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Original Article

Brahman Cross Carcass Production on Different Frame Size

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ABSTRACT

This study observed Brahman cross steer carcass production, (slaughter weight, carcass weight, and dressing percentage). The material used was 166 heads of white Brahman cross steer, with an average slaughter weight of 424.40–35.86 kg, and the range of age was 1.5–2 years. Sample of this study was Brahman cross steers with 83 heads large framed and 83 heads medium framed. The study method used was case studies. The obtained data was analyzed with independent t-tests, simple linear regression, and correlation. Results showed that frame size was highly significant (P<0.01) in slaughterweight. The average slaughterweight on the medium frame was 415.82 ± 35.98 kg, and the medium frame was 432.98 ± 33.83 kg. Frame size is also highly significant (P<0.05) in carcass weight. The average carcass weight on the medium frame was 227.94 ± 20.45 kg, and on the large frame, it was 235.65 ± 20.87 kg. Frame size had no significant effect on the dressing percentage. The average dressing percentage on the medium was 54.83 ± 2.53 %, and 54.42 ± 2.10% on the large frame. The correlation between slaughter weight and carcass weight was very close, with a correlation coefficient of 0.87 on medium frames and 0.90 on large frames. This study concluded that Brahman cross steers with large frames resulted in slaughter weight and carcass weight higher than medium frames but produced the same carcass percentage.

Keywords: Carcass, brahman cross, frame size, production, slaughter

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Introduction

Meeting the need for meat is currently insufficient because the demand exceeds the availability of meat (Smith *et al.*, 2022). Based on 2014 Central Statistics Agency data, beef production in Indonesia in 2014 was 539,965 tons, while beef demand in 2015, based on data from the Ministry of Agriculture of the Republic of Indonesia, was around 639,000 tons. This shows that beef production in Indonesia is still not sufficient for national meat needs, with a total production shortfall of around 100,000 tons (Agus and Widi, 2018).

The grading system makes it possible to predict production performance and carcass characteristics of cattle during the finisher phase (Webb *et al.*, 2020). Frame size is one of the assessments in the grading system for feeder cattle before rearing. Frame size has an accurate effect on predicting the growth potential of beef cattle (Naserkheil *et al.*, 2020). Frame size is related to muscle tone and assessment of livestock condition scores which will be the background for determining carcass characteristics. Frame size includes several factors including environment, nutrition, management and livestock health effects (Chen and Antonelli, 2020).

Based on this description, a study was conducted on the carcasses of Brahman cross-steer cattle at different frame sizes. This research aims to determine the carcass production of Brahman cross steer cattle, which consists of slaughter weight, carcass weight, and carcass percentage in frame sizes M and L.

Materials and Methods

Research design

This research was conducted at PT. Pasir Tengah and RPH PT. Cianjur Arta Makmur in Cikalong Kulon District, Cianjur Regency, West Java. The research was conducted from July 1 to August 2, 2014.

Research sample

The material used in this research was white Brahman cross steer cattle consisting of 83 frame sizes L and M with an average slaughter weight of 424.40 ± 35.86 kg and an age range of 1.5–2 years.

Research methods

The research method used was a case study and purposive sampling. In the early stages of the study, ear tags, age, and frame size were recorded visually, and the cattle were reared for 120 days in the feedlot unit. In the final phase of fattening on the 120th day, the slaughter weight was measured.

The cows are rested in the rest pen for about 3–4 hours, and then an antemortem examination is carried out. The cows are herded and queued through the gangway to the restraining box, after which the stunning process is carried out. Slaughter (performed Islamically by cutting the jugular vein, aortic artery, oesophagus, and trachea) The cow is suspended by its hind legs on the tendo-achilles joint with the help of an electric pulley.

The head is released at the occipto-atlantis joint; the forelegs are released at the carpo-metacarpal joint; and the hind legs are released at the tarso-metatarsal joint using a cutting knife. Skinning (dehiding) is done by making an incision from the ventral direction on the stomach and chest to the dorsal direction on the legs and back. Skinning using a hide puller machine and a special knife. The evisceration process begins by splitting the abdomen with a knife, followed by slicing the chest using a brisket saw, and then removing the contents of the chest cavity and abdominal cavity.

The carcass was split symmetrically using a "Kent Master" carcass saw along the spine, then washed with clean water. The two parts of the carcass were weighed and added together to obtain the carcass weight. Carcass weighing using automatic digital scales (carcass scale).

The data obtained were analyzed using unpaired t-test analysis to determine differences in carcass production between groups of cattle with M frames and L frames. A simple regression correlation analysis was used to determine the relationship between slaughter weight and carcass weight in M and L frame sizes.

Observational variables

Determining frame size (M/L): frame size M is a cow that has a hip height of 111–120 cm, and frame size L has a hip height of 121–130 cm. Cutting weight is the weight when it is cut. Carcass: the body parts of healthy cows that have been slaughtered according to CAC/GL 24-1997, skinned, removed from the viscera, separated from the head and legs from the tarsus/carpus down, reproductive organs and udder, tail, and excess fat. Carcass percentage is the ratio of fresh carcass weight to live weight expressed by the formula:

$$\text{Carcass percentage} = \frac{\text{Carcass weight}}{\text{Live weight}} \text{ x } 100\%$$

Result

The results of observations of slaughter weight, carcass weight, and carcass percentage of Brahman cross-steer cattle at different frame sizes can be seen in Table 1. Carcass production between M and L frames showed very significant differences (P 0.01) in slaughter weights and significant differences (P<0.05) on carcass weight, but the carcass percentage was not significantly different.

Cutting Weight on Frame Size M and L

Based on Table 1, Brahman cross steers between frames M and L showed a very significant difference (P<0.01) in slaughter weight. The average cutting weight of the L frame was higher than that of the M frame, at 432.98 ± 33.83 kg and 415.52 ± 35.98 kg, respectively. Şentürklü *et al.* (2021) concluded that cattle with a large frame size will produce optimal meat formation, resulting in a higher slaughter weight or final weight and percentage of meat compared to cattle with a smaller frame size. The average slaughter

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weight of Brahman cross-steer cattle on frame sizes M and L is presented in Figure 1.

Table 1. Average slaughter weight, carcass weight and carcass percentage of Brahman cross steer cattle at different frame sizes during the study

Frame size	Amount (cattle)	Average slaughter weight (kg)	Average carcass weight (kg)	Average carcass percentage (%)
M	83	415.52 ± 35.98[a]	227.94 ± 20.45[a]	54.86 ± 2.51
L	83	432.98 ± 33.83[b]	235.65 ± 20.87[b]	54.42 ± 2.10
Average amount	166	424.25 ± 34.91	231.79 ± 20.66	54.64 ± 2.305

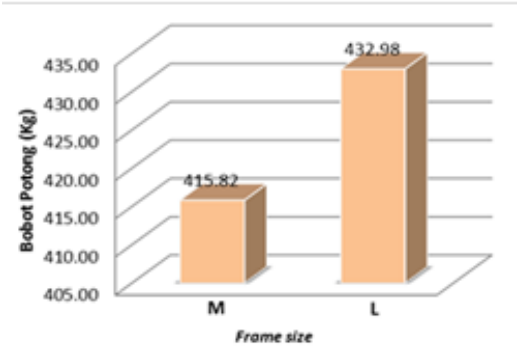

Figure 1. Graph of average cutting weight at M and L frames.

Carcass Weight on Frame size M and L

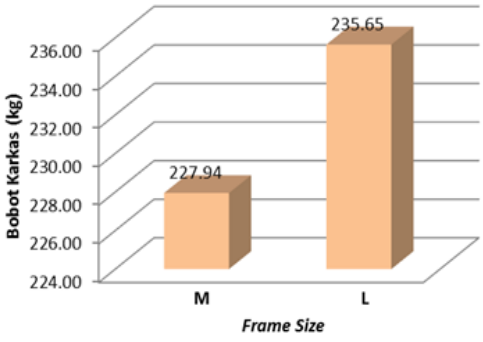

Figure 2. Graph of average carcass weight in frames M and L

Data from Table 1 shows that frame sizes M and L are significantly different (P<0.05) on the carcass weight of Brahman cross-steer cattle. The average carcass weight of the L frame was higher than that of the M frame, namely 235.65 and 227.94 kg, respectively. This shows that frame size has an effect on carcass weight. Pogorzelska-Przybyłek *et al.* (2016) concluded that there was a real difference between the carcass weights produced by cattle with frame sizes L and M. Cows with frame sizes L had significantly heavier carcass weights than cattle with frame sizes M. The average carcass weight of Brahman cross cattle steers on frame sizes M and L is presented in Figure 2.

Carcass Percentage on Frame size M and L

Table 1 shows that frame size was not significantly different from carcass percentage of Brahman cross steer cattle, with the average percentage of carcass frame L and frame M being 54.86% and 54.42%, respectively. This shows that frame size has no effect on carcass percentage. Hafid and Juliadin (2020) states that high carcass weight is not always followed by a high carcass percentage because it is suspected that slaughter weight and non-carcass weight such as skin, head, legs (external offal), and digestive tract organs (internal offal) also affect carcass percentage. The average carcass percentage of Brahman cross-steer cattle in frame sizes M and L is presented in Figure 3.

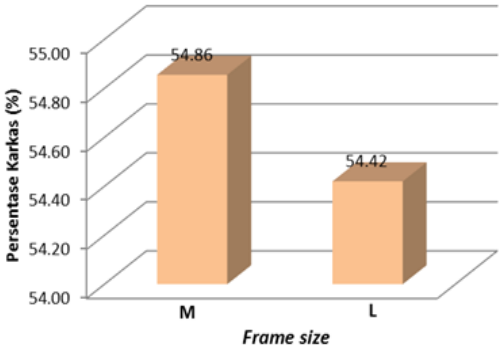

Figure 3. Graph of average carcass percentage in M and L frames

Relationship of Slaughter Weight and Carcass Weight on Frame Sizes M and L

Slaughter weight and carcass weight are two of the variables that influence the carcass percentage. Cows are said to have good production if they can produce a high percentage of carcasses. Prihandini *et al.* (2014) stated that increasing carcass components will result in an increase in slaughter weight, which will also result in an increase in carcass weight. The relationship between slaughter weight, carcass weight, and carcass percentage in frame sizes M and L is shown in Table 2.

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Table 2. Relationship between slaughter weight and carcass weight in frame sizes M and L of Brahman cross steer cattle

Frame size	Correlation	r	R^2	Regression equation
M	SW - CW	0.87	0.76	Y = 0.49X + 24.19
L	SW – CW	0.90	0.81	Y = 0.55X - 7.73
Total	SW - CW	0.78	0.61	Y = 0.52X + 11.11

Note: SW: Slaughter Weight, CW: Carcass Weigh

Discussion

Frame size is related to growth potential, finishing period, and cutting weight. Frame size is used as an indicator to estimate growth, describe the nutrition required by cattle, and describe feed intake in beef cattle. Fiems (2012) stated that livestock with good skeletal conformation tend to have high carcass growth and carcass weight.

Cutting Weight on Frame Size M and L

Hafid *et al.* (2019) found that body conformation has a significant impact on the body weight of cattle before slaughter. Cows with wide and high hips had higher final body weights and muscle scores than cows with narrow hips. According to Şentürklü *et al*. (2021), frame size has a significant effect on the performance of cattle production. Cattle that have a large frame size will produce a higher final weight and carcass weight. Cattle with a frame size of L have a high initial weight, high ADG, high final weight, and carcass weight compared to cattle with a frame size of M.

Kuswati *et al.* (2014) reported that Brahman cross steer cattle raised in Indonesia had an average slaughter weight in the range of 404.4–469.4 kg, whereas Sutarno and Setyawan (2016) reported the slaughter weight of PO cattle and local crosses, namely SIMPO, which were reared intensively. reached 383.3 ± 50.83 kg and 437.0 ± 11.62 kg. This shows that Brahman cross cattle, which are reared intensively in feedlots, can achieve higher slaughter weights than local cross cattle because the genetic potential of Brahman cross cattle is better than that of local cattle; thus, Brahman cross cattle are still more competitive than local cattle.

Carcass Weight on Frame size M and L

Based on the graph in Figure 2, Brahman cross-steer cattle with frame size L have an average carcass weight higher than frame size M. The higher carcass weight in cattle with frame sizes L compared to M is due to the average slaughter weight achieved by the cattle. with frame size L, which is higher than frame size M. Widyas *et al*. (2022) stated that cattle with large body dimensions will produce optimal growth and good performance, including higher slaughter weights and carcass component weights compared to cattle with small body dimensions.

Carcass Percentage on Frame size M and L

Based on the graph in Figure 4, the average percentage of carcass on frame size M is 54.86%, while on frame size L it is 54.42%. Kuswati *et al.* (2022) stated that carcass percentage was also influenced by the weight of non-carcass components such as heads, both forelegs and hind legs, skin, and offal, which had a lower economic value than carcass components. Khalafalla *et al.* (2011) stated that external and internal organs affect carcass percentage. The external organs include the skin, legs, head, and tail, while the internal organs include the red offal and the empty green offal. Irshad *et al.* (2012) states that the main factors that can affect the percentage of carcasses include muscle level, skin weight, and the contents of the digestive tract, which are included in the final weighing process.

Relationship of Slaughter Weight and Carcass Weight on Frame Sizes M and L

On frame size M, slaughter weight affects carcass weight by 76%, while on frame size L, it is 81%. The correlation between slaughter weight and carcass weight on frame size L is higher than M. Coyne *et al*. (2019) found that the final weight of cattle is positively correlated with the weight of the carcass produced. Duwalage *et al.* (2023) added that carcass weight is greatly influenced by the condition of the animal before slaughter and the empty weight of the animal's body.

Conclusion

Cattle with frame size L produce a higher slaughter weight and carcass weight than cattle with frame size M, but produce the same percentage of carcasses.

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