Physicochemical Properties of Ongole Crossbreed (PO) Beef at Lamongan District of Indonesia

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ABSTRACT

The characteristic of local quality beef in every country had been researched including in Indonesia. This research aimed to determine the properties of physical and chemical of Ongole crossbreed beef in Lamongan district as the character of beef and it could be a reference for comparison of the various quality beef in the world. The method was used laboratory analysis and observation of the farmers at Lamongan district. This research was used beef of 10 male and non-productive female of Ongole crossbreed Cattle. Age male cattle was 2-3 years with weight 325-400Kg, and age female cattle was more 5 years and weight 350-425 Kg. The physical properties analyzed were Water Holding Capacity (WHC), cooking loss, and texture. Data were analyzed using descriptive analysis. The chemical properties analyzed were pH, protein, fat, moisture, energy, and ash. The result showed that WHC was 30.81±0.31 - 30.98±0.64 %, cooking loos was 24.54±1.96 – 24.85±1.83%, and the texture was 6,55±0,03 - 6,67±0,02 kg/cm2. The pH was 6.01 ± 0.07 – 6.16 ± 0.06, the protein was 18.97±0.66 – 21.0±0.46 %, the fat was 3.52±0.52 – 3.71±0.74 %, the moisture was 75.62±0.37 – 75.90±0.06 %, energy was 849.78±21.60 – 868.73±11.20 Kcal/Kg and ash was 1.32±0.31 – 1.67±0.31 %.

Keywords: Physicochemical properties, Ongole crossbreed beef, Lamongan.

1. INTRODUCTION

The Ongole Crossbreed (OC) Cattle is one of the Indonesia local cattle and include the Bos Indicus cattle. The local cattle can be identification as a crossbreeding cattle from the outside a region with the inside the region [1]. The OC cattle is the results of crosses between Ongole cattle and Java Cattle that the fenotipe is similar with Ongole Cattle [2]. The OC cattle is produced through the policy of the Dutch East Indies colonial government through the ongolization program [3]. The population of OC cattle is widespread on Java island and the most population is in East Java.

The Lamongan district was one of the district in East Java that had a beef cattle of 107.629 tails [4]. Lamongan district had a comparative advantage on the production side for various commercial livestock commodities. Thi advantage was shown by having an enabling environment as a source of economic growth in the livestock sector [5].

The Meat is one of the animal product that important for human nutritional needs. The various studies of the quality of meat in the world are importatnt to be explored, including the meat of local beef in Indonesia. Lamongan district produced a lot of OC cattle that had a good performance in tropical climate [6]. The percentage of the OC cattle was higher than the Simental-Ongole and Brahman Crossbreeds, but the bone percentage was higher [7].

The exploration of the physicochemical properties of beef is very important to know practically the quality of meat. It is needed by consumers as a global reference for choosing good quality meat. The research on the physicalchemical characteristics of beef has been carried out by [8], [9], [10], [11], but the physicochemical characteristics of OC cattle in Lamongan has not been researched. The purpose of this study determine the physicochemical quality of OC beef in Lamongan district that can be used as a quality characteristic of OC Lamongan beef.

2. MATERIALS AND METHOD

The materials of this research was the OC beef in Lamongan and the data of the Lamongan farmers. Based on the interview of farmers was the OC beef of 10 male and non-productive female of Ongole crossbreed Cattle.

Table 1. The Physical Properties of OC Beef

Gender	Part	Sampel (n)	WHC (%)	CL (%)	Texture (kg/cm^2)
Male	Loin	10	30.78±0.62	24.85±1.83	6.61±0.03
	Round	10	30.95±0.60	24.69±2.16	6.67±0.02
Female	Loin	10	30.81±0.31	24.64±1.66	6,55±0,03
	Round	10	30.98±0.64	24.54±1.96	6.57±0.05

Age male cattle was 2-3 years with weight 325-400Kg, and age female cattle was more 5 years and weight 350-425 Kg. the OC cattle was kept intensively, feeding using cut and carry system that using 70% of forage and 30% of concentrate. The forage was consists of elephant grass and field grass and rice straw, and the concentrate was consist of 100% rice bran. The method was using laboratory analysis and interview. Analysis of meat quality was in Food Technology Laboratory of Brawijaya University, Malang. The physical quality variable of OC beef was WHC, cooking loss, texture, and the chemical quality variable of OC beef was pH and proximate analysis (protein, fat, moisture, energy and ash content). The data were analyzed by descriptive analysis.

3. RESULTS AND DISCUSSIONS

3.1. The Physical Properties Of OC Beef

The data physical of OC Beef (WHC, Cooking loss (CL) and Texture) are showed on Table 1.

3.2. WHC

Water holding capacity (WHC) was an indicator for measuring the ability of protein tissues beef bound the water. WHC value was defined as the percentage of water that is bound in the OC beef. Based on Table 1 showed the range of WHC value was 30.81±0.31% - 30.98±0.64%. This indicates that the Lamongan OC was good quality in terms of the physical quality of the WHC value. The value of a good beef WHC is less than 40% [12]. In some parts of the meat also showed differences in WHC which was supported by the pH meat and the difference of protein structure of each part of the meat. WHC was an indicator of the ability of meat proteins, especially myofibrils to bind or release water, and it affected the color, texture, cooking loss, firmness and juiciness of fresh meat [13].

3.3. Cooking Loss

Based on Table 1, the range of cooking loss value of OC beef was 24.54±1.96% - 24.85±1.83%. The cooking loss of beef indicates whether the physical quality of the meat was good or not. Based on this value, OC beef had a low cooking loss value. This indicates that the physical quality of Lamongan OC Beef is relatively good. The cooking loss value was inversely propotional to the WHC

value in the previous properties. This was relates to the ability of myofibril protein to bind water [14]. The meat parting showed the difference in cooking loss value of Lamongan OC beef. The CL value of loin was higher than at the round as well as the gender, indicating a difference of the cooking loss value of Lamongan OC beef. The male of OC cattle had higher CL value than female OC cattle.

3.4. Texture

The range of texture or tenderness value of Lamongan OC beef was 6.55±0.03 - 6.67±0.02 Kg/cm2. This value indicated that the OC beef was generally relatively tender. The difference in texture occurs at the location of the meat parting. The loin part was the softer than the round part. The round part was used more for movement so the myofibril fibers that were formed of the larger and thicker. The texture difference were caused of the gender. In male OC beef was harder than the female OC beef. This was influenced by the myofibril structure and milamen of female beef which was smaller than male OC beef, so the texture of male OC beef was more tender [15]. The meat texture was related to other physical qualities such as WHC and cooking loss value. The higher of WHC, the lower of the cooking loss and the more water bound in the meat as a result the texture of the meat was juicy and softer [12].

3.5. The Chemical Properties Of OC Beef

The data chemical of OC Beef (pH, Protein, Fat, Moisture, Energy, and Ash content) are showed on Table 2.

3.6. pH

The ranges pH of Lamongan OC beef was 6.00±0.007 – 6.16 – 0.06. This value was still within the normal range of fresh beef. The normal pH of fresh beef was 5.97 – 6.65 [16]. The standart deviation of 0.06 – 0.09 was indicated the samples obtained from the location tend to be uniform because the sampling method used was purposive random sampling that the sample was taken from a slaughterhouse whose the cattle from smallholder farms with a kereman system of 2-5 years old. The pH at various carcass location showed the different pH of OC beef. The difference of pH was caused the myofibril structure of each part meat not same, so that the

Table 2. The Chemical of Lamongan OC Beef

Gender	Part	Total Sampel (n)	pH	Protein (%)	Fat (%)	Moisture (%)	Energy (Kcal/Kg)	Ash
Male	Loin	10	6.01 ± 0.07	21.10±0.46	3.57±0.48	75.62±0.37	862.92±11.26	1.32±0.31
	Round	10	6.11 ± 0.09	20.11±0.41	3.53±0.48	75.78±0.07	868.73±11.20	1.36±0.27
Female	Loin	10	6.14 ± 0.09	19.51±0.44	3.71±0.74	75.83±0.07	849.78±21.60	1.58±0.36
	Round	10	6.16 ± 0.06	18.97±0.66	3.52±0.52	75.90±0.06	854.26±24.67	1.58±0.36

biochemical processed occur produce of lactic acid content was different. pH was an indicator of beef quality that related to tenderness, color, taste, WHC, and physical properties of beef [17].

3.7. Protein Content

The protein of Lamongan OC beef was higher in the loin beef of male OC cattle. The big size of muscle fibers and high WHC value caused the protein in loin part to be maximized. The variability between samples was not large enough, which was indicated by a standart deviation of 0.41-0.066. The relatively high protein content of OC beef was influenced by genetic factors and rearing management of every farmer. The OC cattle tend to be adaptive with a tropical environment that contains a lot of forage and feed fortification from agricultural waste.

3.8. Fat Content

The fat content of OC beef was 3.52±0.52 % - 3.71±0.74 %. It was compared with a various of European breeds, it OC beef tend to be lower in fat. The highest fat content was in the round part of female OC beef. The energy storage in the form of fat occurred more in the thighs female cattle.

3.9. Moisture Content

The moisture content of Lamongan OC beef was 75.62±0.37 – 75.90±0.06 %, this value was inculeded in the normal range of fresh beef of 75-77% [16]. The gender was affected the value of the water content of the meat. The male beef had a moisture content lower than the female beef. The parting of meat showed the difference of moisture content. The moisture content of round part higher than the loin part.

3.10. Energy and Ash Content

The energy and ash content of Lamongan of OC beef also showed the little variation every sample. The energy of beef was relatively low when compared with the energy content of vegetable ingredients, mainly grains. However, several references showed that bioactive compounds such as carnosine, anserin and others as the good source of humans stamina [18].

4. CONCLUSIONS

The physical properties of Lamongan Ongole Crossbreed beef of WHC was 30.81±0.31–30.98±0.64%, cooking loss was 24.54±1.96-24.85±1.83%, and texture was 6.55±0.03-6.67±0.02 kg/cm^2. The chemical properties of Lamongan Ongole Crossbreed beef of pH was 6.01±0.07-6.16±0.06, protein content was 18.97±0.66- 21.10±0.46%, fat content was 3.52±0.52-3.71±0.74%, moisture content was 75.62±0.37-75.90±0.06%, Energy content was 849.78±21.60-868.73±11.20 Kcal/Kg, and ash content was 1.32±0.31-1.67±0.31.

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