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The Effect of Concentrate Supplementation in Diet Base Local Grasses on the Performance and Energy-Protein Retention of Local Rabbit

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Abstract: *The objective of the research were to know energy and protein retention on the body of local rabbit that fed local grasses as basic feed which is supplemented with concentrate of agro industry waste product in different levels. Materials of the research used were 120 male local rabbits, with design of Randomized Block Design, 4 treatments, 6 blocks and five rabbits on each treatment unit. Treatment R0 (control): local grasses without concentrate supplementation, treatment R1: diet control supplemented concentrate for 15 g/head/day, treatment R2: diet control supplemented concentrate 30g/head/day, treatment R3: diet control supplemented concentrate for 45 g/head/day. Result of the research showed that the animal fed R3 was higher (P<0,05) than R2, R1 and R0. It was concluded that the animal fed local grasses supplemented 45 g concentrate /head/day produced higher significantly different energy and protein retention than the other.*

Keywords: *growth, feed efficiency, digestibility energy.*

INTRODUCTION

Rabbit estate development in society was long time implemented but, farmer members and it population are still low. The animal is very potential for developing as meat producer and farmer income increases (Nuriyasa *et al*., 2016). Farmers at village are much depend on local grasses as the animal feed supplemented with concentrate where its formulation and quality uncertainty. Concentrate formulation that often is tofu waste mixed with rice bran or rice mixed with rice bran. Method such this was often not fulfill nutrient needs (energy and protein) so, growth of animal become low. Nuriyasa *et al*., (2014), research found that local rabbit at tropical low land grew optimal if fed diet contained metabolic energy for 2600 kcal/kg and crude protein 17%.

Knowledge about diet quality, nutrient needs at different physiological status is still as obstacle to spur the development of animal in Indonesian country (Nuriyasa *et al*., 2015; 2018; Darmadi *et al*., 2018). Suttle (2010), stated that beside energy and protein, mineral also as nutrient needs in small amount but, it has important function in the animal metabolism. Xiccato *et al*., (1999), said that nutrient balances in diet is much affect, the animal. According to the Blass & Wiseman (1998), that protein, carbohydrate, fat, mineral, vitamin and water are very much need bye the animal. Research result of Mahardhika-Atmaja *et al*., (2016), showed that the animal fed diet contained grape wine waste fermented up 10% was not affected growth and carcass of the local male rabbit.

The objectives of concentrate supplemented base on agro industry waste were to increase plus value of the waste, to prevent pollution of environment, to produce cheep concentrate and to increase growth rate, energy and protein retention in the body of animal.

MATERIALS AND METHODS

Animal, Treatment and Experimental Design

The research used 120 local male rabbits with average initial weight for 220± 1.34 g/head. It used Randomized Block Design wit 4 treatment, 6 replicates and two rabbits on each treatment unit. Control diet was local grasses with metabolic energy content for 1830 kcal/kg and crude protein 9.1% without concentrate supplemented (R0), control diet concentrate supplemented 15 g/head/day (R1), control diet concentrate supplemented 30 g/head/day (R2), control diet concentrate supplemented 45 g/head/day (R3), Concentrate was made inform of pellet with ingredient composition as Table 1.

Table 1: Ingredient Composition and Concentrate Nutrient Content

Ingredient	%	ME (kcal/kg)	CP (%)	Ca (%)	P_{av}	Fat (%)	CF (%)
Yellow Corn	37.5	1263.75	3.225	0.0075	0.0375	1.46	0,75
Coconut waste Mill	9.00	138,60	1,89	0,02	0,02	0,16	1,35
Fish Mill	11.80	227.19	4.65	0.24	0.18	1.18	0.12
Tapioca Mill	11.40	424.08	0121	0.03	0.01	0.15	0,21
Soybean Mill	11.00	386.10	4.18	0.03	0.03	1.98	0.55
Rice Mill	10.20	166.26	1.22	0.01	0.02	1.32	1.22
King Grass	7.70	0.14	0.70	0.03	0.019	0	2.55
NaCl	0.25	0	0	0	0	0	0
Mineral Mix	0.50	0	0	0.13	0.08	0	0
Bone Mill	0.65	0	0	0.17	0.08	0	0
Total	100	2606.13	16.08	0.66	0.47	6.26	6.75

The nutrient composition of the diet was calculated based on the results of the proximate analysis

Place and Length of the Research. The research was conducted for 12 weeks at Dajan Peken village, Tabanan District, Tabanan Regency (50 m above sea level). Laboratory analysis were conducted at Laboratory of Animal Product Technology, Laboratory of Nutrition Faculty Animal Science Udayana University, Denpasar, and Laboratory of Science and Feed Technology Bogor Agriculture Institute.

Shelter and Animal. The research used 24 small compartments with long, wide and height 70, 50 and 45 cm respectively. The height of the compartment was measured from the shelter floor i.e. 70 cm (Nuriyasa *et al*., 2017).

Feed Consumption and Drinking Water. Consumption and drinking water were calculated every day i.e. feed offered minus the rest.

Body Weight. The animal were weight every two weeks to obtain weight gain per week.

Feed Conversion. Feed conversion ratio was calculate ratio between feed consumption and weight gain during the research implemented.

Energy Balance. Diet energy content and feces energy proximate were determined according to AOAC method. Feces protein was analyzed with Kjeldhal method (AOAC, 1984). Energy consumption was obtained by multiplication of feed consumption with total energy content of feed.

Digestible Energy (DE). It was calculated by diminishing of energy consumed with energy in feces.

*Metabolic Energy (ME).*It was obtain by formulation: 0.95 × DE (Parigi-Bini & Xiccato, 1998; Miwada *et al.,* 2018; Mataram *et al.,* 2017).

Energy Retention. Before the study began, the rabbits in each treatment were slaughter and then finely chopped and put into cold storage. The weight of the finely chopped rabbit is weighed first, then the rabbit body sample is sent to the laboratory. By using the AOAC method (1984) the energy content in the rabbit's body at the beginning of the study can be determined. At the end of the study (17 weeks old rabbits), as many as 20 rabbits were slaughter to get the percentage of carcass and physical composition of the carcass. Bodies that have been finely chopped, put in cold storage then sent to the laboratory. By using the AOAC method (1984) the energy content in the rabbit's body can be calculated. It was calculated by diminishing of sum energy in the animal body at the end of the research with sum energy of the animal body at the beginning of the research.

Digestible Protein. It was calculated by diminishing protein of sum protein of the animal body at the end of the research with the body protein of the animal at the begin of the research.

Protein Retention. It was calculated by diminishing of sum protein of the animal body at the end of the research with body protein of the animal at the beginning of the research.

Data Analysis. Data were obtained were analyzed with variance analysis, if there are significant different among treatment (P<0,05), analysis is continued with Duncan Multiple Range Test (Steel & Torrie, 1980; Omer, 2017).

RESULT

Performance

Final body weight and weight gain of animal fed local grasses supplemented concentrate for 45 g/day (R3) were higher (P<0,05) than local grasses supplemented concentrate for 30, 15 and without supplemented i.e. R2, R1 and R0 respectively. The animal fed R3 reach the highest final body weight and weight gain (Table 1) compare to R2, R1 and R0. This was due to R3 consisted of local grasses as basic feed that supplemented concentrate on the highest level so, splayed nutrient particularly energy and protein were highest on animal body. Nuriyasa *et al*., (2014), stated that higher energy and protein consumption would caused higher supply of energy and reach higher growth rate of the rabbit. The animal fed R0 (local grasses only) was the lowest growth rate as the sequences of the feed consumed contain, the highest crude fiber causes decreased of feed digestibility so, nutrient absorbsion was getting less and growth rate lower (Nuriyasa *et al*., 2018). Bagiarta *et al.,* (2017), reported that height crude fiber contain in diet affects digestibility (low digestibility).

Table 2: Performance of rabbit fed local grasses as basal diet and concentrate supplementation

Variable	Treatment				
	R0[1)]	R1	R2	R3	SEM[3)]
Performance					
Final body weight (g)	1234.45^{c}[2)]	1542.65^{b}	1595.97^{b}	1749.82^{a}	37.36
Feed Consumption (g/day)	46.74^{b}	54.32^{a}	56.05^{a}	58.52^{a}	2.03
Weight gain (g/day)	12.04^{c}	15.76^{b}	16.37^{b}	18.24^{a}	0.92
Feed Conversion Ratio	3.88^{a}	3.45^{ab}	3.42^{b}	3.20^{b}	0.22
Carcass					

Carcass Weight (g)	588.31[b]	700.23[a]	780.02[a]	857.52[a]	35.73
Carcass Persentage (g)	46.23[a]	48.70[a]	48.98[a]	50.07[a]	3.01
Bone Weight (g)	190.91[a]	196.43[a]	200.68[a]	212.20[a]	5.99
Fat Weight (g)	12,48[d]	16,56[c]	20,52[b]	28,88[a]	0.61
Meat Weight (g)	384.92[b]	487.24[a]	558.82[a]	616.44[a]	5.67
Meat Bone Ratio	2.02[a]	2.48[a]	2.78[a]	2.90[a]	0.12

1) R0: Local grasses feed without concentrate supplementation

   R1: Local grasses feed with concentrate supplementation for 15 g/day

   R2: Local grasses feed with concentrate supplementation for 30 g/day

   R3: Local grasses feed with concentrate supplementation for 45 g/day

2) The same superscription in the same row showed not significant different (P>0.05) but, different one is significant different (P<0.05).

Thus due to the R3 was the most palatable so, it consumed more than others. The R3 obtain the highest concentrate supplementation so, it dry matter consumption was the highest. According to Mc.Nitt*et al*., (1996), that feed consumption of rabbit was affected by palatability of the feed. Feed Conversion Ratio of the animal feed R3 was lower and non The animal fed R3 was highest feed consumed compare to others R0, R1 and R2. Significant different (P>0.05) than that R2 and R1 but, its lower (P<0.05) compare to R0. This was due to animal fed R3 consumed the highest feed as well as organic matter digestibility. This indicates that un use fullness organic matter in feces and urine were the lowest. Feed conversion ratio in the research was about 3.20 to 3.88. Those were not much different to the results research of Nuriyasa *et al*., (2016), that feed conversion of local rabbit were about 3.24 to 3.26. Energy and protein retention of animal that fed R3 were the highest (Table 3 and 4). This showed that the usefulness of energy and protein of the animal fed R3 was more efficient for is growth than that of other.

Carcass weight and meat weight of rabbit fed diet R0 r were lower (P <0.05) compared to R1, R2 and R3. Rabbits that are only fed forage without supplementation of concentrate (R0), are not able to grow optimally (Ensminger *et al.,* 1990). Rabbits treated with R0 caused total ration consumption to be lower (P <0,05) R1, R2 and R3. Nuriyasa *et al.,* (2014), stated that the higher the consumption of energy and protein, the higher the growth of rabbits and the higher the carcass. Higher carcass meat production is produced by rabbits with higher growth so that bone formation is also high so that the meet bone ratio produced is not significantly different.

Energy Retention

The animal fed R0 consumed the lowest energy (175.18 kcal/day), but the animal fed R1, R2 and R3 consumed 18.871%, 27.06% and 30.44% higher than R3 (Table 3). Local grasses contain metabolic energy for 2431.20 kcal/kg and crude protein for 16.29%, so that the animal fed R0 consumed lower energy than R1, r2 and R3.

Table 3: Energy retention of rabbit fed local grasses as basal diet and concentrate supplementation

Variable	Treatment				
	R0[1)]	R1	R2	R3	SEM[3)]
Energy Consumption (kcal/day)	175.18[c2)]	207.96[b]	222.59[a]	228.51[a]	37.36
Fesses Energy (kcal/day)	45.76[b]	46.05[b]	52.8[a]	53.18[a]	0.25

Digestible Energy (kcal/day)	129.42[c]	161.78[b]	169.79[ab]	175.33[a]	1.39
Metabolic Energy (kcal/day)	122.95[c]	153.70[b]	161.30[ab]	166.57[a]	1.26
Energy Retention (kcal/day)	51.30[a]	50.62[a]	52.23[ab]	54.12[b]	0.32

1) R0: Local grasses feed without concentrate supplementation

   R1: Local grasses feed with concentrate supplementation for 15 g/day

   R2: Local grasses feed with concentrate supplementation for 30 g/day

   R3: Local grasses feed with concentrate supplementation for 45 g/day

2) The same superscription in the same row showed not significant different (P>0.05) but, different one is significant different (P<0.05).

Energy feces content of the animal fed R3 was 53.18nkcal/day, but R2 was 0.71% lower (P>0,05) than R1 and R0 i.e. 13.41% and 13.79% respectively lower (P<0.05) than R3. This indicated that different levels of concentrate supplementation were n affect to energy content of feces. The lowest digestible energy on the animal body of R0 (129.42 kcal/day), while R1, R2 and R3 were 25.00%, 31.19% and 35.47% higher respectively (P<0.05) than R0. The animal fed R0 consumed the lowest energy, but energy on feces was not much different among treatments so, digestible energy on the animal fed R0 was the lowest (Nuriyasa *et al.,* 2014). The animal fed R3 consumed metabolic energy (166.57 kcal/day), but R2 was 3.16% lower (P>0.05), and R1 and R0 was lower 7.73% and 26.19% respectively (P<0.05). Logically consequence of concentrate energy content is higher than local grasses so, the animal fed R3 where it concentrate supplementation was the highest would resulted higher metabolic energy than other treatments.

Protein Retention

Protein consumption of the animal fed R0 was 6.18 g/day lower significantly different (P<0.05) than R1, R2, R3 i.e. 4.04%, 0.51% and 8.73% respectively (Table 4). The animal fed R0 with 9.1% crude protein was much lower than concentrate protein content (16.29%) so, protein consumption of the animal fed was lower than other treatments.

There was no significant different (P>0.05) on all treatments to feces protein variable, Feces protein of R0, R1, R2 and R3 was 0.36 g/day, 0.35 g/day, 0.34 g/day and 0.34 g/day respectively (Table 4). Different levels of concentrate supplementation on basal diet local grasses were not affected protein feces content local rabbit. The animal resulted fed R0 the lowest digestible protein for 5.29 g/day. Digestibility protein of R1, R2 and R3 was 4.60%, 6.14% and 9.36% higher respectively (P<0.05) than that R0, but among R1, R2 and R3 were not significant different (P>0.05). Diet R0 (local grasses only) contain higher crude fiber and less palatable than R1, R2 and R3 so, feed consumption on the animal fed R0 was the lowest. Low feed consumption of the feed same level of energy and protein causes amount of protein consumed was lower. Feces protein content on the same feces and same treatment cause digestibility protein on the animal fed R0 was the lowest (Nuriyasa *et al.,* 2014). Protein retention on R3 (5.29 g/day) higher significantly (P,0.05) than R0, R1 and R2 for 3.64%, 5.46% and 9.09% respectively. Protein retention R2 (0.50 g/day) lower (P<0.05) than R0 (5.66%), R1 (3.85%) and R3 (5.66%). There were no significant different (P>0.05) to protein retention among R0, R1 and R2 treatment (Table 4). The animal fed R0 (without concentrate supplementation) consumed the lowest feed (Table 2), lower feed conversion ratio (Table2), lower metabolic energy (Table 3) and lower metabolic protein (Table 4) so, energy retention on the animal fed R0 was the lowest compare to the others.

Table 4: Protein retention of rabbit fed local grasses as basal diet and concentrate supplementation

Variable	Treatment

	R0[1)]	R1	R2	R3	SEM[3)]
Protein consumption (g/day)	6.18[c]	6.45[b]	6.51[b]	6.75[a]	0.08
Feces Protein (g/day)	0.36[a]	0.35[a]	0.34[a]	0.34[a]	0.005
Digestible protein (g/day)	5.29[c]	5.61[b]	5.67[b]	5.86[a]	0.08
Protein retention (g/day)	0.53[b]	0.52[b]	0.50[b]	0.55[a]	1.26

1) R0: Local grasses feed without concentrate supplementation
   R1: Local grasses feed with concentrate supplementation for 15 g/day
   R2: Local grasses feed with concentrate supplementation for 30 g/day
   R3: Local grasses feed with concentrate supplementation for 45 g/day
2) The same superscription in the same row showed not significant different (P>0.05) but, different one is significant different (P<0.05).

CONCLUSION

From the result of the research could be concluded that the local rabbit fed basal local grasses and concentrate supplementation 45 g/day produce performance, carcass, energy and protein retention on the body was higher than supplementation 30 g/day, 15 g/day and without consentrate supplementation.

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