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Utilization of Native Chicken Manure Flour and Probiotic as an Additional Feed for Pig

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ABSTRACT

A study was conducted to determine the utilization of native chicken manure flour and probiotic as an additional feed for pigs. The research was conducted in the Paras Paros Farmers Group, Padangsambian Kaja Village, Denpasar Barat District, Denpasar City. This study was arranged in a completely randomized design (CRD) with 3 treatments and 10 replications. Treatments were: pigs fed according to the farmers way (B1), pigs fed with native chicken manure flour as much as 50% replacing rice bran (B2) and same as the treatment B2 + probiotic Bio-B 2 cc/l of drinking water (B3). Nutrient content of pigs rations, daily weight gain and feed conversion ratio were analysed and measured. Business profits was calculated based on economic analysis, B/C ratio and R/C ratio. The results showed that treatment B3 gave a weight gain of 319 g/head/day and was significantly higher ($P<0.05$) compared to treatment B1. The results of the economic analysis also showed that pigs that received treatment B3 had the highest profit of Rp. 3,506,525 with the B/C ratio of 0.38 and R/C ratio of 1.38. It can be concluded that pigs that received B3 treatment had the highest daily weight gain and the highest profit.

Key Words: Pig, Supplemental Feed, Manure, Profit

INTRODUCTION

The pigs farming in Bali is mostly a traditional farming type with an average ownership of 1-3 heads/farmers (Budaarsa 2014). The cost of feed is the largest production cost in a pig farm ranging from 65 to 80% of the total production cost (Sihombing 2006; Aritonang 2010). Feed prices at the farm level tend to increase while the price of pork has decreased. This situation causes decrease economic value gained by farmers.

Efforts to reduce the cost of feed has been done through the utilization of from waste product as a component of feed rations. One of the potential waste product to be used as pig feed is chicken manure. It is estimated that one hundred laying hens can produce 1.6 tons of dry manure/year, with a crude protein content of 24.5% (Sinaga & Silalahi 2002). The population of domestic poultry in the province of Bali is 4,035,112 head (Anon 2016) that potentially produce 64,561.79 tonnes of dry manure/day as animal feed. This feed potential is worthy to be explored in an effort to produce a cheap and accessible quality feed.

Utilization of chicken manure as a feed for pigs has not been commonly adopted due to the low palatability. In ruminant livestock, manure chicken has been used as a source of non-protein nitrogen (Paraminta *et al.* 2005). Sinaga & Silalahi (2002) stated that the laying manure could be included in pig ration up to 5%. In improvement of chicken manure palatability could be achieved through fermentation process. Fermentation

process on unpalatable feed could be applied to improve their palatability (Ginting & Krisnan 2006). The results of Guntoro *et al.* (2013) showed that the fermentation process with inoculants containing microbes from the digestive tract of termites for five days can increase the nutritional content of cow feces.

Feed cost savings are not only determined by the low price of feed prices of feeds but also by the efficiency of the utilization and metabolism of the feed in the body. Efficiency of feed utilization can be increased using probiotics as an feed additive. Probiotics are living microorganisms that are applied orally in order to improve the gut health and the degistion and absorption of nutrients by manipulating the balance of microbial population in the gastrointestinal tract of the animal (Pribadi *et al.* 2015). In addition, probiotics could also be used to substitute the use of antibiotics (Haryati 2011). Jaya *et al.* (2015) found that giving 0.25% probiotics in ration could increase the body weight of Landrace crossed pig by 7.32%. By provision of probiotic in diet, it is expected that feed will be digested more efficiently and productivity will be improved. This study was conducted to evaluate the effects of using native chicken manure flour and probiotics in diets on the weight gain of pigs and economics return of the pig farming.

MATERIAL AND METHODS

The research was conducted at the Paros Paras farm, Padangsambian Kaja Village, West Denpasar District, Denpasar City from June 2016 to September 2016. Laboratory analysis was conducted at Lolit Sapi Potong Grati. Landrace crossbred weaned pigs (30 days old) were used in an completely randomized design (CRD) experiment. A total of 30 pigs divided into 3 treatments group with 10 replicates. Treatments consisted of diets commonly practiced by the local farmers (B1), diets containing native chicken manure flour substituting 50% of total rice bran (B2) and B2 + probiotic Bio-B 2 cc/liter of drinking water (B3).

Native chicken manure processing

Fresh manure from native chicken laying hens was fermented using specific inoculants containing cellulolytic microbes isolated from the digestive tract of termites. The inoculant was reproduced in a liquid medium using cool water that had been previously boiled. Brown sugar was added into 10 l of water and the inoculant (1%: v/v) was added. A 10 l solution can be used to 100 kg of fresh manure. The mixture was stirred evenly and then stood and closed for 30 minutes to give microbes a chance to grow. Fermentation was performed for 5 days in fermentation boxes. The fermented product was dried under the sun and then ground.

Laboratory analysis native chickhen manure and other ingredients were shown in Table 1. The crude protein (CP) level of native chicken manure was numerically hihger than that of rice bran, while its crude fibre (CF) content was lower. This suggests that native chicken manure flour can be used to substitute some rice bran in a pig's ration.

Ration and feeding

The ration given consisted of 0.75 kg soya hull, 0.75 kg soya cake waste, 0.2 kg bakery waste and 0.5 kg of rice bran. The feed ingredients were mixed and boiled sterilize to remove any pathogenic microbes that may cause disease. The animals were fed twice at amount of 2.2 kg/head/day, 50% in the morning and the remaining 50% in

the afternoon. Drinking water was provided at the time when feeding the animals. Probiotics Bio-B is a probiotic in liquid form that contained beneficial microbes isolated from the digestive tract of pigs. The types of microbes contained were several types of Lactobacillus which can increase the activity of digestive enzymes (Guntoro *et al.* 2011).

Table 1. Nutritional content of pigs ration material

Ration material	GE (kkal/kg)	Percentage									
		DM	Ash	OM	CP	Fat	CF	Ca	P	NFE	TDN
Soya cake waste	4012	92.16	3.60	96.40	18.81	4.10	22.41	0.47	0.1	46.92	67.58
Soya hull	3268	88.82	3.02	96.98	26.55	8.28	24.08	0.07	0.4	38.07	17.44
Bakery waste	4217	93.27	2.19	97.81	15.45	11.59	5.57	0.07	0.02	62.69	76.56
Rice bran	3581	85.82	17.19	82.81	8.36	5.50	34.19	0.88	0.9	34.76	41.53
Native chicken manure flour	2741	85.66	22.43	77.57	10.41	0.39	18.62	0.41	1.38	48.15	51.01

Nutritional content obtained from laboratory analysis of Lolit Sapi Potong Grati

The addition of native chicken manure flour affects the nutritional content of pigs ration. Rations that obtain additional native chicken manure flour contained higher CP and lower CF. The maximum CF content of ration for pig were recommended at 6% (NRC 1998). Wira (2014) reported that pigs with their simple stomach have very limited ability to digest CF. The nutritional content of pigs ration was shown in Table 2.

Table 2. The nutritional content of pig rations

Nutrient (%)	Treatment		
	B1	B2	B3
Dry mater	89.68	89.66	89.66
Ash	6.36	6.96	6.96
Organic mater	93.64	93.04	93.04
Crude protein	18.77	19	19
Gross energy (Kkal/kg)	3,679	3,583	3,583
Nitrogen free extract	42.57	44.09	44.09
Fat	6.52	5.95	5.95
Crude fiber	24.13	22.36	22.36
Calcium	0.39	0.34	0.34
Phospor	0.38	0.43	0.43
Total digestible nutrient	45.38	46.46	46.46

Nutrition is calculated based on the results of laboratory analysis Lolit Sapi Potong Grati

Parameters observed and sampling methods

Parameters observed were: (1) Nutrient content of pig ration: (2) Daily weight gain; and (3) Feed conversion ratio (FCR). Sampling on the feed given offered was done by the

method of total collection. The total collection was conducted at the end of the study and sample collection was done for seven consecutive days. The sample of the collected feed is the sample of feed that has been boiled according to the way of feeding. Samples (10%) were dried under the sun. All samples were collected and composited and then sub sampled ±200 g was analyzed for nutrient content.

Weight gain was measured by weighing the animal monthly. Daily weight gain was obtained from the final body weight minus the initial body weight divided by the length of the study. FCR is calculated as feed consumption divided by body weight gain. Rations consumption was calculated by subtracting the amount of feed given to feed refusals.

Analysis of data

Data were analyzed by using a analysis of variance. If the components in the test showed significant differences then followed by Duncan's multiple range test level of 5%. The economic performance of the study was conducted by the analysis of input-output. The economic analysis is used to determine the most profitable treatment.

RESULTS AND DISCUSSION

Daily weight gain and feed conversion ratio

The greatest increase in average daily gain was noted in pigs receiving B3 diet (319 g/head) (Table 3). Average daily weight gain was lower than the data obtained by Sinaga & Martini (2010), which amounted to 325.20 g/head. This data was significantly higher ($P<0.05$) compared to that of B1 diet, but was not significantly higher ($P>0.05$) compared to B2 diet. The daily weight gain in B2 diet also significantly higher ($P<0.05$) than that in B1 diet. This suggests that the use of native chicken manure flour in pig rations can significantly increase average daily weight gain.

Table 3. Body weight of pig that fed native chicken manure flour

Parameter	Treatment		
	B1	B2	B3
Initial body weight (kg/head)	9.9^{a}	9.8^{a}	10^{a}
Final body weight (kg/head)	26.38^{a}	32.26^{ab}	38.68^{b}
Average daily weight gain (g/head/day)	183^{a}	250^{b}	319^{b}
Feed consumption (g/head/day)	$1,625^{a}$	$1,750^{a}$	$1,645^{a}$
Feed conversion ratio (FCR)	8.88^{a}	7^{a}	5.16^{b}

Values with different letters in the same row indicate significant differences ($P<0.05$); B1: Diets commonly practiced by the local farmers; B2: Diets containing native chicken manure flour substituting 50% of total rice bran; B3: B2 diet + Bio-B probiotics 2 cc/liter of drinking water

The higher average daily weight gain observed in pigs obtaining feed of native chicken manure flour as supplements was due to its higher CP content compared to rice bran. The addition of native chicken manure flour increased the content of CP and TDN and decreased the CF content. Mcdonald *et al.*

(2002) suggested that nutrient digestibility depends on the amount of nutrient content in the diet. The more nutrients available, the more nutrients are digested and absorbed by the body so that the livestock average daily weight gain becomes higher.

The highest level of average daily weight gain in the treatment of B3 was caused by the provision of probiotics. Provision of probiotics improved the digestibility of feed given to be more efficient. The use of probiotics is one effort to increase the digestibility of feed ingredients so that more nutrients can be absorbed (Astuti *et al.* 2015). The addition of probiotics will be able to increase microbial populations, improve function and health as well as absorption of nutrients in the digestive tract (Kompiang 2009; Moses *et al.* 2009; Mountzouris *et al.* 2010).

Conversion of rations influenced by the level of dietary consumption and the rate of weight gain. In general, increased feeding of native chicken manure flour in rations, tends to decreased the conversion of rations. The level of feed consumption is influenced by the fulfillment of livestock for energy and stomach capacity (Putra 2008). Consumption protein of pig is dependent on the energy content in the feed (Main *et al.* 2016). Livestock will stop consuming the feed if the need for energy has been fulfilled even though the capacity of the stomach can still be filled. The highest energy content of the B1 treatment ration caused the lowest feed consumption level. This caused the consumption of nutrients, especially protein in the ration also became lower, so that gave effect on the daily weight gain to be the lowest.

Although the level of feed consumption in treatment of B2 and B3 is higher than B1, but because of higher daily weight gain cause the FCR becomes lower. The lowest FCR is found in B3 treatment. This indicates that B3 treatment have the highest feed efficiency. This is in line with the statement of Sumadi *et al.* (2015), probiotic supplementation (starbio) in pig feed has significantly reduced feed intake, increased weight gain, and decreased feed conversion ratio (FCR).

Economic analysis

The result of economic analysis shows that pigs that B3 treatment have the highest profit value of Rp. 3,976,275 (Table 4). There was a difference in the value of profit Rp. 2,943,750 compared with treatment B1. Feeding in the form of native chicken manure flour causes a decreased in the number of required inputs in the treatment of B2. This is because the price of native chicken manure flour is cheaper than rice bran. The addition of native chicken manure flour reduced the price of feed from Rp. 1.988,75/head/day to Rp. 1,801.25/head/day. The total cost incurred feed costs only reached 18.84-20.40%. This is not in accordance with the results of Suranjaya *et al.* (2017) that have data feed costs of small-scale pig farm about 67,60%. The low cost of this feed is due to the traditional way of maintenance and the source of feed ingredients comes from the cheap waste.

The addition of input in the form of probiotics on the treatment of B3 caused the amount of input issued to be the highest. However, the contribution of the donated output from the average daily weight gain is highest causing the highest profit to be earned. The value of the profit compared to the total input required resulted the value of BC ratio being 0.46. This lower BC ratio of 1 indicates that pig farming is less efficient in the use of venture capital and less profitable. In addition, when comparing between the total value of revenue with total input, RC ratio will be 1.46. This R/C value of this ratio indicates that pig farming is economically feasible to cultivate.

Table 4. Economic analysis of pigs farming fed native chicken manure flour (10 heads/ 90 days)

Variables	Treatments		
	B1	B2	B3
Input			
Depreciation cage	50,000	50,000	50,000
Piglet @Rp. 650,000	6,500,000	6,500,000	6,500,000
Feed			
Soya cake waste 0.75 kg/day @ Rp. 500/kg	337,500	337,500	337,500
Soya membrans skin 0,75 kg/day @Rp. 385/kg	259,875	259,875	259,875
Bakery waste 0,2 kg/day @Rp. 375/kg	67,500	67,500	67,500
Rice bran @Rp. 2500	1,125,000	562,500	562,500
Native chicken manure flour @Rp. 1,750	-	393,750	393,750
Probiotic @Rp. 30,000			54,000
Firewood	90,000	90,000	90,000
Electricity and water	45,000	45,000	45,000
Workers (20 minute/person/day @Rp. 80,000	300,000	300,000	300,000
Total input	8,774,875	8,606,125	8,660,125
Output			
Final body weight	26.38	32.26	38.68
Selling price			
Pigletst (12 kg) @ Rp. 650,000	6,500,000	6,500,000	6,500,000
Body weight gain	3,307,400	4,659,800	6,136,400
Selling value (a + b)	9,807,400	11,159,800	12,636,400
Profit	1,032,525	2,553,675	3,976,275
BC Ratio	0.12	0.30	0.46
RC Ratio	1.12	1.30	1.46

The investment value of cage is Rp. 2,000,000 with lifetime for 10 years; Calculation of pig selling price at farmer's level is calculated piglets price (≤12 kg) plus price at that time (>12 kg); The price of pigs at the time of the research is Rp. 23,000/kg

CONCLUSION

Manure of native chicken could be used as feed ingredient to substitute 50% of rice bran in the ration. Adding probiotic as feed additive into the diets containing fermented manure of native chicken resulted in higher body weight gain and economic profits than control.

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DISCUSSION

Question

1. *What was the content of probiotic and what was the dose that you used?*
2. *Will the addition of probiotic/manure will increase feed cost?*

Answer

3. *Probiotic contains microbes that can improve feed digestion and has antimicrobial activity. The dose that used was 2 ml/l of water and fed twice a day.*
4. *The addition of probiotic will reduce cost of rice bran by 50%.*