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DETERMINATION OF SOME PROPERTIES OF OAT TARHANA AND COMPARISON WITH TRADITIONAL MARAS TARHANA

YULAF KATKILI TARHANALARIN BAZI ÖZELLİKLERİNİN BELİRLENMESİ VE MARAŞ TARHANASI İLE KARŞILAŞTIRILMASI

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ÖZET

Çalışmamızda besinsel lif içeriği yüksek, protein, yağ gibi besin maddelerince zengin yulaf ezmesi belirli oranlarda yöresel Maraş tarhanasına ilave edilerek hem yeni bir ürün elde etmek hem de yulafın insan beslenmesinde kullanımına yeni bir alternatif geliştirmek amaçlanmıştır. Bu amaçla geleneksel Maraş tarhanasına dövme yerine yulaf ezmesinden % 10, % 20, % 30, % 40 ve % 50 oranlarında ilave edilmiştir. Yulaf ezmesi katkılı tarhanalar aynı koşullarda üretilen kontrol Maraş tarhanası örneği ile fiziksel, kimyasal ve duyusal açıdan karşılaştırılmıştır.

Bu araştırma sonucunda yulaf ezmesinin geleneksel Maraş tarhanasının kimyasal ve duyusal özelliklerini olumlu yönde etkilediği görülmüştür. Tarhana üretiminde kullanılacak en uygun yulaf ezmesi oranlarının % 40 ve % 50 olduğu belirlenmiştir.

Anahtar Kelimeler: Maraş, tarhana, traditional food, fermented food, dietary fiber, oat

ABSTRACT

In this study, oatmeal which is rich in nutritional compounds such as protein, fat, dietary fiber, were added to the Maras tarhana (Soup with Dried Yoghurt) for the replacement of wheat, as a new product and an alternative of oat use on human nutrition. For this purpose, oatmeal was added to the traditional Maras tarhana at 10%, 20%, 30%, 40% and 50%, and changes in the physical, chemical and organoleptic properties were examined in comparison to the traditional Maras tarhana produced from wheat. As a result of this research, it was found that the ash, fat, protein and cellulose contents increased with the addition of oatmeal, Hunter L values decreased, indicating reduction in the lightness, and Hunter a values increased, indicating increase in the redness. The oatmeal addition affected the organoleptic characteristics of the traditional Maras tarhana positively. It was been determined that the most suitable ratio of oatmeal to be used in tarhana production were 40% and 50%.
Keywords: Maraş tarhana, traditional food, fermented food, dietary fiber, oat

Introduction

Traditional foods are ethnic foods that are formed by the interaction of ecological and sociocultural environment over many years and shaped by factors such as climate, agricultural product composition, nutrition habits, working conditions and religion in the region where societies live in (Şahin and Avşar, 2004; Cayot, 2007). Tarhana, which is a traditional fermented food unique to Turkey and generally used in soup making, is a cereal based fermented food made from a mixture of cereals and yoghurt (Akbaş and Coşkun, 2006). According to the legislation of the European Union (within the framework of regulation 2028/92), traditional food consists of products produced using traditional raw materials or produced by the operating method, which reflects a traditional production type characterized by a traditional composition. Traditional foods explain the culture, history and lifestyle of the region which they belong (Vasilopoulou et al., 2005).

Fermented foods, which are generally produced by traditional methods, play an important role in the daily diet of people (Leroy and De Vuyst, 2004). In the recent years, consumer demands that have been minimally processed, free of preservative chemicals and increased against natural foods have made it necessary to develop alternative food processing and preservation techniques. Among these, fermentation is having a great importance as a biotechnological production and preservation method (Erbaş et al., 2004). Different microorganisms and their enzymes break down food components and changes of the taste, smell, texture, durability and nutritional qualities to create products that are more delightful is called fermentation (Nout and Matarjami 1997). With Fermentation fermented foods with improved aroma, texture, shelf life, nutritional value, reliability and serviceability will be produced (Steinkrauss, 2002).

Food fermentation is one of the oldest known application fields of biotechnology and has reached its current state from natural processes with the use of selected starter cultures from environmental conditions and, more recently, strains developed through gene technology. Lactic acid bacteria, especially Aspergillus and Penicillum species from molds, Saccharomyces species from yeasts are very important microorganisms in the formation of these products (Boyacioglu 1994, Kilic and Yukselci 2004).

Nowadays, there is interest in the consumption of fermented foods by millions of people from different communities and ethnic groups around the world. The reason for this consumers are interest in natural healthy foods. In the future Fermented foods consumption is predicted to increase all over the world. Because fermentation is a very effective preservation method that reduces the need for other food preservation techniques that increase shelf life (Campbell-platt, 1994).

Studies conducted by many researchers have shown that fermentation increases the nutritional value and digestibility of cereals. It has been found that there is a significant increase in the extraction rate and digestibility of cereal proteins after fermentation, in general the starch and fiber content decrease slightly due to the use of microorganisms, but the amount of reducing sugar increases. In addition, carbohydrate digestibility of cereals has been shown to increase after fermentation in various studies. Although no changes have been determined after fermentation in the amount of fat and fatty acid composition of cereals, it has been reported that hydrolytic changes may cause changes in the functional and organoleptic properties of the product. While no change was observed as a result of fermentation in the amount of mineral substances, their digestion and absorption increased because in the amount of phytic acid and tannins is decreased as a result of fermentation is thought to be effective (Özbilgin, 1983; Saldamli, 1983). Flour, which the main raw material in Tarhana, is a food rich in essential amino acids. Yoghurt added to tarhana enriches tarhana in terms of essential amino acids that are also missing in flour (Koca and Tarakçı, 1997). It also increases the amount of low lysine and threonine (Tarakçı et al., 2004).

MATERIAL and METHOD

MATERIAL

Wheat (darıyel), oatmeal (ETİ Lifalif), yoghurt (local village yogurt), thyme, salt (Billur Salt) used in this study were purchased from a local market in Kahramanmaraş. Physical, chemical and organoleptic analyzes were performed in Food Engineering Laboratories of Kahramanmaraş Sütçü İmam University Faculty of Agriculture and Kahramanmaraş Commodity Exchange Private Food Control Laboratory.

METHOD

Formulation and Production of Maraş Tarhana

Tarhana samples were made according to the formulation in Table 3.1. 10%, 20%, 30%, 40% and 50% (w / w) of oatmeal was added for the replacement of to Tarhana formulation. Tarhana samples were produced as given in Figure 1.

Table 2. Tarhana formulation

Rawmaterial	Quantity (g)
Wheat	250
Yoghurt	750
Salt	6,25
Thyme	1,5

Table 3. Oatmeal and wheat ratios of oatmeal added tarhanas

Tarhanas	Oat (g)	Wheat (g)
Tarhana with 10% oatmeal added	25	225
Tarhana with 20% oatmeal added	50	200
Tarhana with 30% oatmeal added	75	175
Tarhana with 40% oatmeal added	100	150
Tarhana with 50% oatmeal added	125	125

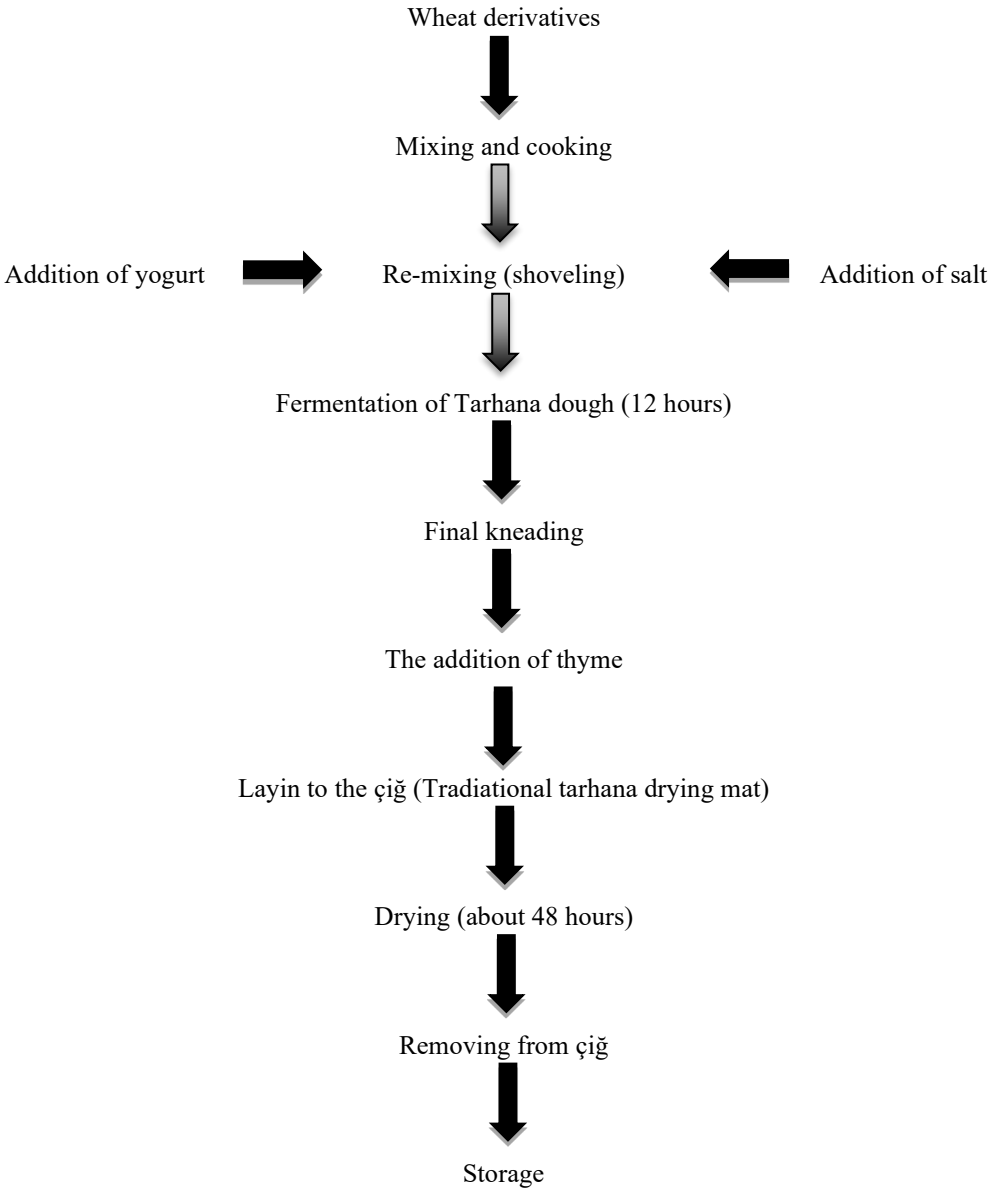

Figure 1. Production flow chart of Maraş tarhana

RESULTS AND DISCUSSION

Raw material properties

The raw material analysis results are given in Table 3. The carbohydrate and moisture content of the wheat which is one of the main components of Maraş tarhana were higher than the oatmeal. However, protein, fat, cellulose and ash ratios of oatmeal are higher than wheat.

Table 4. Properties of wheat and oatmeal

	Moisture (%)	Ash (%)	Protein (%)	Fat (%)	Cellulose (%)	Carbohydrate (%)
Oatmeal	9.44	1.41	12.6	8.37	1.84	68.18
wheat	10.17	1.09	10.6	1.20	1.20	76.94

Moisture content of tarhana

Tarhana samples produced by adding different amounts of oatmeal had a moisture value between 8.86% and 9.36% (Table 4). The lowest moisture content was found in as 8.86% in the tarhana sample with 20% oatmeal and the highest moisture content was found in the control tarhana sample as 9.36%. TSE 2282 standard states that the amount of moisture in tarhana should be at most 10%. The values found in this study are below the value specified in TSE 2282 standard.

Table 5. Statistical results of moisture content of tarhana samples

Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
Tukey	9.36^{a}±1,29	8.90^{a}±0,60	8.86^{a}±0,74	8.97^{a}±0.28	8.93^{a}±0,92	8.93^{a}±0,55
Duncan	9.36^{a}±1,29	8.90^{a}±0,60	8.86^{a}±0,74	8.97^{a}±0.28	8.93^{a}±0,92	8.93^{a}±0,55

Ash content of tarhana

Ash in cereals and cereal products is the residue of the minerals left behind by combustion. The ash contents of tarhana samples are given in Table 5. The ash content of tarhanas produced by adding oatmeal in different ratios were found between 3.19% and 4.27%. The lowest ash content was found in the control tarhana sample as 3.19% and the highest ash content was found in the tarhana sample with 50% oatmeal added as 4.27%.

Table 6. Statistical results of ash content of tarhana samples

Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
Tukey	3.19^{a}±0,09	3.49^{a}±0,08	3.55^{ab}±0,21	3.39^{a}±0,71	4.03^{bc}±0,05	4.27^{c}±0,09
Duncan	3.19^{a}±0,09	3.49^{a}±0,08	3.55^{a}±0,21	3.39^{a}±0,71	4.03^{b}±0,05	4.27^{b}±0,09

pH Value

The pH values of tarhanas produced by adding oatmeal in different ratios were found between 4.04 and 4.12. The lowest pH value was found as 4.04 in tarhana sample with 50% oatmeal added, the highest pH value was found as

4.12 in the control tarhana sample and 20% oatmeal added tarhana sample. The results of the analysis are given in Table 6.

Table 7. Statistical results of pH values of tarhana samples

Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
Tukey	4.12^{c}±0,03	4.10^{bc}±0,01	4.12^{c}±0,02	4.11^{bc}±0,01	4.09^{b}±0,02	4.04a±0,00
Duncan	4.12^{c}±0,03	4.10^{bc}±0,01	4.12^{c}±0,02	4.11^{c}±0,01	4.09^{b}±0,02	4.04^{a}±0,00

Color Analysis

The Hunter Lab values of tarhana samples are given in Table 7. Hunter L values of the tarhanas produced by adding oatmeal in different ratios were found between 50.77 and 66.06. The lowest L value was found in the tarhana sample with 50% oatmeal added as 50.77 and the highest L value was found in the tarhana sample with 20% oatmeal added as 50.77. The reason of this; It can be explained by the fact that the brightness value of oatmeal used as raw material is lower than the brightness value of wheat.

Hunter a values of the tarhanas produced by adding oatmeal in different ratios were found between 0.87 and 2.01. The lowest a value was found in the tarhana sample with 10% oatmeal added as 0.87 and the highest a value was found in the tarhana sample with 50% oatmeal added as 2.01. The reason of this; It can be explained by the fact that the redness value of oatmeal used as raw material is higher than the redness value of wheat.

Hunter b values of the tarhanas produced by adding oatmeal in different ratios were found between 15.90 and 17.74. The lowest b value was found in the tarhana sample with 10% oatmeal added as 15.90 and the highest b value was found in the tarhana sample with 50% oatmeal added as 17.74. The reason of this; It can be explained by the fact that the yellowness value of oatmeal used as raw material is higher than the yellowness value of wheat.

Table 8 Statistical results of Hunter L, a, and b values of tarhana samples

	Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
L	Tukey	62.92^{b}±2,80	55.81^{b}±1,15	66.06^{b}±0,71	60.11^{ab}±1,84	64.60^{a}±4,92	63.77^{a}±0,08
	Duncan	62.92^{bc}±2,80	55.81^{c}±1,15	66.06c±0,71	60.11^{b}±1,84	64.60^{a}±4,92	64.54^{a}±0,08
a	Tukey	1.41^{a}±0,58	0,87^{a}±0,41	1.29^{a}±0,33	1.89^{a}±0,54	1.71^{a}±0,25	2.01^{a}±0,19
	Duncan	1.41^{ab}±0,58	0,87^{a}±0,41	1.29^{ab}±0,33	1.89^{b}±0,54	1.71^{b}±0,25	2.01^{b}±0,19
b	Tukey	18.85^{a}±2,00	19.24^{a}±0,58	19.69^{a}±1,50	16.48^{a}±4,92	17.01^{a}±1,46	17.74^{a}±0,88
	Duncan	18.85^{a}±2,00	19.24^{a}±0,58	19.69^{a}±1,50	16.48^{a}±4,92	17.01^{a}±1,46	17.74^{a}±0,88

Fat content of tarhana

The fat contents are given in Table 8.The fat content of tarhanas produced by adding different amounts of oatmeal was found between 5.1% and 6.7%. The lowest fat content was 5.1% in 10% oatmeal added tarhana and the highest fat content was 6.7% in 50% oatmeal added tarhana sample.

Table 9 Statistical results of fat content in tarhana samples

Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
Tukey	5.72^{ab}±0,04	5.10^{a}±0,02	6.57^{b}±0,24	5.84^{ab}±0,11	6.52^{b}±0,54	6.73^{b}±0,25
Duncan	5.72^{ab}±0,04	5.10^{a}±0,02	6.57^{c}±0,24	5.84^{ab}±0,11	6.52^{c}±0,54	6.73^{c}±0,25

Protein content of tarhana

The results of the protein analysis are given in Table 9.The protein content of tarhanas produced by adding different amounts of oatmeal was found between 15.05% and 15.84%. The lowest protein content was 15.05 % in control tarhana sample and the highest protein content was 15.84% in 50% oatmeal added tarhana sample.

Table 10. Statistical results of protein content in tarhana samples

Tarhanas	Control	10% oatmeal	20% oatmeal	30% oatmeal	40% oatmeal	50% oatmeal
Tukey	15.05^{a}±0,07	15.3^{a}±0,42	15.4^{a}±0,42	15.49^{a}±0,02	15.55^{a}±0,64	15.85^{a}±0,35
Duncan	15.05^{a}±0,07	15.3^{a}±0,42	15.4^{a}±0,42	15.49^{a}±0,02	15.55^{a}±0,64	15.85^{a}±0,35

Organoleptic properties of tarhana

When the results of the organoleptic analysis of tarhanas produced by adding different amounts of oatmeal were examined, the highest score in terms of "color" was obtained from the control tarhana sample. Second highest scored was the tarhana sample with 50% oatmeal added. The lowest score was obtained from tarhana sample with 10% oatmeal added. All results related to organoleptic analysis are given in Table 10.

The highest score in terms of "flavor" was obtained from the control tarhana sample. Second highest scored was the tarhana sample with 50% oatmeal added. The lowest score was obtained from tarhana sample with 10% oatmeal added.

The highest score in terms of "sourness" was obtained from the control tarhana sample. Second highest scored was the tarhana sample with 50% oatmeal added. The lowest score was obtained from tarhana sample with 30% oatmeal added.

In terms of "odor", the highest score was obtained by 50% oatmeal added tarhana and the lowest by 30% oatmeal added tarhana sample. When “Hardness-Brittleness-Fragility” is examined, the highest score is obtained from the

control tarhana and with 50% oatmeal added tarhana and also the lowest score was obtained from tarhana with 30% oatmeal added.

The highest score in terms of "General Acceptability" was obtained from the control tarhana sample. Second highest scored was the tarhana sample with 50% oatmeal added. The lowest score was obtained from tarhana sample with 0% oatmeal added.

Table 11. Statistical results of organoleptic analysis in tarhana samples

	Tarhanas	**Control**	**10% oatmeal**	**20% oatmeal**	**30% oatmeal**	**40% oatmeal**	**50% oatmeal**
Appearence	Tukey	4.13^{c}	2.33^{a}	$_{3}$ab	2.8^{ab}	3.53^{bc}	3.60^{bc}
	Duncan	4.13^{c}	2.33^{a}	$_{3}$ab	2.8a	3.53^{bc}	3.60^{bc}
Colour	Tukey	4.2^{c}	2.47^{a}	3.6^{bc}	2.87^{ab}	3.47^{bc}	3.73^{c}
	Duncan	4.2^{c}	2.47^{a}	3.6^{bc}	2.87^{a}	3.47^{b}	3.73^{bc}
Flavour	Tukey	3.87^{c}	2.07^{a}	$_{3}$abc	2.13^{ab}	3.13^{bc}	3.4^{c}
	Duncan	3.87^{c}	2.07^{a}	$_{3}$b	2.13^{a}	3.13^{b}	3.4^{bc}
Sourness	Tukey	3.47^{b}	2.40^{ab}	2.87^{ab}	1.93^{a}	2.87^{ab}	3.13^{b}
	Duncan	3.47^{c}	2.40^{ab}	2.87^{bc}	1.93^{a}	2.87^{bc}	3.13^{bc}
Odor	Tukey	3.33^{b}	2.80^{ab}	3.33^{b}	2.07^{a}	3.07^{b}	3.47^{b}
	Duncan	3.33^{b}	2.80^{b}	3.33^{b}	2.07^{a}	3.07^{b}	3.47^{b}
Hardness-Brittleness-Fragility	Tukey	4.13^{b}	3.07^{a}	3.47^{ab}	$_{3}$a	3.80^{ab}	4.13^{b}
	Duncan	4.13^{b}	3.07^{a}	3.47^{ab}	$_{3}$a	3.80^{b}	4.13^{b}
General Acceptability	Tukey	$_{4}$b	2.2^{a}	3.13^{ab}	2.67^{a}	3.13^{ab}	3.87^{b}
	Duncan	$_{4}$d	2.2^{a}	3.13^{bc}	2.67^{ab}	3.13^{bc}	3.87^{cd}

RESULTS

The manufacture techniques of the local tarhana which was produced in Kahramanmaraş was demonstrated. Under laboratory conditions, control (by wheat) and tarhanas 10%, 20%, 30%, 40% and 50% oatmeal added were produced and the chemical and organoleptic properties of the tarhanas were determined and the optimum amount of oatmeal that could be used in tarhana production was determined.

When the analysis results are examined, it is seen that the carbohydrate and moisture content of the wheat which is one of the main components of Maraş tarhana is higher than the oatmeal used as an additive. However, protein, fat, cellulose and ash ratios of oatmeal are higher than wheat.

When the moisture content of Tarhana samples is examined, it is seen that all samples have similar values. It can be said that the small differences observed may be due to the raw material properties in tarhana composition and the weather conditions in which the product is dried.

When the amount of ash was examined, it was observed that the addition of oatmeal generally increased the ash amounts of tarhana.

In Tarhana samples, it was observed that the fat content generally increased with the addition of oatmeal. It can be said that the fluctuations observed may be due to the fat content of yogurt, which is an important fat source for the product.

When the pH analysis results of Tarhana samples were examined, it was observed that the pH value was partially decreased by the addition of oatmeal. Accordingly, titration acidity was partially increased with the addition of oatmeal. However, titration acid values were lower than the standard values. This may be due to the fermentation step does not perform at the desired efficiency due to the cool and rainy days when the tarhana samples are prepared and dried. The acidity may not have developed effectively due to the lack of the desired temperature parameter which significantly affects the fermentation.

The protein content of Tarhana samples increased in direct proportion with the amount of oatmeal. This may be due to the relatively higher protein content of oatmeal than wheat.

The carbohydrate content was decreased due to the increase in the amount of oatmeal. This result may be due to the fact that the wheats' carbohydrate is higher than the oatmeal carbohydrate.

The cellulose content of Tarhana samples was partially increased due to the addition of oatmeal. This may be due to the cellulose content of the oatmeal is higher than the cellulose content of the wheat. Furthermore, this increase in cellulose, which forms the water-insoluble portion of the dietary fiber, may lead us to the conclusion that the total dietary fiber content also increases with the addition of oatmeal.

When the color analysis results of Tarhana were examined, it was observed that the increase in oatmeal ratio decreased the brightness of the products but increased the yellowness and redness values.

When the organoleptic analysis results were examined, control tarhana received the most rating in general. This may be due to its appeal to the palate that has been adopted for years. The increase in oatmeal ratio contributed to the increase in the liking scores of many parameters such as color, odor, hardness-brittleness and fragility.

As a result of our study;

Maraş tarhana is an important traditional food with its unique production, drying method and consumption variety. It is a fermented product with high nutritional value. The amount of raw materials used in Tarhana production will be affects product quality and taste.

Oat is important cereal rich in dietary fiber. Its use in human consumption has become widespread in recent years. Oats, which are consumed especially for weight control, are the main protagonists of a healthy diet. It is a cereal that is rich in vitamin E and regulatory effect of intestinal functions should be included in daily consumption. With the addition of oats bearing these characteristics to the Maraş tarhana, a new product was produced and a new alternative for the use of oats in human nutrition was developed.

As a result of this study, oatmeal added tarhanas were produced by adding certain amounts of oatmeal to Maraş tarhana which was traditionally produced and consumed in a limited region and at homes and the significant differences was found between traditional Maraş tarhana and oatmeal added tarhanas. The addition of oatmeal was found to have a positive effect on the chemical and organoleptic properties of tarhana. When chemical analysis and organoleptic analysis results were examined, it was determined that oatmeal ratios to be used in tarhana production were 40% and 50%.

The production of traditional Maraş tarhana by adding different spices and additives will increase the nutritional quality of our traditional product.

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