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Biomass Production and Nutrient Content Animal Feed in Kuantan Singingi District

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ABSTRACT

Forage is a major requirement in increasing ruminant livestock production. Kuantan Singingi Regency is a district that has quite a lot of grasslands whose production and quality of forage are unknown, so this study aims to determine the production and nutritional content of forages in Kuantan Singingi Regency. This research consisted of three stages, survey (field observation and location determination), forage sampling, and nutrient quality analysis. Forage samples were taken in 4 sub-districts, namely the Districts of Central Kuantan, Sentajo Raya, Gunung Toar and Kuantan Mudik. 5 locations were taken for each sub-district, 4 points for each location were taken. The tools used for forage sampling consisted of a 0.5 x 0.5 m2 quadrant, grass shears, sickle, plastic bags of size 10 and size 2 kg, sacks, plastic ropes, and stationery. The analysis of nutrient quality using forage samples in 4 districts using proximate analysis. Forage production data and forage nutrient content were statistically analyzed using analysis of variance (ANOVA). The results showed that there were differences in production and nutrient content in each sub-district $P<0.05$. Fresh biomass production showed a significant effect of $P<0.05$. Fresh forage production ranged from 111.67±16.45 Kg FW/ha/day, while dry forage production ranged from 23.80±5.29 Kg to 187.04±67.35 Kg. The conclusion of this study is that the production and nutritional content of forage in Kuantan Singingi Regency is relatively low, the production of DW/ha/day is 23.80-40.35 Kg, and the CP ranges from 7.85-10.55% DW.

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1. Introduction

Kuantan Singingi or Kuansing Regency is one of the regencies in Riau Province whose existence is bordered by Jambi Province and West Sumatra. This area has many plantation areas as in general, the Kuansing people are active as oil palm and rubber farmers. Based on BPS data, 2018 Kuansing has plantation area of 411,693 hectares. In addition to the area of Kuansing plantations, it also has about 1801 hectares of grassland [1], This shows that Kuansing Regency has the potential for land availability and forage sources that are large enough to support the development of ruminants. Grassland needs to be managed and calculated forage so that it can be evaluated for improving livestock and forage productivity [2].

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Forage is the most important main component in livestock productivity. Forage, originating from plantations and grasslands in Kuansing Regency, is the main source of forage for ruminan animal feed. The resources available in the nature is related to livestock business [3]. The pasteur needs to know the botanical composition and storage capacity [4]. The natural resources such as forage are the main factors for the sustainability of livestock business [5]. Generally, people in Kuansing raise their livestock by releasing them, meanwhile, some of them are kept in cages in the afternoon. Cattle are housed at night with a pasture fattening system [6]. Nonetheless, until recently, these plantations and grasslands have not been studied in an effort to use them for the development of beef cattle, so the quantity and quality of feed that can be produced in Kuansing is unknown. In addition, at the recent time, there is no data on the amount of forage production in Kuansing Regency, so that the biomass production and nutritional content of the forage are not known. Therefore, the purpose of this study is to determine the production of biomass and nutrient content of forage that grows in Kuansing Regency.

2. State of the Art

2.1. Production and Greenery Nutrition

Forage production is the ability of a land to produce forage in a field. A land has a different production depending on the area of land, the type of forage and nutrient content. Forage production of a different land is influenced by management factors such as environmental conditions and seasons. The seasons affect the production and nutritional content of forages [7]. Forage productivity is influenced by land factors that have the availability of forage for livestock [8].

3. Method

Research Procedure

The research was carried out in Kuantan Singingi Regency, Riau Province from July to August 2020. The research was conducted in four sub-districts named Kuantan Tengah District, Sentajo Raya District, Gunung Toar District and Kuantan Mudik District. The determination of the location by purposive sampling method was deliberately based on considerations of regional location and strata [9]. The study used the RAL method, a completely randomized design with four treatments and five replications. This research was conducted in 3 (three) stages, the first stage was to conduct a survey by direct observation to the 4 sub-districts located in Kuantan Singingi district, they are the districts of Kuantan Tengah, Sentajo Raya, Gunung Toar and Kuantan Mudik. The second stage was to take forage samples which were divided into 4 sub-districts with each sub-district taken as many as 5 villages as sampling locations, each location was taken 5 sample points using a 0.5 x 0.5 m2 quadrant. The third stage was calculating forage biomass production and preparing samples for analysis of nutrient content. The analysis of nutrient content was conducted at the UNAND Padang Campus.

Sampling Location Determination Survey

The survey was conducted to observe the land that would be used as a research sampling location and to get a clearer picture of the location of each area. The survey was carried out in four selected districts.

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Forage Sampling

Forage sampling consisted of 4 sub-districts, each sub-district took 5 villages, each village took 5 location points. Side taking with a quadrant (plate meter) measuring 0.5 x 0.5 m2. The quadrants were placed diagonally at random at each selected point. Furthermore, all forage plants that were in the quadrant were cut as high as 5-10 cm from the ground surface or until they were snatched by livestock [10]. The forage that has been cut is then put into a plastic bag, then tied and labeled. The forage is then brought to the laboratory to be weighed.

Forage Biomass Production Calculation and Sample Preparation for Nutrient Content Analysis

The forage that has been weighed freshly to calculate the product in the biomass. The biomass production was calculated by the formula [11]. The analysis of the nutrient content began with cutting the plant 2 to 3 cm long with a knife (machete) and using a cutting board as the base. The forage that have been cut was composited to mix evenly and then put into aluminum foil which was designed like a box with a size of 27 x 11.5 x 5.5 cm and weighed until the weight reached 150 g with 3 replications. The plant samples were then dried in an oven at a temperature of 60 – 65oC or in sunlight for 48 hours or until the stems of the plants were easily broken. The forage that have been in the oven was then weighed dry and mashed using a blender until it become flour.

The Analysis of Food Substances

Forage samples that had been in the form of flour were then analyzed for nutrient content. The content of food substances analyzed were Dry Matter (BK), Ash, Crude Protein (PK), Crude Fiber (SK) [12].

Data Analysis

The data were statistically analyzed using a completely randomized design (CRD) with 4 treatments and 5 replications using analysis of variance (ANOVA) [13]. Data processing using SPSS 20.0 Statistical Software.

4. Results and Discussion

The Forage Biomass Production

Table 1. Biomass Production and Carrying Capacity based on Dry Matter

District	Area of Land	Biomass Production (kg)		Carrying Capacity	
	Ha	FW/ha/day	DW/ha/day	ST/ha	ST/area
KT	1025,56	187.04±67.35a	40.35±17.05a	4.98±2.10a	5901.90±10472.62
SR	1018,80	112.39±21.62b	23.80±5.29b	2.94±0.65b	3126.73±2421.14
KM	4026,20	111.67±16.45b	24.15±5.96b	2.98±0.74b	12864.73±21651.79
GT	856,20	135.03±26.83ab	30.16±10.71ab	3.72±1.32ab	3599.57±3614.86

Keterangan : KT (Kuantan Tengah), SR (Sentajo Raya), KM (Kuantan Mudik), GT (Gunung Toar)

The forage biomass production was forage production produced by a land or area at a certain time. The forage biomass production can be calculated per day, month and year. The forage biomass production per ton/ha/year was obtained by calculating the production of fresh forage in one year.

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The fresh biomass production was used to determine the production of grass on a land within one year. The fresh forage production in Table 1. showed the different production in each sub-district. The fresh biomass production showed a significant effect of P<0.05. The production of fresh forage ranged from 111.67±16.45 FW/ha/day to 187.04±67.35 FW/ha/day, while production of forage DW/ha/day ranged from 23.80±5.29 to 187.04±67.35. The highest forage production is found in the village of KT Kuantan Tengah. The differences in fresh forage production per FW/ha/day and DW/ha/day were caused by the diversity of forage grown in the field and management. Good management would produce maximum forage production. [7] stated that the growth and production of forage is influenced, climate and management. In addition, seasonal factors also affect forage production. Season affects biomass production and nutritional quality of forage feeds [7]. Natural forage production is also relatively decreased in the dry season so that it will directly affect livestock productivity.

The carrying capacity is the ability of a land to accommodate livestock to be reared. The holding capacity of livestock in Kuansing Regency ranged from 2.94 to 4.98 ST/ha, while the holding capacity based on land area ranged from 3126.73 to 12864.73 ST. The storage capacity was closely related to the production of forage biomass. The size of the carrying capacity of a land was determined by the production of forage biomass produced. The higher the forage production, the higher the capacity. [14] stated that the number of livestock carrying capacity on a land was determined by the high level of forage production per unit area of land.

The yield of dry forage biomass production per day when compared to the yield at BPTU-HPT Padang Mengatas looks lower, this is presumably because forage management in Kuansing Regency has not been managed properly and forage is allowed to grow without treatment such as fertilizer. In addition, the natural forage factor that grows in the field and forage that grows around oil palm plantations, rubber plantations, swamps and vacant land that has not been managed, so that forage production in Kuansing Regency is not optimal. The dry biomass production of BPTU-HPT Padang Mengatasa is 116.70 Kg/DW/ha/day in the rainy season and 73.22 Kg DW/ha/day in the dry season, with a land area of 208.41 Ha[7].

Forage Nutrient Content

Table 2. Biomass Production and Forage Nutrient Content ini Kuantan Singingi District

District	Water Content (% FW)	DM content (% FW)	Nutrient (% DM)		
			Ash	CP	CF
KT	78.78±1.51	21.22±1.51	9,43±1.19b	10.55±1.57a	25.76±1.07a
SR	78.88±2,31	21,12±2,31	9,90±1.48b	9.78±0.91ab	25.96±0.78b
KM	78.57±3.01	21.43±3.01	8,76±0.93ab	7.85±1.12bc	25.82±0.85b
GT	78.05±3.56	21,95±3.56	7,33±0.68a	8.63±0.30c	28.09±1.26b

Note: Different superscripts in the same column show different effects. KT (Kuantan Tengah), SR (Sentajo Raya), KM (Kuantan Mudik), GT (Gunung Toar). CP(Crude protein) CF (Crude fiber). DM (Dry Matter). FW (Fresh Weight).

Nutrient content is an important factor in evaluating forage. The nutritional content of forages growing in plantation and grassland areas in each sub-district is presented in Table 2. Based on statistical analysis of forages in Kuansing Regency, it looks different (P<0.05), on the nutritional quality of CP, CF and Ash.

The results of the analysis of the nutrient content of forages in Kuantan Singingi Regency look varied. The high and low nutrient content of forage is influenced by the type of forage. The results

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showed that the dry matter forage ranged from 21.12±2.31 to 21.95±3.56. This shows that the CP forage in Kuansing Regency does not show a significant difference, while the CP shows a significant effect (P<0.05). ±1.12. The CP content of natural forages is not much different from the CP content in other areas. This result is not far from the results of research [15] in [7] which reported that the content of grass land has a BK content ranging from 16.01% to 80.41% while the CP content ranges from 2.71% to 9.48%. This CP content fluctuates according to changes in seasons, age of forage and natural conditions. At the end of the dry season the CP forage is 2.26% and the rainy season is 8-10%.

The highest content of ash and crude fiber was found in Sentajo Raya District, namely 9.90±1.48 Ash. The highest crude fiber was found in Gunung Toar District, namely 28.09±1.06 and the lowest was found in Central Kuantan District, namely 25.76±1.07. The nutritional quality of forage depends on the composition and type of forage that grows in the field, in addition to the factors of plants growing in nature, soil conditions, water availability, fertilization, cultivated plants and also the cutting phase of forage. [7] stated that the high and low content of nutrients in grass land was caused by environmental factors, rainfall, fertilization and also the difference in forage cutting time. [16] said that the factor causing the low crude protein content and high crude fiber content was the undegrazing condition so that the plant vegetation experienced aging.

The nutritional content of forage in Kuansing Regency was relatively low, this was because the forage comes from natural forage that grows in the field. [16] stated that the productivity of livestock fed natural grass forage was not sufficient for the nutritional needs of livestock [17] and [18] stated that livestock nutrients are not sufficient and cannot be fulfilled if it comes from forage that grows in the field/natural grass, in addition, livestock during the growth period show low body weight growth. The nutrient content of the forage in Kuansing Regency was almost the same as the study [7], higher than the study [16] and lower than the study [11] , that the nutrient content of forage in the grazing fields of BPTU-HPT Padang Mengatas was around 9.24 in the rainy season and 11.50 in the dry season [7], CP 6.31-6.63 nutrient content of forage growing in North Lore Pasture, Poso District [16] , nevertheless, compared to the previous study, [11] the CP ranged from 7.72-18.7%. In addition [19] stated that the nutritional content of natural grass forage in BKPH Kebasen Banyumas was DM 24.68%, ash 14.26%, CP 8.90% and CF 33.31%. The high and low protein content of forage in Kuansing Regency was thought to be due to the various types of forage and management that has not been managed properly and fertilization factors. It was also caused by the influence of the season. Forage production which was influenced by different seasons was one of the obstacles in raising livestock[20].

5. Conclusions

Biomass production and forage nutrient content in Kuantan Singingi Regency are relatively low, with production of DW/ha/day 23.80-40.35 Kg, and CP ranging from 7.85-10.55% DM.

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