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Effect of Batak Onions (*Allium chinense* G. Don.) on Quality Parameters of Lamb Rendang

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Authors' contributions

This work was carried out in collaboration among all authors. Author NA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author FW managed the analyses of the study. Author MR managed the literature searches. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aims: The aim of this research is to highlight Lamb Rendang Nutrition with The Addition of Batak Onions (*Allium chinense* G. Don.).
Study Design: A qualitative description.
Place and Duration of Study: LKPP Universitas Pembangunan Panca Budi, Medan.
Methodology: This study used an experimental method with a non-factorial completely randomized design with 3 treatments and 3 replications. The parameters tested were water content and pH value.
Results: The results showed that there was no significant effect (P>0.05) on the pH value and it was very significantly different (P<0.01) on the water content.
Conclusion: Batak onions can increase the nutritional value of lamb rendang seen from the water content and pH values.

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Keywords: Batak onions; water content; pH value; lamb meat rendang.

1. INTRODUCTION

Food is a primary need that cannot be separated from life. Food ingredients can come from vegetable and animal materials. The ingredients must be able to meet the needs of the body such as carbohydrates, proteins, fats, and micromolecules such as vitamins and minerals. Today, the public is aware of the importance of health, so causes the level of public consumption of animal products is high. Foodstuffs Animal products consumed by many people are milk, eggs, and meat. Meat is a food of animal origin that can come from livestock ruminants and non-ruminants. This product can be obtained from cattle, buffalo, goats, and sheep. This livestock product has high nutritional value particularly high in protein and amino acids. In addition, the nutrients contained in the flesh are water. As a result of this complex nutrient content, it makes the product is very easily damaged, especially by bacteria. “Bacteria are contaminants that most often contaminate livestock products so reducing their nutritional value. In addition, product processing also greatly affects the durability of livestock products” [1].

Processing is one of the efforts made to extend the shelf life of livestock products. Some processing techniques are done by cooking the meat into rendang. Rendang is generally made from beef. Then, in terms of taste and aroma, good beef will have a distinctive aroma like beef, while the color of the beef has a bright red color and the fat (marbling) of fresh beef has a yellowish-white color, which means the meat is coming from young cows to produce soft meat, tender, and also tasty (Gunawan, 2013). Currently, rendang is made from various types of meat such as chicken, goat, and lamb, while the spices in rendang are made from garlic, shallots, turmeric, ginger, lemongrass, chilies, and galangal [2]

Batak onion (*A. chinense* G. Don) is one of the plants endemic in the province of North Sumatra, while guava can be found throughout Indonesia. Endemic plants such as Batak onions are used by the community as a spice for several types of dishes. Both of these plants contain antioxidants and antimicrobials. Asmaq and Wibowo [3] found that the use of 10% Batak onion extract (*A. chinense* G. Don) affected the quality of lamb meat. Therefore, research on lamb rendang soaked with onion extract and added Batak onions to the lamb rendang seasoning.

2. MATERIALS AND METHODS

2.1 Tools and Material

The research materials used were Batak onion (*Allium chinense* G. Don), 4000 grams of lamb, 3% red chili, 8 L coconut milk, 3% galangal, 2% ginger, 20% red onion, 2% garlic, 1 nutmeg. %, cardamom 0.5%, coriander 1%, cloves 0.5%, anise flowers 0.5%, bay leaves 0.5%, lime leaves 0.5%, turmeric leaves 0.5%, lemongrass 0.5 %, 2% salt, aluminum foil, PE plastic, plastic wrap, distilled water, technical ethyl acetate, 70% alcohol, food grade alcohol, label paper, and brown glass bottles.

The tools used in the study were permanent pens, aluminum cups, analytical scales, pencils, folio books, knives, blenders, filters, ovens, Petri dishes, measuring cups, stoves, pans, basins, silk, plastic, evaporators, pH meters.

2.2 Research and Procedures

2.2.1 Batak onion extraction (*A. chinense* G. Don) [4,5]

Batak onion bulbs (*A. chinense* G. Don) were cleaned of adhering dirt until clean. The tubers were sliced to a thickness of ± 5 mm, then dried in the oven at 50^{o}C for 6 hours until a constant final weight was obtained. The dried Batak onion bulbs were then mashed using a blender and filtered into powder (Simplicia). Simplicia was extracted by maceration method using food grade alcohol (v/v) and distilled water for 3 days at room temperature. Then filtered and concentrated with a vacuum rotary evaporator at 60^{o}C. The extract is ready to use as a soaking treatment with fresh meat.

2.2.2 Marinate fresh meat with batak onion extract (*A. chinense* G. Don)

Fresh meat is washed thoroughly using running water until there is no dirt attached to the surface of the meat. Next, the meat is soaked with 1% extract and left for 30 minutes. Continue the cooking process.

2.2.3 Rendang making

Red chilies, galangal, ginger, shallots, garlic, lemongrass, nutmeg, cloves, and coriander are blended until smooth. Once smooth, the spices are put into the pan, then added with coconut milk. Then, turmeric leaves, lime leaves, anise

flowers, cardamom, and bay leaves are also added to the pan along with the other spices. After that, the spices are cooked over medium heat while the chili is stirred until the coconut milk releases the oil or the volume decreases. Then, the meat is added to the chili sauce and stirred until all the meat is covered with the sauce. The meat is cooked until the coconut milk shrinks and the color of the meat changes from pink to brown at first. After the coconut milk has shrunk and the meat is slightly tender, put the finely sliced Batak onion into the Kalio Lamb as much as the treatment. The meat is cooked until the gravy dries while stirring the sauce so it doesn't burn. After that, the lamb redang is ready to be tested.

2.3 Observed Parameters

2.3.1 Moisture content [6]

An empty aluminum cup was heated in an oven at 105^{o}C for 30 minutes, then cooled in a desiccator and weighed. The cup drying procedure was repeated until a balanced weight was obtained. A sample of 2 grams in a cup that has been dried is weighed, then heated in an oven at 105^{o}C for 6 hours. After the cup was removed from the oven, it was cooled in a desiccator for 30 minutes. The drying process is repeated until a balanced weight of the material is obtained. The percentage of water content can be calculated using the following formula:

$$Water\ content(\%) = \frac{B_1 - B_2}{B_1} x\ 100$$

Information:

B1 = Weight of the initial material (g)
B2 = Weight of material after drying (g)

2.3.2 pH value [6]

A meat sample weighing 25 g was added to 50 mL of distilled water, then blended until homogeneous. The pH value is determined using a pH meter. Before measurement, the pH meter needs to be calibrated first using pH 4 and 7 buffers. After calibration, the sample is measured by dipping the electrode into the solution until a stable reading is obtained.

Data analysis method: This study used an experimental method with a completely randomized design (CRD) non-factorial design with 3 treatments and 3 replications. The treatment carried out is:

P1: 1% Batak Onion
P2: 1% Batak onion extract
P3: 1% Batak onion extract + 5% Batak onion slices

The mathematical model used is by the design used according to Steel and Torrie (1995), namely:

$$Yijk = \mu + \tau i + \varepsilon ij$$

Yijk = observed value in the ith treatment & jth replication
μ = common mean
τi = effect of the i treatment
εij = experimental error in the ith treatment and jth replicate

If the data obtained in the ANOVA table shows a significant or very significant difference, further tests will be carried out. The further test used will be determined by calculating the value of the coefficient of diversity of the data.

3. RESULTS AND DISCUSSION

3.1 Water Content

The water content of lamb rendang by soaking using Batak onion extract (*Allium chinense* G. Don) is shown in Table 1 below.

Table 1. Water content of lamb rendang (%)

Treatment	Water Rate (%)
P1	58,2678^{B}
P2	57,6921^{A}
P3	55,0654^{C}

Note: Superscripts with different letters in the same column show a very significant difference (P>0.01)

The results showed that the highest water content of lamb rendang was in treatment P1 with a water content value of 58.2678%, namely without the use of Batak onion extract but using Batak onion slices, while the lowest water content was in the P3 treatment with a value of 55.0654%, namely by soaking Batak onion extract as much as 1% and 0.5% Batak onion slices.

This is because the water content in Batak onions reaches > 10%. By the results of Sipayung's research (2020) found the moisture content of Batak onions was 12.72%. Based on the research results obtained, it can be seen that as the combination of Batak onion extract used

increases, the water content decreases in lamb rendang. This is in line with the research of Asmaq and Wibowo [3] that the moisture content of lamb meat decreases by soaking using Batak onion extract with the lowest value of 76.94%. the results of this study are different from the Arief et al. [7] who found that "the longer the meat was stored in garlic extract, the rate of increase in the water content in the sample increased. the rate of increasing of the control water content was higher than the rate of increase in the water content of the meat treated with garlic extract".

In addition, the amount of water content in a product is also influenced by the condition of livestock. By the opinion of Tilman (1989) that "the water content decreases with the increasing age of cattle, on the other hand, the fat content tends to increase until the maturity stage is reached. The water content of the meat reaches 75% in the animal's body, also influenced by the treatment of the livestock. If the transportation is not good (rough), it will affect the water and glycogen content". Soeparno [1] reinforced that "meat has carbohydrates in the form of glycogen in small quantities. Microbes will break down large molecular carbohydrates such as polysaccharides into glucose (monosaccharides) or maltose (disaccharides). Monosaccharides in the process of glycolysis will be converted into pyruvic acid, then converted into tricarboxylic acid in the Krebs cycle and finally split into CO_2 and H_2O, so that the water content increases".

3.2 pH Value

The pH value of lamb rendang by soaking using Batak onion extract (*Allium chinense* G. Don) is shown in Table 2 below.

Table 2. pH value of lamb rendang

Treatment	pH value
P1	6,4
P2	6,3
P3	6,2

The results showed that the highest pH value of lamb rendang was in treatment P1 with a value of 6.4, while the lowest pH value was found in treatment P3. The highest pH value was shown by P1 treatment which was not smeared with Batak onion extract (*A. chinense* G. Don).

The results of this study are different from research conducted by Asmaq and Wibowo [3] that the lowest pH value of mutton is 6.6, namely soaking lamb in Batak onion extract for 2 hours. The pH value in the study decreased with each increase in the amount of extract added, in line with Nurwantoro et al. [8] also found that the pH of beef marinated in garlic juice decreased from 6.54 to 6.31 within 5-20 minutes of marination.

In this study, soaking the meat used Batak onion extract (*Allium chinense* G. Don) for 30 minutes and with the addition of Batak onion slices to rendang as much as 0.5% and 1% of the weight of the meat. Different soaking times will affect different results. The combined use of these plant extracts can also affect the pH value. Fuad [9] emphasized that the longer the marination time, the water holding capacity increased and the pH value of the meat samples decreased by using theobromine. Haikal et al. (2021) found that there was a decrease in the pH value of rejected chicken meat by administering guava extract. The decrease in the pH value was due to the administration of ascorbic acid so that the isoelectric pH was reached. The results showed that the highest pH value of rendang was in treatment P1 with a value of 6.4, while the lowest pH value was found in treatment P3.

The results of this study are supported by the research of Siagian [10] which states that foodstuffs with a pH close to neutral have more microbes in the form of bacteria than other types of microbes. Strengthened by Dina et al. [11] that this microbial growth will take place and an ideal pH will be achieved for microbial growth, namely a neutral pH. In addition, the antioxidant content of the two extracts used caused the pH value to decrease. In line with Dartina [12] that the phenol content as an antioxidant and antimicrobial can act as a tenderizing agent, so that the glycolytic enzymes in the process of anaerobic glycolysis can stop.

4. CONCLUSION

The conclusions obtained in this study are:

a. The added Batak onion extract affects the quality of the lamb rendang.
b. The quality of lamb rendang soaked using Batak onion extract (*Allium chinense* G. Don) and the addition of Batak onion slices had no significant effect ($P>0.05$) on the pH value, but had a very significant effect ($P<0.01$) on the water content lamb chops.

c. The best mutton rendang in the P3 treatment was the use of 1% Batak onion extract (*Allium chinense* G. Don) and 0.5% Batak onion slices (*Allium chinense* G. Don).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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