Erzincan Üniversitesi
Fen Bilimleri Enstitüsü Dergisi
2016, 9(3), 185-193
Araştırma Makalesi

Erzincan University
Journal of Science and Technology
2016, 9(3), 185-193
Research Article

Effects of Ripening in Different Packaging Materials on Sensory Quality of Karın Kaymağı Cheese Samples

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(Geliş Tarihi/Received: 07.12.2015, Kabul Tarihi/Accepted: 16.02.2016)

ABSTRACT

In our study was to evaluate the effects of different packaging materials such as artificial case, barrel and tripe on sensory properties of Karın Kaymağı cheese during ripening time (on 2rd, 15th, 30th and 60th days). The different four Karın Kaymağı cheese samples were prepared from white cheese, civil cheese, pasteurized cream and concentrated yoghurt mixes and ripened at 12 °C. The sensory evaluation were found significant (P<0.01) differences between the Karın Kaymağı cheese samples. Especially M1 and M3 samples of packaged with tripe and artificial case were more preferred by the panellists during ripening period than the others.

Keywords: Karın Kaymağı cheese, sensory properties, tripe

Karın Kaymağı Peynirlerinin Duyusal Kalitesi Üzerine Farklı Ambalaj Materyallerinde Olgunlaştırmanın Etkileri

ÖZET

Çalışmamızda Karın Kaymağı peynirlerinin işkembe, fıçı ve suni kılıf gibi farklı paketmeleme materyallerinde 2, 15, 30 ve 60 gün süre ile olgunlaştırılmasının duyusal özellikleri üzerine etkisi araştırılmıştır. Karın Kaymağı peynirleri; beyaz peynir pıhtısı, civil peynir, lor, pastörize krema ve süzme yoğurttan oluşan 4 farklı karışım halinde hazırlanmış ve 12 °C'de olgunlaştırılmıştır. Karın Kaymağı peynir örneklerinin duyusal değerlendirilme sonuçları önemli bulunmuştur. Özellikle M1 ve M3 işkembe ve suni kılıf içerisinde olgunlaştırılan örnekler panelistler tarafından diğer örneklerden daha çok beğenilmiştir.

Anahtar kelimeler: Karın Kaymağı, peynir, duyusal özellikler, işkembe

1. Introduction

Cheese is an important integral part of Turkish diet. The variety of cheese depends on certain factors: cultural habits and tastes, natural conditions, the species and variety of the animals providing the milk and the production methods employed (Yılmaz et al., 2005). Traditional dairy products, especially diverse cheese types, have an important place in the food culture of rural regions of countries and several of such cheese types have both turned out to be a part of culture and contributed to the formation of a culture based on production. Today, most of cheese

ISSN: 1307-9085
e-ISSN: 2149-4584

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DOI: 10.18185/eufbed.17279

types are registered trademarks and have their protected geographic indications (Dost et al., 2004, Ercan, 2009). At least 50 varieties of local cheese varieties produced in our country have been reported (Üçüncü, 2004; Yangılar and Dağdemir, 2011). Karın Kaymağı cheese, one of the types of cheese, is widely produced in Sarıkamış, Oltu and Kars regions of Turkey (Çakmakçı et al., 1995; Yangılar, 2004; Turgut et al., 2012). Ripened Karın Kaymağı cheese is consumed by most people in Turkey (Özdemir et al., 2010). The production is not for the commercial purposes, but is manufactured to meet the needs of the family (Şengül et al., 2011). Cheese produced in certain months of the year on the market is sold in more than necessity.

The name of Karın Kaymağı cheese is caused tripe which is used in production as the packaging material but growth of microorganisms on colonization of cheese surfaces is generally seen to be an important risk (Kousta *et al.,* 2010) because such surfaces can allow ideal media for microbial growth by involving efficient amount of water and suitable pH conditions (Conte *et al.,* 2013). For example, the stated studies are more related to only gross composition and microbiological status (hygienic aspects) of Tulum cheese. Even though the production of Karin Kaymağı cheese was used tripe which is original packaging material at the present time artificial case, barrel and tripe materials have been used for the ripening of cheese. This packaging materials are more popular because it is available easily and cheaply. Similarly Şengül and Çakmakçı (1998) used polyethylene bags and wooden materials as alternatives to a Tulum bags and the authors reported that the use of different packaging material has an effect on chemical and microbiological qualities of Tulum cheese; however, they recommended further studies to determine the best material. According to the consumers' preference have pleasant appearance plastic bags than Tulum bags (Çakmakçı et al., 2008).

In the traditional production of Karın Kaymağı cheese making is used Beyaz cheese or Civil cheese mixed with cream (butter), cheese whey and yoghurt. Then, mix is salted at 2-3% ratio. The mix is filled to cleaned artificial case (abomasum) unless hole and pressed 3 days. Cheese samples are ripened at 5-10 ^{o}C for 60-90 days (Yangılar, 2004). The aroma in processed cheese is influenced by many factors, from inherent properties of the milk to technological choices in production (Sunesen et al., 2002). Thus the making technique of this cheese can be transferred to dairy plants. The cheese can be produced with standard quality and composition in all regions of world.

Only a few studies were conducted on the application of tripe in Karın Kaymağı cheese in literature. From this point of view, the objective of the present study was the determination of the effectiveness of different mixes and packaging materials (artificial case, barrel and tripe) on sensory evaluation of traditional Karın Kaymağı cheese during ripening.

2. Materials and Methods

2.1. Materials

In this research, cow milk was used for the sample production of Karın Kaymağı cheese. One part of the milk was defatted and used to Civil cheese as acidified to 20 ^{o}SH. Then, milk was heated to 32 ^{o}C and added to rennet 1 ml for 100 L milk. The temperature of milk was raised to 55 ^{o}C. Then, the civil cheese particles were collected with a stainless steel stick. The cream was pasteurized at 75 ^{o}C for 30 minute. The second part of milk was standardized to 3% butterfat and processed to Beyaz cheese curd. The whey is obtained from Beyaz cheese production and processed to cheese whey. Third lots of milk were standardized to 3% butterfat and processed to yoghurt. Then, yoghurt was drained in cloth to get concentrated yoghurt. The Beyaz cheese and yoghurt production were made according to standard production techniques (Demirci and Şimşek, 1997).

2.2. Preparation of Karın Kaymağı Cheese Samples

The procedures for producing of Karın Kaymağı cheese samples were:

Cheese (M1)

Beyaz cheese fragments (80%), cheese whey (10%) and pasteurized cream (10%) were mixed. Then mixes were filled to packaging materials (tripe, barrel and artificial case).

Cheese (M2)

Beyaz cheese fragments (80%), concentrated yoghurt (10%) and pasteurized cream (%10) were mixed and filled to packaging materials.

Cheese (M3)

Civil cheese pieces (80%), cheese whey (10%) and pasteurized cream (10%) were mixed and filled to packaging materials.

Cheese (M4)

Civil cheese pieces (80%), concentrated yoghurt (10%) and pasteurized cream (%10) were mixed and filled to packaging materials.

All cheese samples were ripened at 12 ^{o}C (relative humidity 85%) for 2rd, 15th, 30th and 60th days.

2.3. Sensory Evaluation

Six professional panellists from the Food Engineering Department at Atatürk University, Erzurum, Turkey, evaluated the cheese samples on 2rd, 15th, 30th and 60th days of ripening using a score test for colour, texture, taste and aroma, foreign flavour, saltiness and general acceptability and given scores for their sensory characteristics in a scale ranging from 1 (poor) to 9 (excellent). Water and bread were also serviced to the panellists to cleanse their palates before each sample. All panellists were preferred to be non-smokers and have had prior testing experience with a variety of dairy products including milk, cheese and ice cream and had previously used flavour profile procedures adapted from Nelson and Trout (1951). Hedonic type scala is used in sensory evaluations of Karın Kaymağı cheese samples is given in Table 1.

Table 1. Hedonic type scala is used in sensory evaluations of Karın Kaymağı cheese samples

Name:.....		**Number:.....**		**Date:.....**
Colour	excellent	good	avarege	poor
	9-8	7-6	5-4-3	2-1
Texture	excellent	good	avarege	poor
	9-8	7-6	5-4-3	2-1
Taste and aroma	excellent	good	avarege	poor
	9-8	7-6	5-4-3	2-1
Foreign flavour	no	very little	sensible	too much
	9-8	7-6	5-4-3	2-1
Saltiness	normal	a little salt	salty	very salty
	9-8	7-6	5-4-3	2-1
General acceptability	excellent	good	avarege	poor
	9-8	7-6	5-4-3	2-1

2.4. Statistical Analyses

The experimental design consisted of completely randomized design in a factorial arrangement: four treatments of different cheese mixes (M1, M2, M3 and M4), three different packaging materials (artificial case, barrel and tripe), four storage periods (2rd, 15th, 30th and 60th) and two replicates. All statistical calculations were performed using SPSS 13.0 Statistical Software (SPSS Inc., Chicago, IL, USA). Duncan's Multiple Range Tests and variance analysis were used to evaluate the significance level ($p<0.05$) for statistical differences (Yıldız and Bircan, 1994).

3. Results and Discussion

The sensory evaluation of Karın Kaymağı cheese is given in Table 2. Many traditional cheeses are produced and consumed locally such as Karin Kaymağı cheese, a special cheese in Turkey and after the ripening period, Karin Kaymağı cheese has a characteristically natural taste and flavour. The aroma is described as piquant and mildly acidic. Also ripened Karin Kaymağı cheese is consumed by most people in Turkey. In our study especially the ripening in tripe of Karın Kaymağı cheese samples significantly affected ($p<0.05$) the sensory scores for colour, texture, taste and aroma, foreign flavour, salty and general acceptability. It is thought positively affected that the aroma of the cheese of volatile components formed as a results lipolysis and proteolysis. A significant difference ($p<0.05$) was found to be Karın Kaymağı cheese samples ripened in tripe in terms of texture

Table 2. Sensory properties of Karın Kaymağı cheese samples during ripening time

Karın Kaymağı Cheese Samples		Colour	Texture	Taste and aroma	Foreign flavour	Salty	Geneal acceptability
M1		5.99±0.83^{a}	5.07±0.81^{a}	5.62±1.21^{bc}	6.25±1.02^{b}	6.77±1.04^{a}	5.70±0.82^{ab}
M2		5.67±0.91^{a}	5.37±0.77^{a}	5.22±0.85^{ab}	6.08±0.78^{ab}	6.86±0.62^{a}	5.74±0.90^{ab}
M3		5.80±1.22^{a}	5.42±0.68^{a}	5.82±1.32^{c}	6.44±0.86^{b}	6.90±0.66^{a}	6.18±0.86^{b}
M4		5.65±0.80^{a}	5.42±1.19^{a}	4.81±1.25^{a}	5.67±0.69^{a}	6.65±0.80^{a}	5.56±1.05^{a}
Packaking material							
artificial case		6.10±0.58^{b}	5.02±0.60^{a}	5.25±0.87^{a}	6.20±1.09^{a}	6.67±0.95^{a}	5.97±0.28^{a}
Barrel		5.63±0.43^{a}	5.46±0.35^{b}	5.62±0.33^{a}	6.03±0.81^{a}	6.72±0.76^{a}	5.82±0.67^{a}
Tripe		5.61±0.90^{a}	5.49±1.10^{b}	5.24±0.95^{a}	6.11±0.24^{a}	7.00±0.99^{a}	5.59±0.44^{a}
Ripening time (days)							
2		5.00±0.16^{a}	4.93±0.15^{a}	4.27±0.17^{a}	5.82±0.15^{ab}	6.57±0.15^{a}	5.44±0.17^{a}
15		5.82±0.16^{b}	5.08±0.15^{a}	5.10±0.17^{b}	5.67±0.15^{a}	6.70±0.15^{a}	5.56±0.17^{a}
30		6.32±0.16^{b}	6.09±0.15^{b}	6.38±0.17^{d}	6.74±0.15^{c}	7.21±0.15^{b}	6.40±0.17^{b}
60		5.97±0.16^{b}	5.19±0.15^{a}	5.73±0.17^{c}	6.22±0.15^{b}	6.71±0.15^{a}	5.79±0.17^{a}
Source	***D.F.***						
Samples (S)	3	*	*	*	*	*	*
Ripened (R)	3	**	**	**	**	**	**
Packaged (P)	2	**	**	**	**	**	**
S x R	9	**	**	**	**	**	**
S x P	6	*	*	**	*	*	**
R x P	6	**	**	**	**	**	**
Error	87						
Total	96						

*, ** Significant at 0.05 and 0.01 probability levels, respectively

Counts showed with different letters were significantly different each others, using Duncan's multiple range test

and salty than the others. Koca and Metin (1998) founded that panel test results in Tulum cheese convenient with the results of the present study. Andiç (1999) pointed that Motal cheese samples of packaging with plastic the result of the sensory evaluation more preferred than that of packaging with leather of cheese samples which are parallel with the results in the present study. Bayar (2008) observed packaging with leather in terms of sensory properties better than gland and barrel in Tulum cheese samples. Güven and Konar (1994) determined the best colour and appearance properties which are Tulum cheese in plastic material if it is the best structure, consistency, taste and odour in leather material.

M2 (artificial case with packaged Karın Kaymağı cheese samples) and M4 (tripe with packaged Karın Kaymağı cheese samples) samples were preferred by the most panellists during 30 d ripening times. Çakmakçı et al. (1995) reported that cheese samples stored with tripe is appreciated because of the packaging material and shortened ripening time. These declarations are convenient with the findings in the present study. Güven ve Konar (1994) stated which is prolonged ripening period beyond 90 days is expressed adversely affected sensory properties of Tulum cheese.

The cheese samples of packaged with artificial case were lost higher amount of the water of cheese. For this reason, artificial case was not accepted as good packaging materials compared tripe but the best than barrel. The higher and lower water permeability of packaging materials was the

reason for the undesired variations at sensory properties of cheese samples. Konovolava et al. (1978) found that the packaging with synthetic sheath, the material use packaging in production of Sausage, positively affected in ripening of Tulum cheese. When compared to the results of previous studies, packaging with synthetic sheath of Tulum cheese samples much appreciated by the panellists than packaged with plastic bags (Keleş, 1995; Tekinşen et al., 1998). When considered sensory characteristics, the acceptability of Karın Kaymağı cheese samples packaged with barrel was at reduced level (Fig. 1, 2, 3 and 4). This state can be sourced from imperfect water drainage as other packaging materials. Considering in the literature (e.g. Kaya, 2002; Calvo et al., 2007) is showed an increase in curdle firmness and then reverse proteolysis a decrease due to moisture loss in the study of our also.

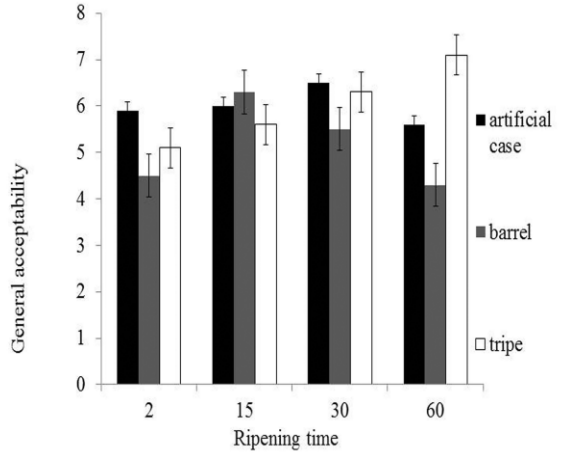

Fig. 1. The evaluation of general acceptability for M1 Karın Kaymağı cheese samples.

In the present study stated that compared packaging materials tripe exhibited better sensory conditions when it was packaged with barrel. Arslaner (2008) found Erzincan Tulum cheese samples of sensory characteristics (structure, odour and taste) affected statistically from packaging materials and milk varieties which are in convenience with the results in the present study.

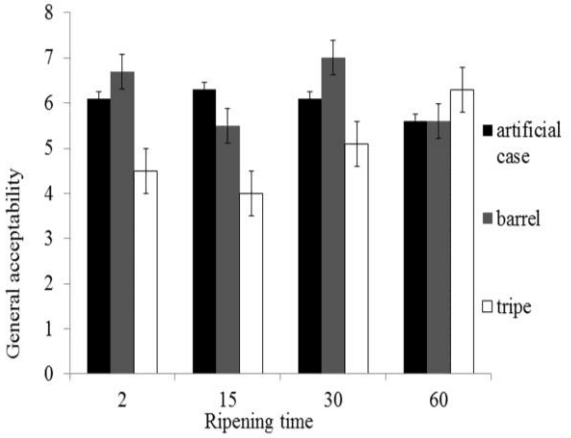

Fig. 2. The evaluation of general acceptability for M2 Karın Kaymağı cheese samples.

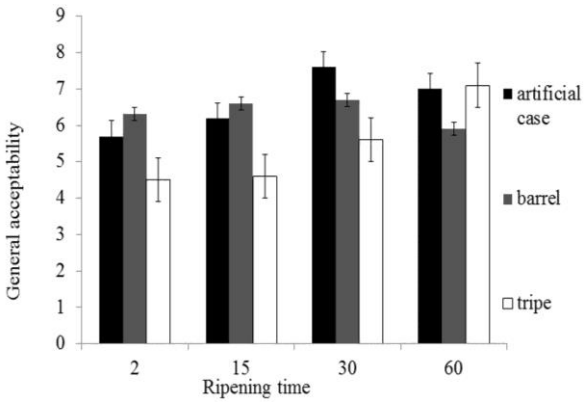

Fig. 3. The evaluation of general acceptability for M3 Karın Kaymağı cheese samples.

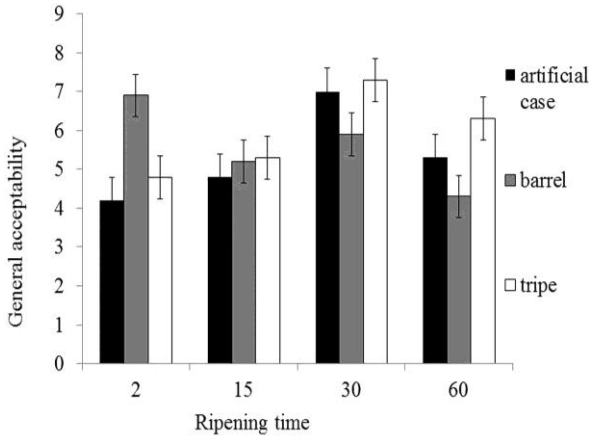

Fig. 4. The evaluation of general acceptability for M4 Karın Kaymağı cheese samples.

4. Conclusions

It was found that tripe is the ideal packaging material for sensory properties of cheese samples but Karın Kaymağı cheese samples should be ripened at 12°C (relative humidity 85%) max. 60th day. The undesired changes may be occurred in the sensory properties of the cheese samples during long ripening. Based on the results, it can be concluded that tripe can be used in the packaging of cheese successfully for development of sensory properties of cheese. However it is an urgent need for the expansion of the use of tripe all over the world to packaging more in industrial fields. This study may be important since it could indicate successfully through the packaged samples with tripe that the mentioned materials could be used as good packaged materials in the manufacture of Karın Kaymağı cheese and extended throughout this cheese production to improve sensory quality.

Acknowledgement

This work was financially supported by Atatürk University Research Fund. Project No: 2003/216.

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