un contenu d'eau et degré d'acidité différents. Les composants les plus stables du fromage sont le sel et les protéines. Un fromage moyen contient 30-35% d'eau, 30% de matière grasse, 29% de protéines, 2-3% de sel de cuisine et environ 10% de matières minérales. Aussi bien le lait que le fromage ne correspondent pas toujours aux normes microbiologiques officielles. Dans le futur, les producteurs devront mettre sur leurs produits un label permettant leur identification.

Mots-clés : Fromage de brebis "oscypek", technologie traditionnelle, qualité.

Introduction

Polish oscypek is a smoked scalded hard cheese which has been made from raw sheep milk in the Tatra region for ages. This cheese is produced in the shepherd's huts during the summer season. Oscypek has the shape of a spindle with a beautiful characteristic pattern imprinted by a carved wooded form in which the cheese is formed. The weight of cheeses ranges between 600-800 g and its diameter is about 8-9 cm. They get their nice brown colour and unique flavour when they lay on the shelf hanging above the permanent fire in the shepherd's hut. The factors which influence the quality are probably the breed of sheep, natural microflora and undoubtedly the hygienic conditions and manual skills of the producers. However, the application of regulations concerning obligatory pasteurization of sheep milk is a threat for the traditional methods of cheese production and will result in a disappearance of mountain sheep farming, because the revenue on oscypek sale is decisive in the economy of mountain sheep farming. Due to the fact that the milk used for oscypek production is not pasteurized, it is not allowed to sell this cheese in official shops. Nevertheless, raw sheep milk cheeses are produced and sold in all the Mediterranean countries belonging to the European Union, e.g., in Italy (Fiore sardo), France (Roquefort), Spain (Manchego), Portugal (Serra da Estrela), Greece (Feta) and many others. Furthermore, some of these cheeses that are produced in a traditional way which specifies the quality, kind of milk and the method of cheese production are covered by an international legal protection that protects the region they come from and their traditional name (AOC in France, DOP in Italy) (Ledda, 1986; Roseiro de Bivar, 1991; Masui and Yamada, 1996).

Presently in Poland there are no standards for oscypek production in the shepherd's huts

conditions. The shepherds use their own experience and tradition, still not always do they comply with an unwritten rule that only sheep milk should be used for the production of this cheese. These facts indicate the need to implement a quality standard for that cheese and an obligation to mark the product with the producer's mark.

The aim of the study was to evaluate the quality of oscypek that are presently being produced in the shepherd's huts as well as to attempt a definition of technological parameters that are important in the production of this cheese.

Materials and methods

Particular phases of oscypek production, from the moment the milk is renneted, through the curd cutting, drying, forming, scalding and smoking were examined in 3 selected shepherd's huts and on small scale in the laboratory conditions. The chemical composition of milk and cheeses, acidity of particular production phases were defined and microbiological evaluation of milk and the final products were carried out.

Milk and cheese analyses (chemical, microbiological and sensory) were conducted every month according to the Polish Standards (PN 86/A-86230 and PN 73/A-86232).

Results

In all the shepherd's huts oscypek were produced from milk of mountain sheep, which were hand-milked. This is the only breed that is milked in the mountain region of Poland (Dro_d_, 1985). In the bulk milk analysed every month the fat content increased from 5.9% at the beginning of the season to 8.8% at the end of season and the protein content increased from 5.6% to 7.5%. These two elements decided on the increase of the dry matter content, which amounted to 16.8% in June and 21.1% in September. The amount of lactose was decreasing slightly during the season (Table 1).

Milk samples taken before processing from the vat contained from 250×10^3 to 900×10^3 of total bacterial count (TBC) and *E. coli* titre from 0.1 to 0.01.

Table 1. Chemical composition of polish mountain sheep milk during season (%)

	June	July	August	September
Fat	5.9	7.2	7.1	8.8
Protein	5.6	5.7	6.0	7.5
Lactose	4.7	4.8	4.5	4.3
Dry matter	16.8	18.2	18.3	21.1

Traditional technology

In the shepherd's huts examined milk processing started after the morning milking, and the milk from the morning was mixed in a wooden vat of about 100 litres with ripened one milked on the night before. During renneting the milk temperature was 36°C on average. All the producers rennet the milk with a commercial rennet. Natural rennet is not used presently, though it is still widely applied in the production of sheep cheeses in the Mediterranean countries (Pettinau *et al.*, 1977).

Milk titration acidity before renneting was 8-9°SH. The curd was usually cut with a wooden comb-shaped device after 30-40 min. After another 30 min the curd rests on the bottom of the vat. An hour after renneting the milk, whey acidity increases by 1-2°SH, sometimes reaching the level of 10°SH. When the cheese mass is mixed the shepherds add a couple of litres of hot water into it, which facilitates syneresis. Then whey acidity drops to the primary level.

The curd of the rice grain size is then grinded softly and poured into a measurer to obtain cheeses of similar size. This activity takes 10-15 min and it has a major influence on the cheese forming, curd grains solidification and the creation of a typical cheese structure. Thanks to this the cheese is plastic and it has a smooth cross-section.

A lump of cheese of the average weight of about 1.4 kg taken out of the measurer is kneaded in the hands to squeeze out the whey and dipped into the hot water of 70-80°C. When the cheese is sufficiently plastic, it is moulded manually into a fat rolling-pin shaped log. In the cheese centre a wire is spiked or a thin wooded stick which helps to squeeze the whey better. The cheese is scalded and kneaded alternatively. When the right shape and consistency are achieved, the cheese is placed in the brine for 24 hours. On the day after the drying, the cheese is placed on the shelves above the fire that burns permanently. Usually after one week the cheese is ready for sale.

The weight of cheeses formed that way depends on the size of the measurer, which is filled with the cheese mass. However, at three producers examined the weights of cheeses were similar and they amounted to the average (n = 70) of 786 ± 5.2 g, length 22.0 ± 0.3 cm, and the diameter was 9.0 ± 0.2 cm.

Milk yield for cheese was 7.6 l/kg of cheese or 6.0 l/oscypek of about 800 g. From the moment the cheese is formed to the moment of sale the content of water drops by 12% (Table 2).

Table 2. Weight of cheeses (n = 70) during processing from forming to selling

	Forming	Salting	Drying	Smoking	For sale
Weight (g)	893	868	832	810	786
Weight loss (%)	–	2.8	6.8	9.3	12.0

The colours of oscypek that are ready for sale range from light yellow to dark orange. The colour depends on the type of wood that was burnt in the shepherd's hut. Cheeses from various producers differed in plasticity, but regular holes in the cross-section were present in the cheeses coming from all the producers.

Oscypek's taste is slightly sour, piquant, salty and characteristic for smoked products. Cheeses from various shepherd's huts differ in their content of water, fat and acidity. The most stable element of the cheese is the content of salt and protein (Table 3).

Table 3. Chemical content of cheeses-oscypek (modified from Paciorek and Dro_d_, 1997)

Item		Mean	Shepherd's hut		
			1	2	3
Water content (%)	x†	27.30	27.67	27.25	26.97
	††	1.20	2.08	2.08	2.08
Fat content (%)	x	22.54	21.75 ^a	22.37	23.50 ^a
		0.49	0.85	0.85	0.83
Fat in dry matter (%)	x	31.31	30.37	31.62	31.96
		0.50	0.87	0.87	0.87
Protein content (%)	x	29.09	28.89	28.40	29.97
		0.58	1.00	1.00	1.00
Soluble nitrogen compounds (%)	x	2.60	3.00	2.50	2.40
		0.20	0.40	0.40	0.40
Salt (%)	x	2.77	2.59	2.83	2.89
		0.06	0.10	0.10	0.10

†Mean.

††Standard error.

^aValues followed by the same letter differ significantly.

The most changeable element of oscypek are fat and water, which is an evidence of discrepancies in technologies applied in particular producers, as well as of different cheese storing time before sale. Fat content in dry matter is 31.3% on average and it increases during the season. The cheese fat content can be increased with the use of a cheese-making sharp knife and a harp for cutting the curd, but the shepherds use a wooden device which beats the curd and this is why a considerable part of fat remains in the whey. The most stable element of oscypek is protein (29%). The table salt content is 2.77% on average. A small amount of soluble nitrogen compounds were present in oscypek, which indicates their low ripeness (Table 3).

Titration acidity ranges widely from 30 to 53°SH and average pH value of cheeses is 5.33 (Table 4).

Table 4. Titration acidity and pH of studied cheeses

Item		Mean	Shepherd's hut		
			1	2	3
Titration acidity (°SH)	x [†]	41.42	53.75 ^a	40.25	30.25 ^a
		3.07	5.32	5.32	5.32
pH	x	5.33	5.12 ^a	5.33	5.55 ^a
		0.06	0.11	0.11	0.11

†Mean.

††Standard error.

^aValues followed by the same letter differ significantly.

Microbiological analyses of the cheeses produced in the shepherd's huts did not contain neither *Listeria monocytogenes*, nor *Salmonella* sp. The *E. coli* titre was relatively high, from 0.1 to 0.01 and in some cheeses the *Staphylococci* coagulase positive were found.

Fatty acids content analysis showed the highest amount of palmitic, oleic and stearic acids.

Conclusion

In Poland oscypek is the most popular product coming from the Tatra region and it is regarded as a symbol of the shepherd's culture of our mountains. This is why its name and a traditional production technology should be protected. The creation of a quality standard, obligation to mark the cheeses and improvement of the hygiene standard shall allow to maintain its production. This time-consuming product which is like craft in its nature offers employment to a particular group of people in a difficult mountain conditions. The protection of regional technologies and a variety of foodstuffs is an evidence of respecting the tradition and the differences among the regions, which were shaped by both the nature and history.

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