Distribution and density of Bali Cattle in South Sulawesi Province

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Abstract. The purpose of research was making a map of zoning tem tamper with the distribution and density of the population of Bali cattle in the province of South Sulawesi. This research was conducted in the district; Barru, Bone and Enrekang where the district was the center of the development of pure Bali cattle breeds. Method of sampling was the multi stage sampling method. Data were analyzed descriptively which included analysis of the distribution and density by using ArchGIS. The distribution and density of Bali cattle followed the spread and density of population following the spread of humans who inhabit a region.

1. Introduction

Central Statistics Agency [1] that the results of PSPK marketing, beef cattle population reached 14.8 million head. South Sulawesi is the third populous of beef cattle in Indonesia with total population 983 985 head (984 thousand head) or 6.65 percent of the total population of beef cattle in Indonesia, after East Java as many as 4.7 million head (31.93 percent) and Middle Java as many as 1.9 million head (13.09 percent).

Building program improvement for beef cattle / meat requires a study of the density and spread of the population of Bali cattle that in South Sulawesi. Documentation characteristics of the system of livestock production together with the achievements of productivity in each region is very helpful in determining the strategy of development in the countryside [2].

Bali Cattle (Bosssondaicus) is one of the types of beef cattle were favored and thrive in widely in the Province of South Sulawesi. Bali cattle has advantages as cattle work, power production high hold and flourish in conditions of environment that is less supportive, resistant ticks, high percentage of carcass, low levels of fat, capital for the community, and high economic value. Breeders consider that this Bali cattle as a savings that can be cashed when needed.

Although the age of the cattle is ready to be sell, but farmers still defend it as not requiring the cost of lead that effort the cattle become not efficient. Conditions have an effect on the population of livestock Bali cattle, growth becomes more sluggish, aggravated further by the high numbers expenditures cattle and cutting female productive so that the population of beef cattle South Sulawesi become not balanced. As illustrated in Table 1.
2. Materials and methods

2.1 Research time and location

The research was done in July–August 2019 in the Bone, Barru and Enrekang Districts.

2.2 Research type

The type of research was quantitative exploratory sequential, a research mix of each stage that involves the collection and analysis of data quantitatively on stage first, which was subsequently followed by the collection and analysis of data qualitatively in stage two. The main focus of the design of sequential exploratory strategies is to explore a phenomenon and also expand qualitative findings [4].
3. Results and discussion

3.1. Spread of Bali cattle in Indonesia

Bali cattle has played a role that is very special in the history of man since in domesticated for the first time. The purpose of cattle maintained for meat, milk, leather and can be used to plough the land in paddy fields, agriculture business, and transport carts. Along with the increasing human population, then an increase in the appropriate requirement, cattle engineered to provide extra meat, milk, and products of milk.

Increasing consumption of meat and dairy products requires an increase in the amount of livestock stock. The environmental impact of livestock businesses must be a concern. Livestock contributes significantly to emissions of gases house of glass, contaminate soil and water, and can reduce the diversity of biodiversity through grazing excessive "over-grazing".

Based on figure 1 regarding the distribution of Bali cattle according to their population, the national distribution of cattle occupies rank I, namely the province of East Java with 34% cattle population (beef and dairy), followed by Central Java with 14% population, then the third rank is occupied by the province of South Sulawesi with 7% of the national population. Fourth with a percentage of 6% is occupied by the province of East Nusa Tenggara, then the fifth is Bali, West Nusa Tenggara, Lampung with 5% national beef cattle population and last place is North Sumatra and DI Yogyakarta with 4% of national beef cattle population.

![National cattle population distribution](image-url)

**Figure 1.** National cattle population distribution.
3.2. Spread of Bali cattle in South Sulawesi

The distribution of Bali Cattle nationally reaches 23% of the beef cattle population, 7% of the population is in South Sulawesi which can be used for poverty alleviation in rural South Selatan. The distribution or density of Balinese cattle in South Sulawesi is illustrated in figure 3.

Figure 3 is a thematic map of Bali cattle density in South Sulawesi Province. The spread of cattle Bali is calculated based on the number of cattle in the region of a vast territory. Thematic density maps were analyzed using the ArcGis application. Districts with a level of density populations most low was in Luwu Utara and Luwu Timur districts. The density of beef cattle in Luwu Timur District was 2.21 tail/Km$^2$, in Luwu Utara district was 4.38 tail/Km$^2$. These two districts have the highest area in South Sulawesi. The population in these two regions is relatively small. The pattern of spreading of Bali cattle follows the spread of population domiciled in an area. The pattern of Bali cattle farming in South Sulawesi is based on semi-intensive to extensive maintenance.

The districts with the highest beef cattle density are in Sinjai, Takalar and Bone Regencies. Sinjai Regency has a density of 81.36 animals/Km$^2$, Takalar with a density of 68.78 animals/Km$^2$ and Bone with a density of 56.87 animals/Km$^2$. Sinjai and Takalar districts are smaller districts in South Sulawesi. However, its density and population are large so it correlates with the number of Bali cattle that are kept.
Figure 3. Map of Bali cattle density in South Sulawesi Province.

The specific policy for the development of Bali cattle is regulated through South Sulawesi Provincial Governor Regulation number 468/VIII/1976 in 1976 which established three districts as centers for the development of pure Balin cattle lines in three districts; Bone, Barru and Enrekang. For Enrekang district, three districts are excluded namely Alla, Baraka and Angeraja. At this time these three districts have become the center of national Bali cattle development in South Sulawesi. Barru Regency is the most consistent regency in developing pure Bali catte breed.

Barru Regency has a density of Bali cattle of 43.39 animals/Km$^2$ while Enrekang Regency has a density of 26.45 animals/km$^2$. The policy support and consistency of the Barru district government in developing exclusive areas for the development of pure Bali cattle lines have also become a major factor in the sustainability of Bali cattle so that germplasm is maintained as a national treasure. One of the reasons for maintaining the purity of Bali cattle as a germplasm is to prevent cross breeds from breeding that can cause the pure breeds of Bali cattle to become extinct. This was stated by [5] related to Ongole cattle (PO) which stated that the population of Ongole breeds (PO)
would be extinct from the island of Java in the next 15–20 years if no thematic maps of population distribution were made.

In the study site Regency Bone and Barru, the community is very familiar and fanatical maintain Bali cattle. Each farmer-household usually raises an average of 3–4 Bali cattle. Farmers have Bali cattle because of their high adaptability, disease resistance, and reproductive period each year. [6] Bali cattle have a high adaptability to the environment and the percentage of calves can reach 80%.

3.3. Bali cattle density in Barru Regency

At the research location, the density of Bali cattle is almost evenly distributed throughout the district, in addition to following the settlement and population distribution, also following the regional topography. In addition, there are several other factors that affect the density and population of Bali cattle in other areas: slaughtering, livestock mortality, livestock exports and the high and low natural increase [5].

**Figure 4.** Map of Bali cattle density in Barru Regency.

The density of Bali cattle populations in the study area is presented in a thematic map (Illustration 4). The highest density of Bali cattle is in the Tanete Rilau District, which is 75.84 head/Km². Soppeng Riaja is the second highest position with a population density of 56.92 individuals/Km². Specifically for
4. Conclusion

The distribution and density of Bali cattle follow the spread and density of population following the spread of humans who inhabit a region.

References

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Tanete Riaja, the population density is 56.06/Km², this puts Tanete Riaja sub-district in the third position in the population density of Bali cattle. The density of Bali cattle population between Soppeng Riaja and Tanete Riaja is very little, the thing that distinguishes this is that the area of Tanete Riaja is greater compared to Soppeng Riaja. Sambasiviah et al [7] stated that density is the number of individuals (a species) per unit or volume.