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## Proximat Composition of By-product of Indonesian Ongole Crossbreed Cattle

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### ARTICLE INFO

**Article history:**

Received 18 Februari 2025

Revised 24 Mei 2025

Accepted 19 Juni 2025

**Keywords:**

Proximate  
Edible by-product  
Local Cattle

**IEEE style in citing this article:**

E. Susanto<sup>a\*</sup>, A. Fadlilah<sup>b</sup>, M.F Amin<sup>c</sup>, Wahyuni<sup>d</sup>, Alkurnia Dyanovita<sup>e</sup>, Adiatma Alfian<sup>f</sup>, Ladhunka Wenny<sup>g</sup>, Arya Arif<sup>h</sup>, Lestariningsih<sup>i</sup>, " Proximat Composition of By-product of Indonesian Ongole Crossbreed Cattle," Animal Husbandry Journal: Scientific Journal of the Faculty of Animal Husbandry, Lamongan Islamic University, vol. 16, no. 1, pp. 148-155, 2025.

### ABSTRACT

Ongole crossbreed cattle (OCC) is a type of local cattle in Indonesia. Exploration of the main products of local livestock, especially by product, of local Indonesian cattle has never been carried out. The important potential of the by-product is to combat protein malnutrition and food insecurity in many countries. The aim of the study was to explore the proximate composition. The research was carried out using the exploratory laboratory method by taking objects in the field and then analyzing them in the laboratory. Samples were taken from the Animal Slaughterhouse of Lamongan district which originated from 8 Farmers. The variables observed were proximate includes water content, protein, carbohydrate, fat and ash. The proximate composition was dominated by water and protein content with the highest average value obtained from the red offal species. Differences in proximate composition also occur between male OCC and female OCC.

## Introduction

Ongole Crossbreed Cattle (OCC) is a type of local cattle in Indonesia. Ongole crossbreed cattle have a characteristic white to grayish body color pattern with black on the muzzle and hooves, and have a variety of head, horn, wattle and hump shapes (Sudrajad & Subiharta, 2014). Several studies on the carcass and quality of OCC beef have also been conducted (Ismail et al., 2014; Ngadiyono, Nono, Soeparno,

2014). Exploration of the main products of local livestock, especially ruminants, OCC and kacang goats have also previously been researched and published by researchers (Susanto et al., 2019; Susanto, Mudawamah, et al., 2022), but this has not been carried out on the by-product.

By-product is a by-product of livestock slaughter consisting of: parts of carcass, skin, internal organs (offal), bones, skin of meat, fatty tissue, horns, legs and heads (Lafarga & Hayes, 2014) which have been considered detrimental to human health so far. It still has the potential to contain nutrition to be explored and developed into functional products. The purpose of this study was to explore the proximat composition of Ongole Crossbreed Cattle edible by-products,

## Materials And Methods

### *Materials*

Materials consist of the edible by-products consist of red offal (liver, kidney, heart, tongue, trachea, lung, spleen), white offal (stomach, intestine) and dark offal (head skin) of Ongole Crossbreed Cattle. Samples were obtained from animal slaughterhouse in Lamongan district, East Java, Indonesia. The number of samples is 8 consisting of 4 females and 4 males from Ongole Crossbreed Cattle 2-3 years old, which are reared intensively. Each animal is kept on the farm, fed twice a day, and drinks ad libitum.

Tools were used for proximate tests (water, protein, carbohydrate, fat and ash).

### *Methods*

The research was carried out using the experimental laboratory method by taking objects in the field and then analyzing them in the laboratory. The observed variables were proximate composition includes water content, protein, fat, carbohydrate and ash.

### **Proximate analyses**

Proximate analyses were carried out to know the protein, fat, carbohydrate, water, and ash content. The test samples were the fresh edible by-product of Ongole Cross Breed. Water content was measured by drying the sample at 105°C for 24 h following the protocol of the Association of Official Analytical Chemists (AOAC, 2005). Ash level was analyzed by drying the sample at 600°C for 6 h (AOAC, 2005)(AOAC, 2000). Fat content analysis used the Soxhlet method through sample extraction for 4-6 h, then heated in an oven at 60°C for 24 h, whereas protein content was obtained through destruction, distillation, and titration method (AOAC, 2005).

Total carbohydrate level was tested using difference method (AOAC, 2005).

## Results And Discussion

### Proximate Composition

Proximate testing of OCC cattle edible by-products consisted of protein, fat, moisture content, ash and carbohydrates. The research results are presented in table 1.

**Table 1. Proximate Composition of Ongole Crossbreed Cattle edible by-product**

Edible Offal Part	Proximate Composition (%)									
	Protein		Fat		Moisture		Ash		Carbohydrate	
	male	fem ale	male	femal e	mal e	femal e	male	fem ale	male	femal e
<b>Red Offal</b>										
Liver	17.56±1.8	NI	1.09±0.2	NI	73.15±1.6	NI	1.29±0.1	NI	6.91±0.3	NI
Kidney	12.99±0.6	NI	5.44±0.3	NI	78.33±1.6	NI	1.00±0.2	NI	2.24±0.4	NI
Hearth	15.74±1.2	11.42±0.4	2.12±0.2	11.57±0.7	77.33±1.3	74.04±1.8	1.03±0.1	0.86±0.1	3.78±0.1	2.11±0.2
Toungue	20.69±0.7	NI	1.36±0.1	NI	76.83±1.4	NI	0.93±0.1	NI	0.19±0.1	NI
Trachea	17.58±1.3	NI	12.33±0.4	NI	68.95±1.3	NI	1.10±0.1	NI	0.04±0.0	NI
Lung	17.05±0.7	NI	0.72±0.1	NI	79.47±1.3	NI	0.93±0.0	NI	1.83±0.2	NI
Spleen	17.93±0.5	NI	1.88±0.1	NI	78.52±1.9	NI	1.66±0.2	NI	0.01±0.0	NI

**White Offal**

Rumen	16.19±1.0	12.28±0.8	1.37±0.2	14.0±0.6	81.07±1.5	72.54±1.8	1.31±0.1	0.64±0.0	0.06±0.0	0.45±0.0
Reticulum	10.14±0.2	NI	4.96±0.2	NI	78.71±1.8	NI	1.98±0.1	NI	4.21±0.1	NI
Omasum	14.17±0.6	NI	0.66±0.0	NI	83.29±2.0	NI	0.81±0.1	NI	1.07±0.1	NI
Abomasum	10.42±0.5	NI	5.12±0.2	NI	76.16±1.3	NI	0.71±0.1	NI	7.59±0.2	NI
Jejenum	13.84±0.4	NI	4.18±0.3	NI	80.46±2.2	NI	0.68±0.0	NI	0.84±0.0	NI
Duodenum	14.94±1.1	6.73±0.4	6.04±0.4	17.20±0.9	78.15±1.8	63.65±1.2	0.72±0.1	0.40±0.0	0.15±0.0	12.02±0.8
Colon	9.77±0.5	NI	2.48±0.2	NI	82.04±2.0	NI	0.69±0.0	NI	5.02±0.5	NI

**Dark Offal**

Head Skin	23.38±1.3	NI	0.78±0.1	NI	71.36±1.3	NI	0.45±0.0	NI	4.04±0.2	NI
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Information: NI= Not Identified

*Protein*

Table 1 shows that the protein content of OCC edible by-product ranges from 9.77% - 23.38%. This value range is quite different from research on OCC beef protein, namely 18.97±0.66% - 21.10±0.46% (Susanto, Fadlilah, et al., 2022) and 20.6% - 21.05% (Ngadiyono, Nono, Soeparno, 2014) and beef on 3 muscle 21.1% - 22.4% (Moholisa et al., 2018), but not much different from reports on protein nutrition of the liver, kidney, heart, brains and tripe of cows which range 13.2% – 20.0% (Williams, 2007).

The highest average protein content was obtained from the edible by-product of dark offal male OCC, namely 23.38%, followed by red offal 17.08 ± 2.34% and white offal 12.78 ± 2.61%. The lowest protein content was obtained from the colon, namely 9.77%. The percentage of the protein component of meat and its by-products differs from one type to another (Ahmad et al., 2018). Differences in the protein

content of edible by-products and beef can be caused by the tissues that make up each organ and the different anatomical locations of the muscles. The anatomical location of muscles affects composition because some muscles contain higher concentrations of tendons and epithelium of connective tissue. This is due to differences in the amount of stromal protein compared to myofibrillar, sarcoplasmic, and granular proteins (Rogers, 2018).

### *Fat*

The results showed that the edible by-product fat content of OCC cattle ranged from 0.78% - 17.20%. The fat content of animal by-products falls within a wide range as used in research samples (Saad et al., 2021) that is equal to 10 – 70 wt%. The percentage of beef fat edible by-product is very different from the fat content of meat which is only around 3.2 – 7.3% (Ahmad et al., 2018),  $2.05 \pm 0.6\%$  (Shehzad et al., 2014) and beef fat OCC  $3.52 \pm 0.52\%$  -  $3.71 \pm 0.74\%$  (Susanto, Fadlilah, et al., 2022) and 2.70% (Ngadiyono, Nono, Soeparno, 2014), but far above lamb fat, which ranges from 17% -21% (Cai et al., 2015; Purnamayanti et al., 2020) .

Table 1 also shows that the highest fat mean was obtained from the edible by-product of female OCC cows of the white offal type, namely  $15.65 \pm 2.20\%$ , followed by red offal  $11.57 \pm 0.0\%$ . The lowest OCC fat content of beef edible by-product was obtained from the scalp 0.78%. and liver 1.09%. This value is lower than the fat content of wagyu beef liver, which ranges from  $3.43 \pm 0.56\%$  -  $5.02 \pm 0.06\%$  (Li et al., 2014). OCC beef edible by-product can be a recommendation for consumers who want food with a low fat content. The difference in fat content in each organ cannot be separated from the presence of adipose tissue in it. Fat is a collection of adipose cells suspended in a connective tissue matrix distended with cytoplasmic lipids, water, and other constituents. (Rogers, 2018).

### *Water content*

Table 1 also shows that the water content of OCC edible by-product ranges from 68.95% - 83.29%. This value is not much different from the water content of OCC meat which ranges from  $75.62 \pm 0.37\%$  -  $75.90 \pm 0.06\%$  (Susanto, Fadlilah, et al., 2022) and 72.7% (Ngadiyono, Nono, Soeparno, 2014), beef  $78.98 \pm 1.8\%$  (Shehzad et al., 2014), 74.8% - 76.4% (Moholisa et al., 2018) dan 73.1% (Williams, 2007). The highest average water content was obtained from white offal of male OCC, namely  $79.98 \pm 2.46\%$ , followed by red offal  $76.08 \pm 3.74\%$  and dark offal 71.36%. This value is also comparable to the water content of the by-product of pigs which ranges from  $69.73 \pm 4.70\%$  -  $80.69 \pm 2.19\%$  (Seong et al., 2014). The lowest water content was obtained from the head skin organ, namely 71.36%. This could be due to the fact that the dry

matter is dominated by collagen protein so that the number of other proximate components is lower (Ockerman H. W., 2000).

### *Carbohydrate*

Table 1 also shows that the edible by-product carbohydrate content of OCC ranges from 0.01% - 6.91%. The highest value was obtained from the liver and the lowest was obtained from the spleen. The main source of carbohydrates in the animal's body is the liver, which contains about 1/2 of the total carbohydrates present in the body (Ahmad et al., 2018). The carbohydrate content of meat and its by-products is relatively very low (Rogers, 2018). However, the results of this study indicate that the carbohydrate content varies in a fairly large range. Differences in the chemical composition of meat and its by-products can also be influenced by the type of breed, muscle structure, and also the type of tissue in these organs (Lawrie, 2006).

### *Ash*

The ash content of OCC edible by-product shown in table 1 ranges from 0.45% - 1.98%. This value is comparable to the ash content of OCC beef, namely  $1.32 \pm 0.31$  % -  $1.58 \pm 0.36$ % (Susanto, Fadlilah, et al., 2022) and 1.1% (Ngadiyono, Nono, Soeparno, 2014) (Shehzad et al., 2014), but lower than the pork by-product content which ranges from  $0.15 \pm 0.08$ % -  $1.34 \pm 0.11$ % (Seong et al., 2014). Ash is a component that functions for growth, development and maintenance of the human body (Ahmad et al., 2018).

## **Conclusion**

This study produced basic data on the proximate composition and amino acid profile of Ongole Crossbreed Cattle edible by-products. The proximate composition was dominated by water and protein content with the highest average value obtained from the red offal species. Differences in proximate composition also occur between male OCC and female OCC.

## **Conflict Of Interest**

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organization related to the material discussed in the manuscript.

## **Acknowledgement**

We express our gratitude to the Directorate of Higher Education, Ministry of Education, Culture, Research and Technology of the Republic of Indonesia for the basic research grant for the 2022 national competition as well as to the Research and

Community Service Institute at the Universitas Islam Lamongan (Litbang Pemas UNISLA).

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