Nutrient Composition and In Vitro Digestibility of *Brachiaria decumbens* cv. *Basilisk* with Different Level of Fertilizer

Nafiatul Umami[1], Adib Norma Respati[1], Bambang Suhartanto[1,2], and Nilo Suseno[1]
[1] Forage and pasture Sci Laboratory, Animal Sci Faculty, Universitas Gadjah Mada
[2] Center of Inovation and Agrotechnology, Universitas Gadjah Mada
Correspondence author: nafiatul.umami@ugm.ac.id

ABSTRACT

This research was aimed at identifying the quality of *Brachiaria decumbens* cv. Basilisk including the nutrient content and digestibility of dry and organic matters planted with different level of NPK fertilizer. The *in vitro* method of Tilley and Terry (1963) modified by Utomo (2010) was used to analyze the samples. The fertilizer treatment were (P0) 0 kg/ha, (P1) 150 kg/ha, and (P2) 300 kg/ha. The harvested *Brachiaria decumbens* cv. Basilisk was then put in an oven with 55ºC temperature and grinded to create samples to be analyzed with proximate and *in vitro* digestibility analysis. The analyzed variables were the grass' chemical composition and the digestibility of dry and organic matters. The obtained data were then analyzed by using Completely Randomized Design (CRD) and the difference between means was then analyzed by using *Duncan's Multiple Range Test* (DMRT). The result showed that crude protein and fat was affected (P<0,05) by addition of NPK fertilizer of *Brachiaria decumbens* cv. Basilisk grass. Crude protein P0 (9.504%), P1 (9.836%) and P2 (12.032%), crude fat P0 (7.584%), P1 (9.101%) and P2 (10.867%). The digestibility of dry matters P0 (50.75%), P1 (52.77%) and P2 (53.89%) and the digestibility of organic matters P0 (46.33%), P1 (48,69%), P2 (49.95%). Dry matters, organic matters, crude fiber, the digestibility of dry matters and the digestibility of organic matters were not affected by the addition of NPK fertilizer. Based on the result, it can be concluded that the addition of NPK fertilizers 150 kg/ha and 300 kg/ha of *Brachiaria decumbens* cv. Basilisk grass affected the crude protein and crude fat.

Keywords: *Brachiaria decumbens cv. Basilisk*, *in vitro* digestibility

INTRODUCTION

Forage was the main feed of ruminant. The animal productivity depend on feed quality and quantity of (Suryanah *et al*., 2013). Grass and legume were forage. Plants received energy, solar irradiance, water, and soil nutrient. Plants provided energy and nutrient to animal and crop residue was used to improve soil conditions. Plants served as prevention of erosion, protected the soil from the physical damage. Generally, the grass was used as basic forage feed for herbivores. The grass used should be in good quality, high in palatability and continuous in availability. Research on breeding and discovery of new cultivars of *Brachiaria* had been conducted. The discovery of new species was due to Brachiaria had several species including *Brachiaria brizantha* (A.Rich.) Stapf, *Brachiaria decumbens, Brachiaria humidicola, Brachiaria ruziziensis, Brachiaria dictyoneura,* and *Brachiaria distachya*.

Brachiaria decumbens was usually grown for permanent grazing. It was grown as a good soil cover to prevent erosion in sloped areas (Miles et al., 1996). *Brachiaria decumbens* cv. The basilisk had a good adaptation to acid soil, good growth, and good nutrient value.

Plant growth and crop yield could be improved by appropriate fertilizer application (Purbajanti, 2013). Fertilizer consisted of macro elements (N, P, K, Ca, Mg) and micro elements (Zn, Cu, Mn). Fertilization could increase crop yield and changed chemical composition.

Fertilizer had a main function to increase soil productivity. The use of fertilizer in a balanced manner would increase crop yield (Winarso, 2005). The results of experiments in China showed that long-term use of NPK fertilizers improved soil fertility, such as increaseing organic matter, N and P content. The nutrient content of forage was very important for the animal. The nutrient content of forage including crude protein, extract ether, crude fiber, nitrogen free extract, and mineral. Digestibility was the proportion of feed absorbed from the digestive tract. Digestibility was calculated from the amount of feed that could be absorbed and utilized by the animal (Purbajanti, 2013). Digestibility test was necessary to identify the potential of *Brachiaria decumbens* cv. Basilisk as feed with different dosage of NPK fertilizer treatment. This research was expecting high digestibility value.

MATERIALS AND METHODS

This research was conducted in greenhouse and Laboratory of Pasture and Forage Science, Animal Science Faculty, Universitas Gadjah Mada, Yogyakarta. NPK fertilizer, seeds of *Brachiaria decumbens* cv. Basilisk were from Laboratory of Bioresource Science, Miyazaki, Japan.

Methodology

Germination of *Brachiaria decumbens* cv. Basilisk seeds was conducted by using a potray. Germination was conducted for 2 weeks and doing observation every day. The soil was taken from the field of Laboratory of Pasture and Forage Science, Animal Science Faculty, Universitas Gadjah Mada, Yogyakarta, then it was sieved. It was put into polybag (diameter 25 cm) range ¾ polybag. The fertilizer treatment were (P0) 0 kg/ha, (P1) 150 kg/ha, and (P2) 300 kg/ha. *Brachiaria decumbens* cv. Basilisk was moved into a polybag which was filled with soil. One polybag contained one plant. Fertilization was conducted according to dosage of NPK fertilizer treatment. Fertilization was distributed twice on the 30th and 45th days after planting. Harvesting was conducted on the 60th days. The *in vitro* of Tilley and Terry (1963) method modified by Utomo (2012 was used to analyze the samples. Chemical analysis including dry matter, organic matter, crude protein, crude fiber by using AOAC method (2005) and crude fat by using Kamal method (1997). All of the data were analyzed by using Completely Randomized Design (CRD) and statistically significant differences between means were determined by *Duncan's Multiple Range Test* (DMRT).

RESULTS AND DISCUSSION

Chemical composition

Chemical compositions of *Brachiaria decumbens* cv. Basilisk harvested at 60 day old with different dosage of NPK fertilization treatment were shown in Table 1.

Table 1. Chemical composition of *Brachiaria decumbens* cv. Basilisk harvested at 60 day old with different dosage of NPK fertilization treatment (%)

Variable	Treatment		
	P0	P1	P2
Dry matter (%)[ns]	15,12±2,53	16,35±1,52	12,92±1,83
Organic matter (%)[ns]	84,65±1,04	84,71±0,51	83,65±1,41
Crude protein (%)	9,51±0,79 [a]	9,83±1,25 [a]	12,03±0,92 [b]
Crude fiber (%)[ns]	37,18±2,49	36,52±1,89	37,32±2,22
Extract ether (%)	7,58±1,58 [a]	9,10± 0,63 [b]	10,86±1,77 [b]

[a,b] Different superscripts in the same row indicate significant differences (P<0.05)
[ns] Not significant

Table 1 showed that the treatment of NPK fertilization were not significant (P>0.05) on dry matter, organic matter and crude fiber content. The production of dry matter related to the production of organic matter. Soil nutrients affected plant growth (Sutejo, 1995). Soil that have high nutrient content grew plant better and can produce high biomass because nutrients for growth were fulfilled. The content of crude fiber was related to digestibility; feed that had a high content of crude fiber, low digestibility (Anggorodi, 1979), and also the cell wall was thicker.

Based statistical analysis, the addition of NPK fertilizer 150 and 300 kg/Ha on *Brachiaria decumbens* cv. Basilisk were significant (P<0,05) on crude protein content. This result was in line with result of Hardianti's research (2015), stated that the effect of addition of nitrogen fertilizer treatment had a significant difference on elephant grass. The more nitrogen levels added to the elephant grass fertilization, it would increase the crude protein content. Crowder and Chheda (1982) suggested that the crude protein content of feed was very important since it improved the production of crude protein that would increase the production of dry matter.

The extract ether content increased with the addition of dosage of NPK fertilizer. However, based on the analysis of variance, the addition of NPK fertilizer 150 and 300 kg/Ha on *Brachiaria decumbens* cv. Basilisk was not significant (P>0.05). Plant had a high fat content due to the wax layer on the leaf surface. The wax layer on plant inhibited water loss through transpiration, and the wax dissolved in the ether (Tillman *et al*., 1991).

In vitro digestibility

In vitro digestibility of dry matter and organic matter of *Brachiaria decumbens* cv. Basilisk harvested at 60 days old with different dosage of NPK fertilization treatment were shown in Table 2.

Table 2. In vitro digestibility of dry matter and organic matter *Brachiaria decumbens* cv. Basilisk harvested at 60 days old with different dosage of NPK fertilization treatment (%)

Digestibility	Treatment		
	P0	P1	P2
Dry matter (%)[ns]	50,75±4,45	52,77±2,20	53,89±3,85
Organic matter (%)[ns]	46,33±3,37	48,69±0,56	49,95±3,24

[ns] Not significant

Table 2 showed the different dosage of NPK fertilization treatment which were not significant (P>0.05). It was due to the high crude fiber content. Increased crude fiber content decreased the digestibility by increasing lignification (Tillman *et al*., 1998). Lubis (1992) explained that crude fiber had an effect on digestibility. The component of crude fiber include cellulose, hemicellulose and lignin. Feed containing high fiber could interfere the other feed digestibility because it need a lot of energy to be digested.

The organic matter was part of dry matter (Fathul and Wajizah, 2010). When dry matter increased, so did the organic matter. Similarly, if the dry matter increased, so did the digestibility of organic matter. Factors that affected the difference of both value were the shape and size of physical feed, plant maturity, number and type of microbes in the rumen.

CONCLUSIONS

Based on the study, it can be concluded that treatment of addition of NPK fertilizers 150 kg/ha and 300 kg/ha of *Brachiaria decumbens* cv. Basilisk affected the crude protein and fat.

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