

Evaluation of Nutrient Content of Animal Feed Crops in Tropical Islands Region (Case Study of Tomia Timur District, Wakatobi Regency, Indonesia)

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ABSTRACT

Ruminant livestock raised by the community in Tomia Timur District, Wakatobi Regency, are mainly grazed semi-extensively, with forages that grow wild in the surrounding nature. However, the nutrient content of the forage is not yet explicitly known, which can affect livestock productivity. This study analyzes the nutrient characteristics of forage plants used as animal feed in the Tomia Timur District. This study was conducted for two months, from March to April 2024, through two stages. The first stage was sampling forage in the field. In contrast, the second stage involved analyzing nutrient content at the Animal Feed Technology Unit Laboratory and the Animal Feed Analysis Unit Laboratory, Faculty of Animal Science, Halu Oleo University, Kendari. The research method used was purposive sampling, with data collection through interviews with respondents and field observations. The variables analyzed included dry matter, organic matter, crude protein, and crude fiber. The findings show that most of the greens given to ruminant livestock in Tomia Timur District have a nutrient content good enough to meet the nutritional needs of cattle and goats. The greens analyzed include *Callophyllum inophyllum* L., *Lanea coromandelica* (Houtt.) Merr., *Strobilanthes crispus*, *Garuga floribunda* Decne., *Cassytha filiformis*, *Ampelopsis heterophylla* var. *vestita* Rehd., *Dendrolobium umbellatum* (L.) Benth., *Syzygium cumini* (L.) Skeels, *Passiflora foetida*, *Gliricidia sepium*, *Bridelia tomentosa* Blume, *Wikstroemia indica* L. C.A. Mey, *Ischaemum rugosum* (saramollagrass), with varying nutrient content, namely dry matter between 20.34%-44.42%, organic matter 82.68%-96.15%, crude fiber 13.37%-32.83%, and crude protein 6.51%-22.10%. These findings indicate that wild greens in the area have good potential as ruminant livestock feed.

Keywords: Ruminant Livestock, Wild Plants, Nutrient Content, Animal Feed, Tropical Islands

INTRODUCTION

Wakatobi, located in Southeast Sulawesi, is a district of small islands, including the Wangi-Wangi Islands, Kaledupa, Tomia, and Binongko. The Tomia Islands, with an area of 78.84 km², are divided into two sub-districts: Tomia District and Tomia Timur District. In this area, ruminant livestock activities, especially cattle and goats, are one of the critical sectors. The population of cattle and goats in Wakatobi Regency tends to increase yearly. In 2022, the cattle population in Tomia Timur District was recorded at 185, while the goat population was 2.603, and in 2023, the cattle population increased to 194. However, the number of goats decreased slightly to 2.158. Green fodder plays an essential role in the success of livestock farming, considering that around 70% of livestock production costs are used to meet livestock feed needs. Green fodder consists of two main groups, namely gramineae (*grass*) and legumes (*beans*), which are the primary sources of nutrition for ruminant livestock, such as cows and goats [1],[2]. Success in livestock farming is highly dependent on the availability of quality green fodder in terms of quantity, quality, and continuity [3],[4]. However, in the Tomia Timur District, most of the feed given to livestock comes from wild plants that have not been specifically cultivated. The types and characteristics of nutrients from this green fodder are not yet known in detail, causing uncertainty regarding its quality and suitability as a source of livestock feed. Even so, livestock in this area can survive and thrive, even though the feed given does not have clear standards in terms of nutritional quality. This indicates the need for further research to

explore the potential of wild plants that can be used as livestock feed in the Tomia Timur District.

The availability of quality green fodder is closely related to livestock productivity[5],[6]. Forage plants rich in nutrients can support livestock growth better, while low-quality feed can inhibit the growth and reproduction process of livestock[7],[8]. Several factors that affect the quality of green fodder include plant type, plant age, climate conditions, season, and land management[9],[10]. Therefore, it is essential to identify the types of forage plants in Tomia Timur District and analyze their nutrient content to determine their suitability as livestock feed. Knowing the characteristics of forage nutrients in this area will provide helpful information for farmers to formulate more balanced and appropriate feed[11],[12]. In addition, this information can help farmers choose the type of forage most suitable to support livestock growth and productivity.

The characteristics of green fodder nutrients will directly affect the level of livestock preference for feed, as well as the ability of the feed to support livestock growth and development[13],[14]. The nutrient content in green fodder includes various components, such as protein, crude fiber, fat, and minerals, all of which are essential in supporting livestock nutritional needs [15],[16]. Therefore, this study will be beneficial for obtaining data on the quality of green fodder nutrition that can be used as the primary feed source for livestock in the area. In addition, this study also contributes to the management of local natural resources. By utilizing wild plants that grow naturally around the livestock area as a feed source, livestock farmers can reduce

their dependence on commercial feed, whose prices tend to fluctuate, thus providing economic benefits for livestock farmers, especially in areas with limited access to cultivated feed.

As a novelty, this study will investigate the potential of wild plants as animal feed that has not been widely explored in Indonesia's animal husbandry context. Although there are various studies on cultivated animal feed, very few studies focus on feed from wild plants in rural areas, especially in areas with diverse biodiversity, such as Wakatobi. This study will also provide empirical data on the nutrient content of wild plants that can be used to increase livestock production in the Wakatobi archipelago. This study will enrich the existing literature on animal feed and contribute to the development of more efficient and environmentally friendly local resource-based animal husbandry. Farmers in Tomia Timur District can use the results of this study to improve the quality of animal feed and assist authorities in formulating policies that support animal feed management in the Wakatobi archipelago.

METHODS AND MATERIAL

2.1 Research Materials

The research material is in the form of feed plants that are often liked and consumed by ruminant livestock and generally used by livestock farmers in Tomia Timur District, Wakatobi Regency, Southeast Sulawesi Province. These green plants include grasses and legumes that are naturally available in the area and are often used as the main feed for cattle and goats. In the sampling process, the equipment used consists of machetes and scissors to cut greens, sample bags to store samples taken, digital scales to weigh the weight of the samples, and stationery to record the results of observations. In addition, cameras document the conditions and types of feed plants found in the field.

In the proximate analysis stage, the equipment used includes a porcelain cup, gegap, 60°C oven, 105°C

oven, analytical balance, manual distillation equipment, Kjeldahl flask, vacuum pump, measuring cup, beaker, furnace, hot plate, desiccator, sprayer, fume hood, mohr pipette, beaker, and Erlenmeyer flask. The chemicals used in this analysis include H_2SO_4 , NaOH, HCl, equates, boric acid, filter paper, methyl red solution, and selenium, which are used to determine the levels of dry matter, organic matter, crude protein, and crude fiber in forage samples.

2.2 Research Procedures

2.2.1 Determining Sample Location

Determination of sample locations was carried out using the purposive sampling method, which was selected based on the criteria of Tomia Timur District's largest ruminant livestock population. The locations chosen for this study included Timu Village, Dete Village, and Kahianga Village, the villages with the largest livestock populations in the Tomia Timur District. The selection of this location aims to obtain representative data on the diversity of types of feed plants and the quality of nutrients contained therein.

2.2.2 Sampling Techniques

The sampling technique used two main approaches: interviews with respondents and direct observation at the research location. Interviews were conducted with farmers with experience providing livestock feed to determine the types of feed plants most often given to livestock and their management patterns. In addition, field observations were carried out to identify the types of green plants available in the surrounding nature, which would then be taken as samples to analyze their nutritional content.

2.2.3 Nutrient Level Analysis

Analysis of nutrient levels in feed plants was carried out using the proximate method to measure the content of dry matter, organic matter, crude protein, and crude fiber. The technique used for this analysis refers to the procedure listed in AOAC (2005), which has been internationally recognized in animal feed analysis. After the data is obtained from the analysis results, the data will be analyzed descriptively to

describe the characteristics of the nutrients contained in each type of green forage plant available. The research data will be compared with the analysis results of similar studies to determine the best quality of the same green forage plants in different areas. This comparison is expected to find a better source of feed that can support the development of ruminant livestock in Tomia Timur District, Wakatobi Regency.

RESULTS AND DISCUSSION

The characteristics of feed plants, along with the results of laboratory analysis regarding the nutrient content of green fodder often given to ruminant livestock in Tomia Timur District, Wakatobi Regency, can be seen in Table 1. This table presents data on various types of feed plants along with their main nutritional components, such as dry matter, organic matter, crude protein, and crude fiber.

Table 1. Characteristics of Nutrients from Analysis of Feed Plants in Tomia Timur District

Scientific Name	Local Name	Nutrient Content (%)			
		Dry Matter	Organic Matter	Crude Fiber	Crude Protein
<i>Callophyllum inophyllum</i> L.	Tihette	39.49	95.47	18.91	14.20
<i>Lannea coromandelica</i> (Houtt.) Merr.	Tolti	34.03	93.55	20.2	14.55
<i>Strobilanthes crispus</i>	Tiribula	20.34	82.68	25.19	10.12
<i>Garuga floribunda</i> Decne.	Kau sangia	25.89	93.21	19.74	12.76
<i>Cassytha filiformis</i>	Puka-puka	28.98	93.36	20.02	9.96
<i>Ampelopsis heterophylla</i> var. <i>vestita</i> Rehd.	Felalo moane	40.59	95.21	19.59	15.86
<i>Dendrolobium umbellatum</i> (L.) Benth.	Koia	29.66	92.62	13.37	17.98
<i>Syzygium cumini</i> (L.) Skeels	Ujo	44.42	96.15	19.39	9.17
<i>Passiflora foetida</i>	Katali-tali	27.03	89.91	14.10	12.19
<i>Gliricidia sepium</i>	Gamal	22.75	89.28	17.27	22.13
<i>Bridelia tomentosa</i> Blume	Pettu	36.5	92.72	21.03	16.86
<i>Wikstroemia indica</i> L. C.A. Mey	Rango	32.08	91.13	15.09	16.53
<i>Ischaemum rugosum</i> (saramollagrass)	He s	43.95	95.34	32.83	6.51
Average		32.75	92.36	19.75	13.76

Note: Laboratory Analysis Results 2024.



Note: (a) *Callophyllum inophyllum* L., (b) *Lannea coromandelica* (Houtt.) Merr., (c) *Strobilanthes crispus*, (d) *Garuga floribunda* Decne., (e) *Cassytha filiformis*, (f) *Ampelopsis heterophylla* var. *vestita* Rehd., (g) *Dendrolobium umbellatum* (L.) Benth., (h) *Syzygium cumini* (L.) Skeels, (i) *Passiflora foetida*, (j) *Gliricidia sepium*, (k) *Bridelia tomentosa* Blume, (l) *Wikstroemia indica* L. C.A. Mey, (m) *Ischaemum rugosum* (saramollagrass), (n) location of pasture, (o) place where livestock forage, (p) research process.

3.1 *Callophyllum inophyllum* L. (Tihette)

Tihette (local name in the Tomia language) is a plant often used to feed ruminant livestock in the Tomia Timur District. This plant can be found in hilly areas,

especially rocky ones, and grows well on hill rocks. In addition to being used as animal feed, *Callophyllum inophyllum* L. is often sought by local people for firewood because it has a dense and durable wood texture. The proximate analysis results of *Callophyllum inophyllum* L. plant leaves showed quite a good nutrient content, with dry matter values of 39.49%, organic matter 95.47%, crude fiber 18.91%, and crude protein 14.20%. These figures indicate that *Callophyllum inophyllum* L. has relatively high feed quality compared to similar plants, such as Kesambi tree leaves. Based on the analysis, Kesambi leaves have a dry matter content of 84.29%, crude fiber of 19.12%, and crude protein of 10.94%[17]. This difference may be due to various factors, including the environmental conditions where it grows. The Wakatobi Islands, mostly of land with less fertile soil dominated by limestone, can affect the nutrient content of forage grown in the area [18]. Factors such as soil type, soil fertility, climate conditions, and plant age play an important role in determining forage productivity and nutrient content. Therefore, even though the soil conditions in Wakatobi are classified as less fertile, plants such as Tihette can still grow well and have a reasonably high nutrient content, making it a potential source of feed for ruminant livestock in this area[19].

3.2 *Lannea coromandelica* (Houtt.) Merr. (Toiti)

Toiti (local name in Tomia language) is a type of tree plant found in Timur District that resembles a jackfruit tree. This plant is classified as a tree that produces sap, but even so, its leaves are very popular with livestock, especially goats. *Lannea coromandelica* (Houtt.) Merr. Leaves are often used as feed because they are considered easy to digest and have good nutritional value for livestock. The analysis results of nutrient levels in *Lannea coromandelica* (Houtt.) Merr. plant leaves showed quite good values, with a dry matter content of 34.03%, organic matter of 93.55%, crude fiber of 20.20%, and crude protein of 14.55%. These values are not much different from

the analysis of similar plants containing sap, namely jackfruit tree leaves. Based on the analysis, jackfruit tree leaves have a dry matter nutrient content of 36.36%, crude fiber of 32.96%, and crude protein of 15.78%[20]. The difference in nutrient levels between various types of ruminant livestock feed is greatly influenced by several factors, such as variety, type of plant, age of plant, season, location of growth, and maintenance management[21]. Therefore, although the nutrient content of *Lannea coromandelica* (Houtt.) Merr. leaves are slightly lower than those of jackfruit tree leaves, but both still have good potential to be used as livestock feed, especially for goats that prefer leaves with a softer texture.

3.3 *Strobilanthes crispus* (Titibula)

Strobilanthes crispus, or Tomia *Titibula*, is a type of plant that grows in groups. It has a brown main stem and green young stems. Based on the proximate analysis presented in Table 1, *Strobilanthes crispus* leaves have a nutrient content consisting of dry matter of 20.34%, organic matter 82.68%, crude fiber of 25.19%, and crude protein 10.12%. Although the nutrient content of *Strobilanthes crispus* leaves is still relatively low when used as the leading green fodder for ruminant livestock, these leaves can be utilized by combining them with superior legumes such as *Gliricidia sepium* or even with concentrates that have higher nutrient content. The problem is that green fodder in tropical areas, including Indonesia, tends to be of poor quality. This is caused by factors such as plant types, soil conditions, and climates that are less supportive of the growth of high-quality green fodder. To optimally meet the nutritional needs of livestock, providing concentrate feed is a solution that is often applied to supplement the lack of nutrients in green fodder[22].

3.4 *Garuga floribunda* Decne (Kau sangia)

Garuga floribunda Decne. or in Tomia *Kau sangia* language, is a type of plant with a large tree shape and branches. This tree has a unique leaf color because there is a difference in color between young leaves

and old leaves. Based on the results of the proximate analysis presented in Table 1, the leaves of the *Garuga floribunda* Decne. plant have a nutrient content value with dry matter of 25.89%, organic matter 93.21%, crude fiber 19.74%, and crude protein 12.76%. These values indicate that *Garuga floribunda* Decne. leaves have a fairly good nutrient content, even higher than similar plants, namely neem tree leaves (*Azadirachta indica* Juss). Based on the analysis, neem tree leaves have a dry matter content of 22.73%, organic matter 91.94%, crude fiber 20.75%, and crude protein 11.97% [23]. The nutrient content of animal feed dramatically affects the growth and productivity of livestock. Differences in nutrient content are caused by various factors, including plant type, climate, season, and soil type where it grows. Therefore, in efforts to provide animal feed, especially green fodder, farmers must pay attention to these factors to ensure optimal feed quality to support livestock health and productivity[24].

3.5 *Cassytha filiformis* (Puka-puka)

Cassytha filiformis, or in the Tomia language known as *Puka-puka*, is a type of climbing plant. It can be categorized as a weed or parasite because it lives by attaching or creeping on other plants as its host. The results of the proximate analysis presented in Table 1 show that the Puka-puka or *Cassytha filiformis* plant has a nutrient content with a dry matter of 28.98%, organic matter of 93.36%, crude fiber of 20.02%, and crude protein of 9.96%. These values turned out to be much lower compared to other types of climbing legume plants, namely *Calopogonium mucunoides*, which, based on previous reports, had a nutrient content of dry matter of 87.62%, crude fiber of 21.73%, and crude protein of 22.03%[25]. The difference in nutrient levels between the two types of plants shows that the kind of plant greatly influences the nutrient content. The chemical composition of nutrients in green fodder varies, and various factors, such as plant type and variety, plant age, climate, season, soil type, and fertilization, influence this

variation. In addition, external factors such as season, land use, and topography can also affect the production of green fodder[26]. Therefore, these factors must be considered when selecting and managing feed sources in an area to ensure optimal feed quality.

3.6 *Ampelopsis heterophylla* var. *vestita* Rehd. (Felalo Moane)

Felalo Moane (in the Tomia language) is a plant with leaves used as cattle and goat feed in the Tomia Timur District. This plant has oval leaves with white pinnate veins and a slightly rough leaf surface. The results of the analysis of the nutrient content of *Ampelopsis heterophylla* var. *vestita* Rehd. leaves listed in Table 1 show that this plant has a dry matter nutrient content of 40.59%, organic matter of 95.21%, crude fiber of 19.59%, and crude protein of 15.89%. Although these values are pretty good, they are still much lower when compared to similar plants, such as lamtoro leaves. Lamtoro leaves have a crude fiber content of 19.13% and a crude protein of 27.89%[21]. Meanwhile, fermented lamtoro leaves contain dry matter of 98.52% organic matter of 90% [27]. The difference in nutrient content between *Ampelopsis heterophylla* var. *vestita* Rehd. and lamtoro is caused by the differences in the types of plants themselves. Like other types of tree forages, *Ampelopsis heterophylla* var. *vestita* Rehd. is a plant that can adapt to various environmental conditions. However, environmental conditions, including climate, soil type, and maintenance management, will affect the composition of nutrients contained in the plant leaves [28]. Therefore, although *Ampelopsis heterophylla* var. *vestita* Rehd. can grow in various conditions, but the quality of the nutrients contained in it is still influenced by external factors around where it grows.

3.7 *Dendrolobium umbellatum* (L.) Benth. (Koia)

Dendrolobium umbellatum (L.) Benth, or in the Tomia language, Koia, is a legume plant often found in coastal areas or near the coast. It looks like *Gliricidia sepium*. The proximate analysis results in

Table 1 show that the leaves of the *Dendrobium umbellatum* (L.) Benth. the plant has a dry matter nutrient content of 29.66%, organic matter of 92.62%, crude fiber of 13.37%, and crude protein of 17.98%. The dry matter and organic matter content in *Dendrobium umbellatum* (L.) Benth. leaves are much lower, reaching 60.06% and 59.13% respectively[29]. In addition, the crude protein and fiber content in *Dendrobium umbellatum* (L.) Benth. is also lower when compared to the crude protein in *Gliricidia sepium* leaves, which has a value range of 17.93%-19.44%, while the crude fiber of *Gliricidia sepium* reaches 41.46%-45.65%[30]. This condition can be explained by the location of the *Dendrobium umbellatum* (L.) Benth. grows in a coastal area known to have soil with low nutrient content. Coastal soil generally has a coarse and sandy texture, which causes its surface area to be smaller and reduces the soil's ability to absorb or retain water and nutrients needed by plants. This means that coastal soil tends to have difficulty retaining nutrients and water, affecting the quality of nutrients in plants growing in the area [31].

3.8 *Syzygium cumini* (L.) Skeels (Ufo).

Syzygium cumini (L.) Skeels or *Ufo* in the Tomia language is a type of guava tree that, at first glance, looks like a banyan tree but does not have hanging roots. It can be found in Tomia Timur District in rocky soil areas. The analysis results of nutrient levels in *Syzygium cumini* (L.) Skeels leaves showed a dry matter value of 44.42%, organic matter 96.15%, crude fiber 19.39%, and crude protein 9.17%. These results indicate a pretty good nutrient content, but different from similar plants, namely banyan leaves. Banyan leaves have a dry matter value of 18.10%, organic matter of 85.70%, crude fiber of 33.00%, and crude protein of 11.10%, which shows a significant difference in nutrient composition between the two types of plants [32]. The use of leaves as feed for ruminants, in addition to field grass, which is the main feed, is a common practice among people with

traditional maintenance patterns. In addition to economic factors, the selection of leaves is also influenced by their availability in nature, which is still abundant. However, the quality of leaves used as animal feed is also greatly influenced by the location and altitude of the place where they grow. Location and altitude can contribute significantly to the nutritional quality of leaves used as animal feed, which in turn affects the productivity of the livestock that consume them[33].

3.9 *Passiflora foetida* (Katali-Tali)

Plant *Passiflora foetida* (*Katali-tali* in Tomia language), commonly known as forest passion fruit (*Passiflora foetida*), is a type of climbing legume found in gardens, forests, and coastal areas. The proximate analysis presented in Table 1 shows that the *Passiflora foetida* plant has a nutrient content with dry matter of 27.03%, organic matter of 89.91%, crude fiber of 14.10%, and crude protein of 12.19%. This value is lower than the forest passion or mini passion fruit, with a dry matter content of 98.12%, crude fiber of 9.58%, crude fat of 2.93%, and crude protein of 25.90% [34]. This significant difference in nutrient content can be influenced by various factors, one of which is the age of the plant. The older a plant is, its water content tends to decrease, its crude fiber increases and its crude protein content often decreases [35]. In addition, the chemical composition of nutrients in green fodder is also influenced by other factors such as plant type, variety, climate, season, soil type, and fertilization practices (nutrient input) [36],[37],[36]. Therefore, to obtain the best quality green fodder, it is necessary to pay attention to these factors, especially when selecting and managing plants as a source of animal feed.

3.10 *Gliricidia sepium* (Gamal)

Gliricidia sepium is a legume plant commonly given to livestock because of its high nutrient quality. Based on the laboratory analysis, *Gliricidia sepium* plant leaves have a dry matter nutrient value of 22.75%, organic matter of 89.28%, crude fiber of 17.27%, and

crude protein of 22.13%. The dry matter and organic matter analysis in the plants studied showed significant differences compared to where the dry matter and organic matter nutrient values in *Gliricidia sepium* leaves were recorded at 60.06% and 59.13%, respectively [32]. In addition, the levels of crude protein and fiber are also different from those given liquid organic fertilizer with different doses. In the study, crude protein has a nutrient value between 17.93% -19.44%, while oil fiber is 41.46% - 45.65%[30]. These differences in nutrient levels are most likely caused by differences in the nutrients contained in the soil where the plants grow. Nutrients in the soil can affect the nutritional quality of green fodder. In addition, the age of the plant also plays a vital role in changes in the nutritional content of green fodder. As the age of the plant increases, the crude protein content will decrease, while the crude fiber will increase [38]. This shows that the nutritional quality of green fodder is greatly influenced by external factors such as soil conditions and plant age, which in turn affect the nutrient content of animal feed [39],[40].

3.11 *Bridelia tomentosa* Blume (Pettu)

Bridelia tomentosa Blume, or Pettu in the Tomia language, is a woody tree plant whose fruit is often used as traditional toy bullets. In addition, the local community also uses the roots of this plant as a medicine for internal wounds by boiling and drinking the water. The results of the nutrient content analysis presented in Table 1 show that *Bridelia tomentosa* Blume leaves have a dry matter nutrient content of 36.50%, organic matter of 92.72%, crude fiber of 21.03%, and crude protein of 16.89%. This value is lower when compared to similar plants, namely *Sauropus adrogynus* leaves, which have a nutrient content of dry matter of 18.43%, organic matter of 87.05%, crude fiber of 17.13%, and crude protein of 31.80%[33]. In addition, these results are also much lower compared to other similar plants, namely Indigofera (*Indigofera* sp.), which has a nutrient

content of dry matter between 17.29%-27.80%, organic matter of 87.15%-92.03%, and crude protein of 21.17%-18.94% [41]. Indigofera is one of the legume greens known to have high nutritional quality, so naturally, there are differences in the quality of nutrient content between Kenidai and Indigofera. Several factors, including the plant type, age, and conditions of the place of growth, such as climate and soil fertility, greatly influence the quality and production of animal feed greens. In addition, harvesting greens is also influenced by seasonal factors, cutting age, and cutting intervals, all of which contribute to the nutritional quality of the greens that will be given to livestock[42].

3.12 *Wikstroemia indica* L. C.A. Mey (Rango)

Wikstroemia indica L. C.A. Mey or *Rango* in the Tomia language is a plant often used as goat feed in the Tomia Timur District. The results of the analysis of the nutrient content of *Wikstroemia indica* L. C.A. Mey leaves (Table 1) show that *Wikstroemia indica* L. C.A. Mey leaves have a nutrient content value of dry matter, namely 32.08%, organic matter 91.13%, crude fiber 15.09% and crude protein 16.53%. The results of the analysis of nutrient levels in *Wikstroemia indica* L. C.A. Mey leaves are lower when compared to similar plants. Namely, Turi leaves (*Sesbania grandiflora*). Turi leaves have complete nutrient levels, with a protein content of 27.54%, fat of 4.7%, carbohydrates of 21.30%, ash of 20.45%, crude fiber of 14.01%, and water of 11.97% [43]. Turi is a legume plant with excellent nutritional quality for animal feed.

In contrast, *Wikstroemia indica* L. C.A. Mey is a type of plant that grows in rocky areas, where nutrients in the soil tend to be low. Factors such as plant type, climate, season, soil type, and light intensity can affect the supply of nutrients obtained by plants, which will determine their nutrient levels. Therefore, the difference in nutrient content between *Wikstroemia indica* L. C.A. Mey and Turi can be explained by variations in environmental conditions where plants grow, as well as differences in

nutritional needs and adaptation of each species to these conditions [44].

3.13 *Ischaemum rugosum* (saramollagrass) (He'e)

Ischaemum rugosum (saramollagrass), or in the Tomia language known as He'e, is a grass plant almost spread throughout the Tomia Islands, such as the coast, hills, and slopes. The results of the proximate analysis presented in Table 1 show that the *Ischaemum rugosum* (saramollagrass) has a dry matter nutrient content of 43.95%, organic matter 95.34%, crude fiber 32.83%, and crude protein 6.51%. These nutrient values, especially in oil fiber and crude protein content, are not much different from *Ischaemum rugosum* (saramollagrass), which has a dry ingredients nutrient content of 28.53%, crude fiber of 33.98% and crude protein of 15.65%[45].

Ischaemum rugosum (saramollagrass) grass is one grass field often found in Tomia Timur. Like other field grasses, *Ischaemum rugosum* (saramollagrass) grows on marginal land that is poor in nutrients, which causes the production of this grass to be low [46]. Infertile soil conditions and lack of fertilization on marginal land affect grass productivity, affecting livestock's nutritional content. As the grass grows in an environment with limited nutrients, *Ischaemum rugosum* (saramollagrass) may not optimally meet all livestock's dietary needs. However, it can still be used as an additional feed source.

CONCLUSION

The findings can be concluded that most of the green fodder given to ruminant livestock in Tomia Timur District, Wakatobi Regency, has a nutrient content of sufficient quality to meet the needs of livestock, both cattle and goats. Plants found as sources of green fodder in the area include *Callophyllum inophyllum* L., *Lannea coromandelica* (Houtt.) Merr., *Strobilanthes crispus*, *Garuga floribunda* Decne., *Cassytha filiformis*, *Ampelopsis heterophylla* var. *vestita* Rehd., *Dendrolobium umbellatum* (L.) Benth., *Syzygium cumini* (L.) Skeels, *Passiflora foetida*,

Gliricidia sepium, *Bridelia tomentosa* Blume, *Wikstroemia indica* L. C.A. Mey, *Ischaemum rugosum* (saramollagrass). The nutrient content of these green plants varies, with dry matter between 20.34% and 44.42%, organic matter between 82.68% and 96.15%, crude fiber between 13.37% and 32.83%, and crude protein between 6.51% and 22.1%. This variation shows the potential for a relatively diverse source of green feed. However, some plants still need to be combined with other feeds with higher nutrient content, such as legumes or concentrates, to achieve optimal nutritional balance for ruminant livestock.

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