

Performance of Etawah Crossbred Goat Fed Different Types of Probiotics

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ABSTRACT

The research was conducted to evaluate different types of probiotics on the performance of Etawah crossbred goats that fed. This research was carried out for 4 months, used 28 goats with the average body weight of 26.40 ± 4.97 kg. The study was arranged in a completely randomized design with 7 treatments and 4 replications. Goats were divided and fed with one of the treatments as follows: P0: only forage, according to the farmer's way; P1: feed equal to P0 + 5cc probiotic Bio-Cas/head/day; P2: feed equal to P0 + 5 grams of probiotic Probion/head/day; P3: feed equal to P0 + 5 grams of probiotic Bioplus/head/day; P4: feed equal to P1+300 grams of rice bran/head/day; P5: feed equal to P2+300 grams of rice bran/head/day; P6: feed equal P3+300 grams of rice bran/head/day. Variables of initial body weight, final body weight, body weight gain, feed consumption and feed conversion ratio (FCR) were observed. The study indicated that goats of P1, P2 and P3 had a significantly higher body weight gain by 108.58, 85.05 and 105.65% ($P < 0.05$) compared with P0, respectively. Body weight gain of goat P5 was similar ($P > 0.05$) to other probiotic treatments but was significantly higher (171.39%) than that of P0 goat. Similarly, goat of P6 and P4 was significantly higher body weight gain (126.60 and 113.70%, respectively) than P0 goats. This study suggests that treatment P5 resulted in the highest body weight gain. In the economic analysis, goats given treatment of P1 provided the highest level of benefit.

Key Words: Goat, Probiotics, Performance

INTRODUCTION

Goat livestock farming in the province of Bali has good prospects for development. This is in line with the high demand for daily consumption of lamb meat. However, on the other hand goat's population in Bali has been decreasing at average of 4.2%/year (Anon 2014). To meet the goat's meat demand, Bali province brings in an average of 678.86 tonnes of frozen lamb annually.

In rural areas, breeding goat mainly Etawah crossbred has been conducted by farmers. This goat is a dual-purpose type, (meat and milk type), with milk production of about 1.5 to 2 liters per day (Batubara 2007). Goats are usually being raised in the integration system with food crops or plantations. In this system, goat farming is not the main job, so less attention on goat is taken. Feeding only rely on forages that are available at the surrounding area. This causes nutritional needs can not be met which resulted in low productivity.

One of the efforts to improve goat productivity is by improving the digestibility of feed consumed. The process of digestion in ruminants, is determined more by fermentative digestion in the rumen. Probiotics will increase the number of beneficial bacteria and suppress the harmful microbes that compete to live in the digestive tract (Ahmad 2008; Sugoro 2010). Therefore, addition of probiotics is expected to improve the fermentative digestibility by increasing the number of microbes in the rumen.

Probiotics are living microorganisms that are applied orally with the aim to improve animal health and nutrient absorption by manipulating the microbes in the body of

livestock (Personal et al. 2015). The use of probiotics is one of the efforts to increase the feed digestibility and nutrients absorption (Astuti et al. 2015), hence increase the body weight gain. This study aimed to evaluate the effect of three kinds of probiotics on productivity and profits of Ettawah crossbred goats. The results of this study are expected to be used as a reference in improving productivity and benefit of raising Ettawah crossbred goats.

MATERIAL AND METHODS

The experiment was conducted in the Sanda village, Pupuan districts Tabanan regency. PE goats with average body weight of 26.40 ± 4.97 kg were used in this research for 4 months. The study was arranged in a completely randomized design with 7 treatments and 4 replications. Each experimental unit consisted of one goat that placed in the individual cage. Goats were divided and fed with treatments as follows: P0: only forage according to the way farmer's way; P1: feed equal to P0+5cc probiotic Bio-Cas/head/day; P2: feed equal to P0+5 grams of probiotic Probion/head/day; P3: feed equal to P0+5 grams of probiotic Bioplus/head/day; P4: feed equal to P1+300 grams of rice bran/head/day; P5: feed equal to P2+300 grams of rice bran/head/day and P6: feed equal P3+300 grams of rice bran/head/day.

Forages such as legume forage and grasses were given twice a day (morning and afternoon feeding) with the total amount of 10% of their body weight. Provision of rice bran was done in the morning before forage feeding. The drinking water was supplied at the same time with forage feeding. Probiotics Bio-Cas was given through drinking water while probion and Bioplus were given directly to the goats. For P5 and P6 treatments probion and Bioplus probiotics were mixed with rice bran.

The parameters observed were: (1) Initial body weight; (2) Final body weight (3) Daily weight gain; (4) Feed consumption; (5) Feed conversion ratio (FCR). Goat was weighed every month. Feed consumption was calculated by subtracting the amount of feed given to food remains. FCR is calculated as the number of feed consumption divided by body weight gain. The data obtained from this study were analyzed by analysis of variance with an error rate of 1-5%. When testing the effect of variance showed significant differences, then the test between the two treatments performed by averaging multiple range test of Duncan. 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

Initial body weight of goats were not significantly different among treatments ($P > 0.05$). Similarly, the final body weight showed no significant difference ($P > 0.05$) (Table 1).

The average body weight gain of goats that obtained by the additional probiotic was higher than goats without probiotics. However, there was no significant body weight gain ($P > 0.05$) among treatments that received probiotic. Goats of P1, P2 and P3 had a body weight gain significantly higher by 108.58, 85.05 and 105.65% ($P < 0.05$) compared with P0, respectively. Body weight gain of goat P5 was similar ($P > 0.05$) to other probiotic treatments but was significantly higher (171.39%) than that of P0 goat.

Table 1. Performance of goat that fed different types of probiotics

Parameters	Treatment						
	P0	P1	P2	P3	P4	P5	P6
Initial body weight (kg/head)	25.75 ^a	24.80 ^a	27.13 ^a	25.14 ^a	26.80 ^a	26.91 ^a	28.45 ^a
Final body weight (kg/head)	28.68 ^a	30.90 ^a	32.54 ^a	31.15 ^a	33.05 ^a	34.85 ^a	35.08 ^a
Average daily weight gain (g/head/day)	26.35 ^b	54.96 ^a	48.76 ^a	54.19 ^a	56.30 ^a	71.50 ^a	59.70 ^a
Feed consumption (g/head/day)	772.50 ^{AB}	744.00 ^B	813.75 ^{AB}	754.13 ^B	954.00 ^A	957.50 ^A	1003.50 ^A
FCR	27.23 ^a	13.61 ^b	17.33 ^b	14.61 ^b	17.68 ^b	13.57 ^b	25.96 ^a

P0: forage; P1: P0+5 cc biocas/head/day; P2: P0+5 g Probion/head/day; P3: P0+5 g bioplus/head/day; P4: P1+300 g rice bran/head/day; P5: P2+300 g rice bran/head/day; P6: P3+300 g rice bran/head/day

Values with different letters in the same row indicate significant differences
Values with different capital letters on the same row showed a highly significant difference

The average body weight gain of goats that obtained by the additional probiotic was higher than goats without probiotics. However, there was no significant body weight gain ($P>0.05$) among treatments that received probiotic. Goats of P1, P2 and P3 had a body weight gain significantly higher by 108.58, 85.05 and 105.65% ($P<0.05$) compared with P0, respectively. Body weight gain of goat P5 was not significantly higher ($P>0.05$) compared to other probiotic treatments but was significantly higher (171.39%) compared goat of P0. Similarly, goat of P6 and P4 was significantly higher (126.60 and 113.70%, respectively) than P0 goats. This indicates that the three types of probiotics treatment have significant effect on increasing body weight gain.

The addition of probiotics will be able to improve the microbial population, improve health and function and application of nutrients in the digestive tract (Kompang 2009; Musa et al. 2009; Mountzouris et al. 2010). It was also reported by Riswandi et al. (2015) that additional of probiotics in the in vitro fermentation showed a tendency to increase the DM digestibility of the ration. High fiber content in the ration would slow down the process of hydrolysis by enzymes in the rumen microbes, resulting in lower levels of digestibility (Tang et al. 2008). Instead, a mixture of probiotic supplementation rumen microbes enhanced higher crude fiber digestibility value (Haryanto et al. 2008; Krisnan et al. 2009) and higher nutrient was supplied for the animal.

Probiotics can increase dry matter intake (Sugoro 2013). The feed flow rate is increased so that the digestive tract is quickly empty and there is a possibility of new feed to be consumed, which means increases total feed consumption (McLay et al. 2003). This is shown by higher feed intake of goats that obtained by additional probiotics and rice bran.

The addition of rice bran will further increase the number and completeness of the availability of nutrients in the ration given. Feed consumption was the highest on goats of P6 and was significantly higher ($P<0.01$) compared with goats P1 and P3. With more nutrients available from rice bran and higher microbial activity in the rumen causes the amount of nutrients that would be consumed and absorbed increases. McDonald et al. (2002) stated that the digestibility of nutrients depended on the amount of nutrient content in the feed. The high digestibility of nutrients will have an effect on increasing nutrient

absorption so that the body weight gain of goats that received combination of rice bran and probiotics are relatively higher.

In goats that was supplied by probiotics (P1) had the highest body weight gain. This is due to the probiotic Bio-Cas has better palatability compared to other types of probiotics. This is due probiotic Bio-Cas containing molasses. The addition of molasses significantly affect on flavour and palatability of feed (Alvianto et al. 2015). Diet with other probiotics were less preferred if given directly to the goat because they had strong smell that affected palatability. This resulted in the number of probiotic consumption becomes less. Even though the amount of feed consumption is high but less of probiotics intake caused body weight gain goats of P2 and P3 became lower than goat of P1. When compared with goats P0, goat of P1 had higher body weight gain with lower feed consumption. This result indicates that the probiotic may affect feed efficiency by improving feed digestibility in the rumen. Thus higher amount of digested and absorbed nutrients causing body weight gain becomes higher. Baah et al. (2009) stated that supplementing diets with probiotic could improve ruminal fermentation and average daily gain through promoted cellulolytic activities and improved microbial digestion of fibrous components

Goats obtained additional probiotic had Feed Conversion Ratio (FCR) lower than P0. The increased of feed efficiency through FCR reduction in probiotic treatments shown by Stephens et al. (2010) who reported that there was an improvement of feed conversion in feedlot steers fed probiotic compared to control. The lowest FCR was on the goat given P5 treatment. That was caused by the highest body weight gain, and the consumption of feed was also too high. The low FCR value of P1 goats was caused by the lowest feed consumption, but higher in body weight gain. FCR value is related to the efficient use of feed by livestock.

The economic farming analysis results indicate that giving of Bio-Cas probiotics without rice bran (P1) has the highest profit level (Table 2). Goat of P1 had a surplus in net profit of Rp. 108.600 compared with the goat of P5. This shows that the giving of Bio-Cas probiotics without obtaining additional feed ingredient such as rice bran give higher profits, even though had lower body weight gain.

The high profit earned is caused by the additional inputs. Goat of P1 had the least which expenses for purchasing probiotic (Rp. 18,000/maintenance period). The lower input was influenced by the price of probiotic Bio-Cas that was cheaper than other probiotic products. This affected the total issued input. Compared with P0 treatment, P1 treatment had a surplus in net profit of Rp 1.35528. R/C ratio showed more than 1 with R/C ratio is highest in goats P1. This suggests that goat farming of P1 has the highest efficiency. To improve profitability in the goats raising, in addition to the provision of additional forage, probiotic Bio-Cas should be given every day.

Table 2. Economic analysis of a farm that conduct fattening goat given different types of probiotics (10 animals / treatment/120 days)

No	Parameters	Treatment						
		P0	P1	P2	P3	P4	P5	P6
A	INPUT							
1	Depreciation cage	166,666.67	166,666.67	166,666.67	166,666.67	166,666.67	166,666.67	166,666.67
2	Goats @Rp. 40.000/kg	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00
3	Feed							
	forage @ 200/kg	600,000.00	600,000.00	600,000.00	600,000.00	600,000.00	600,000.00	600,000.00
	rice bran @ Rp 2.500					900,000.00	900,000.00	900,000.00
	probiotics		18,000.00	21,000.00	33,000.00	18,000.00	21,000.00	33,000.00
4	Workers Rp. 50.000 /person/day)	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00
	Total input	11,016,667.00	11,034,667.00	11,037,667.00	11,049,667.00	11,934,667.00	11,937,667.00	11,949,667.00
B	Output							
1	Body weight gain	31.62	65.95	58.51	65.03	67.57	85.81	71.65
2	Final body weight	282.00	316.00	309.00	315.00	318.00	336.00	322.00
3	Income with selling price @ Rp. 40.000/kg	11,264,800.00	12,638,080.00	12,340,480.00	12,601,120.00	12,702,880.00	13,432,480.00	12,866,080.00
C	BENEFITS	248,133.00	1,603,413.00	1,302,813.00	1,551,453.00	768,213.00	1,494,813.00	916,413.00
D	B/C Ratio	0.02	0.15	0.12	0.14	0.06	0.13	0.08
E	R/C Ratio	1.02	1.15	1.12	1.14	1.06	1.13	1.08

P0: forage; P1: P0+5 cc biocas/head/day; P2: P0+5 g Probion/head/day; P3: P0+5 g bioplus/head/day; P4: P1+300 g rice bran/head/day; P5: P2+300 g rice bran/head/day; P6: P3+300 g rice bran/head/day . Depreciation cage was calculated by assuming a price per block enclosure Rp. 250,000 with a lifespan of 5 years. Initial body weight of goat =25 kg. The selling price of goat was assumed Rp. 40,000 /kg body weight.

Price of probiotics: (1) Bio-Cas = Rp. 30,000 /liter; (2) Probion = Rp. 35,000 /kg; and (3) Bioplus = Rp. 55,000 /kg

CONCLUSION

Goats given treatment of P5 (feed + 5g of Probian) + 300 grams of rice bran /head/day) had the highest productivity with the highest body weight gain. In the economic analysis, goats given treatment of P1 (feed + 5cc probiotic Bio-Cas /head/day) provided the highest level of benefit.

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DISCUSSION

Question

Based on your slide of daily gain, basically the treatment of feed (P1, P2 and P3) are similar (feed equal to P0), however when you added 5 gram of different supplement causing a high daily growth. Could you please explain why it happen?

Answer

The addition of 5 gram supplements (probiotics) can improve rumen microbial population that works to digest feed. With the increase in digestibility, it can increase absorption of feed nutrients and will increase the body weight gain.