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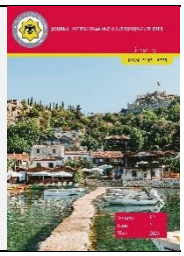

The Effect of Different Marinades on Some Quality and Sensory Properties of Chicken Breast Meat

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Abstract

In this study, it was aimed to determine the effects of different marination liquids on some quality and sensory properties of chicken breast meat. Three different marination formulations (containing olive oil, red wine and yogurt) were used in the study. After cooking, cooking loss, marinade absorption, pH, color, texture analysis results and sensory test results are discussed. As a result, it was observed that the differences between cooking loss, marinade absorption and pH values of the cooked samples were statistically significant ($p<0.05$) as a result of analysis of variance and multiple comparison test (Tukey). When the color analysis results were examined, it was determined that different marinades could be effective on the brightness (L*), redness (a*) and yellowness (b*) values of the cooked chicken meat samples and the results obtained were statistically significant ($p<0.05$). Since the textural values did not show a normal distribution, the Wilcoxon test was applied and no significant difference was detected between the marinades ($p>0.05$). A panelist test was conducted on 25 people by examining the smell, texture, flavor and color of the samples sensory-wise and a general appreciation scale was created. As a result of the Tukey multiple comparison test applied to sensory analysis data, it was determined that the marination solution containing olive oil had the highest approval score by consumers.

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INTRODUCTION

The characteristics of a food in terms of quality have primary importance in determining the preferability of that food. Consumers perceive food as tasty if it is pleasing to the senses. At food and beverage enterprises, it is expected for the protein-based products such as meat, fish, and chicken presented to the consumers to be of high quality and taste. The food consisting of these products being more expensive on the enterprises' menus is a fact known to be effective on the expectations of customers. There are numerous operations performed on meat to improve its flavor. The first one among these is known as marination (Rault et al., 1989; Gault, 1991). Marination is defined as the application of a liquid mixture to the meat that contains salt, sugar, phosphate, spices, and substances providing aroma and crispiness (Suderman, 1993). In other words, marination is defined as the application of various food stuffs, such as vegetable oils and salt, and of flavoring substances to raw meat through suitable technology (Yıldırım & Çiçek, 2021).

The mixture of flavoring substances used for the marination operation is called marinade. It is ensured that the marinades penetrate the meat structure through injection, immersion, tumbling, and massage (Parks et al, 2000; Sheard et al., 2005; Yusop et al., 2010). Marination operation improves the textural characteristics of meat and strengthens the meat in terms of taste and aroma (Erge et al., 2018).

Crispiness and juiciness, among the mouthfeel sensory characteristics, are the primary criteria in determining the taste of meat and meat products. While crispiness is determined as the resistance of meat against chewing and status of being cut by the teeth, the sense arising during the release of the juice while chewing is expressed as juiciness. Even if it is known that the marination operation is applied to red meat it is largely frequently observed that poultry meat is also being marinated. In general, it is important to give flavor to hard and dry poultry meat through marination, and to consume them as such (Akyüz et al., 2020). In marination operations, plenty of use of organic acids as well as salt is observed (Kahraman et al., 2010). In particular, acetic acid, lactic acid, and citric acid among organic acids are ingredients extensively used in marinade mixtures due to their natural structures. Such organic acids decrease the intracellular pH, so they increase the water-holding capacity of meat (Aktaş & Kaya, 2001). Since yoghurt and liquids such as vinegar, fruit juices, and wine structurally include such acids, they increase the shelf-life as well as decrease the pH (Ergezer & Gökçe, 2004). Moreover, it is also known that the ingredients used in the obtainment of marinades positively affect many quality parameters such as aroma, taste, color being in the first place (Ponce et al., 2008). Since the marination period being admitted for chicken, among the most frequently consumed poultry meats, can be 2-3 hours, it is suggested to increase the marination period to 6-8 hours for a stronger improvement in taste and aroma (Tarantino, 2006). Even if it is known that industrial marination operations are generally performed for chicken meat, it is also known that tumbling and injection methods are frequently preferred (Yusop et al., 2010).

In this study, it was aimed to determine the effect of marinating chicken breast with different marinades using the immersion method on some quality and sensory properties. Thus, marinated chicken breast will be improved in terms of aroma and taste, and the effect of marination on quality characteristics of chicken breast will be determined. The study is a multidisciplinary study that brings together disciplines such as gastronomy, food science and nutrition. Cesur (2009), Erge, Cin and Şeker (2018), Akyüz, Güneşer and Esen (2020), Serdaroğlu, Abdraimoz and Önenç (2007), Kadıoğlu et al. (2019), Ertbjerg et al. (1999) in their studies on chicken meat. They evaluated the marinating

liquids they used. In the studies, acidic or alkaline marinades were evaluated separately. The difference of this study from the aforementioned studies is related to the use of acidic and alkaline marinades together. Chicken breast meat, which generally has a lean and dry structure, is frequently included in menus because it has a high protein value and is a protein product alternative to red meat and fish. Flavoring this relatively tasteless meat and standardizing marination formulations are important in terms of consumer taste and product diversity. The main problem of the study is what kind of changes the marinades most frequently used in kitchens cause in the structure of chicken meat, both in terms of quality and sensory. In particular, as a result of sensory tests, it will be possible to determine which marinade consumers prefer in chicken breast meat, and this will form the basis for the application of such a marination technique in kitchens. The study is limited to the chicken breast meat sample and marination formulations used in the material.

Methodology

Material

In the study, the chicken fillets procured from a special wholesale firm were received at +4˚C, and they were conveyed to the kitchen without breaking the cold chain. It was cared for the chicken fillets to have a weight of about 100-130 gr and to be of equal size and thickness. Moreover, it was taken care of to store the fillets under +4˚C until the marination operation. The ingredients used in the marination operation were procured from a local chain store. The ingredients and their ratios used in the marination formulations were created as a result of pre-cooking trials and sensory analysis tests (applied to 25 panelists between the ages of 19-41) performed in these trials. As a result of the pre-cooking experiments and sensory controls, the desired aroma could not be achieved when freshly used onion and garlic, which have a strong aromatic effect, therefore it was preferred to dry them in the dehydrator and use them as powder. The wine used in the formulation is Öküzgözü-Boğazkere wine with 13.5% alcohol content. Additionally, full-fat yoghurt was used in the study. The marinades prepared are presented in Table 1.

Table 1. Marinate Formulations

	Marinade 1	**Marinade 2**	**Marinade 3**
Ingredients (100 gr)	Olive Oil Salt (% 2,5) Sugar (%1,5) Onion Powder (%3) Garlic Powder (%1,5) Thyme (%1 Rosemary (%2,5)	Red Wine Salt (% 2,5) Sugar (%1,5) Onion Powder (%3) Garlic Powder (%1,5) Thyme (%1 Rosemary (%2,5)	Yoghurt Salt (% 2,5) Sugar (%1,5) Onion Powder (%3) Garlic Powder (%1,5) Thyme (%1 Rosemary (%2,5)

Method

In the study, chicken fillet samples were marinated using control sample (marinated with pure water) and three different marinade solutions. The samples were treated with marinades by immersion method, marinated at +4°C for 24 hours, then analyzes were carried out. The study was carried out in three replications.

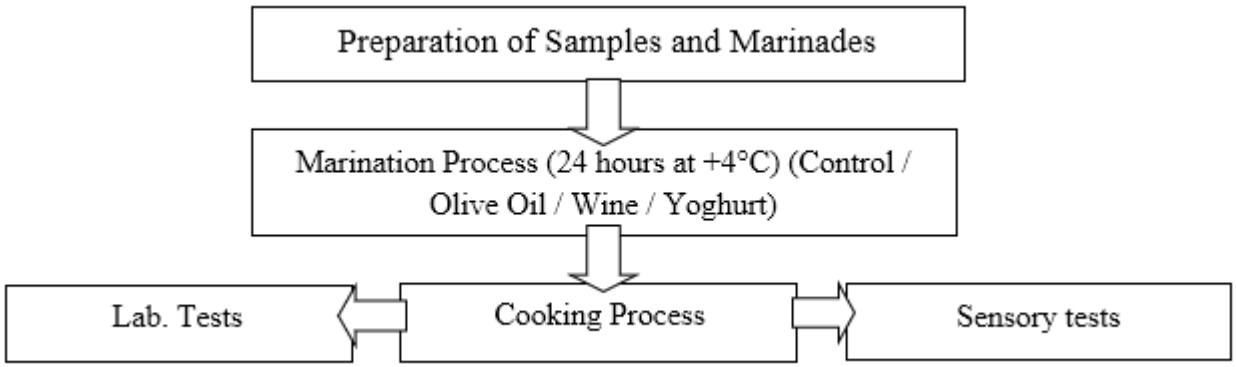

Figure 1. Experimental Pattern

Following the conveyance of the chicken fillet samples to the kitchen, they were marinated using the different marinades shown in Table 1 through the immersion method under +4˚C for 24 hours. The marination operation was carried out inside the gastronome basin in such a manner that the marinade would completely cover the chicken fillets at a rate of 1:1. Marination solutions were created by the author. The gastronome basin was covered with stretch film. The same procedures were used with distilled water for the control sample (Erge et al.,2018). The preference of the immersion method in the study is due to its simplicity, applicability to many meat types, and enablement of working in small capacities (Ergezer & Gökçe, 2004).

Following the marination operation performed for 24 hours under +4˚C in the fridge, the chicken fillets were placed in hot pan, and cooked as being seared. After the cooking operation, it was ensured that the samples would reach room temperature and their analyses were performed.

For the determination of the cook loss of the marinated and cooked chicken fillets, loss of weight of the sample was considered (Jarvis et al., 2012). The formula used in the calculation of cook loss is as follows;

*Cook loss = 100 * (Wts – Wtp) / Wts*

Wts: Weight of raw meat samples

Wtp: Postcook weight of the samples

Marinade absorption is used to determine how much marinade has penetrated the marinated products. Marinade absorption is calculated using the pre-marination and post-marination weights of the samples (Young & Buhr, 2000).

Marinade Absorption = 100 * (Wtm – Wti) / Wti

Wtm: Post-marination weight

Wti: Pre-marination weight

For the determination of pH value, a 10 gr of the sample was homogenized with 100 mL of distilled water in a homogenizer, and it was read via a pre-calibrated pH meter (Gökalpet al., 2002).

Color measurements of the marinated chicken fillets were actualized under three conditions by the use of the HunterLab device. These conditions were determined as pre-marination, post-marination, and post cook. In the measurement of color values, a calculation was performed over the L* (brightness), a* (redness) and b* (yellowness) values (Başoğlu, 2004).

Pieces of approximately 4x4 cm and 1 cm thickness were cut for texture profile analysis in the samples cooked after marination. The cooked chicken fillets' hardness, springiness, chewiness, and cohesiveness factors were measured via the TA-XT Plus Stable Micro Systems, UK device. Texture profile analysis conditions; Target compression-deformation: 25%, Trigger load: 0.44N, Test speed: 1mm/s, 35 mm cylindrical probe was used for the texture profile analysis (Balık, 2011; Söylemez, 2013).

In order to evaluate the marinated and cooked samples in terms of sensory properties, a hedonic scale sensory analysis test (smell, taste, color, texture, general appreciation) was conducted with 25 semi-trained panelists (Enes, Yavuz & Ercik, 2022). The panelists participating in the test consist of academicians and students with sensory analysis knowledge in the fields of Gastronomy and Culinary Arts and Food Engineering. The average age of the panelists is between 19-41. In the tests, samples marinated with 3 different formulations were presented to the panelists. Samples were presented on a randomly coded white porcelain plate at eating temperature (55 to 65° C) and weighing approximately 15 g. Panelists were asked to evaluate the sensory properties of the samples on a 10-point hedonic scale. During sample passages, panelists neutralized the oral cavity with water and white bread (Akyüz et al., 2020).

The ethics committee permission required for the sensory analysis study was received by Doğuş University Ethics Committee with number 2024/25. In the study, an ethical statement and an informative text were conveyed to the consumers before the sensory test was performed. In this context, the participation of the participants in the study is on a voluntary basis. Participants do not have to write their names or give any information that will reveal their identity, the names of the participants in the research will be kept confidential. The data collected within the scope of the research will only be used for scientific purposes, will not be used outside the purpose of the research or in any other research, and will not be shared with others without the consent of the participant, if necessary.

In the study, all the analyses were conducted with three iterations. The SPSS version 25 software was used in the statistical analysis of the data obtained, and the data was subjected to One-Way Analysis of Variance (ANOVA). Since the data for the texture variable did not exhibit a normal distribution, the Wilcoxon test was applied. In the evaluation of significant differences obtained, Tukey's HSD (honestly significant difference) test was used. In addition, data are given with arithmetic mean (mean of three replications) and standard deviation (Ural & Kılıç, 2018; Coşkun et al., 2019).

Results and Discussion

In Table 2, data regarding the cook loss of chicken fillets marinated with different marinades is provided.

Table 2. Cook loss (%)

Marinade	Cook Loss (%)
Control	31.08 ± 0.89^{a}
Marinade 1	28.37 ± 0.84^{ab}
Marinade 2	26.19 ± 0.79^{b}
Marinade 3	27.89 ± 0.81^{b}

a-b$p<0.05$ Different letters on the same column are statistically different.

According to the results obtained from the study, it was understood that different marinades had an effect on the cook loss of the chicken fillets ($p<0.05$). It was observed that marinated samples showed lower cook loss compared

to control sample. Considering the cook loss data, it was observed that Marinade 2 showed the lowest cook loss (26.19%). This status indicates that Marinade 2 is a more usable marinade in terms of cook loss. Cesur (2008) specified in his study that the relationship between the marinade and cook loss may be related to the amount of solid ingredients in the marinade. In their study, Erge, Cin, and Şeker (2018) explored the usability of plum and apple juice in the marination of chicken. According to the data obtained from their study, they revealed that apple juice was causing the lowest cook loss, and that apple juice may be used in the marination of chicken in terms of cook loss. In this study, the lowest cook loss rate was observed in chicken marinated with Marinade 2. It is thought that its reason may be the use of red wine in the marinade. A similar state is characterized by the presence of malic acid in the wine in Marinade 2 and the presence of the same in the apple juice used in the study by Erge, Cin, and Şeker (2018). In Table 3, data regarding the marinade absorption characteristics of chicken samples marinated with different marinades is provided.

Table 3. Marinade absorption (%)

Marinade	Marinade Absorption (%)
Control	1.09 ± 0.04^{b}
Marinade 1	0.37 ± 0.01^{c}
Marinade 2	0.02 ± 0.01^{c}
Marinade 3	1.12 ± 0.04^{a}

a-c $p<0.05$ Different letters on the same column are statistically different.

Considering the data in Table 3 regarding the marinade absorption characteristics of chicken fillets, it is possible to specify that there is a significant difference between the marinades and the control sample ($p<0.05$). In addition, it is observed that there is no statistically significant difference between Marinade 1 and Marinade 2 in terms of absorption state ($p>0.05$). From the findings of the study, it is observed that Marinade 3 had provided the highest marinade absorption. Marinade 3 is a marination mixture prepared with yoghurt. In their study on the subject, Akyüz, Güneşer, and Esen (2020) obtained similar results. In the study, higher marinade absorption was observed in marination with hot and sweet yoghurt compared to other marinades. It is thought that this is due to the fact that yoghurt contains more lactic acid, which has a tissue-breaking effect, compared to other marinades.

Table 4. pH degrees of marinade and chicken breast sample

Marinade	pH of Marinade	Pre-marination pH	Post-marination pH	Post-cook pH
Control	5.71 ± 0.01	5.71 ± 0.02^{b}	5.82 ± 0.01^{ab}	5.96 ± 0.01^{ab}
Marinade 1	3.35 ± 0.05	5.16 ± 0.04^{bc}	4.89 ± 0.03^{c}	5.63 ± 0.01^{bc}
Marinade 2	4.14 ± 0.04	6.22 ± 0.04^{d}	5.90 ± 0.02^{bc}	6.23 ± 0.02^{d}
Marinade 3	3.74 ± 0.05	4.42 ± 0.03^{c}	4.09 ± 0.01^{d}	5.39 ± 0.01^{bc}

a-d$p<0.05$ Different letters on the same column are statistically different.

Considering the findings of the study, it was concluded that the marinades used in marination operations were effective on pre-marination, post-marination, and post cook pH ($p<0.05$). Following the cooking operation, the sample with the highest pH value became the one marinated with Marinade 2. Marinade 2 is a mixture with relatively high acidity due to the inclusion of wine. It is thought that the increase in pH may be related to this status. This result obtained differs from some studies in the literature. Serdaroğlu, Abdraimov and Önenç (2007) discovered a decrease in pH after marinating turkey with grapefruit. Similarly, Cesur (2008) specified that marination operations with acidic fruit juices were decreasing the pH value.

Table 5. Color values of sample

Marinade	Pre-marination			Post-marination			Post-cook		
	L*	***a****	***b****	***L****	***a****	***b****	***L****	***a****	***b****
Control	58.24±2.15[a]	0.80±1.89[a]	7.52±0.28[a]	63.44±3.02[a]	-	5.77±0.34[a]	67.61±6.02[a]	3.48±1.63[b]	-
Marinade 1	55.78±2.10[a]	11.14±0.59[b]	8.45±0.52[a]	58.35±2.03[a]	1.23±0.12[c]	9.57±1.16[c]	63.82±3.85[a]	6.59±4.89[a]	19.62±3.16[c]
Marinade 2	64.78±0.69[a]	15.02±1.25[c]	2.66±0.19[c]	65.92±0.71[a]	9.56±0.62[a]	4.44±1.22[a]	66.90±4.75[a]	7.23±5.74[a]	6.95±1.28[a]
Marinade 3	58.96±2.19[a]	10.25±0.51[b]	4.52±0.39[b]	60.05±2.30[a]	8.67±0.58[a]	6.70±0.37[a]	63.20±248[a]	5.98±2.40[a]	9.89±11.07[a]

a-cp<0.05 Different letters on the same column are statistically different.

Before the marination operation, the differences in chicken breast in terms of average L* value were found to be statistically significant ($p<0.05$). It was observed that the relevant values ranged between 55.78 and 64.78 before the marination. At this point, it was observed that the highest value occurred in samples marinated with Marinade 2, and that the lowest value occurred in samples marinated with Marinade 1. Furthermore, as a result of the comparison of the data obtained with the control sample, it was observed that Marinade 1 had a decreasing effect on L* value and that Marinades 2 and 3 had an increasing effect on the same. Considering the literature, there are studies advocating the increasing or decreasing effect of marination on L* value. Regarding the subject, Cesur (2008) determined a decrease in the L* values of red meat marinated with apple, grape, pomegranate, and sour cherry juices. Kadıoğlu et al. (2019) determined by their study that an increase was occurring in the L* value of marinated chicken breast following cooking. Our results regarding the L* value are similar to the findings of the study of Kadıoğlu et al. (2019). In terms of marinades, it was observed that the L* value was increasing in the order of before cooking > post-marination > pre-marination. When the data was examined over the values of a* and b*, the differences among the pre-marination, post-marination, and post cook values were found to be statistically significant ($p<0.05$). According to this result, it was observed that the marinades were effective on the a* and b* values of chicken breast. Bor (2011) examined in his study the effects of different marinades on the a* and b* values of meats and concluded that the marinades were effective on the a* and b* values of meats. It is known that factors such as rate of spices used, marination period, and marination method are highly effective on the color values of poultry meats marinated with various marinades (Akyüz, Güneşer and Esen, 2020).

Table 6. Textural characteristics of marinated and cooked sample

Marinade	Hardness (N)	Springiness (mm)	Cohesiveness	Chewiness
Marinade 1	31.26±0.46[a]	0.67±0.02[a]	0.14±0.01[c]	478.96±18.44[b]
Marinade 2	49.65±3.15[b]	0.62±0.02[a]	0.53±0.04[b]	540.23±22.90[b]
Marinade 3	40.89±2.43[b]	0.58±0.06[b]	0.78±0.02[a]	742.11±46.51[a]

a-cp<0.05 Different letters on the same column are statistically different.

Findings regarding the textural characteristics of chicken breast samples cooked after being marinated with different marinades are provided in Table 6. In this direction, the change caused by the marinades on the textural characteristics of chicken breast was found to be statistically significant ($p<0.05$). Based on the data obtained, it was observed that the sample marinated with Marinade 2 provided the highest hardness rate (49.65). Marinade 2 was a marinade containing wine. It is known that marinades containing organic acid may increase the hardness values of meats (Ertbjerg et al., 1999). The study found that samples marinated with Marinade 1 had the lowest hardness degree

(31.26). Marinade 1 was a marinade containing olive oil. It is able to be specified that olive oil ensures the softness of the meat. In parallel with our study, Akyüz, Güneşer, and Esen (2020) obtained the lowest hardness rate of turkey by the marinade prepared with olive oil.

The difference in the springiness values of chicken cooked after being marinated with different marinades was not found to be statistically significant ($p>0.05$).

The difference in the cohesiveness values of chicken cooked after being marinated with different marinades was found to be statistically significant ($p<0.05$). Considering the data obtained from the study, it was observed that the samples marinated with Marinade 3 provided the highest cohesiveness rate (0.78). Marinade 3 was a marinade containing yoghurt. Similarly, Barbut and Choy (2007) concluded in their study that milk proteins form a higher cohesiveness when combined with meat proteins.

Considering the data in terms of chewiness rates, the results obtained were found to be statistically significant ($p<0.05$). Szczesniak (2002) defined chewiness as the sum of hardness, springiness, and cohesiveness of food. Deniz (2009) concluded in his study that the marinades prepared with mixtures containing lactic acid were chewier. Similarly, it was concluded in the study that the chicken breast marinated with Marinade 3 (marinade containing yoghurt) provided higher chewiness compared to other marinades.

Table 7. Sensory characteristics of marinated and cooked sample

Marinade	Smell	Flavor	Color	Texture	General Appreciation
Marinade 1	11.26±0.56[a]	7.97±0.02[a]	2.34±0.21[a]	4.59±0.11[a]	2.21±0.04a
Marinade 2	29.65±1.15[b]	5.57±0.06c	2.83±0.24[a]	5.93±0.29[b]	1.96±0.05b
Marinade 3	22.89±1.43[b]	4.62±0.02b	2.58±0.22[a]	3.48±0.22[c]	1.62±0.05b

a-cp<0.05 Different letters on the same column are statistically different.

In the study, chicken breast meats marinated with three different marination liquids were subjected to panelist test in terms of sensory parameters such as smell, flavor, color, texture and general taste. It was determined that there were differences between the sensory properties of chicken breast meat cooked and treated with marinade with three different formulations ($P<0.05$). The results for the relevant sensory test are given in Table 7. It was determined that there were significant differences in all sensory properties of the samples with spicy and non-spicy formulations ($P<0.05$). When the sensory tests were examined in terms of odor parameter, it was seen that marinade 1 (marine containing olive oil) had a lower appreciation than the other two marinating liquids. The fact that the marinade containing olive oil is caused by the usual smell of olive oil is reflected as a normal situation in the consumer taste. It is striking that marinade two (marine containing red wine) has the highest appreciation in consumer taste. The reason for this can be explained as the acrid aroma of red wine improves the sensory properties of the meat. When the sensory test results were examined in terms of the flavor variable, it was seen that the chicken breast marinated with marinade 1 (marinated with olive oil) was the product with the highest score. Due to the acidic feature of olive oil, it has contributed positively to the development of flavor with the effect of cooking. The lowest score in terms of taste was found to belong to the chicken breast marinated with marinade 3 (marinated with yogurt). The strong acidic feature of yogurt and the sharp aroma of yogurt may be perceived as intense or heavy on the palate. In the sensory controls, it was determined that chicken breast meat marinated with three different marinades (olive oil, red wine, yogurt) got similar scores in terms of color parameter and there was no significant difference between the

samples. In terms of texture parameter, it was seen that the highest score was in chicken breast meat marinated with yogurt and red wine, respectively, and the lowest score was in chicken breast meat marinated in olive oil. It has been observed that the main reason for this is due to the high acidity of yogurt and red wine, and the relatively low acidity of olive oil. In terms of general taste, it was stated that chicken breast meat marinated with marinade 1 (marinade with olive oil), marinade 2 (marinade with red wine) and marinade 3 (marinade with yogurt) had high scores and was more preferable by the consumer.

Conclusion

Marination is an important process in the food and gastronomy industry in terms of flavoring foods and thus presenting them to consumer preference. Thanks to this process, desired products with a certain appreciation rate can be developed. In this study, it was intended to determine the effect of different marinades on some quality parameters of chicken breast. Three different marinades were used in the study, and these were olive oil (marinade 1), red wine (marinade 2), and yoghurt (marinade 3) based marinades. When the results of the study were examined, significant differences were determined among the results of the variable of cook loss of chicken breast marinated with different marinades ($p<0.05$), and it was observed that the lowest cook loss had occurred with the marinade containing red wine. In terms of marinade absorption, it was observed that the highest absorption rate had occurred in the sample marinated with the marinade containing yoghurt. Considering the pH variable it was observed that the samples marinated with Marinade 2 (marinade containing red wine), which was more acidic compared to other marinades, had higher acidity values. Considering the effects of marinades on the color, the differences among the results were found to be statistically significant ($p<0.05$). In this direction, it is possible to specify that marinades cause changes in terms of color in the structure of chicken compared to control sample. Considering the textural characteristics, it was observed that the lowest hardness was present in the samples marinated with olive oil based Marinade 1. It can be said that this arises from the fact that olive oil causes softness between ligaments. Considering the springiness variable, no significant difference was determined among the marinades ($p>0.05$). And the difference in the cohesiveness values of chicken cooked after being marinated with different marinades was found to be statistically significant ($p<0.05$). While Marinade 1 (olive oil) had the lowest cohesiveness rate, Marinade 3 (yoghurt) had the highest cohesiveness rate. Finally, considering the chewiness parameter it was observed that the samples marinated with Marinade 3 provided higher chewiness characteristics. It is thought that this status arises from the lactic acid being present in yoghurt. In the study, sensory analysis parameters such as smell, color, taste, texture and general taste were evaluated. In terms of odor variable, the marinating liquid containing red wine was found to be more desirable. In terms of taste, it was noticeable that marination liquid containing olive oil was preferred. In terms of color variable, no major difference was observed for all three marinades. When evaluated in terms of texture, it was determined that the marinating liquid containing red wine was more preferable. When the sensory analysis results were examined in terms of the general taste variable, it was seen that the chicken breast meat marinated and cooked with a marinade containing olive oil received the highest score in terms of consumer taste. The main reason for this is thought to be due to the aromatic components of olive oil and because olive oil is often used as a heat transfer medium as an oil, it is perceived as a customary taste on the palate.

Considering all the findings obtained, it was concluded that different marination mixtures had significant effects on some quality parameters of chicken. The said marinades are frequently used in giving flavor to poultry meat

expressed as relatively tasteless, especially chicken breast. By means of marination operation, the enrichment of chicken in terms of edibility and its improvement in sensory sense are important from the point of product range. Especially for businesses and consumers, it can be recommended to use marinade 1 formulation (with olive oil), which has a higher sensory appreciation score than other marinades, on approximately 100-130 g of chicken breast meat. In future studies on marination processes, marinating lean and dry poultry meats other than chicken breast, where the flavor needs to be improved, also making quality and sensory evaluations on different types of meat, investigating the structural effects of marinade components on meat, using different marinating methods such as injection, dipping, tumbling. It is also recommended to apply them comparatively.

Declaration

All authors of the article contributed equally to the article process. The authors have no conflict of interest to declare. Ethics committee permission for the sensory analysis study was obtained from Doğuş University Ethics Committee with the number 2024/25. Ethical declaration and information text were sent to the consumers before sensory testing in the study.

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Appendix 1. Ethics Committee Permission

Evrak Tarih ve Sayısı: 08.02.2024-58140

07.02.2024

Sayı :2024/25
Konu : Etik Kurul izni

Ar. Gör. Görkem TEYİN

"Farklı Marinasyon Çözeltilerinin Tavuk Göğüs Etinin Bazı Kalite ve Duyusal Özellikleri Üzerine Etkisi" başlıklı araştırmanız için yapacağınız ankete ait sorularla ilgili olarak Doğuş Üniversitesi Etik Kuruluna yapmış olduğunuz başvuru Etik Kurulunda incelenmiş, bilimsel araştırma etiği açısından **uygun olduğuna** karar verilmiştir.

Bilgilerinizi rica ederiz.

Prof. Dr. Mesut KUMRU
Etik Kurul Başkanı
Mühendislik Fakültesi

Prof. Dr. Hamide ZAFER
Etik Kurul Üyesi
Hukuk Fakültesi

Prof. Dr. Oktay VELİEV
Etik Kurul Üyesi
Mühendislik Fakültesi

Prof. Dr. Nüket SARACEL
Etik Kurul Üyesi
İktisadi ve İdari Bilimler Fakültesi

Prof. Dr. Gülsün Pelin SARIOĞLU ERDOĞDU
Etik Kurul Üyesi
Sanat ve Tasarım Fakültesi

Prof. Dr. Tarık BAYKARA
Etik Kurul Üyesi
Mühendislik Fakültesi

Dr. Öğr. Üyesi Aslı TELSEREN ÖMEROĞLU
Etik Kurul Üyesi
Fen Edebiyat Fakültesi

Bu belge, güvenli elektronik imza ile imzalanmıştır.