



# Imports of Indonesian Beef Cattle: A Study of Cattle Weight Loss Based on Type of Ship and Type of Cattle

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**Abstract** | Weight loss of imported cattle from Australia entering Indonesia is highly probable due to the long distances and journeys. This research aimed to analyze the weight loss of imported cattle from Australia entering Indonesia based on the type of ship used and the type of imported cattle. The types of ships used as the objects of observation were MV Diamantina, Barkly Pearl, and MV Gudali Ex, while the types of cattle used as the objects of observation were Brahman Cross cattle, including heifers, steers, and bulls. The observation involved 4,238 Brahman Cross cattle. The data were analyzed using descriptive analysis and independent sample t-test using SPSS 26.0 software. The results revealed that the weight loss of the imported cattle on the MV Diamantina ship was  $12.92 \pm 5.66$  kg per cattle, Barkly Pearl was  $9.98 \pm 5.05$  kg per cattle, and MV Gudali Ex was  $14.32 \pm 4.20$  kg per cattle, while the weight loss of Brahman Cross heifers was  $12.71 \pm 6.19$  kg per cattle, of steers was  $12.15 \pm 3.86$  kg per cattle, and of bulls was  $15.86 \pm 3.97$  kg per cattle. It was concluded that the imported beef cattle from Australia with the lowest weight loss during the observation period was Brahman Cross steers transported using the Barkly Pearl ship.

**Keywords** | Cattle impor, Brahman cross, Livestock transportation, Beef cattle, Heifers, Steers

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## INTRODUCTION

The available population of beef cattle in Indonesia in 2022 was recorded at 18,610,148, which accounts for only 0.067% of the overall Indonesian population of 275,773,800. This condition shows that the need for beef cattle and beef in Indonesia needs to be taken seriously considering that the demand for beef consumption continues to increase along with the increase in human population. The ongoing impact of this phenomenon is the high price of beef at the consumer level (Niloofar *et al.*, 2023; Sneessens *et al.*, 2019). The ongoing impact of this phenomenon is the high price of beef at the consumer level (Amam *et al.*, 2021), so people's purchasing power

is low, it is recorded that beef consumption in Indonesia is only 2.26 kg per capita per year (Rusdiana *et al.*, 2023) or equivalent to 0.010 kg per capita per week (Indonesia's Central Statistical Agency, 2022a), even though in the same year there was an increase in per capita income of 5.31% (Indonesia's Central Statistical Agency, 2022c).

Apart from the high price of beef and economic factors related to consumer purchasing power, there are other interesting thing that needs to be underlined is that the growth rate of the beef cattle population in Indonesia of 3.56% or equivalent to an increase to 18.16 million beef cattle in 2022 (Indonesia's Central Statistical Agency, 2022b), and is still higher than that of the human population

of 1.17% (Indonesia's Central Statistical Agency, 2022d). This condition indicates that the government's efforts to increase the population, production, and productivity of beef cattle continue to be carried out solely for beef self-sufficiency (Jouan *et al.*, 2021; Tichit and Bernués, 2014). In this case, self-sufficiency is the government's effort to meet the domestic beef needs (Yulianto *et al.*, 2020; Zahrosa *et al.*, 2020).

Various efforts have been made by the Indonesian government for the beef self-sufficiency program, including a ban on slaughtering productive female cattle, as stated in Law Number 18 of 2009 concerning Animal Husbandry and Animal Health and the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 48 of 2016 concerning Special Efforts to Accelerate the Increase in Pregnant Cattle and Buffalo Population (Rusdiana and Praharani, 2019; Wahyudi *et al.*, 2020). It is expected that these regulations will be able to encourage an increase in the beef cattle population in Indonesia (Amam *et al.*, 2019, 2020). These efforts are proven by the increase in the beef cattle population in Indonesia in the last 2 years, namely an increase in population of 3.52%.

Ironically, the increase in the number of cattle in Indonesia's beef industry is not reflected in the meat's market availability (Amam *et al.*, 2023a). The interesting thing need to know is that beef cattle farming in Indonesia is dominated by micro-scale smallholder farms with ownership of under 5 (five) heads and spread across 34 provinces in Indonesia. These farms only use family labor (which is not paid) and operate for personal savings rather than commercial purposes, and the use of resources that overlaps with farmers' subsistence needs, and the use of resources that overlap with farmers living needs, such as the motorbikes used by farmers to look for grass are the same as those used by farmers to go to the market or for other purposes (Amam *et al.*, 2023b, c).

In reality, micro-scale livestock farming is not carried out by developing livestock businesses or efforts to increase the livestock population because livestock business is not the main occupation, but rather as farmers in paddy fields, fields and gardens, or in other words farmers who have beef cattle (Rusman *et al.*, 2018; Widiati, 2014). The challenges of smallholder beef cattle farming include market access and long marketing chains, poor reproductive management and low availability of feeders, as well as weak protection of the selling price of live cattle and prices tend to fluctuate (Amam *et al.*, 2024a, b).

The condition affects the low slaughter rate of local beef cattle raised by individuals farms since the livestock ownership is intended for family savings. As a result, owners will not sell their livestock unless they require a

large amount of money. The low slaughter rate of local beef cattle greatly affects the availability of beef on the market, resulting in high beef prices due to limited supply. On the one hand, beef in Indonesia is a strategic food commodity that its availability, price, and distribution are regulated and controlled by the government. Thus, one of the efforts made by the Indonesian government is to regulate import permits for feeder cattle and beef (Hendrawati, 2018; Santoso, 2020)

One of the regulations governing cattle import licensing in Indonesia is the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 108 of 2014 concerning Imports of Feeder Cattle, Parent Cattle, and Cattle Ready for Slaughter into the Territory of the Republic of Indonesia. This regulation defines feeder cattle as non-breeding cattle that have superior characteristics to be raised for a certain period for meat production (Amam *et al.*, 2023d). Breeding cattle, on the other hand, are non-breeding female cattle with normal reproductive organs, good health, and used for breeding purposes. Lastly, cattle ready for slaughter are beef cattle appropriate for slaughter.

However, in practice, cattle imported from abroad, particularly from Australia, undergo long journeys resulting in weight loss. This is due to the disparity between the weight of the cattle from the supplier (in Australia) and the arrival weight (in Indonesia) after being transported via ship (Hersom *et al.*, 2011; Lalman *et al.*, 2019). Hence, this research aimed to analyze the weight loss of imported cattle from Australia entering Indonesia based on the types of ships used and the types of imported cattle. The novelty of this research is to map the types of imported cattle and the types of ships as means of transporting imported cattle from Australia to Indonesia with the lowest impact on the cattle weight loss. The findings provide valuable evaluation material for importers, exporters, and ship transport service providers, as well Government of the Republic of Indonesia.

## MATERIALS AND METHODS

This was comparative research since it compared the types of ships used as means of transporting imported cattle from Australia to Indonesia and the types of imported cattle. The types of ships used as the objects of observation were MV Diamantina, Barkly Pearl, and MV Gudali Ex, while the types of cattle used as the objects of observation were Brahman Cross cattle, including heifers, steers, and bulls. The observation involved 4,238 Brahman Cross cattle. The weight loss was calculated based on the disparity in weight of the beef cattle obtained from supplier (from Australia) and of that on arrival (when they arrive in Indonesia) after being transported via ship. Mathematically, it can be calculated as follows.

**Table 1:** Weight loss of imported beef cattle based on types of ships.

Types of ships	Descriptive statistics					
	N	Cattle Weight	Minimum	Maximum	Mean	Std. Deviation
MV Diamantina	2,368	Supplier weight	223.25	503.20	343.46	37.217
		Arrival weight	216.00	494.00	330.53	36.427
		Weight loss	-7.19	38.30	12.92	5.669
Barkly Pearl	528	Supplier weight	243.96	481.96	354.41	47.308
		Arrival weight	249.00	483.00	344.43	45.972
		Weight loss	-13.54	22.86	9.98	5.051
MV Gudali Ex	1,342	Supplier weight	194.41	467.84	304.59	29.000
		Arrival weight	182.00	475.00	290.27	27.742
		Weight loss	-7.16	29.44	14.32	4.208

**Source:** Processed primary data (2023).

$$L_{bw} = BW_{ex} - BW_{im}$$

$L_{bw}$  shows the disparity in cattle weight (kg);  $BW_{ex}$  shows the weight of beef cattle from the supplier (from Australia) (kg); and  $BW_{im}$  shows the arrival weight of beef cattle (when they arrive in Indonesia) (kg). The observation was made on 4,238 Brahman cross cattle consisting of 2,135 heifers (50.37%), 1,456 steers (34.35%), and 1,342 bulls (31.66%). Besides, observation was also made on the types of ships used as means of transportation for the imported beef cattle, including the MV Diamantina with 2,368 cattle (55.87%), the Barkly Pearl with 528 cattle (12.45%), and the MV Gudali Ex with 1,342 cattle (31.66%).

Factors influencing body weight loss outside the observation variables are considered the same because they have been taken into account for observation purposes, such as livestock stress conditions, feeding practices, transportation conditions and handling during travel. This observation was also carried out based on the similarity of the weather when sending beef cattle to Indonesia, namely sunny weather with a temperature of 27-33°C with a wind speed of 4-15 knots and air humidity of 68-83 percent, with a sea wave height of 0.5-1.25 meters. The data were analyzed using descriptive analysis and independent sample t-test by means of SPSS 26.0 software.

## RESULTS AND DISCUSSION

### WEIGHT LOSS OF IMPORTED BEEF CATTLE BASED ON TYPES OF SHIPS

The weight loss of imported beef cattle based on types of ships used as means of transportation is shown in Table 1.

The Barkly Pearl ship was means of transportation for the imported beef cattle which during the shipment, it showed the lowest initial weight loss for the beef cattle compared to the MV Diamantina and MV Gudali Ex. This is because the Barkly Pearl transport the smallest

population compared to other ships, allowing the cattle ample space and to feel comfortable. The Barkly Pearl was the oldest ship compared to other ships, making its speed and condition inferior newer ships. As a result, the ship's captain had to steer the ship more carefully slowing it down and improving its stability, helping the livestock onboard feel comfortable (Hakem *et al.*, 2022; Wendimu *et al.*, 2023).

The MV Gudali Ex experienced the most significant weight loss during cattle shipment despite being larger than the MV Diamantina. Although the cattle population was smaller, the Gudali Ex's newer condition and higher speed facilitated faster delivery. However, due to increased shaking on the vessel, the cattle experienced discomfort during transportation (Bianco *et al.*, 2021; Façanha *et al.*, 2019). The MV Diamantina carried the largest number of cattles among the Barkly Pearl and MV Gudali Ex, boasting dimensions larger than the Barkly Pearl and smaller than the MV Gudali Ex. Despite the significant population on board, weight loss was not the highest due to excellent ship steering and livestock care during transport. The comparison of weight loss of imported beef cattle is shown in Table 2.

**Table 2:** Comparison of weight loss of imported beef cattle based on types of ships.

Types of ships		MV dia- mantina	Barkly Pearl	MV Gu- dali Ex
MV Dia- mantina	N	2,368	-	-
	Significance (2-tailed)	-	0.000	0.000
	Mean	12.92	-	-
Barkly Pearl	N	-	528	-
	Significance (2-tailed)	0.000	-	0.000
	Mean	-	9.98	-
MV Gudali Ex	N	-	-	1,342
	Significance (2-tailed)	0.000	0.000	-
	Mean	-	-	14.32

**Source:** Processed primary data (2023).

**Table 3:** Weight loss of imported beef cattle based on types of cattle.

Types of cattle	Descriptive statistics					
	N	Cattle weight	Minimum	Maximum	Mean	Std. Deviation
Heifers	2,135	Supplier weight	219.57	503.20	330.61	42.23
		Arrival weight	208.00	494.00	317.90	41.45
		Weight loss	-13.54	38.30	12.71	6.19
Steers	1,456	Supplier weight	237.06	481.96	346.84	37.64
		Arrival weight	225.00	475.00	334.69	37.12
		Weight loss	-7.16	28.22	12.15	3.86
Bulls	1,342	Supplier weight	194.41	451.44	306.55	29.39
		Arrival weight	182.00	422.00	290.69	27.75
		Weight loss	4.54	29.44	15.86	3.97

**Source:** Processed primary data (2023).

Tables 1 and 2 reveal that each type of ship transported different population of Brahman cross beef cattle from the Port of Darwin in Australia to the Port of Tanjung Perak in Indonesia. The total number of beef cattle transported was 2,368 by MV Diamantina, 528 by Barkly Pearl, and 1,342 by MV Gudali Ex. The tables also show the significant differences in the weight loss of cattle on the MV Diamantina and the Barkly Pearl, the MV Diamantina and the MV Gudali Ex, and the Barkly Pearl and the MV Gudali Ex. The significance value in all three test results was less than 0.05 (0.000). This means that the three types of ships used as means of transportation for imported cattle exhibited variations in weight loss of beef cattle. Specifically, the MV Diamantina, the Barkly Pearl, and the MV Gudali Ex resulted in average weight loss of 12.92 kg per cattle, 9.98 kg per cattle, and 14.32 kg per cattle, respectively.

#### WEIGHT LOSS OF IMPORTED BEEF CATTLE BASED ON TYPES OF CATTLE

The weight loss of imported beef cattle based on types of imported cattle is shown in Table 3.

The steers had the lowest average weight loss compared to heifers and bulls. The heifers had the largest population, but their weight loss was not too high compared to bulls. The bulls were the ones experiencing the highest weight loss (Cominotte *et al.*, 2020; Jr *et al.*, 2014; Rodriguez *et al.*, 2014). The steers and bulls were male, but the difference was that steers were male cattle that had been castrated while bulls were not castrated. This could affect the amount of weight lost by cattle, as those not castrated often exhibit a strong libido (Jr *et al.*, 2012), leading to aggression and increased movement (Tofastrud *et al.*, 2020). The comparison of weight loss of imported beef cattle is shown in Table 4.

Tables 3 and 4 reveal that each type of cattle imported by ship had different population. The population of heifers

was 2,135 cattle, that of steers was 1,456 cattle, and that of bulls was 647 cattle. The tables also show the significant differences in the weight loss of three types of cattle since the significance values for heifers with steers were 0.002 and 0.001, that for heifers with bulls was 0.000, and that for steers with bulls was 0.000, meaning that all significance values were less than 0.05. The average weight losses of beef cattle during the shipping process by ship from the Port of Darwin, Australia to the Port of Tanjung Perak, Indonesia varied based on the types of cattle. Heifers lost an average of 12.71 kg per cattle, steers lost 12.15 kg per cattle, and bulls lost 15.86 kg per cattle.

**Table 4:** Comparison of weight loss of imported beef cattle based on types of cattle.

Breed		Heifers	Steers	Bulls
Heifers	N	2,135	-	-
	Significance (2-tailed)	-	0.001	0.000
	Mean	12.71	-	-
Steers	N	-	1,456	-
	Significance (2-tailed)	0.002	-	0.000
	Mean	-	12.15	-
Bulls	N	-	-	647
	Significance (2-tailed)	0.000	0.000	-
	Mean	-	-	15.86

**Source:** Processed primary data (2023).

#### CONCLUSIONS AND RECOMMENDATIONS

Based on the findings, it can be concluded that weight loss of imported beef cattle during the shipping process from Australia to Indonesia varied based on the type of ships (MV Diamantina, Barkly Pearl, and MV Gudali Ex) and the types of cattle (heifers, steers, and bulls). The Barkly Pearl ship had the lowest weight loss, while steers experienced the lowest weight loss among the three types of cattle.

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## NOVELTY STATEMENT

The novelty of this research is to map the types of imported cattle and the types of ships as means of transporting imported cattle from Australia to Indonesia with the lowest impact on the cattle weight loss. The findings provide valuable evaluation material for importers, exporters, and ship transport service providers, as well Government of the Republic of Indonesia.

## AUTHOR'S CONTRIBUTION

EBK: Head of project, conceptualization, investigation, writing-review and editing. AA: Conceptualization, methodology, formal analysis, validation, writing original draft, writing-review and editing. All authors have read, reviewed, and approved the final manuscript.

## CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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