

The Response of Local and *Verenigde Deutch Lanvarken* Pigs to *Corypha gebanga* Feeding Supplementation

(RESPONS BABI LOKAL DAN BABI *VERENIGDE DEUTCH LANVARKEN* TERHADAP PENAMBAHAN PAKAN *PUTAK*)

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ABSTRACT

Study to examine the growth of local breed pigs and *Verenigde Deutsch Lanvarken*(VDL) pigs supplemented with *Corypha gebanga* pith and maize have been conducted for 14 weeks. A total of 32 neutered pigs (16 local breed and 16 VDL pigs) were used in the study. The average initial live weight was 8.0 kg for the local breed and 12.1 kg for VDL pigs. Four feeding treatments were applied: T1-60% *C.gebanga* +15% maize; T2- 65% *C.gebanga* + 10% maize; T3-70% *C.gebanga* + 5% maize; and T4- 75% *C.gebanga* + no maize, respectively. Live weights and feed consumption were analyzed using repeated measures, analysis of variance. The results showed that feed supplemented with different composition of *C.gebanga* and maize had no effect towards the growth of local breed pigs. However, this phenomenon was not seen in VDL pigs. The growth of VDL pigs supplemented with 75% was significantly lower ($P<0.01$) compared to the local breed pigs. It can be concluded that substitution of maize with *C.gebanga* has no influence towards the growth of local breed pigs. However, its effects on the growth of VDL pigs need further observation.

Key words: local breed pigs, VDL pigs, *Corypha gebanga*, pig's productivity.

ABSTRAK

Penelitian tentang pengaruh substitusi jagung oleh *putak* (*Corypha gebanga*) dalam ransum terhadap pertumbuhan ternak babi lokal dan babi *Verenigde Deutsch Lanvarken* (VDL) dilakukan selama 14 minggu. Sebanyak 32 ekor babi jantan yang telah dikebiri, terdiri dari 16 ekor babi VDL dan 16 ekor babi lokal dengan bobot awal 12,1 kg dan 8,0 kg digunakan untuk mengevaluasi responnya terhadap empat jenis pakan perlakuan (T1, T2, T3, dan T4) dengan komposisi *putak* dan jagung berbeda. Pakan perlakuan T1 mengandung 60% *putak* dan 15% jagung; T2 (65% *putak* dan 10% jagung); T3 (70% *putak* dan 5% jagung); dan T4 (75% *putak* dan 0% jagung). Data bobot badan masing-masing ternak dikumpulkan dan dianalisis menggunakan *repeated measurement analysis of variance*. Hasil penelitian menunjukkan bahwa komposisi *putak* yang berbeda tidak berpengaruh terhadap penambahan bobot badan babi lokal. Adanya interaksi antara waktu dan komposisi pakan terhadap penambahan bobot badan babi VDL, mengindikasikan bahwa penambahan bobot badan babi VDL berbeda selama penelitian berlangsung. Pertambahan bobot badan babi VDL yang diberi 75% *putak* sangat nyata ($P<0,01$) lebih rendah dibandingkan pertambahan bobot badan babi lokal. Berdasarkan hasil secara keseluruhan, dapat disimpulkan bahwa substitusi jagung oleh *putak* (*C. gebanga*) tidak berpengaruh terhadap pertumbuhan babi lokal, namun terjadi penurunan laju pertumbuhan pada babi VDL. *Putak* (*C. gebanga*) dapat menggantikan jagung dalam ransum ternak babi lokal, sedangkan manfaatnya dalam ransum babi VDL masih perlu diteliti lebih lanjut.

Kata kunci: babi lokal, babi VDL, *putak*, *Corypha gebanga*

INTRODUCTION

Indigenous types of pigs is usually spread throughout rural areas of West Timor and comprise a large proportion of the total numbers of pigs in the region. Under the subsistence level or semi intensive system of pig management, several crops and by-products are suitable feed for pigs, for some of which, especially maize are staple food for human. Lack of feed supplementation in pig diets resulted in the low meat production (Fuah and Priyanto, 2011). Farmers in the villages commonly feed their animals such as goats and chickens with stem pith of a palm (*C. gebanga*), and occasionally with maize grain to pigs (Fuah and Pattie, 2013). *Corypha* is a genus of seven species of palms, native to Indonesia, India, Philippines, Malaysia and North-Eastern Australia. They reach heights of 20-40 m and with a trunk diameter of up to 1,0-2,5 m. *Corypha gebanga* known as *sago* had a very important roles in socio-economic and cultural aspects in Eastern Indonesia, functioning as main food for local people, especially as traditional foods in Papua province (Lestari, 2009). The sago plantation of approximately 60 varieties, spread over the region on 900.000 ha of land. Implementation of processing technology may improve the values of their products. Its starch were commonly used as raw materials for making cakes or functioned as daily food for the rurals house meals (Kanro *et al.*, 2003). Despite the utilisation as staple human food, in West Timor, the palm pith was also used in livestock feeding (goats, pigs and chickens) during critical period of dry seasons when feed for animal were limited (Fuah and Priyanto, 2011).

The used of *C. gebanga* in animal feeding should be supplemented with sufficient nutrients including minerals and vitamins to provide balanced ration. Mahan *et al.*, (2007) demonstrated that supplementation of B vitamins at the 100% total NRC (National Research Council) levels for starter and grower pigs (25-85 kg) increase pig performance, i.e. a greater longissimus muscle area, and a lower backfat depth. Lekule and Kyvsgaard, (2003) recommended that programs aimed at increasing indigenous pig production, requires good knowledge and good understanding of local breed of pigs, environment and the resource poor regions as a whole system. The growth response of local and exotic pigs in the Latin villages of several tropical and semi arid regions were

reported by de Alba (1972); including the effect of feed and nutritional status on litter mates and their growth (Rigor and Kroeske, 1985), relation between live weight development and reproduction performance (Hoving *et al.*, 2010), and development factors on sow longevity (Hoge and Bates, 2012). Dwyer *et al.*, (1993) reported that pig litter mates fed with a high fiber tended to grow faster and more efficiently than litter mates with a lower fiber content. The information of substitutability of *C. gebanga* in pig ration were limited, particularly in Eastern Indonesia. This study was aimed to assess the effect of *C. gebanga* supplementation on the performance of local and exotic *Verenigde Dutch Lanvarken* (VDL) pigs.

RESEARCH METHODS

Supplementary Feeding of Pigs

Pig feeding trials were conducted over 14 weeks at the Agricultural Research and Development Institution (BPPT), Kupang. The experiment was carried out to compare various combination of *C. gebanga* (palm pith) and maize as supplements in the diet. Thirty-two castrated male pigs were used in the study comprising of 16 local and 16 VDL pigs. The average initial liveweight was 8.0 kg for the local pigs, and 12.1 kg for the VDL pigs. The local pigs were bought from a pig breeding centre located in the region.

There were six weeks of preliminary study and eight weeks of data collection. Animals were allocated randomly to eight pens in groups of four animals per breed per pen. Each pen was 2 m long, 2 m wide and 1.10 m high. Four rations formulated from the locally available materials were given to the animals. Four pigs of each breed received each treatment. The composition of each ration is shown in Table 1. Animals were weighed individually every week. Feed consumption of each group of the animals was measured daily. The feed conversion ratio (FCR) was calculated for each week and estimated as the weight (kg) of feed consumed per kilogram live weights gain.

The average crude protein content of each of the rations was 13%. A proximate analysis of samples from the rations was carried out at the University of Nusa Cendana. The program was used for data analyses was the Repeated Measure Analysis of Variance (SAS, 1985, pp. 631-635): The effects of feeding treatment on growth performance were examined on both local and

Table 1. Feed composition of the four rations fed to pigs in a supplementation trial (%)

Rations	Corypha	Rice bran	Fish meal	Maize	Premix
T1	60	4.5	20	15	0.5
T2	65	4.5	20	10	0.5
T3	70	4.5	20	5	0.5
T4	75	4.5	20	-	0.5

Ration:

T1 60% *C. gebanga*, 4.5% rice bran, 20% fish meal, 15% maize and 0.5% premix

T2 65% *C. gebanga*, 4.5% rice bran, 20% fish meal, 10% maize and 0.5% premix

T3 70% *C. gebanga*, 4.5% rice bran, 20% fish meal, 5% maize and 0.5% premix

T4 75% *C. gebanga*, 4.5% rice bran, 20% fish meal, 0% maize and 0.5% premix

Table 2. Calculated nutrient compositions of T1, T2, T3 and T4 samples of the rations fed to pigs during the trial (%).

Ration	DM	CP	Ca	P
T1	88.0	14.45	1.65	0.58
T2	79.3	14.02	1.72	0.59
T3	78.6	13.66	1.80	0.60
T4	77.9	13.34	1.82	0.61

DM = Dry matter; CP = Crude protein; Ca = Calcium; P = Phosphorus

Ration:

T1 60% *C. gebanga*, 4.5% rice bran, 20% fish meal, 15% maize and 0.5% premix

T2 65% *C. gebanga*, 4.5% rice bran, 20% fish meal, 10% maize and 0.5% premix

T3 70% *C. gebanga*, 4.5% rice bran, 20% fish meal, 5% maize and 0.5% premix

T4 75% *C. gebanga*, 4.5% rice bran, 20% fish meal, 0% maize and 0.5% premix

VDL pigs, including analysis of feed efficiency of each of the treatments.

Feed Composition

Table 2 shows the nutrient composition of four rations given to pigs under trial conditions. The choice of these rations was based on their availability in the regions, easy access and preparation by farmers.

RESULTS AND DISCUSSIONS

Effect of Treatments on Feed Consumption and Growth

The Table 3 show that neither feeding treatment nor interaction between time and feeding had significant effects on liveweights of local pigs. With VDL pigs, although feeding treatment did not have a significant effect on average liveweight gain, there was a significant interaction effect between time and feeding treatment (P<0.01). This shows that in the VDL

pigs there were significant differences of liveweight gain between treatments at different times during the eight week feeding period. At the conclusion of the feeding period, the VDL pigs receiving the 75% *C. gebanga* diet were approximately 7 kg lighter than their counterparts receiving the 60% *C. gebanga* diet (Table 4).

The results summarized in Figure 1 and Table 4, indicate that palm pith can replace maize in feed supplements for local but not VDL pigs, at the levels used. Based on the data in Figure 1, the VDL pigs grew much faster than the local breed (P<0.01). Ignoring feeding treatment, the average weekly gain per animal was 3.1 kg for VDL pigs compared to 1.2 kg for local pigs. The results may have been affected by worm infestation in local pigs. The growth rate of supplemented pigs (VDL and local) appears to be much higher than the average gains measured in village pigs of 378 g/week. Oluwafemi *et al.*, (2012) and Akintunde *et al.*, (2012) reported a possitive response of growth

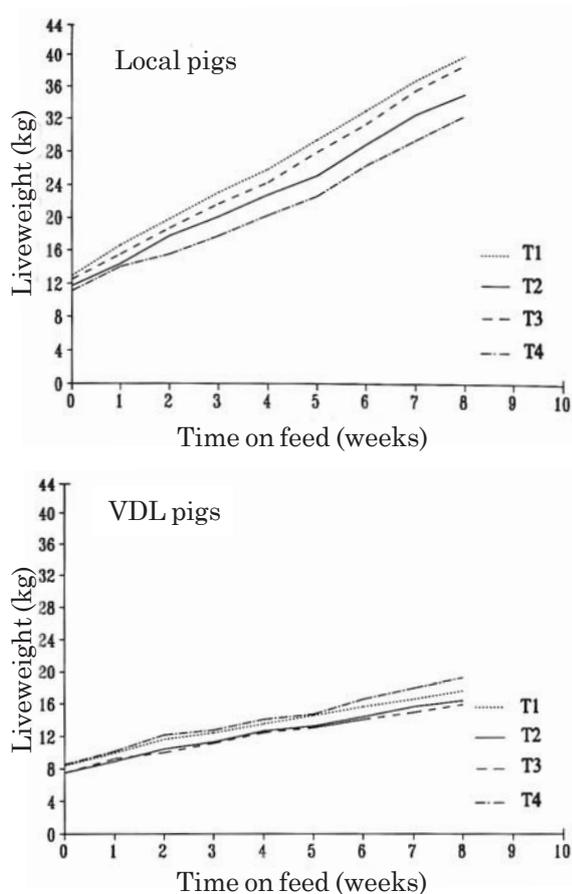


Figure 1. The effect of replacement of maize by corypha gebanga meal in the diet of local and VDL pigs on liveweight response from 16 to 24 weeks of age.

Treatment:

- T1 60% *C. gebanga*, 4,5% rice bran, 20% fish meal, 15% maize and 0,5% premix
- T2 65% *C. gebanga*, 4,5% rice bran, 20% fish meal, 10% maize and 0,5% premix
- T3 70% *C. gebanga*, 4,5% rice bran, 20% fish meal, 5% maize and 0,5% premix
- T4 75% *C. gebanga*, 4,5% rice bran, 20% fish meal and 0,5% premix

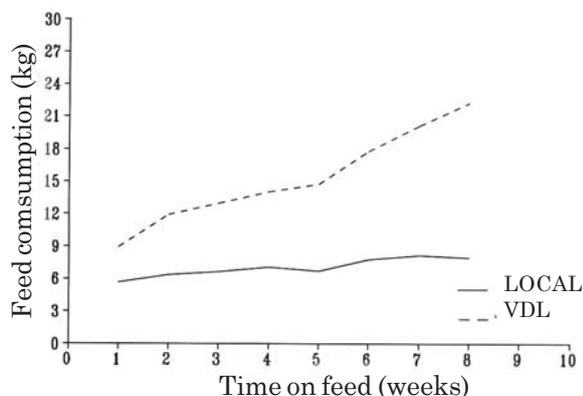


Figure 2. Feed consumption (kg per animal per week) of local and VDL pigs

for experimental growing and finisher pigs used in their studies, by using palm kernel based meal supplementation in the pig ration. According to information from survey study (Fuah and Priyanto, 2011), some individual farmers in the villages, who fed their pigs using palm pith, however, experienced higher gains (1.6 kg/week) than the average gain of the supplemented local pigs. The effect of *C. gebanga* as feed supplementation did not give significance results, since the animals were affected by endoparasites of which contributed to such slow growth performance.

The local pigs used in this study, came from different sources and some of the animals apparently carried parasites when they entered the trial. Although affected animals were treated during the preliminary period, differences in health condition and the virulence of worm infestation may have influenced the effects of the treatment. Farmers used to treat their animals using traditional medicins, without consulting Veterinary Service Personnels. The use of supplementation was suggested to improve the immunity of animals. Leonard *et al.*, (2012) demonstrated that seaweeds and seaweed extracts supplementation enhanced piglet immune function and colonic microflora at weaning. Increasing immunity of animal during the early ages was quite important, in order to improve performance during the early growth stages. Walter *et al.*, (2002) stated that birth weight has a substantially greater impact on pig growth performance after weaning than increasing nutrient intake during lactation.

The VDL pigs consumed much more feed (2.2 kg/pig/day) than the local pigs (1.0 kg/pig/day). The Least Square Means of feed consumption per week across the four feeding treatments are presented in Figure 2. There were small decreases in feed consumption of local pigs during weeks five and eight due to worm infestation. Faecal analyses carried out at the Livestock Health Service laboratory showed that the parasitic types affecting the experimental pigs were *Strongylus* sp., *Ascaris* sp., and *Metastrongilus* sp. Albendazole (Piperazine^o) and Valbazen were recommended by Livestock Health Service staff for oral administration to affected animals. This health control measure was not applied to the VDL pigs since they were bought from a pig breeding enterprise and were believed free from worm parasites. Diarrhea occurred within the local pig group during the preliminary period, so animals were treated with Albendazole to reduce worm burdens. However, some animals were still apparently affected during the measurement period of the trial.

Table 3. Least Square Means (LSM) of liveweights (kg) of *Verenigde Deutch Lanvarken* pigs receiving four feeding treatments.

Week	<i>Verenigde Deutch Lanvarken</i> Pigs							
	T1		T2		T3		T4	
	LSM	SE	LSM	SE	LSM	SE	LSM	SE
1	16.62	2.24	14.37	2.24	15.50	2.24	14.00	2.24
2	19.87	2.32	17.75	2.32	18.75	2.32	15.50	2.32
3	23.00	2.45	20.12	2.45	21.62	2.45	17.75	2.45
4	25.75	2.51	22.75	2.51	24.25	2.51	20.25	2.51
5	29.37	2.66	25.12	2.66	27.87	2.66	22.62	2.66
6	33.00	2.80	28.87	2.80	31.25	2.80	26.25	2.80
7	36.75	2.98	32.50	2.98	35.50	2.98	29.37	2.98
8	39.87	3.05	35.00	3.05	38.75	3.05	32.37	3.05

Treatment:

- T1 60% *C. gebanga*, 4,5% rice bran, 20% fish meal, 15% maize and 0,5% premix
- T2 65% *C. gebanga*, 4,5% rice bran, 20% fish meal, 10% maize and 0,5% premix
- T3 70% *C. gebanga*, 4,5% rice bran, 20% fish meal, 5% maize and 0,5% premix
- T4 75% *C. gebanga*, 4,5% rice bran, 20% fish meal and 0,5% premix

The Least Square Means of feed conversion rate per animal per week are presented in Table 4, the exotic animals were more efficient in converting feed into live weight than local pigs. The feed conversion ratios were high, 6.6 for local pigs and 5.1 for VDL pigs, even in comparison to data reported from some village studies. For example the FCR of the native Taoyuan pigs in Taiwan and Ilocas pigs in the Philippines under good management was 4.22 and 4.78 respectively (Rigor and Kroeske, 1985b). The bulky, high crude fibre feed in the present study would have been largely responsible for the high feed

conversion ratios and the worm infestation in the local breed would have exacerbated the effect.

If farmers wish to utilize the growth potential of VDL pigs, they need to feed high levels of supplement. There are some local feeds including corn, cassava, *Ipomoea* species and other types of potential local feeds available for pigs, which are staple food for human consumption. Therefore, alternative supplemented feeds with balanced nutrients should be available and provided, which may fulfill the basic need animals to meet their requirement. Several vitamins and minerals are

Table 4. Least Square Means (LSM) of feed conversion (feed consumed/kg weight gain) of local and *Verenigde Deutch Lanvarken* pigs

Week	Local pigs		<i>Verenigde Deutch Lanvarken</i> Pigs	
	LSM	SE	LSM	SE
1	3.61	0.17	2.95	0.17
2	4.78	0.86	4.49	0.86
3	8.29	0.94	4.90	0.94
4	5.67	0.38	5.31	0.38
5	8.78	0.55	5.06	0.55
6	6.46	0.29	4.97	0.29
7	7.62	0.48	5.49	0.48
8	8.02	0.44	7.56	0.44
Average	6.66	0.14	5.09	0.14

LSM = Least Square Means; SE = Standard Error; VDL= *Verenigde Deutch Lanvarken*

also important to be considered in formulating animal rations. Mahan *et al.*, (2007) stated that supplementation of B vitamin at the 100% total NRC levels for starter and growing pigs was sufficient to meet their needs. The effect of various supplements, including palm corypha, on the growth of starter and growing pigs were reported by several researchers (Mahan *et al.*, 2007; Leonard *et al.*, 2012). The effect of *C. gebanga* feed supplementation on the growth of goats, including the limiting factors influencing animal performance was reported by Fuah and Pattie, (2013). Individual responses of each species of the experimental animals to feed supplementation and the effect of parasites investigation, had a great influences on the different growth and feed efficiency of the experimental pigs.

After being subjected to the treatments for eight weeks, local pigs were found not to grow sufficiently to compensate for the extra cost of the supplementary feed given. From an economic point of view, supplementary feeding of local animals is not quite efficient and does not seem advisable. It would be better to keep them under a scavenging system at little or no cost, as farmers currently do. On the other hand, supplementation of *VDL* pigs appears to be a profitable option, as long as farmers can afford the cost of supplements. In the countries where pig industries are well established and feed resources are available, researches conducted on feeding supplementation, methods and types of feed to improve efficiency and pig performance, were well documented (Fastinger and Mahan, 2003; Sulabo *et al.*, 2010; Yoon *et al.*, 2010). In this regard, however, limited feed availability in the study areas, made *Corypha* pith became local potential feed for pigs, since maize was staple food for human consumption. It would seem that replacement of *C. gebanga* for maize in diets with 60% of *C. gebanga* and 15% of maize, is not indicated in exotic breed pigs. Baconawa (1986), reported that raising indigenous pigs with optimum utilization of available local feed resources in villages, had played important roles as a source of farmers income in The Philippines. The study results suggested that examination and treatment for parasites would be very important. Better management and regular disease control would be needed to maintain a steady growth rate and allow an acceptable slaughter live weight to be attained. It is likely that imported breeds could be used to improve the genetic potential of local breeds through crossbreeding, as *VDL* pigs have demonstrated a capacity to perform well under local feed and environmental conditions.

CONCLUSION

Evidence was found that substitution of maize in pig diets with *C. gebanga* did not influence growth rates of local pigs, but that the growth rate of exotic pigs (*VDL*) was slightly depressed by such substitution. Feed supplementation of pigs in villages could result in more efficient use of the existing local feed resources, but an intensive care and appropriate treatments for parasites would seem to be very important in any improved feeding program.

SUGGESTIONS

Supplementary feeding with sufficient nutrients on exotic breeds of pigs, would be better and may improve growth rate and feed efficiency which will in turn, may improve cost efficiency. However, whether farmers adopt feed supplementation will be very much depend on the availability of labor, local feed resources and capability of farmers to purchase supplements.

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