

# EFFECT OF FEEDING DURATION ON PERFORMANCE AND CARCASS CHARACTERISTICS OF GROWING PIGS

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**ABSTRACT:** A total of 36 Large White weaner male pigs of 8 weeks old were allotted to two groups (ad libitum feeding for 3 months and 80% ad libitum feeding for 5 months) in a Randomized Completely Design, to evaluate the effect of feeding duration on performance and carcass characteristics of growing pigs. Each group consists of 18 pigs with initial average weight of  $9.67 \pm 0.26$  and was further replicated into 3 with 6 pigs per replicate. Data were collected on weekly basis and carcass characteristics were done at the end of 3<sup>rd</sup> and 5<sup>th</sup> months of feeding. Feed duration had significant ( $P < 0.05$ ) influence on final body weight, daily weight gain, Daily feed intake, water consumption and daily cost of feeding with higher values (54.17 kg, 349.42 g, 1.63 kg, 5.05 litres and ₦74.72), respectively recorded for pigs fed 80% ad libitum for 5 months. Higher values of bled weight (46.78 kg) and carcass weight (35.44 kg) were noted for pigs fed 80% ad libitum for 5 months. Pigs fed 80% ad libitum for 5 months had higher value in head (12.42%), ham (14.40%), shoulder (13.92%) and feet (2.73%) weights compared to values documented for pigs fed ad libitum for 3 months. Better values for back fat thickness (0.43 cm) and fat-free index (49.69) were obtained among the pigs fed ad libitum for 3 months. Feeding duration greatly influenced performance and carcass parameters and should be used in improving the quality of carcass.

**Key words:** Feeding Duration, Ad Libitum, Pig, Performance, Carcass Characteristics

## INTRODUCTION

Inadequate animal protein remains a serious problem in the developing countries with about 36 million people dying yearly from causes directly or indirectly related to nutritional problems (UNIS, 2004). Many common health problems facing man can be prevented or alleviated with healthy diet. Insufficient or poorly constituted diet has deleterious effect on health causing deficiency diseases. Hence, the need to promote and enhance livestock production cannot be over emphasized in order that cheap animal protein can be made available at affordable price, thereby promoting healthy living by solving the problem of malnutrition.

There is no doubt that the solution to animal protein shortage rests in the promotion and more efficient production of all classes of meat animals. Pig is one of the veritable sources of animal protein. It represents one of the fastest ways of increasing the availability of animal protein since pigs grow at a fast rate and are highly more prolific than other livestock species (Ikani and Dafwang, 1995). Since pork is cheaper than beef, chicken, mutton, chevon and other animal protein sources, encouraging pork production and consumption will reduce the pressure on the demand for these meats thereby making them more available and at cheaper rates. To this effect a study was conducted to evaluate the effect of duration of feeding on performance and carcass characteristics of growing pigs.

## MATERIALS AND METHODS

### Experimental Site

The experiment was carried out in the Piggery Unit of the Teaching and Research Farms Directorate (TREFAD), Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. The farm lies within latitude  $7^{\circ} 10' N$ , longitude  $3^{\circ} 2' E$  and altitude 76 mm. It is located in the derived savannah zone of South-Western Nigeria. It has a humid climate with mean annual rainfall of about 1037 mm and temperature of about  $34.7^{\circ} C$ . The relative humidity ranges in the rainy season (late March-October) and dry season (November-early March) is between 63-96% and 55-82%, respectively with an annual average of 82% (Google Earth, 2012). The seasonal distribution of

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annual rainfall is approximately 44.96 mm in the late dry season (January-March); 212.4 mm in the early wet season (April-June); 259.3 mm in the late wet season (July-September) and 48.1 mm in the early dry season (October-December).

### Experimental Animals and their Management

Thirty six weaner Large White male pigs of eight weeks old with mean body weight of  $9.67 \pm 0.26$  kg were randomly assigned to two treatments in a completely randomized design. The pigs were grouped based on weight equalization to two groups (*ad libitum* feeding for 3 months and 80% *ad libitum* feeding for 5 months) of eighteen pigs each. Each group was replicated thrice to consist of 6 pigs per replicate. The pigs were group fed and housed in naturally ventilated pens (3 pigs per pen) with floor size dimension of 3m x 2 m. Fresh water was supplied daily *ad libitum*.

### Dietary Treatment

Feeding was carried out at 09:00 hours each day for three and five months depending on feeding duration. The carcass analysis of the pigs on *ad libitum* feeding was carried out at the end of 3<sup>rd</sup> month, while those on 80% *ad libitum* feeding was evaluated at the end of 5<sup>th</sup> month of the experiment. Diets were formulated to meet the body requirements of growing pigs. The ration contained 18% crude protein and metabolisable energy of 2906.00 kcal DE/kg as shown in Table 1.

**Table 1 - Composition of Experimental Diets (%)**

Ingredients	Grower ration
Maize	45.00
Groundnut cake	20.00
Wheat offal	20.00
Palm kernel cake	12.50
Bone meal	2.00
Premix*	0.35
Common salt	0.30
Lysine	0.05
Methionine	0.05
Total	100.00
<b>Calculated Analysis</b>	
Crude protein (%)	18.06
Crude fibre (%)	5.84
Calcium (%)	0.72
Phosphorus (%)	0.34
ME (Kcal DE kg)	2906.00
*To supply the following per kg diet: Vit. A 12600 IU; Vit. D <sub>3</sub> 2800 IU; Vit. E 49 IU; Vit.K <sub>3</sub> 2.8 mg; Vit. B <sub>1</sub> 1.4 mg; Vit. B <sub>2</sub> 5.6 mg; Vit. B <sub>6</sub> 1.4 mg; Vit. B <sub>12</sub> 0.014 mcg; Niacin 21 mg; Pantothenic Acid 14 mg; Folic Acid 1.4 mg; Biotin 0.028 mcg; Choline Chloride 70 mg; Manganese 70 mg; Zinc 140 mg; Iron 140 mg; Copper 140 mg; Iodine 1.4 mg; Selenium 0.28 mg; Cobalt 0.7 mg; Antioxidant 168 mg.	

### Data Collection

Feed intake was determined daily by subtracting the feed left-over from the feed supplied. Initial body weight of weaner pigs were taken using weighing scale with a 0.05 g precision and documented when the pigs arrived at the experimental site and weekly records of change in body weight were subsequently taking and documented. The feed conversion ratio was calculated as ratio of feed/gain.

### Cost Estimation

The prevailing market prices of the ingredients at the time of study were used to calculate the unit cost of feed (₦/kg) and the cost of feed to produce a unit weight (₦/kg weight gain)

### Carcass Characteristics

For carcass evaluation, six pigs were selected from each group (*ad libitum* feeding for 3 months and 80% *ad libitum* feeding for 5 months) and analysed for carcass parameters, cut-up parts and fat composition at the end of each feeding interval. The pigs were fasted for 16 hours, and the fasted weight of each pig meant for slaughtering was taken before they were stunned by percussion method and bled by incision using a sharp knife cutting through the jugular vein between the skull and the atlas. Complete bleeding and dehairing were done. The stomach of the pigs was opened along the greater curvature and emptied. The head was removed by section at the occipito-atlas joint and the feet by sawing through the hock joint at a right angle to the long axis of the leg. The carcass was divided longitudinally. The left half of the carcass was dissected as described by FAO (1991). Ham was separated by locating the division between the 2<sup>nd</sup> and 3<sup>rd</sup> sacral vertebrae and saw perpendicularly along axis of the ham. Shoulder of the pig was separated from the loin and belly by a straight cut between the second and third ribs and a straight cut 2.5 cm ventral to the ventral edge of the scapula. The parts were weighed and recorded. Back-fat depth was taken at the last rib using vernier calliper. The fat-free index was estimated using the formulae postulated by National Pork Producers Council (1994).



Fat-free index = 50.767 + (0.035 x hot carcass weight, kg) - (8.979 x last rib midline back-fat on hot carcass, cm).

Dressing percentage = carcass weight/live weight x 100

### Statistical Analysis

Data were processed by one-way analysis of variance using SAS [SAS Inst., Inc., Cary, NC, 1990]. Significantly (P<0.05) different means among variables were separated using New Duncans Multiple Range Test as contained in SAS (2000) package. The model used was:  $Y_{ijk} = \mu + A_i + E_{ijk}$

Where,  $Y_{ijk}$  = individual observation;  $\mu$  = general mean;  $A_i$  = effect of feeding duration;  $E_{ij}$  = experimental error

## RESULT

### Effect of Feeding Duration on Growth Performance of Growing Pigs

Feeding duration significantly (P<0.05) influenced final body weight, daily weight gain, daily feed intake, water intake and daily feed cost per day. These parameters significantly increased with increase in feeding duration. The higher observed means values for final body weight (54.17 kg), daily weight gain (349.42 g), feed intake (1.63 kg/pig/day), water intake (5.05 litres/pig/day) and daily feed cost (₦74.72) were obtained by the pigs fed 80% *ad libitum* for 5 months while the corresponding means values (49.17 kg, 302.25 g, 1.30 kg/pig/day, 3.46 litres/day and ₦63.97) respectively were documented for those fed *ad libitum* for 3 months.

### Effect of Feeding Duration on Carcass Characteristics of Growing Pigs

Most parameters considered for carcass evaluation except initial body weight and dressing percentage were significantly (P<0.05) influenced by feeding duration. The final body weight, bled weight, and carcass weight significantly increased with increase in feeding duration while fat free index decreased with increase in feeding duration. The pigs fed 80% *ad libitum* for 5 months recorded higher means values on final body weight (53.44 kg), bled weight (46.78 kg) and carcass weight (35.44 kg) while their corresponding means values (41.00 kg, 37.80 kg and 26.78 kg) respectively were documented for those fed *ad libitum* for 3 months. Pigs fed 80% *ad libitum* for 5 months had higher head (12.42%), ham (14.40%), shoulder (13.92%) and feet (2.73%) weights compared to 11.05%, 13.73%, 12.61% and 2.61%, respectively recorded for pigs fed *ad libitum* for 3 months. Pigs fed *ad libitum* for 3 months had better means values in back fat thickness (0.43 cm) and fat free index (49.69) when compared to the values (0.83 cm and 47.40) respectively obtained for those fed 80% *ad libitum* for 5 months.

Table 2 - Effect of feeding duration on growth performance of growing pigs

Parameters	Feeding Duration	<i>Ad libitum</i> feeding for 3 months	80% <i>ad libitum</i> feeding for 5 months	SEM
Initial body weight(kg)		9.50	9.83	0.26
Final body weight (kg)		49.17 <sup>b</sup>	54.17 <sup>a</sup>	0.99
Daily weight gain (g)		322.25	369.42	27.02
Daily feed intake (kg)		1.30 <sup>b</sup>	1.63 <sup>a</sup>	0.15
Feed conversion ratio		3.46	3.66	0.12
Water intake (litre/pig/day)		3.15 <sup>b</sup>	5.06 <sup>a</sup>	0.30
Daily feed cost (₦)		98.36 <sup>b</sup>	109.11 <sup>a</sup>	3.45
Cost/Kg weight (₦)		294.10 <sup>b</sup>	311.41 <sup>a</sup>	8.50

<sup>ab</sup> means within rows followed by different superscripts are significantly (P<0.05) different

Table 3 - Effect of feeding duration on carcass of growing pigs

Parameters	Feeding Duration	<i>Ad libitum</i> feeding for 3 months	80% <i>ad libitum</i> feeding for 5 months	SEM
Final weight (kg)		41.00 <sup>b</sup>	53.44 <sup>a</sup>	1.60
Bled weight (kg)		37.80 <sup>b</sup>	46.78 <sup>a</sup>	1.84
Carcass weight (kg)		26.78 <sup>b</sup>	35.44 <sup>a</sup>	1.38
Dressed weight (%)		76.27	76.59	2.03
<b>Cut-up parts<sup>1</sup></b>				
Head weight		11.05 <sup>b</sup>	12.42 <sup>a</sup>	0.28
Ham weight		13.73 <sup>b</sup>	14.41 <sup>a</sup>	0.37
Shoulder weight		12.61 <sup>b</sup>	13.92 <sup>a</sup>	0.30
Feet weight		2.61 <sup>b</sup>	2.73 <sup>a</sup>	0.03
Tail weight		0.29	0.24	0.01
Backfat depth (cm)		0.43 <sup>b</sup>	0.63 <sup>a</sup>	0.04
Fat-free index		49.69 <sup>a</sup>	48.40 <sup>b</sup>	0.11

<sup>ab</sup> means within rows followed by different superscripts are significantly (P<0.05) different

<sup>1</sup> values expressed as percentage of final body weight.



## DISCUSSION

Growth hyperplasia and hypertrophy are modulated by the rate of feed intake, digestion and utilization of nutrients as demonstrated in the better record obtained from the pigs fed 80% *ad libitum* for 5 months duration when compared to those fed *ad libitum* for 3 months duration in terms of feed intake, daily weight gain and final weight of the pigs. Growth is said to be the difference between anabolic and catabolic processes (Bastianelli and Sauvant, 1997). The proportion of feed intake that goes for maintenance increases with time. The amount of feed required for tissue maintenance and physiological need of the pigs increases over time. Hence, pigs take more feed for more rapid, efficient growth and increased intramuscular fat as it continued to age. Emmans and Kyriazakis (1999) assert that substantial increase in absolute energy requirement per day is fundamental for sustaining the growth rate of animal. Nutrients requirement of pigs continue to increase as they age, the significant increase in water intake by the pigs fed 80% *ad libitum* for 5 months duration over those fed *ad libitum* for 3 months can be associated to higher physiological needs of these pigs. Pigs increase dry matter intake with age and as well increase their water intake in order to meet up with the increasing metabolic functions, movements of nutrients in body tissues, removal of metabolic waste and for growth which are associated with digestion and utilization of feed. This assertion is in line with the findings of Czarick and Fairchild (2012) who reported that daily water consumption increase with animal age. The significant effect observed in the daily cost of feed (₦) and cost per unit weight gain (₦/kg) in term of duration of feeding on growth performance might have resulted from increase in the rate of feed intake over time. Richard et al. (1993) reported that the improvements in the growth rate, feed efficiency and carcass traits will more than pay for the changes in the rate of feed consumption. Sufficient offering of diet to pigs is important in optimizing overall growth performance. Feeding strongly influences the final cost per kilogram at slaughter (Daza et al., 2003).

The higher bled and carcass weights obtained by the pigs fed 80% *ad libitum* for 5 months duration over those fed *ad libitum* for 3 months must have been influenced by the difference in the final body weight of the pigs. This observation corroborates the findings of Gu et al. (1992), Virgile et al. (2003) and Correa et al. (2006) who asserted that the rate of growth with age is greater in carcass than for the whole body. Also, Leuret (2008) reported that restricted feed allowance strongly reduces growth rate but improves carcass quality. Head, ham, shoulder and feet weights significantly increased with increase in feeding duration. This might have resulted from better body conformation of pigs in relation to their body mass. Pigs with larger body weight produce carcasses with a higher relative share of head, ham, shoulder and feet weights. This observation is in line with the findings of Latorre et al. (2008) and Lo-Fiego et al. (2005) that reported increase in primal cut with increasing slaughter weight. From this study, back fat of pigs increases with an increasing age while fat free index decreases with increasing age. The rate of fat accumulation was more pronounced at latter age of the pigs. Since, body fat deposition rate increases with age, in contrast to protein deposition rate which remains almost constant during the growing-finishing period (Reeds et al., 1993). Early slaughtering of animal at lighter weight will improve the carcass quality of pork, reducing the fat content thereby improving the sensory quality traits in pigs. Teye (2009) reported that high quality pork and pork fat can be obtained when pigs are slaughtered at a suitable age. While Scot et al. (1983) and Numberg et al. (1998) observed minimal deposition of saturated fatty acid content in average aged pigs.

## CONCLUSION

Feeding pigs 80% *ad libitum* enhances the performance of pigs (feed intake, weight gain and water consumption rate) and carcass characteristics (bled and carcass weights) but compromised the fat composition. Hence, pigs meant for lean pork production should be given unrestricted feeding and slaughtered at lighter weight (50-60 kg) as fat deposition is a function of age and weight.

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