

## Effects of group size and floor-space allowance on growth performance and body components of wean-to-finish pigs in the tropical environment

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### Abstract

Ninety large white x landrace crossbred weaners pigs with average body weights of  $10.00 \pm 0.05$  kg 42 days of age were randomly assigned to three floor-spaces of  $4.40\text{m}^2$ ,  $5.50\text{m}^2$  and  $6.60\text{m}^2$  with three group sizes of 8, 10 and 12 pigs, respectively. The feeding was done with weaner ration (20% CP, 3500 kcal/kg ME), finisher ration (16% CP, 3000Kcal/1kg ME) and water was given ad libitum. The average daily body gain (ADBGs and feed: gain ratio were 0.222kg, 0.208kg, 0.180kg and 8.42, 9.13, 9.72 for group size of 8, 10 and 12 pigs, respectively. Pigs in group sizes 8 and floor-space  $4.40\text{m}^2$  were significantly ( $P < 0.05$ ) higher in daily weight gain, final body weight, feed intake and feed:gain ratio compared to the other group sizes 10 and 12, and floor-spaces  $5.50\text{m}^2$  and  $6.60\text{m}^2$ . Again, pigs in group size 8 and floor-space  $4.40\text{m}^2$  were significantly ( $p < 0.05$ ) higher in final gain and percent (%) gain on body length (BDL), body circumference (BDC), heart girth (HEG), ham length (HAL) and height-at-withers (HAW). Based on these results, group size and floor-space allowance could be of great scientific guide to pig farmers in designing and improving breeding performance as well as commercial pig rearing in the tropics. It is however, recommended that the research be carried out on a larger scale to cater for commercial pig farmers in the tropics.

**Keywords:** Growth, group size, floor-space, wean-to-finish pigs, tropics

### Introduction

Construction and operation of pig housing systems are expensive. Pigs have been penned generally from weaning to finish (market weight) in group sizes of five to thirty. According to Wolter *et al.* (2001), the number of pigs per pen (group size) and the floor-space allowance are important factors in the design and utilization of the pig houses. Research has shown that the weaner pig performance varies with the number of animals per group and floor-space allowance (Kornegay and Notter, 1984). In addition, the authors and Wolter *et al.* (2001) opined that several studies have shown that decreasing floor-space reduces

average daily gain (ADG) of both nursery and grow-to-finish pigs. Besides, Kornegay and Notter (1984) found out that for weaning pigs (body weight  $< 30$ kg) at a constant floor-space allowance, average daily gain (ADG) and the average daily feed intake (ADFI) decreased as the number of pigs per group increased from three (3) through thirty-two (32) pigs.

Thus, Gonyon and Strickland (1998) noted that in commercial operations where large group sizes are involved, perhaps total space per pig can be decreased without reducing growth rate. However, for relatively large group sizes, there is a few data related to the effect of group size and

floor-space allowance on pig performance under the tropical conditions. As the tasks before pig produced is to ascertain a standardized stocking rate as it affects overall pig performances. Measurement of body weights (BDW) and body size parameters components provide a faster and ease means of determining the percentage growth rate of measureable traits in animals (Ganiyn *et al.*, 2016). The aim of this research is to determine the effects of group size and floor-space allowance performance and some body components of wean-to-finish pigs under the tropical environment.

### **Materials and methods**

The research was carried out at the Piggery Unit, Department of Animal Science, University of Calabar, Calabar, Nigeria. This is located in South Eastern Nigeria which falls between latitude 45°58'N and longitude 8°17'E of Equator with annual rainfall range of 1260mm – 1280mm. Average temperature ranged from 25°C to 30°C during the period. Ninety (90) large white (LW) x Landrace (LD) crossbred weaner pigs of average body weight of 10.00±0.05kg of six (6) weeks, forty-two (42) days of age were used for the experiment. The experimental animals were randomly assigned to three (3) group sizes consisting 8, 10 and 12 weaner pigs on three (3) floor-space allowance of 0.55m<sup>2</sup> per finishing pig as recommended by Olumu and Oboh (1995) for pigs in the tropics. The total floor-space allowance for each treatment group were 4.40m<sup>2</sup>, 5.50m<sup>2</sup> and 6.60m<sup>2</sup> for group size of 8, 10 and 12 weaner pigs respectively. Each treatment group (group size) consisted of equal number of male and female weaner pigs replicated thrice. The animals were quarantined for one week during which they were treated against ectoparasites

using Diazintol solution (1ml/10kg body weight), dewormed with albendazole (2.5% oral suspension) and injected intramuscularly with oxytetrin for 10mg acting broad spectrum antibiotic at 1ml/10kg body weight. They were fed compounded weaner and finisher rations containing 20%CP, 3500kcal/kg ME and 16% CP, 3000 kcal/kg ME respectively. Each pig was fed twice daily, 08.00am and 02.00pm on average feed from 0.5kg/day to 1.00kg/day at weaner's phase and from 1.00kg/day to 2.00kg/day at the finisher's phase. Fresh, cool water as given ad libitum to the experimental animals throughout the 16 weeks of the study. The animals were housed in concrete floor pens equipped with standard waterers and feeders. Routine management practices were followed. Records of feed consumption and weight gained each week were kept on treatment group basis. Feed: gain ratio was calculated by dividing total feed consumed with total weight gain. Body components measured were body weight (BDW), body length (BDL), body circumference (BDC), heart girth (HEG), ham length (HAL) and height-at-withers (HAW). The reference points and procedure for body measurements/components were as prescribed by Okon (2008). Data obtained were subjected to mean and standard error of mean using statistics analysis software (SAS, 2012).

### **Results and Discussion**

The daily feed intake (1.73 to 1.90kg), daily weight gain (0.180 to 0.222kg), final body weight (32.72 to 37.25kg) and feed:gain ratio (8.42 to 9.72) were different across group size and floor-space (Table 1). These parameters showed significantly different ( $p<0.05$ ) effects of group size (8 and 12) and floor-space (5.50m<sup>2</sup> and 6.60m<sup>2</sup>) on the performance of the wean-to-finish pigs. Daily weight gain and feed: gain ratio

decreased ( $p < 0.05$ ) with increasing group size and floor-space, resulting in

significantly ( $p < 0.05$ ) reduction in body weights at the end of the experiment (16 weeks).

**Table 1: Performance of wean-to-finish pigs on different group size and floor-space**

Parameters	F <sub>1</sub> (8)	F <sub>2</sub> (10)	T <sub>3</sub> (12)	*SEM
Mean initial body weight(g)	12.37	12.50	12.54	0.20
Mean final body weight(g)	37.25 <sup>a</sup>	35.77 <sup>a</sup>	32.72 <sup>bc</sup>	2.52
Mean weight gain(g)	24.88 <sup>a</sup>	23.27 <sup>a</sup>	20.18 <sup>bc</sup>	2.48
Daily weight gain(g)	0.222 <sup>a</sup>	0.208 <sup>a</sup>	0.180 <sup>bc</sup>	0.03
Daily feed intake(g)	1.87 <sup>a</sup>	1.90 <sup>a</sup>	1.73 <sup>bc</sup>	0.04
Feed: gain ratio	8.42 <sup>bc</sup>	9.13 <sup>a</sup>	9.72 <sup>a</sup>	0.60

<sup>abc</sup>Means along the same row with different superscript vary significantly at  $P < 0.05$

F<sub>1</sub> = Floor space (4.40m<sup>2</sup>)

F<sub>2</sub> = Floor space (5.50m<sup>2</sup>)

F<sub>3</sub> = Floor space (6.60m<sup>2</sup>)

SEM = Standard Error of Mean

Okon *et al.* (2008) had earlier reported lower daily weight gains of 130.71g/d and 136.34g/d for crossbred pigs of the same age reared under non specified floor-space and group size in the same tropical environment, compared to the higher increasing daily gain (0.180 to 0.222kg) obtained for this study. Whereas, Okon *et al.* (2010) working later on influence of sex and body weight ranges on variability of some growth indices on wean-to-finish pig production system recorded higher daily weight gains of 514g/d for males and 326g/d for females and final growth rate of 165g/d for pooled males and 105g/d for pooled females at 42 days reared under non specified group size and floor-space in the same tropical environment. This was so because Okon *et al.* (2010) used heavy weaner pigs with average body weight range of 6 to 14kg. On the other hand, Adebiyi *et al.* (2016) obtained lower ADFI range (0.95 to 1.10kg), ADG range (0.31 to 0.51kg) and FCR range (1.86-4.85) from crossbred LD x LW growing pigs fed diets supplemented with *saccharomyces cerevisiae* probiotics. The results obtained by these authors might be attributed to the effects of higher average body weight of growing pigs (17.00 ±

2.10kg) used, number of pigs (2) per pen, feed form and probiotics and non specified floor-space allowances. Also, Adedoyin *et al.* (2016) reported higher daily weight range (0.400 to 0.463kg), daily feed intake range (2.17 to 2.48kg), but lower feed:gain ratio range (4.92 to 5.90) for crossbred pigs fed whole cassava chips supplemented with brewer's yeast. The higher results by the authors might be due to the fact that the authors used growing pigs aged 12 weeks with average body weights of 21.14kg reared under non specified floor-space allowance and four (4) equal reduced numbers of pigs per group.

Worthy of note however, were marginally better growth and feed utilization recorded for wean-to-finish pigs on group size (8) and floor-space (4.40m<sup>2</sup>) compared to the other two groups sizes (10 and 12) and floor-spaces (5.50m<sup>2</sup> and 6.60m<sup>2</sup>). Growth rate is largely driven by feed intake (Whittmore and Green, 2001), hence variable rates (recorded) are the reflection of variable feed intake (Table 1). The results obtained in this study (Table 1) agreed with Kornegay and Notter (1984) report that average daily gain (ADG) and average daily feed intake (ADFI) decreased as the number of pigs per group



significant reduction of body components measured at the end of the experiment (16 weeks). These results confirmed DeDecker *et al.* (2003) report of reduction in daily gain with increasing group size and floor-space. The results of variations in body components obtained (Table 2) corroborate/support Abia (2007) report of existence of variation in body components measurement due to competition for spaces.

The percent (%) body length gain range (34.14 to 31.13%), body circumference range (28.84 to 26.18%), heart girth gain range (30.30 to 21.21%), ham length gain range (40.98 to 37.25%) and height at-wither gain range (34.19 to 30.28%) decreased with increase in group, size and floor-space (Table 2). The values obtained were low and below average, probably due to effects of feed, completion, social stress, decreased daily gain and feed: gain ratio with increasing group size and floor-space.

### Conclusion

This study revealed that growth performance traits of wean-to-finish pigs were different across the group sizes and floor-spaces. There were significant difference ( $p < 0.05$ ) effects of group sizes (8 and 12) and floor-spaces (5.50m<sup>2</sup> and 6.60m<sup>2</sup>) on the performance of wean-to-finish pigs. Daily weight gain and feed: gain ratio decreased with increasing group size and floor-space, resulting in significant ( $p < 0.05$ ) reduction of body weights. Pigs on group size (8) and floor-space (4.40m<sup>2</sup>) had better growth rate and feed utilization. There were significant difference ( $p < 0.05$ ) effect of groups size and floor-space on all body components measured, with pigs on group size (8) and floor-space (4.40m<sup>2</sup>) recording significantly ( $p < 0.05$ ) higher body components. There were also significantly ( $p < 0.05$ ) decreased body

components with increased group size and floor-space, resulting in significant ( $p < 0.05$ ) reduction on body component measured at the end of the experiment (16 weeks). The percent (%) gain for all body components measured decreased with increase group size and floor-space, resulting in low and below average values. Thus group size and floor-space allowance could be of great significant guide to pig farmers in designing and improving breeding programmes as well as commercial pig rearing in the tropics. It is however recommended that the study be carried out on a larger scale to cater for commercial pig farmers in the tropics.

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