

1 **Use of Compost Fertilizer from Sheep Manure and Chicken Manure on Bengal Grass**  
2 **Growth(Panicum Maximum) After First harvest**  
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6 **ABSTRACT**

7 *This study at to determine the effect of manure on the growth and production of fresh forage tall*  
8 *elephant grass. The design used was completely randomized design (CRD) with 4 treatments and 5*  
9 *replications. The treatments were as follows: Po = control (without fertilizer), P1 = cow manure; P2 = sheep*  
10 *manure and chicken manure P3. The results showed that the use of some types of manure to the planting of*  
11 *elephant grass was highly significant (p <0.01) in the plant height, leaf length, number of tillers and fresh*  
12 *forage production.*

13 **Keyword:** Bengal Grass, Sheep Manure and Chicken Manure  
14

15 **INTRODUCTION**

16 Bengal Grass is a type of grass that is widely used as animal feed that has a good  
17 nutritional composition. The origin of the Bengal grass is from Africa, precisely in  
18 Zimbabwe which was later given the Latin name *Panicum maximum*. This type of grass can  
19 serve as ground cover, grazing, or processed in the form of hay and silage  
20 (Humphreys, 1995). The characteristics of this plant are that it grows upright to form clumps,  
21 can reach 1-1.8 m high, leaves are smoother than elephant grass, hairy leaflets and tongues,  
22 form many tillers, flowers are arranged in panicles and are green or yellowish in color, and  
23 roots deep fiber, drought resistance, high production potential, high quality feed (Adedji,  
24 2006).

25 Bengal grass has a nutritional content of PK 18.37%, SK 27.40%, LK 3.81, Ash  
26 3.81. This grass can grow on rocky soil with a thin layer of soil, even on poorly drained  
27 soil and is tolerant of mild dry conditions and shade soil, long-lived plant, adaptable to all  
28 types of soil. At light intensity of 30-50% still producing normally. Cultivation in the  
29 context of developing and utilizing Bengal grass as forage for livestock has introduced  
30 several superior cultivars.

31 Many types of superior grasses have been cultivated in our country, the most  
32 popular are of course elephant grass and king grass. Actually, there is another grass race  
33 that also has high potential to be used as forage for livestock which is actually also easy to  
34 cultivate, namely Bengal grass (*Panicum maximum*). Bengal grass is a grass originating  
35 from tropical and sub-tropical Africa. Entered Indonesia in 1865 and cultivated because of  
36 its high nutritional value as animal feed.

37 The problem with artificial fertilizers used so far is that it causes damage to the soil  
38 structure due to the continuous use of artificial fertilizers so that the development of plant  
39 roots is not perfect. This will also have an impact on the production of crops cultivated by  
40 farmers who are usually given artificial fertilizers. Likewise, the effect of modern  
41 production facilities on the environment has been felt by many farming communities, the  
42 continuous use of artificial fertilizers causes dependence and their land becomes more  
43 difficult to cultivate.

44 Manure is organic fertilizer derived from livestock manure, either in the form of  
45 solid manure (feces) mixed with leftover feed, or urine (urine). Feed has a very important  
46 influence in determining nutrient levels, if the feed given contains a lot of N, P and K  
47 nutrients, the feces will also be rich in these substances (Hardjowigeno, 1995). (Isroi, 2009)  
48 includes the element N which functions in protein synthesis to form plant organs. Element

49 P functions for root growth and on the top of plants such as stems and leaves, other  
50 functions are to stimulate flower growth and increase resistance to pests and diseases.  
51 Elemental K is useful for increasing the synthesis and translocation of carbohydrates,  
52 thereby accelerating cell wall thickness and stalk strength.

53 Provision of manure on grass greatly affects the productivity of cultivated grass  
54 plants. Manure contains different nutrients depending on the type of animal. Manure can  
55 increase the availability of nutrients for plants and can stimulate plant vegetative growth.  
56 The application of manure can increase the production of fresh weight forage and dry  
57 weight of Bengal grass (Lugio, 2004).

58 The purpose of the study was to determine the effect of the use of fertilizers  
59 from sheep manure and chicken manure on the growth of bengal grass (**pannicum**  
60 **maximum**) after the first defoliation.

61

## 62 **MATERIALS AND METHODS**

### 63 **Place and time of research**

64 This research was conducted in Klambir Lima Kebun Village, Hamparan Perak  
65 District, Deli Serdang Regency, North Sumatra **Province**. This research was conducted for  
66 3 months and started from **April 2017 to July 2017**.

67

### 68 **Research Materials and Tools**

69 The materials used in this study were bengal grass seed (**Panicum maximum**),  
70 manure from chicken and sheep manure.

71 The tools used in this study were hoes, sickles, ropes and scales, wheelbarrows,  
72 meters, spades, calculators, stationery.

### 73 **Research methods**

74 The method used in this study was a completely randomized design (CRD) with 6  
75 treatments and 4 replications. The treatment given is as follows:

76 T0 = **Bengal grass without manure**

77 T1= **fertilizercompost 50% chicken manure + 50% sheep manure**

78 T2= **fertilizercompost 25% chicken manure + 75% sheep manure**

79 T3= **fertilizercompost 75% chicken manure + 25% sheep manure**

80 T4 = **fertilizercompost 100% chicken manure**

81 T5 = **fertilizer100% sheep manure compost**

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### 83 **Data analysis**

84 The linear model used in this study is a non-factorial Completely Randomized  
85 Design (CRD) with a linear model as follows:

$$86 Y_{ij} = \mu + i + ij$$

87 Information :

88  $Y_{ij}$  : The results of the observation of the i-th treatment and j . repetition

89  $\mu$  : **General mean**

90  $i$  : Effect of treatment to - i

91  $ij$  : Experimental error due to treatment - i and repetition - j

92 If there is a real difference, it will be tested further with further tests in accordance  
93 with the coefficient of diversity of the research data (**Hanafiah**, 2014).

94

### 95 **Land Preparation**

96 Land preparation begins with clearing the land of weeds **andgarbage** using a hoe  
97 and scratching. **Sand the making** of 24 plots of land with the size of each plot of 3 **mx** 3 m

98 and the distance between the plots of 1 m. Furthermore, manure was spread at a dose of 20  
99 tons/ha according to the treatment evenly on each plot and allowed to stand for 2 weeks  
100 before planting.

101

### 102 **Planting**

103 Bengal Grass Planting (**Panicum maximum**) is **done** in the form of cuttings planted as  
104 deep as 2 cm according to the cuttings used as research material. Bengal Grass **Seeds**  
105 (**Panicum maximum**) were planted perpendicularly with a spacing of 60 **mx** 60 m.

106

### 107 **Plant Maintenance**

108 Plant maintenance is carried out since the seeds of the **Bengal Grass (Panicum**  
109 **maximum)** are planted in the field until the grass is harvested. The maintenance of the  
110 **Bengal Grass plant (Panicum maximum)** includes the following:

111

### 112 **Weeding**

113 During the growth of the **Bengal Grass (Panicum maximum)** weeds were carried  
114 out on each plot of weeds. Weeding is done by pulling the weeds by hand carefully so as  
115 not to damage the roots of the **Bengal grass (Panicum maximum)** plant itself. While  
116 weeding, carefully loosen the soil.

117

### 118 **Sprinkling**

119 At the beginning of growth, **Bengal Grass (Panicum maximum)** **need** to get enough  
120 water. Therefore, watering is done once a day, or depending on the weather and soil  
121 conditions. When watering, the soil should not be too wet (muddy), because it can cause  
122 plant roots to rot. Watering activities are carried out in the morning.

123

### 124 **Data Treatment and Collection**

125 The treatment of manure from sheep and chicken manure was given two weeks  
126 before planting. Manure was sprinkled on each plot as much as 20 tons/ha (18 kg/9 m<sup>2</sup>).  
127 Bengal grass growth data was taken two weeks after the first defoliation. Data on plant  
128 height, number of leaves and number of tillers were carried out once a week. Fresh forage  
129 production data was carried out when the Bengal grass was 50 days old by cutting all the  
130 grass in each plot by leaving 10 cm above the soil surface. Furthermore, the grass from  
131 each plot was weighed to determine the production of fresh forage.

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### 133 **Observed Parameters**

#### 134 **1. Plant Height After First Cutting (cm)**

135 Plant height measurements were carried out from the limit after the first cutting to  
136 the tip of the highest leaf.

#### 137 **2. Number of Leaves After First Defoliation (strands)**

138 Measured from the base of the leaf to the tip of the longest leaf.

#### 139 **3. Number of tillers after first defoliation (stalk)**

140 Measured together with plant height

#### 141 **4. Fresh Forage Production After First Defoliation (kg)**

142 Measurement of forage production was carried out by cutting and weighing all the  
143 grass contained in the plot.

144

## 145 **RESULTS AND DISCUSSION**

### 146 **Plant Height (cm)**

147 The data on the average growth of grass height during the study are presented in  
 148 Table 1 and the height development of the Bengal grass during the study is explained in  
 149 Figure 1.  
 150 Table 1. Average plant height using chicken and sheep manure compost on Bengal grass.

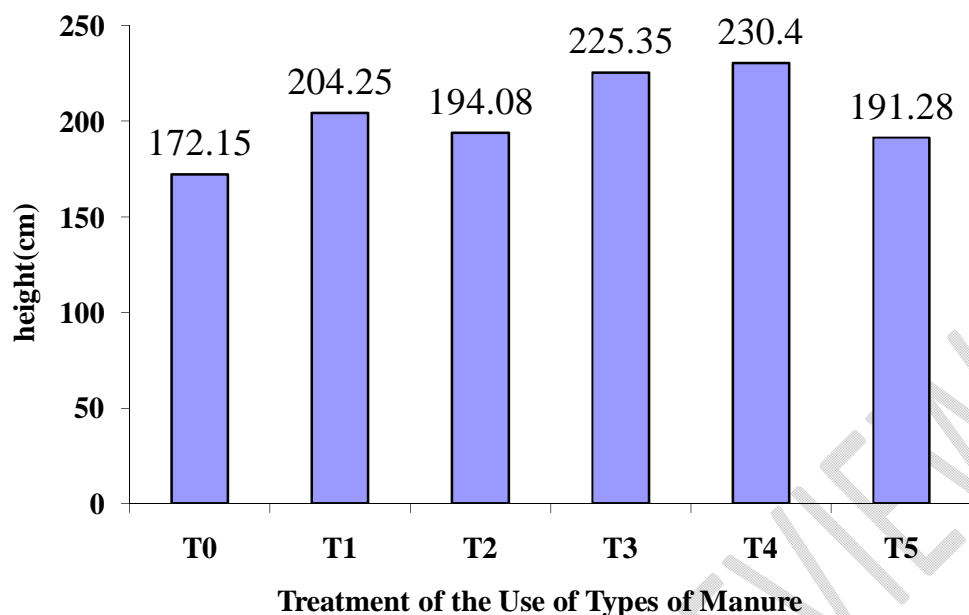
Treatment	Test				Total	Average
	I	II	III	IV		
T0	172.40	170,40	173.50	172.30	688,60	172.15 A
T1	201.30	206,80	205,30	203.60	817.00	204.25 C
T2	193.40	193.60	195.00	194.30	776.30	194.08 B
T3	224,20	225,20	226.30	225,70	901.40	225.35 D
T4	230.61	228.50	236.70	225,80	921.61	230.40 D
T5	192.70	190.60	189.50	192.30	765.10	191.28 B

151 Description: Different superscripts in the same column show very significant differences (p  
 152 >0.01)

153 The results showed that the T4 treatment (chicken manure) and T3 treatment (75%  
 154 chicken coop manure and 25% sheep) were better than the use of fertilizers in T1 treatment  
 155 (50% chicken coop manure and 50% sheep), T2 treatment (chicken manure) 25% and sheep  
 156 75%), and treatment T5 (sheep manure). This is because the application of manure can  
 157 increase nutrient elements, especially N and K in the soil. Although the combination of  
 158 sheep manure and chicken manure still cannot compensate for the application of 100%  
 159 chicken manure which has higher N, P, and K content and the decomposition power of sheep  
 160 manure is slower due to the hardness of sheep manure. This is what makes fertilizer  
 161 application with T4 treatment (100% chicken manure) the best in the study.

162 The element N is needed by plants for the formation of chlorophyll, and chlorophyll  
 163 itself is an acceptor in the absorption of sunlight which is needed by plants in the  
 164 photosynthesis process in order to produce photosynthesis which is needed by plants for  
 165 growth and development. (Rodina, 2014).

166 The availability of nutrients in the soil through proper fertilization during plant  
 167 growth and development results in the activity of plant roots causing the addition of  
 168 nutrients, making more nutrients can be absorbed from the soil. According to Santoso (2002)  
 169 states that nitrogen in plants functions as a constituent of protoplasm, chlorophyll molecules,  
 170 nucleic acids and amino acids which are constituents of proteins, if nitrogen deficiency  
 171 occurs it can cause disturbed vegetative and generative growth of plants. The average  
 172 developmental height of the Bengal grass from the measurement results during the study is  
 173 presented in Figure 1.



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Figure 1. Height Growth of Bengal Grass from the Effect of Manure Use.

#### Leaf Length(cm)

The average leaf length of Bengal grass from the effect of chicken and sheep manure application is presented in Table 2 and clarified in Figure 2.

Table 2. Average Leaf Length of Bengal Grass from the Effect of Giving Chicken and Sheep Manure compost during the study.

Treatment	Test				Total	Average
	I	II	III	IV		
T0	83.80	82.40	83.80	83.90	333.90	83.48 A
T1	95.50	94.80	96.20	97.10	383.60	95.90 D
T2	93.40	91.10	92.80	92.30	369,60	92.40 C
T3	103.90	102.40	104.70	104.50	415,50	103.88 E
T4	105,90	107.40	108.70	109.50	431.50	107.88 F
T5	85,20	87.50	86.60	88,10	347,40	86.85 B

182 Description: Different superscripts in the same column show very significant differences (p  
183 > 0.01)

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The results showed that the treatment using manure from chicken and sheep manure had a very significant effect on leaf length. In general, the treatment with manure gave better results on leaf length when compared to without the use of manure (P0). This is because manure contains high levels of nutrients needed by plants. The growth of bengal grass leaf length during the study can be presented in Figure 2.

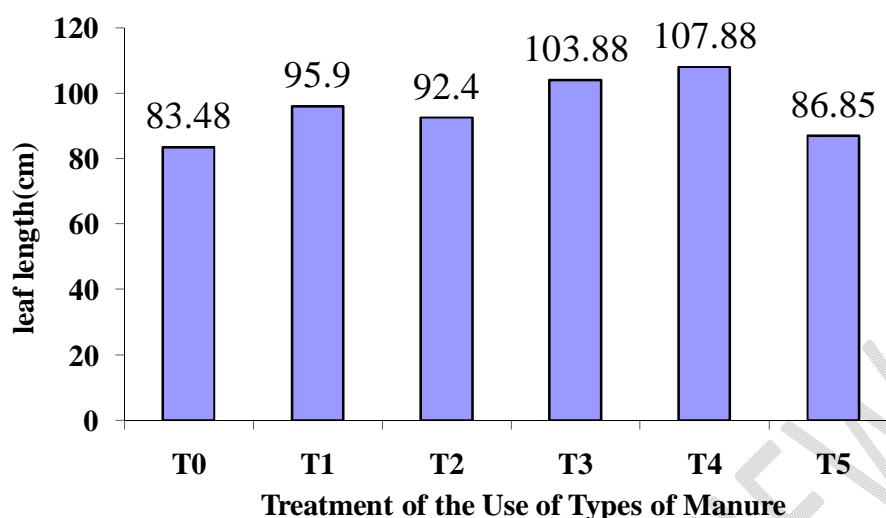


Figure 2. Development of leaf length from the effect of giving some manure.

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The use of fertilizer in the T5 treatment (sheep manure) had shorter leaves due to the slower solubility of sheep manure in the soil so it was absorbed. Fertilization using chicken manure (T4) has a better leaf length when compared to the treatment of sheep cages or a combination of the two manures. This is because the solubility of nutrients in chicken coop is higher than sheep manure, thus accelerating the absorption of nutrients in the soil. and some can be washed into the soil and not absorbed by plant roots, besides that the use of fertilizers quickly results in nutrients in the soil for plants remaining available to plants. Lingga and Marsono (2003) stated that it is necessary to apply fertilizers containing more nutrients, which are assessed based on the nutrient content of the fertilizer, concentration and organic fertilizer. This is due to the higher amount of nutrients in organic matter resulting in better leaf length.

#### Number of tillers (children)

The average number of saplings of Bengal grass from the effect of applying several types of fertilizers during the study is presented in Table 3 and clarified in Figure 3.

Table 3. Average number of Bengal grass tillers from the effect of manure application for chickens and sheep during the study.

Treatment	Test				Total	Average
	I	II	III	IV		
T0	3.60	3.80	4.20	4.30	15.90	3.98 A
T1	4.95	4.57	4.80	5.20	19.52	4.88 BC
T2	4.43	4.50	4.60	4.45	17.98	4.50 ABC
T3	4.40	4.90	5.30	5.50	20,10	5.03 C
T4	4.80	5.20	4.90	5.30	20,20	5.05 C
T5	4.20	3.90	4.30	4.40	16.80	4.20 AB

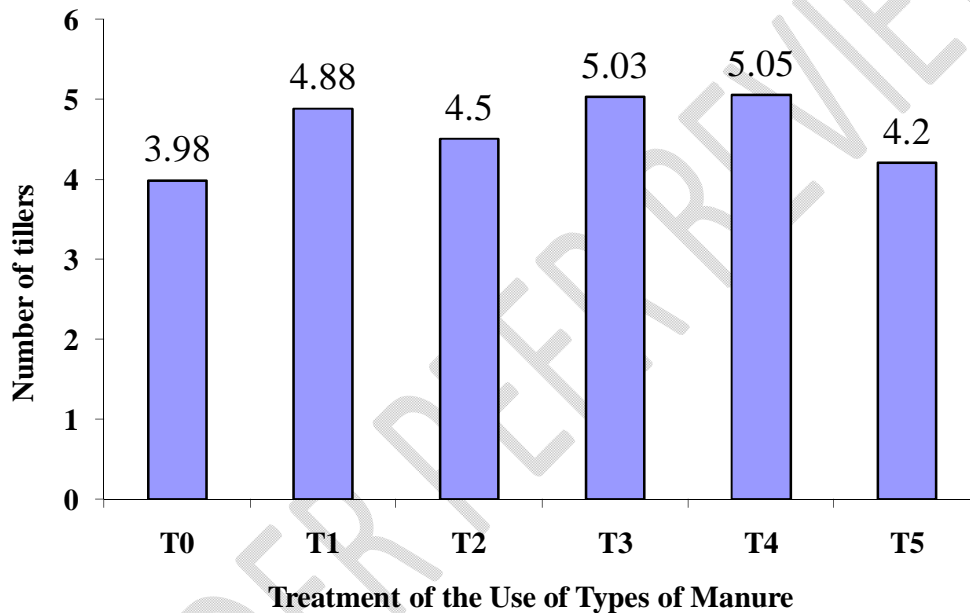
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Description: Different superscripts in the same column show very significant differences ( $p > 0.01$ )

The number of tillers is an important factor in increasing bengal grass production. Tests in the use of several types of manure have a very significant effect on the number of

215 tillers. **H**This shows that fertilizer from sheep and chicken manure can stimulate the increase  
216 in the number of tillers. The number of tillers cannot be separated from the effect of nutrient  
217 dissolution in manure as well **as**absorption of nutrients by plant roots, so that nutrients and  
218 absorbed by bengal grass plant roots can be utilized by plants for plant propagation. From  
219 the results of the study, it was found that the use of chicken manure in T4 treatment was the  
220 best number of tillers with the highest number of tillers, followed by T3 treatment with a  
221 combination of 75% chicken manure + 25% sheep and the lowest with the use of sheep  
222 manure.

223 The two types of manure used are organic fertilizers which have different solubility  
224 and are slower than inorganic **fertilizers**. Organic fertilizers that dissolve and melt in the soil  
225 are able to add nutrients to the soil and are sufficient for the development of Bengal grass  
226 plants. One of the more dominant factors is that the type of fertilizer will accelerate its  
227 response to the increase in the number of plant tillers (Santoso, 2002). The growth of the  
228 number of Bengal grass tillers during the study can be presented in Figure 2.



229 Figure 3. The development of the number of tillers from the effect of giving several types of manure.  
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## 231 **CONCLUSIONS AND RECOMMENDATIONS**

### 232 **Conclusion**

233 The use of chicken and sheep manure and their combination on Bengal grass showed  
234 that the use of fertilizer in T4 treatment (100% chicken manure) was still the best and for  
235 the combination, T3 treatment (75% chicken manure and 25% sheep) was a type of  
236 fertilizer. cages are the best in increasing the growth and production of bengal grass.  
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### 241 **Suggestion**

242 Further research is needed on the use of various types of manure and their combinations on  
243 different grasses to determine the most efficient and best fertilizer for the growth of the  
244 grass.  
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