

## A Preliminary Study of Kashar Cheese and Its Organoleptic Qualities Matured in Bee Wax

ASYA CETINKAYA<sup>1\*\*</sup>, HILMI YAMAN<sup>2\*</sup>, MEHMET ELMALI<sup>\*3a</sup>, GENCEHAN KARADAGOGLU<sup>\*\*4</sup>

<sup>\*\*</sup>Kafkas University, Technical Vocational School of Higher Education, Kars/TURKEY

<sup>1\*</sup>Kafkas University, Faculty of Veterinary, Food Hygiene and Technology, Kars/TURKEY.

Tel:00904742426800-06/1124, Fax:00904742426853, Email<sup>a</sup>: [ELMALI25@hotmail.com](mailto:ELMALI25@hotmail.com)

### SUMMARY

In this study, we examined the organoleptic qualities of Kashar Cheese matured in bee wax. 500 g Kashar Cheeses were embedded in bee wax to form a layer around the cheeses. They were matured in bee wax film for 13, 10, 6 and 3 days at 10-12°C. End of 13, 10, 6 and 3 days maturation time, 31 panelists were asked to evaluate the differences in terms of flavor and aroma, the surface of cut, feeling left in the mouth, colour and out layer of cheese, appearance and texture on a scale (0-100) according to Turkish Standards Enstitute (TSE). No significant differences were observed between cheese groups in terms of feeling left in the mouth and the surface of cut, but significant ( $P<0.05$ ) differences were found by the panelists in terms of flavour and aroma, colour and out layer of cheese, appearance and texture between the cheeses matured in bee wax for 13 days and 3 days; 13 days and 6 days; 10 days and 3 days. It was concluded that bee wax can be used as a casing material and minimum 7 days maturation time in bee wax is required to observe any significant differences in the organoleptic qualities of Kashar Cheese.

**Key words:** Kashar Cheese, bee wax, organoleptic qualities, maturation

### INTRODUCTION

Kashar Cheese is a traditional hard cheese which is produced and consumed widely in the east of Turkey. Consumption of Kashar Cheese in Turkey is about 30.000 ton per year (Halkman and Halkman, 1991). It shows similarity with other type of cheeses such as Caciocavalle, Provolone, Regusono, Kashkaval and with the 'Pasta Filata' type cheese such as Mozzarella partially (Halkman and Halkman, 1991). Some researchers find similarity between Cheddar and Kashar Cheese (Akgun, 1982; Tekinsen, 1978). Traditionally, Kashar Cheese is made from raw milk and the flora of milk (lactic acid bacteria) is used for maturation. However due to the risk of food pathogenes, pasteurized milk is used at present and yoghurt is used as starter culture. In the last two decays, research has been focused on finding new starter cultures suitable for the maturation of cheeses and the methods to shorten the time of maturation including using different packaging materials (Akyuz, 1978; Tekinsen, 1978; Akgun, 1982; Ozkok, 1988; Halkman and Halkman, 1991; Yetismeyen et al., 1993; Guven and Konar, 1994; Güven et al, 1997). Tekinsen and Nizamlioglu (1993), Tekinsen (1995) examined the effect of different packaging materials on the maturation time of another cheese called 'Tulum Cheese' and reported that a polyethilen material used in the packaging of Tulum Cheese had positive effects on the maturation time. As a result, Tulum Cheese packed in a polyetilen material matured in shorter time

comparing to traditional ones. Sengul (1995) also used different casing materials of pelt, plastic and wood (*Picea orientalis*) during the maturation process. It was shown that the type of milk and casing materials used had significant influence on the physical and chemical properties of cheeses and also showed positive organoleptic properties on cheese. Akyuz and Gulumser (1984) also reports the use of pots as a casing material tradiotionally in the Yozgat District, Turkey. Bostan (1991) examined Tulum Cheeses that were matured in the plastic case and in the goat pelt case from markets in Istanbul, Turkey. It was shown that cheese matured in the plastic case, organoleptically had higher marks as a whole and in terms of texture, aroma, flavor and appearance. However, Guven and Konar (1994) reported opposite stating that Tulum Cheese matured in the goat pelt case had the best aroma, flavour and texture.

These studies indicate that in addition to the other important criteria such as the microflora of milk, the quality of milk, the method and the starter culture used in making of cheese, environmental factors, packaging or casing material and time used during the process of cheese maturation may have some effects on the quality of cheese and on the organoleptic properties of cheese. This may play a role in the acceptance of one particular cheese by the consumers.

Kashar Cheese is traditionally produced in 27-30cm diameter and 10-13 cm height and 6-10 kg weight. It is traditionally matured without

packaging at 2-3°C for 3-10 months. In this way, moulds grow on the surface of cheese and they have to be removed from the surface of cheese before consuming by cutting off the out layer of cheese causing a loss of some cheese. However, today it is commercially produced from pasteurized milk in different shapes and in different weights and matured in vacuum packed polyethilen material for a short time (a month). This way the growth of moulds is prevented and the loss of cheese is limited. Although there are some researches on the Kashar Cheese microbiology and chemistry (Halkman and Halkman, 1991; Soyutemiz et al., 2000), there is no study in our knowledge regarding use of different packaging or casing materials during the maturation process of Kashar Cheese as there are for the Tulum Cheese. Therefore, the aim of this study was to investigate the use of a natural product, bee wax, as a packaging or casing material and to evaluate the organoleptic properties of Kashar Cheese matured in bee wax on a student population.

#### **MATERIALS and METHODS**

Kashar Cheese was made from cow's milk collected locally. Milk had 3.3% fat, 9.5% solid dry matter and 12.8% total solid matter. Its acidity was 75 SH°. Milk was heated to 32 °C and a commercial rennet (Fromaser 220, Istanbul, Turkey) was used. 42 ml of rennet was diluted (1/10) with milk and added to 350 L of milk. Coagulation of milk was achieved in 45 minutes. Draining of whey was achieved by cutting of the coagulant in small pieces and then pressing in a cheese cloth. The coagulant was then kept for two hours to recover and the acidity was checked as pH 5.2-5.4 is required before the melting process (Yetismeyen, 1997). Subsequently, pressed coagulant was broken into small pieces and added to 75°C hot water in a mixer to make a dough. Finally, it was divided into 40 pieces of cheese in 500 g quantities in the shape of a ball. Afterwards, all cheeses were kept in a 14% salt solution for an hour and were hung on a metal bar to drain excessive salt solution at room temperature. Cheeses were divided into four groups. Each group contained 10 samples of cheese (500 g each). First group of 10 cheese samples were covered with bee wax at the same day of cheese making. Bee wax melted at 65°C and each cheese was dipped into bee wax to form a layer of wax around the cheese. Second group of 10 cheeses were kept for 3 days, third group of 10 cheeses kept for 7 days and fourth group of 10 cheeses were kept for 10 days at 10-12°C in a plastic container for the maturation of cheeses. End of 3, 7, and 10

days, cheeses were covered with bee wax and kept at room temperature for further maturation. This second stage continued for 3 days after waxing the fourth group. This way, each group was matured in bee wax for different days of 13, 10, 6 and 3 respectively. Finally, 3 cm<sup>3</sup> piece of cheeses were served to the panel of 31 people to investigate organoleptic qualities of Kashar Cheeses covered and matured in bee wax film.Z

#### **RESULTS and DISCUSSION**

In this study 31 panellists were asked to evaluate the organoleptic qualities of Kashar Cheeses which were matured in bee wax for 13, 10, 6 and 3 days. Each individual cheese was marked in the range numbers of 0-100 according to Turkish Standards Enstitute (TSE) (Anonim, TS 3272).

Maturation of cheese needs time depend on the variety and also some variety of cheeses are matured in different packaging and in different conditions. There are many parameters that effect the quality of cheeses. Packaging or case material is one of them. Considering the organoleptic qualities, Bostan (1991) reported that Tulum Cheese matured in plastic containers had higher marks regarding appearance, texture, aroma and flavor comparing to Tulum Cheese, traditionally matured in dried goat pelt. It has been stated that the use of dried goat pelt was the choice of case material probably due to the lack of alternative materials. Further more, dried goat pelt may cause cheese to have undesirable aroma and flavor (Yaygın, 1971). On the contrary, Guven and Konar (1994) stated that, in their study, Tulum Cheese matured in dried pelt was given higher marks in terms of texture, aroma and flavor compare to Tulum Cheese matured in polyethilen bags but the appearance of cheese and colour were better in polyethilen bags. Plastic containers seems to be cheaper and easy to get on hold, however, Yigit (1980) states that, keeping cheese with high fat content and high acidity in plastic containers may cause some cancerogenous agents to exist in the cheeses. In some regions of Turkey, clay pots are the choice as a casing material but these cheeses are produced in small quantities and consumed locally (Akyüz and Gülümser, 1984). Şengül (1995) investigated the use of dried pelt, plastic container and wood case made of Orientalis spruce (*Picea orientalis*) on the organoleptic properties of Tulum Cheese over the 30, 60 and 90 days maturation time periods. In his study, packaging or casing material had significant (P<0.05) effect on the flavor and aroma of cheese. The highest mark

was given in terms of aroma and flavor to the cheeses which were kept in dried pelt and the lowest mark was given to the cheeses which were kept in wood case made of Orientalis spruce (*Picea orientalis*). The cheeses kept in plastic container were given marks which were between these two. Cheeses which were kept in dried pelt and wood case made of Orientalis spruce (*Picea orientalis*) also had significant differences ( $P<0.05$ ) in terms of feeling left in the mouth. These results show similarity with the results obtained by Guven and Konar (1994). Additionally, maturation time had a significant ( $P<0.01$ ) effect on the flavor and aroma of cheeses in Sengul's study (1995). These studies on Tulum Cheese cannot be correlated directly with the Kashar Cheese but they indicate that suitable packaging or case material and maturation time have an effect on the flavor and aroma and other qualities of cheeses. Therefore, we examined the effect of bee wax on the organoleptic properties of Kashar Cheese. Apart from Kashar Cheese, vacuum packed in polyethilen bags commercially, there is no study on different packaging or casing materials regarding Kashar Cheese in our knowledge. Bee wax was the choice of packaging or casing material

since Kars District is well known for its Kashar Cheese and also honey production, therefore bee wax is readily available.

Our results indicated that bee wax had no significant effect on the surface of cut, the feeling left in the mouth and the out layer of Kashar Cheese. Panelists could not distinguish any significant differences between the groups of first (13 days maturation time) and second (10 days maturation time); second (10 days) and third (6 days maturation time); third (6 days) and fourth (3 days maturation time) in terms of flavor and aroma, colour, appearance and texture. However, there were significant differences (Table 1) between the groups of Kashar Cheese in terms of aroma and flavor and also colour, appearance and texture. Significant differences ( $P<0.05$ ) were observed between mainly the first group (13 days) and the third group (6 days); the first group (13 days) and the fourth group (3 days) in terms of flavor and aroma, colour, appearance, and texture. In addition to this, there were significant differences ( $P<0.05$ ) between the second group (10 days) and the fourth group (3 days) in terms of flavor and aroma, colour, appearance and texture.

Table 1. Effect of bee wax as a casing material on the organoleptic qualities of Kashar Cheese\*

Maturation time	Group IV 3 days	Group III 6 days	Group II 10 days	Group I 13 days
Flavor and aroma	a,c	b	c	a,b
Surface of cut	-	-	-	-
Feeling left in the mouht	-	-	-	-
Colour	a,c	b	c	a,b
Out layer of cheese	-	-	-	-
Appearance	a,c	b	c	a,b
Texture	a,c	b	c	a,b

\*Groups that have same letters are significantly ( $P<0.05$ ) different.

(-) Not significant

These results indicate that maturation of Kashar Cheese in bee wax for 7 days and over (10 days) had significant positive effects on the organoleptic properties of Kashar Cheese and these were distinguishable by the panelists. Unfortunately, the control groups (not covered with bee wax) for each Kashar Cheese matured in bee wax for 3, 6, 10 and 13 days are lacking and this unable us to compare the differences between the traditional one and the ones matured in bee wax. Therefore this is still to be determined. However this, preliminary study may indicate that covering Kashar Cheese with bee wax may help in the maturation process and on the orgonaleptic qualities of Kashar Cheese and also bee wax

may prevent the post-contaminations of undiserable micro-organisms.

## REFERENCES

- Anonymous: (1978).** Turkish Standards Enstitute (TS 3272). Necatibey Cad. No: 112, Bakanlıklar-Ankara/ Turkey.
- Akgun, S. (1982).** Studies on to improve the making process of Kashar Cheese from cow's milk by using yoghurt starter culture. Thesis. Veterinary Faculty, Ankara University No: 174, Ankara, Turkey.
- Akyuz, N. (1978).** Studies on the effect of heating, starter culture and packaging on the quality of Kashar Cheese and its aroma and flavour. PhD Thesis, Agriculture Faculty, Atatürk University No: 148, Erzurum, Turkey.

**Akyuz, N. and Gulumser, S. (1984).** Production of Yozgat Pot Cheese: Its composition and maturation. *Gıda* 9 (4), 231-238.

**Bostan, K. (1991).** Organoleptic, chemical and microbiological qualities of Tulum Cheese matured in different packaging material and sold in Istanbul market. II. National Dairy Products Sempoziyum, *Journal of Agriculture Faculty of Tekirdag University* No: 125, 249-253.

**Guven, M. and Konar, A. (1994).** A Comparative study on the physical, chemical and organoleptic qualities of Tulum Cheese which were made from cow's milk and packed and ripened in different materials *Gıda* 19 (5), 287-293.

**Guven, M., Konar, A., and Akin, M. S. (1997).** Effects of different packing materials and ripening periods on the proteolysis level of Edam Cheese. *The Journal of Agriculture Faculty of Cukurova University* 12 (4), 1-10.

**Halkman, K. and Halkman, Z. (1991).** Studies on the different combinations of Kashar Cheese starter cultures. *Gıda* 16 (2), 99-105.

**Ozkok, U. (1988).** Use of ultrafiltration, starter culture and lipase in making of Kashar Cheese. Turkish Dairy Industry Publishings. pp 82-89. Ankara, Turkey.

**Sengul, M. (1995).** Investigation of some quality criteria of Tulum Cheese made from raw and pasteurized milk and matured in different packing materials. Msc Thesis. Ataturk University, Applied Science Enstitute, Department of Food Engineering, Erzurum, Turkey

**Soyutemiz, E., Anar S., and Cetinkaya, F. (2000).** Investigation on the microbiological and chemical changes of Kashar Cheese at production stages. *Journal of Faculty of Veterinary Medicine* 19/1-2, 87-92.

**Tekinsen, O. C. (1978).** Microbial flora of Kashar Cheese during maturation in the middle region of Turkey: Lactic acid bacteria and studies on microbiological quality. Thesis. Veterinary Faculty, Ankara University, No: 154, Ankara, Turkey

**Tekinsen, O. C. and Nizamoglu, M. (1993).** A new type of cheese: Selcuklu Tulum Cheese. *Veterinary Journal*, 5 (5), 34.

**Tekinsen, O. C., (1995).** Syntetic packing material for Tulum Cheese. *Gıda Sanayi* No: 41, pp 39.

**Yaygin, H. (1971).** Production of Pickled White Cheese and Its features. *Journal of Agriculture Faculty of Ege University* 8 (1), 91-124.

**Yetismeyen, A., Yıldırım, M., and Yıldırım, Z. (1993).** Influence of various starter cultures on properties of Kashkaval-like (Kashar)

Cheese, *Lebensmittelindustrie-und-Milchwirtschaft* 114 (6), 140-143.

**Yetismeyen, A. (1997).** Dairy Technology. Ankara University, Faculty of Agriculture. Book No : 443, pp 194-198. Ankara, Turkey.

**Yigit, V. (1980).** Investigations of the additives in food from packaging materials. TÜBİTAK, Marmara Bil. End. Araşt. Ent. Beslenme ve Gıda Tek. Böl. Yay. No: 41, Gebze, Turkey.