

## Production Techniques and Some Properties of Traditional Lavas Cheese

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**Abstract:** Cheese making technique, chemical and microbiological properties of Lavas cheese were investigated. After microbiological analyses, as follows: the average aerobic mesophilic bacteria, coliform group bacteria, mould-yeast, *Staph. aureus* and spore forming bacteria counts were found  $6.78 \pm 0.60$ ,  $5.37 \pm 0.8$ ,  $42.67 \pm 1.06$ ,  $4.73 \pm 0.69$ ,  $1.13 \pm 0.27$ ,  $1.33 \pm 0.33$  log/g respectively. Average chemical analysis results were dry matter  $45.80 \pm 4.77\%$ , fat  $17.42 \pm 2.95\%$ , protein  $20.52 \pm 2.04\%$ , ripening degree  $2.30 \pm 1.64$ , salt  $6.06 \pm 1.08\%$ , ash  $7.16 \pm 1.14\%$  and titratable acidity  $22.74 \pm 5.50$  SH in cheese samples.

**Key words:** Lavas cheese, production technique, chemical and microbiological properties

### Introduction

In Turkey, different cheese types are traditionally produced and consumed locally. The amount of cheese produced traditionally is about 50 t in Turkey (Anonymous, 1990). The Lavas cheese produced in Karacadag vicinity of Diyarbakir in Turkey is generally made from ewe's milk. The milk is separated and renneted at about 30 °C with liquid abomasum ferment. The curd is broken about rice size, drained in cheese cloth and fermented in room temperature ( $25 \pm 2$  °C) for 4-5 h. Fermented curd is sliced and boiled about 5-10 min. Then boiled curd is cut in 200g portions and put into leaf like shape by hand. Then, the cheese is salted and consumed freshly or stored in cold condition ( $< 10$  °C) until consumption.

The processing technique and properties of Lavas cheese are comparable with Kashar, Orgu, Abhaza and Eritme cheeses, produced in other parts of Turkey.

The composition of Eritme cheese samples was 42.39-64.40 % drymatter, 18.0-23.5% fat, 4.98-7.28% ash, 3.97-6.07% salt, 13.13-39.68% protein, 0.28-0.89% water soluble protein and 16-72 SH titratable acidity (Eralp, 1974). Özdemir *et al.* (1998) found that Orgu cheese contained average 6.00 log/g total aerobic mesophilic bacteria, 6.23 log/g lactic acid bacteria, 0.26 log/g spore forming bacteria, 0.26 log/g coliform group bacteria,  $< 1$  log/g *Staph. aureus* and 5.00 log/g yeast and mould. The composition of Orgu cheese reported was 44.84% drymatter, 14.72% fat, 21.69% protein, 0.63% water soluble protein, 3.09% ripening degree, 7.43% ash, 6.02% salt and 22.86 SH titratable acidity. Additionally, Akyüz *et al.* (1998) also reported that Orgu cheese samples had average 6.22 log/g, 1.98 log/g and 5.24 log/g total aerobic mesophilic bacteria, coliform, yeast and moulds in Orgu cheese samples respectively. However, the average drymatter, fat, protein, ash, salt and titratable acidity were 42.70, 17.35, 15.83, 8.01, 6.03 and 14.37SH, respectively. In Kashar cheese, 6.20-7.35 log/g for the mean aerobic mesophilic bacteria, 7.24-8.11 log/g for lactic acid bacteria,  $< 1$  log/g for coliform group bacteria and 2.1-4.87 log/g for yeast was reported by Aran (1998). Also, Abhaza cheese samples had average 52.90-68.05% drymatter, 21.54-28.15% fat, 23.66-32.79% protein, 0.84-1.89% water soluble protein, 4.56-6.36% salt, 28.64-56.73 SH titratable acidity (Uysal *et al.*, 1998).

There is no study on lavas cheese so far, therefore, the objective of this research was to investigate the production techniques as well as the microflora and chemical properties of Lavas cheese produced in Diyarbakir region.

### Materials and Methods

Microbiological and chemical properties of 18 Lavas cheese samples collected in April 2000 from different parts of

Diyarbakir regions were analysed in laboratory of Food Engineering Department of Ataturk University. Total aerobic mesophilic bacteria (TAMB), lactic acid bacteria, coliform group bacteria, *Staph. aureus*, spore forming bacteria and mould and yeast counts were determined according to the methods given by Speck (1976) and Diliello (1982). The dry matter, fat, protein, water soluble protein, ash, salt content and titratable acidity were analyzed according to the methods given by Kurt *et al.* (1996). Ripening degree was calculated by dividing water-soluble protein by the amount of total protein. Salt and fat ratio in drymatter were determined with calculation.

### Results and Discussion

The results for microbiological analysis of Lavas cheeses were summarised in Table 1. TAMB counts of the Lavas cheese samples was changed around 6.04-7.86 log/g with an average of  $6.78 \pm 0.60$  log/g. These results were in parallel with the results of Kashar cheese reported by Aran (1998), while they were higher than that of Orgu cheese (Akyüz *et al.*, 1998; Özdemir *et al.*, 1998). The differences may be due to the different production techniques and storage conditions.

The lactic acid bacteria (LAB) counts were shown in Table 1. The LAB counts were lower than the findings reported for Kashar cheese (Aran, 1998) and for Orgu cheese Özdemir *et al.*, 1998).

The coliform counts of samples varied around  $< 1$ -3.41 log/g with the average value of  $2.67 \pm 1.06$  log/g. However, the coliform count were higher than that of Orgu cheese (Akyüz *et al.*, 1998; Özdemir *et al.*, 1998) while lower than that of the result of Kashar cheese (Aran, 1998). These results show that Lavas cheese samples were probably contaminated with coliform group bacteria after processing.

The yeast and mould counts of Lavas cheese samples were between 3.74-5.97 log/g with the average of  $4.73 \pm 0.69$  log/g. The yeast and mould counts of Lavas cheese samples were lower than that of Orgu and Kashar cheese (Akyüz *et al.*, 1998; Aran, 1998) but higher than that of Orgu cheese samples (Özdemir *et al.*, 1998). Again the result shows that Lavas cheese was contaminated with yeast and mould after processing.

The average counts of *Staph. aureus* was  $1.13 \pm 0.27$  log/g although 13 Lavas cheese samples had  $< 1$  log/g. This was higher than that of the Orgu cheese samples (Özdemir *et al.*, 1998). In general these results indicates that boiling process of the cheese curd inactivated the *S. aureus*.

The spore forming bacteria counts of the samples were between  $< 1.00$ -1.88 log/g with an average value was  $1.33 \pm 0.33$  log/g, which was also higher than Orgu cheese (Özdemir *et al.*, 1998).

Celik *et al.*: Production techniques and some properties of traditional lavas cheese

Table 1: Microbiologic properties of Lavas cheese (log/g)

Cheese Samples	Total Aerobic mesophylic Bacteria	Lactic Acid Bacteria	Coliform Bacteria	Molud and Yeast	Staph aureus	Spore Forming Bacteria
1	5.69	4.48	3.04	4.61	<1	<1
2	6.41	4.75	5.08	4.67	<1	1.54
3	6.47	4.11	3.18	5.20	1.40	1.18
4	7.38	4.15	3.20	4.81	<1	1.78
5	6.98	6.30	2.51	4.87	1.30	1.18
6	6.62	5.00	2.11	4.11	1.85	<1
7	7.08	4.00	3.66	5.91	1.78	1
8	7.86	4.86	1.18	5.97	<1	1.40
9	6.20	6.20	2.08	5.52	<1	1.60
10	7.51	6.20	1.48	5.53	<1	1.48
11	7.53	6.40	1.48	4.87	1	1.65
12	6.04	5.82	3.20	3.78	<1	1.30
13	6.76	5.89	3.30	4.42	<1	1
14	7.59	6.62	3.30	4.48	<1	1
15	6.72	5.11	3.41	4.48	<1	1.88
16	6.60	5.60	3.32	4.40	<1	<1
17	6.20	5.72	<1	3.74	<1	1.88
18	6.46	5.40	1.60	3.74	<1	1
Min.	6.04	4.00	<1	3.74	<1	<1
Max.	7.86	6.62	3.41	5.97	1.85	1.88
Mean	6.78 ± 0.60	5.37 ± 0.84	2.67 ± 1.06	4.73 ± 0.69	1.13 ± 0.27	1.33 ± 0.33

Table 2. Chemical properties of Lavas Cheese

Cheese Samples	Drymatter (%)	Fat (%)	Protein (%)	Ripening Degree	Salt (%)	Ash (%)	Acidity (%)
1	46.36	18.5	18.68	3.61	6.78	8.38	32.70
2	51.23	19.5	22.68	0.53	7.72	8.40	16.54
3	45.03	14.5	21.43	2.47	7.50	8.60	16.42
4	37.02	12.5	17.96	4.81	4.68	5.60	28.65
5	41.46	17.5	18.80	4.04	3.51	4.52	24.35
6	42.43	14.5	19.56	5.59	6.15	7.59	16.84
7	47.91	17.5	21.32	0.29	7.20	8.42	18.95
8	40.29	14.5	18.21	3.64	5.50	6.76	26.71
9	45.09	16.0	20.76	1.03	6.50	7.49	16.52
10	40.95	12.5	19.92	3.28	6.55	7.59	24.35
11	44.48	16.5	20.04	3.65	5.15	6.99	24.41
12	44.55	17.5	18.80	1.56	6.79	7.32	20.32
13	45.63	18.5	19.54	1.89	6.32	6.92	28.47
14	47.71	20.5	21.22	1.22	4.68	5.02	28.43
15	50.05	20.5	22.02	0.90	5.62	7.07	28.63
16	47.88	19.5	20.33	0.80	6.55	7.22	16.25
17	48.10	19.5	21.42	1.84	6.32	7.05	24.46
18	58.28	23.5	26.61	0.30	5.62	7.95	16.54
Min	37.02	12.5	17.96	0.29	3.51	4.52	16.25
Max	58.28	23.5	26.61	5.59	7.72	8.60	32.70
Mean	45.80 ± 4.77	17.42 ± 2.95	20.52 ± 2.04	2.30 ± 1.64	6.06 ± 1.08	7.16 ± 1.14	22.74 ± 5.50

The chemical properties of Lavas cheese samples were given in Table 2. Dry matter ratio of the samples was between 37.02-58.28% with an average value of 45.80 ± 4.77 %. The results were higher than that of the results reported for Orgu cheese (Akyüz *et al.*, 1998; Özdemir *et al.*, 1998) while lower than that of Eritme and Abhaza cheese (Eralp, 1974; Uysal *et al.*, 1998).

The fat ratio of Lavas cheese samples showed a great variations. This may be originated from different milk used in cheese making. The average fat ratio of Orgu cheese (Akyüz *et al.*, 1998) was parallel with this result. However, the fat ratio of Eritme and Abhaza cheeses (Eralp, 1974; Uysal *et al.*, 1998) were higher but the fat ratio of Orgu cheese (Özdemir *et al.*, 1998) was lower than that of the results of this research.

Lavas cheese samples had high protein contents. The protein ratio of the samples was between 17.96-26.61 with the

average of 20.52 ± 2.04 %. These results were higher than that of the result of Orgu cheese (Akyüz *et al.*, 1998) and lower than that of the result of Eritme, Orgu and Abhaza cheese (Eralp, 1974; Özdemir *et al.*, 1998; Uysal *et al.*, 1998).

The ripening degree of the cheese samples varied around 0.29-5.59% with the average of 2.30 ± 1.60 %. So, the result was in parallel with the result of Orgu cheese (Özdemir *et al.*, 1998).

The average salt ratio of Orgu (Akyüz *et al.*, 1998; Özdemir *et al.*, 1998) and Eritme (Eralp, 1974) cheeses were in parallel with the current results, except Abhaza cheese (Uysal *et al.*, 1998) which was lower than that of Lavas cheese samples. Lavas cheese samples generally contained high salt level, but it should be reduced.

It was found that the ash ratio of the samples was between 4.52-8.60% with the average of 7.16 ± 1.14 %. High ash

**Celik *et al.*: Production techniques and some properties of traditional lavas cheese**

content was influenced by high salt content of the samples. Ash ratio of Lavas cheese samples was usually higher than that of the result of Eritme (Eralp, 1974) but lower than that of Orgu cheese (Akyüz *et al.*, 1998; Özdemir *et al.*, 1998). The titratable acidity of the cheese samples varied between 16.25-32.70 SH with the average value of  $22.74 \pm 5.50$  SH. These results were in parallel with the Orgu cheese samples (Özdemir *et al.*, 1998). It was also found that the acidity of Lavas cheese samples was higher than that of Orgu cheese (Akyüz *et al.*, 1998) but lower than that of Eritme and Abhaza cheese (Eralp, 1974; Uysal *et al.*, 1998). This result can be originated from different production techniques of cheese and the different storage conditions or durations. Microbial load of Lavas cheese samples were high, especially the coliform group bacteria and mould and yeast number. This may indicate the contamination after production, and/or a great variation in composition of the cheese samples. To reduce the microbial contamination, cheese must be stored and sold in hygienic condition, and to decrease the differences in cheese composition, a standard processing technique must be established, and also the salt content of the cheeses should be reduced.

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