HAKI

INTERNATIONAL SEMINAR

IMPROVING TROPICAL ANIMAL PRODUCTION FOR FOOD SECURITY

NOVEMBER 3-5, 2015

Auditorium of Eddy Agus Mokodompit

Organized by

Faculty of Animal Science Universitas Halu Oleo
Kendari - South East Sulawesi
Indonesia

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Remark From The Chairman of International Seminar Committee

ssalamualaikum Warahmatullahi

Vabarakatuh Dear Ladies and Gentleman,

s the host of the International Seminar, we are very grateful and would like to hanks to keynote speaker, all invited speakers and presenter who have repared the papers and participating to the seminar. We strongly believe that heir significant contribution will be useful to all of societies to enhance the evelopment of tropical animal production in the future.

he theme of this seminar is "Improving Tropical Animal Production for Food ecurity". We believe that food issue has become important and strategic ector and it should be the main strength of the Indonesian economic mpowerment. Food security in the animal production field is the concept of ulfilment food from animal which is produced using sustainable and eco-riendly farm system appropriate with local wisdom. Therefore, it was ecessary to formulate various policies, programs and strategies to accelerate he improvement of the production and the productivity of the tropical animal ased on the latest research.

n this seminar we have keynote speaker, Dr. Nasrullah Alwi; his current osition is Director of Animal Feedstuff at Directorate General of Animal lusbandry and Animal Health, Ministry of Agriculture, Republic of Indonesia. le will talk about The Policy of Indonesian Government on Improving Animal roduction.

esides that, we have six invited speakers from different countries;

rof. L. C. Cruz, he was Head of Philippine Carabao Research Center.

rof. Dr. Dahlan Ismail, he is an expert in the field of integrated livestock system, Universiti Putra Malaysia.

r. Kieren McCosker, he is an expert in free range-based management of cattle production. He works at Department of Primary Industry and Fisheries, Northern Territory, Australia.

rof. Monchai Duangjinda, he is an expert in animal breeding–native chicken production. His current position is Dean of Faculty of Agriculture, Khon Kaen University. He also works as Director of Research and Development Network Center for Animal Breeding (native chicken), Thailand.

The Effect of Liquid Extract Organic Fertilizer of Centrosema (*Centrosema pubescens*) Leaf Sheats on The Growth and Biomass Pruduction of Elephantgrass (*Pennisetum purpureum*).

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ABSTRACT

This research was aimed to determine the effect of liquid extract organic fertilizer of centrosema (*Centrosema pubescens*) leaf sheats on the growth and biomass pruduction of elephantgrass (*Pennisetum purpureum*). This research used complete random sampling method with five treatments and three replications by using polybag as a planting media. The treatments conducted were P0 (0 ml liquid feltilizer/plant), P1 (10 ml liquid feltilizer/plant), P2 (20 ml liquid feltilizer/plant), P3 (30 ml liquid feltilizer/plant), P4 (40 ml liquid feltilizer/plant). The parameters observed were the growth of plant height, tiller number, fresh biomass production and leaf blade percentage of elephantgrass. The results showed that the treatments were significantly affected on plant height, tiller number, fresh biomass production and leaf blade percentage of elephantgrass. Each treatment obtained best results such as in plant height was reached at P3 (135 cm), tiller number and fresh biomass productions were reached at P4 (8,33 plants and 291,67 gr) and leaf blade percentage was reached at P1 (55,31%).

Key words: Centrosema leaf sheath, growth, biomass pruduction, elephantgrass

INTRODUCTION

Availability of forage fodder in cattle breeding business in particular is very important, because the feed forage is one of the basic necessities of life to improve livestock productivity. To meet the needs of the forage in the industrial-scale farms and households can be done in various ways, one of which is the development of forage fodder land. Efforts are made to the cultivation of certain

types of grass pasture systems and non pasture on grazing or cut and carry in order to obtain optimum production.

There are many varieties of cut and carry grasses that are already utilized as beef cattle feeding. All that varieties generally have the character grow vertically, high productivity and has a lot of tillers and responsive to fertilization. Elephant grass is one that has been widely recognized by the public as a type of grass that has high productivity. This grass has been cultivated by farmers and livestock on an industrial scale. In order to increase the production of elephant grass, perform the various efforts that support the creation of conditions favorable environment for these plants. Steps are done through tillage and fertilization. Tillage is intended to prepare an optimal growing medium for plants. While fertilization aims to provide nutrients for plant growth as well as to replace nutrients lost or absorbed by plants (Mukhtar, 2005).

Fertilization elephant grass which has been frequently done is to use chemical fertilizer or organic or a combination of both. Fertilization with chemical fertilizers do have a significant effect for the growth of elephant grass. Chemical fertilizers have excellent ability in promoting plant growth and able to provide high yields. But over time, this method proved to have many shortcomings that are very detrimental to the life of living beings. Negative impacts biodiversity is declining soil causes the soil structure becomes dense and hard. In addition, the impact is even further is the use of chemical fertilizers is one of the largest contributors of greenhouse gas emissions. Seeing this, the use of chemicals in the field of livestock industry should gradually should begin to be abandoned and began to turn to organic fertilizers. Organic fertilizers are commonly used can be composted plant waste, composted manure and can also be combined with leguminous plants as green manure.

Utilization of legume crops as organic fertilizer has been developed mainly in the field of cultivation of green fodder. Plants of this type can improve

soil fertility because it has the ability to fix nitrogen from the air and pass it into the ground. Various methods are used in fertilizer use legume crops, namely: 1) immersing a legume plant parts around the plant as compost; 2) extracting the leaves of legumes primarily to be used as a liquid fertilizer; and 3) Conduct a combination of grasses and legumes that nitrogen is absorbed by the roots of legume can be utilized by the grass plants.

One type of legume used as organic fertilizer is Centrosema plants (Centrosema pubescens). The plant has the ability to absorb nitrogen very well so that the production of biomass is very high when combined with other plant species. In addition it also has the advantage centrosema can live in conditions of poor soil so that it can be used as ground cover plants known to have a good and rapid development. The nutrient content of leaves centrosema shown in Table 1.

Table 1. Nutrients Plant of Centrosema

Parameters	Materials content (%)
Dry matter	88,99
Crude protein	23,24
Crude fiber	8,80
Nitrogen	55,50
Calcium	1,22
Potassium	1,85
Phosphorus	0,54
Magnesium	0,30

Source : Nworgu, 2013

Centrosema plant's ability to absorb nitrogen from the air causing these plants contain a lot of nitrogenous especially on the leaves of plants, so it is good to be used as organic fertilizer. Liquid fertilizer production centrosema leaf extract has not been developed so that it would need to research how far centrosema leaf extract liquid material can be used as liquid fertilizer, especially in improving the productivity of forage fodder.

MATERIALS AND METHODS

Sample and Extract Preparation

The research was carried out at the experimental field of Animal Science Department of Agriculture Faculty, Gorontalo State University from November 2014 to February 2015. Liquid fertilizer used was extracted from the leaves of centrosema. The examined variety used was elephantgrass (*Pennisetum purpureum*).

The method of making liquid fertilizer was as follows: Centrosema leaves as much as 100 grams of fresh chopped solvent was then extracted with water at a ratio of 1: 3. Extraction is done by using a homogenizer / blender for 15 minutes. The extraction is left for 24 hours then filtered using a soft cloth and then the solution is ready for use as a treatment.

Results of the analysis of nitrogen fertilizer Centrosema leaf extract can be seen in Table 2 as follows:

Table 2. Levels of Nitrogen (N) in Centrosema leaf extract

Sampel	Titration (ml)	N Each Titration
Filtrate	21,80	36,52%
Dregs	19,95	63,44%

Source: Chemical Laboratory, Mathematic and Science Faculty, Gorontalo State University

Experimental Design and Treatments

The research was conducted using a completely randomized design with 5 treatments and three replications that overall there are 15 experimental units. The study was conducted in polybag as a planting medium where every unit planted the grass cuttings. The liquid fertilizer treatments are as follows:

P0 : 0 ml per polybag

P1 : 10 ml per polybag

P2 : 20 ml per polybag

P3 : 30 ml per polybag

P4 : 40 ml per polybag

Treatment of liquid fertilizer performed two weeks after planting and repeated every two weeks until the 60-day-old plants. Each treatment is required fertilizer liquid fertilizer as much as 300 ml, whereas during the study conducted fertilization three (3) times, so the total fertilizers required for the study was about 900 ml.

Parameters and Measurements

Parameters and measurements performed at the age of 60 days after establishment. The parameters observed in this study are:

1. The growths of plant were plant height and tiller number. Plant height is measured from ground surface to the highest end of the plant. Tiller number is measured from any number of tillers that grow in complete (stems and leaves).
2. The production of biomass were fresh biomass and leaf blade percentage. Fresh biomass measured after defoliated from the soil surface. While the percentage of leaf blade measured based on the leaf blade weight divided fresh biomass.

Data Analysis

The data were analyzed statistically by the analisis of varian and the difference in the mean value was calculated by least significant different (LSD).

RESULT AND DISCUSSION

4.1 Elephant Grass Plant Growth

a. Plant height

Plant height is an indicator that the plant is able to absorb nutrients well and the availability of sufficient,nutrients in the soil for plant growth. The growth of plant height between treatments are shown in Table 3 as follows:

Table 3. Mean of Plant Height of Elephantgrass 60 days after Establishment

Treatments	Mean of Plant Height (cm)
PO	107,70^{d}
P1	119,30^{c}
P2	124,0^{bc}
P3	135,00^{a}
P4	128,70^{b}

P0, P1, P2, P3 and P4 were extract liquid fertilyzer of 0 ml, 10 ml, 20 ml, 30 ml and 40 ml per polybag, respectively.
Different letter denote siqnificant difference among treatments at 5% level

Table 3 shown that the highest result obtained in P3 which was 135 cm, while the lowest growth at P0 was 107.67 cm. Analysis of variance in treatment centrosema leaf extract fertilizer on plant height elephantgrass showed the treatment was significantly different (P>0.05). The data above shown that fertilizer centrosema leaf extract at the level of the provision of 10, 20, 30 and 40 ml plant showed higher growth than without fertilizer centrosema leaf extract. It shown that the fertilizer is given can provide nutrients that can be utilized for the growth of the plants.

Yani (2008), reported that complement organic liquid fertilizer showed significantly different effect on the growth of tall grass. Concluded the highest

growth was obtained in the treatment of 4 ml/liter of water that is 65.24 cm, while liquid fertilizer without showing plant height 48.65 cm. This is because the grass needs nitrogen that is readily absorbed in the soil have not been fulfilled optimally as a result of the use of chemical fertilizers in the long term so that the use of the PLC has not shown the maximum results.

Treatment effect on plant height allegedly closely related to the dose/level of fertilizer applied, where the higher levels of fertilizer applied the more nutrients that plants can absorb. The average plant height data indicate that growth is only slightly lower P0 to P1, P2, P3 and P4. This is presumably due to the low nutrient that can be absorbed by plants that have not been sufficient to promote the growth of plant height maximum. As it is known that the leaf extract liquid fertilizer Sentro nitrogen content is high enough where these elements are very useful in the process of plant growth. This is in accordance with the opinion of Muhakka *et al* (2012) which states that the nitrogen needed by the plants in the process of the formation of proteins that boost the growth of crop plants such as stems, leaves and roots.

Lasamadi (2013) reported that states that the amount of the percentage of growth is highly dependent on the availability of nutrients in the soil, especially nitrogen and organic matter also directly affects plant physiology such as increased respiration to stimulate the uptake of nutrients that promote the growth and production of these

b. Tiller Number

One indicator is the productivity of elephant grass seedling production/shoots, where a growing number of tillers, the more prospective parent in the future. Seedling production can be used to predict high and low weight of forage produced. The tiller number production of elephantgrass are shown in Table 4.

Tabel 4. Tiller number Production 60 days after establishment

Treatments	Tiller Number
PO	5,3
P1	6,3
P2	6,7
P3	7,0
P4	8,3

P0, P1, P2, P3 and P4 were extract liquid fertilyzer of 0 ml, 10 ml, 20 ml, 30 ml and 40 ml per polybag, respectively.
Different letter denote siqnificant difference among treatments at 5% level

The above data shown the production of elephant grass seedlings treated tends to be higher than the untreated. The highest production contained in P4 stem that is equal to 8.33, while the lowest production at P0 is 5.33 rods.

Results of analysis of variance showed that centrosema leaf extract fertilizer treatment effect was significantly different (P>0.05) on the production of elephant grass seedlings. Based on the data the average production of seedlings showed that production at P0 lower than treatment P1, P2, P3 and P4. This indicates that the leaf extract fertilizer Centrosema quite an effect on seedling growth of elephant grass, but due to the still low level of provision that is thought to cause the least nutrients that can be absorbed by plants so that there are no significant differences between treatments.

Lasamadi (2013) reported where the provision of effective microorganism fermented manure 4 (EM-4) Significantly affected the number of tillers grass where the composting of 30% indicates the average number of tillers as much as 29.8 stem, while without Compost fertilizer can only peak at 21.4 stems. This is According to Lasamadi (2013) Showed that the nutrient nitrogen contained in organic fertilizers huge benefit for plant growth and development, Among others: making plant leaves more fresh greens and many Contain grains of green leaves

(chlorophyll) the which has a very important role in the process of photosynthesis, plant growth Accelerate (height, number of tillers and branches) and increase of the protein content of the plant. The organic fertilizer to the soil conditions were critical or nutrient poor very good because of the addition of organic fertilizers in the soil, improving the structure of the soil is more crusts and increase of the number of pores of the soil só as to facilitate new shoots grow through the soil surface.

Nuriyasa *et al* (2012) reported that organic fertilizer biourin as much as 75,000 liters/ha (150 ml/pot) perpengaruh significantly to the production of elephant grass tillering fertilizer application biourin than without it. Fertilizer treatment of 150 ml/pot showed an average of seedling production growth of as much as 6.50 tiller while without fertilizer as much as 4.50 tillers. This shows that the amount of fertilizer given a great effect on the production of elephant grass tillers so it concluded that the level/doses given in this study was quite low which cause no significant differences after receiving treatment.

The second related study above shows that the higher the doses of fertilizer applied, elephant grass seedling production will be higher. It can be concluded that organic fertilizer can increase production elephant grass seedlings.

4.2. Biomass Production

a. Fresh Biomass

Fresh biomass production is the most important indicator in assessing the productivity of elephantgrass. A fresh production plant fresh weight after cutting, in this case the cuts are made at the plant with a distance of 10 cm from the ground. Cutting is done at the age of 60 days after planting. The mean of fresh biomass production was shown in Table 5.

Table 5 showed that fresh biomass production plant fertilizers centrosema leaf extract (P1, P2, P3 and P4) have a slightly higher fresh production of the plant without fertilizer (P0). Fresh average production is highest at P4 was 291.67 gr and the lowest production at P0 was 135 gr.

Tabel 5. Fresh biomass production 60 days after establishment

Treatments	Fresh Matter Weight (gr)
PO	135,0
P1	250,3
P2	258,0
P3	268,0
P4	291,7

P0, P1, P2, P3 and P4 were extract liquid fertilyzer of 0 ml, 10 ml, 20 ml, 30 ml and 40 ml per polybag, respectively.
Different letter denote siqnificant difference among treatments at 5% level

Fresh biomass production shown that fertilizer centrosema leaf extract was significantly different (P>0.05). Results of previous studies on the use of liquid fertilizer on elephantgrass plants show different things as reported Muhakka *et al* (2014), that the administration of liquid fertilizer with a dose of 2 l/ha showed the highest production among other treatments in which up to 648.93 gr/clump, this production is reported to be significantly different from the control treatment whose production only reached 306.95 gr/clump.

The absence of real effect Centrosema leaf extract fertilizer treatment in this study thought to be caused due to the still low level of fertilizer given to the treatment plant so that the nutrients are absorbed by plants is still low, thus the plants have not shown optimal growth. Nevertheless administration of liquid fertilizer Centrosema leaf extract proven to provide higher yields than without fertilizer. This shows Centrosema leaf extract fertilizer contains nutrients useful

Baggi plants, especially nitrogen (N), which is needed in the growth and its produktivity.

Muhakka *et al* (2014) reported that nitrogen needed in the process of formation of plant proteins thus improving vegetative growth of plants such as stems, leaves and roots. Nitrogen is the main nutrient that can accelerate plant vegetative growth of plants (Nasaruddin, 2010). Nitrogen is needed to stimulate vegetative growth, increase the size of the leaves and increase the chlorophyll content. Kusuma (2013) reported that the fertilizer is an important source of nutrients for plants in the growth process both in increasing the vertical height, number of leaves, as well as the number of seedlings and crop production.

b. Leaf blade Persentage

A high percentage of leaves showed the quality of elephant grass plants, the higher the percentage of leaves showed that the higher the plant nutrients. This was due to more plant nutrients found in the leaves than the stems. The leaf blade percentage of this researched are shown in Table 6.

Tabel 6. Leaf blade percentage of elephantgrass 60 days after establishment

Treatments	Leaf Blade Percentage
PO	54,5
P1	55,3
P2	54,2
P3	55,3
P4	55,1

P0, P1, P2, P3 and P4 were extract liquid fertilyzer of 0 ml, 10 ml, 20 ml, 30 ml and 40 ml per polybag, respectively.
Different letter denote siqnificant difference among treatments at 5% level

Analysis of variance of the mean percentage of leaf blade showed Centrosema leaf extract fertilizer treatment was significantly different (P> 0.05) but almost similar from PO to P4. However it was high percentage reached at P1 and P3 than at P4 and lowest at PO and P2.

Previous research as reported Nuriyasa (2012), that the administration of liquid fertilizer on the plants bulrush biourin able to increase the number of leaves that fertilizer treatment as much as 75,000 ml/ha significantly different than without fertilizer biourin. Leaf extract liquid fertilizer treatment had no significant effect Centrosema allegedly caused by the low doses of fertilizers applied to the treatment that few nutrients that can be absorbed by plants. Nutrients contained in organic fertilizers is very beneficial to plants, especially in the formation of roots, leaves and stems of plants. According Nuriyasa (2012), the higher the dose of fertilizer biourin given to plant grass and Setaria the growth and forage production will increase. This is because the higher the nutrients available to plants cause growth and increased productivity.

Mulatsih (2003) reported that which conducts research on elephant grass discovered that the elephant grass didefoliasi at 30 days tended to show a higher percentage of leaves than didefoliasi between 45 and 60 days. Further stated that the longer the life of defoliation, the more chance the plants to grow and photosynthesize, so that the greater accumulation of carbohydrates and some carbohydrates that form is used for the formation of cell walls and further increase the proportion of stem and fresh forage grass. Opinion was supported by Kurniawati, in Mulatsih (2003), that at the age of short defoliation of plants are forming and growing new shoots so the plants need a lot of nutrients used plant organs such as leaves, so the ratio of leaf stems tend to be higher

CONCLUSION

The provision of liquid organic fertilizer Centrosema leaf extract significantly affected (P <0.05) on the growth of plant height and tiller number of elephantgrass at the age of 60 days after establishment, the best results of plant height growth was obtained in treatment 4 (P3) was 135 cm, while tiller number in treatment 5 (P4) was 8.33.

The provision of liquid organic fertilizer Centrosema leaf extract significantly affected (P<0.05) and the percentage of leaf biomass production elephant grass, where the best treatment for fresh production is in treatment 5 (P4) which is 291.67 grams, while the percentage of leaf blade contained in treatment 2 (P1) is 55.31%.

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