MON -57

Growth Performance, Back Fat Thickness and Loin Eye Area Measurements of Growing Pigs Fed with Different Energy Sources

O.S. Akinola[1], M.B. Olaniyi[1], A.V. Jegede[2], E.O. Akinsaya[1] and G.A. Ajayi[1]
[1]Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
[2]Department of Animal Nutrition, Federal University of Agriculture, P.M.B. 2240, Abeokuta, Ogun State, Nigeria
Corresponding author: O.S. Akinola; E-mail:bayomiola@yahoo.com; +2348035700959

Abstract
Twenty-four crossbred pigs were used to determine the performance characteristics, back fat thickness and loin eye area measurement of growing pigs fed different energy sources. Four energy sources tested were: Maize, Wheat, Sorghum and Unpeeled Cassava root meal. Six pigs per treatment were housed individually in an open sided pen. Animals were fed *ad- libitum* feed and water. Feed intake and body weight were taken on a weekly basis. After 10 weeks of rearing, the pigs were slaughtered using standard procedure, and carcass measurements, back fat, and longissimus measurements were taken. The back fat thickness was measured at the first and the last rib, the measurements on the loin eye muscle were taken with the aid of a venier caliper and fat measurement (at P1, P2 & P3) from the mid-line of back at the last rib along the right split carcass was taken with a ruler and tape rule. There were no significant difference ($p>0.05$) in final body weight, total weight gain, total feed intake, weight gain per day, feed intake per day and feed conversion ratio. The diets had no significant ($p>0.05$) effects on back fat at first rib , last rib, A, B, P1, P2, P3, dressing percentage and carcass percentage. Results from this study indicate that sorghum, whole cassava diet and wheat had no negative effect on the growth performance of growing pigs; and hence can replace maize at any level in the diet of growing pigs.

Keywords: Pigs, energy feed, cassava, maize,back fat

Introduction

Energy is expected to become an increasingly expensive nutrient as competition with bio-fuel industries for ingredients rich in starch or oil is growing daily. Understanding how energy is utilized by the pig, and how the pig responds to other sources of energy, other than maize, is vital in order to increase commercial pig production in developing countries. Most cereal grains contain 60% and 70% starch, which is easily digested by pigs and absorbed in the form of glucose to increase growth performance. The meat industry requires animals to be as lean as possible since pork with low fat content reduces human caloric intake and intramuscular fat is related to lower sensory quality traits (Fernandez *et al*., 1999). High level of carcass fat is unacceptable because of associated health problems. Feeding of maize diet, sorghum diet, wheat diet and cassava diet can affect growth performance, carcass quality in terms of back fat and loin muscle area of growing pigs.

This present research is aimed at investigating the performance, back fat thickness and loin eye area of pigs fed wheat, sorghum, cassava and maize diet.

Materials and Methods

The experiment was carried out in the piggery unit of the teaching and research farm directorate (TREFAD), Federal university of agriculture, Abeokuta Ogun state, (7 9 39″N, 2 54″ E, 76m above sea level) located in the Derived Savannah vegetation zone of South Western Nigeria. The region's climate is humid, with mean annual precipitation averaging 1037mm and rainfall occurring from March to October. The average annual temperature is 34.7^{O}C and the relative humidity average 82% throughout the year (Google Earth 2017. Four diets were formulated which include; maize as control, sorghum, wheat, cassava root meal as total replacement for maize. The cassava root was purchased from a reputable farm, cassava was washed and crushed, packed into the sacks, placed under hydraulic press for 2 days, after which it was sun dried for 2-3days.

Twenty- four crossbred pigs (18 males and 8 females) with initial body weight of 13.2kg were randomly assigned to four experimental groups in a completely randomized design. The pigs were grouped based on weight equalization to four groups with six pigs per group with a pig per replicate. Feed and clean water were given *ad-libitum* twice daily. Feed intake and weekly body weight were recorded. The test ingredients (maize, sorghum, wheat and cassava) and composite feed used in the experiment were analysed in the laboratory to determine the crude protein content, crude fiber content, moisture content, total ash and nitrogen free extract. The pigs were randomly assigned to 4 experimental groups in a Completely Randomized design of 6 pigs per group.

Table 1. Composition of experimental Diets (%)

Ingredient	Maize	Wheat	Sorghum	Cassava
Maize	55	0	0	0
Wheat	0	55	0	0
Sorghum	0	0	55	0
Cassava	0	0	0	55
Fishmeal 72%	1	1	1	3
Groundnut cake	7	0	3.5	8.5
Soya meal	20	15	22	26
Wheat offal	12	22	12	2.5
Palm kernel oil	1	3	2.5	1
Bone meal	2	2	2	2
Limestone	1	1	1	1
Lysine	0.3	0.3	0.3	0.3
Methionine	0.3	0.3	0.3	0.3
Premix	0.2	0.2	0.2	0.2
Salt	0.2	0.2	0.2	0.2
Total	100	100	100	100
Calculated analysis				
Metabolize energy	2867	2815	2854.25	2845.5
Protein	19.34	19.45	19.69	19.375
Fat	3.74	3.52	3.04	3.9125
Fiber	3.84	3.73	3.405	3.1525
Calcium	0.9615	0.9474	0.975	1.008
Av. Phosphorous	0.4073	0.3878	0.5326	0.45005
Lysine	1.3815	1.1175	1.4183	1.72465
Methionine	0.5951	0.5535	0.564	0.66065

After the feeding trial, animals selected for slaughter were fasted overnight, weighed, stunned and exsanguinated by severance of the carotid arteries and jugular veins. Full gut weight, empty gut weight, empty intestinal weight and length, empty caecum weight etc. were taken; the carcass was then split into two equal halves. The left carcass was used for measurement of the following carcass indices: carcass weight and length. At the last rib bones a cut was made through the back bone, to reveal the loin eye muscle, where Aand B were measured; back fat depth was taken at the first and last rib. And the fat depth at 4.5cm, 6cm and 8cm were measured from the mid-line back to the right-side split carcass. These measurements were taken using the venirecaliper. Data obtained were subjected to one-way analysis of variance using Minitab 15.0.

Results and Discussion

There was no significant effect of energy source on final body weight of pigs. It was observed that the pigs fed sorghum diets had the marginally highest record of final body weight. This might be due to the fact that pigs fed sorghum diet had higher feed intake (1.45kg/day) and correspondingly better weight gain (0.47kg/day) compare to those fed other energy sources. This is in line with the work of Garcia-valverde *et al.* (2008) that reported response of pigs with increase weight gain when allowed more feed. The tannin content in sorghum did not adversely affect it intake and utilization by pigs. The utilization of feed with alternative energy sources other than maize was marginally better than those pigs fed with maize diet. Though, parameters measured were not significant, maize, as an energy source did not fare better than other energy sources used in this study. Wheat, cassava and sorghum appear to support pig growth than maize as seen in the parameters measured.

The result of back fat thickness and *Longissimus dorsi* muscle measurement as shown in Table 3 showed no effect of the energy sources on the response of growing pigs to the different energy sources. Among the energy sources used, cassava root, yielded low back fat thickness in pigs as shown in the measurements of back fat at the 1st and last rib, P1, P2 and P3. This implies that cassava root as an energy sources yield low fat deposition in pig to produce a leaner carcass. The reason for this might be due to the fact that cassava root possess resistance starch (Pereira and Leonel, 2014), which causes gradual release of energy for the animal

use; preventing the accumulation of excess energy, which may convert to fat for storage. There was no significant ($p>0.05$) difference in the loin muscle measured in pigs on the different energy sources. This implies that the quality of meat produced from the carcasses from pigs fed the different energy diet were similar.

Table 2: Growth Performance

Parameters	Maize	Wheat	Sorghum	Cassava	SEM	P-VALUE
Dressing%	72.626	84.737	79.303	78.231	2.22	0.269
Carcass %	58.271	66.096	63.892	63.151	1.55	0.415
First rib	21.420	20.920	20.960	14.180	1.52	0.348
Last rib	5.653	5.393	5.693	4.987	0.596	0.981
A(mm)	71.293	63.497	75.913	62.313	3.08	0.451
B(mm)	35.873	37.693	38.940	36.527	1.16	0.852
P1(4.5cm)	3.827	3.627	3.473	2.413	0.380	0.671
P2(6cm)	3.000	3.733	4.187	1.570	0.415	0.193
P3(8cm)	3.610	3.753	3.980	2.453	0.335	0.383

"A" = maximum width of the *longissimus dorsi* muscle at the widest point
"B" = maximum depth of the *longissimus dorsi* muscle at the greatest depth and perpendicular to "A"
"P1" = Subcutaneous fat depth 4.5cm from the mid-line
"P2" = Subcutaneous fat depth 6cm from the mid-line
"P3" = Subcutaneous fat depth 8cm from the mid-line

Table 3: Back fat thickness and *longissimus dorsi* measurement

Initial weight (kg)	13.17	13.17	13.25	13.25	0.74	1.00
Final weight (kg)	39.50	41.67	43.00	41.17	1.26	0.84
Weight gain per day ($gday^{-1}$)	0.42	0.45	0.47	0.44	0.45	0.45
Feed intake per day ($gday^{-1}$)	1.37	1.38	1.45	1.35	0.04	0.90
Feed conversion ratio	3.24	3.05	3.07	3.06	0.06	0.39

Conclusion

The result of this study showed that the growth performance was not affected by different energy sources fed to growing pigs. The backdate thickness and longissimus dorsi muscle were also not affected by different energy sources fed to the animals, but the use of cassava as energy source helped in the marginal reduction of back fat and increased leaner carcass. Hence all the energy sources can be used to replace of maize in diet of growing pigs.

References

Fernande, Z.X., Monin, G., Talmant, A., Mourot, J. and Lebret, B. (1999). Influence of intramuscular fat content on the quality of pig meat. *Meat Science,* 53:59-72.

Garcia-Valverde, R., Barea, R.,Lara, L, Nieto, R. and Aguilera, J.F. (2008). The effects of feeding level upon protein and fat deposition in Liberian heavy pigs. *Livestock Science,* 114: 263-273.

Google Earth(2017). https://goo.gl/maps/zd6vC4tfuux

Pereira, B.L.B. and Leonel, M. (2014). Resistant starch in cassava products. *Food Sci. Technol*., 34(2): 298-302.