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The Effect of Copra Meal Replacement with Fermented Palm Oil Waste on the Performance of Rabbit

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ABSTRACT

The aim of this research was to determine the effect of copra meal (CM) substitution with fermented palm oil waste (FPW) in feed ration on the performance of local male rabbit. This research has been conducted at the teaching farm, Faculty of Agriculture, University of Tanjungpura and Animal Nutrition Laboratory, Department of Animal Husbandry and Veterinary, West Kalimantan. The experiment was conducted for eight weeks, and used 16 rabbits. This research was assigned in Completely Randomized Design one-way classification with four treatments (P0, P1, P2, and P3), with four replications and each contained one local male rabbit. The treatments were namely: P0 = 60% field grass (FG) + 40% concentrate (contained 15% CM + 0% FPW); P1 = 60% FG + 40% concentrate (contained 10% CM + 5% FPW); P2 = 60% FG + 40% concentrate (contained 5% CM + 10% FPW), and P3 = 60% FG + 40% concentrate (contained 0% CM + 15% FPW). Measured variables were average daily gain, daily feed consumption, feed conversion ratio and feed cost per gain. The result of this research were, average daily gain of 6.87 to 7.31 g/day, daily feed consumption from 36.64 to 42.36 g/day, feed conversion ratio from 5.42 to 5.79. At 15% FPW in the ration (P3), it reduced feed cost per gain value on Rp. 7,909.90. The result of this research indicated that the substitution of copra meal with FPW up to 100% (15% from the total ration) has no significant effect on the performance of local male rabbit, but reduced feed cost per gain value.

Key Words: Fermented Palm Oil Waste, Copra Meal, Local Male Rabbit, Performance

INTRODUCTION

Rabbits produce meat that has good quality animal proteins that can be used as an alternative in the community. Increased animal protein is required in the community, since this is in line with the increase in population. Increased animal protein demands several solutions such as increased livestock production, diversification of products and the search for new sources of animal protein.

Rabbits can produce high-quality meat with high content of animal protein (±20%), and low fat content. The meat tastes good, and is not forbidden by certain religion. Cholesterol content is also low at 1.39 mg/kg (Sudaryanto 2007).

Rabbits also have some other advantages, they do not require large areas in maintenance, can consume various types of forage, kitchen waste and byproducts of agricultural products. Besides meat, rabbits byproducts including leather/fur, head, feet, tail and their droppings can be utilized for various purposes. Rabbit production costs are relatively inexpensive, therefore they do not require large amounts of capital, maintenance is easy and birth rate is 4-6 times annually (Damron 2006).

According to Gidenne et al. (2010), rabbit are herbivores that can not properly digest fiber, therfore it is called pseudoruminant. Fermentation occurs only in the cecum which

is 50% of the capacity of the digestive tract. Commercial feed for rabbits on the market are relatively expensive so there is a need to look for alternative ingredient feed that is available continuously, cheap, easyly obtained, possess enough nutritional value and maintain the health of livestock. Copra meal as one of the feed ingridients material source of protein in the ration. However, it has some drawbacks including the limited availability in the market and the price is relatively expensive. One alternative feed ingredient to reduce the price of commercial feed is fermented sludge. Utilization of waste as animal feed is also one way to solve a pollution problem caused by industrial waste.

Palm oil sludge is a waste generated during the process of extraction, it consisted of 4-5% solids, 0.5-1% residual oil and 94% water. For every ton of palm oil produced approximately 2-3 tons of palm oil sludge. According to Hidayat et al. (2007). Palm oil sludges (solid) constitute sufficient resources that potential for livestock feed, inexpensive, available in large quantities and are relatively available all the times. The nutrient content of palm oil sludge are: crude protein 12.17%, crude fiber 21.15%, fat 19.96%, cellulose, hemicellulose and lignin 11.42%, 18.77; 36.40% respectively (Lekito 2002).

Effort to reduce the content of crude fiber, especially lignin and cellulose is by utilizing microbial activity through a fermentation process. This study aimed to study the effect of the use fermented palm oil sludge to replace copra meal in the ration on feed digestibility and production performance of rabbits.

MATERIAL AND METHODS

Materials

The experiment uses 16 heads of two months old local male rabbit with an average weight of 630 g. The rabbit was placed in battery cages measuring 50×30×30 cm^3. Feed ingredient used for experimental ration was native grass (G), concentrate consist of fermented of palm oil sludge (FPW), corn, copra meal, rice bran, fish meal, tapioca flour, and calcite.

Methods

Sixteen rabbits were divided into 4 treatments with 4 replicates. P0 = 60% G + 40% concentrate (15% copra meal + 0% FPW); P1 = 60% G + 40% concentrate (10% copra meal + 5% FPW); P2 = 60% G + 40% concentrate (5% copra meal + 10% FPW); P3 = 60% G + 40% concentrate (0% copra meal + 15% FPW). Rabbits were kept in individual cage for three months. Feed adaptation period (preliminary) was the first two weeks of this study followed by 10 weeks of observation. Rabbits were fed a mixture of concentrate and grasses at the level of 2.5-3% of body weight, twice a day in the morning at 7:00 to 8:00 pm and in the afternoon at 16:00 to 17:00 pm. Drinking water provided *ad libitum*. Daily offered and residual were measured. Body weight of rabbit was weighed every month.

The variables in the study observed were feed consumption, body weight gain, feed intake, feed conversion and feed cost per gain. Data were analyzed with analysis of variance (ANOVA) and if there is a significant difference, further analysis was conducted by Duncan test (Mattjik & Sumertajaya 2002).

RESULTS AND DISCUSSION

Body weight gain

ANOVA analysis results in showed that the treatment was not significantly affect body weight gain (P>0.05). This is because the ration at each treatment has a protein content that is compliant quality requirements stipulated in the NRC for concentrates for rabbits growth of at least 12-16% (NRC 1994).

Mean weight gain rabbit value obtained during the research for each treatment P0, P1, P2, and P3, respectively are 7.01; 5.99; 6.58; and 7.01 g/head/day. Effect is not noticeable on the weight gain was due to the replacement of copra meal with fermented palm oil sludge in the ration caused the ration has energy and protein content were relatively the same. As stated by McNitt et al. (2013) that the rations which contained energy that relatively similar causing no difference in consumption and therefore contributes to weight gain.

Dry matter needs and basic living needs are increasing with increasing live weight of animal (Gidenne 2010) so that the remaining amounts of nutrients for growth relatively similar. The average weight gain local male rabbits in this study are shown in Table 1 below:

Table 1. Mean of final weight, average gain, average daily gain of local male rabbits fed diet contained copra meal that replaced gradually with fermented palm oil waste

Treatment	Initial body weight (kg)	Final body weight (g)	Average gain (g/head)	Average daily gain (g/head/day)
P1	616	1271.2	655.2	7.28
P2	697	1299.1	602.1	6.69
P3	609	1227.3	618.3	6.87
P4	601	1258.9	657.9	7.31

P0: Native grass and feed concentrates containing copra meal 15% and fermented palm oil sludge 0%; P1: Native grass and feed concentrates containing copra meal 10% and fermented palm oil sludge 5%; P2: Native grass and feed concentrates containing copra meal 5% and fermented palm oil sludge 10%; P3: Native grass and feed concentrates containing copra meal 0% and fermented palm oil sludge 15%

Feed consumption

The average of consumption obtained during the research for each treatment P0, P1, P2, and P3, respectively are 40.11; 36.64; 37.21; and 42.36 g/head/day. ANOVA results showed that no significant difference on feed intake. This means the replacement of copra meal with FPW to 15% did not affect the feed intake of local male rabbit.

No effect on consumption due to the replacement of copra meal with fermentation of palm oil waste not increase the palatability of the feed. So the feed treatment have the same relative palatability. This is expected because the physical oil sludge fermentation used has a smooth texture and not so flavorful, mixing with other concentrate material will be fused with the smell and texture that similar to feed without oil sludge fermentation (control diet). Also in terms of the quality of fermented oil sludge TDN has

a lower content of the copra meal that is equal to 78.7%. But protein is very low, this resulted in FPW protein still under copra meal protein. Due to these reasons, the feed palm oil waste treatment using fermentation will provide the same level of palatability of feed controls. One of the factors affecting the level of feed intake is palatability. De Blas (2010) says that the palatability of the feed is reflected by the organoleptic such as appearance, odor, flavor, and texture.

The range of dry matter consumption was between 2.2 to 2.4% of body weight. This value is still within the standard range of dry matter intake rabbit between 2.2 to 4% of their body weight (NRC 1994). The level of feed intake is influenced by the quality of the ration that can be seen from the content of nutrients. According to Tazzoli (2009), the level of energy content in the feed effects the extent of feed consumption. The content of total digestible nutrients (TDN) of oil sludge fermentation was 55.11% lower than copra meal being 78.7%, but the energy content of the ration four treatment is still in the same relative range. This is the reason for the same level of feed intake.

In addition the level of consumption is also influenced by a variety of factors, including that of the animal itself (weight, sex, age, genetic factors, and the type of nation rabbit), food provided, and the environment in which the animals are kept (McDonald et al. 2010). Factors of cage and environmental conditions during the study were relatively similar.

Table 2. Mean value of average daily gain, feed consumption, feed conversion ratio of local male rabbits fed diet contained copra meal that replaced gradually with fermented palm oil waste

Treatment	Average daily gain (g/h/d)	Feed consumption (g/h/d)	Feed conversion
P0	7.28±0.91	40.11±to 0.88	5.51±0.08
P1	6.69±0.62	36.64±0.52	5.48±0.06
P2	6 87±1.73	37.21±0.81	5.42±0.03
P3	7.31±1.01	42.36±0.34	5.79±0.05

Feed conversion ratio

Based on ANOVA analysis, the study treatment outcomes were not significantly different (P> 0.05) on conversi feed (Table 2). Feed conversion value in this study were treated P0 5.51; P1 5.46; P2 and P3 5.42 and 5.79. Feed conversion was lowest for the treatment P3 (native grass and feed concentrates containing 35% fermented palm oil sludge and copra %) of 0.15 means that every 1 kilogram of ration produce daily body weight gain of 0.15 kg. The results showed that the average value of rabbit feed conversion during the study ranged from 5.42 to 5.79. These results are consistent with research infallible that male rabbit feed conversion by 5.01 -5.67 weaning.

Feed conversion value in the study using the oil mud is also the same fermentation studies using sweet potato pellets ranging from 5.1 to 9.9 (Sunarwati, 2001). Ensminger (1991) said the rabbit feed conversion value between 2.4 to 4.0 by using good management and high-quality ration, high conversion in the fourth of this treatment due to the high crude fiber of fermented palm oil sludge contained in the feed treatment. Fermented palm oil sludge was a substance containing lignin complex that is very difficult to be digested.

Feed cost per gain

Ration treatment using oil sludge fermentation in livestock local male rabbit does not affect feed cost per gain. Feed cost per gain is divided by the cost of feed conversion ration. The results of the economic analysis of each treatment feed containing fermented palm oil sludge as a substitute for copra meal in the concentrate at a local rabbit in detail is shown in Table 3. The total cost of the ration is P0 treatment Rp. 1,785/kg, treatment P1 Rp. 1,645/kg, treatment P2 Rp. 1,505/kg, and treatment P3 Rp. 1,365/kg, the lowest for the treatment P3 and the highest at P0 treatment. Feed cost per gain from the lowest to the highest in treatment P0 Rp. 9838.66/cow/day, treatment P1 Rp. 9009.39/cow/day, treatment P2 Rp. 8151.54/cow/day, and the treatment P3 Rp. 7909.90/ cow/day.

Table 3. Feed cost gain of local male rabbits fed diet containing copra meal that was replaced gradually with fermented palm oil waste

Variables	Treatment			
	P0	P1	P2	P3
Feed conversion	5.510	5.480	5.420	5.790
Cost of making ration (IDR/kg)	1,785	1,645	1,505	1,365
Feed cost per gain (IDR/head/day)	9838.660	9009.390	8151.540	7909.900

Average of feed cost per gain during the study for each treatment P0, P1, P2, and P3 respectively namely Rp. 9,834.66; Rp. 9,009.39; Rp. 8,151.54, and Rp. 7,909.90. Table 3 shows that the cost of feed at P2 treatment is the most efficient because the same consumption tend to result in weight gain higher than other treatments, resulting in lower feed conversion value. Due to the low feed conversion values obtained when the same consumption produces a high body weight gain (Chen & Li 2008), so as to reduce the cost of feed.

Damron (2006) to get the feed cost per gain is lower then the selection of feed ingredients to prepare the ration should be as cheap as possible and provided continuously or can also use agricultural waste which is not competitive. Feed cost per gain is considered good when the rate was as low as possible, which means economically efficient use for feed.

CONCLUSION

It can be concluded that the use of fermented palm oil sludge in the diet up to 15% did not negatively affect local male rabbit performance.

REFERENCES

Chen P, Li PF. 2008. Effect of dietary fat addition on growth performance, nutrient digestion and fermentation in the cecum 2-3 months old meat rabbits. In: Proceedings of the 9th World Congress Rabbits. Italy.

Damron WS. 2006. Introduction to animal science. 3rd Ed.New Jersey Pearson education. Upper Sanddle River.

De Blas C, Wiseman J. 2010. Nutrition of the rabbit. 2nd Ed. London (UK): CAB International.

Directorate General of Plantation. 2012. Statistics Plantation Indonesia, the Ministry of Agriculture in Jakarta.

Gidenne T, Carabano R, Garcia J, De Blas C. 2010. Fiber digestion nutrition of the rabbit. In: De Blas, Wiseman, editors. 2nd Ed. Wallingford: CABI Publishing.

Lebas F.2013. Feeding strategy for small and medium scale rabbit units. In: 3rd Conference of Asian Rabbit Production Association – Bali Indonesia.

Lekito MN. 2002. Analysis of the nutritional content *lumpur* palm oil (palm oil sludge) from a processing plant in the district of Manokwari Regency Prafi Papua Province. J Anim Husbandry Environ. 8:59-62.

Mattjik AA, Sumertajaya IM. 2002. Design of experiments with apps SAS and minitab. Volume I. 2nd Ed. Bogor (Indonesia): IPB Press.

McDonald P, Edwards R, Greenhalgh J. 2010. Animal nutrition. 7th Ed. New York (US).

McNitt JI, Lukefahr SD, Cheeke PR, Patton NM. 2013. Rabbit production. Wallingford (UK): CABI.