The Performance 0f Balinese Gilt Reared Intensively And Supplemented With Probiotic

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Abstract. Study to improve the performance of Balinese gilt reared by intensive management including good quality rations supplemented with yeast culture as a source of probiotics has been conducted. Randomized Block Design (RBD) were used in this study. Sixteen post weaning (two months old) gilts weight 10-12kg were divided into 4 groups: (i)ration control, R1 (ration containing 18% concentrate, 40% corn and 41% rice bran and 1% mineral); (ii) R2 (R1+ 0.20% probiotics; (iii) R3 (R1+ 0.25% probiotics and R4 (R1 + 0.30% probiotics) with 4 replications. Parameters measured including: feed intake, body weight gain, feed conversion ratio (FCR) and digestibility of the ration. Results showed that feed intake, daily weight gain and feed digestibility increased significantly ($P < 0.05$) in the gilt receiving probiotic treatment, on the other hand the value of FCR decreased significantly compared to the control group. It is concluded that the addition of probiotics in rations significantly improve the performance of Balinese gilt.

Keywords: **Balinese gilt, intensive management, probiotics**

I. INTRODUCTION

Population of native pig in Bali tends to decrease over the last few years. Data from the Provincial Statistics Center reported a population decrease of 10.74% from year 2012 which was 284,531 to 253,959 in 2013 due to the vast number of animals being slaughtered for consumption compared to their production rate. One reason that proceeds the condition is the pig farming system where animals are raised wildly or chained under a tree with limited and poor quality of feed provision. The pig farming system is locally known as tatakan banyu which means the animals are raised mainly for kitchen garbage disposal. The total number animal raised is small, usually one or two animals and they will be tied up with rope under tree shade in yards. So the animals will be wet during the rainy season and further wallowing in the mud mixed with their defecation and urine. Consequently pigs raised under this condition have a poor hygienic and health condition which resulted in low and unhealthy meat quality for consumption. This native pig breed has the potential to be improved as a small holder farms, as it is an integral part of living in the society in rural areas, and still as the major raw materials for preparing food sold in local restaurants [1] also for offerings especially in particular area in the Karangasem regency [2].

Two native pig species are found in Bali, one is in the eastern part of Bali which is originally from Sus vitatusand the second is found in the northern, middle, western and southern area of Bali. The characteristic of the first one is black color, rough hair, with back slightly curved downward that its belly close to the ground and a long snout. Whilst the second, black color with white tip in the belly and its four legs, and forehead. Its back curved downward with its belly almost touch the ground especially when pregnant or obese. It has a short head (24-28 cm), erect short ears (10-11 cm), shoulder high 48-54 cm, body length 90 cm, chest size 81-94 cm and tail length 20-22 cm. The length of their teat 12-14 cm, average litter size 12 [3]. The second species is known as the Balinese hog.

Sudiastra and Budaarsa (2015) similar to Sihombing (2006) found that the color of Balinese hog found in three regencies (Klungkung, Karangasem and Buleleng) in Bali is black and black with white tips on lower part of the belly and legs as found in Nusa Penida Klungkung (Fig. 1). The white tips on their legs resembling of wearing white socks. White tips also seen at lower part of the belly and also white color extending behind its head.

Fig 1. Characteristics of the Balinese Hog: (top) black color with white tips below the belly, nose and legs; (bottom) black with white color extending behind the head through the belly and legs.

Physically, Balinese pig is characterized by the arched down back of the body (lordosis). This typical traits is seen in the pigs found in Klungkung, Karangasem, and Buleleng; and it is obvious in sows compared to boars. The measures of Balinese pig are small compared to highbred pigs. For the purpose of husbandry, their body length (from tip of snout to edge of hind thigh) 97-137 cm; whereas the standard body length is 80-97 cm. The stand high is 49 cm, comprises of the average of the shoulder, back, and waist high is 48-57 cm, 40-52 cm, and 52-58 cm, respectively. Their chest, belly, and waist size is 90-136 cm, 95-136 cm, and 80-115 cm, respectively. Their head measures 20-25 cm, ears 10 cm, and tail length 20-25 cm [4].

Genetically the production growth of Balinese pigs is slower compared to the highbred one. To reach 80 kg it takes 12 months compared to 5-6 months for the highbred [2]. It is believed that intensified in the farming system and providing a high quality of ration by the adding of probiotics will significantly improve the production growth.

Probiotics are live microorganisms which have been found to benefit the host by improving the balance of the host normal flora in the digestive tract [5]. In the rations probiotics have the role in digesting indigestive feed. Moreover, supplementing probiotics in rations will improve the feed consumption, optimize feed digestion that results in daily weight gain. Probiotics have the benefit in overcome environmental pollution through reduction of the manure odor. Therefore it is highly recommended to be use as feed additive in animal production.

The use of probiotics in pigs ration have been studied and it significantly increase the carcass weight and length and Loin Eye Area of Landrace crossbred finisher pig [6]. Giang et al. (2011) used combination of Bacillus, Saccharomyces and lactic acid bacteria as probiotics in pig ration [7]. They found that the combination had a significant influence of the growth, feed conversion rate and nutrient digestibility of grower pigs. Dragan (2015) also reported the supplementation of probiotic (Bacillus subtilis and B. licheniformis) in a weaned cross Landrace and Yorkshire pig ration which resulted in increased body weight and efficiency in feed consumption [8]. This study also showed that the height and width of intestinal villi were significantly higher compared to animals not receiving the probiotics indicating increased in nutrition absorption. In another study by Lojanica et al. (2010) reported that weaned piglets receiving probiotic (Enterococcus faecium DSM 7134) showed lower feed conversion rate, higher daily growth gain and lower percentage of mortality compared to those giving the normal diets [9]. Pospíškováet al. (2013) reportedthat adding probiotic in pig diets could reduce the numbers of pathogenic bacteria (Escherichia coli and Clostridium spp.) in the pig intestine [10]. Similarly, the use of probiotic as alternative feed have been studied in other production animals. Arista (2012) used combination of yeast and sweet potatoes in broiler chicken feed [11]; Roni et al. (2015) used probiotic prepared from culture of Saccharomyces spp. isolated from yeast for duck feed [12]. The later reported that by adding 0.20-0.30% of probiotic in the duck feed resulted in increased of carcass and levelled down the fat and ammonia in the duck excretes.

The use of probiotics in local pigs, especially Balinese pig has never been reported. This study aimed to observe the performance of young gilts reared intensively and supplemented with probiotics (Saccharomyces spp. isolated from cassava yeast) in their diets

II. RESEARCH METHOD

Randomized Block Design was used with four treatment groups: (i) normal ration (R1); (ii) normal rations + 0.20% probiotic (R2); (iii) normal rations + 0.25% probiotic (R3); and normal rations + 0.30% probiotic (R4), respectively. Animals were grouped into four based on their body weight: (i) group I, 10-14 kg; (ii) group II, 15-16 kg; (iii) group III, 17-21kg, and group IV, 22-25kg. Each group of animals were randomly treated with four replications. A total of 16 pigs were used in this study. Probiotic used was cassava yeast from culture of Saccharomyces spp. The ingredients and nutrition fact rations is showed in Table 1.

TABLE 1.
COMPOSITION, ENERGY AND PROTEIN CONTENT OF RATION USED IN THE TRIAL

Ingredients (%)	Treatment*			
	R1	R2	R3	R4
Corn	40	40	40	40
Concentrate	18	18	18	18
Rice bran	41	41	41	41
Mineral	1	0.80	0.75	0.70
Probiotic	0	0.20	0.25	0.30
Total	100	100	100	105
ME (kcal/kg)	2805	2816	2820	2824
CP (Crude Protein)	16,08	16,13	16,24	16,28
Calcium	0,61	0.63	0,74	0,74
Phosphorus	0,71	0,71	0,64	0,62
CF (Crude Fiber)	7,59	7,46	7,40	7,32

* R1 = normal rations; R2 = normal rations + 0.20% probiotic; R3 = normal rations + 0.25% probiotic; R4 = normal rations + 0.30% probiotic

The Animal Used

A total of 16 weaned local gilt weight approximately 10kg were used in this study. The animals were obtained from Nusa Penida, Klungkung. Animals were treated and observed for 4 months. Colony cages of 4 x 4 x 0.75 m were used and separated into 16 individual cages. Each cage was equipped with food and water container.

Probiotics

Probiotics used were cassava yeast which is a culture of Saccharomyces spp. commercially available in the local market under trade mark Na Kok Liong 26895. Probiotics were finely crushed with a porcelain pestle prior to be used for the treatment.

Parameters Measured

Feed consumption: total daily feed provided minus daily left over on the same day; Weight gain: animals will be weighted every a fortnight then divided by 14 in order to measure the daily weight gain; Daily weight gain (gram) = animal weight at the end – animal weight at start; Feed Conversion Rate (FCR): total feed consumption divided by body weight at a particular period. FCR will be calculated on weekly basis; Digestive of feed: total feed consumption minus total weight of defecation.

Data analysis

Data were analyzed using Analysis of Variance, following with Duncan's Multiple Range Test at 5% when there is a significantly difference (P<0.05) (Steel and Torrie, 1986). Data will be presented in Tables and Figures.

III. RESULTS AND ANALYSIS

Feed Consumption

Feed consumption correlates to the growth of pig. Table 2 showed the various feed consumption of the probiotic treated group versus the no probiotic (normal rations) group. Feed consumption of animals receiving probiotic 0.20% (R2) 1.24 kg/day was statistically no difference to those without probiotic (R1 = 1.17 kg/day). However, animals receiving 0.25% (R3) and 0.30% (R4) probiotic showed significantly higher (20.51% and 27.35%, respectively) (P<0.05) feed consumption compared to the no probiotic (R1) group. The addition of probiotics resulting in better ration taste which promote the animals to feed more rations. Similar results have been reported by Dragan (2015) and Mahardika et al. (2015). Mahardika et al (2015) used probiotic in Balinese pig rations [13]. The Balinese pigs ten to consume rations less compared to the highbred pigs. This is due to the differences in the animal body weight at the same age where Balinese pigs tend to have lighter body weight compared to the highbred one.

TABLE 2
PERFORMANCE OF BALINESE WEANED GILT RECEVING PROBIOTICS IN THEIR RATIONS.

Parameters observed	Treatment*			
	R1	R2	R3	R4
Dry matter feed consumption (kg/d)	1,17^{a}	1,24^{a}	1,41^{b}	1,49^{b}
Organic compound consumption (kg/d)	1,10^{a}	1,17^{a}	1,34^{b}	1,42^{b}
Protein consumption (g/d)	184,28^{a}	208,94^{b}	243,22^{b}	275,95^{b}
Crude Fiber consumption (g/d)	72,31^{a}	59,64^{b}	58,51^{b}	56,32^{b}
Fat consumption (g/d)	71,60^{a}	79.24^{b}	100,95^{b}	93,72^{b}
Daily Weight Gain (kg)	0,38^{a}	0,39^{ab}	0,46^{b}	0,49^{b}
Feed Conversion Rate	3,53^{b}	3,60^{b}	3,43^{a}	3,42^{a}

* R1 = normal rations; R2 = normal rations + 0.20% probiotic; R3 = normal rations + 0.25% probiotic; R4 = normal rations + 0.30% probiotic

Consumption of organic compound was also increased significantly in animals receiving the 0.25% (R3) and 0.30% (R4) probiotic, although there were no significant differences between the R3 and R4 group. Protein consumption of animals receiving probiotics, R2, R3, and R4 increased significantly to 208.94 g/day, 243.22 g/day and 275.92 g/day, respectively compared to those without probiotics (R1, 184.28 g/day) (P<0.05).

Crude fat consumption was also increased in the probiotic treated group, 79.24 g/day; 100.95g/day and 93.72 g/day in R2, R3, and R4, respectively compared to the no probiotic animals 71.60 g/day. Crude fiber consumption significantly decrease in animals receiving probiotics (P<0.05). The crude fiber consumption was 59.64 g/day; 58.51 g/day; and 56.32 g/day in R2, R3 and R4, respectively. Whereas in animals without probiotic 73.31 g/day. Biodegradation of microbes in the probiotics through fermentation causing the crude fiber breaks down into

simple component. Pigs do not have the capability to digest crude fiber as the ruminant. Therefore the addition of probiotics in their rations helps in their crude fiber digestion.

Daily Weight Gain

Similar to the above results, daily weight gain increased as the probiotic concentration increased. Daily weight gain in group animals receiving probiotics R3 and R4 increased by 21.05% and 28.95% compared to those receiving no probiotics.

Fig 2. Balinese pig, black color at the end of the probiotic treatment observations.

Feed Conversion Rate

Efficiency in feed consume is expressed by the feed conversion rate (FCR). The FCR of pigs group receiving normal rations was 3.53, whereas those received probiotic, R2, R3, and R4 was 3.60, 3.43 and 3.42, respectively. Feed conversion rate value decreased as the concentration of probiotics increased, indicating the efficiency of feed consume by the animals. Others study have also reported similar results. Study by Lojanica et al. (2010) where they added Enterococcus faecium DSM 7134 as probiotics in the weaned pig ration. The addition of probiotics significantly reduced the FCR whilst increased the daily weight gain and also reduced the percentage of mortality.

Digestible of Feed

Digestible of feed is measure by total collection methods which is measuring the total feed consume and also collect and measure the total feces in one week period. Following this, analysis of the ration nutrient content as well as the fecal nutrient content were determined. From this data digestible of dry matter rations and nutrient digestible were measured.

Generally the addition of probiotics in pig rations significantly improve the digestible of feed. This phenomena is shown in Table 3. Improvement in digestible of organic compound, dry matter, protein, fat and crude fiber were found in all of the probiotics treatment groups compared to the group of animal receiving normal rations.

TABLE 3.
DIGESTIBLE OF NUTRIENT IN PIGS RECEIVING PROBIOTICS TREAMENT IN THEIR RATIONS

Parameters observed	Treatment*			
	R1	R2	R3	R4
Digestible of Dry Matter (%)	62,35 a	65,42b	66,15 b	68,15 b
Digestible of organic compound (%)	65,47 a	66,35a b	67,8b	69,97 b
Digestible of protein (%)	66,78 a	67,58b	69,78 b	68,84 b
Digestible of crude fiber (%)	60.25 a	64.56b	65,54 b	65,24 b
Disgestibe of fat (%)	65.24 a	67,56b	68,25 b	68,65 b

* R1 = normal rations; R2 = normal rations + 0.20% probiotic; R3 = normal rations + 0.25% probiotic; R4 = normal rations + 0.30% probiotic

The improvement in the digestibility of ration nutrient is a result of the addition of probiotics. Microbes in the probiotics break down the complex compound to simple compound through the enzyme they produced so that the complex compound have a high solubility. As a high solubility compound it is easily digest. Hendraningsih (2005) stated that fermentation will break down the structure of complex compound to simple compound so that it will be easily digest by the animals. Apart from that, the total number of pathogenic bacteria in the intestine also affected digestibility. A high number of bacteria will affect the fermentation process in the intestine. Study by Pospiscova et al. (2013) demonstrated that feed supplement with probiotics capable of pressing down the number of pathogenic bacteria in the animal intestine. Similarly, Mahardika et al. (2015) also found that adding fermented rice bran in the Balinese pig rations resulted in increase of ration nutrient digestibility. In conclusion, the use of probiotics in Balinese pig rations reared intensively will improve the performance of gilt.

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