Brahman Crossbred Cattle's Performances Were Extensively Reared Based on the Integration of Oil Palm Cattle in South Arut District, West Kotawaringin Regency

Dwi Kristanto[1(✉)], Kurnia Achjadi[1], and Sigit Sepriadi[2]

[1] Faculty of Veterinary Medicine, Brawijaya University, Malang, East Java 65151, Indonesia
dkristanto@ub.ac.id

[2] Faculty of Agriculture and Animal Husbandry, State Islamic University of Sultan Syarif Kasim Riau, Pekanbaru 28293, Indonesia

Abstract. The purpose of this study was to determine and show the performance of Brahman Crossbred cattle reared based on the integration of oil palm cattle. The Heifers used in this study were 360 of Brahman crossbred cattle (24 months). The performance of the cattle was observed from postpartum to the age of 30 months. Parameters observed in determining performance include the percentage of live births (%), the percentage of calf mortality (%), birth weight (kg), weaning weight (kg), yearling weight (kg), adult weight (kg), age at first heat (months), age at first mating (months), percentage of pregnancy (%), percentage of adult mortality (%). The results showed that the percentage of live births 53,23%, the percentage of calf mortality was 3,95%, birth weight 25.52 ± 52 kg, weaning weight 145,60 ± 8 kg, yearling weight 195,42 ± 3,9 kg, adult weight >270,38 ± 11,76 kg, age of first heat 12,6 ± 4 months, age first mating in 22,3 ± 3 months, pregnancy percentage 55,10%, adult mortality percentage 2.8%. Based on these performance observations, it can be concluded that the performance of Brahman crossbred cattle was included in the good category, as several parameters were already above Indonesian national standards.

Keywords: Brahman Crossbred · Performance · Oil Palm

1 Introductions

The development of the beef cattle population in Indonesia is considered by various groups to be still very low and very far from the target for national meat consumption needs. This is because of the government continued to import live cattle to fulfill domestic consumption needs which are not comparable to supply [1]. In 2017 and 2018, the estimated national meat production is still around 532,000 tons and 403,668 tons from a demand of 663,290 tons per year, where production supply is dominated by Java, East, West Java, and Central Java [2].

An effort to reduce the number of imports and increase the population of beef cattle is to increase the production of beef cattle through smallholder farms and encourage

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large-scale farmers to invest in beef cattle. On the other hand, increasing the beef cattle population is constrained by the decrease in grazing land due to the shift in the conversion of agricultural land to other sectors, the increasing cost of animal feed and the difficulty of finding sustainable sources of feed ingredients. One solution that can be used to overcome this problem is to integrate cattle with oil palm. This solution is an option considering that the area of oil palm plantations in Indonesia in 2017 reached 14.04 million hectares and is estimated to reach 14.67 million hectares in 2019 [3]. The program is also supported by the government with the change to regulation of Minister of Agriculture Regulation No. 05/Permentan/PD.300/8/2014 concerning the Integration of the Oil Palm Plantation Business with the Beef Cattle Cultivation Business. The program is expected to not only provide legal certainty to investors but also is expected to be able to provide land and biomass by-products of palm oil products that can be used as animal feed [4].

In Indonesia, large-scale cattle companies prefer to use cow-calf operations combined with the concept of an extensive cattle-oil palm integration system [5]. This is reasonable considering the potential for the land area as a breeding area and grazing will help accelerate population increase, reduce feed operational costs, and become a provider of cheap feed raw materials [6]. According to Ayob and Kabul [7], this concept is also considered to be able to build a harmonious relationship between livestock, shaded forage, and plantation. It is also considered a solution to ineffective biological weed control [7].

To achieve the target of increasing the population and achieving the concept of integration of oil palm cattle, it is necessary to support the studies related to the basic data of Brahman crossbred cattle performance which is considered very lacking as reference in carrying out good farming practices. This study aims to determine the performance of Brahman crossbred cattle which are extensively reared in oil palm with the concept of cow-calf operation. The results of this study are expected to be a consideration for all parties involved, both the government and the private sector in carrying out cow-calf operations for Brahman crossbred cattle which are carried out with the concept of integration of cattle-oil palm plantation.

2 Materials and Methods

2.1 Research Material and Handling

This research was conducted from September 2016 to May 2019 in Kotawaringin Barat Regency, Central Kalimantan Province. The Heifers were used in this study 360 of Brahman crossbred cattle (24 months). The heifers were reared with extensive integration of oil palm cattle and observed until parturition. Additional feed for cattle in the form of a concentrate of as much as ±3 kg/head/day and drinking water is given ad libitum. The results of the calf were observed and their performance was recorded from the first arrival to maturity. Performance parameters observed from crossbred Brahman cattle included calving rate (%), calf mortality percentage (%), birth weight (kg), weaning weight (kg), yearling weight (kg), adult weight (kg), age first heat (months), age at first mating (months), pregnancy rate (%), mature mortality (%).

2.2 Data Analysis

This research uses a purposive sampling method and the data used is primary data. The available data will be collected and calculated using Microsoft Excel based on the observed parameters with the following formula:

Calving rate
$$\text{Calving rate (\%)} = \text{Natality/Number of cows} * 100\% \quad (1)$$

Calf mortality
$$\text{Calf mortality (\%)} = \text{Total of Calf Dead/Total parturition} * 100\% \quad (2)$$

Calf birth weight
$$\text{Average Calf Weight (Kg)} = \text{Total of Calf Weight/total of number calves} \quad (3)$$

Weaning weight
$$\text{Weaning weight (Kg)} = \text{Total of weaning weight/total of number weaners} \quad (4)$$

Yearling weight
$$\text{Yearling weight (Kg)} = \text{Total of yearling weight/total of number yearling} \quad (5)$$

Mature weight
$$\text{Mature weight (Kg)} = \text{Total of mature weight/total of number mature cattle} \quad (6)$$

First heat age
Observation of the age of estrus was done visually observations that are carried out manually in the field. (7)

First mating age
The mating process is carried out by gathering bull into the heifer's population with a ratio of 1:20 at the age of 18−24 months of the heifer. Observations will be made until the heifer's age is 24 months along withpregnancy checks. (8)

Pregnancy rate
$$\text{Pregnancy rate} = \text{Total of pregnancy heifers/total of heifers} * 100\% \quad (9)$$

Mature mortality
$$\text{Mature mortality} = \text{Total of cattle died/number of cattle} * 100\% \quad (10)$$

3 Results and Discussion

The results of observing the performance of Brahman Crossbred cattle that were kept with the cow-calf operation concept in oil palm plantations for approximately 3 years from 2016 to 2019 are shown in Table 1.

Table 1. Performance value of Brahman Crossbred cattle reared extensively under palm oil plantation

Indicator	Result	References	Indonesia National Standard
Calving rate (%)	53, 23	80,7% [8]	>60
Calf Mortality (%)	3,95	17.27 [10]	<15
Calf Birth weight (Kg)	25.52 ± 5.7	24.74 ± 2,54 [14]	22–25
Weaning weight (Kg)	145,60 ± 8	173.48 ± 28.74 [11]	120–122
Yearling Weight (Kg)	195,42 ± 3.9	194.948 ± 23.88 [16]	195
Mature Weight (Kg)	270,38 ± 11.76	298 ± 71.8 [17]	301–305
Age at first Heat (Month)	12,6 ± 4	14–16 [18]	12
Age at first Mating (Month)	22,3 ± 3	23–24 [19]	24
Pregnancy rate (%)	55.10	88,0 [8]	>70
Adult Mortality (%)	2.8	12.23% [10]	<10

Calving Rate. In this study, Brahman cross cattle reared under oil palm plantations had a calving rate of 53,23. This is to the report of Khotimah et al. [8] states that the calving rate performance of Brahman cross cattle is 80.7 per cent, which is almost the same in the present study. In addition, according to Balls [9] the normal birth rate is 60–70% and will never reach 100% due to failure of conception and embryonic death. These results indicated that the variation of calving rate in different parity and locations mainly regarded as the differences origin of the genotype of the heifers, overall management of animals by the station, and the availability of feed resources in the palm oil area.

Calf Mortality. The results of the observation that the percentage of calf mortality that was reared extensively in oil palm plantation ns was 3,95%. Meanwhile, [10] reported that the mortality rate for calves was 17.27% and [11] reported 8.40% and 12.42% respectively. Based on these data, it can be concluded that the percentage of calf mortality is still at a very low limit. The mortality rate in calves can be influenced by genetic factors, seasons, nutritional aspects, quality of colostrum, quality of mother's milk, disease, maintenance systems, and management [12, 13].

Calf Birth Weight. The average birth weight of calf in crossbred Brahman cattle reared in oil palm plantations is 25.52 ± 5.7 This result is above normal birth weight, which is reported by Pardede et al. [14] reported that the average birth weight of Brahman crossbred cattle was 24.74 ± 2.54 kg. Factors that affect birth weight include the age of the offspring body condition score, genetics of the sires and males, the quality of the ovum cells, the stress level, the presence of infection, and is the nutritional factor [15].

Weaning Weight. Weaning process in Brahman cattle that are extensively reared in oil palm plantations at the age of 6 months. Observations showed that the average weaning weight was 145,60 ± 8. Meanwhile, Widi et al. [11] reported that weaning weight ranged from 173.48 ± 28.74 kg. While Pardede et al. [14] reported that the weight of Brahman crossbred cattle at the age of 3 months was 73.22 ± 8.17 kg. The difference in yield can be influenced by various factors such as genetics, weaning age, health and maintenance management, colostrum quality, and feed aspects.

Yearling Weight. Yearling observations and weighing were carried out at the age of 12 months. The weighing results show that the average yearling weight of Brahman Crossbred cattle reared with an integrated system of oil palm cattle is 195,42 ± 3.9. These results are similar to the report of Otto et al. [16] who reported yearling weights of Brahman Crossbred cattle of 194.948 ± 23.88. Yearling weight can be influenced by genetic factors, nutritional aspects, yearling weighing age, maintenance location, maintenance systems, and management.

Mature Weight. Observations on mature weight in brahman cattle reared in oil palm plantations were reported as 270,38 ± 11,76. These results are different from the reports of Da Costa et al. [17] where the mature weight is 298 + 71.8 kg. These differences can be influenced by various factors such as genetics, nutrition, maintenance location, system, and maintenance management.

Age at First Heat. The results of observations on the age of first heat in Brahman crossbred cattle that were kept extensively in oil palm plantations were reported at the age of 12,6 ± 4. These results are in line with the report of Tatman et al. [18] that the age of first estrous at the age of 14–16 months. The first estrous factor is influenced by various aspects such as genetics, breed, nutritional aspects, body condition score, and season.

Age at First Mating. The mating process is carried out by natural mating with a male and female ratio of 1:20. Males will be included at the age of 18 months of the heifer, and then the mating calculation will be observed until the age of 24 months at which time pregnancy checks are carried out. Observations and results of pregnancy tests found that the estimated age at first mating ranged between 22,3 ± 3.months. These results are also by Fordyce and Chandra. [19] reported, which is between 23–24 months. The age of mating is influenced by various things such as genetics, hormonal, breed, nutrition, body condition score, and season.

Pregnancy Rate. The average percentage of pregnancy in brahman cattle reared by cow-calf operation in oil palm plantations is 55.10%. The pregnancy rate is still considered low when compared to the report of Khotimah et al. [8], that the average pregnancy rate in Brahman cattle is 88.0% with the lowest value being 84.6% and the highest at 95.2%.

Mature Mortality. The percentage of mortality in heifer is influenced by various factors including nutritional status, season, maintenance and management, and the presence of disease. The mortality rate of Brahman cattle that are extensively reared in oil palm

plantations, is reported to be 2.8%. Meanwhile, according to a report by Yuwono and Sodiq [10], the mortality rate in mature cattle is 12.23%.

4 Conclusions

Based on these performance observations, it can be concluded that the performance of Brahman Crossbred cattle was included in the good category due to some parameters were already above the Indonesian national standard so it can be used as a reference to breed Brahman Crossbred Cattle that were integrated with oil palm plantation. Feed supplementation and medication during lactation are also recommended to reduce calves' mortality and increase calves rate.

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