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Analysis of Physical, Chemical and Organoleptic Quality of Shredded *Afkir* Chicken with Different Meat Types

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Abstract The study aims to determine the physical, chemical, and organoleptic qualities of shredded *afkir* chicken with different types of meat. The experimental design was completely randomized (CRD) with three treatments and six replications on P1 breast meat, P2 thigh meat, and P3 breast and thigh meat combinations. The variables measured in this study were physical quality tests: pH, cooking losses, and yield. In the chemical quality test: ash content, moisture content, fat content, and protein content, while in the organoleptic test: color, texture, aroma, taste, crispness, and general acceptance. The results showed that the quality of shredded chicken with different types of meat had a significant effect ($P<0.05$) on physical quality, including cooking loss and yield. Still, they had no significant impact on the pH of shredded chicken ($P > 0.05$). Chemical quality has a significant effect ($P<0.05$) on moisture content, fat content, and protein content but has no significant effect ($P > 0.05$) on ash content. Organoleptic quality testing significantly impacts color, texture, crispness, and general acceptance. Still, it has no significant effect on the aroma and taste of shredded *afkir* chicken with different types of meat.

Keywords *Afkir* Chicken, Shredded, Physical Quality, Chemical Quality, Organoleptic Quality

1. Introduction

Processed livestock products are a business opportunity for development, one of which is meat processing to create valuable products with high nutritional value [1], [2]. The only processing that can be done is on the meat of rejected laying hens [3]. Laying hens rejected are layers whose production period has expired and have a tough texture to their meat. Even though the meat is not as good as purebred chicken meat, specifically for cutting purposes, laying hens can still be used in various recipes and processed meat products [4], [5]. This can have huge potential if rejected laying hens can be appropriately managed. Efforts have been made to make the meat of rejected laying hens more tender and aim to diversify other livestock products, including beef jerky and shredded meatballs [6]. One potential that is quite large is the availability of rejected chickens from laying hens of lower quality. Therefore, processing techniques are needed to increase the efficiency of rejected laying hens which are preferred by consumers increasingly demanding a variety of processed products. Many ways have been developed to increase the use value and shelf life of fresh meat by processing it into shredded meat [7], [8].

Shredded floss is processed by frying and adding spices [9], [10]. Some of the advantages of the process of making shredded are that it is easy to do, the resulting product has a distinctive aroma and taste, and it can be developed as a business both on a small and medium scale [11], [12]. The meat of rejected laying hens has the potential to be processed into meat products because the nutrient content is not much different from broiler meat and has a high-fat content [13], [14]. The fat content in the meat determines the quality of the meat because fat determines the taste and aroma of the meat. An alternative to making processed laying hen meat products is to make shredded chicken because shredded chicken can improve the taste, shelf life, nutrition, and physical quality of raw meat [15]. To get high-quality shredded material, good processing is required. The processing carried out in shredded products is cooking; the proper cooking time in processing chicken meat will determine the crunch and delicacy of the shredded [11].

Boiling meat is one way to tenderize meat by cooking causes protein denaturation [16], [17]. Protein denaturation breaks proteins into smaller units [18]. One factor affecting the meat's tenderness is the postmortem factor, one of which is the cooking method of boiling [19]. Based on this description, it can be concluded that by increasing the length of time for boiling chicken meat, the denatured protein increases, so the tenderness of the meat also increases [20]. Therefore, assuming into account the importance of the things that have been described, it is very important to study this matter. Many benefits of this research are expected to be a source of information for the community as well as a reference for further researchers regarding the physical, chemical, and organoleptic qualities of shredded *afkir* chicken with this type of meat. The problem statement in this study is related to the physical, chemical, and organoleptic qualities of shredded culled chicken with different types of meat.

2. Materials and Methods

The research was conducted at the Animal Product Technology Laboratory and Animal Feed Analysis Laboratory of the Department of Animal Husbandry, Faculty of Animal Science at Halu Oleo University in Kendari. The tools used in this study were knives, stoves, pans, cutting boards, bowls, scales, filters, spatulas, shredding presses, plastic clips, oil drainers, spoons, label paper, pH meters, measuring cups, filter paper, stopwatches, spinners, digital, multiple bowls, Blender, Stove, Pan, Pan, Sieve, Knife, Spinner, H_2SO_4, Saucer, Desiccator, Cotton Swab, Oven, Petri Dish, Extractor Hood, Dropper, Oven, Beaker, Sleeve, Rubber Bulb, Glass Funnel, Kjeldhal Flask, Analytical Balance, Crushed Press, and still.

The ingredients used in this study were layers of breast and thigh meat and side dishes (coconut milk, shallots, garlic, lemongrass, galangal, brown sugar, coriander, bay leaves, salt, flavorings, and cooking oil). In the meantime, the chicken meat samples are being selected. Killed laying hens were removed from UD. Nagivitama Kec. Konda, South Konawe Regency. Then cut in an Islamic way and continue by separating the meat from the breast and thighs.

To start the research, we need to prepare ingredients such as 200 grams of discarded lying hens' breast and thighs meat. This includes coconut milk, shallots, garlic, lemongrass, galangal, brown sugar, candlenuts, coriander, bay leaves, salt, flavorings, and cooking oil for each treatment, repetition, and supporting materials. Next, we cook the meat for 30 minutes at 75 ℃. We sauté the spices and add the shredded chicken, stirring until evenly distributed, and heat it on the stovetop until dry and lightly browned. After that, we drain it and allow it to cool before putting it into the centrifugal machine to remove the oil in about 5 minutes. Once the oil comes out, we put it in the shredder. The scheme for making dental floss is presented in Tables 1 and 2.

Table 1. Procedure create shredded *afkir* chicken with different meat types

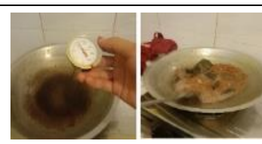
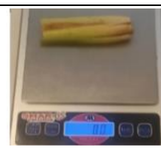
Procedure	Activities
The process of separating the breast and thigh meat	
The result of separating the meat from the bone	
Meat weighing 200 grams each for each treatment	
Boiling meat for 30 minutes at 75 ℃	
Meat stewing	
Shredded frying at 120 ℃. With the deep frying method	
Spinner process and pressing shredded for 5 minutes	
Shredded chicken	

Table 2. Formulation for making shredded chicken *afkir* in 200 grams of meat

Materials	Gram	Percentage (%)	Picture
Meat	200	-	
Coconut milk	15	8,5	
Citronella	8	4	
hazelnut	3	1,5	
Galangal	5	2,5	
Coriander	3	1,5	
Bay leaves	8	4	
Onion	9	4,5	
Garlic	7	3,5	
Brown sugar	15	8,5	
Salt	2	1	
Flavoring	1	0,5	

Cooking variables include physical quality (shrinkage, pH, yield test), chemical quality (moisture content, ash content, fat content, protein content), and organoleptic quality. The first level of physical quality testing is the cooking loss, which is checked by weighing a 200-gram sample of chicken breasts and thighs as the starting weight and then weighing the finished shredded product. Equation (1) calculates the final weight of crushed cooking shrinkage as per the treatment.

$$Shirink\ cook\ (\%) = \frac{initial\ weight - final\ weight}{initial\ weight} \times 100 \quad (1)$$

The pH was tested by weighing the 5-gram shredded sample, which had been mashed, then mixing it with 10 ml of distilled water and stirring until homogeneous. The pH meter is cleaned with distilled water and put into the pH-7 buffer to adjust the pH. The pH of each solution was measured three times, and the results were averaged as the shredded pH value. Meanwhile, the yield test uses a product weight ratio to material weight x 100% [21]; equation (2) can calculate the shredded yield value.

$$Yield = \frac{shredded\ weight}{raw\ material} \times 100 \quad (2)$$

The first chemical quality tested is the water content. Analysis of water content using the oven and weighing the shredded sample, as much as 5 grams, in a porcelain cup whose weight is known. Then dried in an oven at 105 ℃ for 5 hours. Cooled in a desiccator for 5 minutes and weighed (x). Reheat in the oven for 30 minutes, cool in a desiccator, and weigh until it weighs (z) and a constant weight is obtained. Moisture content is calculated by equation (3).

$$water\ content = \frac{(X + Y - Z)}{Y} \times 100 \quad (3)$$

Description, X: weight of empty cup, Y: cup weight + initial sample, Z: cup weight + dry sample.

Next comes the ash content. The ash content analysis procedure follows: the beaker is preheated in the oven to 105 ℃ for 30 minutes, then cooled in a desiccator to remove moisture, and weighed (A). The sample weighed 5 grams in a dried beaker (B). Then continue ash in a furnace at a temperature of 600 ℃ until ash is complete for 6 hours. The ashed sample is cooled in a desiccator. The next analysis is fat content. The fat flask is dried in an oven at 110 ℃, cooled, and weighed. The sample is weighed to 0.5 grams, wrapped in filter paper, and then placed in the extractor (Soxhlet) containing hexane as the solvent. It was refluxed for 5 hours, and then the solvent was distilled in the fat flask and collected. Furthermore, the fat flask with the extracted fat was heated in an oven at 105 ℃ until the weight became constant, cooled in a desiccator, and then weighed. To calculate fat content, use Equation 4.

$$fat\ content\ (bb) = \frac{W_1 - W_2}{W_0} \times 100 \quad (4)$$

Description: W0: empty cup weight, W1; cup weight + initial sample, W2; cup weight + dry sample

The next step is to determine the protein content. The method used for protein determination is the Kjeldal method. The crushed sample is weighed to the nearest 0.1, placed in a Kjeldal flask, and added to half a spatula of selenium mixture and 20 mL of 95% H_2SO_4. Place on the stove or electric heater and heat until the solution clears. After the sample is clear, it is diluted to 120 ml with Aquadest (carefully and slowly, as heat is generated), withdrawn to 5 ml with a pipette, placed in the distillation apparatus, and added to 10 ml of NaOH solution and rinsed with Aquadest. Distillation was carried out with a 2% boric acid solution in a flask filled with BCG-MR indicator until the distillation volume was ± 30 ml. The distillation was then titrated with 0.01 N HCl until a pink endpoint color formed, which did not disappear for 30 seconds. The formula (5) determines the protein content

$$PC = \frac{(titration\ blank) \times 0.01 \times 14 \times 24 \times 6.25}{weight\ sample\ (mg)} \times 100 \quad (5)$$

Where, PC = Protein content

Meanwhile, for organoleptic quality, sensory observation was carried out by 15–25 semi-trained panelists from students of the Animal Husbandry Faculty, Animal Husbandry Study Program, Halu Oleo University, with organoleptic parameters to be observed, namely color, aroma, taste, texture, and preference test. The test scale ranged from 1–5 (one lowest score and five highest scores). The scoring data test was done by tasting each shredded sample and then filling out a questionnaire with an assessment score. The data analysis technique involved a completely randomized design (CRD). If there is a significant effect (P <0.05) on the treatment being measured, then it will be continued with the BNT test (most minor apparent surgery) using SPSS version 26

3. Results and Discussion

3.1. Physical Quality

Shredded *afkir* chicken is a product of processed chicken meat originating from rejected chickens. These chickens have reached slaughter age and are unfit for consumption as whole or fresh pieces. In this study, an evaluation was made of the physical quality of shredded *afkir* chicken made using different types of meat. The results of the physical quality of pH, cooking losses, and yield of shredded culled chicken meat with different types of meat are presented in Table 3.

Table 3. The average value of pH, cooking loss and yield

Variable	Treatment		
	P₁	*P₂*	*P₃*
pH	6,08 ±0,1	6,25 ±0,2	6,03 ±0,1
Cooking loss	56,61 ±1,08	59,18 ±0,87	58,77^b ±0,48
Yield	36,16 ±0,90	34,01 ±0,72	34,36^a ±0,40

Note: Different superscripts in the same line show a significant difference (P<0.05).

Analysis in Table 3 shows that the pH analysis indicated that the treatment with the types of breast meat, thighs, and the combination had no significant effect (P > 0.05) on the pH of shredded meat. The average pH value of shredded chicken meat with different meats ranged from 6.03 to 6.25. The high pH is due to the emergence of alkaline compounds such as ammonia, trimethylamine, and other volatile compounds, which could also reduce the organoleptic value of the product. According to Pursudarsono et al. [22], the more sugar is added, the more the pH value will increase. pH, withering, heating, species, age, storage and preservation, sex, health, treatment before cutting, and intramuscular fat all impact water binding capacity [23], [24]. Rodriguez et al. [25] stated that samples' average pH value under aerobiosis conditions tended to increase during the storage period, causing a decrease in sample quality.

Meanwhile, in terms of cooking losses, it was found that treating types of breast meat, thighs, and combined meat had a significant effect (P<0.05) on shredded cooking losses. The average value of cooking losses for shredded chicken meat with different types of meat ranges from 56.61% to 59.18%. The highest mean was found in treatment P_2, namely thigh meat and P_3 (combination), while the lowest was found in treatment P_1, namely breast meat. It shows that breast meat or P_1 affects shredded cooking shrinkage. Compared to other treatments, it is suspected that there is a difference in the meat quality where the thigh meat is more demanding than the breast meat. This statement aligns with the findings of Kartikasari et al.[26] and Ndun et al. [27] who found that breast and thigh meat have different levels of tenderness. Generally, breast meat has a good level of tenderness, and thigh meat has a medium level of tenderness. Another factor that affects the cooking loss of shredded meat is the process of cooking or processing meat which can cause cooking losses to decrease. Barbanti & Pasquini [28] reported that the cooking loss of meat is an essential indicator in assessing meat quality. The analysis found that the higher the temperature, the greater the cooking loss of meat.

The same thing was found in the yield test, with the results showing that the treatment of types of breast meat, thighs, and combinations had a significant effect (P <0.05) on the yield of shredded meat. The average yield of shredded chicken meat with different types of meat ranges from 34.01% to 36.16%. The highest mean was found in treatment P_1, namely breast meat, while the lowest was found in treatment P_2, namely thigh meat and combination P3. It shows that P_2 and P_3 affect the yield of shredded meat due to shrinkage. It is suspected that the reduction in weight of the food is caused during the process of making shredded food, namely at the boiling and frying stages, as a result of evaporation and the removal of the water content from the food. The meat liquid will increase if the temperature and cooking time are too long. This statement is in line with the findings of Garcia-Segovia et al. [29] who stated that an increase in temperature causes the amount of water bound to decrease the amount of meat liquid that comes out during cooking to become greater.

3.2. Chemical Quality

The chemical quality of shredded chicken culled includes several parameters that will be analyzed in this study, as described in the following points:

Protein Content: The protein content of shredded chicken is important in determining the product's nutritional value. Protein is an essential nutrient for the growth and maintenance of body tissues. In this study, an analysis of the protein content of shredded *afkir* chicken was carried out using different types of meat. Differences in the type of meat can affect the protein content of shredded chicken; some types of meat may have a higher protein content than others, as shown in Table 4.

Table 4. Percentage value of the average protein content of shredded chicken meat with different types of meat

Repetition	Treatment (%)		
	P₁	*P₂*	*P₃*
1	35,52	32,08	33,56
2	33,79	31,30	32,08
3	34,79	30,12	31,26
4	32,52	31,03	32,57
5	34,03	30,41	34,25
6	34,48	31,08	32,12
Average/SD	34,18 ±1,01	31,00 ±0,69	32,64 ±1,08

Note: Superscripts show significantly different (P>0.05). P_1: Shredded chicken breast, P_2: Shredded chicken thigh, P_3: Shredded chicken breast and thigh (Combination)

Table 4 shows that treatment with different types of meat had no significant effect (P > 0.05) on the protein content of shredded *afkir* chicken meat. The average protein content of shredded chicken meat ranges from 32.58% to 34.18%. The lengthy time spent boiling the meat, which results in protein denaturation, impacts protein levels. Irawan et al. [30] say that the protein content decreases during boiling because, in the boiling method, the protein has dissolved in the water. Ulfaturriza et al. [31] added that boiling can reduce protein levels in foodstuffs because processing at high temperatures will cause protein denaturation, resulting in coagulation and reducing solubility. Protein heating can cause both expected and unexpected reactions. Furthermore, Alyani et al. [32] report the value of absolute protein content is reduced due to the impact of the long boiling time. Bukaini et al. [33] wrote that the chemical characteristics of beef and chicken, such as water, protein, and fat content, generally determine the level of meat quality and affect the quality of processed products.

Fat content: The fat content in shredded chicken was also a concern in this study. Fat is an essential energy source that gives the product taste and texture. Fat content analysis will be carried out to compare the differences between shredded *afkir* chicken made with various types of meat. Some types of meat may produce shredded meat with a higher or lower fat content, which can affect the nutritional profile and palatability of the product. The results of the analysis of fat content are presented in Table 5.

Table 5. The percentage of the average value of the fat content test of shredded chicken meat with different meat

Repetition	Treatment (%)		
	P_1	P_2	P_3
1	15,08	19,28	16,88
2	13,14	17,39	18,79
3	15,60	16,78	17,47
4	16,84	16,84	18,08
5	13,19	19,02	18,71
6	15,68	18,47	15,95
Average/SD	14,92 ±1,47	17,96 ±1,10	17,64 ±1,10

Note: Superscripts show significantly different (P>0.05). P_1: Shredded chicken breast, P_2: Shredded chicken thigh, P_3: Shredded chicken breast and thigh (Combination)

From Table 5, it was found that differences had a very significant effect (P<0.05) on the fat content of shredded *afkir* chicken meat. The average fat content of shredded chicken meat ranges from 14.92% to 17.96%. The highest fat content is found in P_3, namely breast and thigh meat (combination). In comparison, the lowest was found in P_2, namely in the thigh meat.

The results of the BNT follow-up test that had been carried out showed a significant difference in the treatment, namely in the P_3 treatment with a very high-fat content of 17.96% compared to the very low P_2 treatment of 14.92%. Soeparno [34] states that breast meat has a higher fat content than thigh meat. It is possible due to oil entry into the meat when the frying process occurs when making shredded meat. According to Soriano-Santos [35], frying causes fat to enter the meat. Moreover, other factors are suspected to affect the increase in fat content in shredded meat; during the cooking process, the meat undergoes denaturation. It agrees with Prasetyo [15] that heat and high temperatures in the cooking process cause denatured proteins where heat causes fat to melt, resulting in protein gabs that contain a liquid that includes emulsions. The emulsion is affected by heat and denaturation; the quality of the meat influences the high and low levels of fat. The three treatments met the requirements and quality of shredded meat set by SNI in 2013: a maximum fat content of 30%. Meanwhile, Bulkaini et al. [33], [36] wrote that culled laying hen meat contains 56% water, 25.4% to 31.5% protein, and 1.3 to 7.3% fat. The nutritional content of rejected laying meat is not much different from broiler meat.

Water content: Moisture content plays an important role in supporting the resulting shredded quality. The results of the analysis of water content are presented in Table 6

Table 6. The percentage value of the average water content of shredded chicken meat with different types of meat

Repetition	Treatment (%)		
	P_1	P_2	P_3
1	4,23	3,61	5,33
2	4,08	3,88	4,73
3	4,58	3,24	5,07
4	4,41	3,74	5,33
5	5,02	3,49	5,21
6	4,53	4,13	5,28
Average/SD	4,8 ±0,57	4,1 ±0,55	5,0 ±0,61

Note: Superscripts show significantly different (P>0.05). P_1: Shredded chicken breast, P_2: Shredded chicken thigh, P_3: Shredded chicken breast and thigh (Combination)

The results of the analysis of water content (Table 6) showed that the treatment of types of breast meat, thighs, and combinations had a significant effect (P<0.05). Shredded chicken meat's average water content value ranges from 4.1% to 5.0%. The highest average treatment was in treatment P_3, namely combination meat, while the lowest was found in P_1 breast meat and P_2 thigh meat. It shows that P_3 affects the shredded water content. High water content can cause rancidity to speed up because water is a catalyst in the oxidation and hydrolysis processes. Shredded water content is closely related to the texture and crispness of the shredded. The water content of the shredded material will affect the texture and level of crispiness. The cause of the high shredded water content is thought to be several factors, starting with the different quality of the meat, where the thigh meat is more challenging than the breast meat so the thigh meat binds less water when boiling. Towadi et al.[37] and Sonya & Lydia [38] reported that temperature and heating time also affect the water content in processed food products. The three treatments still met the requirements and quality of shredded paper set by SNI in 2013: a maximum moisture content of 7%.

Ash Content: Generally, chicken meat has a lower ash content than red meat, such as beef. This is because chicken meat generally has a lower fat content. The results of the analysis regarding the ash content of shredded *afkir* chicken are presented in Table 7.

Table 7. The Percentage value of the average ash content of shredded chicken culled with different types of meat.

Repetition	Treatment (%)		
	P₁	*P₂*	*P₃*
1	3,67	4,02	3,88
2	3,61	3,98	3,75
3	3,59	4,03	3,65
4	3,50	4,00	3,70
5	4,74	4,17	4,14
6	4,74	4,71	3,99
Average/SD	**3,97±0,6**	**4,15±0,3**	**3,85±0,2**

Note: Superscripts show significantly different (P>0.05). P_1: Shredded chicken breast, P_2: Shredded chicken thigh, P_3: Shredded chicken breast and thigh (Combination)

The analysis results in Table 7 reported that the breast, thigh, and combination meat types did not significantly affect shredded ash content (P>0.05). The average ash content of shredded chicken meat with different kinds of meat ranges from 3.85% to 4.15%. The highest ash content was found in treatment P2, while the lowest was in treatments P1 and P3. Of the three treatments, they met the SNI (Indonesia National Standard) Shredded, which stipulates a maximum shredded ash content of 7%. Raw materials and processing influence the amount of ash content. The raw material processing process consists of the processing method and the use of the material. Ash content comes from added ingredients such as salt and spices. Excessive amounts of seasoning can also cause high levels of shredded ash [39]. Kamsina & Anova [40] and Wahyuni [41] say that the reaction of metal elements and oxygen, where these metal elements have a greater density results in the oxide is left behind as ash, while the non-metallic oxide CO_2 will fly as smoke. When shredded chicken meat has fewer minerals than the additional ingredients, it reduces the ash content. Another factor that makes the ash content lower is in the cooking process, where soaking and boiling reduce mineral availability; this is because the minerals in a material will be dissolved by the water used.

3.3. Organoleptic Quality

The organoleptic qualities of shredded chicken, such as taste, aroma, and texture, may vary depending on various factors, including the raw materials used, manufacturing methods, and processing quality. The results of organoleptic quality tests for color, texture, aroma, taste, crispness, and general acceptance of shredded culled chicken meat with different types of meat are presented in Table 8.

Table 8. Test the organoleptic quality of color, texture, aroma, taste, crispness and general acceptance

Variable	Treatment		
	P₁ (Chest)	*P₂* (Thigh)	*P₃* (Combination of chest and thighs)
Color	2,8±0,44	3,4 ±0,50	3,3 ±0,48
Texture	3,1 ±0,53	3,5 ±0,5	3,4 ±0,49
Aroma	3,7 ±0,68	3,8 ±0,41	3,6 ±0,48
Flavor	3,9 ±0,28	4,02 ±0,20	4,05 ±0,35
Crisp	3,6 ±0,50	3,9 ±0,28	3,7 ±0,48
General acceptance	4,0 ±0,54	4,5 ±0,51	4,1 ±0,57

The results of the color analysis in Table 8 showed that the treatment of types of breast meat, thighs, and combinations had a significant effect (P<0.05) on the color of shredded meat. The average value of shredded chicken meat with different meat ranged from 2.8 to 3.4 (light brown - moderately brown). The highest color score was found in treatment P_2, namely thigh meat, 3.4, and combination meat, P_3 of 3.3 (quite brown), while the lowest was in treatment P_1, namely breast meat, 2.8 (light brown). In the score of the three treatments, the researcher preferred the color of shredded thigh meat to the combination of breast meat and beef. It is suspected that there are several factors, including the different types of meat where the color of the breast meat is brighter than the slightly reddish thigh meat and the addition of spices in making shredded beef with the frying process. Floss is generally yellow-brown in fine fibers. Pigments and the browning process influence the color of food [42]. In addition, in the process of making shredded meat sugar is added so that the color turns brownish yellow. Putri et al. [43] reported that cooking or processing meat could cause the color of the food ingredients or shredded products to become brighter due to the loss of pigment in the meat and the release of fluids inside the meat cells.

Meanwhile, regarding texture, the analysis resulting in Table 8 found that treating types of breast meat, thighs, and combinations had a significant effect (P <0.05) on shredded texture. The average value of shredded chicken texture ranges from 3.1 to 3.5 (relatively coarse). The highest texture value of shredded chicken was found in treatment P_2, namely shredded thigh meat and combined shredded meat in P_3, while the lowest was found in treatment P1, namely shredded breast meat. The texture of the shredded chicken meat product in the thigh and the combination has a reasonably coarse texture compared to the sliced breast. It is suspected that there is a difference in meat quality where breast meat is softer than thigh meat. Agustin [44] rejected laying hens in the chest area is more delicate than rough thigh muscles. It is where the thigh muscles are an active part of the movement, thus affecting the amount of connective tissue more and more. According to Abustam et al. [45], the size of individual muscle bundles (Fascicule) and the amount of connective tissue in the muscle will affect the texture of the meat. In addition to the type of meat, the manufacturing process also affects the texture, namely shredding long fibers, cooking, and frying. Aida et al. [46] and Sigit et al. [42] say that the texture and aroma of shredded meat highly depend on the frying process. Texture can be affected by treatment during cooking, and the procedure for making shredded meat is generally soft, smooth and not coarse. In addition, culled chicken has a meat texture that is rough and very tough. Culled chicken meat has a rough texture; the texture measures muscle fiber bundles limited by connective tissue perineal septum that divides the muscles longitudinally [47].

Furthermore, regarding the organoleptic analysis in the aroma section, it was found that treating types of breast meat, thighs, and combinations did not significantly affect shredded beef's aroma ($P > 0.05$). The average value of the smell of shredded chicken meat ranged from 3.6 - 3.8 (quite flavorful). For the score of the three treatments, the researcher preferred the aroma of the shredded thigh and breast meat to the combined meat. The heart and spices used in manufacturing can influence the product's smell. Rohmawati et al. [48] report the aroma of processed products is controlled by a combination of fat, amino acids, water content, sugar, and heating temperature. Meanwhile, in terms of taste, it was found that treating types of breast meat, thighs, and combinations did not significantly affect the taste of shredded beef ($P > 0.05$). The average value of the taste of shredded chicken meat with different types of meat ranges from 3.9 to 4.05 (quite like it). Rosita et al. [23] stated that the taste that determines consumer acceptance is the meat's spiciness, saltiness, and flavor level. The distinctive taste contained in shredded chicken depends on the level of concentration of curing ingredients such as salt, which gives a salty taste; brown sugar, which offers a sweet taste; and ginger and lemongrass, which play a role in providing a spicy taste sensation to the taste buds of consumers and panelists. According to Irawan et al. [30] the taste is a quality character that proves consumer tolerance for a product obtained from adding added ingredients such as spices or from the product's raw materials or the processing process.

The same thing was found regarding crispiness: treating types of breast meat, thighs, and combinations had a significant effect ($P<0.05$) on the crispiness of shredded meat. The average crispiness of shredded chicken meat with different types of meat ranges from 3.6 to 3.9 (crispy enough). The highest crunch value of shredded chicken was found in treatment P_2, namely in thigh meat (3.9). The lowest was found in treatment P_1, namely shredded breast meat (3.6). It is suspected that shredded chicken thighs have a relatively rough and dry texture compared to sliced breasts and combinations.

Meanwhile, regarding general acceptance, the types of breast meat, thighs and combinations had a significant effect ($P<0.05$) against the widespread acceptance of shredded. The average value of general acceptance of shredded chicken meat with different types of meat ranges from 4.0 to 4.5 (liked to very liked). The highest score was found in P_2, namely in thigh meat, 4.5 (very like), and the lowest was in shredded treatment P_1 breast and combination P_3 (Like). The difference between these three treatments is related to the quality, such as color, texture, aroma, taste, and crispness. Prasetyo [15] shows that food acceptance is influenced by smells, taste, texture and various factors that lead to complete acceptance.

4. Conclusions

From the results of testing and analysis, it can be concluded that the quality of shredded chicken with different types of meat had a significant effect ($P<0.05$) on physical quality, including cooking loss and yield, but had no effect on the pH of shredded chicken ($P>0.05$). The chemical quality has a significant impact ($P<0.05$), including moisture, fat, and protein content. However, it did not significantly affect the shredded ash content ($P>0.05$). The organoleptic test showed a significant effect ($P<0.05$) on color, texture, crispness, and general acceptance. However, it did not significantly affect the taste and aroma of the shredded meat ($P> 0.05$).

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REFERENCES

[1] J. S. Gregg *et al.*, "Valorization of bio-residuals in the food and forestry sectors in support of a circular bioeconomy: A review," *J. Clean. Prod.*, vol. 267, no. 9, p. 122093, 2020.

[2] W. Khalid, M. Maqbool, and M S Arshad, "Recent Advances and Innovation in Meat with Reference to Processing Technologies," in *Health Risk of Food Additives*, Intechopen.com, 2022, pp. 1–100. [Online]. Available: https://www.intechopen.com/online-first/85095

[3] D. B. J. Rumondor, R. Tinangon, J. Paath, E. Pujihatuti, and T Ransaleleh, "Proteins profil of sausage laying chicken meat with Angkak (red rice) used as natural food material," *Sci. Pap. Ser. D. Anim. Sci.*, vol. 62, no. 2, pp. 1–15, 2019.

[4] H. Mardhika, B. Dwiloka, and B E Setiani, "Pengaruh berbagai metode thawing daging ayam petelur afkir beku terhadap kadar protein, protein terlarut dan kadar lemak steak ayam [Effects of Various Methods of Frozen Post-

Laying Hens on The Protein Levels, Dissolved Protein and Fat Content of Chicken Steak],” *J. Teknol. Pangan*, vol. 4, no. 1, pp. 48–54, 2020.

[5] S. Sukaryani, E. A. Yakin, and C. S. Purwati, “Penyuluhan dan pelatihan pembuatan nuget, bakso daging ayam petelur afkir kombinasi rumput laut pada kelompok ibu-ibu kader posyandu ‘Mawar’ Perumahan Barat Dusun Karangduren Desa Jati [Counseling and training on making nuggets, meatballs, meat laying hen],” *J. Pengabdi. Kpd. Masy.*, vol. 1, no. 6, pp. 385–391, 2021.

[6] A. K. Yusuf, V. Tenrisanna, V. S. Lestari, and I Rasyid, “Business Profit Analysis of Rejected Laying Hen Traders,” *Adv. Environ. Biol.*, vol. 16, no. 11, pp. 11–16, 2022.

[7] S. Komansilan, “Pengaruh penggunaan beberapa jenis filler terhadap sifat fisik chicken nugget ayam petelur afkir [The effect of the use of several types of filler on the physical properties of chicken nuggets of rejected layers],” *Zootec J.*, vol. 35, no. 1, pp. 106–116, 2015.

[8] H. Nur’aini, I. Ishar, and D Derius, “Inovasi Pengolahan Abon Lokan (Pilsbryoconcha exilis) Dengan Perlakuan Substitusi Tebu Telur (Saccharum edule) [Processing Innovation of Shredded Lokan (Pilsbryoconcha exilis) With Egg Sugarcane (Saccharum edule) Substitution Treatment],” *Agritepa J. Ilmu dan Teknol. Pertan.*, vol. 6, no. 2, pp. 37–54, 2019.

[9] E. N. Dewi, A. A. Nurbaiti, and L. Purnamayanti, “Chemical changes of shredded catfish (Clarias gariepinus) added with different concentration of sucrose during storage at room temperature,” *E3S Web Conf.*, vol. 147, no., pp. 03001–03010, 2020.

[10] N. Umamah and J Purdiyanto, “Pengaruh Penambahan Gula Merah Terhadap Kualitas Sensoris Abon Ayam [The Effect of Adding Brown Sugar on the Sensory Quality of Shredded Chicken],” *Maduranch J. Ilm. Peternak.*, vol. 7, no. 2, pp. 66–73, 2022.

[11] K. Kastalani, Y. Yemima, and A Winata, “Pengaruh lama perebusan dan tingkat konsentrasi bahan kyuring : garam, gula merah, jahe dan serai terhadap kualitas uji hedonik abon ayam broiler [The Effect of Boiling Time and Curing Concentration of Curing Materials: Salt, Palm Sugar, Ginger and Lemon Grass on the Hedonic Quality Test of Shredded Broiler Chicken],” *J. Trop. Anim. Sci.*, vol. 5, no. 2, pp. 68–71, 2016.

[12] R. Harianti and F S Tanberika, “Pemberdayaan wanita tani melalui produksi abon ikan lele [Empowering women farmers through the production of shredded catfish],” *JPPM (Jurnal Pendidik. dan Pemberdaya. Masyarakat)*, vol. 5, no. 2, pp. 167–180, 2018.

[13] S. M. Sembor, H. Liwe, and N. N. Lontaan, “Testing Of Chemical, Ph And Test Of Antibiotic Culled Laying Hens Meat,” *Food Sci. Qual. Manag.*, vol. 81, pp. 94–98, 2018.

[14] R. A. Djawa, B. Sabtu, and H. Armadinato, “Pengaruh Penambahan Tepung Daun Kelor (Moringa oleifera Lam) Terhadap Kualitas Kimia dan Organoleptik Bakso Daging Ayam Petelur Afkir [The Effect Of Addition Of Moringa leaves Flour (Moringa Oleifera Lam) On The Chemical And Organoleptic Quality Culling L,” *J. Peternak. Lahan Kering*, vol. 3, no. 4, pp. 1783–1791, 2021.

[15] E. Prasetyo, A. M. Nuhriawangsa, and W Swastike, “Pengaruh lama perebusan terhadap kualitas kimia dan organoleptik abon dari bagian dada dan paha ayam petelur afkir [The effect of boiling time on the chemical and organoleptic quality of shredded chicken breast and thighs of culled layers],” *Sains Peternak. J. Penelit. Ilmu Peternak.*, vol. 10, no. 2, pp. 108–114, 2012.

[16] T. Y. Yu, J. D. Morton, S. Clerens, and J M Dyer, “Cooking-induced protein modifications in meat,” *Compr. Rev. Food Sci. Food Saf.*, vol. 16, no. 1, pp. 141–159, 2017.

[17] P. B. Pathare and A. P. Roskilly, “Quality and energy evaluation in meat cooking,” *Food Eng. Rev.*, vol. 8, pp. 435–447, 2016.

[18] Z. Zhang, V. Arrighi, L. Campbell, J. Lonchamp, and S R Euston, “Properties of partially denatured whey protein products: Formation and characterisation of structure.,” *Food Hydrocoll.*, vol. 52, pp. 95–105, 2016.

[19] W. Jia *et al.*, “Proteomics analysis to investigate the impact of diversified thermal processing on meat tenderness in Hengshan goat meat,” *Meat Sci.*, vol. 183, no. Agustus, p. 108655, 2022.

[20] O. A. Lapase, “Kualitas fisik (daya ikat air, susut masak, dan keempukan) daging paha ayam sentul akibat lama perebusan [Physical quality (water holding capacity, cooking loss, and tenderness) of Sentul chicken thigh meat due to boiling time],” *Students e-journal*, vol. 5, no. 4, pp. 1–10, 2016.

[21] H. Hafid, “Sifat fisik dan mutu sensori daging sapi bali yang dipelihara secara tradisional (pengaruh pelayuan dan jenis kelamin) [Physical properties and sensory quality of Balinese beef that is reared traditionally (effect of withering and sex)],” *Maj. Ilm. Agriplus*, vol. 14, no. 1, pp. 61–64, 2009.

[22] F. Pursudarsono, D. Rosyidi, and A. S. Widiati, “Pengaruh Perlakuan Imbangan Garam dan Gula Terhadap Kualitas Dendeng Paru-Paru Sapi [The Effect of Balancing Salt and Sugar Treatment on the Quality of Beef Lung Jerky],” *J. Ilmu dan Teknol. Has. Ternak*, vol. 10, no. 1, pp. 34–45, 2015.

[23] F. Rosita, H. Hafid, and R Aka, “Susut masak dan kualitas organoleptik bakso daging sapi dengan penambahan tepung sagu pada level yang berbeda [Cooking loss and organoleptic quality of beef meatballs with the addition of sago flour at different levels],” *J. Trop. Anim. Sci.*, vol. 2, no. 1, pp. 14–20, 2017.

[24] H. F. Rasman and Nuraini, “Pengaruh Penambahan Buah Nangka Muda terhadap Sifat Fisik dan Organoleptik Abon Daging Itik Afkir [The Effect of Adding Young Jackfruit on the Physical and Organoleptic Properties of Shredded Duck Meat],” *J. Ilmu dan Teknol. Peternak. Trop.*, vol. 5, no. 3, pp. 95–101, 2018.

[25] M. B. R. Rodriguez, C. C. Junior, C. S. Carneiro, R. M. Franco, and S B Mano, “The effect of carbon dioxide on the shelf life of ready-to-eat shredded chicken breast stored under refrigeration,” *Poult. Sci.*, vol. 93, no. 1, pp. 194–199, 2014.

[26] L. R. Kartikasari, B. S. Hertanto, A. S. D. Pamungkas, I. S. Saputri, and A M P Nuhriawangsa, “Kualitas Fisik dan Organoleptik Bakso Berbahan Dasar Daging Ayam Broiler yang Diberi Pakan dengan Suplementasi Tepung Purslane

(Portulaca)[Physical and Organoleptic Quality of Broiler Meat-Based Meatballs Fed with Purslane (Portulaca oleraceae) Flour Sup," *Sains Peternak. J. Penelit. Ilmu Peternak.*, vol. 18, no. 1, pp. 66–72, 2020.

[27] A. N. Ndun, F. M. Telupere, and N G A Mulyantini, "The Reject Green Kale Substitution (Ipomoea Aquatica) Fermented Yeast in Commercial Feed on Performance and Carcass Quality of Super Native Chicken," *J. Trop. Anim. Prod.*, vol. 21, no. 1, pp. 1–12, 2020.

[28] D. Barbanti and M. Pasquini, "Influence of cooking conditions on cooking loss and tenderness of raw and marinated chicken breast meat," *LWT-Food Sci. Technol.*, vol. 38, no. 8, pp. 895–901, 2005.

[29] P. Garcia-Segovia, A. Andres-Bello, and J Martinez-Monzo, "Effect of cooking method on mechanical properties, color and structure of beef muscle (M. pectoralis)," *J. Food Eng.*, vol. 80, no. 3, pp. 813–821, 2007,

[30] D. Irawan, J. Jumsurizal, and R. M. S. Putri, "Karakteristik Otak-Otak Tulang Ikan Todak (Tylosurus crocodilus) dengan Penerapan Teknologi Modern [Characteristics of Swordfish (Tylosurus crocodilus) Brains with the Application of Modern Technology]," *Marinade*, vol. 4, no. 2, pp. 92–103, 2021.

[31] Z. Ulfaturriza, T. R. Ferasyi, and A. Azhar, "Pengukuran kadar protein pada tahap pembersihan, perebusan dan pengeringan produk ikan kayu dikecamatan kuta alam banda aceh [The Measurement of Protein Content on Cleaning, Boiling And Drying Stages of Wooden Fish Product in Kuta Alam Regency Banda Aceh]," *J. Ilm. Mhs. Vet.*, vol. 3, no. 3, pp. 170–174, 2019.

[32] F. Alyani, W. F. Ma'aruf, and A D Anggo, "Pengaruh lama perebusan ikan bandeng (Chanos chanos Forsk) pindang goreng terhadap kandungan lisin dan protein terlarut [Effect of boiling time of fried boiled milkfish (Chanos chanos Forsk) on lysine and dissolved protein content]," *J. Pengolah. dan Bioteknol. Has. Perikan.*, vol. 5, no. 1, pp. 88–93, 2016.

[33] Bulkaini, B. R. D. Wulandari, D. Kisworo, and W. Yulianto, "Diseminasi Teknologi Pembuatan Abon yang Berbasis Daging Ayam Petelur Afkir [Dissemination of Shredded Production Technology Based on Afkir Laying Chicken Meat]," *J. Pengabdi. Magister Pendidik. IPA*, vol. 3, no. 2, pp. 1–15, 2020.

[34] Soeparno, *Ilmu Dan Teknologi Daging*, Edisi 5. Yogyakarta: Gajah Mada University Press, 2009.

[35] J. Soriano-Santos, *Dietary products for special populations. Handbook of poultry science and technology*. Hokoben: John Wiley & Sons, 2010.

[36] Bulkaini *et al.*, "Antioxident Activity and Nutrition Values of Shredded Meat Of Laying Hens reject Immersion in Pineapple Peel Extracts," *J. Crit. Rev.*, vol. 7, no. 19, pp. 4504–4510, 2020.

[37] K. Towadi, R. M. Harmain, and F A Dali, "Pengaruh lama pengasapan yang berbeda terhadap mutu organoleptik dan kadar air pada ikan tongkol (Euthynnus affinis) asap [Effect of different smoking times on organoleptic quality and moisture content of smoked tuna (Euthynnus affinis)]," *Nik è J. Ilm. Perikan. dan Kelaut.*, vol. 1, no. 3, pp. 177–185, 2013.

[38] N. T. Sonya and S. H. R. Lydia, "Analisis Kandungan Gula Reduksi Pada Gula Semut dari Nira Aren yang Dipengaruhi pH dan Kadar Air [Analysis of Reducing Sugar Content in Ant Sugar from Palm Nira Affected by pH and Moisture Content]," *Bioedukasi (Jurnal Pendidik. Biol.*, vol. 12, no. 1, pp. 101–108, 2021.

[39] R. Awaliah, S. Yanto, and A. Sukainah, "Analisis sifat fisiko kimia nugget rajungan (Portunus pelagicus) dengan berbagai jenis tepung sebagai bahan pengisi [Analysis of physico-chemical properties of blue swimming crab nuggets (Portunus pelagicus) with various types of flour as fillers]," *J. Pendidik. Teknol. Pertan.*, vol. 3, no. 2, pp. 1–10, 2017, doi: 10.26858/jptp.v3i2.5526.

[40] K. Kamsina and I. T. Anoya, "Pengaruh penambahan gula dan karagenan terhadap mutu jelly mentimun [The effect of adding sugar and carrageenan to the quality of cucumber jelly]," *J. Litbang Ind.*, vol. 3, no. 1, pp. 49–57, 2013.

[41] R. Wahyuni, "Optimasi pengolahan kembang gula jelly campuran kulit dan daging buah naga super merah (Hylocereus costaricensis) dan prakiraan biaya produksi [Optimization of processing of jelly confectionery mixed with skin and flesh of super red dragon fruit (Hylocereus costaricensis)]," *Teknol. Pangan Media Inf. dan Komun. Ilm. Teknol. Pertan.*, vol. 1, no. 1, pp. 76–83, 2011.

[42] M. Sigit, M. Akbar, and L. Fianti, "Kualitas organoleptik abon ayam yang diberi perlakuan substitusi kacang tanah (Arachis hypogaea L.) [Organoleptic quality of chicken floss treated with peanut substitution (Arachis hypogaea L.)]," *J. Ilm. Fill. Cendekia*, vol. 2, no. 1, pp. 1–8, 2017.

[43] S. Putri, "Pengaruh Substitusi Nangka Muda (Artocarpus Heterophyllus Lmk) Terhadap Kualitas Abon Ampas Tahu [The Effect of Substitution of Young Jackfruit (Artocarpus Heterophyllus Lmk) on the Quality of Shredded Tofu Dregs]," *Holistik J. Kesehat.*, vol. 8, no. 4, pp. 1–10, 2014.

[44] R. Agustin, "Pengaruh Penambahan Pepaya (Carica Papaya L.) Terhadap Kualitas Abon Ayam (Gallus gallus domestica)(Studi Eksperimen Sebagai Sumber Belajar Peserta Didik Pada Materi Bioteknologi Untuk Sekolah Menengah Atas," UIN Raden Intan Lampung, 2019. [Online]. Available:http://repository.radenintan.ac.id/5680/

[45] E. Abustam, J. C. Likadja, and A Ma'arif, "Penggunaan asap cair sebagai bahan pengikat pada pembuatan bakso daging sapi Bali [The use of liquid smoke as a binder in the manufacture of Balinese beef meatballs]," in *Prosiding Seminar Nasional Kebangkitan Peternakan. Program Magister Ilmu Ternak Pasacasarjana Fakultas Peternakan Universitas Diponegoro*, 2009, pp. 1–10.

[46] Y. Aida, C. F. Mamuaja, and A. T. Agustin, "Pemanfaatan Jantung Pisang (Musa Paradisiaca) Dengan Penambahan Daging Ikan Layang (Decapterus Sp.) Pada Pembuatan Abon [Utilization of Inflorescence of Banana (Musa Paradisiaca) With The Addition Of Scad Fish (Decapterus sp) on Making Abon]," *J. Ilmu dan Teknol. Pangan*, vol. 2, no. 1, pp. 1–20, 2014, [Online]. Available: https://ejournal.unsrat.ac.id/index.php/itp/article/view/7371

[47] Soeparno, *Ilmu Dan Teknologi Daging [Meat Science and Technology]*, 4th ed. Yogyakarta: Gajah Mada University Press, 2009.

[48] N. Rohmawati, S. Sulistiyani, and L. Y. Ratnawati, “Pengaruh penambahan keluwih (Artocarpus camasi) terhadap mutu fisik, kadar protein, dan kadar air abon lele dumbo (Clarias gariepinus) [Effect of Addition of Keluwih (Artocarpus camasi) against Physical Quality, Protein Content, and Water Content of Abon Lele Dumbo (Clarias gariepinus],” *J. ilmu Kesehat. Masy.*, vol. 9, no. 2, pp. 1–12, 2013