Female Bali Cattle performance in field station of Sekolah Peternakan Rakyat (SPR), Sungai Lilin District, Musi Banyuasin Regency

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Abstract. Bali cattle conventionally kept in field station of *Sekolah Peternakan Rakyat*, IPB University (SL-SPR-IPB) has been consolidated well, although all cattle have not physically not yet been lovated in a communal stall. This study was conducted to design a baseline performance of female Bali cattle as the main component at the cattle breeding production system in the SL-SPR-IPB. Ninety seven female Bali cattle owned by 45 animal farmers from three villages including Cinta Damai, Bukit Jaya, and Berlian Makmur Villages in Sungai Lilin District were measured and recorded based on their production and reproduction perfomances. Survey and observation were done on January, 2019. Data were analyzed using statistical and descriptive methods. The data were obtained from determined parameters including: cattle origin, ownership status, management system, system of matting, age average, calf total average, calf sex ratio, and body condition score (BCS). The results indicated that 55% of female Bali cattle maintained was originated from the outside of SL-SPR, while the others were from the inside; 88% were fully owned, while others were partial ownership; 52% were maintained intensively, while others were extensively or semi-extensive; and 51% mated with artificial insemination, while others were natural fertilization. 23% of female cattle kept by farmers was five years old in age average, with 36% of the female has one calf in average. The calf sex ratio between male and female was 49%:51%. 48% female has BCS of 3 (max scalae of 5). Results obtained were part of a comprehensively ultimate goal to start establishing a collective breeding cattle industry in the village to increase the livestock population and genetic quality.

1. Introduction

More than 90% of the cattle population in Indonesia is still dominately owned by small farmers. The tendency of small farmers to have cattle is as savings and raising farming activities as a pet, causing management of cattle farming is conducted in a minimum way with less attention. This results poor performance of the farm. Efforts to increase farm productivity can be done through improving the performance of female cattle as calf producers. Female cattle with good performance is expected to produce good offspring as well. Bali cattles are one of the cattle breedstocks that are mostly maintained by small farmers because they have good adaptive power, and are able to utilize low-quality feed. Purwantara *et al*. (2012) stated that Bali cattle are the most cattles kept in small farms because of their high fertility and low mortality.

Sekolah Peternakan Rakyat Institut Pertanian Bogor (SPR-IPB) is a concept initiated and implemented firstly by Prof. Dr. Ir Muladno MSA in 2013. Through the concept of SPR-IPB, small farmers have begun to change their mindset about the orientation of cattle and increasingly understand the science and technology provided by the campus so that the productivity of cattle farming can be increased. SPR-IPB Field Station (SL-SPR-IPB) in *Sungai Lilin* District *Musi Banyuasin* Regency is the location of the SPR-IPB declared to have passed assistance from IPB.

The SL-SPR-IPB has a large population of Bali cattle that is still very potential to be developed. Land that is mostly planted with oil palm plantation can be used optimally for integration with cattle. Based on data from the Badan Pusat Statistik (BPS, 2018), Musi Banyuasin (MUBA) is one of the regencies in South Sumatra Province which has potential natural resources and cattle population, which showed 31,834 populations spread across 14 districts in 2017.

One obstacle that often occurs in small farmers is simple recording of cattle absence which include the date of birth, age, date of sale, family tree, and the weight of cattle used as basic and reference so that productivity improvemens increases by program selection (Hakim *et al*., 2017).

This study aimed to make the baseline performance of female Bali cattle as the most important component in cattle breeding at SL-SPR-IPB.

2. Material and Methods
2.1. Material
The study was conducted at SL-SPR-IPB in Sungai Lilin Subdistrict, Musi Banyuasin Regency, South Sumatra Province. Materials used in this study were 97 Bali cattle owned by 45 farmers who lived in three villages. 65 farmers owned by farmers in Cinta Damai Village, 21 in Bukit Jaya Village, and 11 female Bali cattle in Berlian Makmur Village.

2.2. Methods
Determination of location and number of samples of female Bali cattle using purposive random sampling, there are random selection based on the largest cattle population in Sungai Lilin District. Secondary data in the form of regional potential data, as well as the total population of local cattle originating from BPS data (Badan Pusat Statistik), supporting data from the local cattle and Animal Health Service and several references related to the research topic. Primary data is obtained from the results of in-depth interviews based on questionnaires containing data on farmers and Bali cattle data obtained by direct observation. The collected data is compiled and analyzed qualitatively and quantitatively.

3. Results and Duscussion
3.1. Cattle Origin
The origin of female Bali cattle in the SL-SPR-IPB is grouped into several categories, including firstly born, purchased, or obtained from inside and outside the group.

Table 1. Origin of female Bali cattle at SL-SPR

Cattle origin	Total of female cattle	Percentage (%)
Firstly born	16	16
Purchased from other farm	53	55
Obtained from the owned farm	28	29
Total	97	100

Source: Primary data that has been processed, 2019

55% cattle from the outside of farm (Table 1) came from government assistance in 2012 to save productive female cattle. Productive female cattles found at the local slaughterhouse were collected and distributed to small farmers who belonged to cattle groups. At that time the majority of farmers did not know the prohibition on slaughtering productive females, as the policy related to the prohibition of

slaughtering productive females was regulated in UU No.41/2014 of national policies about animal health science on 18 ayat (4) and l 86 about sanctions for violators. Government assistance in the form of female Bali cattle has variety of ages and conditions, both virgin, pregnant and female cattle that are old.

The second rank of female Bali cattle are form the within group with a percentage of 29%. This shows that with the formation of SL-SPR, it is easy for farmers to trade their cattle in one group. The mother who has been born since has a percentage of at least 16%. This is because the female Bali cattle who have been born since are generally young cattle who are the calf as a result of government assistance.

3.2. Ownership status
The majority of female Bali cattles in the SL-SPR-IPB Sungai Lilin are their own (82%) and the rest belong to the group and provit sharing (gaduhan) as shown in Table 2.

Table 2. Ownership status of female Bali cattle in SL-SPR Sungai Lilin.

Ownership status	Total of female cattle	Percentage (%)
Personal	85	88
Provit sharing	1	1
Belongs to the group	11	11
Total	97	100

Source: Primary data that has been processed, 2019

Farmers who are mostly transmigrants also make a living as farmers in general. They still make their cattle as savings so that each family has an cattle, especially the female cattle that function to produce calves. This is in accordance with Roessali's (2004) statement, which states that small-scale farmers in raising cattle are still on tend to keep the numbers constant from year to year based on the number of family members.

Provit sharing system in SL-SPR Sungai Lilin begins with an agreement between the two parties, from cattle farm owners and farmer on the basis of mutual trust. There is no proportion of profit sharing in the row system applied. In this profit sharing system, the farmer maintains a prospective female cattle from the owner to produce a calf. Then, the calf were divided into two, each for the farmer and owner, while the female cattle that produces the calf remains the owner's right.

The group system is carried out in each village which is maintained together in a communal stall. In this maintenance, cattle belonging to the group is managed by farmers with the division of jobs with the agreed conditions.

3.3. Total average of ownership cattle
Total average of ownership cattle in farmer is different, the classification of ownership cattle are as presented in Table 3.

Table 3. Classification of farmers based on total average of ownership cattle in SL-SPR-IPB Sungai Lilin

Total of cattle	Farmers	Percentage (%)
1-5	30	67
6-10	10	22
>10	3	11
Total	45	100

Source: Primary data that has been processed, 2019

Average of farmers who have cattles over than 10 cattle for generations and some manage their cattle by means of provit sharing (gaduhan). In the long term, through synergy with the IPB and the local cattle

service office, the proportion is reversed so that the number of farmers with a scale of ownership of more than 10 is the most.

3.4. Management system

Beef cattle farms in SL-SPR Sungai Lilin are generally in the form of breeding businesses that are still maintained with traditional systems. The management system applied is in intensive and semi-intensive systems. The intensive system is carried out by full and continuous handling of cattle with a system of feeding is cut and carry, while for semi-intensive or combined management system is carried out by grazing the cattle in the morning and evening and holding it at night.

Table 4. The management system of female Bali cattle in the SL-SPR Sungai Lilin

Management system	Total of female cattle	Percentage (%)
Intensive	50	52
Semi-intensive	47	48
Total	97	100

Source: Primary data that has been processed, 2019

As shown in Table 4, the proportion of farmers who maintain their cattle with these two system is relatively the same. The land of cattle grazing is still quite extensive in the region. management with an intensive system is more applied because the ownership status of cattle is still low, so it is enough to be strung up. As for the management of semi-intensive system, generally in a pasture that consists of many cattle belonging to several farmers who are pastured together.

Cattle caged with intensive systems are generally placed in the stall of farmer that are near from the house and also communal stall with joint ownership of several farmers. Feed that given to intensive management systems is in the form of forage grass without giving concentrate. The grass that is commonly given is *Pennisetum purpureum* grasses. These grasses are obtained by farmers based on estimates and in an unmeasured amount.

Female Bali cattle grazed on Semi-intensive systems on grazing land planted with oil palm and also in the yard beside of farmers home with forage in the form of field grass. Yamin *et al*. (2010) stated that the semi-intensive system with integration of cattle and oil palm plantation is very suitable for nursery business because it provides many advantages where the manure of cattle can be fertilized on oil palm plantations, and former cattle footing can suppress the growth of weeds around the land. Cattle can use forage around the oil palm plantations as a source of forage feed, and for its shortcomings can be supplied by utilizing palm trees and leaves, grasses and nuts that grow on the land.

3.5. Age average

The age average of female cattle can be used to determine the population structure and efficiency of cattle that are maintained so that female cattle who are old and have low reproductive performance can be immediately culled. The age data of female Bali cattle were obtained by interviewing cattle owners. The average age of female Bali cattle can be seen in Table 5.

Table 5. Age average of female Bali cattle at SL-SPR Sungai Lilin

Age average	Age (year)								Total
	3	4	5	6	7	8	9	10	
Total of female cattle	21	17	22	13	16	7	0	1	97
Percentage (%)	22	18	23	13	16	7	0	1	100

Source: Primary data that has been processed, 2019

Based on the data obtained (January 2019), the average female cattle kept 5 years old is as much as 23%, while for the oldest cattle aged 10 years as much as 1%. In general, female cattle is maintained until the age of 7 years.

3.6. Calf total average

One indicator of reproductive traits of female cattle is the ability to produce calf in one period from the lifetime. Female cattle with good reproductive traits will produce large numbers of calf with short calving interval. Female Bali cattle in SL-SPR-IPB Sungai Lilin generally start first calving at 3 years of age. The classification average of the number of calf produced by female Bali cattle can be seen in Table 6.

Table 6. Average of the number of calf that produced by female Bali cattle in SL-SPR-IPB Sungai Lilin

Classification	Calf total average						
	1	2	3	4	5	6	7
Total	34	29	17	5	6	3	1
Persentage (%)	36	31	18	5	6	3	1

Source: Primary data that has been processed, 2019

The data in (Table 6) shows that the total average of calf produced from 97 female Bali cattle is a much as one calf with a percentage of 36%, while the age of female that produced a total of seven calfs are 10 years old with a percentage of 1%. If were associated with the age of female cattles in the population, the total average of calf can be produced if the first calving of female cattle is 3 years, so will be produced 1 until 3 calves.

The absence of a record containing the date of birth and the time of cattle being sold is one of the problems in calculate the calving interval. While calving interval is very important to know because it can be used as a reproductive indicator for female cattle. Recording that inculude the age average of female cattle and total of calf born can help to predict the performance and reproductive efficiency of female cattle in small farmers.

3.7. Mating system

Average farmers in SL-SPR-IPB Sungai Lilin mated female cattles at the age of 1.5 to 2 years old. The mating system is artificial insemination and natural mating. The AI system is done by veterinarians from the local Cattle Service Office. The natural mating system usually occurs when cattle are grazed in grazing fields without supervision from farmers so that female cattles mate with any bulls cattle that are not potential stud. Data of system of mating was obtained from the total of calves that produced by 97 dams, that are 214 calves. The percentage of the Bali cattle mating system can be seen in Table 7.

Table 7. System of mating of female Bali cattle in SL-SPR-IPB Sungai Lilin

System of mating	Total of cattle	Percentage (%)
Natural	105	49
Artificial insemination	109	51
Total	214	100

Source: Primary data that has been processed, 2019

The data in Table 7 shows that the artificial insemination is more applied as much as 51%, while 49% still usesm manual system. Artificial insemination is generally used by farmers who applied the intensive management system. Especially for female Bali cattle, farmers choosing semen from male Bali cattle for artificial insemination. This is because farmers do not want to take risks whether the cattle has difficulties in giving birth. Problems often occur with the artificial insemination system are failure of insemination from inseminator caused by long distances and difficulties in access between villages.

While natural systems occur in semi-intensive or combined management systems. Natural mating systems can occur in the grazing fields or around the yard. In grazing fields, cattle belonging to farmers gather together so that natural mating system often occurs. Natural mating system that occur in the

grazing fields or in the yard are generally unknown to farmers. This shows that the management of natural mating system in Sungai Lilin SL-SPR-IPB is still uncontrolled. System of mating improvement can be done if the data pedigrees of cattles in the population has been recorded. The occurrence of natural mating between females and bulls that are not selected can lead to as inbreeding. The affects of genetic quality decline are low productivity of cattle. Depison (2010) states that the occurrence of inbreeding will result in reduced endurance, fertility and birth weight of calves.

3.8. Body Condition Score
Body Condition Score (BCS) is generally used to assess the condition of cattle by looking at the ribs that appear on the stomach. BCS can be used to evaluate feeding management and assess the health status of cattles. BCS estimation is done by observing fat deposits visually on the back of the abdomen, around the spine and hips. Budiawan *et al*. (2015) stated that BCS has a relationship with reproduction status such as fertility, pregnancy, calving easae, lactation which all affect the reproductive system. The scale of BCS is 1-5 with successive categories, which are very thin, thin, moderate, fat, and very fat (Pawere *et al*., 2012). BCS of female Bali cattle can be seen in Table 8.

Table 8. BCS values of female Bali cattle in SL-SPR-IPB Sungai Lilin

Body Condition Score	Score					Total
	1	2	3	4	5	
Total of female cattle	1	41	47	7	1	97
Percentage (%)	1	42	48	7	1	100

Source: Primary data that has been processed, 2019

The results of observation (Table 8) show that BCS of female Bali cattle conditions are quite good with BCS 2 and 3. Female cattle with fat condition is fat or fatty is not good for reproduction. This is in accordance with the research of Aditia *et al.* (2015) that the BCS average of female cattle that maintained by the integration syatem of cattle and oil palm plantation has a BCS 3 while in heifers are 2.75. BCS is strongly influenced by feed. Cattle that receive feed is sufficient to suit their needs, thus generally tend to have moderate BCS. The female cattle who has a very thin appearance (BCS 1) has less fat reserves, resulting in a low reproduction rate of cattle.

3.9. Calf sex ratio
Based on the data obtained from 97 female cattle, 214 calves were produced. The sex ratio of calf from 97 female Bali cattle can be seen in Table 9.

Table 9. Calf sex ratio results from 97 Bali cattle in the SL-SPR-IPB Sungai Lilin

Sex Ratio	Total female cattle	Percentage (%)
Male	104	49
Female	110	51
Total	214	100

Source: Primary data that has been processed, 2019

Data (Table 9) shows that the calf sex ratio is male and female 49%: 51%. Information of regarding the sex ratio of calfis very necessary to predict the structure of cattle populations in the future.

4. Conclusion
Cattle origin, ownership status, management system, mating system, average age, calf total average, calf sex ratio, and body condition score (BCS) can be a description of female Bali cattle performance conditions in SL-SPR- Sungai Lilin IPB can be used as a baseline for improving maintenance and long-term breeding program management.

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