STUDY ON GROWTH RATE OF MALE RABBITS (*Lepus negricollis*) FED DIFFERENT LEVELS OF FERMENTED COFFEE PULP

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ABSTRACT

A study on growth rate of male rabbit fed different levels of fermented coffee pulp was carried out at Gulingan village, Mengwi, Badung regency, Bali province from August to October 2013. A Randomized Block Design (RBD) with five treatments and eight replicates in each treatment was used in this experiment. The treatment were diet without coffee pulp (R0), diet with 10% unfermented coffee pulp (R1), diet with 20% unfermented coffee pulp (R2), diet with 10% fermented coffee pulp (R3), and diet with 20% fermented coffee pulp (R4). Each treatment consisted of 8 male five week old local rabbits as replication. Variables observed were final body weight, weight gain, feed intake, water consumption, feed efficiency, dry matter, energy and protein digestibility. The results showed that rabbits given ration with 10% fermented coffee pulp (R3) revealed has higher dry matter energy and protein digestibility. Further, that had highest final body weight, weight gain and highest feed efficiency. From the result of the experiment can the concluded that the use of 10% fermented coffee pulp in the diet produced the highest performance ($P<0,05$) compared to other treatments. The use of fermented coffee pulp 10% could be recommended to farmers for substituting rice brand in rabbits diets.

Key words: rabbits growth, coffee pulp, fermentation

INTRODUCTION

Rabbit has a great potential to be developed in Bali as another alternative job for farmers as well as to provide other meat resources regionally and nationally. This is due to the fast growth and prolificness of the rabbit which coned produce 8-10 litters per birth. Their weight can reach 2 kg at the age of 8 weeks old (Lestari *et al.,* 2005). Chemical composition of rabbit meat has good quality in which the protein content of its meat reaches the equivalent of 20-25 g of chicken meat (Ensminger *et al.,* 1990), fat content of 5,5 g, collestrole 53 g, and 137 kcal energy (Chan *et al*, 1995).

When the rabbits were fed forage only, this production could not be maximum (Diwyanto *et al.,* 1985). Consequently rabbit productivity can be improved by feeding a good quality of feed and optimized its quantity (Ensminger *et al.,* 1990). The high price of concentrate feed is often an obstacle for rabbits farmers, therefore efforts are needed to look for feed stuffs with high nutrient contents but low in price. According to Mastika (1991) several waste from agricultural industries including livestock might be used for animal feed stuffs. Those waste was cheep and less competitive to human needs. One of those is coffee pulps which are available continuosly in the whole year and consisted of 85.22% dry matter, 10.47% crude protein, 0.26% crude fat, 32.36% crude fiber, and 4.14 kcal/kg gross energy (Wiguna, 2007).

More over nutrient content of fresh pulp can be improved by fermentation using *Aspergillus niger*. Budiari (2009) reported fermented coffee pulp contains crude protein 9.94% to 17.81%, and crude fiber 13.05%. This research was carried out to study the potents of fermented coffee pulp in rabbits feed for growing rabbits.

Materials and Methods

Fourty local male rabbits of 5 weeks old with an average body weight 258,35 ± 1,19 g were arranged into 5 treatments and eight replicates in each treatment. Rabbits were keep in individual cages with 70 cm length, 50 cm width, and 45 cm height. Each cages was equipped with trough for feed and drinking water. A plastic sheet for urine and faeces collection were place at the bottom of the cage

Rations were made of yellow corn, fish meal, rice bran, coconut meal, soybean meal, elephant grass, tapioca flour, coffee pulp (fresh or fermented), coconut oil, and bone meal. Diets were composed in iso energy and protein with 16% crude protein and 2500 kcal/kg metabolized energy (ME) (NRC, 1977). Diet composition and nutrients content of the diet are presented in Table 1.

Tablel 1. Compotition of Rabbit Feed

Feed stuffs (%)	Treatments				
	R0	R1	R2	R3	R4
Feed Stuffs Component (%) :					
Yellow corn	24,00	23,00	23,00	22,00	20,50
Coconut meal	14,50	13,00	10,50	10,00	6,50
Fish meal	6,50	6,50	7,00	6,00	5,00
Tapioca flour	4,00	4,00	4,00	4,00	4,00
Soybean meal	6,50	6,55	6,10	5,50	5,15
Rice bran	15,00	12,45	10,00	16,00	16,05
Elephant grass	25,00	22,00	18,90	24,00	22,30
Non fermented coffee pulp	-	10,00	20,00	-	-
Fermented coffee pulp	-	-	-	10,00	20,00
Coconut oil	4,00	2,00	0,00	2,00	0,00
Bone meal	0,50	0,50	0,50	0,50	0,50
Total	100	100	100	100	100
Nutrients Contents :					
TDN %	64,83	64,85	65	64,65	64,73
ME(Kkal/kg)	2506,11	2519,72	2553,34	2523,40	2554,14
Crude protein %	16,00	16,01	16,00	16,01	16,02
Crude fat %	8,21	7,01	5,40	5,86	4,14
Crude fiber %	12,13	12,72	13,38	11,96	12,18
Calcium %	0,51	0,46	0,38	0,41	0,46
Phosporus %	0,62	0,59	0,55	0,64	0,66
Lysine %	0,62	0,59	0,55	0,55	0,48
Metionine + cystine %	0,40	0,38	0,35	0,35	0,30
Isoleusine %	0,61	0,58	0,55	0,54	0,47
Leusine %	1,99	0,93	0,87	0,89	0,77
Phenilalanin + Tyrosine %	1,99	0,88	0,81	0,84	0,73
Treonine %	0,48	0,45	0,41	0,42	0,37
Tryptofhan %	0,12	0,11	0,10	0,10	0,09
Valine %	0,63	0,59	0,54	0,55	0,48

*Proximate analysis at laboratory *LOKA Penelitian Sapi Potong, Grati*

Final body weight, weight gain, feed consumption, water consumption, feed conversion ratio, digestability coefficients of dry mater intake, energy and protein were observed in this study. Dry matter was coefficient of digestability calculated based on the total collection (Tillman *et al.*, 1986), energy and protein digestability were calculated based on the collection method (Prasad *et al.,* 1996). Data were analyzed using analysis of variance and if significant treatments were

found (P<0,05), analysis will be continued using Duncan multiple range test (Steel and Torrie, 1980).

Results and Discussion

Results of the experiment showed that rabbits fed ration with 10% fermented coffee pulp (R3) were significantly (P<0,05) higher in their final body weight and weight gain compared to those fed the other rations (Table 2). The R3 ration contained the lowest fiber content (Table 1) there for could increase digestability coefficients of the diet and further more resulted the better growth rate of the rabbits.The use of Aspergillus niger as fermentor also reduces the tannin content of the coffee pulp by 33% and consequently could increased their feed intake and availability of feed energy (Krisnan, 2002). Guntoro *et al*. (2004) also reported that etawa goats fed 200 g/head/day fermented feed pulp increased their daily weight gain by 52,38% during the 3 month periods.

Table. 2 Performance of rabbits fed different levels of fermented coffee pulps

Variabel	Treatments					
	R0	R1	R2	R3	R4	SEM
Final body weight (g)	1769,50^{b}	1730,25^{c}	1725,38^{c}	1866,75^{a}	1739,88^{bc}	11,21
Feed consumption (g/day)	75,63^{d}	77,36^{cd}	83,61^{b}	79,19^{c}	86,19^{a}	0,64
Weight gain (g/day)	21,59^{b}	21,03^{c}	20,96^{c}	22,98^{a}	21,16^{bc}	0,16
Feed Conversion Ratio (FCR)	3,50^{c}	3,68^{b}	4,01^{a}	3,45^{c}	4,08^{a}	0,03
Water consumption (ml/day)	153,30^{c}	157,90^{c}	181,46^{a}	170,95^{b}	183,37^{a}	2,35

R0 : Diet without coffee pulp
R1 : Diet with 10% unfermented coffee pulp
R2: Diet with 20% unfermented coffee pulp
R3: Diet with 10% fermented coffee pulp
R4: Diet with 20% fermented coffee pulp
Numbers with the same superscripts in the same rows indicate non significant differences (P>0,05)
SEM: Standard Error of the Treatment Means

Figure 1 showed that rabbit on R3 grew similar with the other treatments during the first two weeks. This probably due to the adaptation on feed containing coffee pulp. During the folowing weeks the growth of rabbits fed R3 ration was higher than the other treatments.

Feed intake of the rabbits given treatment R4 was 86,18 g/day, while the R0, R1, R2, R3 were 12,25%, 10, 25%, 2,99%, and 8,12% lower than group R4 respectively (Table 2). Perhaps this was because of diet R4 has sweeter smell than those other four treatments. McNitt. (1996) stated that of rabbit preffered feed with sweet aroma. Low crude fiber in the ration R4 caused the faster flow rate and

coefficient of feed digestability, so the digestive track was empty more quickly and more space available for aditional food.

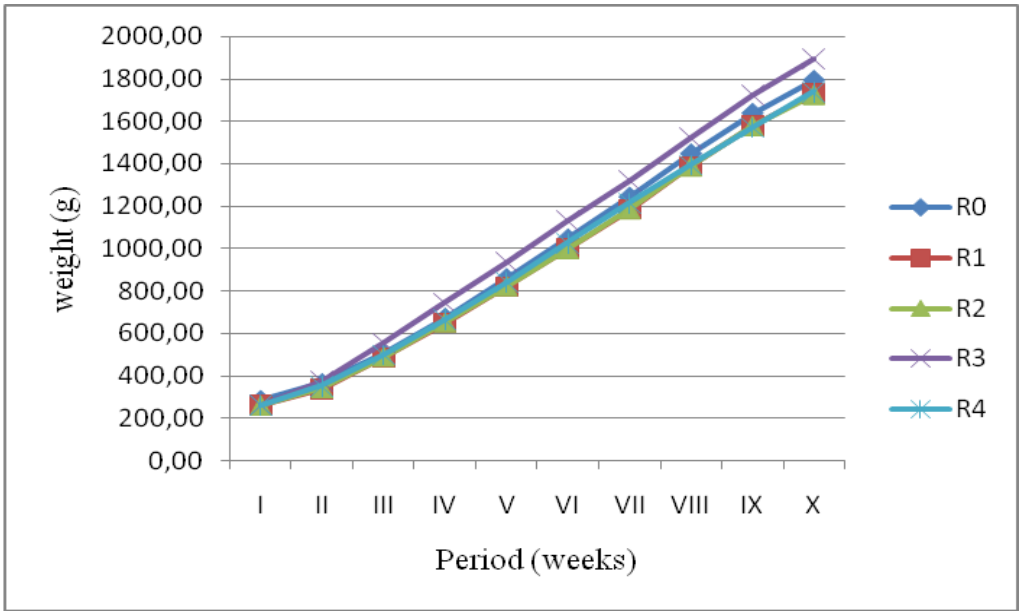

Figure 1. Growth of rabbits fed different levels of coffee pulp

Rabbit fed diet R3 had the lowest feed conversion ratio (3.45) compared to the other treatments aceepts R0. This was because of the rabbits fed R3 ration had higher dry matter digestability, higher energy and protein digestability compared to the other treatments (Table 3). This indicated using energy and protein, that rabbits fed R3 diet ware the most efficient in the average feed conversion of this R3 fed rabbits in this study (3,74) was higher than the results reported by Nuriyasa (2012) with an average feed conversion ratio 3.57. Different treatment given to the rabbits might be the cause of this differences. However, the result of this experiment was still on the similer range 3,0 – 4,0 described by McNitt (1996) and de Blass and Wiseman (1998).

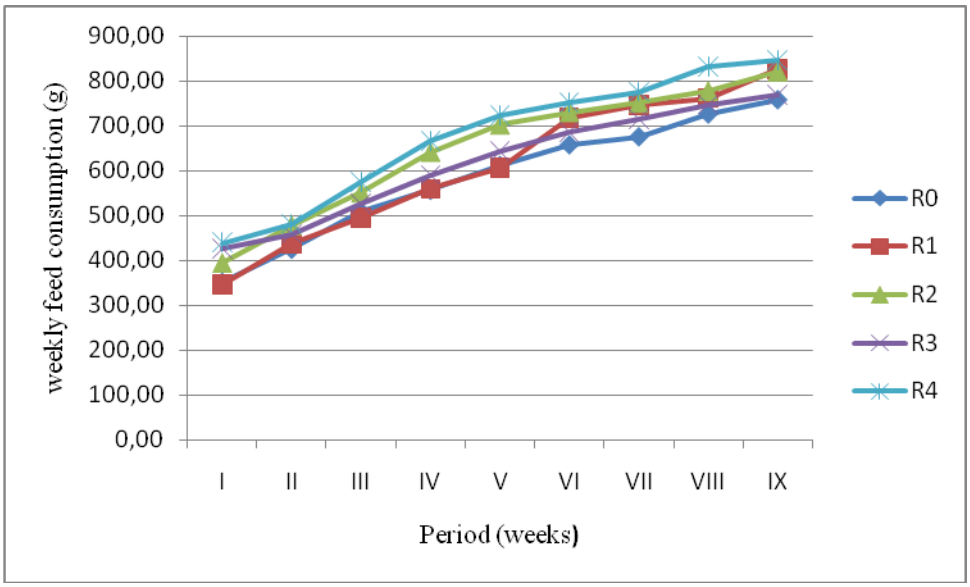

Figure 2. Weekly feed consumption of rabbits fed different levels of coffee pulp

The highest consumption of water in R4 fed rabbits was related to their highert feed consumption (Table 2). This result was in line with Tillman *et al*. (1986) who stated that the higher the feed consumption of the rabbits the more the drinking water was needed. The less density diet cause more consequently need more water. Density of the diet for treatment R4 (21,44 g/ml) was lower than R0 (25,76 g/ml), R1 (22,60 g/ml), R2 (22,51 g/ml) dan R3 (23,38 g/ml), so that the diet R4 which was more dusty caused rabbits consumed more water. This result was supported by Nuriyasa (2012) who found that water consumption was influenced by the density of the ration.

Digestability of dry matter in R3 fed rabbits were higher than the other treatments including the control. This was due to the lowest content of its crude fiber (Table 1). Therefor the R3 fed rabbits consumed more feed than the other group of treatments. Tillman *et al.* (1986) reported that the digestibility of the ration was influenced by the composition and the constituents of the diet on the physical form of feed. Nuriyasa. (2012) got an average dry matter diggestibility for local male rabbits was 68,52%, while between 60%-65% according to Parigi Bini and Xiccato (1998)

The R3 fed rabbit had the highest energy digestibility (67,87%) which were 2.20%, 3.61%, 3.36% and 2.80% higher than R0, R1, R2 and R4 respectively (Table 3). This was due to the lower crude fiber content of the R3 diet. Prasad *et al.* (1996) states *chinchilla rabbit* have energy digestability ranged 66,17% - 77,79%.

Table 3. Diet digestibility of the rabbits fed different levels of fermented coffee pulp

Variabel	treatment					
	R0	R1	R2	R3	R4	SEM
Dry matter digestibility (%)	58,29^{c}	57,13^{d}	58,41^{c}	59,84^{a}	59,28^{b}	0,15
Energy digestibility (%)	66,37^{b}	65,42^{c}	65,59^{c}	67,87^{a}	65,97^{bc}	0,20
Protein digestibility (%)	86,64^{a}	84,18^{c}	83,54^{c}	85,85^{b}	86,19^{ab}	0,46

R0: Diet without coffee pulp
R1: Diet with 10% unfermented coffee pulp
R2: Diet with 20% unfermented coffee pulp
R3: Diet with 10% fermented coffee pulp
R4: Diet with 20% fermented coffee pulp
The same superscripts in the same rows indicated non significantly differences (P>0,05)
SEM : Standard Error of The Treatment Means

Protein digestibility of rabbits given treatment R0 was 86,64%, and the difference was not significantly different compared to R4, but 2,84%, 3,58% and 0,91% higher than R1, R2 dan R3 (Tabel 3). This showed rabbits feed R0 was most efficiently use the protein for growth, can be seen a lower FCR (Table 2). Average digestibility in this study was 85,28%. This figure is higher than the report of Nuriyasa (2012). This difference is caused by differences in the physical form of feed and foodstuffs used. Tillman *et al.* (1986) stated that protein digestibility is affected by animal species, It might be concluded that physical form and composition of feeds.

Conclusions

1. The used of 10% fermented coffee pulp in the rabbit diet was significantly improved the eficiency of feed utilization and digestibility of dry matter, energy and protein, and consequently increased their weight gain and final body weight.
2. Farmers could be advised to use coffee pulp the fermented in the rabbit diet with the level of 10% must be fermented before it was used.

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