

Population Structure and Production of Madura Cattle n Lenteng Subdistrict, Sumenep District, East Java Province

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Abstract. The objective of this research was to examine the population structure and production of Madura cows. Indonesian local Madura cows are originally from Madura island. Its development is constantly improved to sustain the existence and production of Madura cows as the main contributor to beef. The research was conducted in Lenteng sub-district, Sumenep district, East Java province from August to September 2023. The research method used was the survey method and sampling was done by accidental sampling. Madura cows data used were 263 heads. Data analysis using descriptive. The results showed that the population structure of Madura cows was 9.89% male calves and 13.69% females, 7.22% young males and 28.52% females, 0% bull and 41% cows. The number of cows to the population was 40.68%, the number of births to the population was 13.69%, the number of mortalities to the population was 2.28%, the Natural Increase was 11.41% with Calf Crop was 29.51%. The results indicated that the production of Madura cows is still low. It is suggested to procure selected males for artificial insemination or natural mating. Based on the population structure there is a rarity of males.

1 Introduction

Based on the purpose of Madura cattle breeding, it is differentiated into meat production, cultural tourism, and as a symbol of prestige (Sonok and Kerap) for breeders. Data from the Animal Husbandry Office of East Java Province at the opening of the Madura Cattle Festival 2023 showed that Madura cattle total 1,157,536 heads (22.83%) of the East Java cattle population and 6.79% of the national population. The release of Madura cattle from East Java in 2023 was 24,180 head (2.09%). Herviyanto, Kuswati, and Ciptadi, [1] madura cattle have characteristics including rice yellow, brick red to red-brown body color, small to medium body posture, short toenails, and black muzzle. The superiority of Madura cattle is that they are resistant to hot climates, can live with limited feed conditions, are resistant to parasite attacks, and have good meat quality.

Madura cattle already have the standards and quality requirements for breeding assessment in Indonesian National Standard 7651-2:2023. Madura cattle development needs

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to be improved to keep up with the increasing demand for meat. Improving the quality of the calf is essential to supply feeder cattle, control the outcome, and prepare replacement cattle for breeding areas. This can be identified by technical parameters that affect parent production are population structure, natural increase, and calf crop of Madura cattle. According to Duila, Souhoka, and Lebtubun [2], population structure needs to be known as a parameter in regulating the mating system, maintenance management, and population size in smallholder farms, it can also be known how many cows and productive heifers with the ratio between cows and heifers to males.

The efforts to overcome breeding problems include knowing the population structure, calf crop, and natural increase as the indicators of cow reproductive performance. The reproductive performance of the cows is one of the important factors that need to be known in supporting the efficiency of the breeding program. Suboptimal reproductive management, long lambing distances, and relatively high calf mortality are factors that influence the low value of calf crops. Information on natural increase and calf crops is very important to determine the reserve of replacement cattle and the rest that can be released without disturbing the population. Calf crop numbers can increase births and reduce calf mortality.

2 Materials and Method

2.1 Experimental Design

The research material was 263 heads of Madura cattle at a breeding location in Lenteng District, Sumenep Regency. The research method used was a survey method. Location determination is based on purposive sampling with an accidental sampling technique [3]. Data analysis using descriptive analysis to describe the population structure (calves, young and adult) and technical parameters of Natural Increase (Percentage of birth and mortality) and Calf crop with the formula [4]:

$$\text{Percentage of births to population: } \frac{\text{Number of calves birth rate}}{\text{Population number}} \times 100\% \quad (1)$$

$$\text{Percentage of mortality to population: } \frac{\text{Number of cattle mortalities}}{\text{Population number}} \times 100\% \quad (2)$$

$$\text{Calf Crop: } \frac{\text{Number of calves births} - \text{number of cattle mortalities}}{\text{Number of cows} + \text{number of mortality of cows} + \text{number of cows out}} \times 100\% \quad (3)$$

$$\text{Natural Increase: birt percentage} - \text{mortality percentage} \quad (4)$$

3 Results and Discussion

3.1 General Description of Farmers

Sumenep district is one of the areas with the highest beef cattle population in East Java. Geographically, Sumenep district is located between 113° 32' - 116° 16' East longitude and 4° 55' - 7° 24' South latitude. According to data from the Central Bureau of Statistics (2023), the beef cattle population in Sumenep district is 388,090 heads. Farmers mostly raise livestock in a traditional way. Livestock breeding was influenced by several aspects, including farmer age, education, and breeding experience. Farmer identity data can be seen in Table 1.

Table 1. Identity of Madura Cattle Breeders

No	Description	Average
1	Farmers' age (years)	53.84 ± 11.77
2	Length of Farming (years) (%) < 1 year 5-10 years >10 years	18.33 ± 9.45 0.86 25.86 72.28
3	Education (%) Not graduated from elementary school Elementary School Junior High School High School Bachelor's degree	13.79 74.14 7.76 2.59 1.72
4	Livestock Ownership (Heads)	2.27 ± 0.48

Number of respondents: 263 breeders.

Based on Table 1, the average age of breeders was 53.84 ± 11.77 years. The highest average length of breeding experience was above 10 years (72.28%). Breeder education was still considered to be low with the highest percentage of elementary school education (74.13%). Census data from the Directorate General of Husbandry and Animal Health in 2012-2016 stated that the highest level of education in the livestock subsector is elementary school graduates. The average cattle ownership was 2.27 ± 0.48 heads. The low level of education and low average livestock ownership were due to the fact that the livestock sector in Indonesia still functions as savings and is sold when needed, not yet commercial livestock. Long farming experience was the basic resource for business development. Education and appropriate technology education need to be improved to broaden breeders' mindsets. Livestock must be used as a business in addition to the socio-culture of Madura cattle that has been embedded in the community.

3.2 Population Structure and Livestock Productivity

The research data used 263 Madura cattle with the structure of the livestock population can be seen in Table 2.

Table 2. Population structure of Madura cattle at the smallholder farming scale.

Status	Male		Female		Total	
	Quantity	%	Quantity	%	Quantity	%
Calf	26	9,89%	36	13,69%	62	23,57%
Young	19	7,22%	75	28,52%	94	35,74%
Adults	0	0,00%	107	40,68%	107	40,68%
Total	45	17,11%	218	82,89%	263	100%

Based on Table 2, the number of young bulls were 7.22% and heifers were 28.52%, indicating that the ratio of heifers was greater than young bulls, as a result of the sale of male calves by farmers to meet their needs. Farmers retain heifers as replacements for discarded cows. The number of bulls was not obtained. In the research location, there was a rarity of bulls and Madura cattle straw was difficult to obtain as a result of a shortage of replacement males that have been used. It is necessary to collect superior bulls in other livestock breeding to be used for natural mating while waiting for Madura cattle straw, so that cows in heat can be mated. In addition, in general, breeders sell young bulls at higher prices to meet their

needs, which will affect the percentage of bulls in the population structure. According to Kutsiyah et al [5], the maintenance of young bulls is prepared as replacement stock for breeding bulls that can later be used as breeding bulls. The percentage of cows was 40.68%, farmers kept the basic population of cows for calf-producing breeding. The population structure of 40.68% cows when compared to the national was 56.76% and the regional was 57.09 lower [6]. It was necessary to replace unproductive cows and improve the nutrition of existing cows.

The percentage of births and mortality from the Madura cattle population in the breeding area is a factor that affects calf crops and Natural Increase. The results of calf crop percentage and Natural Increase are presented in Table 3.

Table 3. Technical parameters of Madura cattle.

No	Description	Result (%)
1	Number of male calf births	55,56
2	Number of female calf births	44,44
3	Number of births to population	13,69
4	Number of cows to population	40,68
5	Number of cattle mortalities to population	2,28
6	Calf crop	29,51
7	Natural increase	11,41

The percentage of Madura cattle births to the population was 13.69% with a composition of 55.56% males and 44.44% females. The natural increase value was calculated based on the percentage of births minus the percentage of deaths to the population at a certain period of time. Natural Increase data of Madura cattle are listed in Table 3. The Natural Increase value obtained was 11.41%. The high and low of Natural Increase depends on the availability of cows, birth, and mortality rate of a population. The value of Natural Increase will be more significant if the high birth rate is balanced with the low mortality rate per year. The value of Natural Increase will be high if there is no calf mortality and all cows give birth. The high value of Natural Increase was influenced by the absence of calf mortality. According to Widyaningrum, Budisatria, and Maharani [4], the value of natural increase is caused by mortality and the number of cows in the population. An increase in natural increase will be obtained if all cows in a population can give birth without experiencing death. Data from the Directorate General of Animal Husbandry and Animal Health [6] stated that nationally in 2017 the percentage of births is 21.51% and the percentage of deaths is 2.74%, resulting in a Natural Increase of 18.97%. At the East Java regional level, the percentage of births was 19.56% and deaths were 0.59%, resulting in a Natural Increase of 18.97%. Based on these data, the Natural Increase value of Madura cattle was lower than the National and regional. Increasing Natural Increase can be done by replacing old cows and procuring superior bulls for natural mating and frozen semen straw must be available at all times along with improved feed to improve Body Condition Score.

The percentage of calf crop is the number of calves weaned compared to the number of cows during one breeding season multiplied by one hundred percent. Based on Table 2, it showed that the calf crop of 29.51% was low because the average national calf crop value was 50-60% [7] and 45.48%. Baliarti, Budisatria, Atmoko, and Maulana [8] stated that calf production factors are influenced by calving interval, calving rate, and calf mortality. A short calving interval and low mortality rate affect the high productivity of calves. Shah, Sethi, Kumar, Mohanty, Dewry, Sarkar, and Bhakat [9] one of the factors that cause low calf crop value is calf mortality caused by mothers experiencing dystocia. Cows that experience

dystocia have a lower breeding rate than cows that can give birth normally and without assistance. According to Habaora, Fuah, Abdullah, Priyanto, Yani, and Purwanto [10], the difference in calf crop value is influenced by the time and length of lambing in female cows. The value of calf crop was influenced by the number of births, the percentage of cows that gave birth to the total population, and the percentage of calf mortality.

4 Conclusion

The results showed that the production of Madura cows is still low, with the dominance of the percentage of cows at 40.68%, Natural Increase at 11.41, and Calf crop at 29.51%. It is suggested to increase the pregnancy rate by procuring males for natural mating and artificial insemination and improving nutrition to increase Body Condition Score.

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