



(RESEARCH ARTICLE)



Analysis of regional potential and carrying capacity of food crop waste feed and beef cattle development in boalemo regency

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Abstract

This study aims to determine the production and carrying capacity of livestock feed derived from agricultural plant waste in supporting beef cattle development in Boalemo Regency. The research was conducted in Boalemo Regency by selecting three (3) sub-districts. The selection of these locations was based on the number of cattle population and the area of rice fields and plantations. Primary data was obtained directly in the field by conducting direct interviews with beef cattle farmers and local government officials, as well as conducting field surveys. The sample represents the population characteristics and meets the sampling technique requirements. The determination of the area or sub-district was carried out by grouping the level of cattle population with the area of rice fields and plantations. Data collection techniques were conducted through interviews and observations. The research found that the implementation of an integrated crop-livestock system has a multiplier effect for livestock, farmers, and the environment, including providing adequate feed for livestock from agricultural waste, facilitating farmers in providing feed, increasing farmer income from agricultural and plantation waste, which was previously considered economically less valuable, and preventing environmental pollution and damage due to the burning of agricultural waste. This research is expected to facilitate the acquisition of information about the production and carrying capacity of agricultural plant waste feed sources in Boalemo Regency, as well as providing information on the accessibility of agricultural plant waste feed resources in Boalemo Regency.

Keywords: Analysis; Regional Potential; Feed Carrying Capacity Feed; Food Crop Waste; Beef Cattle

1. Introduction

Boalemo Regency is a regency where the majority or most of the population works in the agricultural sector. Generally, they depend on agricultural land for their livelihood. Agricultural land, as a place for farmers to carry out activities, continues to shrink. This situation is caused by the increasing population while the agricultural land does not increase. The population grows daily, and development continues to be intensified. As a result, the ability of agricultural land to meet the food needs of the population is decreasing.

The availability of sufficient green feed derived from agricultural plant waste will greatly influence the continuation or development of beef cattle farming. One of the problems faced in beef cattle farming is the decreasing area of land that is commonly used for grazing or as a source or producer of livestock feed. Thus, the provision of livestock feed often experiences fluctuations.

Regional development planning, especially for the livestock sector in Boalemo Regency, needs to be in line with the region's needs; therefore, an analysis of the potential of agricultural plant waste feed resources based on an information system is required. This is one of the steps to support planning for the development of livestock farming. However, to

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achieve this, an information system technology is needed that can present the potential of agricultural plant waste feed sources both in data form and in visual form (maps).

2. Method

2.1. Location and Time of Research

The research was conducted in Boalemo Regency by selecting three (3) sub-districts, namely Wonosari, Dulupi, and Mananggu sub-districts. The location selection was based on the cattle population and the area of rice fields and plantations. The research period lasted approximately two months, from January to February 2024.

2.2. Data Sources

The data in this research comes from primary and secondary data. Primary data is obtained directly in the field by conducting direct interviews with beef cattle farmers and local government officials, as well as conducting field surveys. Secondary data is obtained from related agencies or departments (Boalemo District Livestock and Animal Health Service, Boalemo District Agriculture and Horticulture Service, Agricultural Extension and Food Security Agency, and Central Bureau of Statistics). Other supporting data related to this research is obtained from study reports or reviews and various other literature sources.

2.3. Population and Sample

2.3.1. Sample Location Determination

The determination of the area or sub-district was carried out by grouping the level of cattle population with the area of rice fields and plantations.

2.3.2. Respondent Determination

The number of respondents in each sample location is determined using the Slovin formula [1] as follows:

$$N = \frac{n}{1 + n(e)^2}$$

Where

- N = Sample Size;
- N = Population Size;
- e = Margin of Error (10%).

2.4. Data Collection Method

2.4.1. Data collection techniques are carried out by

- Structured Interview Technique, using a questionnaire filled out by respondents and/or conducted through direct question and answer sessions.
- Observation Technique, collecting data by directly observing the location to objectively understand the field conditions.

2.5. Data Analysis

2.5.1. Regional Potential Analysis

The regional potential analysis uses secondary data obtained from related agencies, including statistical data on the general overview of the region and the potential land in Boalemo Regency.

2.5.2. Agricultural Plant Waste Utilization Level

To determine the level of utilization of agricultural plant waste, surveys and direct interviews with farmers in selected areas or locations are conducted using prepared questionnaires. The farmers interviewed are beef cattle farmers randomly selected from the four selected sub-districts based on the grouping of cattle population levels with the area of rice fields and plantations. The measured parameter is the number of farmers utilizing agricultural plant waste as feed for beef cattle.

2.6. Identification of Agricultural Plant Waste Potential

2.6.1. Analysis of Agricultural Plant Waste Production

The calculation of each agricultural plant waste production is done based on the formula by [2] as follows: Total Fresh Production = Fresh Production (tons/ha) x Harvested Area (ha) Total Dry Production = Dry Production (tons/ha) x Harvested Area (ha) Total DM Production = DM Production (tons/ha) x Harvested Area (ha)

2.6.2. Carrying Capacity of Agricultural Plant Waste

To calculate the carrying capacity of agricultural plant waste (DDLTP), some assumptions about livestock feed needs are used. The assumption is that one livestock unit (1 LU) of beef cattle requires an average of 6.25 kg/day of dry matter (DM) (NRC, 1984), and DDLTP is calculated according to [2] as follows: DDLTP based on DM = DM Production (tons/year) / DM Requirement of 1 LU (tons/year)

2.6.3. Capacity for Increasing Beef Cattle Population

The capacity for increasing beef cattle population (KPPTS) is calculated as the difference between the carrying capacity of agricultural plant waste feed and the existing cattle population [2].

2.6.4. Agricultural Plant Waste Carrying Capacity Index

$$\text{IDDLTP} = \frac{\text{The carrying capacity index is calculated based on dry matter using the following equation [3]:}}{\text{Number of Ruminant Population (ST) x Speed.BK Adult Cows (Kg/ST)}}$$

Or

$$\text{IDDLTP} = \frac{\text{Carrying Capacity of Food Crop Waste (ST)}}{\text{Total Ruminant Population (ST)}}$$

3. Results and Discussion

The potential of a region for livestock development can be technically calculated based on the existing livestock population in the region and the potential livestock feed produced by the region [4]. According to [5], livestock development is the regional development based on superior livestock commodities, the development of farmer and livestock breeder institutions, livestock business from the livestock industry, the optimization of local natural resource utilization and security and protection, and the development of environmentally friendly appropriate technology.

Livestock development in a region generally needs to be considered from various aspects such as regional characteristics, including climate, topography, commodity type, soil and its usage trends, community conditions, capital availability, development patterns, feed availability, infrastructure, and institutions. Specifically, livestock development can be carried out through various methods such as zoning, production, seed source, system development, facilities, farmer empowerment, and livestock feed development. There are three principles of beef cattle development that must be met: (1) maintaining the balance of meat supply-demand, (2) preservation, and (3) reducing dependence on imports [6].

4. Conclusion

The high production of agricultural plant waste in Boalemo Regency is influenced by the large harvested area of food crops, especially the extensive harvested area of rice and corn, resulting in more rice straw and corn stalks, and ultimately affecting the high total production of dry matter of agricultural plant waste. The capacity for increasing the beef cattle population (KPPTS) is calculated as the difference between the carrying capacity of agricultural plant waste feed and the existing cattle population. The capacity for increasing the beef cattle population is the number of livestock that can be added to a region based on the availability of agricultural plant waste as a feed source. The increase in the cattle population in Boalemo Regency based on dry matter feed sources is positive, with a carrying capacity of 1,041,900.46 LU and a cattle population of 43,532 LU. Therefore, the development of beef cattle in Boalemo Regency can be pursued, supported by feed supplies from agricultural plant waste.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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