

VARYING LEVELS OF MAIZE BRAN IN DIETS ON THE PERFORMANCE AND CARCASS CHARACTERISTICS OF STARTER-GROWER PIGS

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ABSTRACT

A 17-week study was conducted to evaluate the effects of varying levels of maize bran in the diet on growth performance and carcass characteristics of starter-grower pigs. Nine 8-week-old Large White entire male pigs of initial weight of 14.4 kg were used in the study. The pigs were randomly allotted in equal numbers to three dietary treatments containing 0, 100 and 200 g maize bran kg⁻¹, with maize, fishmeal and soyabean meal as major ingredients. The diets were formulated to be isocaloric and isonitrogenous. The pigs had free access to feed and water. The concentration of maize bran in the diet had no significant effect on feed intake, weight gain, feed conversion efficiency and the various carcass parameters measured. There was, however, a decrease in the cost of feed and feed cost kg⁻¹ live weight gain with increasing levels of maize bran. The results indicate that maize bran may be included in pig starter diets up to 209 g kg⁻¹ without causing adverse effects on pig performance.

Keywords: maize bran, starter-grower pigs.

INTRODUCTION

The pig industry is an economic enterprise which provides food and gainful employment (Nuru, 1983). The need to improve efficiency, lower production costs and supply a product that meets consumers expectations are key elements required for producers to remain profitable and viable (Mullan and D'souza, 2005). The increase in human population over the last decade has influenced the demand for food of animal origin. The pig has a high rate of reproduction and it is also characterized by higher efficiency of nutrient transformation into high quality animal protein. Pigs are monogastric animals which compete with human beings for their food, though they are useful in converting byproducts of human food into meat.

Feed ingredients such as cassava and other root crops, soyabean, copra etc. and their by-products as well as the by-products of the milling and vegetable oil industries, serve as an excellent basis that can support the pig industry. Maize bran (MB), which is a by-product from the milling industry, is relatively inexpensive and can be used to partially replace maize as a source of energy. It consists of the testa, the germ together with some broken pieces of the grain and is high in fibre. It has a very high energy value and an appreciable level of crude protein.

The objective of this study was to assess the effect of maize bran as a partial replacement for maize on the growth performance and carcass characteristics of Large White pigs.

MATERIALS AND METHODS

Location of study. The study was carried out at the Livestock Section of the Department of Animal Science, KNUST, Kumasi, Ghana, during the months of September 2006 to February 2007.

Experimental Design. Nine entire male weaner pigs of an average initial weight of 14.4 kg were used in a completely randomised design (CRD) feeding trial over a 17-week period. The pigs were randomly allocated to three dietary treatments with three replicates per treatment and fed diets (Table 1) containing 0, 100 and 200 g maize bran kg⁻¹ (T₀, T₁₀ and T₂₀).

Table 1: Composition of the experimental diets

INGREDIENTS	QUANTITY (kg)		
	T ₀	T ₁₀	T ₂₀
Maize	59.00	50.50	44.00
Fishmeal	10.00	8.50	8.00
Soya bean meal	8.00	8.00	7.00
Palm kernel cake	5.00	6.00	4.00
Wheat bran	16.00	15.00	15.00
Maize bran	0.00	10.00	20.00
Groundnut skin	1.00	1.00	1.00
Oyster shell	0.50	0.50	0.50
Salt	0.25	0.25	0.25
Vitamin/Mineral Premix	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated analysis			
Crude protein (CP) %	18.50	18.50	18.50
Ether extract (EE) %	4.23	4.38	3.69
Crude fibre (CF) %	5.43	4.62	5.74
ME (Kcal/kg)	3,020.00	3,020.00	3,020.00

Animals and Management. The pigs were housed in individual well-ventilated concrete floored pens measuring (3 x 1 m). Kepromec (Ivermectin), a broad-spectrum antihelminthic, was administered by injection for the control of both internal and external parasites.

Feeding. The pigs were given *ad libitum* access to feed and water and records of daily feed consumed were kept.

Growth Measurements. The pigs were weighed at the commencement and end of the study. The mean of the two weights represented the initial and final live weight. Feed and water were withdrawn twelve hours before weighing. The difference between the final and the initial body weights represented the weight gain. Feed conversion efficiency, defined as the amount of feed per kg weight gain, was also determined. At the end of the study, pigs were slaughtered and the following carcass traits studied: dressing percentage, weight of viscera, head and trotters, carcass length, backfat thickness and loin eye muscle area. Cost of kg feed and cost of feed to produce a kg body weight were also calculated.

Statistical Analysis. The data obtained was subjected to analysis of variance (Steel *et al.*, 1997).

RESULTS AND DISCUSSION

There were no health related problems nor mortalities that may be attributed to the amount of maize bran in the diet. There was one mortality during the entire study and this was from pigs fed the 100 g maize bran kg⁻¹ diet.

The general performance of the pigs on the three dietary treatments is shown in Table 2. The dietary treatments had no significant influence ($P>0.05$) on daily feed intake, average daily gain and feed efficiency. However, the pigs on the diet, which contained 200 g maize bran kg⁻¹, had slightly higher average daily weight gain than those on the 100 g maize bran kg⁻¹ diet. This indicates that pigs will consume diets containing maize bran up to 200 g kg⁻¹ without adverse effects on growth.

Table 2: Mean values of growth and economic performance criteria of starter-grower pigs

Parameters	Dietary Treatment			SEM	Sig
	To	Tio	T ₂₀		
Initial weight, kg	14.00	14.20	15.00	0.553	N
Final weight, kg	58.67	53.17	58.00	2.680	N
Daily feed intake, kg	1.38	1.24	1.28	0.076	N
Weight gain, kg	44.67	38.97	43.00	2.770	N
Average Daily Gain, kg/day	0.39	0.34	0.37	0.024	N
FCR, feed/gain	3.57	3.70	3.44	0.084	N
Feed cost/kg, £	1,706.88	1,550.38	1,447.13	-	-
Feed cost/kg gain, £	6,110.61	5,736.39	4,963.64	-	-

FCR (Feed Conversion Ratio); SEM (Standard Error of Mean); NS (Not Significant). <1:9,200.00 = 1 USD

Pigs on the 200 g maize bran kg⁻¹ diet were also slightly more efficient in converting feed to body weight compared with those on the other dietary treatments. Of considerable interest to pig farmers in any part of the world where MB is available is the observation that feed cost as well as feed cost per kg live weight gain declined as more MB was added to replace maize in the diet. The diet with the higher amount of MB was cheaper, i.e. £1,706.88, 01,550.38 and £1,447.13 kg⁻¹ for dietary treatments T₀, T₀ and T₂₀, respectively. Feed cost per kg live weight gain decreased from £6,110.61 (T₀)

to 05,736.39 (T₁₀) and 04,963.64 (T₂₀). The reduction in feed cost came about because the MB being a by-product (Fomunyan, 1984) was a cheaper source of feed (about 0700.00 kg⁻¹) compared to maize with an average price of 01,600.00 kg⁻¹, and the fact that slightly less fishmeal had to be added to the T₁₀ and T₂₀ diets.

The mean weights of the shoulder, ham, belly, loin and the other body components of the pigs on the 3 diets are shown in Table 3. There were however, no significant (P >0.05) differences among the treatments, indicating that maize bran, a high fibre product, can be incorporated into pig diets without adverse influence on the primp cuts as also observed by Longland *et al.* (1993), Le Goff and Noblet (2001) and Le Goff *et al.* (2002).

Table 3: Carcass measurements (kg) of experimental pigs

Parameters	T ₀	T ₁₀	T ₂₀	SEM	Sig
Shoulder	3.47	3.13	3.60	0.221	NS
Ham	1.97	2.43	2.63	0.339	NS
Belly	3.80	2.87	3.50	0.404	NS
Loin	4.67	4.43	4.77	0.366	NS
Heart	0.23	0.17	0.23	0.030	NS
Liver	1.30	1.18	1.28	0.061	NS
Kidney	0.18	0.13	0.20	0.019	NS
Spleen	0.12	0.08	0.12	0.019	NS
Thigh	5.43	4.65	5.63	0.326	NS
Inside fat	0.53	0.48	0.50	0.099	NS

Table 4: Dressing percentage, backfat thickness and loin eye area of carcass of starter-grower pigs

Dietary Treatments

Parameter	T ₀	T ₁₀	T ₂₀	SEM	Sig
Liveweight at slaughter, kg	58.67	53.17	58.00	2.230	
Chilled Dressing percentage, %	57.30	59.81	61.51	2.230	NS
Warm Dressing Percentage, %	59.80	62.80	64.80	2.630	NS
Carcass Length, cm	76.00	73.00	76.34	0.563	NS
Backfat thickness, cm	1.82	1.85	1.73	0.220	NS
Loin Eye Area, cm ²	27.80	26.40	30.97	1.254	NS

In Table 4 are presented the mean values of the carcass traits. The warm and the chilled dressing percentages, as well as the carcass length, the backfat thickness and loin eye area were not significant

($P > 0.05$) among pigs on the dietary treatments. However, the pigs on the 200 g maize bran kg^{-1} diet had slightly higher chilled dressed percentage, warm dressing percentage and loin eye area as well as slightly lower backfat thickness compared to those on 0 and 100 g maize bran kg^{-1} diet.

CONCLUSION

From the results of the study, it can be inferred that MB could be included in pig starter diets up to 200 g kg^{-1} without any adverse effects on growth performance and carcass characteristics. It even confers an economic advantage. It would be worthwhile to conduct studies with higher levels of MB and a greater number of starter pigs per replicate to substantiate the results of this experiment.

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