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Development of an Integrated Cattle Farm on an Ex-coal Mining Area in Indonesia

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Abstract

Reclamation on ex-coal mining area is potential to be developed as cattle farm through Good Mining Practice Implementation Guidelines in Indonesia. In addition, beef import still undergoes to fulfil domestic beef demand. However, some strategies has been arranged to meet the demand including extended livestock area to apply more cattle breeding which can be purposed on ex-coal mining. This research aims to define the weight gain and birth rate of cattle which breed on ex-coal mining. The data was taken from Integrated Cattle Farm in PT Berau Coal, East Kalimantan Province, Indonesia. The data was analysed using descriptive statistics. The results showed that the birth rates of the calves are 62% for the Brahman Cross's, 47% for Bali's and 82% for Donggala's. Based on the measurements of the weight gain of the Brahman Cross's cattle, the results showed that 0.10 kg/day of weight gain for intensive farming (zero grazing) and 0.23 kg/day of weight gain for semi-intensive farming (grazing). The nutrient which comes from cover crop and grass was also tested and met the requirement of beef cattle. This idea however does not only support the government's project but also function as training farming centre for local community to build the capacity and independency of local farmers in mine closure. Furthermore, development of integrated cattle farm on mine reclamation land is also an example of sustainability of natural resources management between non-renewable and renewable resources.

Keywords: cattle, integrated farming, weight gain, birth rate, mine reclamation

Introduction

Coal production has significant role as domestic income in Indonesia which however, its exploitation inflicts environmental and social damages. In order to rehabilitate the ex-mining land and embody the sustainable development, mine reclamation can be functioned as productive land such as housings, tourism object, water intake and livestock or farming (Ministry of Energy and Mineral Resources, 2018). Productive land on mine reclamation is expected to gain new source of economic development for local community for example by developing integrated cattle farm which they can take advantage from beef and milk and chance to supply domestic demand. Moreover, this project also answers the beef demand which presently Indonesia still relies on beef import to meet the demand. Jiuhardi (2016) stated that average beef import were 26% of domestic demand in 2010-2014. The Central Bureau of Statistics (2018) also reported that Indonesia imported 160,198 tons of beef in 2017 with Australia as the main importer (53%). The

dependency of international market makes the beef price in Indonesia to rise to 19.4% since the unbalanced growth between consumption and production. Ministry of National Development Planning (2015) arranged that cattle breeding have to be extended to gain cattle population and avoid productive cows cutting. As pilot project, this research aims to define the weight gain and birth rate of cattle which breeds on ex-coal mining to further can be predicted as further can be projected in the larger scale.

Material and Methods

Study Area

This study took place in Integrated Cattle Farm (ICF) PT Berau Coal, East Kalimantan Province, Indonesia. PT Berau Coal is a coal mining company which has initiated the ICF since 2011 on Binungan and Lati Site for preconditions mine closure purposes. It has 5 ha for livestock facility and 191 ha for grazing area which consists of *Pennisetum* sp., *Brachiaria* sp. and Leguminosa Cover Crop (LCC) as the cattle feed.

Data and Methods

The data of cattle population and cattle weight of the Bali cattle (*Bos javanicus*), the Donggala cattle (originated from *Bos indicus*) and the Brahman Cross cattle (*Bos indicus*) were analyzed using descriptive statistics. The birth rate was taken from 2013 to 2018 while the weight gain was measured from 2018 to 2019. For the weight gain, the Brahman Cross cattle were taken for example due to the limitation of measurement in Lati (the weight scale is available in Lati which is only for the Brahman Cross).

Results and Discussion

Birth Rate

The ICF in Binungan Site is the first cattle farm for Bali cattle (*Bos javanicus*), the Donggala cattle (originated from *Bos indicus*) and the Brahman Cross cattle (*Bos indicus*) since 2011. The cows of three types of cattle has successfully bred with the birth rate of the cattle is shown in Fig. 1.
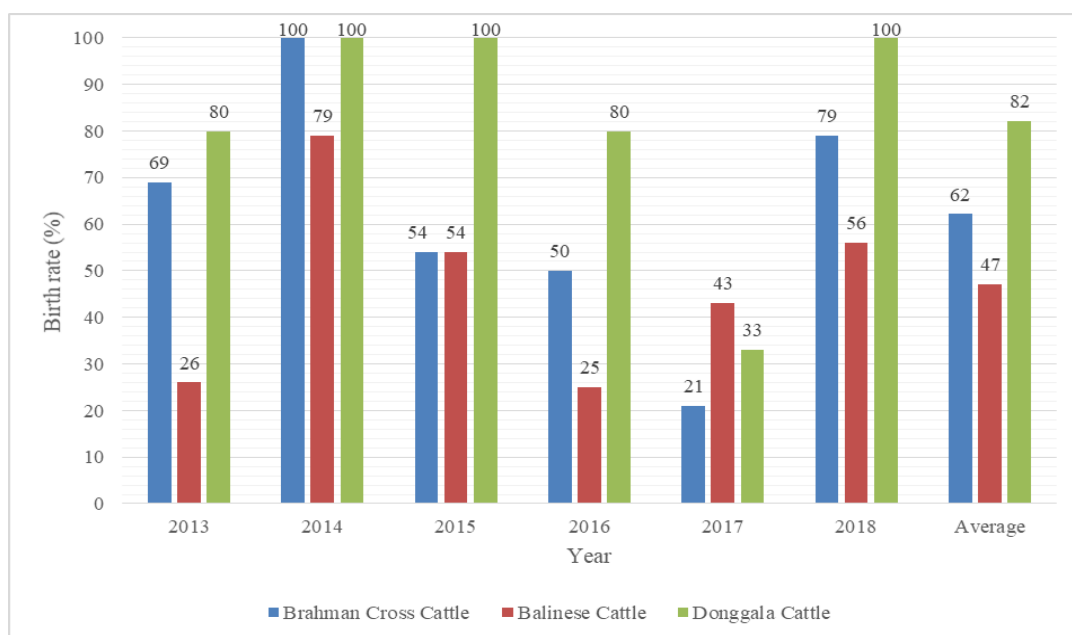

Fig.1 The birth rate of cattle in Integrated Cattle Farm PT Berau Coal

From the Fig. 1, Donggala cattle have the highest birth rate among all cattle (82%), followed by Brahman Cross's (62%) and Bali's (47%). Due to the data history and site observation, Donggala cattle are the most resistance to the disease and can ingest many kinds of feed. Wumbu *et al.* (2019) stated that Donggala cattle which had heavier body weight are tent to have earlier first mate period. The sufficient nutrition makes the cows gain the body weight faster and produce adequate milk for the calves.

Weight Gain
The data of weight gain was taken in Lati Site which is the second established ICF in PT Berau Coal. The developed facility in Lati is part of lesson learned of Binungan experience which began in 2018 with only Brahman Cross cattle in the farm. From September 2018 to February 2019, intensive farming was adopted and the body weight was measured per month. In the intensive farming, the farmers fed the cattle in the cowshed without grazing. After one semester, the average body weight gain was calculated only 0.1 kg/day (Fig. 2) and the ICF made the decision to change the farming system to semi-intensive. The cattle feed modification to silage affected the negative value of weight cattle on December 2018.
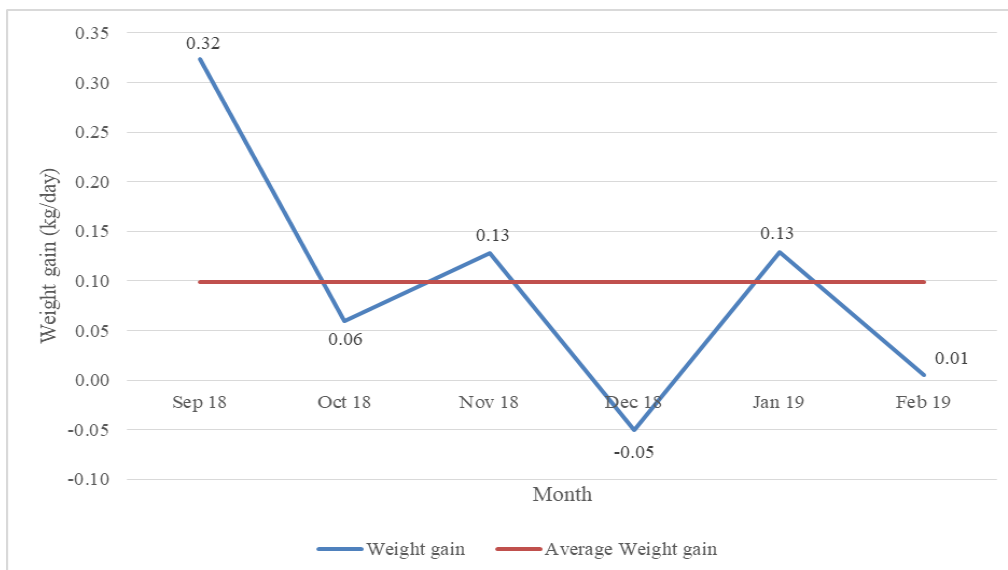

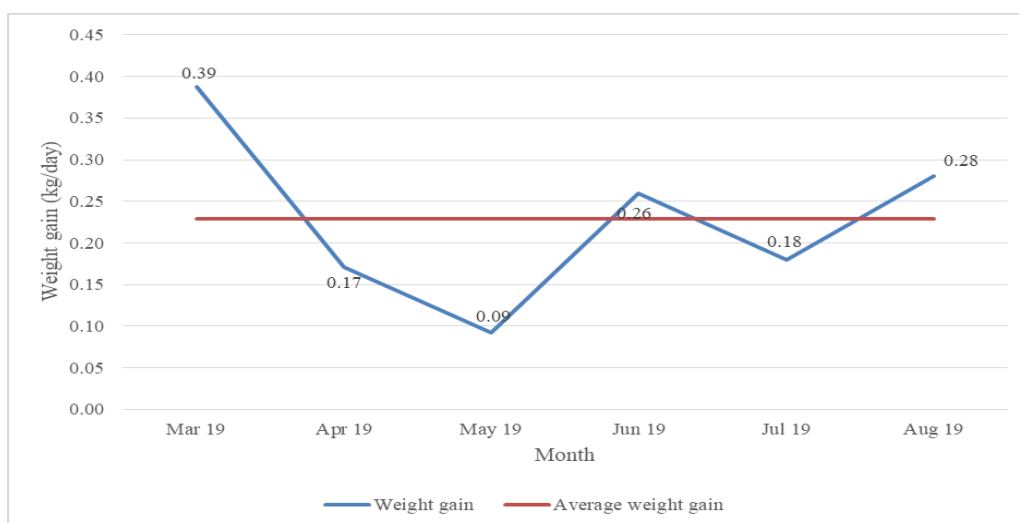Fig. 2 The weight gain of intensive farming

Fig. 3 The weight gain of semi-intensive farming

The body weight measurement from March to August showed that there was significant gain of this alteration farming system (Fig. 3). The average body weight gain of semi-intensive farming is 0.23 kg/day. In the semi-intensive farming, the cattle were put on grazing area which had more time to feed.

Conclusions

The development of ICF on ex-coal mining land is a bridge of the gap between non-renewable and renewable resources. The ICF in PT Berau Coal is an example which has bred Bali cattle (*Bos javanicus*), the Donggala cattle (originated from *Bos indicus*) and the Brahman Cross cattle (*Bos indicus*) since 2011. Donggala cattle had the highest birth rate due to the resistance ability to the disease and nutrition intake which led to the body weight and mating period. In addition, semi-intensive farming (full grazing) is more effective and efficient than intensive farming (zero grazing) to gain more weight of cattle. The ICF however needs more experiment and experience in order to prepare the mine closure program. Furthermore, the ICF is not only potential to support the government's project but also functioned as training farming centre for local community to build the capacity and independency of local farmers.

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