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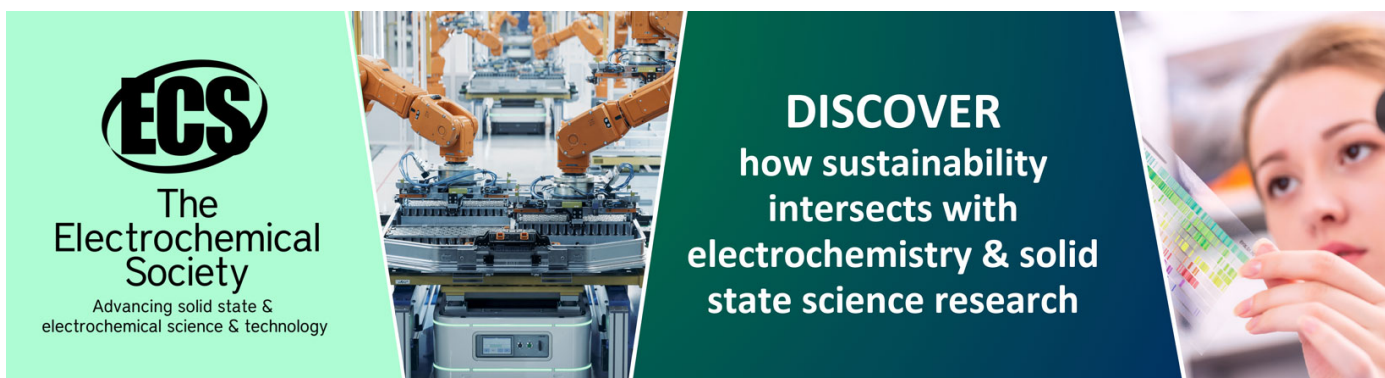
Grati-Ongole-crossbred cattle (POGASI Agrinak) development on farm kept in diverse agroecological zones

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Grati-Ongole-crossbred cattle (POGASI Agrinak) development on farm kept in diverse agroecological zones

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Abstract. The Indonesian Beef Cattle Research Station (BCRS) has undertaken conservation and improvement of Grati-Ongole crossbred cattle (POGASI Agrinak) by distributing selected cattle into some provinces in Indonesia. This study aimed to evaluate the productive performance of the calves born in different agroecological zones. Sixty-seven male and female POGASI Agrinak were distributed in Indonesia including in upland (e.g., in 50 Kota, Payakumbuh, one bull, and nine cows and Pule, Trenggalek, one bull, and eight cows) and in low land (e.g., in Jember, one bull and six cows, Indramayu, one bull and six cows, Situbondo, 25 bulls and Tanahlaut, South Kalimantan, ten bulls). The cattle were kept under diverse environmental and management systems. The natural mating system was applied in communal pens using selected bulls. The parameters observed were the number of calves and the birth weight. It resulted in 168 calves born in the upland and five calves born in low land. While the birth weight of calves born in lowland and upland was 25.8 ± 1.6 kg and 25.2 ± 2.4 kg respectively. Meanwhile, the birth weight of calves in BCRS was 25.3 ± 25 kg. To conclude, the birth weight both in BCRS and in those sites' *ex-situ* was comparable.

Keywords: POGASI Agrinak, the performance of the calves, agroecological zones

1. Introduction

Ongole crossbred cattle are well adapted in the tropical climate, therefore, they should be conserved. These cattle are resistant to heat stress, tropical diseases, and parasites, and well adapted to a low-quality diet. While those cattle also have a good reproductive performance. Based on statistical data from the Directorate General of Livestock and Animal Health [1] the total population of Ongole crossbred cattle was 4.281.602 heads and adapted in Indonesia with the highest population is in Java island. The distribution of superior breed aims to conserve and improve the productivity and population to promote the Indonesian beef cattle self-sufficiency program.

Since 2010, The BCRS has carried out a dissemination program to distribute selected Grati-Ongole crossbred cattle (POGASI Agrinak) into some provinces in Indonesia, as an effort to conserve and improve the productive performance of this breed. The superior breed that has been selected from the population of BCRS has been managed by the superior breed management unit (SBMU). The distribution activity has been done by the management and utilization of a superior breed unit that has been monitored periodically throughout the year for the development of the cattle and their calves.

Indonesia is a tropical country that has a diverse topography that can support the development of livestock business as it is supported by the feed sources and the physical ecology that can be modified by the human resource [2]. The topographical diversity causes agroecosystem conditions. This is related



to the productive performance of livestock. Based on the elevation, it can be divided into two different agroecological zones, upland and lowland. The upland has an elevation about > 700 m above sea level while the low land has an elevation from 0 to 200 m above sea level. In the low land, the temperature and rainfall are high while the temperature and rainfall in the upland are relatively lower.

One of the parameters that are usually used to understand the productive performance of the cattle is the number of calves and their birth weight. The birth weight is an important breeding value and related to the growth rate potency of the cattle [3]. The birth weight is a breeding value that can be used as a selection method for providing a superior breed. This study aimed to evaluate the productive performance of POGASI Agrinak calves born in different agroecological zones.

2. Materials and methods

This study evaluated POGASI Agrinak calves born from cows disseminated by BCRS in 2019. Sixty-eight bulls and cows were distributed into some provinces in Indonesia. Those cattle were disseminated into upland (in a group of farmer “Harapan Mulia” in Limapuluh Kota District, West Sumatera, one bull and nine cows and a group of a farmer “Margo Mulyo I” Trenggalek district, East Java, one bull and eight cows) and into lowland (in a Poltek Negeri Jember, Jember, East Java, one bull and six cows and into a group of a farmer in Indramayu district, West Java, one bull and six cows, farmer group “Singomulyo” in Situbondo district, East Java, 25 bulls and into Cahaya Abadi Petani (BUMN CAP) in Tanahlaut district, South Kalimantan, 10 bulls).

The cattle were kept in diverse environmental and management systems. The natural mating system is applied in communal pens with selected bulls. The system is chosen because of its labor and cost-effectiveness. The data were collected and incorporated with stakeholders. The observation has been done until 2020. The parameters were the number of calves and the birth weight. Data were analyzed descriptively.

3. Results and discussion

3.1. The general condition of research location and stakeholder profiles

Harapan Mulia farmer group located in Jorong Sibaladung Nagari Sungai Kamuyang, Luak Limapuluh Kota district, West Sumatera. It is in an upland that has an elevation from 700 to 1100 m above sea level [4]. Sari et al [5] stated that the temperature in Nagari Sungai Kamuyang was 12.95-23.26 °C. The dry season was not available during the year and the lowest rainfall was 91.6 mm.

Based on the data from Statistic Biro of Lima Puluh Kota district [4], in 2019 the dry season was from June to July, with the rainfall was 92.25 mm. The rest of the months was the wet season with the rainfall was 206.28 mm. The population of cattle in Luak subdistrict in 2019 was 8,697 heads. The management system adopted by the Harapan Mulia farmer group was the same as those applied in BCRS. The forages offered to the cattle were elephant grass (*Pennisetum purpureum* and or *Brachairia decumbens*) grown around the pens. The member of farmers also grew them in their backyards and near their paddy fields. There was abundant feed although the farmers did not well understand the cutting age of the grass, this affected its nutritive values. The amount of rice straw at the harvest time is abundant, some of them were used by the farmers to feed their cattle, and some of them were burnt. This was because there was plenty of grass available.

Margo Mulyo I farmer group is located in Sidomulyo, Pule, Trenggalek, East Java. The village is 825 m above sea level. In 2019, the dry season was in May-November with the rainfall was 2.14 mm. The wet season was in December-April with a rainfall level was 255.2 mm. The population of cattle in 2019 was 806 heads [6]. This group of farmers provided feed by growing grasses and agricultural byproducts from rice and crops, native grass, tree legumes (*Calliandra calothyrsus* and *Gliricidia sp.*). Although farmers often provide the cattle with grass. This farmer group also has a rice straw shed and manure processing unit.

Politeknik Negeri Jember is located in Sumbersari, Sumbersari, Jember, East Java. It is in the lowland, at 124 m above sea level. The rainfall average in 2019 was 136.33 mm. The population of

cattle in 2019 was 2,803 heads [7]. The management system adopted by Politeknik Jember was similar to those applied in BCRS. This Politeknik has a concentrate feed-making machine.

Rimba Raya farmer group in Indramayu is in Loyang, Cikédung, Indramayu, West Java. Based on data from Statistik Biro, Indramayu^a [8], in 2019 the dry season was in June–November, with the rainfall was 183.00 mm. In May, the high humidity was recorded with the rainfall was 90.00 mm. The wet season was in December–April with the rainfall was 5.67 mm. The population of cattle in Cikédung was 1,237 heads [9]. The management system adopted in this group was the same as it applied in BCRS. The feed provided by this group was elephant grass grown near the pen and some members also grew it in their backyard and paddy's field. Cassava and sugar cane were also been grown in this area for industries, and the byproducts were used as feed, such as *cassava pulp*/tapioca industry byproducts and molasses. The tree legume was also well grown such as *Gliricidia sp* as a hedgerow, although the farmers did not understand the use of tree legumes as cattle feed.

Singomulyo farmer group is located in Sumberwaru and Wonorejo villages, Banyuputih, Situbondo, East Java. Those villages are 0–10 m above sea level. The data from Kalorkoran station, Banyuputih, in 2019, the dry season was recorded throughout the year with only 1.92 mm of rainfall. The cattle population in Banyuputih was 1,237 heads [10]. All households in Sumberwaru and Wonorejo had cattle, about 4–10 heads. The Ongole crossbred cattle are the common breed kept by farmers in this site. The ratio between male and female cattle was not ideal, they did not have enough bulls for the natural mating system. Artificial insemination (AI) could not be successfully applied, because the farmers kept the cattle in the pasture near Baluran National Parks from morning to evening. Therefore, the farmers have applied mating, housing, feeding, and breeding system recommended by BCRS. In general, the farmers provided hay that could be from grass, rice straw, corn stover, tree legumes, and they stored them above the pens. The hay was given to the cattle especially in the dry season.

Cahaya Abadi Petani (BUMP CAP) is farmer-owned business located in Sungai Aris, Sungai Jelai, Tambang Ulang, Tanah Laut district, South Kalimantan. Tambang Ulang is in 25 – 100 m above sea level. The data in 2019 from Statistik Biro, Tambang Ulang 2011, the dry season is in May to October, the rainfall level was 13.60 mm. The rest was the wet season with the rainfall level was 280.14 mm. The population of cattle in Tambang Ulang in 2019 was 1,667 heads [11].

3.2. The number of calves born during dissemination

The productive performance of POGASI Agrinak cattle disseminated by BCRS into some provinces in Indonesia was provided in Table 1.

Table 1. The productive performance of POGASI Agrinak cattle was disseminated by BCRS into some provinces in Indonesia.

No.	Stakeholder/ Farmer group	Location	Bulls (heads)	Cows (heads)	The number of cattle disseminated (heads)	Calves born (heads)
<i>Upland</i>						
1.	Harapan Mulia	Lima Puluh Kota district, West Sumatera	1	9	10	3
2.	Margo Mulyo I	Trenggalek district, East Java	1	8	9	2
Total						5
<i>Lowland:</i>						
1.	PT Cahaya Abadi Petani (CAP)	Tanah Laut district, South Kalimantan	10	0	10	35

2.	Singomulyo	Situbondo district, East Java	25	0	25	126
3.	Politeknik Negeri Jember	Jember district, East Java	1	6	7	5
4.	Rimba Raya	Indramayu district, West Java	1	6	7	2
Total						168

The results showed that the number of calves born in the lowland was 168 heads, five calves were born in Jember, two calves were born in Indramayu, 126 calves were born in Situbondo and 35 calves were born in Tanah Laut. Meanwhile, the number of calves born in upland were five in Trenggalek and only three calves were born in Lima Puluh Kota. More calves were born in the lowland than in the upland. This is because BCRS disseminated bulls in Situbondo and Tanah Laut, therefore, the bulls mated the existing cows in the herd of population. In contrast to our finding, a study reported that in Jambi province, the reproductive performance of Ongole crossbred cattle in the upland was better than those kept in the lowland [12].

3.3. The birth weight of the calves

The average birth weight of POGASI Agrinak calves born in some Indonesian provinces was provided in Table 2.

Table 2. The average birth weight of POGASI Agrinak calves born in some Indonesian provinces.

No.	Stakeholder/Farmer Groups	Location	The average birth weight (kg)
<i>Upland:</i>			
1.	Harapan Mulia	Lima Puluh Kota district, West Sumatera	26.7 ± 1.5
2.	Margo Mulyo I	Trenggalek district, East Java	24.5 ± 0.7
Average			25.8 ± 1.6
<i>Lowland:</i>			
1.	PT Cahaya Abadi Petani (CAP)	Tanah Laut district, South Kalimantan	25.8 ± 1.4
2.	Singomulyo	Situbondo district, East Java	25.4 ± 2.2
3.	Politeknik Negeri Jember	Jember district, East Java	25.6 ± 2.3
4.	Rimba Raya	Indramayu district, West Java	24.5 ± 0.7
Average			25.2 ± 2.4

The birth weights of POGASI Agrinak calves in the upland and lowland were 25.8 ± 1.6 kg and 25.2 ± 2.4 kg, the different elevations did not result in different birth weights. A study reported that the body sizes of Ongole crossbred cattle were not different between three elevations, upland, midland, and lowland [13]. Our findings were in line with this report. While the birth weight of calves born at BCRS was 25.3 ± 25 kg.

4. Conclusion

To conclude, the birth weight of calves born in BCRS and *ex-situ*'s farm was not different, therefore the different elevation levels did not affect the birth weight of POGASI Agrinak calves.

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