Analysis of pH and cooking losses of chicken meat due to the use of different percentages of turmeric flour

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Abstract: The use of turmeric as an active compound for preservatives is widely used because it is simple, inexpensive, and easy to find. To prevent the losses of quality and damage to the meat, processing and preservation is required. The purpose of this study was to determine the effect of using different percentages of turmeric flour on the pH and cooking losses of chicken meat. This study used 2.2 kg Broiler chicken breast and 214.5 g turmeric flour. The research design used was a completely randomized design consisting of 4 treatments and 5 replications so that the total sample was 20 units. With the percentage of using turmeric flour T0 (0%), T1 (10%), T2 (13%) and T3 (16%). The results of research that have been carried out the percentage of using turmeric flour as much as 13% (5.90) is the best treatment for the pH of broiler chicken meat. The results of research that have been carried out the percentage of use of turmeric flour as much as 13% (25.35%) is the best treatment for cooking losses.

1. Introduction
Turmeric is an agricultural commodity that has various benefits for humans. Apart from being a seasoning for cooking for use at home, turmeric is also a natural ingredient that contains ingredients such as curcumin and essential oils. Natural ingredients have certain components in them that can work to inhibit microbial activity [1]. The addition of turmeric to a food ingredient is able to maintain freshness, nutritional value, increase preferences and increase the storability of these foodstuffs [2].

One of the food products of animal origin that are commonly consumed by the community is chicken meat; chicken meat itself is a source of protein from animal origin which is favored by various components of society. Meat is quickly deteriorate and its physical and chemical quality deteriorates when stored at room temperature, resulting in the meat being unfit for consumption. To prevent the loss of quality and damage to the meat, processing and preservation is required.

One of the methods used to process and preserve meat is the marinating method. This method is one of the processes of preserving meat, by immersing the meat in seasoned ingredients or seasoned liquid, before further processing. The seasoned liquid used as a meat marinade is used to extend the storability of the meat and maintain the quality of the meat. One of the ingredients for marinating that can be used is turmeric, besides being used as an ingredient for marinating, turmeric can also be used as an antioxidant. There are several things that are indicators to see the quality of meat, including the pH of the meat and the cooking losses of the meat. pH can describe the water holding capacity, the higher the pH, the water that is retained in the muscles will increase. Cooking losses can describe the tenderness of the meat, the greater the cooking loss, the higher the tenderness of the meat. From this
background, research was carried out on the analysis of pH and cooking losses in chicken meat due to the use of different percentages of turmeric flour.

2. Materials and methods
This research was conducted at the Laboratory of Meat Processing Science and Technology and the Laboratory of Milk Processing Science and Technology, Animal Husbandry Department, Faculty of Agriculture, Syiah Kuala University, Banda Aceh. The research was conducted from May to August 2019. The research materials used were 2.2 kg of broiler chicken breast and 214.5 grams of turmeric flour. The materials used in this study consisted of broiler chicken breast, turmeric flour and distilled water. The research design used in this study was a completely randomized design consisting of 4 treatments and 5 replications (Table 1), so that the total sample is 20 units. The parameters observed in this study were the pH value and cooking losses of broiler chicken meat. The process for carrying out the cooking losses based on: Prepare chicken breast weigh 100 grams as a sample, steam the sample at 100°C for 20 minutes, remove the sample from the steamer, cooling the sample to room temperature. weigh the sample after cooking, calculate cooking losses with the formula:

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\text{Cooking losses (\%) = } \frac{\text{weight before cooking} - \text{weight after cooking}}{\text{weight before cooking}} \times 100\%
\]

3. Results and discussion
pH is the level of acidity which is usually used to determine the acidity and basicity of a solution. The pH value of a solution is neutral when it is at 7, and is acidic when the number is less than 7, and alkaline or alkaline when the pH value is more than 7. The results of measuring the pH value of broiler chicken meat due to the use of different percentages of turmeric flour can be seen in Figure 1.

The average results of the analysis of the pH analysis of broiler chicken meat due to the use of different percentages of turmeric flour ranged from 5.84 to 6.05 (Figure 1). The results of variance showed that the use of different percentages of turmeric flour had a very significant effect (P < 0.01) on the pH value of broiler meat. The further test results of the Duncan multiple-area showed that the use of a percentage of turmeric flour as much as 0% (5.84) and the use of 16% (6.05) had a very significant different pH value while the use of the percentage of turmeric flour as 10% (5.98), and the use of 13% (5.90) had a pH value that was not significantly different. From the results of research that has been done, the percentage of using turmeric flour as much as 13% is the best treatment for the pH of broiler chicken meat.

![Figure 1. Graph of pH value of broiler chicken meat.](image-url)
The results of this study indicate that the pH value of the meat is good, where meat with a low pH (5.1-6.2) will be bright red, have good flavor, do not rot easily and have an open structure [4]. This study also showed better results compared to the study of who reported that the average pH ranges from 5.96 to 6.58 [5]. Before the slaughtering process, broiler chickens have a pH value of 6.8 and will then decrease to the isoelectric point (5.0 - 5.2) in 30 minutes to 4.5 hours at room temperature, broiler meat has the ultimate normal pH range between 5.4 - 5.8 [6]. The pH of the meat decreased after the slaughtering process. Factors that influence postmortem meat pH are divided into two, namely external factors and internal factors [7]. External factors include environmental temperature, handling of livestock before slaughter and storage temperature, while internal factors include the glycogen content in meat [8].

The high of pH value will cause the meat structure to close and reduce the liquid that permeates the meat so that there is no change in the hydrogen ion balance and causes the pH to remain stable [9]. So that it can inhibit the glycolysis process quickly. The glycolysis process will produce lactic acid so that it can cause the pH value of the meat to be decrease [8]. That meat that has high lactic acid will produce a low meat pH while meat that has lower lactic acid will have a high meat pH and tends to be alkaline [9].

Cooking shrinkage is one of the determinants of the nutritional value of meat because it is related to the level of meat juice, namely the amount of water bound between the muscle fibers [3]. The average results of the analysis of the cooking losses value of broiler chickens meat due to the use of different percentages of turmeric flour ranged from 25.35% - 33.58% (Figure 2). The results of variance showed that the use of different percentages of turmeric flour had a very significant effect (P <0.01) on the cooking losses value of broiler meat. The further test results of the Duncan multiple-areas showed that the use of a percentage of 0% turmeric flour (33.58%) had a very significant difference in cooking losses. While the use of the percentage of turmeric flour as much as 10% (27.83%), 13% (25.35%) and 16% (26.43%) was not significantly different.

![Figure 2. Graph of cooking losses in broiler chicken meat due to the use of different percentages of turmeric flour.](image)

The percentage of cooking losses obtained in this study is much better when compared to the results of study which reported that the range of cooking losses percentages was 32% - 34.2% [4]. From the results of research that has been carried out the percentage of use of turmeric flour as much as 13% is the best treatment for cooking losses, this shows that the use of different percentages of turmeric flour in broiler chicken meat can reduce the percentage of cooking losses. Cooking losses is one of the
important determinants of meat quality, because it is related to the amount of water lost and nutrients that dissolve in water due to the influence of the cooking process.

The weakening of protein bonds is an indicator of the amount of cooking losses, which results in the ability to bind the meat juices to become weak and results in the amount of meat juices that are released due to decreased water holding capacity [10]. Broiler meat aged 6 to 7 weeks has a cooking losses of 34.57%. Meat with low cooking losses has better physical quality when compared to meats that have higher cooking losses, because the loss of nutrients during the cooking process is less, one of the determining indicators of low or the percentage of cooking losses is temperature and cooking time. This is in accordance with the report of stated that several components that can affect cooking losses include meat sample weight, cross-section of meat, meat size and pH [11,12].

4. Conclusion
The conclusion from the results of this study is that the use of different percentages of turmeric flour can have a very significant effect (P <0.01) on the pH and cooking losses of broiler chicken, where the use of a percentage of turmeric flour as much as 13% is the best treatment for pH and cooking losses values.

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