Nutrition content of brisket point end of part Simental Ongole Crossbred meat in boiled various temperature

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Abstract. This aim of this study was to determine the quality of nutritional contents of beef brisket point end of Simental Ongole Crossbred meat in various boiling temperatures. Simental Ongole Crossbred had been fattened for 9 months. Furthermore, they were slaughtered at slaughterhouse and brisket point end part of meat had been prepared to analyse its nutritional contents using Food Scan. These samples were then boiled at 100°C for 0 (TR), 15 (R15), and 30 (R30) minutes, respectively. The data was analysed using Randomized Complete Design (CRD) and Duncan’s multiple range test (DMRT) had been conducted to differentiate among three treatments. The results showed that boiling temperatures significantly affected moisture, and cholesterol contents of beef \( (P<0.05) \) while fat content was not significantly affected by boiling temperatures. The boiling temperature decreased beef water contents from 72.77 to 70.84%, on the other hand, the treatment increased beef protein and cholesterol contents from 20.77 to 25.14% and 47.55 to 50.45 mg/100g samples, respectively. The conclusion of this study was boiling of beef at 100°C for 15 minutes and 30 minutes decreasing water content and increasing protein and cholesterol contents of brisket point end of Simental Ongole Crossbred beef.

Keywords: Nutrition content, brisket point, Simental Ongole, meat, temperature

1.Introduction
Good quality meat is high in protein and low in cholesterol [1]. Factors that may affect meat quality include age, muscle type and cooking method. Handling meat when cooked will affect the chemical composition of the meat so that processing is a major factor to reduce the loss of nutrients in meat [2]. Cooking methods determine the nutritional content of meat because it is influenced by the temperature and duration used. The length of boiling may affect the chemical composition of meat, while the temperature affects the strength of the myofibrillar. The duration of boiling in a water bath varies from 30 minutes to 24 hours.

Boiling at temperatures up to 80°C, does not affect the tenderness of beef when compared to boiling with lower temperatures [2]. Boiling meat at high temperatures (90°C) will cause a shrinkage of about 30% [3]. The chemical composition of meat may change due to heating [4]. Therefore, the duration of boiling should be in accordance with the characteristics of the meat so that the nutrients in the meat remain awake and not easily lost. Based on the above statement, this research needs to be done to find out the influence of boiling duration toward the chemical composition of brisket point end meat on Simental Ongole Crossbred cattle.
2. Materials and Methods

2.1. Fattening system and slaughtering

This study uses beef that is taken from the brisket point end Simental Ongole Crossbred cattle. Cows fattened with feedlot system for 90 days. The feed to be used in the study consisted of 30% fermented rice straw, 55% basal concentrate and 15% soybean and protected *lemuru* fish oil. The nutrient content of feed is 10.45% crude protein, 6.28% crude fat, crude fiber 19.87%, organic material 88.91%, dry matter 91.10% and TDN 60.92% [1].

Carcass was prepared using Australian Meat and Livestock Corporation (AMLC) method (1993). Bulls were slaughtered in a slaughterhouse. Then, carcass and non-carcass parts were separated by splitting into two halves right along the spine into two halves of the right carcass and the left carcass. Right carcass was used for experiment. The brisket point end part of the front row carcass or "Force Quarter" was collected for nutritional content analysis.

2.2. Nutritional content analysis

Meat samples were weighed at 180-200 grams for each boiling sample. Meat samples were placed in polyethylene plastic bags tightly clipped around the sample. The sample is then cooked by dipping all the meat in a water bath using an electric stove at a time and temperature controlled. Temperature is measured using a thermometer, while time is measured using stopwatch. Boiled samples are square, boiling is done at an external temperature of 100°C for 15 minutes and 30 minutes.

The nutrient content of meat is known to use Food Scan type 78810 foss electric A / S 69 DK Siangerupgade Denmark [1]. Place of research in Laboratory of Animal Technology and Products Faculty of Animal Husbandry Universitas Gadjah Mada Yogyakarta. Meat nutrients tested include moisture content, fat content and protein content. Considering the already homogeneous sample of 30g. Inserting into a petridish cup (15 cm in diameter) then flattened until the surface is tightly closed. Turn on the computer connected with the foodscan tool. Then turn on the foodscan machine and open the application on the computer. Insert the petridish plate into the scan room. Wait a while until the count is complete. Repeat the calculation for duplicated data to be generated. Then save the result data out of the foodscan machine.

Meat cholesterol levels are known using the Libberman Burchad method. Place of research in Laboratory Biochemistry Faculty of Animal Husbandry Gadjah Mada University of Yogyakarta. Insert 1 g of meat sample into centrifuge tube containing 10 ml of acetone alcohol (1: 1) solution, boil the tube until boiling solution. Centrifuge at 3000 rpm for 15 minutes, take the supernatant and then evaporate on the boiling waterbath until the residue remains. Perform dilution with chloroform. Residue + 2 ml chloroform + 2 ml mixture (concentrated sulfuric acid: anhydride acetate = 1:30) by vortex. 2 ml standard solution (2 mg cholesterol / 1 ml chloroform) + 2 ml mixture of concentrated sulfate and acetic anhydride, vortex. Blanko: 2 ml of chloroform + 2 ml mixture of concentrated sulfate and acetic aldehyde, by vortex. Put it into a dark room.

The reading at 680 nm after the colour turns green (10 min). Calculate with the equation \( Y = 0.034190303 + 26.861515 X X \) in mg / 100 ml (%). Calculation of cholesterol level is regression equation \( Y = 0.00565 + 2.355436 X \), where \( Y = \) absorbance, \( X = \) rate, Weight of sample = 1.9211 g, % T, = 20.2, Absorbance = 0.6946 and Dilution = 2 X.

2.3. Data analysis

Data obtained in this study was analysed Randomized Complete Design (CRD) and Duncan’s multiple range test (DMRT) had been conducted to differentiate among three treatments.
3. Results and Discussion
The content of beef nutritional contents of Simental Ongole Crossbred cattle at various boiling times is presented in Table 1.

Table 1. Nutritional content of breast meat in Simental Ongole Crossbred male at various times of boiling.

| Nutrient Content          | Treatment | P-value |
|---------------------------|-----------|---------|
| Water content (%)         | TR        | R15     | R30     |            |
| 72.77 ± 1.74a             | 70.88 ± 4.32b | 70.84 ± 0.68b | 0.05     |
| Protein content (%)       | 20.77 ± 1.10a | 24.24 ± 0.72b | 25.14 ± 0.71b | 0.05     |
| Fat content (%)           | 4.94 ± 1.95  | 2.19 ± 1.97  | 2.33 ± 0.99  | NS        |
| Cholesterol content (mg/100g) | 47.55 ± 3.89a | 50.45 ± 3.64b | 50.37 ± 4.57b | 0.05     |

abDifferent superscript in the same row indicates significant effect (P<0.05). NS is not significant; TR is unboiled beef; R15 is boiled beef at 100°C for 15 minutes; and R30 is boiled beef at 100°C for 30 minutes.

The effect of boiling time on water content showed a significant difference among treatments (P<0.05). Decreased moisture content due to boiling process with a temperature of 100°C for 30 minutes of 4.6% compared with meat without boiling. [2] states that the higher the boiling temperature, the greater the level of the lost meat fluid until it reaches a constant level. Added by [5] boiling will affect the water content of meat because the heat will evaporate water. Mean moisture content of meat in this study, which is 70.4% still in the normal range in accordance with the opinion of [1], which states that the meat muscle contains water about 75% (65 - 80%) [6]. Cooking resulted moisture losses, on the other hand, the nutritional effects of microwaves cooking on protein, lipid, and minerals appear minimal [3].

The effect of boiling time on protein content showed a significant difference (P <0.05). This is because long boiling at 100°C for 15 and 30 minutes can increase meat protein levels by 3.5% and 4.4% compared to meat without boiling. Meat protein levels increased at 100°C for 30 minutes, this is suspected because the protein has not been perfectly denatured, especially against the type of protein that is stable to heat. This is in line [4], protein content and water content of meat have a close relationship, where it is explained that muscle protein is hydrophilic means having the ability to bind water. Another factor that affects the increase in protein levels due to shrinkage of meat is due to the shrinkage of muscle fibres due to protein denaturation by heat induction, thereby pushing the meat fluid out of the sample and evaporating [3]. The shrinking flesh has the least water content and high meat protein. The bonds that are affected by the process of protein denaturation due to boiling include hydrogen bonds (glycine), hydrophobic bonds (leucine, valine, phenylalanine, and tryptophan), ionic bonds and intra-molecular bonds such as disulfide groups in the system [2].

The high boiling temperatures in the damaged flesh have different effects on the protein, the proteins undergoing coagulation to the side by denaturation [4]. This is in the opinion [5] that the normal meat protein content of 16 - 22%. According to [1] meat protein levels are relatively fixed and are not affected by age or diet. Heat may even improve nutritive value of processing foods [4].

The results showed no effect of long boiling on fat content. This is presumably because the fat content does not damage at 100°C so that the fat content value is relatively constant. This arena of heating process can damage the cholesterol levels. According to [6] the chemical composition of meat may change due to heating. [2] reported that cooking treatments did not affect fat content in beef-based foods. However, cooking treatments may cause higher cholesterol oxidation in hamburger.

4. Conclusions
The conclusion of this study was boiling for 15 and 30 minutes decreasing water content and increasing protein and cholesterol contents at brisket point end of Simental Ongole Crossbred beef.
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