Effect of Adding Batak Onions (*Allium chinense* G. Don.) on Water Content and Ash Content of Mutton Meat Rendang

ABSTRACT

Aims: The aim of this research is to determine the water content and ash content of goat meat rendang with the addition of Batak onions in the processing process
Study design: Qualitative description
Place and Duration of Study: Vahana Scientific Laboratory, West Sumatera
Methodology: This study used an experimental method with a non-factorial completely randomized design with 4 treatments and 4replications. The parameters tested were water content and ash content
Results: The results showed that there was a highly significant effect ($P<0.01$) on the water content and ash content
Conclusion: Batak onions can increase the nutritional value of mutton rendang seen from the water content and ash content

Keywords: Batak Onions, Water Content, Ash Value, Mutton Meat Rendang

1. INTRODUCTION

Food is a primary need that is needed and has a very important essence in life to grow and develop. Foodstuffs can come from vegetable and animal sources. The ingredients consumed must be able to meet the body's needs, namely macro and micro nutrients, namely carbohydrates, protein, fat, vitamins and minerals. In this day and age, people are aware of the importance of health, which has caused people's consumption levels of animal products to become high. The most commonly consumed animal-based foodstuffs are milk, eggs and meat (Asmaq et.al., 2023).

Meat is food of animal origin derived from ruminants and non-ruminants. This product can be obtained from cattle, buffalo, sheep and goats (Asmaq et.al., 2023). These livestock products have high nutritional value, especially protein and amino acids. In addition, this product also contains cholesterol. Cholesterol is one of the most essential structural components needed in the body. High cholesterol in the body of goats can affect cholesterol levels in goat meat as well. These animal products are usually consumed into processed products such as curry. But not all people like this processed goat meat product. One of the efforts made is to carry out food diversification measures.

Food diversification is the process of diversifying food into new products that have high nutritional value while maintaining the quality of processed products. One of the food diversification carried out for goat meat processing products is rendang. Rendang is a typical traditional product from West Sumatera Province which is worldwide. This product is known for its delicious taste because it is cooked using special spices and the use of fresh coconut milk. The coconut milk used in the cooking process of this product can affect the cholesterol of processed rendang products. Products with high cholesterol can affect the health of consumers. This can be anticipated by utilizing antioxidants from natural ingredients such as Batak onions (*Allium chinense* G. Don) (Asmaq et.al., 2023).

Batak onion *(A. chinense* G. Don) is one of the endemic plants found in the province of North Sumatra. Endemic plants such as Batak onions are used by the community as a spice for several types of dishes. This plant contains antioxidants and antimicrobials. Asmaq and Wibowo (Asmaq and Wibowo, 2022) found that the use of 10% Batak onion extract (*Allium chinense* G. Don) affected the quality of the mutton. Asmaq, et al (2022) also found that soaking mutton using Batak onions (*Allium chinense* G. Don) and guava leaves (*Psidium guajava* L.) provided organoleptic changes in mutton. Therefore, the author is interested to see the water content and ash content of mutton rendang with the addition of Batak onions.
In this research, the researcher want to know how significant the sliced of Batak onion on mutton meat rendang.

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

TOOLS AND MATERIAL

The research materials used were Batak onion (*Allium chinense* G. Don), 4000 grams of mutton, 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 % and 2% salt.

The tools used in the study were permanent pens, analytical scales, pencils, folio books, knives, blenders, filters, ovens, porcelain cup, plastic, oven, and furnace.

RESEARCH AND PROCEDURES

Rendang Making

Red chilies, galangal, ginger, shallots, garlic, lemongrass, nutmeg, cloves, and coriander are blended. 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 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 Mutton 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 mutton redang is ready to be tested.

Observed Parameters

Moisture Content (AOAC, 2005)

“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”. [14] 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)

Ash Content (AOAC, 2005)

Ash content measurements were tested based on AOAC references. Samples were weighed 2 grams, then put in crucibles to be burned in a furnace at high temperature 600℃ for 1 hour, then cooled in a desiccator. After that, weighed until constant weight and calculated the percentage of ash content.

$$Ash\ content(\%) = \frac{W_3 - W_1}{W_2 - W_1} x\ 100$$

Information:

W_1 = the weight of the crucible (g)
W_2 = the weight of the crucible (g) + sample weight (g)
W_3 = the weight of the crucible (g) + sample weight after ashing (g)

Data analysis method

This study used an experimental method with a completely randomized design (CRD) non-factorial design with 4 treatments and 4 replications. The treatment carried out is:

P0: Control (without Batak onion)

P1: 5% addition of sliced Batak onion

P2: 10% addition of sliced Batak onion

P3: 15% addition of sliced Batak onion

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

$$\mathbf{Yijk = \mu + \tau i + \varepsilon ij}$$

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

Water Content

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

Table 1. Water Content of Mutton Rendang (%)

Treatments	Water Content (%)
P0	$44,57^{D}$
P1	$52,54^{A}$
P2	$52,39^{B}$
P3	$48,97^{C}$

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

The results showed that the highest water content of mutton rendang was in treatment P1 with a water content value of 52,54%, which used 5% of sliced Batak onion, while the lowest water content was in the P0 treatment with a value of 44,57%, namely without used of sliced Batak Onion. Based on further test analysis, it was found that the addition of Batak onions was highly significant (P<0,01) on the water content of mutton meat rendang.

The significant difference in water content in this study was due to the addition of Batak onions in the process of making mutton rendang. This is because Batak onions contain 10% water content. 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 the addition of sliced Batak onion used increases, the water content decreases in mutton rendang. This is in line with the research of Asmaq and Wibowo (2022) that the moisture content of lamb meat decreases by soaking using Batak onion extract with the lowest value of 76.94%. In line with the research of Asmaq and Fachrina (2023) that found the combination of addition of extract and sliced Batak onion can increase the nutrition of lamb rendang. Asmaq and Fachrina (2023) also found that the addition of the combination Batak onion extract and guajava leaves extract can maintain the nutrition of lamb meat.

In addition, the amount of water content in a product is also influenced by the condition of the mutton in this case. By the opinion of Tilman (1989), “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 (2005) 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 CO2 and H2O, so that the water content increases”. In line with Setiyono et.al. (2017) research that found that “breed, age can affect carcass weight but it doesn’t affect the nutrition of meat”.

Ash Content

Ash content of mutton rendang by the addition of sliced Batak onion (*Allium chinense* G. Don) is shown in Table 2. below.

Table 2. Ash Content of Mutton Rendang (%)

Treatments	Ash Content (%)
P0	$2,75^{A}$
P1	$2,43^{C}$
P2	$2,71^{B}$
P3	$2,34^{C}$

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

The results showed that the highest ash content of mutton rendang was in treatment P0 with a value of 2,75%, while the lowest ash content was found in treatment P3 with a value 2,34%. The highest ash content was shown by P0 treatment without the addition of sliced Batak onion (*A. chinense* G. Don).

The results of this study are in line with Bidaya el.al. (2018) that for any processed product that has a high water content, the amount of solids in the product will also be small so that the ash content of the product will also decrease. The high and low value of ash content in food depends on the length of time and storage temperature. According to Sundari et al (2015), high ash content in room temperature is caused by high temperature, so the water content is lost a lot. The determination of ash content has to do with the minerals of a material. Womb and the composition of ash or minerals in the material depends on the type of material and the method its ashing. In the process of combustion organic matter burns, but substances inorganic is not, that is called ash. Ash is the residue left behind when a material is burned completely in an ashing furnace. Most foodstuffs are 96 percent composed of organic matter and water, the rest consists of mineral elements (Andarwulan et al, 2011). Next Widrial (2005), explained that ash content is also caused by many levels of salt, preservatives, and raw materials. The Ash content of tempeh rendang produced meets the quality requirements of rendang according to SNI (7764-2012) which is a maximum of 5%. Liur (2019) also found that the high ash content of food is caused because of the mineral content in the source of raw materials used.

4. CONCLUSION

The conclusions obtained in this study are:

a. The addition of sliced Batak onion highly significant (P<0,01) on the water content and ash content.

b. The best mutton rendang in the P3 treatment was the addition of 15% sliced Batak onion (Allium chinense G. Don) and 0.5% Batak onion slices (Allium chinense G. Don).

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AUTHORS' CONTRIBUTIONS

Author 1: designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript.

Author 2: managed the analyses of the study.
Author 3: managed the literature searches

All authors read and approved the final manuscript

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