

# Effect of Initial Weight and Sex (*Steer and Heifer*) on Growth, Slaughter Weight, Carcass Weight, and Carcass Yield of Brahman Cross in PT KASA Lampung Tengah

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**Abstract**— Research aims to determine the effect of Brahman cross cattle initial weight and sexes on ADG, slaughter weight, carcass weight, and carcass percentage. This research used a survey method in the form of direct observation at the research location. The data collected includes recording data and direct observation data. Determination of the location using purposive sampling technique, namely samples taken deliberately based on the population of Brahman cross cattle found at PT KASA Lampung Tengah and the nearest slaughterhouse. Direct observational data were obtained through direct observation and measurement of livestock including carcass weight, carcass percentage. Recording data obtained through the company includes data on initial weight, slaughtered weight, daily weight gain. The analytical model used in the study used ANOVA with a nested design where sex was nested at the initial weight. The results of the analysis of small initial weights have a higher average ADG and carcass percentage than the medium and large initial weight groups, while the large initial weight groups have a higher average slaughter weight and carcass weight than the small and medium initial weight groups. BX steer cattle have a higher average ADG, slaughter weight and carcass weight than BX heifer cattle, while the carcass percentage of BX heifer cattle has a higher average than BX steer cattle. It was concluded that the different initial weight groups had an effect on the productivity of BX cattle including ADG, slaughter weight, carcass weight, but did not affect the percentage of carcass. The best initial weight group is the small initial weight group and has a higher average ADG and carcass percentage, while the best initial weight group for slaughter weight and carcass weight is the large initial weight.

**Keywords**— Brahman cross, productivity, sex (steer and heifer).

## I. INTRODUCTION

Demand for meat in Indonesia currently reaches 2.56 kg per capita per year and tends to increase every year, but this increase has not been matched by the addition of adequate production. In 2019 the demand for meat reached 686.270 tons with meat production only reaching 490.420 tons (Badan Pusat Statistik, 2019). The beef cattle imported in the fattening industry in Indonesia is the Brahman Cross (BX) cow originating from Australia.

Up to now, the demand for meat in Indonesia has been met by imported cattle from abroad in the form of feeder cattle. One of the factors that determine the success of the final program of the fattening business is going. Feeder cows, namely young cows aged 2 - 3 years from certain breeds of

cattle and have different initial weights. Gender can affect cows when they are in the fattening process. There are 2 types of feeder cattle based on gender, namely steer and heifer cattle. Steer cattle are castrated young bulls at the age of 6-24 months, while heifer cows are heifers who have not yet mated or have offspring. Sex differences cause differences in body weight when cows are adults, one of which is influenced by the bone component where the bone component of heifer cattle is significantly lighter than steer cattle (Kuswati *et al.*, 2014). The low average initial weight in BX cattle will have a higher average body weight gain than BX cattle which have a large initial weight. Of course, the main product produced after the cow is slaughtered is carcass, this is closely related to the final weight. The high final weight results in a larger carcass so that it is expected that the meat portion will be bigger (Soeparno, 2005). The Brahman Cross carcass varies between 45% - 55% depending on the condition of the cow when it is live weighed and the performance of each individual. The production of a livestock carcass is also influenced by several factors including sex, age and nutrition.

Currently, the center of beef cattle production in Lampung province is Central Lampung district, with a population of 344,506 heads (Badan Pusat Statistik, 2018). Lampung Province is an area that has the potential to develop livestock businesses. Areas that have the potential to develop commercial livestock businesses, especially beef cattle, are in Central Lampung. One of them is PT KASA, which has a population of around 7000 Brahman cross cows in 2019, has the potential to optimize its production.

An important aspect to work on is maximizing the potential of feeder steers and heifers based on initial weights. This aspect is important in order to establish the need for productive beef so that it can meet domestic demand for beef. Production characteristics can be seen from the daily gain in body weight, final weight when cattle are slaughtered, carcass weight and carcass percentage. Based on these thoughts, a study was conducted "Effect of Initial Weight and Sex (Steer and Heifer) on ADG, Slaughter Weight, Carcass Weight, and Carcass Percentage Brahman Cross in PT KASA Lampung Tengah".

II. MATERIALS AND METHODS

A. Materials

The research material consisted of 150 Brahman Cross Steer and Heifer and primary data from recording initial weight, daily body weight gain, slaughter weight, and carcass data. Data collection techniques are direct observations / measurements in the field and recording observations of cows from previous weighing results.

B. Research Data Sources

- a) Primary data, namely research data taken by direct observation and measurement of livestock at the Slaughterhouse, namely carcass weight, carcass percentage.
- b) Data recording, namely data obtained from the management of PT KASA which includes the geographical conditions at the research location as well as the recording of livestock used as research material including initial weight data, slaughter weight, daily weight gain and maintenance time, and feed.

C. Methods

This research used a survey method in the form of direct observation at the research location. The data collected includes recording data and direct observation data. Direct observational data were obtained through direct observation and measurement of livestock including carcass weight, carcass percentage. Recording data obtained through the company include initial weight data, slaughter weight, daily weight gain.

D. Variables

1. Initial Weight

The initial weight is divided into 3 groups, namely: small (<300 kg), medium (300-350 kg), large (> 350 kg).

2. ADG

ADG is calculated by the following formula: PBBH formula =

$$\frac{\text{Bobot Akhir} - \text{Bobot Awal}}{\text{Lama Pemeliharaan}}$$

3. Carcass Weight

The carcass is part of the body of a healthy cow that has been slaughtered, skinned, offal removed, separated from the head and legs from the tarsus / carpus down, reproductive organs and udder, tail and excess fat. (Badan Standarisasi Nasional, 2008).

Carcass data researched after fat reduction.

4. Carcass Percentage

The percentage of carcass is the ratio between body weight multiplied by one hundred percent, with the following equation:

$$\text{Percentage of carcass} = (\text{carcass weight} \times 100\%) / (\text{slaughter weight})$$

E. Statistical Analysis

The analytical model used in the study used nested experimental analysis, namely the use of a factorial experimental design, but there was no interaction between

factors.

III. RESULTS AND DISCUSSION

A. Effect of Initial Weight and Sex (Steer and Heifer) on ADG Brahman cross

The observation results of the initial weight and sex of the steer and heifer of Brahman cross on ADG can be seen in Table I and Table II. The average observed results of initial weight and sex of steer and heifer of Brahman cross on ADG can be seen below this.

TABLE I. Average PBBH of BX cattle at different initial weights

Initial Weight (kg)	Average ± sd		
	Small (n=50)	Medium (n=50)	Large (n=50)
ADG (kg)	1.61 ± 0.43 <sup>b</sup>	1.41 ± 0.38 <sup>ab</sup>	1.32 ± 0.44 <sup>a</sup>

Notes: <sup>a, b</sup> superscript on different lines shows a very significant difference (P < 0.01).

TABLE II. Average ADG for Different Sex (steer and heifer)

Initial Weight (kg)	Average ± SD ADG		
	Small (n=50)	Medium (n=50)	Large (n=50)
Steer (n=25)	1.73 ± 0.47 <sup>c</sup>	1.49 ± 0.48 <sup>ab</sup>	1.27 ± 0.46 <sup>a</sup>
Heifer (n=25)	1.49 ± 0.35 <sup>ab</sup>	1.32 ± 0.25 <sup>ab</sup>	1.37 ± 0.43 <sup>ab</sup>

Note: <sup>a, b</sup> the same superscript shows no significant difference (IW (S) > 0.05).

The effect of initial weight on ADG can be seen in Table I. The results of statistical analysis show that the lowest average weight gain for BX cattle was found in the large initial weight range group, with an average of 1.32 ± 0.44 kg, while The highest average PBBH of BX cattle was found in the small initial weight range group with an average of 1.61 ± 0.43 kg. The results of statistical analysis obtained P < 0.01, this indicates that the ADG mean in the different initial weight groups, there is a very significant difference. The effect of sex (steer and heifer) and initial weight on ADG can be seen in Table II. The results of statistical analysis show that the lowest ADG average of BX cattle is found in steers with a large initial weight group of 1.27 ± 0.46 kg, while the highest ADG average was found in the small kg steer cattle with an average of 1.73 ± 0.47 kg. In the steer group, the medium initial weight group and the small heifer group had the same ADG average of 1.49 ± 0.48 kg and 1.49 ± 0.35 kg. The results of the nested test analysis showed IW (S) > 0.05, this indicates that the sexes nested at the initial weight were different, there was no significant difference.

Compared to the initial weight for the medium and large ranges. This is due to the high growth rate during the period of BX cattle fattening. Selection of the initial weight is very important, if the selected initial weight is higher it will reduce ADG of BX cattle, so it is necessary to pay attention to the selection of cattle with a lower initial weight. High growth rates are possible due to compensatory growth, where livestock are given good quality feed and adequate nutrition. The average ADG for steer is higher than heifer cattle, this is because steers have fast growth. This is according to what Hidayat (2013) said that bulls have a faster growth acceleration than the growth of heifer, another thing that also

affects growth is the genetic potential of livestock.

**B. Effect of Initial Weight and Sex (Steer and Heifer) on Slaughter Weight Brahman cross**

The observation results of the initial weight and sex of the steer and heifer of Brahman cross cattle on slaughter weight can be seen in Table III, Table IV. The average results of observations of the initial weight and sex of the steer and heifer of Brahman cross cattle on slaughter weight can be seen below.

TABLE III. Average Slaughter Weight of BX cattle at different initial weights

Initial Weight (kg)	Average ± sd		
	Small (n=50)	Medium (n=50)	Large (n=50)
Slaughter Weight (kg)	409.44 ± 42.6a	434.14 ± 40.3b	484.72 ± 48.04c

Notes: <sup>a, b</sup> superscript on different lines shows a very significant difference (P <0.01).

TABLE IV. Average Slaughter Weight for Different Sex (steer and heifer)

Initial Weight (kg)	Average ± SD Slaughter Weight		
	Small (n=50)	Medium (n=50)	Large (n=50)
Steer (n=25)	440.72 ± 31.6c	459.48 ± 34.0a	504.04 ± 50.1e
Heifer (n=25)	378.16 ± 25.9a	408.8 ± 28.8b	465.4 ± 37.7d

Note: <sup>a, b</sup> the same superscript shows very significant differences (IW (S) <0.01).

The effect of initial weight on final weight can be seen in Table III. The results of statistical analysis show that the lowest average final weight of BX cattle is found in the large initial weight range group, with an average of 1.32 ± 0.44 kg, while the average -The highest average final weight of BX cattle was found in the small initial weight range group with an average of 1.61 ± 0.43 kg. The results of statistical analysis obtained P <0.01, this indicates that the mean of the cut weight in the different initial weight groups, there is a very significant difference. The effect of sex (steer and heifer) and initial weight on slaughter weight can be seen in Table IV. The results of statistical analysis show that the lowest average slaughter weight of BX cattle is found in heifer cattle in the small initial weight group of 378.16 ± 25, 9 kg, while the highest average slaughter weight was found in the steer cattle with a large initial weight group with an average of 504.04 ± 50.1 kg. In the steer group, the initial weight group with medium range and the large heifer group had an average with the same notation, namely 459.48 ± 34.0 kg and 465.4 ± 37.7 kg, respectively. The results of the nested test analysis obtained IW (S) <0.01, this indicates that the sexes nested at the initial weight are different, there is a very significant difference.

Table III and Table IV show that the average slaughter weight of BX steer and heifer cattle based on the same initial weight group has differences, the analysis results show that the steer cattle in the same initial weight group have a higher slaughter weight. The sex difference factor contributes to the difference in slaughter weight, according to Soeparno (2005). This is caused by male sex hormones which result in faster

growth in bulls compared to female cows due to the accumulation of muscle building processes that are influenced by hormone work. Another thing that happens in the field is because during the loading process, cattle from Australia have a higher initial weight of steer than heifer cattle.

**C. Effect of Initial Weight and Sex (Steer and Heifer) on Carcass Weight Brahman cross**

The results of observation of the initial weight and sex of the steer and heifer of Brahman cross cattle to carcass weight can be seen in Table V and Table VI. The average results of observations of the initial weight and sex of the steer and heifer of Brahman cross cattle to carcass weight can be seen below.

TABLE V. Average Carcass Weight of BX cattle at different initial weights

Initial Weight (kg)	Average ± sd		
	Small (n=50)	Medium (n=50)	Large (n=50)
Carcass Weight (kg)	198.98 ± 21.85a	208.98 ± 20.1b	234.72 ± 27.5c

Notes: <sup>a, b</sup> superscript on different lines shows a very significant difference (P <0.01).

TABLE VI. Average Carcass Weight for Different Sex (steer and heifer)

Initial Weight (kg)	Average ± SD Carcass Weight		
	Small (n=50)	Medium (n=50)	Large (n=50)
Steer (n=25)	214.68 ± 17.07c	221.52 ± 16.54d	245.12 ± 29e
Heifer (n=25)	183.28 ± 13.05a	196.44 ± 15.15b	224.32 ± 21.87d

Note: <sup>a, b</sup> the same superscript shows very significant differences (IW (S) <0.01).

The effect of initial weight on carcass weight can be seen in Table V. The results of statistical analysis show that the lowest average carcass weight of BX cattle is found in the small initial weight range group, with an average of 183.28 ± 13.05 kg, while the average -The highest average carcass weight of BX cattle was found in the large initial weight range group with an average of 245.12 ± 29 kg. The results of statistical analysis obtained P <0.01, this indicates that the average carcass weight in different initial weight groups, there is a very significant difference. The effect of sex (steer and heifer) and initial weight on carcass weight can be seen in Table 6. The results of statistical analysis show that the lowest average carcass weight of BX cattle is found in heifer cattle with small initial weight group of 183.28 ± 13.05 kg, while the highest average carcass weight was found in the steer cattle with a large initial weight group with an average of 245.12 ± 29 kg. In the steer group, the medium initial weight group and the large heifer cow group had an average with the same notation, namely 221.52 ± 16.54 kg and 224.32 ± 21.87 kg, respectively. The results of the nested test analysis obtained IW (S) <0.01, this indicates that the sexes nested at the initial weight are different, there is a very significant difference.

The amount of carcass is strongly influenced by the weight of the cow before slaughter and the empty weight of the cow. Carcass as a unit of production is expressed in terms of carcass weight, percentage of carcass. Carcass weight has a close relationship with cutting weight (Soeparo, 2005). Gender

factors can also affect carcass weight, Setiyono *et al* (2017) states that sex classification affects the average carcass weight of cow, heifer, and steer in BX cattle. According to Maylinda and Busono (2020), said that the difference in carcass weight between steer and heifer cattle is thought to be due to the management of feeding, where most of them are given feed in the form of onggok that has been silaged before being fed.

**D. Effect of Initial Weight and Sex (Steer and Heifer) on Carcass Percentage Brahman cross**

The results of observations of the initial weight and sex of the steer and heifer of Brahman cross cattle to the carcass percentage can be seen in Table VII and Table VIII. The average results of observations of the initial weight and sex of the steer and heifer of Brahman cross cattle to carcass percentage can be seen below.

TABLE VII. Average Carcass Percentage of BX cattle at different initial weights

Initial Weight (kg)	Average ± sd		
	Small (n=50)	Medium (n=50)	Large (n=50)
Carcass Percentage (%)	48.59 ± 1.52a	48.14 ± 1.44a	48.25 ± 1.68a

Note: a, superscripts on different lines show no significant difference (P> 0.05).

TABLE VIII. Average Carcass Percentage for Different Sex (steer and heifer)

Initial Weight (kg)	Average ± SD Carcass Percentage (%)		
	Small (n=50)	Medium (n=50)	Large (n=50)
Steer (n=25)	48,7 ± 1,42a	48,23 ± 1,42a	48,35 ± 1,78a
Heifer (n=25)	48,48 ± 1,62a	48,05 ± 1,47a	48,16 ± 1,6a

Note: a, the same superscript shows no significant difference (IW (S)> 0.05).

The effect of initial weight on carcass percentage can be seen in Table VII. The results of statistical analysis show that the relatively low percentage of BX cattle carcass was found in the medium initial weight range group, with a percentage of 48.14%, while the percentage of BX cattle was quite high obtained in the small initial weight range group with a percentage of 48.59%. The results of statistical analysis obtained P> 0.05, this indicates that the mean percentage of carcass in different initial weight groups, there is no real difference. The effect of sex (steer and heifer) and initial weight on carcass percentage can be seen in Table VIII. The results of statistical analysis show that the lowest percentage of BX cattle carcass was found in heifer cattle in the medium initial weight group at 48.05%, while the carcass percentage The highest was found in steer cows with small initial weight group with a percentage of 48.7%. The results of the nested test analysis obtained IW (S)> 0.05, this indicates that the sexes nested at the initial weight were different, there was no significant difference.

The results of the analysis of the percentage of carcass between steer and heifer cattle did not have a significant difference, although the carcass percentage of heifer cattle was lower than that of steer cattle. This may be due to the different initial weight groups having high non-carcass weights, thereby

reducing the carcass percentage. According to Purbowati (2011), states that the percentage of carcass is influenced by the weight of cut and the weight of body components consisting of carcass components and non-carcass components. In addition, according to Zajulie *et al.* (2015), the effect of feeding and drinking causes a variation in the weight of the digestive tract which indirectly affects the percentage of carcasses, as well as for cows that are not fasted do not experience depreciation of live weight so that the percentage of carcass produced is lower.

IV. CONCLUSION

Different initial weight groups have an effect on the productivity of BX cattle including ADG, slaughter weight, carcass weight, but on the other hand, they do not affect the percentage of carcass. The best initial weight group is small initial weight and has a higher average ADG and carcass percentage, while the best initial weight group for cut weight and carcass weight is large initial weight.

Sex at different initial weights has no effect on ADG and carcass percentage, but affects slaughter weight and carcass weight. BX steer cattle have a higher average on ADG, slaughter weight, carcass weight than BX heifer cattle, while the carcass percentage of BX heifer cattle has a higher average than BX steer cattle.

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