# Bali Cattle Productivity on Maiwa Breeding Center Partnership System in Barru Regency South Sulawesi

Aulia Uswa Noor Khasanah[1], Suyadi[2], Kuswati[3]

[1]Magister Program, Faculty of Animal Science, Universitas Brawijaya, Malang 65145, Indonesia
[2]Department of Animal Production, Faculty of Animal Science, Universitas Brawijaya, Malang 65145, Indonesia
[3]Department of Animal Production, Faculty of Animal Science, Universitas Brawijaya, Malang 65145, Indonesia
Email address: auliauswanoor @ gmail.com

*Abstract*— *This study aims to examine the productivity of Balinese cattle in the Maiwa Breeding Center with partnership system by analysed the technical aspects of production and reproduction. This research was conducted in September 2019 - December 2019. The research material consisted of 301 heads of Bali cows and 55 calves from 131 MBC stakeholders. The samples were obtained by using total sampling technique with questionnaires, depth interview, observation and documentation. The data were analyzed descriptively by using data tabulation. Production performance variables were observed included population structure, birth rate, mortality rate, mutation of livestock, calf crop, statistics vital (body length, withers height, and chest girth). Performance reproduction were included Service Per Conception and Conception Rate. The structure population of male calves was 7.3%, female calves was 8.5%, cow population was 84, 55%, and calf crop value was 16,61%, calves birth was 18.21%, birth male calves to the cow was 47.27%, female calf birth to the cow was 52.72%, the calf birth value to the population was 15.44%, the value of the cow to the population was 84.55%, the value of calves death to cow was 1,6%. Vital statistics of Bali cattle are in accordance with the 2017 National Standard (SNI) 2017 was included in class II. Service Per Conception value was 1,2 and Conception rate was 16.94%.*

## I. INTRODUCTION

One type of local beef cattle that has great potential to be developed is Bali cattle. Bali cattle are the result of domestication of native Indonesian banteng which have advantages in reproductive power, adaptability and a high percentage of carcasses. The priority for ruminant livestock development will be focused outside the island of Java. Things that are taken into consideration are the availability of large areas of land and a relatively lower population density. South Sulawesi Province is one of the provinces that has the potential for natural resources that support the development of the beef cattle industry in Indonesia. Based on statistical data on Animal Husbandry and Animal Health in 2019, South Sulawesi Province occupies the third position after East Java and Central Java Provinces with the largest number of beef cattle in Indonesia. Production of beef cattle in South Sulawesi Province in 2019 amounted to 1,362,604 heads, an increase of 4% from 2018, which amounted to 1,310,194 heads (Director General of Animal Husbandry, 2019).

Maiwa *Breeding Center* (MBC) is a center for beef cattle development which was established on the basis of a cooperative relationship between the Ministry of Research and Technology, the Government of South Sulawesi, PT. Karya Anugerah Rumpin (KAR) and Hasanuddin University. MBC stands on an area of 250 hectares and become a center for the breeding of local cattle developed by the University of Hasanuddin. One of the goals of the MBC's program is to collaborate in the form of empowerment for local Stakeholders. In 2016 MBC added Barru District as part of a partner or collaboration program. The form of cooperation carried out is giving heifers to stakeholders (as partners) which are spread across several livestock groups in Barru Regency. It is hoped that this cooperation program can increase the livestock population of the breeding area and improve the welfare of partner stakeholders.

As a source area for Bali cattle breeds, Barru district plays an important role in fulfilling the supply of Bali cattle breeds, especially in the South Sulawesi region. One of the efforts made is to increase the productivity of local beef, in this case Bali cattle, and it is also beneficial for the conservation of Bali cattle through cooperation in the form of a partnership with Maiwa *Breeding Center* in Barru Regency. The form of partnerships that have been running between the Maiwa *Breeding Center* and partner stakeholders is increasing every year. Therefore, it is necessary to evaluate the performance of Bali cattle to see the productivity of Bali cattle being maintained. It is hoped that the selection quality improvement can be made to select superior seeds through the identification of Bali cattle productivity and adjusted to the National standards for Indonesian local cattle breeds.

## II. MATERIALS AND METHODS

The research location was carried out *purposively*, based on the area where Stakeholders live in partnership with the Maiwa *Breeding Center* spread over four districts, namely Tanete Riaja District, Tanete Rilau District, Balusu District and Barru District, Barru Regency, South Sulawesi Province. The research was conducted from September 2019 to December 2019.

The research material used in this study was 419 Bali cattle. The research material consisted of 301 cows, 30 steers, 32 weiners and 55 calves, and the partner Stakeholders consisted of 131 people.

This study used a survey method in the form of direct observation at the research location. The data collected are primary data and secondary data. Primary data were obtained through direct observation and measurement of livestock including vital statistical measures in the form of body length. Shoulder height, chest circumference, and body weight, as

well as interviews with respondents using a questionnaire. Secondary data were obtained from the Management of the Maiwa *Breeding Center* such as population data, stakeholders information data, reproduction *recording* data such as AI data and PKB data and calf birth data. The data were then tabulated and described descriptively.

The variables observed in this study were Bali cattle productivity based on production and reproduction aspects. Based on the production aspects, it includes structure population, birth rate, mortality rate, livestock mutation, *calf crop, Natural Increase* and vital statistics of Bali cattle body (body length, shoulder height and chest circumference). Based on the reproduction aspects, it includes *Service per Conception and Conception Rate.*

*Production Analysis*

The primary data obtained were tabulated and the percentage, average and standard deviation were calculated for further descriptive analysis. The following calculation formulas are used:

The calculation of the percentage of births and deaths according to Sonbait, et al (2011), Jaeger (2003) is as follows:

➢ Percentage of births by sex:

$$\frac{\text{Number of Birth Calves (sex)}}{\text{Number of Birth Calves}} \times 100\%$$

➢ Percentage of calf births to sample population:

$$\frac{\text{Number of Cows}}{\text{Number Of Population}} \times 100\%$$

➢ Percentage of deaths to births:

$$\frac{\text{Number of Death Cattle}}{\text{Number of Birth Cattle}} \times 100\%$$

➢ Percentage of deaths to overall sample population:

$$\frac{\text{Number of death cattle}}{\text{number of Population}} \times 100\%$$

➢ Natural Increase

Natural Increase = Births Percentage (%) – Deaths Percentage (%)

Livestock Unit (UT)

- Calves (0 - 12 months) = n x 0,25
- Young (> 12 - 24 months) = n x 0,5
- Adult (> 24 months) = n x 1

Information:

n : Number of Samples

*Reproduction Analysis*

a. *Service per conception (S/C)*

Service per Conception is a number that indicates the number of inseminations used to produce a pregnancy (Hartatik et al., 2009).

$$S/C = \frac{Number\ of\ Insemination\ to\ Get\ Pregnancy}{\text{Number of Pregnant Acceptor}}$$

b. *Conception Rate*

Conception Rate is the percentage of cows that are pregnant at the first AI from all AI's sample. (Susilawati, 2011).

$$CR = \frac{Number\ of\ Cows\ that\ Got\ Pregnant\ from\ first\ AI}{\text{Number of Acceptor}} \times 100\%$$

## III. RESULTS AND DISSCUSION

*Production Aspect*

Structure population data were obtained through direct observation and interviews with Stakeholders using a questionnaire. The population structure of the research results can be seen in Table 1.

The results of the analysis in Table 1. It shows that the sex ratio of male calves to female calves in the population structure of Bali cattle in the study is 7.3%: 8.15% or with a ratio of 1: 1.1. The population of female calves is higher than male calves. The results of this study are lower than the results of Sawo's research (2017), namely the ratio of male calves to female calves in Bali is 1: 1.8, the number of female calves is higher than male calves. The structure population at the Maiwa *Breeding Center* in Barru Regency does not use males (natural mating) as a breeder but rather uses artificial insemination technology (AI).

The total population of cows in the study was 71.83%. The total population in this study was higher than Fadli's (2020) study, which was only 42.21% followed by Tanari's (2011) research, which was 48%. The greater the percentage of the number of cows and heifers in a population, the more likely the number of calves born each year will be in a certain period of time, where female calves will increase the number of prospective broodstock prospects later (Labatar, 2017). The percentage of adult female cattle is higher than other population structures due to the mutation of incoming and outgoing livestock. The percentage of the number of input livestock mutations is higher than the mutations of output livestock. The percentage of input cattle from the entire population was 18.82%, more than the number of livestock that left with a percentage of 5.33%. All of the incoming cattle are heifers thus to increasing of cow populations.

TABLE 1. Structure Population at Maiwa Breeding Center in Barru Regency

| No. | Group | Male | | | Female | | | Total | | |
|-----|-------|------|-----|-----|------|-----|-----|------|-----|-----|
| | | Head | UT | % | Head | UT | % | Head | UT | % |
| 1. | Calves (0-12 months) | 26 | 6.5 | 7.3 | 29 | 7.25 | 8.15 | 55 | 13.75 | 1 3 , 13 |
| 3. | Young (12-24 months) | 32 | 16 | 7.64 | 30 | 15 | 7,16 | 62 | 31 | 14.80 |
| 2. | Adult (> 24 months) | 0 | 0 | 0 | 301 | 301 | 71 , 83 | 301 | 301 | 71.83 |
| | Total | 58 | 22.5 | 14.94 | 360 | 323.25 | 87.14 | 419 | 3 45 , 75 | 100 |

Some indicators to success of cattle production activity are the value of the *calf crop,* birth and mortality rates. *Calf crop* data is obtained through direct observation. *The calf crop of* the research results can be seen in Table 2.

The *calf crop value* in the Maiwa *Breeding Center* Barru

Regency is 16.61%. The *calf crop value* in this study is lower than the results of Rauf's (2015) research, namely the average *calf crop value of* Bali cattle in Bombana Regency is 59.64%. The number of cows in this study was quite high with a percentage of 71.83%. The high number of cows is due to the

mutation of all incoming cattle which are cows, thus increasing the population of existing cows at the research location. The factors that can cause a lower *calf crop* value are influenced by the maintenance management of calves from birth to weaning. Habaora (2018) states that in an effort to increase the *calf crop of* cattle, Stakeholders must be precise in paying attention to the time and duration of heat and the accuracy of mating time.

TABLE 2. Bali cattle calf *crop* at the Maiwa *Breeding Center* Partnership in Barru Regency

| No. | Information | | Percentage (%) |
|---|---|---|---|
| 1. | Calf weaning to cow (*Calf crop*) | | 16.61 |
| 2. | Calves delivery to the mother | | 18.27 |
| | a. | Male | 47.27 |
| | b. | Female | 52.72 |
| 3. | Calf births to population | | 15.44 |
| 4. | Cow to population | | 71.83 |
| 5. | Calf's Death | | 1.66 |
| 6. | *Natural Increase* | | 7.96 |

The value of calf mortality to cow of the study was 1.66%. This value is lower than Rauf's research (2015) which states that the average mortality rate of cows was 8.14% in Bombana Regency, North Sulawesi. Thalib (2002) also reported that the adult livestock mortality rate in South Sulawesi and Bali was 3%. The cause of death of adult livestock at the study location was caused by the presence of Distocia, mallnutrition, Brucellosis to poisoning, which caused sudden death.

The value of calf births to the population results obtained a value of 15.44% lower than the results of Rauf's research, (2015) which was 33.99%. While the rate of child birth to cows obtained from this study was 18.27%, this value is lower than the study of Lucas *et al.* (2012) namely 53.12%. According to Brown (2013), to increase the percentage of *calf crop* is to carry out management checks that affect reproductive efficiency (*postpartum, partum*. breeding, and during development).

The components for calculating the *Natural Increase* of Bali cattle are shown in Table 2. From Table 2, it shows that with 71.83 percent of cows available, the calf births were obtained for the population of 13.21%, but the number of deaths reached 5.25. % then the *Natural Increase* value in the research area is 7.96 percent. The *natural increase* in Bali's cattle population can produce a calf harvest of 16.61%.

*Natural Increase value* is lower than the *Natural Increase* value than study of Putra et al. (2015) which was 29.46%, Susanti et al. (2015) amounted to 24.39%. The value of *Natural Increase* in this study is low caused by the low birth rate compared to the number of existing cows. This is in accordance with the opinion of Budiarto (2013), which states that the *Natural Increase* value will be more meaningful if a high birth rate is balanced with a low mortality rate, and the calculation is carried out every year.

*Reproductions Analysis*

*Service per conception* observed in the Maiwa *Breeding Center* partnership in Barru Regency is shown in Table 3. The average *S / C* value of Bali cattle is shown in Table 3.

The results showed that the average Service per

Conception of Bali cattle at the research location was 1.2 times. The results obtained are the same as the provisions of the 2017 Indonesian National Standard, namely 1.2 times. According to Zainuddin, Ihsan and Suyadi (2015), stated that low production is influenced by age because it is related to the physiological status of the livestock. The increasing age of the parent along with the increase in ovulation rate which causes productivity to reach optimal and will gradually decrease as the livestock age. Based on observations obtained high S / C at the study are affected by low levels of partner stakeholders Education. Low education causes stakeholders to be less willing to accept the latest innovations and information. Low education causes stakeholders to be less willing to accept the latest innovations and information.

TABLE 3. Value of Service per Conception (S / C) and Conception Rate of Bali cattle in the Maiwa *Breeding Center* Partnership System in Barru Regency

| Parameter | Total |
|---|---|
| AI's services | 93 |
| Pregnant acceptors | 72 |
| Service Per Conception | 1,2 |
| Pregnant Cows at First AI | 51 |
| Number of acceptors | 301 |
| *Conception Rate* (%) | 16.94 |

The knowledge that has been obtained from generation to generation is not in accordance with the conditions in the field and sometimes many people wrongly apply the way of raising cattle, so that the results are not optimal, the knowledge that is obtained from generation to generation is usually obtained by Stakeholders from their families who have already raising beef cattle (Haryanto, 2015).

The results of the research data obtained shown that the percentage of the *Conception Rate* value was 16.95%. The conception rate obtained in this study is much lower than the standard set by the Director General of Animal Husbandry (2010), which is 62.5%. Based on observations, because of the poor level of stakeholders knowledge about reproductive management and introduction of reproductive disorders in cattle. A good CR value for cattle is between 60-70% and it is understandable that the CR value for cattle in Indonesia is due to natural conditions, management and distribution of livestock that are already considered good if the CR value is 45-50% ( Fanani et al. 2013 ; Riwukore 2018). The S / C value also affects low CR value of Bali cattle in this study. The average S / C value obtained at the research location was 1.2 times. This is in accordance with the opinion of Febrianthoro (2010), which states that the higher the S / C value can reduce the value of the *Conception Rate* in Bali Cows.

## IV. CONCLUSION

The population structure in the Maiwa *Breeding Center* partnership is 85.55% cows. The *calf crop value* is 16.61%. The production performance of Bali PI4 vital statistics based on the Indonesian National Standard (SNI-2017), class I 28.0%, class II 36.8%, class III 20.7% and not including class 14.5%. The value of Natural Increase in this study is 7,96 percent and is included in the low category. The productivity of Bali cattle viewed from the reproductive aspect includes the

average value of *Service per Conception which* is 1.2 times higher than the 2017 Indonesian National Standard. The value for the *conception rate* aspect is 16.94% lower than the standard.

### REFERENCES

[1] Anonim[b]. 2015. Pedoman Pelaksanaan Pewilayahan Sumber Bibit. Direktorat Perbibitan Ternak. Direktorat Jenderal Peternakan dan Kesehatan Hewan. Kementrian Pertanian. Jakarta. Diakses pada tanggal 4 Oktober 2019.

[2] Bahonar, A.R., M. Azizzadeh, M.A. Stevenson, and M. Vojgani. 2009. Factors Affecting Days Open In Holstein Dairy Cattle in Khorasan Razavi Province, Iran; A Cox Proportional Hazard Model. J. Ani. and Vet. Adv. 8:747-754

[3] Brown. T. D. 2013. How To Improve Your Percent Calf Crop. UGA Extension. University of Georgia Cooperative Extension Circular 672. BSN. 2017. Bibit Sapi Potong: Rumpun Bali, SNI 7651-4:2017. Badan Standar Nasional. Jakarta.

[4] Fahrul, A.H Hoddi, M.B Rombe. 2011. Analisis Pendapatan Peternakan Sapi Potong di Kecamatan Tanete Rilau Kabupaten Barru. Jurnal Agribisnis. 10(3) September 2011.

[5] Fanani S., Subagyo dan Lutojo. 2013. Kinerja Reproduksi Sapi Perah Peranakan Frisien Holstein (PFH) di Kecamata Pudak, Kabupaen Ponorogo. Tropical Animal Husbandry. 2 (1): 21-27.

[6] Febrianthoroa. F., Hartono. M., Suharyati. S. 2015. Faktor-faktor yang mempengaruhi Conception Rate pada sapi Bai di Kabupaten Piringsewu. Jurnal Ilmiah Peternakan Terpadu. 3(4): 239-244

[7] Habaora. F., Fuah. A. M., Abdullah. L., Priyanto. R. Yani. A., Purwanto. B. P. 2019. Performans Reproduksi Sapi Bali Berbasis Agroekosistem Di Pulau Timor. J. Ternak Tropika Vol 20 (2) : 141-156

[8] Hartatik, T., D. A., Mahardika, T.S.M. Widi dan E. Baliarti. 2009. Karakteristik dan kinerja induk sapi silangan limousin-madura dan madura di Kabupaten Sumenep dan Pamekasan. Buletin Peternakan. 33(3): 143-147.

[9] Haryanto. D., Hartono. M., Suharyati. S. 2015. Beberapa Faktor yang Mempengaruhi *Service Per Conception* Pada Sapi Bali di Kabupaten Piringsewu. Jurnal Ilmiah Peternakan Terpadu. 3(3): 145-150

[10] Jaeger J. R., G. J. Pirelli and D. W. Weber. 2003. Beef Cow-Calf Management Guide. Oregon State University Extension Service. Page 1 – 2.

[11] Putra, D. E., Sumadi, dan T. Hartatik. 2015. Estimasi Output Sapi Potong di Kabupaten Pesisir Selatan Provinsi Sumatera Barat. Jurnal Peternakan Indonesia 17(2):105-115.

[12] Sonbait, L. Y., K. A. Santosa dan Panjono. 2011. Evaluasi Program Pengembangan Sapi Potong Gaduhan Melalui Kelompok Lembaga Mandiri yang Mengakar di Masyarakat di Kabupaten Manokwari Papua Barat. Buletin Peternakan. 35 (3): 208 – 217.

[13] Susanti, A. E., N. Ngadiyono, dan Sumadi. 2015. Estimasi output sapi potong di Kabupaten Banyasin Provinsi Sumatera Selatan. Jurnal Peternakan Sriwijaya. 17-28

[14] Susilawati, T. 2011. Tingkat keberhasilan inseminasi buatan dengan kualitas dan deposisi semen yang berbeda pada sapi Peranakan Ongole. Jurnal Ternak Tropika. 12 (2): 15-24.

[15] Tanari, M., Y. Duma., Y. Rusiyantono, dan M. Mangun. 2011. Dinamika populasi sapi potong di Kecamatan Pamoa Utara Kabupaten Poso. J. Agrisains 12 (1):24- 29.

[16] Zainudin, M., Ihsan, M. N., & Suyadi, S. (2014). Efisiensi reproduksi sapi perah pada berbagai umur di CV. Milkindo Berka Abadi Desa Tegalsari Kecamatan Kepanjen Kabupaten Malang. Jurnal Ilmu-Ilmu Peternakan, 24(3), 32–37