Original Research Article

Meat Production from Cull Bali Cows as Compared to Ongole Cows

Abstract

Aims: The need for beef in most cattle production centers in Indonesia is mostly met by slaughtering cull cows. However, the quality of cull female beef is often lower than that of previously fattened bulls. Until now, the quality of meat and processed products of cull Bali and Ongole cows is unknown. This research was carried out to examine the characteristics of meat from cull Bali and Ongole cows.

Materials and methods: A total of 6 cull cows, 3 each from Bali and Ongole cows, were slaughtered. The percentage of carcass and carcass parts were determined after being removed from the non-carcass parts. The carcass parts were dissected to separate the meat and bones. Meat samples were taken to determine the chemical composition of the meat from the main meat parts. The organoleptic qualities of the meat including color, smell, and cooking loss were compared between the two breeds.

Results: The results showed that carcass production was higher ($P<0.05$) in Bali cows compared to cull Ongole cows. Carcass parts that have meat quality and with higher economic value are also better in cull female Bali cattle compared to Ongole cattle.

Conclusion: It can be concluded that at the similar body condition, cull Bali cows produces more meat and parts having higher quality meat.

Key words: Meat production, quality, carcass, Bali cows, Ongole cows

Introduction

The Indonesian government through various programs seeks to boost the national cattle production in order to reduce the imports in the form of feeder cattle and meat which in recent years has continued to increase. Efforts made by the government are to increase the population and productivity of cattle in all provinces in Indonesia, especially in the areas of cattle production centers, including the Province of East Nusa Tenggara. With a current population of more than 1 million heads (Disnak NTT Province, 2020), this area ranks the 5th largest cattle population in Indonesia after East Java, Central Java, South Sulawesi and West

Nusa Tenggara. However, NTT's contribution to the fulfillment of national meat and the improvement of community welfare has not been optimal due to the low productivity of cattle in this area. Jelantik (2001) and Mullik and Jelantik (2009) reported that only 9-12% of the population can be transported to Jawa and slaughtered to meet the need for national meat.

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One of the factors that contributes the highest to the low productivity of cattle in this area is the high proportion of cull (old) cows more than 8 years old that are still in the population. Jelantik (2001) found about 32% of the adult female population on smallholder farms aged more than 8 years. The impact of the presence of these cull cows is a decrease in the birth rate (Jelantik, 2001; Jelantik and Kune, 2011), and an increase in the calf mortality rate (Jelantik et al., 2008). The factor that causes these cull cows to remain in the population is the preference for slaughtering productive females to meet local meat needs. This is because cull cows produce low-quality meat. However, until now there has been no study on the quality of meat from cull cows from several local cattle breeds. Likewise, information on the quality of processed meat products such as meatballs and se'i meat, which are processed meats typical of NTT made from different breeds of cattle, is still very limited. This experiment was conducted to investigate carcass and meat production from cull Bali and Ongole cows.

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Material and Methods

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Location, Research Materials and Experimental Design. This research was conducted using 6 cull Bali and cull Ongole cows, each of which was 3 cows. The animals were purchased from the Undana's Livestock Laboratory and from the Lili livestock market. The cattle were placed in individual cages at the Animal Husbandry Lababoratory of the Integrated Field Laboratory/PUI on Archipelago Dry Land. The animals were given feed in the form of rice straw and concentrate with a ratio of 60:40% for 1 month before being slaughtered.

The study was carried out following a completely randomized design with 2 treatments and 3 cows as replicates. The treatments tested in this study were different breeds of cows: Bali and Ongole cows. Slaughter of cattle was done after the animals were fed for one month.

Variables measured included slaughter weight, carcass and carcass parts. Slaughter weight (kg) was obtained from the results of weighing cattle before slaughter using a live cattle scale with a capacity of 2000 kg. Cattle were fasted for 12 hours before being weighed and slaughtered. At the time of slaughtering, the blood was collected by placing a large plastic bucket under the head until all the blood was drained. Blood was immediately weighed and recorded. The cows were then hulled and the skins were then weighed and further processed. Furthermore, the non-carcass part was weighed which included blood, skin, head, forelegs, hind legs, fluck (lungs, heart, liver, spleen, pancreas gland), and the digestive tract. The forelegs were cut at the metacarpal bones, while the hind legs were cut at the tarsal joints. The digestive tract was lifted and immediately weighed while the digesta was still in it. The digesta was then removed and the digestive tract was cleaned with tap water and reweighed. The liver, lungs, kidneys and gallbladder were removed and weighed. Similarly, the reproductive organs were also taken and weighed.

Carcass weight (kg) was obtained by weighing the carcass separated from the non-carcass parts. Furthermore, the percentage of carcass and non-carcass was calculated relative to live weight before slaughter. The carcass percentage was calculated by the formula: Carcass percentage= (carcass weight)/(live weight) x 100%

The carcass was then cut into several parts, namely the forelegs, skin, ribs, and back. Each part was weighed and the total amount was determined as the total weight of the carcass. Each part of the carcass was then dissected to separate the meat, fat and bones. The meat, fat and bone from each part of the carcass were then weighed. All data were expressed as percentage of live weight.

After the carcass was weighed, the meat was separated from the bone and subcutaneous fat and weighed to obtain the weight of the meat. The percentage of meat was calculated using the following formula:

1. Percentage of meat = (weight of meat)/(weight of live) x 100%

2. Percentage of meat = (weight of meat)/(weight of carcass) x 100%

The assessment of the amount of fat covering the carcass (sub cutaneous fat) was carried out by measuring the thickness of the back fat above the rib eye tendon between the 12th and 13th ribs. The measurement was carried out using a ruler (millimeter).

The meat quality of the two breeds of cull cows will be compared by taking samples of the Longissimus dorsi (LD) and Bicep femoris (BF) muscles. The resulting meat samples will be evaluated for physical quality using organoleptic tests to determine the level of preference for beef (LD and BF) which include: texture, color, aroma, taste and tenderness. The test method used is the hedonic scale method. The same sample was also analyzed for its chemical composition.

Organoleptic Test included smell, colour, and taste. A total of 30 grams of samples were taken from each package and sliced into small pieces, then put into a beaker and tightly closed. After 4 hours the lid was opened and the ~~panelists~~panellists smell it directly to determine the odour score (Bensik. et al., 1973). The score was assigned a scale of 5 = meat dominant odour, 4 = meat dominant odour and a slight citrus smell or liquid smoke, 3 = Slightly characteristic meat odour, dominant smell of citrus or liquid smoke, 2 = Slightly strong odour, and has a slight citrus or liquid smoke smell, 1 = odourless. This process was carried out 3 times for each ~~panelist~~panellist, for 1 replication.

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After testing on odour, it was continued with testing on colour. Colour testing also uses a hedonic scale, namely: 5 = Red is brighter than the meat colour, 4 = Se'i's distinctive colour (bright red), 3 = Dark red/ Dark red, 2 = Red brown, 1 = Red young. The number of samples given to the ~~panelists~~panellists was the same as in the colour test. The sample used is the same sample, cooked and scored for its taste.

RESULTS AND DISCUSSION

Fulfilling the need for beef both nationally and regionally has always been a priority for the Indonesian government because of its enormous influence on the inflation rate which in turn will affect people's purchasing power and economy. The government is trying to maintain the meat national supply to keep the inflation rate from varying much. In cattle-producing areas in Indonesia, the supply of beef mostly comes from slaughtering female cattle. The slaughter rate for female cattle in Indonesia can reach 72 to 92% (Priyanti et al., 2017). Most of the slaughtered female cattle are still productive. The slaughter rate for productive female cattle can reach 81.7% (Suardana et al., 2013) or even reach 90% (Priyanti et al., 2018) of the slaughtered female cattle. This is one of the main causes of the slow development or even decline in cattle populations in various regions. Thus, to prevent the negative impact of slaughtering productive female cattle, it is necessary to encourage the slaughter of cull cows in order to fulfil the beef demand.

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The success of the efforts to encourage the slaughter of cull cows is highly dependent on the capacity of these cattle to produce meat relative to other classes of cattle (productive females and males). This can be seen from the carcass percentage (dressing percentage) of cows slaughtered. The percentages and carcass composition of the two breeds of cows being slaughtered in this study are shown in Table 1 and the weight of the carcass components is shown in Table 2. The results showed that cull Bali cows were slaughtered at almost the same weight had a higher carcass percentage (P<0. 05) compared to Ongole cattle. The results of this study are in line with the results of other studies comparing the carcass production of the two breeds of cattle, although the majority of these studies used bulls. Yosita et al. (2011) reported that the carcass percentage of Bali cattle was higher than that of Ongole cattle. In their study, they recorded the carcass percentage of Bali cattle was 53.26%, and PO cattle 46.9%. In previous studies, the percentage of male Ongole cattle carcass could reach 51.42% at a body weight of around 200-250 kg (Agung et al., 2015). Tahuk et al. (2018) reported that the percentage of fattened male Bali cattle carcasses reached 55.6%.

Table 1. Percentage of carcass of Bali cattle and cull female Ongole

Percent of Live Weight (LW)	Breeds		SEM	P-*value*
	Bali	Ongole		
Non carcass	26.78	27.50	0.662	0.222
Carcass	58.04[a]	49.31[b]	1.202	0.002
Lean meat	40.12[a]	33.35[b]	1.366	0.008
Fat	1.85	1.75	0.627	0.973
Bone	16.07	14.73	0.997	0.271

[a,b] values followed by different superscripts indicate significant differences (P<0.05)

The higher carcass percentage in –cull Bali cows indicates that this breed has a higher potential for meat production compared to Ongole cattle. The percentage and total meat production in this study were higher (P<0.05) in Bali cattle compared to Ongole cattle. The meat produced also appears to be of higher quality due to the higher proportion of meat

produced in carcass parts. In this case, the carcass weight of the hind thighs was significantly higher (P<0.05) in Bali cattle compared to Ongole cattle (Table 2).

Differences in carcass percentage are generally caused by differences in non-carcass components (Hafid & Juliadin, 2021). In general, many studies reveal that the non-carcass component is higher in Ongole cattle compared to Bali cattle (Moran ~~&~~ and Wood, 1985). However, the percentage of non-carcass in this study did not differ between the two breeds of cattle (P>0.05). Thus, the clearest difference between the two breeds of cattle is the rumen content which indicates the capacity of the cattle to consume feed. In addition, the weight of offal including the rumen in this study was also higher (P<0.05) in Ongole cattle than Bali cattle (Table 2). Thus, the results of this study indicate that the rumen capacity of Ongole cattle is greater than that of Bali cattle. The large rumen capacity gives Ongole cattle a comparative advantage over Bali cattle, especially when the quality of feed in pasture is low. With a large rumen capacity allows the flow rate of feed out of the rumen to be slower (Fisher, 1996; Forbes, 2007) so that it will increase the digestibility of low-quality feed (Forage, 1987). These advantages will be lost if the livestock is given feed of sufficient quality.

Table 2. Composition of Carcass and Non Carcass of cull Bali and Ongole cows

Berat bagian (Kg)	Bangsa Sapi		SEM	P-*value*
	Bali	Ongole		
Berat Potong	223.3	233.3	10.47	0.393
Non Karkas :	59.86	64.34	6.096	0.501
Kulit	20.00	17.00	1.344	0.089
Darah	8.97	6.86	2.614	0.466
Fluck	6.79	8.03	1.019	0.291
Jeroan	12.60	21.24	1.378	0.003
Kepala	11.50	11.23	1.378	0.854
Karkas	129.63	115.14	7.318	0.112
Paha depan	25.63	22.56	1.759	0.156
paha belakang	40.70	34.31	2.040	0.035
rusuk	25.70	22.30	2.121	0.184
Punggung	37.60	35.97	4.616	0.742

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Table 3. Meat produced from different parts of carcass of cull Bali and Ongole cows

Berat (Kg)	Bangsa Sapi		SEM	P-*value*
	Bali	Ongole		
Total meat	89.63	77.85	5.448	0.097
Forelegs	18.13	18.38	1.621	0.888
Hindlegs	33.93	22.22	3.149	0.020
Ribs	14.63	13.55	2.554	0.964
Loin	22.93	23.71	1.339	0.742
Fat	4.10	4.15	1.481	0.973
Bome	35.90	34.60	3.393	0.722
Forelegs	7.80	6.27	0.643	0.076
Hindlegs	6.47	5.72	1.178	0.561
Ribs	6.93	7.44	1.608	0.770
Back	14.70	15.17	1.033	0.672

Conclusion

Carcass production was higher in Bali cattle compared to cull female Ongole cattle. Carcass parts that had meat quality and with higher economic value were also better in cull female Bali cattle compared to Ongole cattle.

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