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Some Properties of Fresh and Ripened Herby Cheese, a Traditional Variety Produced in Turkey

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Summary

Herby cheese (Otlu peynir) is widely produced and consumed in eastern parts of Turkey, and is generally made from sheep milk. The objectives of this study were to determine some properties of fresh and ripened herby cheese samples. Samples (20 fresh and 20 ripened) of herby cheese were collected from retail markets in Van, and analysed chemically and biochemically. Higher levels of dry matter, salt, fat and titratable acidity (%) were found in ripened cheeses. Also lipolysis and protein degradation were higher in ripened herby cheese samples than in fresh samples. Urea-polyacrylamide gel electropherograms of ripened cheese samples showed that higher degradation of α_s-casein than of β-casein occurred.

Key words: herby cheese, Otlu peynir, urea-PAGE

Introduction

Herby cheese, called »Otlu peynir« in Turkish, is mainly produced in eastern and south-eastern parts of Turkey. Most people consume it as a part of almost every meal. Herby cheese is produced from raw sheep's milk on the farms. Nowadays, it is produced in well equipped factories, as well. If sheep milk is not available, a mixture of sheep and cow or sheep and goat milk can be used for cheesemaking.

To make herby cheese, sheep milk is first filtered immediately after milking and then coagulated with calf rennet at the milking temperature. After cutting the coagulum, whey is removed, and previously prepared herbs are added into the curd. About 25 kinds of herbs can be used to make herby cheese, *e.g. Allium* spp., *Thymus* spp., *Ferula* spp., *Anthriscus nemorosa*, *etc*. From these herbs, single or mixture of some herbs can be added. The rate of the addition of herbs changes between 0.5 and 2 kg per curd obtained from 100 L of milk. After the addition of herbs, the cheese is pressed for about 3 h to remove the remaining whey. The pressed cheese is then cut into blocks. Cheese blocks are ripened in brine or they are dry salted and placed in plastic containers. Then whey cheese or »cacik« (a quark-like product) is put between cheese blocks so that air is not allowed inside the container. All containers filled with cheese are turned upside down and kept in a cool place or placed in the soil to permit the moisture to come out. In this position, the bottom of the container is always left open to enable the moisture loss. This cheese is ripened for ≥3 months to get the desired taste and flavour (*1*).

First study on herby cheese was carried out by Eralp (*2*). He described some chemical characteristics of the cheese, and found that herby cheese had dry matter (DM) content between 44.95–68.72 %, fat 14.0–34.1 %, salt 3.28–14.51 %, protein 19.24–27.39 %, and titratable acidity (TA) 0.78–2.88 %. The following studies were conducted by Kurt (*3*) and Kurt and Akyüz (*4*), and they reported similar results. Yetişmeyen *et al.* (*5*) studied 25 herby cheese samples obtained from Ankara retail markets and found the following: DM content of the cheeses 47.23 %, protein 19.66 %, salt 6.45 %, pH=4.84

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and TA 0.71 %. Coşkun and Öztürk (*6*) reported DM, fat, salt and TA of herby cheese samples to be 42.00, 15.35, 3.15 and 0.34 %, respectively. Coşkun *(7)* compared the characteristics of herby cheeses produced with two different methods. In the first method, raw milk and herbs were used, and in the second method pasteurised milk and pasteurised herbs, and starter culture were used. The author found that higher degrees of proteolysis and lipolysis were obtained from those made with raw materials. Isolation of lactic acid bacteria from herby cheeses was performed by Sağdıç *et al.* (*8*).

As seen from the literature reviewed above, herby cheeses have a wide range of chemical properties. However, no indication was made in the literature whether the samples were taken from fresh or ripened herby cheeses. Since the cheese loses a certain amount of moisture during ripening, chemical and ripening characteristics might change.

The aim of this study was to determine protein degradation and the characteristics of fresh and ripened herby cheeses obtained randomly from Van markets. In addition, a comparison among ripening parameters was made.

Materials and Methods

A total of 40 herby cheese samples were collected from Van retail markets; 20 fresh samples were taken between May and June 2002, and 20 ripened samples were taken between January and February 2003. The age of the ripened cheeses was approx. 9 months. All cheese samples were brought to the laboratory at refrigeration temperature, and analysed chemically and biochemically.

The cheese samples were analysed for dry matter, fat, protein, salt, pH and titratable acidity (TA/%) by the methods described by Kurt *et al.* (*9*).

Water soluble nitrogen (WSN), trichloroacetic acid-soluble nitrogen (TCA-SN), and phosphotungstic acid-soluble nitrogen (PTA-SN) were determined according to the method given by Bütikofer *et al.* (*10*).

Determination of lipolysis was done using the BDI method; 10 g of finely ground cheese sample were placed in a butyrometer with a large reservoir. A volume of 20 mL of BDI reagent (a solution of Triton X-100 30 g and sodium tetraphosphate 70 g in 1 L of distilled water) was added, and the butyrometers were placed in a boiling water bath for 20 min to extract the fat. The mixture was centrifuged for 1 min. Enough aqueous methanol was added to bring the fat into column neck of the bottle and then centrifuged for another 1 min. Then, the fraction of liquid fat was transferred into a 50-mL flask and weighed. A volume of 5 mL of fat solvent (4:1 petroleum ether and *n*-propanol) was added to the flask. Titration was carried out with 0.01 N tetra *n*-butyl ammonium hydroxide under a slight nitrogen gas flow (*11,12*). Calculation of total free fatty acids was carried out as described by Case *et al.* (*13*). The degree of lipolysis was reported as acid degree value (ADV).

Urea-PAGE electrophoresis of the cheese samples was carried out according to the modified method of Creamer (*14*). Sample buffer (pH=8.4) was prepared with EDTA 0.0925 g, Tris 1.08 g, boric acid 0.55 g and urea 36.0 g and made up to 100 mL. A cheese sample (0.5 g) was homogenised in 25-mL sample buffer, then centrifuged at 3000 x *g* for 30 min; 2 mL of central portion was transferred into a small tube and stored at –20 °C. Casein standard was obtained by dissolving sodium caseinate, prepared from cow and sheep milk in urea buffer. Urea-PAGE solutions and the method were as follows: resolving gel buffer was prepared with Tris 9.2 g, urea 54 g and solved in 100 mL of distilled water, then pH was adjusted to 8.8 and the solution was made up to 200 mL; 15 mL of 30 % acrylamide/bis-acrylamide (37.5:1) solution, 35 mL of separating gel buffer and 15 μL of TEMED were used for resolving gel solution. After degassing, 70 μL of ammonium persulphate (APS) solution (0.1 mg/L) was added and immediately poured into gel apparatus. A volume of 0.5 mL of distilled water was placed on gel solution. After polimerisation of the resolving gel, water was removed and the comb was inserted. Stacking gel solution was prepared with Tris 1.08 g, urea 36.0 g, boric acid 0.55 g, EDTA 0.092 g and 5 g of acrylamide/bis-acrylamide (37.5:1), and made up to 100 mL (pH=8.4); 15 mL of this solution was taken, and 15 μL of TEMED was added. After degassing, 50 μL of APS was added. This solution was poured on the previous gel, and after polimerisation, the comb was removed. Finally the gel was placed in the electrophoresis unit (Owl P10DS, NH, USA; Power unit from Consort, BE).

To the frozen cheese samples, 3 % mercaptoethanol and 2 % bromphenol blue (0.1 %) were added; 36–42 μL of cheese samples were taken and placed into the slots. Since protein values of the cheeses were different, protein loading was made on an equal protein basis.

Stock chamber buffer was prepared with EDTA 3.7 g, Tris 43.2 g and boric acid 22 g and made up to 1 L (pH=8.4), and the buffer was diluted with distilled water (1:4) before use. The conditions of electrophoresis were (10±1) °C, maximum 280 V, maximum 70 mA and 20 W. Protein bands were stained with Coomassie BBR-250 solution (1 g of Coomassie brillant blue R-250, 500 mL of isopropanol and 200 mL of glacial acetic acid, and made up to 2 L). Then, the bands were destained with destaining solution (200 mL of isopropanol and 200 mL of acetic acid made up to 2 L). The gels were scanned, and the pictures were transferred to the PC.

Results and Discussions

Table 1 shows chemical properties of fresh and ripened herby cheese samples. Higher dry matter (DM), salt and titratable acidity (TA) and lower pH values were obtained from ripened samples. Protein value was almost the same. As stated in introduction section, this kind of cheese is ripened in the containers with the open side down to permit the removal of moisture. Therefore, values of the chemical parameters discussed were higher in ripened samples. Higher TA or lower pH in ripened herby cheeses is found to be specific result for this kind of cheese. The reason is that while cheese blocks are placed into the container, whey cheese is sometimes used to fill the empty places between cheese blocks. Since whey cheese is rich in lactose, this might

Table 1. Chemical properties of fresh and ripened herby cheeses

Properties	Fresh cheeses (N=20)			Ripened cheeses (N=20)		
	m	M	Mean±σ_N	m	M	Mean±σ_N
Dry Matter/%	40.04	56.15	45.80±4.458	50.54	66.05	55.41±4.454
Fat/%	14.50	24.50	17.83±2.715	18.50	31.50	24.37±3.697
Protein/%	16.59	26.02	21.37±3.626	18.01	25.98	21.22±1.964
Salt/%	3.86	6.40	5.19±0.812	4.80	9.07	6.64±1.190
pH	4.90	5.96	5.52±0.275	4.01	5.40	4.55±0.314
TA/%	0.27	0.71	0.48±0.124	0.82	2.35	1.84±0.374

N – the number of samples analysed, m – minimum value, M – maximum value

Table 2. Biochemical properties of fresh and ripened herby cheeses

Properties	Fresh cheeses (N=20)			Ripened cheeses (N=20)		
	m	M	Mean±σ_N	m	M	Mean±σ_N
Lipolysis (ADV)	0.40	1.88	0.92±0.503	2.36	6.76	3.92±1.221
Ripening degree/%	7.60	13.04	10.07±1.517	10.12	21.61	17.14±3.413
TCA/%	4.26	10.45	7.08±1.691	6.01	18.64	11.46±3.522
PTA/%	2.28	5.37	3.85±0.882	3.97	8.60	5.97±1.054

N – the number of samples analysed, m – minimum value, M – maximum value

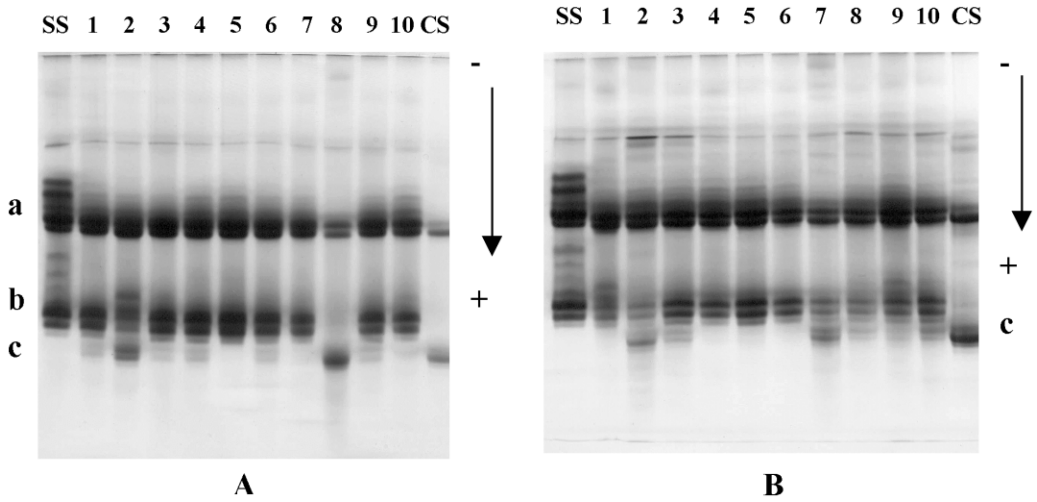

Fig. 1. Typical urea-polyacrylamide gel electropherograms of fresh (A) and ripened (B) herby cheeses (+ anode, – cathode, SS, sheep milk casein standard lane, CS, cow milk standard lane, lanes 1 to 10 in Fig. A show fresh samples, lanes 1 to 10 in Fig. B show ripened samples; a, zones of β-caseins of sheep and cow; b, α_s-casein of sheep and c, α_s-casein of cow).

cause higher TA or lower pH value, as seen in Table 1. Tarakci (*15*) reported that the pH of herby cheese ripened with whey cheese decreased during ripening.

Higher lipolysis values were found for ripened herby cheeses (Table 2). Since herby cheese is normally made from raw sheep milk, the indigenous milk lipase remains in milk and cheese, and results in higher lipolytic activity. In addition, other factors such as high number of lipase-producing microorganisms (such as moulds, some psychrotrophs and lactic acid bacteria which have little activity) might be another reason. Coşkun (*7*) produced herby cheese from raw and pasteurised materials (both milk and herbs), and found that the cheese produced from raw materials had higher ADV values than that produced from pasteurised cheese.

Higher levels of WSN, TCA-SN and PTA-SN (indices of proteolysis) were found in ripened cheeses than in the unripened ones. When tasted, the cheese had a strong flavour since the protein degradation and fat hydrolysis occur under different environmental (such as storage temperature and humidity) and cheese making conditions (pH, salt, different herbs, *etc.*), and many kinds of microorganisms that hydrolyse proteins and lipids might be responsible since the cheeses are made using raw milk with different microflora.

Fig. 1 shows typical urea-polyacrylamide gel electropherograms of fresh (10 samples) and ripened (10 samples) herby cheeses. As seen from the figure, less intensive α_s-casein bands were obtained from ripened samples (Fig. 1B), which shows that more degradation of α_s-casein occurred in ripened cheeses. However, the intensities in each lane were different from each other. It may imply that ripening conditions of each sample were different from one another. Lane 2 of α_s-casein bands from Fig. 1A and lanes 2 and 7 in Fig. 1B from ripened samples show that the cheeses were most probably

made from a mixture of sheep and cow milk. On the other hand, lane 8 in Fig. 1A shows that the cheese was made only from cow milk. Even though sheep milk is usually used in making herby cheese, in this study it was determined that producers may sometimes use cow milk only.

The group with higher mobility consisting of α_s-casein is subdivided into two variants, this phenomenon is clearer in ripened samples. Sheep milk sometimes may have 3 variants of α_s-casein, which depends on sheep breed (*16*). Çelik (*17*) obtained 2 or 3 phenotypes of α_s-casein from milks of İvesi and Morkaraman breeds.

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Neka svojstva svježih i zrelih sireva sa začinima proizvedenih u Turskoj na tradicionalan način

Sažetak

Sir sa začinima puno se proizvodi i konzumira u istočnim dijelovima Turske, a najčešće se dobiva iz ovčjeg mlijeka. Svrha je rada bila odrediti neka svojstva svježih i zrelih sireva sa začinima. Iz maloprodaje u Vanu uzeti su uzorci sireva (20 svježih i 20 zrelih) te analizirani kemijski i biokemijski. U zrelim je sirevima nađena veća količina suhe tvari, soli, masti i postotak kiselosti te utvrđen veći stupanj lipolize i degradacije proteina nego u svježim sirevima. Elektroferogrami na urea-poliakrilamidnom gelu zrelih sireva pokazali su viši stupanj degradacije α_s-kazeina od β-kazeina.