Each manure was composted consisting of manure (80%), rice husk (10%), Gamal leaves (5%), husk ash/kitchen ash (5%), agricultural lime (1%), molasses (100ml) and EM-4 (100ml) fermenters. The composting process is carried out for three weeks. Compost analysis test results are shown in Table 2.

C. Biochar Manufacturing

Biochar is made in a simple way through coaxing on a pan made from used drum flats. Each livestock faeces as much as 100 kg is carried out burning 1-2 hours, then cooled to obtain a 30-60% yield range. Biochar analysis results of cow, goat, and chicken faeces are shown in Table 3.

TABLE III
BIOCHAR CHARACTERISTICS OF COW, GOAT, AND CHICKEN MANURE [9]

Type of Analysis	Biochar		
	Cow	Goat	Chicken
C organic (%)	28.82	22.39	24.07
N (%)	0.14	0.19	0.16
C/N	205.86	117.84	150.44
P (ppm)	383.09	420.62	391.04
K (ppm)	159.64	175.20	232.36

D. Research Design

This research was conducted in the Selat Village, Abiansemal District, Badung Regency, Bali. Analysis of soil properties before and after the study was conducted at the Soil Laboratory of the Faculty of Agriculture, Udayana University, Denpasar. The study was conducted in a greenhouse using polybags, which lasted from April to August 2019. This research was a nested experiment using a randomized block design. The treatment composition consisted of 6 types of fertilizer: Cow Compost (Cc), Goat Compost (Gc), Chicken Compost (Ckc), Cow Biochar (Cb), Goat Biochar (Gb), Chicken Biochar (Ckb), and three levels of fertilizer dosage (5, 10, and 15-tons ha^{-1}) and one control treatment. From the treatments' arrangement, 19 treatments were obtained, using 3 replications, a total of 57 experimental units were needed.

E. Observation Variable

The observed variables are the soil properties after the study (C-organic, N-total, P-available, K-available, and C/N), and the observed plant variables are the amount of fresh red chili per plant and the weight of fresh red chili per plant.

III. RESULTS AND DISCUSSION

The statistical test results in Table 4, show that the differences in the types of compost fertilizer differed significantly ($P<0.05$) with N-total and weight of red chili, and were significantly different ($P<0.05$) against P-available. This result shows that differences in livestock manure sources (cattle, goats, and chickens) for compost affect soil properties and chili yields. Goats' eating behavior as a browser consumes more leaves so that the P content is higher (Table 1). While the highest N-amount in chicken manure, because the ration consumed is more than whole grains, so it is not perfectly digested in the digestive tract. Whereas after being processed into compost, N-total in compost from cow dung is highest because of the presence of microbes that multiply in the cecum and large intestine and develop during the composting process, but the P available is the lowest (Table 2). Although the type of livestock manure raw material in compost and biochar does not affect the amount of red chili per plant, this type of fertilizer has a significant effect on the weight of red chili per plant.

TABLE IV
SIGNIFICANCE OF THE EFFECT OF TYPES AND DOSES OF BIOCHAR AND COMPOST ON VARIABLE SOIL PROPERTIES AND YIELD OF RED CHILI

No	Variable	Type of fertilizer	Dosage					
			Cc	Gc	Ckc	Cb	Gb	Ckb
1.	C-organic (%)	ns	ns	**	ns	ns	ns	ns
2.	N-total (%)	*	ns	ns	*	ns	ns	**
3.	P-available (ppm)	**	ns	**	**	**	**	**
4.	K-available (ppm)	ns	**	*	**	ns	**	ns
5.	Rasio C/N	ns	ns	ns	ns	ns	ns	ns
6.	Number of red chilies (fruit)	ns	ns	ns	ns	ns	ns	*
7.	Weight of fresh red chili (g)	*	ns	ns	ns	ns	ns	**

*= significant effect, ** = very significant, ns = not significant

TABLE V
EFFECT OF COMPOST AND BIOCHAR FERTILIZER ON SOIL PROPERTIES AND YIELD OF RED CHILI

Type of Fertilizer	C organic (%)	N total (%)	P available (ppm)	K available (ppm)	C/N	Number of red chillies (fruit)	Weight of fresh red chilli (g)
Cow Compost (Cc)	2.95 a	0.14 c	75.03 c	181.12 a	20.95 a	17.67 b	143.86 b
Goat Compost (Gc)	3.56 a	0.18 abc	132.72 b	182.18 a	20.51 a	20.75 ab	168.37 ab
Chicken Compost (Ckc)	3.18 a	0.21 a	153.63 b	182.51 a	16.28 a	18.33 ab	156.80 ab
Cow Biochar (Cb)	3.07 a	0.16 abc	141.54 b	174.25 a	20.52 a	19.42 ab	158.22 ab
Goat Biochar (Gb)	3.51 a	0.15 bc	127.87 b	184.75 a	25.23 a	18.75 ab	163.79 ab
Chicken Biochar (Ckb)	3.08 a	0.20 ab	271.13 a	171.93 a	16.27 a	21.42 a	188.74 a
Coefficient of Variant	24.94%	23.96%	18.30%	7.16%	27.05%	18.65%	18.87%

Information: The same letter at the average value in the same column is not significantly different at the Duncan test level of 5%

Figures 1, 2, 3, 4, and 5 presents the effect of various types of fertilizer treatment on soil properties such as N, P, K, C / N, and fresh weight of red chili. In detail, in Table 5 compost from chicken manure has the highest N and P content (Figure 1, 2) significantly different ($P<0.05$) compared to cow dung compost, but the available K is not significantly different (Figure 3). Potassium and Calcium (part of plant cell walls) show positive deviation when composted. While the C/N ratio (Figure 4) is lower than cow dung compost, but it is not significantly different ($P>0.05$), and is still in a good range [6].

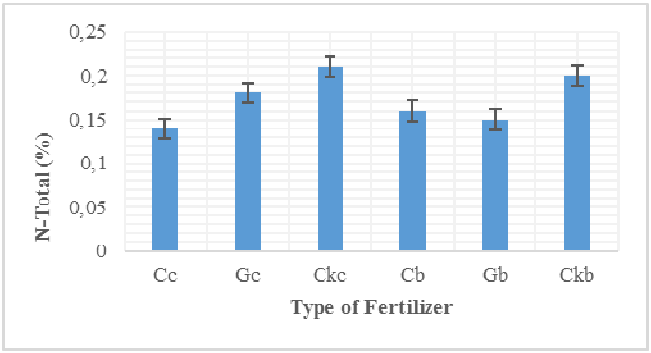

Fig. 1 Relationship between the type of fertilizer with N-total

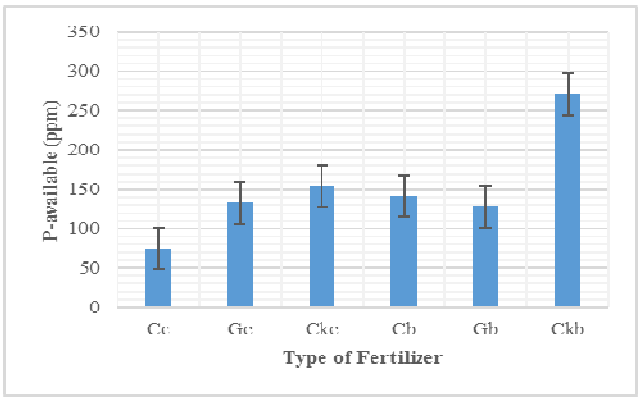

Fig. 2 Relationship between the type of fertilizer with P-available

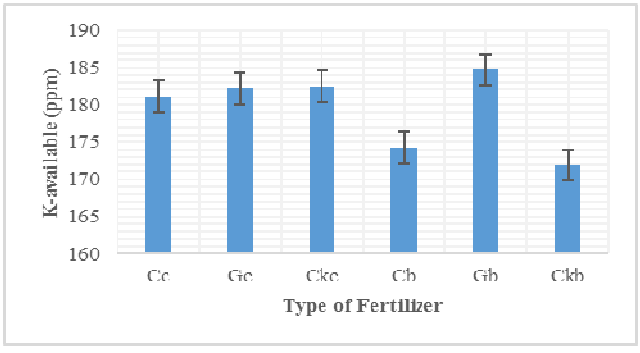

Fig. 3 Relationship between the type of fertilizer with K-available

Biochar treatment from chicken manure gave the highest yield on fresh chili weight variables than other types of fertilizer treatments (Figure 5). This result proves that goats consume more legume leaves and, in the cecum, and large intestine of living bacteria so that manure contains a lot of N, then after decomposition N is available in more soil. Besides, with the hard physical structure of goat faeces, the nutrient elements bound in it are not easily washed away dissolved in water.

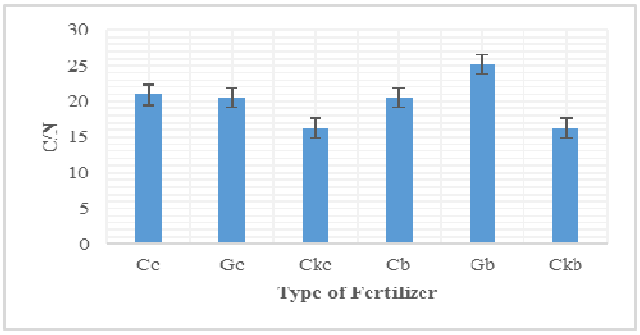

Fig. 4 Relationship between the type of fertilizer with C/N ratio

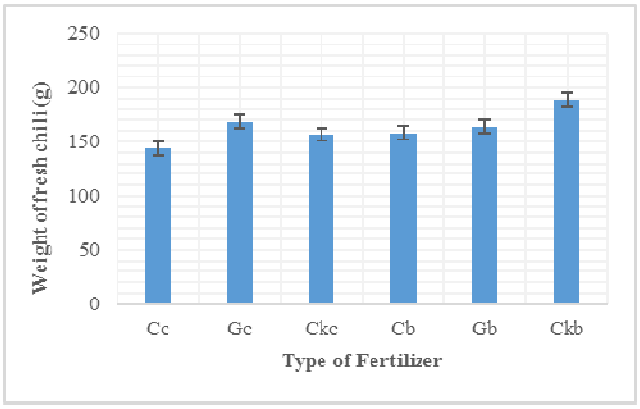

Fig. 5 Relationship between the type of fertilizer with the weight of fresh chili

Whereas, chicken biochar manure was significantly ($P<0.05$) highest for fresh red chili per plant and the weight of fresh red chili per plant, and this is because of the highest total N and P, and the lowest C/N in poultry biochar droppings. Corn production increased by 6% in the first season [21]. Chicken manure fertilizer is better than a goat and goat manure in vegetable crops [22]. Poultry droppings are among the best-performing organic fertilizers and are therefore recommended for farmers in agro-climatic conditions compared to other livestock compost on the number of branch leaves, leaf area, and speed of harvest time on coriander plants [23].

Compost from cow dung responds to the lowest amount of fresh red chili per plant and the lowest weight of fresh red chili per plant ($P<0.05$), because of the lowest amount of N and P available and the highest C/N. This finding is also related to the predominant consumption of fodder field grass and elephant grass [24], where field grass contains high crude fiber, which consequently will increase the C/N ratio. Higher C/N ratios cause high C levels to suppress plant growth because microbial decomposers will use available N to decompose organic matter so that plants lack N [6]. The fermentation process in processing cow dung into biological fertilizer affects the pH decrease from 8.13 to 6.77 and can eliminate pathogenic microorganisms at 50 ºC [25]. Seasonal differences also affect the quality of animal feed, were in the dry season the composition of field grass in the ration increases [26], consequently, the higher the crude fiber, the higher C/N.

TABLE VI
EFFECTS OF COMPOST AND BIOCHAR FERTILIZER DOSE ON SOIL PROPERTIES AND YIELD OF RED CHILI

Dose Treatment	C organic (%)	N total (%)	P available (ppm)	K available (ppm)	C/N	Number of red chilies per plant (fruit)	Weight of fresh red chili per plant (g)
CcD0	2.09 a	0.13 a	59.55 a	162.97 b	16.73 a	16.33 a	137.49 a
CcD1	2.47 a	0.15 a	71.71 a	169.71 b	17.33 a	18.00 a	144.28 a
CcD2	3.38 a	0.15 a	84.94 a	207.18 a	22.88 a	18.67 a	150.38 a
CcD3	3.87 a	0.15a	83.93 a	184.62 ab	26.88 a	17.67 a	143.27 a
GcD0	2.09 b	0.13 a	59.55 c	162.97 b	16.73 a	16.33 a	137.49 a
GcD1	3.36 b	0.16 a	106.57 bc	178.46 b	20.83 a	24.00 a	172.20 a
GcD2	3.55 b	0.22 a	138.24 b	180.38 b	16.40 a	22.67 a	189.95 a
GcD3	5.26 a	0.20 a	226.52 a	206.93 a	28.09 a	20.00 a	173.84 a
CkcD0	2.09 a	0.13 c	59.55 c	162.97 b	16.73 a	16.33 a	137.49 a
CkcD1	3.45 a	0.20 abc	179.31 b	210.08 a	18.25 a	18.00 a	173.67 a
CkcD2	3.50 a	0.26 a	128.90 b	183.22 b	13.46 a	18.67 a	141.36 a
CkcD3	3.66 a	0.25 ab	246.77 a	173.78 b	16.69 a	20.33 a	174.68 a
CbD0	2.09 a	0.13 a	59.55 c	162.97 a	16.73 a	16.33 a	137.49 a
CbD1	3.00 a	0.15 a	95.48 bc	181.22 a	20.05 a	18.33 a	149.05 a
CbD2	3.30 a	0.17 a	187.69 a	177.71 a	21.86 a	23.67 a	197.92 a
CbD3	3.89 a	0.19 a	223.42 a	175.10 a	23.43 a	19.33 a	148.42 a
GbD0	2.09 a	0.13 a	59.55 c	162.97 c	16.73 a	16.33 a	137.49 a
GbD1	3.85 a	0.15 a	88.69 bc	167.79 bc	26.08 a	19.67 a	182.10 a
GbD2	4.04 a	0.15 a	137.74 b	194.90 ab	30.61 a	21.00 a	183.01 a
GbD3	4.07 a	0.19 a	225.48 a	213.33 a	27.47 a	18.00 a	152.54 a
CkbD0	2.09 a	0.13 c	59.55 d	162.97 a	16.73 a	16.33 b	137.49 b
CkbD1	3.24 a	0.16 bc	217.94 c	189.30 a	20.98 a	23.33 ab	200.81 ab
CkbD2	3.57 a	0.27 a	329.16 b	169.38 a	13.41 a	21.00 abc	183.35 abc
CkbD3	3.44 a	0.25 a	477.87 a	166.07 a	13.95 a	25.00 a	233.31 a

Information:

- The same letter at the average value in the same column is not significantly different at the Duncan test level of 5%
- Cow Compost (Cc), Goat Compost (Gc), Chicken Compost (Ckc), Cow Biochar (Cb), Goat Biochar (Gb), Chicken Biochar (Ckb), 0-ton ha^{-1} (D0), 5 ton ha^{-1} (D1), 10 ton ha^{-1} (D2), 15 ton ha^{-1} (D3).

The low number of fresh red chilies and the weight of fresh red chilies per plant, especially in soils that are composted with cow compost, are due to the low N and the available P levels K available in the soil. In photosynthesis, the N element functions in leaf formation, while the P and K elements function in the growth of stems, branches, and roots. The more leaf formation and the better the growth of stems and roots, the more fruit formation. Likewise, when viewed from the biochar quality of chicken manure significantly the highest number of fruits and the weight of chili fruit, due to the highest amount of elements N and P found in the soil.

When viewed from compost doses and biochar fertilizers, in general, they have a significant effect on soil properties such as N, P, K, except C/N which are not significantly different (Tables 4 and 6). Likewise, the amount of fresh chili per plant and the weight of fresh chili per plant appears to have a significant effect, but the increase in chicken compost dose responds to the number of fresh red chili per plant, and the weight of red chili per plant is increasing, because it significantly causes improvements in the properties. land such as total N, P and K available in the soil. Similar conditions were also shown by biochar from chicken manure and were significantly higher than controls. This finding also proves that compost of chicken manure and biochar chicken manure is better than cow dung or goat manure.

There were no significant differences in the total doses of cattle and goat compost dose to the variable C / N ratio and the number of chilies and weight of red chilies per plant. However, the only P variable available in the compost of goat manure was significantly different. While the compost dose of chicken manure there is a significant difference in soil properties both the total content of N, P available, and K available in the soil, but there is no significant effect on the number of fruits and the weight of fresh red chili. In contrast to the biochar dosage of cow, goat, and chicken manure, there is no significant difference from the total N, because, during the combustion process in the production of organic biochar elements, especially proteins undergo evaporation. Only P is available in the soil, especially chicken manure, the more highly significant doses, the higher. As a result, the number of fruits and the weight of fresh red chili per plant also differed significantly. Animal manure and chicken

manure have different effects on changes in soil properties, especially K variable, plant biomass production and root distribution in tropical soils [27]. The use of bio-organic fertilizer in the soil can reduce pathogenic bacteria's development and reduce the incidence of disease in plants [28].

IV. Conclusion

Type of livestock manure raw material for making compost and biochar influences soil properties and production of fresh red chili per plant and the weight of fresh red chili per plant. Compost from goat manure is best, while biochar from chicken manure is best. The higher the dosage of chicken manure compost, the better, and the higher biochar dose significantly increases the number of fresh red chilies per plant and the weight of fresh red chili per plant.

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