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Identification of Forage Potential for Grazing in Latimojong, Luwu, South Sulawesi

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ABSTRACT

The objective of this study was to identify botanical composition, diversity, and forage production. This study was conducted in Kadundung village and Boneposi village, Latimojong subdistrict, Luwu regency. This study is classified as descriptive research using qualitative and quantitative approaches, through observational surveys and documentation studies. The parameters in this study include botani, biodiversitas, and forage production. The results showed that the average percentage of botanical composition in Kadundung Village was: grasses 48.29%, legumes 14.59%, and other plants 37.12%. Forage production yielded a fresh weight of 4.18 tons/ha/year, and the biodiversity richness index (4.20), diversity index (0.84), and evenness index (0.28) were measured, with a carrying capacity of 0.17 AU/ha/year. Meanwhile, the average percentage of botanical composition in Boneposi Village was: grasses 45.32%, legumes 16.52%, and other plants 38.16%. Forage production yielded a fresh weight of 4.36 tons/hectare/year, and the biodiversity richness index (2.90), diversity index (0.82), and evenness index (0.24). Therefore, botanical composition, vegetation diversity, and forage production are still. These findings underscore the importance of an integrated approach to grassland on seasonal patterns to maintain ecological balance and sustain year-round grassland productivity.
Keywords: Botanical composition, pasture, forage production.

INTRODUCTION

Natural pasture plays a crucial role in providing feed for ruminant livestock, especially in tropical regions such as Indonesia. Grazing lands are ecosystems with significant ecological and economic functions, particularly in rural areas, as they support livestock production, maintain biodiversity, and contribute to the livelihoods of local communities [1] [2]. Grazing lands not only provide forage for livestock but also serve as habitats for a variety of plant and animal species. Vegetation diversity within grazing lands contributes greatly to ecosystem functions such as pest control, soil quality maintenance, and nutrient cycling. In East Sumba District, Luwu Regency, Indonesia, these functions are particularly important due to the region's reliance on natural grazing systems for cattle production. However, limited site-specific data on vegetation composition, forage productivity, and biodiversity highlight the need for this study to support sustainable grazing land management in the area [3].

Grazing significantly shapes the structure and function of grassland ecosystems. This study found that appropriate grazing practices increase vegetation heterogeneity and support ecosystem balance. Conversely, excessive or uncontrolled grazing can degrade biodiversity and forage quality. Research shows that forage is essential to the diet of ruminant livestock, particularly beef cattle, accounting for approximately 74–94% of total feed intake, sometimes even up to 100%. This benchmark is highly relevant to conditions in Latimojong, where the current vegetation composition of grazing lands remains relatively low, particularly due to the suboptimal proportion of grasses and legumes. This condition affects both forage productivity and feed quality. Therefore, by introducing and improving vegetation—specifically by establishing a composition of 60% grasses and 40% legumes it is expected that grassland productivity can be enhanced, feed quality improved, and the sustainability of livestock systems in the Latimojong area better supported.

Species competition poses significant challenges for grazing land management. This competition can disrupt ecosystem balance, ultimately reducing vegetation quality and diversity [4]. As a result, the land becomes less productive and economically unviable for grazing, making land rehabilitation, especially in natural areas, essential. Additionally, Sema et al. [1] reported that natural grass vegetation accounts for approximately 84.42% of grassland composition in tropical climates. Other data from Khaerani et al. [5] indicate that grass vegetation covers about 64.04% of Indonesia's total grassland area, particularly in South Sulawesi.

Efforts to identify botanical composition, vegetation diversity, and forage production are essential for gaining deeper insight into dryland ecosystems. Dryland ecosystems cover slightly more than 41% of the Earth's surface and support 40% of the global population [6].

Therefore, research on the novelty of identifying botanical composition, vegetation diversity, forage production, and grassland carrying capacity has not yet been conducted in Latimojong Subdistrict, Luwu Regency. Thus, the authors need to conduct this study to understand the forage potential that sustains grassland ecosystems. A management approach that accounts for vegetation diversity, productivity, and carrying capacity can enhance grassland productivity, resilience to disturbances, and habitat provision for various species, while also ensuring year-round availability of high-quality forage for livestock. This study aims to identify the forage potential for grazing in the Latimojong Sub-district, Luwu District, South Sulawesi.

MATERIALS AND METHODS

Time and location of the study

This study was conducted in the villages of Kadundung and Boneposi, Latimojong Subdistrict, Luwu Regency, South Sulawesi, Indonesia, over a one-year period in 2024. These two locations were selected as representative grazing areas within the subdistrict. The area is characterized by hilly topography with an average elevation of approximately 1,000 meters above sea level, as well as climatic conditions including temperatures of 18-25°C, humidity of 75-90%, and annual rainfall of 2,500-3,000 mm, all of which are relevant to vegetation growth and forage production. The research location is presented in Figure 1.

A B

Figure 1. Code A. Map of the research location, Latimojong Subdistrict, Code B. Field locations for sampling in Latimojong Subdistrict. Source: Processed Data, 2024.

The research methodology employed a survey approach, followed by field measurements and observations, and the use of Geographic Information System (GIS) software for processing vector and raster data [7]. This study collected both primary and secondary data; primary data were obtained through direct field measurements, while secondary data were sourced from the literature and relevant institutions. The primary data focused on vegetation types, vegetation counts, and forage production. Plant composition data were collected using direct measurement methods, including the Summed Dominance Ratio (SDR) based on frequency and density metrics. Vegetation diversity data were analyzed using diversity indices, including the Shannon-Wiener Index, species richness (Margalef/Richness), and species evenness (Evenness Index) [8].

Procedure for botanical composition observation

Sample plots were collected using a 1 m × 1 m quadrat. Randomness in plot placement was ensured by randomly tossing the quadrat frame within the observation area to determine the initial (central) sampling point. From this central point, plots were systematically extended in four cardinal directions: east, west, north, and south. In each direction, 14 plots were established at fixed, equal intervals to maintain consistent spacing and improve reproducibility. Within each plot, vegetation types and species distributions were recorded. The frequency, density, and dominance of each species were determined by counting all vegetation present in each observation plot [9].

Procedure for forage production data collection

Forage production data were collected using a combination of surveys, direct measurements, and field observations. Forage production was measured using the "Actual Weight Estimate/Dry Weight Rank" method [10] with a 1 m x 1 m quadrat frame. The frame was placed systematically and randomly across the grasslands, and the vegetation within the frame was clipped and placed in plastic bags for immediate weighing.

Procedure for vegetation diversity sampling

Vegetation diversity data were collected based on diversity indices (Shannon-Wiener Index), species richness (Margalef/Richness), and species evenness (Evenness Index). The data collected included species names, the number of individuals per species, and forage production. Forage production was assessed using a survey approach combined with direct field measurements and observations, evaluated using the “Estimated Actual Weight” method.

The diversity variable (Shannon-Wiener Index) was calculated using the following formula:

$$H' = - \sum Pi \ln Pi$$

Where:
H’ = Shannon-Wiener Diversity Index
Pi = ni/N
ni = Number of individuals of the *i*th species
N = Total number of individuals in the community
ln = Natural logarithm
Shannon-Wiener Index criteria (Shannon and Wiener):

- H’ < 1: low diversity, unstable community
- 1 < H’ < 3: moderate diversity, moderately stable community
- H’ > 3: high diversity, stable biotic community

Species richness was calculated using the following formula:

$$Dmg = (S - 1) / \ln N$$

Where:
Dmg = Margalef Richness Index
S = Number of species
N = Total number of individuals observed
ln = Natural logarithm
Species evenness was calculated using the Pielou Evenness Index formula:

$$E = H / \ln S$$

Where:
E = Evenness Index
H = Shannon-Wiener Diversity Index
S = Number of species observed
ln = Natural logarithm

The evenness index ranges from 0 to 1. A value of 0 indicates a highly uneven species distribution within the community, while a value approaching 1 indicates that most species have similar abundance.

Procedure for carrying capacity measurement

To measure the carrying capacity of the grazing land, 1 m × 1 m quadrats were randomly placed at the study site. All forage within each quadrat was clipped at a height of 0.5 cm above ground level. The harvested material was then sorted by type, placed into plastic bags, and weighed. A second sample was taken 5 to 10 steps to the right and left of the first sample. These two samples were considered a single cluster.

Carrying capacity was analyzed using the Addler Method [11] with the following steps:

- Total Production = calculated based on the number of harvests and harvest seasons
- Production Rate = Total Production × Palatability Use Factor (PUF)
- PUF (Moisture Content) = PUF Production × average moisture content from forage samples
- Dry Matter Production = PUF Production − moisture content
- Carrying Capacity = Dry Matter Production / average dry matter consumption needs of livestock based on body weight

Data analysis

The collected data were tabulated and calculated to determine biodiversity and average forage quality. Data were analyzed using descriptive methods and Multivariate Analysis.

RESULTS AND DISCUSSIONS

Botanical Composition

Vegetation values are used to assess grassland quality, which can influence livestock activity [12]. These values serve as a qualitative assessment of grazing land conditions that may affect livestock behavior. The botanical composition of the grassland in Kadundung and Boneposi Villages, Latimojong Subdistrict, Luwu Regency, is presented in Tables 1 and 2.

Based on Tables 1 and 2, the dominance of grasses in the grazing lands of both Kadundung Village (48.29%) and Boneposi Village (45.32%) indicates that these ecosystems are still primarily composed of key grass species that serve as the primary forage for livestock. However, the relatively low proportion of legumes (14.59% in Kadundung and 16.52% in Boneposi) suggests that the quality of the grazing lands is not yet optimal, as legumes play an important role in improving forage protein content and enhancing soil fertility through nitrogen fixation.

In addition, the relatively high proportion of other plant species (37.12% in Kadundung and 38.16% in Boneposi) may indicate environmental pressure or early signs of degradation, such as overgrazing, which allows non-forage species or weeds to proliferate. Therefore, although grass dominance indicates that the basic function of the grazing land is still maintained, an unbalanced vegetation composition highlights the need for improved management to prevent further degradation and enhance the productivity and ecological quality of the grassland ecosystem.

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Table 1. Botanical composition of grasslands in Kadundung Village, Latimojong Subdistrict, Luwu Regency

Latin Name	Indonesian Name	Percent (%)
Grass		
African grass	Afrika Star	9.50
Axonopus compresus	Karpet	8.15
Cynodon dactylon	Bermuda	6.10
Cyperus rotundus	Teki	6.05
Urena laboto	pulutan	5.78
Eleusina indica	Belulang	4.20
Ptisana salicina	Pakis raja	3.05
Paspalum conjugatum	Pahit	2.23
Imperata cylindrical	Alang-alang	2.11
Paspalum dilatatum	Dallis	1.12
Average		**48.29**
Legumes		
Pyhllantus urinaria	Meniran	4.28
Amaranthus viridis	Bayam raja	3.12
Cynthillum cenerlum	Sawi langit	2.40
Calopogonium mucoinedes	Kalopo	2.09
Ludwigia palustris	Cacabean	1.45
Desmodium triflorum	Desmodium	1.25
Average		**14.59**
Other Plant		
Chromolaena odorata	Kerinyuh	8.5
Eclipta prostrata	Urang aring	7.5
Ageratum conyzoides	Bandotan	6.97
Malasthoma malabatrichum	Herending	4.5
Elephantopus mollis	Tutup bumi	3.19
Senna alata	Ketepeng cina	2.56
Lamtana camara	Tahi ayam	2.28
Crassocephalum crepidiodes	Sintrong	0.7
Ipomoea lecunosa	Katang-katang	0.54
Rubus fruticocus	Kesusur hitam	0.22
Ambrosia artemisifolia	Ambrosia	0.16
Average		**37.12**

Source: Processed Research Data. 2024

This indicates that grassland productivity in Kadundung and Boneposi Villages in Latimojong Subdistrict, Luwu Regency, remains relatively similar. However, productivity has declined. Natural grasslands dominated by grasses and other plants, with minimal legumes, tend to produce lower-quality forage. One contributing factor is allelopathic compounds produced by other plants, which can inhibit the growth of both grasses and legumes. Legumes, in particular, contain higher nutrient levels compared to grasses and contribute to nitrogen availability through nitrogen fixation (N), which is vital for sustainable grassland management [13]

According to Watuwayu et al. [14] and Sema et al. [1], an ideal grazing area should consist of 60% grasses and 40% legumes. One reason for the low percentage of legumes may be the slightly alkaline soil conditions, which hinder nutrient ion absorption by plants [15].

Table 2. Botanical Composition of Grasslands in Boneposi Village, Latimojong, Subdistrict, Luwu Regency

Latin Name	Indonesian Name	Percent (%)
Grass		
Cynodon dactylon	Bermuda	12.01
Axonopus compresus	Karpet	8.10
Cyperus rotundus	Teki	7.15
Dactyloctenium aegypriun	Tapak jalak	6.81
Eleusina indica	Belulang	3.65
Paspalum conjugatum	Pahit	3.28
Setaria neglecta	Setaria	2.21
Imperata cylindrical	Alang-alang	2.11
Average		**45.32**
Legumes		
Calopogonium mucoinedes	Kalopo	7.24
Mimosa pudica	Putri malu	3.70
Ludwigia palustris	Cacabean	3.35
Desmodium triflorum	Desmodium	2.23
Average		**16.52**
Other Plant		
Chromolaena odorata	Kerinyuh	11.18
Ageratum conyzoides	Bandotan	7.39
Malasthoma malabatrichum	Herending	8.24
Senna alata	Ketepeng cina	7.56
Erigeron bonariensess	Jelantir	1.92
Crassocephalum crepidiodes	Sintrong	1.54
Ipomoea lecunosa	Katang-katang	0.33
Average		**38.16**

Source: Processed Research Data. 2024

The vegetation shown in Figure 2 is dominated by grass species in Kadundung Village (48.29%) and in Boneposi Village (45.32%). The proportion of forage species in the natural grasslands of Kadundung Village in this study has not yet reached the optimal threshold, as grasses account for only 48.29%, legumes 14.59%, while other plants make up 37.12%, nearly rivaling grass growth. Meanwhile, in Boneposi Village, the proportions of forage species are 45.32% grasses, 16.52% legumes, and 38.16% other plants. These findings differ significantly from those reported by [16], who stated that the optimal forage composition in grasslands is 60%

grasses and 40% legumes. This discrepancy is likely due to factors such as water availability, soil topography, and climatic conditions.

Climatic factors such as temperature, humidity, rainfall, light intensity, and altitude are key determinants of forage nutritional value and productivity. Geographically, Latimojong Subdistrict in Luwu Regency is located at an altitude of 1,000 meters above sea level. The region is estimated to experience an annual temperature range of 18–25°C, an average humidity of 75–90%, and annual rainfall of 2,500-3,000 mm. Altitude significantly affects the distribution of forage species, while livestock grazing is a major factor in grasslands degradation [17].

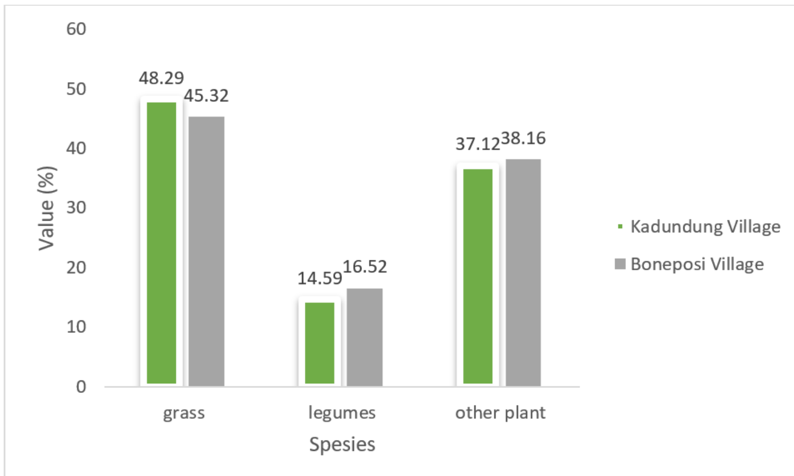

Figure 2. Percentage proportion of botanical composition in the Kadundung and Boneposi Villages. Source: Processed Research Data. 2024

The proportion of legumes in the grazing lands of Kadundung Village, Latimojong Subdistrict, is lower compared to other plants and grasses (Figure 2) due to increased competition. This aligns with the view of Fraser et al. [11], who stated that the presence of other or competing plant species can compete for soil nutrients and suppress growth, especially when the initial proportion of legumes is below 20%.

Vegetation Diversity

Vegetation diversity encompasses all life on Earth, including plants, animals, fungi, and microorganisms, along with the genetic material they possess and the diversity of the ecological systems in which they live. In this study, the measured level of vegetation diversity is directly related to grassland ecosystem functions, including ecosystem stability, forage productivity, and resilience to environmental disturbances. Higher diversity values generally indicate a more stable ecosystem capable of supporting various ecological functions, including nutrient cycling and natural pest control. Conversely, low diversity may signal environmental pressure or ecosystem degradation. Therefore, the diversity results in this study have important management implications, highlighting the need to maintain and enhance species variation—such as through proper grazing management and the introduction of legumes—to improve productivity and ensure the sustainability of grazing lands [18].

The results of the 2024 survey and field observations on the diversity of forage vegetation are presented in Figure 3, which illustrates the types of richness index (R), diversity index (H), and evenness index (E) of forage plants in the grazing lands during the dry and rainy seasons in Latimojong Subdistrict, Luwu Regency, Indonesia.

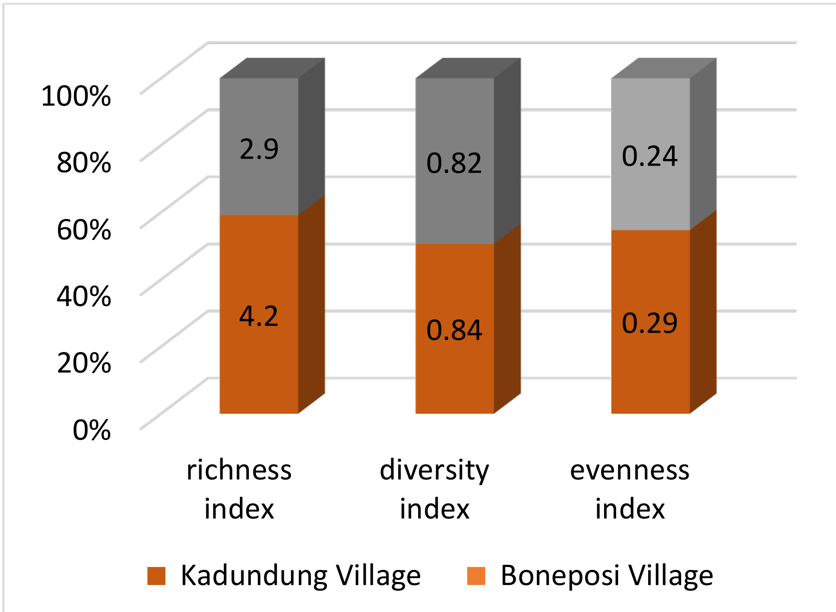

Figure 3. Average Vegetation Diversity Index in Kadundung and Boneposi Villages, Latimojong Subdistrict. Source: Processed research data, 2024

Richness Index (R)

Based on the research results shown in Figure 3, the average plant feed richness index in the grassland of Kadundung Village was 4.2, and in Boneposi Village, the index was 2.90. These values are considered relatively high and indicate good species richness, which contributes to ecosystem stability and forage availability. However, this condition should not be attributed solely to the rainy season. Other ecological factors also play important roles, such as ecosystem disturbances, vegetation fragmentation, and grazing pressure.

Ecosystem disturbances, including land use changes and human activities, can alter species composition and affect the richness index. Vegetation fragmentation may limit species distribution and reduce ecological connectivity, thereby influencing diversity patterns. In addition, grazing pressure, especially if not well managed, can suppress the growth of certain plant species while promoting others, ultimately shaping the structure and diversity of the grassland ecosystem. Therefore, although rainfall significantly enhances plant growth and diversity, these additional factors must be considered to provide a more comprehensive explanation of the observed richness index in the study area.

These figures are consistent with the findings of Darmawati et al. [19] which reported that the grass richness index during the dry season in Tanete Riaja Subdistrict was 3.09, with a legume index of 1.21. These values are considered high because the richness index is influenced by the number of species present in a given area.

This data is supported by Sharma et al. [20], who reported that the average richness index ranged from 2.37 to 2.47 across directions and from 2.10 to 2.41 at different times of the day. The richness index has been widely used in ecological studies to assess species richness under various environmental conditions

According to Zheng et al. [21] approximately 26.5% of feed production is achieved within just five rainy days during the wet season. Plants generally grow more luxuriantly and rapidly during the rainy season due to increased rainfall and higher soil moisture. During periods of increased rainfall, photosynthetic activity also rises, resulting in greater biomass production. This ultimately enhances plant species diversity in grasslands and improves feed availability for livestock.

Changes in rainfall patterns due to climate change can affect photosynthesis and plant growth. Plants can adjust their photosynthetic activity and growth by 10% to 30% in response to changes in rainfall, such as shifts from drizzle to heavy rain. This indicates that rainfall intensity and frequency play a vital role in regulating photosynthetic efficiency and plant growth rates [22].

Diversity Index (H)

The average diversity index of forage plants in the grassland (Figure 3) of Kadundung Village is 0.84. In Boneposi Village is 0.82. These figures indicate that the diversity is low and the community is unstable. This condition is influenced by several factors, including water availability, reduced productivity, interspecies competition, grazing, and changes in species composition.

In addition, grazing pressure that is not properly managed can lead to selective feeding, where preferred species are continuously suppressed while less palatable species tend to dominate, thereby reducing overall diversity. Soil conditions, such as low fertility and limited nutrient availability, also restrict plant growth and the establishment of diverse species. Furthermore, vegetation disturbance—resulting from land-use changes or continuous grazing —can alter habitat structure and reduce ecological balance. These factors collectively affect the diversity and stability of plant communities in pastures, ultimately influencing forage productivity and ecosystem resilience.

These factors affect the diversity and stability of plant communities in pastures, ultimately influencing forage productivity, species composition, and the overall resilience of the ecosystem. According to Nahlunnisa et al. [23], if the diversity index $H' < 1$, the diversity is low and the community is unstable. If $1 < H' < 3$, diversity is moderate and the community is relatively stable. If $H' > 3$, diversity is high and the community is stable. The diversity and stability of grassland vegetation are closely linked to environmental conditions, particularly seasonal changes between the dry and rainy seasons.

Water availability during both the dry and rainy seasons significantly determines plant growth and contributes to increased species diversity. During the rainy season, various plant species can survive and thrive. Conversely, in the dry season, water availability decreases drastically, and only drought-resistant plants can survive. Such changes are highly probable if grazing continues during the dry season [24].

Additionally, a study by Wu et al. [25] on semi-intensive found that rainfall variability, particularly the concentration of annual rainfall, significantly influences plant species diversity.

The study found that increased rainfall concentration enhances plant species diversity, thereby increasing the diversity index.

Evenness Index (E)

The average evenness index of forage plants in the grassland (Figure 3) of Kadundung Village is 0.29. In Boneposi Village, the values were 0.24. This condition is influenced by rainfall patterns in the study area. The annual temperature ranges from 18–25°C, with an average humidity of 75–90% and annual rainfall between 2,500 mm and 3,000 mm. Therefore, the distribution of individual species in this study is characterized by high evenness and is influenced by several ecological factors.

Grazing pressure can lead to selective consumption, allowing certain tolerant or less palatable species to dominate, thereby reducing evenness. Soil conditions, such as nutrient limitations and variability in soil fertility, can further favor the growth of specific species over others. In addition, vegetation disturbance and habitat heterogeneity may influence species distribution patterns, causing some species to cluster while others decline. Therefore, the low evenness values observed in this study reflect an uneven distribution of species driven by both environmental conditions and management-related factors, rather than rainfall alone.

This is supported by Hadidi and Feng [26], who stated that an evenness index value of 0–0.33 is considered low, 0.34–0.67 moderate, and 0.68–1 high. The evenness values obtained in these grazing lands are closely related to rainfall and grazing pressure. Excessive grazing increases functional richness but reduces functional evenness, indicating that overgrazing can alter the functional diversity of animal communities [27].

The evenness index is a measure used to assess the distribution of individuals among species in a community. It reflects how evenly individuals are spread among the species. According to Nahlunnisa et al. [23], the evenness index ranges from 0 to 1, with values closer to 1 indicating a very even distribution and values closer to 0 indicating dominance by one or a few species.

Increased grazing pressure reduces plant cover and increases variation in plant traits, indicating that grazing affects the composition and diversity of plant communities [28]. Evenness (variability or consistency) during the rainy season is higher compared to the dry season. In the rainy season, rainfall tends to be more variable across regions and over shorter periods. Meanwhile, during the dry season, rainfall is generally lower and more consistent. Therefore, evenness is lower in the rainy season and higher in the dry season [27].

Forage Production

Plant species, soil, and climate are internal and external factors that can affect the production of fresh and dry matter, particularly as feed for ruminants. Approximately 80% of ruminant feed comes from forage sourced from Plant species, soil, and climate, which are internal and external factors that can affect the production of fresh and dry matter, especially as a feed source for ruminants. Approximately 80% of ruminant feed comes from forage sourced from natural grasslands, cultivated pastures, and marginal lands, whose productivity is strongly influenced by local environmental conditions such as rainfall, soil fertility, and management practices. Therefore, when comparing production values with other studies, it is important to consider contextual differences in ecological conditions, including climate variability, soil characteristics, grazing intensity, and vegetation composition, as these factors can lead to significant variation in forage yield across different regions [1] [29].

Therefore, the availability of feed in terms of quantity, quality, and sustainability throughout the year must be considered. The research results on average forage production in the grasslands indicate variations influenced by vegetation composition, environmental conditions, and grazing management practices in Kadundung Village and Boneposi Village, Latimojong Subdistrict, Luwu Regency, as shown in Figure 4 below.

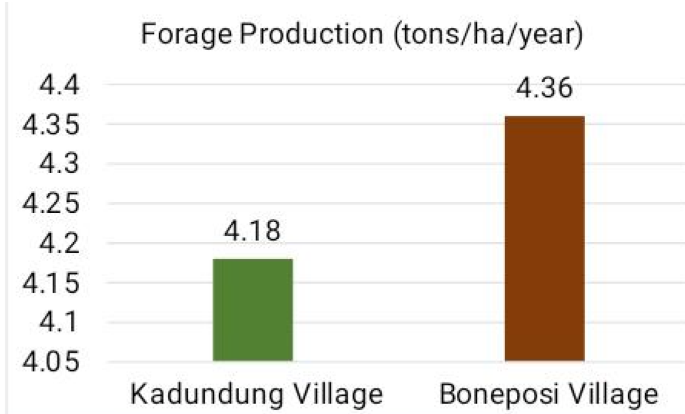

Figure 4. Average fresh forage production in the villages of Kadundung and Boneposi, Latimojong Subdistrict, Luwu Regency.

Fresh forage production in Kadundung Village (Figure 4) is 2.30 tons/hectare/year. In comparison, Boneposi Village4.36 tons/hectare/year. These figures are considered low compared to the results of the study by Sema et al. [1], where the average forage production during the rainy season in Lamata Village, Gilireng Subdistrict, Wajo Regency was 56 tons/hectare, with a Summed Dominance Ratio (SDR) value for grasses of 84.42% and legumes of 15.58%. The forage production observed in this study indicates a decline attributable to various factors, including rainfall, temperature, and the survival of certain plant species.

Factors influencing the growth and production of forage, besides the characteristics of the plants themselves, also include external factors such as rainfall and temperature, which are directly related to these processes. Adequate rainfall ensures the availability of water that plants can utilize in their physiological processes. Besides rainfall, temperature also directly affects the rate of transpiration. If the temperature exceeds the threshold required for photosynthesis, the rate of photosynthesis will decrease, ultimately impacting forage production and quality.

The transition between the rainy and dry seasons negatively affects the quality and quantity of forage available in natural systems [17], as reported by Setiawan et al. [30]. Forage production in natural areas is higher during the rainy season than during the dry season, but its quality is lower [31].

CONCLUSIONS

Based on the research results, the grasslands in Latimojong Subdistrict are dominated by grasses, followed by other plant species, with a lower proportion of legumes. This indicates that the ecosystem still functions as a forage source for livestock; however, vegetation quality and balance need to be improved, particularly through increasing legume presence to enhance soil fertility and forage quality. Ecologically, this unbalanced composition indicates relatively low ecosystem stability, highlighting the need for improved management to enhance both ecological function and grassland productivity. The classification of "low" refers to general vegetation-ecology interpretations, in which dominance by a limited number of species indicates low community balance. Although this study is limited to a one-year period and a restricted sampling area, it provides important baseline data on vegetation composition and forage production (4.27 tons/ha/year) that can be used as a reference for future management strategies.

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AUTHORS' CONTRIBUTIONS

M.Akbar: Conceptualization, data collection, drafting the manuscript, and final revision; B. Budiman: Conceptualization, data collection and tabulation, drafting the manuscript, and final revision; R. Islamiyati: Conceptualization, drafting the manuscript, data collection, tabulation, and final revision.

COMPETING INTERESTS

The authors declared that there is no conflict of interest

ETHICAL CLEARANCE

This research is a quantitative descriptive study; therefore, it does not involve livestock types in the field.

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