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SOME CHARACTERISTICS OF "KATIK KEŞ" A TRADITIONAL TURKISH DAIRY PRODUCT

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ABSTRACT
In this study, it was aimed to determine some chemical, microbiological and sensorial properties of Katık Keş samples produced and sold in local bazaars in Bolu. Totally 15 "Katık Keş" samples were collected and analyzed. According to the results obtained; mean dry matter, fat, protein, total ash, salt, acidity and pH of the samples were found as 67.05 %, 8.78 %, 36.59 %, 11.11 %, 5.20 %, 1.35 % and 3.90, respectively. The numbers of yeasts & molds and coliforms of the samples were 5.98 and 3.36 log CFU/g, respectively. Mean water activity value was obtained as 0.76. In terms of sensorial properties, the samples were found mostly in shape of symmetric cone, hard in structure, porcelain white color, salty, acidic and having strained yogurt smell.
Key words: Katık Keş, kurut, cheese, traditional product

GELENEKSEL BİR ÜRÜNÜMÜZ OLAN KATIK KEŞİNİN BAZI ÖZELLİKLERİ

ÖZ
Bu çalışmada, Bolu'daki yerel pazarlarda üretilen ve satılan Katık Keş örneklerinin bazı kimyasal, mikrobiyolojik ve duyusal özelliklerinin belirlenmesi amaçlanmıştır. Toplam 15 Katık Keş örneği toplanmış ve analiz edilmiştir. Elde edilen sonuçlara göre; örneklerin ortalama kuru madde, yağ, protein, toplam kül, tuz, asitlik ve pH değerleri sırasıyla % 67.05, % 8.78, % 36.59, % 11.11, % 5.20, % 1.35 ve 3.90 şeklinde tespit edilmiştir. Örneklerin maya-küf ve koliform mikroorganizma sayıları sırasıyla 5.98 ve 3.36 log KOB/g olarak belirlenmiştir. Keş örneklerinin ortalama su aktivite değeri 0.76 olarak bulunmuştur. Örneklerin duyusal özellikleri bakımından; çoğunlukla simetrik koni şeklinde, sert yapıda, porselen beyaz renkte, tuzlu ve asidik tatta, süzme yoğurt kokusuna sahip oldukları saptanmıştır.
Anahtar Kelimeler: Katık Keş, kurut, peynir, geleneksel ürün

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INTRODUCTION

"Kurut" or "Keş" is known as a traditional Turkish dairy product produced and consumed in Middle Asia and in Anatolia for centuries. Kaşgarlı Mahmud, lived between years of 1008-1105, explained the word "qurut" as dry cheese or "çökelek" produced from non-fat milk or from "ayran", so the word "kurut" comes from the root of drying in Turkish language (Erdi and Yurtsever, 2005). Kurut is obtained from yogurt by removing its serum and then by drying in the air. The Kurut has the same meaning as "Keş". In Turkey, there are many kinds of Kurut or Keş whose properties vary according to region, producer and consumer preference. Some examples of them are the Keş for macaroni, the Keş for frying, the Keş eaten with bread (Coskun et al., 2008), Fresh Keş, Yellow Keş, Dry Keş, Skin Keş, Gök (mouldy) Keş (Kalender and Güzeler, 2013), Kars creamy Kurut, Hatay style spicy Sürük, Bitlis Kurut and Giresun Keş (Ünsal, 2007). This dairy product is known as Kashk in Iran, Kishk in Lebanon, Jub-Jub in Syria and Kuşuk in Iraq. Kurut is also a dairy product widely produced by the Kyrgyz, Kazakh, Tatar and Uzbek Turks and consumed in Central Asia (Soltani and Güzeler, 2013). All varieties may have their own properties and different usage area, but they are mostly similar product. The presence of many Keş varieties in our country shows our cultural richness in terms of cheese production and consumption.

Some characteristics of Kurut or Keş varieties were studied by many researchers. First, Eralp (1953) reported some chemical properties of Kurut as dry matter 80.03 %, fat 11.07 %, protein 52.35 %, salt 9.11 %, ash 4.80 and acidity 21.2 SH.

Akyüz and Gülümser (1987) reported the contents of dry matter, fat, ash, salt, protein and acidity of Kurut samples as 79.69 %, 10.58 %, 11.06 %, 9.66 %, 52.89 % and 59.75 SH respectively. They also reported total microorganisms as 3.93 log CFU/g, yeasts and molds as 3.70 log CFU/g and no coliform was found in the samples.

Akyüz et al. (1993) analyzed the chemical and microbiological properties of Kurut samples collected from Van city and found that Kurut samples had dry matter as 85.51 %, fat 8.52 %, protein 54.64 %, acidity 1.18 %, total bacteria count 4.15 log CFU/g and yeasts-molds count 3.15 log CFU/g.

Tarakcı et al. (2001) found dry matter as 60.69-78.40 %, moisture 21.60-39.31 %, fat 4.5-23.5%, protein 31.22-50.68 %, total mineral content 4.36-14.23 %, salt 2.84-13.19 %, titratable acidity 1.49-3.26 % and pH 3.37-4.24 in Kurut samples collected from Ordu province.

Coşkun et al. (2008) analyzed Keş samples for macaroni from Bolu province and reported dry matter as 57.35 %, fat 7.50 %, acidity 0.31 %, pH 3.68 and a_w 0.75. They also reported the number of total live bacteria, yeasts and molds, *Lactobacilli*, *Streptococci*, coliforms and *Escherichia coli* as 5.37, 5.37, 4.50, 5.25, 3.31 and 3.55 log CFU/g, respectively.

Kalender and Güzeler (2013) reported chemical properties of fresh Keş as the following: Dry matter 34.96 %, fat 3 %, protein 27.18 %, salt 0.93 %, acidity 2.68 %, pH 3.54. For yellow Keş, they reported dry matter as 57.37 %, fat 8.70 %, protein 29.80 %, salt 4.70 %, acidity 1.87 % and pH 4.65; for dry Keş, the values were 89.58 %, 4.40 %, 73.44 %, 2.54 %, 6.03 %, 4.56 respectively.

The production parameters of Keş for frying and Keş for macaroni were optimized by Emirmustafaoğlu and Coşkun (2017a,b) and Yaman and Coşkun (2017), respectively. Emirmustafaoğlu and Coşkun (2017a,b) also patented their study as "A new method for production of Keş for frying" with number TR 2016 08793 B. The production parameters of both products are ready for industrial production when requested.

Mollabashĩ and Aydemir Atasever (2018) found moisture amount as 19.56 %, fat as 12.53 %, protein as 50.74 % ash as 11.47 %, salt as 9.63 %, acidity as 1.80 %, pH as 4.74, water activity as

0.598 in traditional Kurut samples obtained from Maku city in Iran. They also reported total mesophilic aerobic bacteria as 1.51±0.54 logCFU/g, yeasts and molds as 1.31±0.54 log CFU/g and *Enterobacteriaceae* as 1.75±0.57 log CFU/g.

One of the Keş varieties is "Katık Keş". In the past, it was usually consumed by farmers in fields during working or by shepherd during animal grazing in pasturages. Katık Keş is consumed with bread during outstanding period mentioned. Today it is still produced traditionally. However, a sustainable production by industry is required to move this product, which has been produced for centuries, into the future. In literature, there is some information about how to produce Katık Keş in traditional way (Coşkun et al., 2008), however, no information is available about chemical, microbiological and sensorial properties of Katık Keş. In this study, it was aimed to determine some chemical, microbiological and sensory characteristics of Katık Keş samples bought from directly farmers in local bazaars in Bolu.

MATERIALS AND METHODS

First, the local bazaars in Bolu were visited and the production information of Katık Keş were obtained from the sellers. While taking samples, it was observed that some samples were still fresh and some were dried.

The samples were collected from different local bazaars in Bolu by every week in October of 2019. Totally 15 samples were bought from different bazaars in different weeks. The samples were brought to the laboratories of Food Engineering Department of Bolu Abant Izzet Baysal University and some chemical, microbiological and sensorial analyses were done.

Dry matter, protein, fat, total ash, salt, pH and acidity of the samples were determined according to the methods given by Kurt et al. (1993). The counts of coliforms and yeasts & molds were enumerated according to Frank et al. (1985), using Violet Red Bile Agar (VRBA) and Potato Dextrose Agar (PDA), respectively. Water activity (a_w) was measured using a water activity measuring device (Novasina, Lab MASTER-aw, Switzerland). Sensorial analyses were done by 8 panelists, each panelist was asked to test the samples and described properties in terms of color and appearance, structure and consistency and taste and smell sensorially (Metin, 1977).

RESULTS AND DISCUSSION

The production of Katık Keş

According to the knowledge obtained, mostly strained yoghurt is used in making Katık Keş. However, differently cream and whey as raw material are also used. In traditional way of making Katık Keş, first the cream of milk is separated and the rest (skim milk) is heated. Then the milk is cooled to fermentation temperature and yogurt starter culture is added. The yogurt obtained is cooled and transferred to a cloth bag. As such, it is filtered overnight. Then it is transferred into another cloth and a weight (usually a clean stone) is put on it. Thus, the serum of the yogurt is removed. After that the strained yogurt is salted and pressed again. Pressing takes 1-3 days. Then, the press is removed and the yogurt precipitation is salted again and the precipitate (the Keş dough) is kneaded. The kneading process continues until the precipitate (drained yogurt) picks up itself. If desired, black cumin seed is added. During kneading, salt may be added again. The desired shape (usually symmetric cone shape) is given to the Keş and dried in open air for 10-15 days. The cone shape is done manually. The production of the Keş in villages and highland houses is mostly done to meet family consumption. There are also those who do it as income generating activities and sell it in the markets. The product Keş can be stored for a long time. Pictures of Katık Keş produced in this way are given in Figure 1.

Some chemical properties of Katık Keş

The minimum, maximum and mean values and the distribution of the chemical analysis of Katık Keş samples are given in Table 1 and in Figure 2, respectively. When Table 1 is examined, the mean dry matter value of the samples was found to be 67.052 %. While one of the samples had dry matter value as 85 %, the values of ten samples

were over 60 % and five samples between 40-60 %. The general distribution was changed between 45 and 70 % (Figure 2). Therefore, it can be said that Katık Keş may be evaluated in category of hard cheese. The probable reason for the variations in the values of dry matter to be so high may be due to the fact that manufacturers sometimes market their fresh product immediately after production, or sometimes marketed after a long wait from production, or the production style habit. The values obtained were similar to the values reported by Akyüz et al. (1993). In addition, the results were lower compared with the values obtained by Güven and Karaca (2009).

Figure 1. Katık Keş sold in Bolu local bazaars

Table 1. Chemical properties of Katık Keş samples (n=15)

	Chemical properties (%)						
	Dry matter	Fat	Protein	Total ash	Salt	Acidity	pH
Minimum	44.90	1.50	29.09	6.55	2.80	0.80	3.46
Maximum	85.12	28.00	47.79	15.25	6.93	2.30	4.74
Mean	67.05 ±8.842	8.78 ±5.897	36.59 ±5.837	11.11 ±3.410	5.20 ±1.381	1.35 ±0.364	3.90 ±0.346

Milk fat significantly influences the flavor and nutritional value of the Katık Keş as in other dairy products. When Table 1 is examined, the mean fat value of the samples was found to be 8.78 % and the distribution of the values of thirteen samples was found between 5-12 % (Figure 2). Fat ratios of the samples were found quite different. The reason for that may be due to the different fat content of the raw material used in making; such as strained yogurt, cream and whey. The fat values were lower than the Kurut samples produced in Elazığ (Patır and Ateş, 2002).

The mean protein value of the samples examined was 36.59 % as average (Table 1). The general distribution of protein values was between 29-48 % (Figure 2). Akyüz et al. (1993) reported protein values between 36.71-69.86 % and the average as 54.64 % in the Kurut samples obtained from the province of Van. Eralp (1953) reported lowest

protein value as 34.48 %, the highest value as 65.59 % and the average as 52.35 %. It can be said that the composition of the raw material used in the Kurut and difference in processing might affect protein value.

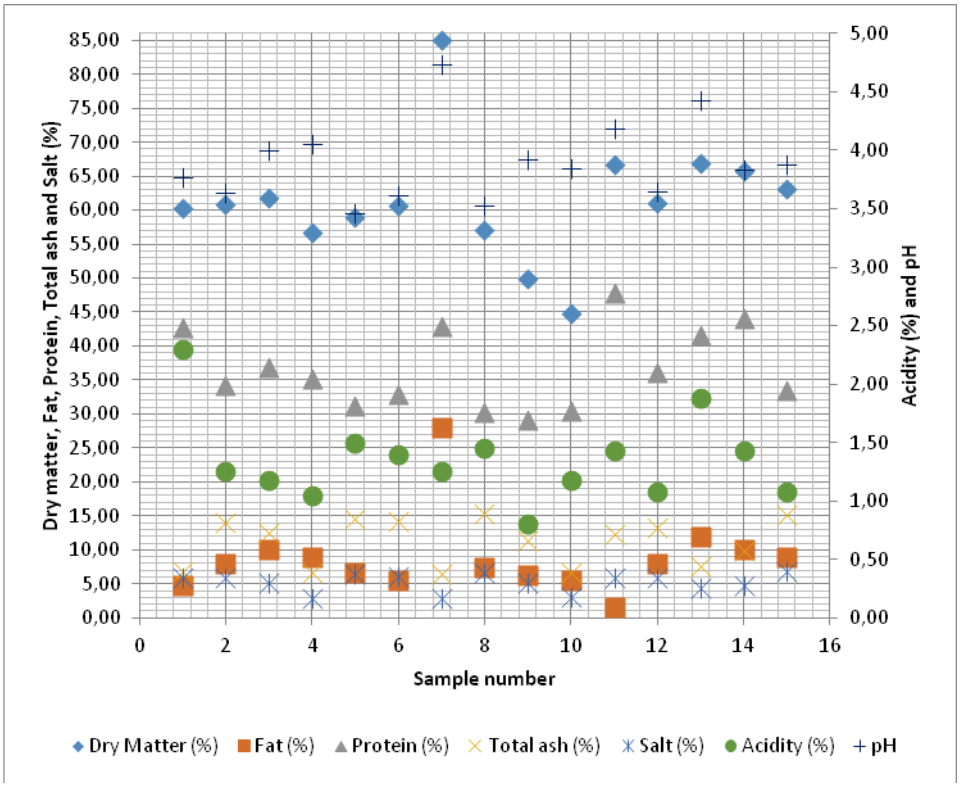

Figure 2. Distribution of chemical values of Katık Keş samples

The mean total ash content of Katık Keş samples was found to be 11.11 % (Table 1) and the general distribution was between 6.5-15 % (Figure 2). The mean value was similar to the value obtained by Akyüz and Gülümser (1987), which was 11.06 %.

Salt contents of the samples analyzed were shown in Table 1. As seen from the table the mean value was found as 5.20 %, which was lower than that of Akyüz and Gülümser (1987). The salt values were generally distributed between 4-7 % (12 of 15 samples) (Figure 2). Our values were fairly lower than those (mean 14.98 %) given by Coşkun et al. (2008). The reason for that Katık Keş is eaten directly and in this case salt level should be lower. Keş for macaroni is produced with higher salt content because the cooking of macaroni is done without salt and thus no need to add salt into the macaroni.

Since Katık Keş is produced from the strained yogurt, it is acidic. The mean acid value as lactic acid (%) of the samples was found to be 1.35 % (Table 1). However, the distribution of the acid values belonged to twelve samples occurred between 1.0-1.5 as percentage. Kalender and Güzeler (2013) reported higher values.

Katık Keş samples had pH values between 3.46 as minimum and 4.74 as maximum (Table 1), which were similar to those reported by Kalender and Güzeler (2013).

Some microbiological properties of Katık Keş samples

The results of microbiological analyses and water activity values of the samples were given in Table 2. The distributions of counts of the microorganisms and water activity values of the samples were given in Figure 3.

Table 2. Some microbiological properties of Katık Keş samples

	Microbiological properties		
	Yeasts and molds (log CFU/g)	Coliforms (log CFU/g)	Water activity (a_w)
Minimum	2.00	0.00	0.67
Maximum	8.01	8.65	0.90
Mean	5.98±2.000	3.36±2.854	0.76±0.068

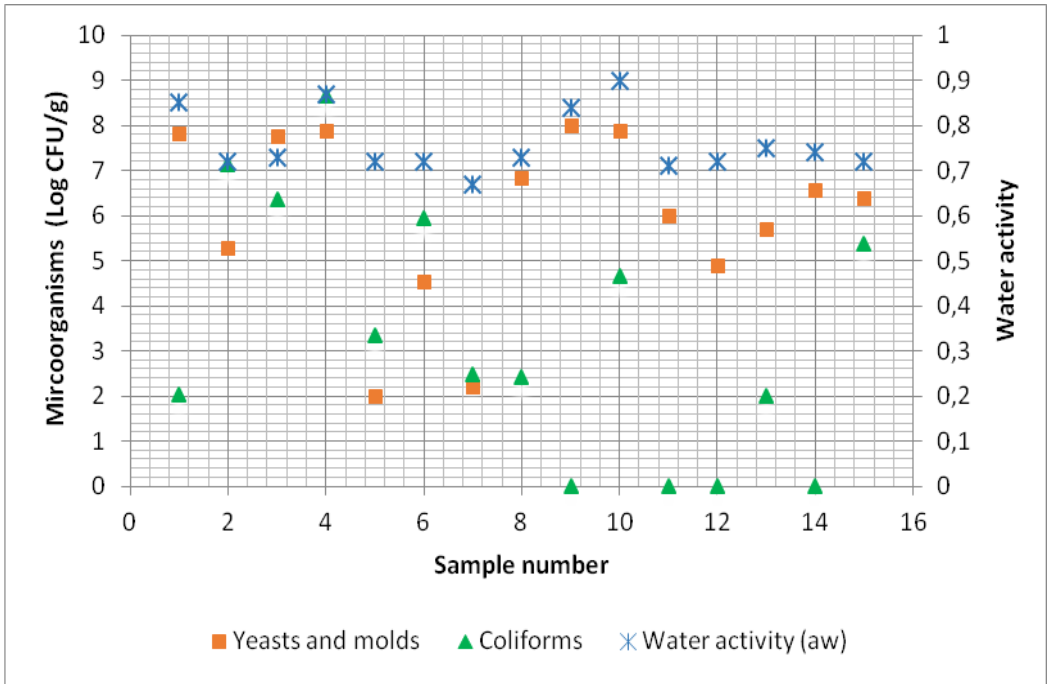

Figure 3. Distribution of counts of the microorganisms and a_w in Katık Keş samples

The numbers of yeasts and molds of 13 samples distributed between 4 and 8 log CFU/g (Figure 3) and the average number took the value of 5.98 log CFU/g. Coşkun et al. (2008) reported similar results. Higher values above 6.00 log unit maybe because of; 1) giving the shape to the Keş by hand, 2) selling the samples in open air and finally 3) handling by costumers and these factors may increase contamination.

Five samples of Katık Keş contained no coliforms (Table 1), the rest of the samples had coliforms between 2.00 and 9.00 log CFU/g (Figure 3). The numbers were lower than those reported by Akyüz et al. (1993) and Coşkun et al. (2008). In 6 samples, coliform counts were higher than 4.00 log unit and the high numbers may show the availability of post contamination from production to marketing.

The results of analysis showed that the most of Keş samples (11 of 15 samples) had water activity (w_a) below 0.75 and in this w_a, limited groups of organisms may grow such as halophilic bacteria and some molds and yeasts (Ayhan, 2000). The rest of the samples were between 0.84 and 0.90 w_a, average was 0.76. The average was similar to that reported by Yaman and Coşkun (2017).

Defining sensorial properties of Katık Keş

All samples of Katık Keş were in the shape of symmetric cone (see Figure 1). The color of the samples was mostly porcelain white, however, some of them were in color of yellowish, white and off-white.

In terms of structure and consistency, 3 of the Keş samples were in soft structure and 12 of the samples were in hard structure. Five of the samples were easily dispersed in the mouth. However, some of the samples were sticky in the mouth, some were crumbling like sand, some were fatty consistency and some contained air gaps.

The Katık Keş samples usually had the taste of salty (sometimes less or normal) and acidic. Smell of the samples was mostly similar to strained yogurt. Two of the samples had heavy smell. Differently, one of the samples had fatty taste.

CONCLUSION

In this study, Katık Keş samples were collected from the villagers in Bolu local bazaars. Totally 15 samples analyzed. Results showed that Katık Keş samples had higher amount of dry matter, fat and protein ratios since the products were dried. Even if some samples contained no coliforms, it can be said that post contamination risk available. Sensorial descriptions showed that the samples were mostly porcelain white color, symmetric cone in shape, hard structured and easily dispersed in the mouth, salty and acidic taste and smelling as strained yogurt.

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