GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF WEANER PIGS FED CEREAL OFFALS IN DIETS

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Abstract

Twenty (20) weaned crossbred (Landrace × large white) pigs with an average body weight of 8.5±0.4 kg were used to evaluate performance and nutrient digestibility of weaned pigs fed five experimental diets containing cereal milling by-products. Diet 1 contained maize offal, while diets' 2, 3, 4 and 5 contained wheat offal, sorghum offal, millet offal and rice offal respectively. The animals were balanced for sex and weight and allotted to five dietary treatments and replicated four times in a completely randomized design. Data were collected on feed intake and weight gain for a period of eight weeks. A digestibility trial was carried at the end of the feeding trial using four pigs per treatment. Average daily weight gain ranged from 0.21kg/ day (T5) to 0.44kg/day in (T1). The result of growth performance and nutrient digestibility showed that average feed intake, final body weight as well as digestibility of dry matter, crude fibre, ether extracts, crude protein and ash were higher ($P<0.05$) for pigs fed T1, T2, T3 and T4, while those on T5 had the lowest growth and nutrient digestibility. It was concluded that maize offal, wheat offal, sorghum offal, millet offal can be used in weaner pigs' diet.

Keywords: Digestibility, Growth performance, offal, Pigs

Introduction

High cost of feeding has been identified as one the major impeding factors affecting the pig industry in developing countries (Uddin and Osasogie, 2016). This is as a result of continued increase in prices of conventional feedstuffs which are mostly used as sources of dietary energy and protein. However, for the pig industry to remain profitable, development of low- cost feeding strategies which are locally available to pig farmers has been the major challenge of animal nutritionist (Nelson *et al.* 2007). The use of agro-based by-products in pigs has been evaluated by various researchers indicating improved growth performance (De Lange *et al*. 2010; Kim *et al.* 2011) while others reported depressed performances (De la Llata *et al*. 2001) as a result of high dietary fibre depending on the cereal type (Freira *et al*. 2000; Galassi *et al.* 2004), type and extent of milling (Amaefule *et al.* 2009) as well as climate and soil conditions where the grain is produced (Wenk 2001). The comparative evaluation of feeding the cereal milling by products on pig performance and nutrient digestibility is scanty. This study therefore assessed the performance of weaned pigs fed diets containing cereal milling by-products.

Materials and methods

Experimental animals and their management

Twenty (Landrace × Large white) pigs with an average initial body weight of 8.00±0.56 kg were used. Each pen had solid concrete floor and were fitted with water and feed troughs. The pigs were treated against parasites using Ivomectin®. The pigs were offered experimental diets and water *ad libitum*.

Experimental diets

Five experimental diets (Table 1) were formulated based on the five cereal milling by-products i.e. maize offal, wheat offal, sorghum offal, and millet offal and rice bran. They were purchased at the agro-by product market in Yola. Diet 1 contained maize offal, while diets' 2, 3, 4 and 5 contained wheat offal, sorghum offal, and millet offal and rice bran.

Experimental design and data collection

Twenty weaner pigs were randomly allotted to five dietary treatment groups replicated 4 times in a Completely Randomized Design. Data were collected for eight weeks. Pigs were weighed at the beginning of the experiment and weekly, subsequently. Weight gain was calculated as final live weight minus initial live weight. Feed intake was obtained as the difference between the quantity offered and quantity not consumed. Feed conversion ratio (FCR) was calculated as feed intake divided by weight gain

Statistical analysis

Data collected were subjected to one way analysis of variance means were separated using Duncan's Multiple Range Test using SAS (2003).

Table 1 Ingredient and Percentage Composition of Experimental Diets

	Dietary treatments				
Ingredient	T1	T2	T3	T4	T5
Maize offal	56.00	0.00	0.00	0.00	0.00
Millet offal	0.00	56.00	0.00	0.00	0.00
Sorghum offal	0.00	0.00	56.00	0.00	0.00
Wheat offal	0.00	0.00	0.00	56.00	0.00
Rice offal	0.00	0.00	0.00	0.00	56.00
Soybean cake	20.00	20.00	20.00	20.00	20.00
Kapok seed cake	10.00	10.00	10.00	10.00	10.00
Fishmeal	10.00	10.00	10.00	10.00	10.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Methionine	0.50	0.50	0.50	0.50	0.50
Lysine	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50
Premix	0.50	0.50	0.50	0.50	0.50
Total	100	100	100	100	100
Determined analysis					
ME/Kcal/kg	2727.91	2701.56	2768.89	2834.56	2714.56
Crude protein	20.79	20.12	20.89	20.89	20.10
Crude fibre	16.45	17.34	17.12	18.05	20.56

Vitamin/Mineral premix from Bio-organics supplied per kg: Vit. A, 10,000 iu; Vit. B, 2,000 iu; Vit. E, 13,000 iu; Vit. K, 1,500mg; Vit. B12, 10mg; Riboflavin, 5,000mg; Pyridoxine,1,300mg; Thiamine, 1,300mg; Panthothenic Acid; 8,000mg; Nicotinic Acid, 28,000mg; Folic Acid, 500mg; Biotin, 40mg; Copper,7,000mg; Manganese, 48,000mg, Iron, 58,000mg; Zinc, 58,000mg; Selenium, 120mg; Iodine, 60mg; Cobalt, 300mg; Choline,275,000mg**.**

Results and discussion

The crude protein and fibre of the cereal offal are represented in Table 2. The values recorded were similar to that of Aduku, (1993).

Crude protein and fibre composition of cereal offals

Parameter	Crude protein	Crude fibre
Maize offal	11.8	10.52
Wheat offal	12.00	10.56
Sorghum offal	12.56	9.23
Millet offal	11.1	7.50
Rice bran	13.20	11.50

Growth performance of weaner pigs fed cereal offal in diets

Table 3 shows the effect of the cereal offal on the growth performance weaner pigs. Final body weight, average daily feed intake (ADFI), average daily gain (ADG) and feed conversion ratio (FCR) were significantly (P<0.05) influenced by experimental diets. ADWG, ADFI and final weight were significantly higher (P<0.05) for pigs fed T1, T2, T3 and T4 diets than those fed T5 diet. This could be due to the palatability and acceptability of this diets as demonstrated by high intake of the diet and high ADG. The result agreed with the findings of García-Valverde *et al.* (2008) and Mwesigwa *et al.* (2012) who fed by-products of maize and that of wheat. The dietary fibre in T1, T2, T3 and T4 diets could have improved pig gut morphology, hence stimulating mucosa enzyme activity which eventually improves nutrient digestibility and growth olist *et al.* 2009). Pigs fed T5 diet had significantly (P<0.05) lower feed intake. Low protein intake has been reported to result in slow growth rate of pigs (Nyachoti *et al.* 2006)

Table 3 Growth Performance of weaner pigs fed offals

	Dietary treatments					
Parameter	T1	T2	T3	T4	T5	SEM
Initial body weight (kg)	8.56	8.77	8.69	8.69	8.76	0.23
Final body weight (kg)	38.25^{a}	31.75^{a}	30.00^{ab}	32.75^{a}	21.00^{c}	1.70
Average daily weight gain (kg)	0.44^{a}	0.41^{a}	0.37^{a}	0.42^{a}	0.21^{b}	0.03
Average daily feed intake (kg)	1.42^{a}	1.47^{a}	1.42^{ab}	1.47^{a}	0.90^{c}	0.04
Feed conversion ratio	3.24^{b}	3.60^{b}	3.84^{b}	3.59^{b}	4.32^{a}	0.38

Mean on same row bearing different superscript differ significantly (P<0.05)
SEM = Standard error mean

Nutrient digestibility of weaner pigs fed offals in diets

Nutrient digestibility of the diets is presented in Table 4. DM, CF, CF, EE and ash digestibility were significantly higher (P<0.05) for pigs fed T1, T2, T3 and T4 diets than those fed T5 diet. Nutrients digestibility of pigs fed T5 diet was significantly lower (p<0.05). Lower values of nutrient digestibility observed in T5 diet could be attributed to the decrease in the mean retention time of this diet in the gastro-intestinal tract (Bindelle *et al.* 2008) brought about by higher levels of fibre, compared with those in T1, T2, T3 and T4 diets. High dietary fibre depresses apparent digestibility of dry matter and nitrogen, decreases daily body weight and increase feed to gain ratio The higher fibre digestibility observed for pigs fed T1, T2, T3 and T4 diet could have resulted from fermentation of CF in the hind gut with the volatile fatty acids produced contributing to the net energy requirement of the pigs. Birkett, (2005) reported VFAs contribute about 5–28 % of the energy required for maintenance in the growing pig resulting from fermentation of fibre in the gastro-intestinal. Utilisation of CF by non-ruminants has been shown to vary considerably according to the fibre source (Freira *et al*. 2000; Galassi *et al*. 2004), degree of lignification, level of inclusion and the extent of processing (Amaefule *et al.* 2009).

Table 4 Nutrient digestibility of weaner pigs fed cereal milling by –products In Diets

	Dietary treatments					
Parameter (%)	T1	T2	T3	T4	T5	SEM
Dry matter digestibility	86.42^{a}	82.57^{a}	81.50^{a}	80.94^{ab}	74.13^{c}	1.34
Crude protein digestibility	66.15^{a}	69.06^{a}	69.80^{a}	68.62^{a}	50.67^{b}	1.55
Crude fibre digestibility	72.94^{a}	73.42^{a}	69.38^{ab}	72.38^{a}	49.19^{a}	1.97
Ether extracts digestibility	73.93^{a}	72.17^{a}	70.73^{a}	70.81^{a}	52.13^{b}	2.64
Ash digestibility	60.56^{a}	62.53^{a}	69.39^{a}	59.67^{ab}	50.53^{c}	1.09

Mean on same row bearing different superscript differ significantly (P<0.05)*
SEM = Standard error mean

Conclusion

The study reveals that using maize offal, sorghum offal, wheat offal and millet offal in the diet of weaned pigs improves their growth and nutrient digestibility, compared to rice bran. It is therefore recommended that pig farmers, animal nutritionist and feed milling industries should include maize offal, sorghum offal, wheat offal and millet offal in the diet of weaner pigs.

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