PIG GROWTH PERFORMANCE DATA USING THE LOUDONG BIO-FERMENTATION WASTE TREATMENT TECHNOLOGY IN CLOSED HOUSE SYSTEM

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ABSTRACT. A trial and pig performance data collection was conducted to evaluate the efficiency of Luodong Bio-Fermentation Treatment Technology with zero discharge effect in a pig close house system at Tanjung Sepat, Selangor. This trial was done to gather and monitor the pig growth performance and the pig acceptance of using the Loudong Bio-fermentation Waste Treatment Technology in close house enviroment. Growth performance of the pigs were monitored by an average daily gain, feed conversion ratio, behaviour and veterinary observations. Close house temperature, moisture measurement and bedding sampling were also conducted.

Keywords: pig, growth performance, waste treatment, closed house system, zero discharge, feed conversion ratio (FCR)

INTRODUCTION

The pig industry has been known to cause environmental pollution especially air and water pollution. Therefore, new technologies are developed which are more environmental friendly and effective to address the problem arising from the pig farming area. The technology of using microorganism Fermentation Bedding in pig farming has been studied in Malaysia since the 1980s (Choo, 1988; Ong, 1988; Teoh, 1988) because of the importance of the waterway pollution and social problem. Common raw material used in the bedding include saw dust, rice straw and rice husk. These bedding material is mixed with useful microorganism to facilitate the breakdown of waste in the pig manure thus no washing is required to clean the pig and the pig pens. This subsequently will reduce water usage in the farming system and reduce enviromental pollution since less effluent is being released to the common drainage.

The Loudong Bio-fermentation Waste Treatment Technology is a technology that uses microorganism and enzymes in their product which includes *Bacillus natto*, yeast, Amylase, Protease and other probiotics in the feed and bedding. This technology was developed in Japan by the Japan Rakuto Kasei Chemical Industry Co. This product can be mixed in the bedding and also fed

to the animal to improve food digestion, nutrient absorption and reduce odour and ammonia emission from pig manure (as claimed by the manufacturer). This system operates only in a closed house system. The whole waste treatment system consists of the closed house system, bedding and the Luodong enzymes. In order to evaluate the efficiency of this system, data collection of the pig performance using the Luodong Bio-Fermentation Treatment Technology in a close house system with zero discharge effect was proposed. This trial was done to monitor pig growth performance and pig acceptance of using the Loudong Bio-fermentation Waste Treatment Technology in the closed house farming system in Malaysia.

MATERIALS AND METHODS

A total of 40 weaners (17 males and 23 females) of Large White cross-breeds were allotted in a closed house farming system in Tanjung Sepat, Selangor (Figure 1). The experimental closed house used in this trial was situated within an open house pig farming system. This trial was done from weaners age (day 60) to market age (day 180). Weighing was done 3 times during the trial at age 60 days, 120 days and 180 days. The feed was mixed with Loudong enzyme at 1% for below 35 kg body, 1.5% for 35 kg and above and 2% for above 65kg body weight. Drinking water was given *ad lib*. Nipple drinkers were provided inside the pen with cemented collection base under them in order to avoid wetting the bedding. The feed was self-mixed in the farm, supplied by the farm owner and the feed used was the Grower feed and Finisher feed. Feed consumption was monitored for grower and finisher. Feeding was done *ad lib* at the beginning and then restricted after the weaners showed signs of the effect due to overfeeding. The feeding was done twice daily, once in the morning at 8 am and once in the afternoon at 4 pm.

The temperature and moisture inside the house were monitored and recorded 3 times daily at 9 am, 12:30 pm and 4 pm. The bio-fermentation bedding used was made from 50% rice husk and 50% sawdust at 0.6 m thickness where the rice bran and sawdust were at 5-7 kg/m^3 and Loudong enzyme at 200-500 mg/m^3 (Figure 2). The floor litter size for this study was 28.24 m × 3.1 m or 2.18 m^2 per pig (Figure 3). The bedding material was wetted with normal water every 2 days depending on the condition of the bedding. The bedding was turned and mixed every 2 weeks with a mini excavator (Figure 4). Random sampling of the bedding material was carried out at day 45 and 105. The bedding material was sent for laboratory testing of bacterial culture and identification for pathogenic bacteria.

Behaviour and veterinary observations of the growing-finishing pigs were carried out from day one of loading to marketable age and weight. Mortality rate and any clinical symptoms were observed and reported.

Figure 1: Closed House System in Tanjung Sepat, Selangor

Figure 2: The bedding material used

Figure 3: Weaners on the Bedding Material

Figure 4: Mini excavator used to mix and turn the bedding

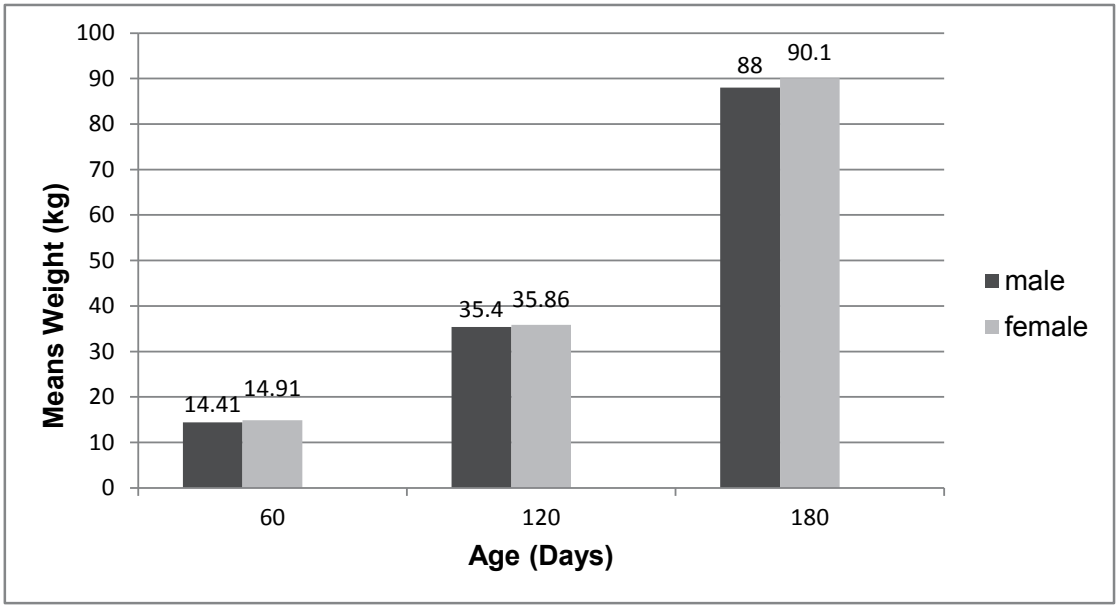

Figure 5: Means weight (kg) distribution of the male and female pigs according to age (days)

Table 1: Weight of the pigs

Age/Sex	Male			Female		
	No. of animals	Total weight (kg)	Mean weight (kg)	No. of animals	Total weight (kg)	Mean weight (kg)
60 days	17	245	14.41	23	343	14.91
120 days	15	531	35.40	21	753	35.86
180 days	15	1320	88.0	21	1892	90.10

RESULTS

Growth and Mortality

At the growing stage, 4 (2 male and 2 female) out of 40 (10% mortality) experimental pigs died. Three (3) died due to overfeeding – pigs were fed *ad lib* in the early stage and then switched to restrict feeding after many of the piglets had diarrhoea and soft stool, 1 died due to suspected Swine Erysipelas however no post-mortem was conducted as the body was already disposed off.

From Table 1, the female and male pigs were almost at the same weight at the first and second weighing but at the final weighing (day 180) the females were slightly heavier than the male pigs. The weight of the piglets was better after day 120 as shown in Figure 5. The feed conversion ratio (FCR) was higher during the growing stage (day 60 -120) which was 3.32 and lower during the finishing stage (day 120 to 180) which was 2.11 (Table 2).

Close House Temperature, Moisture and the Bedding Material

The temperature and moisture reading inside the closed house was taken 3 times daily at 9 am, 3 pm and 6:30 pm. The 9 am temperature ranged between 25.3°C to 30.3 °C. The 3 pm temperature ranged between 29.3°C to 34.1°C and the 6:30 pm ranged between 28.5°C to 31.5°C. The 9 am moisture reading ranged between 56% to 78%. The 3 pm moisture reading ranged between 68% to 90% and the 6:30 pm

Table 2: Growth Performance

	Grower (60-120 days)	Finisher (120-180days)
No. of pigs	36	36
Average Daily gain, g	590	494
Average Daily feed, kg	1.96	1.04
Feed Conversion Ratio (feed/gain)	3.32	2.11

Table 3: Result of bacteria isolation and identification from bedding material sampled at Day 45 and Day 105 post loading of weaners

Day (post-loading of weaners)	Organisms from bedding material sampled at			
	Surface	Middle	Bottom	Near Drinker
Day 45	*Pseudomonas* sp. *Bacillus* sp. *Acinebacter* sp.	*Alcaligenes* sp. *Bacillus* sp. *Acinebacter* sp.	*Bacillus* sp. *Acinebacter* sp.	*Aeromonas* sp. *Bacillus* sp. *Acinebacter* sp.
Day 105	*Escherichia coli* *Alcaligenes* sp. *Bacillus* sp.	*Aeromonas* sp. *Escherichia coli* *Bacillus* sp.	*Aeromonas* sp. *Escherichia coli* *Bacillus* sp.	*Aeromonas* sp. *Escherichia coli* *Bacillus* sp.

moisture reading ranged between 63% to 78%. There were few technical problems that contributed to the high temperature and fluctuation of moisture reading in the closed house. This included malfunction of one of the exhaust fans, cooling curtain and the water pump.

The bedding material was taken at three levels, the outer surface, middle part and the bottom part of the bedding and also near the nipple drinker. The samples were sent for bacteria isolation and identification. Two sampling was done at day 45 and day 105 post-loading of weaners. Bacillus sp. and *E. coli* were the common bacteria isolated from the bedding (Table 3).

Behaviour and Veterinary Observations of the Growing-Finishing Pigs

In the first day of loading the weaners into the bio-fermented pen, they were not given food in the morning and afternoon, and most of them were sleeping on the concrete flooring near the feeding trough. Four (4) of them were heard coughing and most of the others were seen scratching their body due to the irritation made by the bedding materials. On day 4 post-loading, more piglets were coughing and one of them had diarrhoea. By day 9, the majority of the pigs had diarrhoea. They were treated with Clindamycin antibiotic (Clinda-plus®) for 3 days. The mortality case was recorded at day 18 (2 deaths with clinical signs of generalised weakness, coughing and diarrhoea), day 34 (1 death with clinical signs of generalised paralysis) and day 39 (1 death with clinical signs of generalised weakness, coughing and diarrhoea). No pig with severe skin problem was noticed during the whole trial.

DISCUSSION

When the pigs were just introduced to a different environment and management system, the adaptation process is very critical. After weaning (day 60 to 120) the pigs showed a much higher FCR as there were many factors that contributed to the result. As at the beginning of the trial, there were a lot of technical problems in the closed house system that caused the difficulty in maintaining or stabilising the temperature and moisture required. The fluctuation of the temperature and moisture in the closed house could be one of the factors that triggered stress on the piglets. The piglets were not used to the bedding material as from a day old to day 60 the piglets were living on cemented flooring with the sows. This explained the behaviour of the piglets munching and playing with the bedding material on the first week after loading onto the bio-fermented bedding. The dust, heat and the bedding material could have been the cause of coughing and diarrhoea at the growing stage but once the piglets were used to the different environment and improved management, the piglets progressed well and the FCR reduced to 2.11 at day 180. At day 180, both male and female pigs mean weight was still below the marketable weight (110 kg). The timing for the temperature and moisture reading was

not at the optimum (which was suppose to be at 8 am, 1 pm and 8 pm) but due to technical support constraints, this reading could not be performed.

There were no pathogenic bacteria isolated from the bedding material. The most common bacteria isolated from the bedding were *Bacillus* sp. as they were the main microorganism in the Loudong Bio-fermentation Waste Treatment Technology product. *E. coli* was the anaerobic bacteria commonly found in the manure and the gastro-intestinal tract. Since the experimental closed house was situated in the open housed pig farming area, the odour emission from the pig manure could not be appreciated. There were fewer odours in the house due to the usage of the exhaust fans and cooling pads but the odour in the surrounding area could not be determined. This trial should be supported with a more proper experimental design and location for better scientific comparison. The cost of production should be determined so that the farmers will not get discouraged from using the Luodong Bio-Fermentation Treatment Technology in a close house system with zero discharge effect as one of the alternatives to control environmental pollution especially air and water pollution.

CONCLUSION

The behaviour of the pigs and herd health related to the bio-fermented bedding were greatly influenced by the management and adaptation of the pigs itself. The technical problem which occurred during the trial should be solved before starting to prevent negative effects to trial.

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