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The Effect of Varying Dietary Levels of Maize Cob Meal on the Growth and Nutrient Digestibility of Grower Pigs

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Abstract: Thirty-six large White X Landrace pigs weighing on the average 19.50±1.06 kg at 16 weeks of age were used to study the effect of corn cob meal on the performance of grower pigs. The pigs were divided into 4 treatment groups consisting of 9 per pigs treatment group. Each treatment group was further replicated 3 times 3 pigs per replicate. Four experimental diets were formulated with corn cob meal at 0, 5, 10 and 15% inclusion levels and fed to the pigs in a completely randomized design. Water and feed were provided *ad libitum*. Daily feed intake and digestible energy intake were significantly different ($p<0.05$) between treatment means. Daily weight gain, feed intake/kg live weight gain (F/g ratio) and digestible energy consumed/per kg live weight gain (DE/kg^{10}) did not show any significant ($p>0.05$) difference between treatment means, however, there was significant ($p<0.05$) difference at 15% inclusion level. The results show that 15% corn cob meal inclusion affected the performance of pigs.

Key words: Performance, corn cob meal, pigs, growth and digestibility, dietary level

INTRODUCTION

The search for alternative feedstuffs for farm animals particularly pigs and poultry has been the goal of animal nutritionists and production experts in Nigeria for the past two decades. The search was necessitated by the high cost of conventional feeds, feedstuffs and occasional feed scarcity. This is further aggravated by the under production of grains and the keen competition among humans, industries and livestock for the scarce grains and oil seeds. Maize cob is a waste product from shelling maize seeds and it is seen littering the surroundings, markets, streets and constitutes a public nuisance. Against this background we decided to evaluate the use of maize cob as a replacement for maize.

Recently it has been demonstrated that pig feeding has been accomplished through the use of peels of cassava, yam, plantain and corn cobs by-products (Babatunde *et al*., 1975). Others have used industrial products and wastages to feed pigs (Amaefula, 2005; Onyimonyi and Okeke, 2001). The present trial is aimed at evaluating further the feeding value of maize cob for grower pigs in a humid tropical environment.

MATERIALS AND METHODS

Maize cobs were collected from farmers' cooperative maize shelling plants at Okigwe, Imo State. The cobs were sun-dried for seven days, milled and included at 0, 5, 10 and 15% of the diet to replace equivalent fraction of maize. The diets were formulated to contain 18% crude protein and 2800 Kcal ME/kg. Proximate analysis was done according to the methods of AOAC (1989). Thirty-six Large White X Landrace pigs weighing averagely 19.5±1.05 kg at 16 weeks were used for the trial. The pigs were randomly assigned to 4 diets namely: 0, 5, 10 and 15% representing treatment 1, 2, 3 and 4. Each treatment had nine pigs and is replicated 3 times with three pigs per replicate shown in Table 1. The experiment was a completely randomized design lasting 56 days. The pigs were allowed seven days as period of adjustment. Feeding was done three times, 0.800, 12.00 and 18.00 h and water was made available *ad libitum*. The pigs were fed 4% of their average body weight as ration. The pigs were weighed individually on weekly basis.

After 6 weeks on the diets, two pigs from each of the treatment groups were randomly selected and used in the nutrient digestibility studies which lasted for 10 days, the first 3 days being allowed for acclimatization to the environment and the next 7 days for collection of faeces. Chronic oxide was used as a marker for faecal collection, each day's sample being weighed and kept in the freezer until we were ready for analysis. All the faecal specimens were pooled at the end of the period, the faeces were dried in the oven at 100°C for two days, ground and analyzed for crude protein, ether extract and crude fibre according

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to the AOAC (1989) method of analysis. All the figures collected were used to calculate the digestion coefficient of the nutrients Table 2. Data collected on all parameters measured were arranged, processed and subjected to analysis of variance followed by Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

The performance of the pigs in response to the maize cob diets is presented in Table 3. The effects of treatment on daily feed intake and digestible energy intake were significant ($p<0.05$). Daily weight gain, feed intake, live weight gain and digestible energy consumed/kg weight gain obtained for the control, 5, 10 and 15% were not significantly ($p>0.05$) different between treatments. The effect of treatment on daily feed intake and digestible energy intake were the same up to the 10% maize cob diet level. Significant ($p<0.05$) difference was observed when maize cob diet was fed at 15% level. All pigs had similar growth rate with no definite trend in response to treatment. This may be attributed to the fact that pigs are single-stomach animals, physiologically ill equipped to digest fibres or it may be related to some intrinsic factors associated with the cell wall constituent of maize cob fibre (Babatunde *et al*., 1975). The poorer performance of pigs at 15% level of maize cob inclusion could also be due to the drop in digestive efficiency due to high crude fibre content leading to low dry matter digestibilities. This is in agreement with the reports of Pond *et al.* (1962) who reported that daily gain of growing pigs fed corn cob declined significantly as the level of inclusion increased.

Dry matter, crude protein and crude fibre digestibility were significantly depressed ($p<0.05$) as level of corn cob meal increased. Dry matter and crude protein digestibility were similar ($p<0.05$) in the controls and 5% corn cob diets but were significantly different ($p<0.05$) from dry matter and crude protein digestibility of 10 and 15% corn cob diets. The lowest digestibility of dry matter and crude protein was obtained on the 15% corn cob diet. Crude fibre digestibility was significantly depressed ($p<0.05$) among treatment. The control treatment had the highest digestibility and 15% corn cob diet (treatment 4) had the lowest digestibility. The ether extract digestibility was significantly different ($p<0.05$) between 5 and 15% corn cob diets. The 5% corn cob diet had the highest and 15% corn cob diet had the lowest digestibility. Nitrogen free extract digestibility differed significantly ($p<0.05$) between the control (0%) and 15% corn cob diets but 0, 5 and 10% corn cob diets were similar ($p>0.05$). Energy digestibility differed significantly ($p<0.05$) between 5 and 15% corn cob diets only but highest in 5% corn cob diet and lowest in 15% corn cob diet Table 4.

Table 1: Percentage composition of diets using maize cobs at three levels

Ingredients	% Dietary 5%	Treatment 5%	10% 10% (T_2)	15% 15% (T_4)
Maize	65	65	60	55
Soyabean meal	18	18	18.60	18
Blood meal	5	5	5	5
Palm oil	4	4	4	4
Slued wheat bran	5	-	-	-
Maize cob	-	5.	10	15
Oyster shell	1.00	1.00	1.00	1.00
Calcium	1.25	1.25	1.25	1.25
Methionine	0.25	0 .25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
*Min-Vit. Premix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00

Pre-Mix contained per kg ration Vit. A. 10,000 iu, Vit B_3 1,500 iu, Vit E 3 iu, Vit K_2 mg, riboflavin 3 mg, panthothenic acid 6 mg, niacin 15 mg, chlorine 5 mg, Vit B_{12} 0.08 mg, folic acid 4 mg, Mn 8 mg, Iodine 0.1 mg, Co 1.2 mg, Ca 10 mg, Fe 20 mg

Table 2: Proximate composition of maize cob (DM%)

Component (%)	Dietary treatments 0% (T_1)	5% (T_2)	10% (T_3)	15% (T_4)
Dry matter	93.46	92.86	93.21	92.91
Crude protein	18.64	18.51	17.92	18.01
Ether extract	6.52	6.28	5.87	6.23
Crude fibre	5.76	6.49	7.71	8.05
Total ash	7.32	9.13	10.24	10.78
Nitrogen free extract	54.75	52.82	46.56	48.12

Table 3: Performance of growing pigs fed varying levels of Maize Corn Meal (MCM)

Treatment	Treatment means 1	2	3	4	
Maize cob level (%)					
Parameters	(0%)	(5%)	(10%)	(15%)	SEM
Initial live weight (kg)	19.40	19.3	19.2	19.6	
Final live weight (kg)	51.1	51.5	50.91	49.95	0.46
Daily weight gain (kg)	0.56	0.58	0.54	0.45	0.05
Daily feed intake (g)	1.54^{ab}	1.68^{a}	1.5^{ab}	1.41^{b}	0.07
Digestible energy intake (Kcal)	5.8^{ab}	6.45^{a}	5.92^{ab}	4.63^{b}	0.21
Kg fed intake/kg live weight	2.66	2.90	2.8	3.03	0.16
Digestible energy intake/kg Wt. gain	10.38	11.12	10.96	10.32	0.48

a' b: Means along the same row having different subscripts differ significantly ($p<0.05$)

The results showed a depressing trend in nutrient digestibility of dry matter, crude protein, crude fibre, either extract, nitrogen free extract and energy. The results of the nutrient digestibility are in line with the findings of Igwebuike *et al.* (1999), Jegede *et al.* (1999), Longe and Fagbenro-Byron (1990), Low (1985) and Onyimonyi and Okeke (2001). The depressions in nutrient digestibility were obtained on the 15% corn cob diet level which would tend to show that the inclusion of corn cob meal at 5 and 10% levels were still very good for the promotion of bowl movement of the pigs. The fibre at these levels of inclusion (5 and 10%) aided the digestive process.

Table 4: Apparent digestibility of nutrients of pigs on diets containing different levels of corn cob meals

	Treatment means				
Parameters	1	2	3	4	
Maize cob level (0%)	(0%)	(5%)	(10%)	(15%)	SEM
Dry matter	85.8^{a}	82.2^{a}	78.8^{b}	68.8^{c}	1.28
Crude protein	86.4^{a}	84.2^{a}	76.1^{b}	69.7^{c}	1.07
Crude fibre	62.8^{a}	56.1^{b}	40.9^{c}	27.5^{d}	0.78
Ether extract	74.3^{ab}	80.3^{a}	73.2ab	70.4^{c}	0.07
Nitrogen free extract	86.5^{a}	82.6^{ab}	80.3^{ab}	73.6^{c}	0.96
Energy digestibility	83.8^{a}	84.1^{a}	80.1^{ab}	74.2^{c}	1.31

a, b, c: Means along the same row having different superscripts differ significantly (1<0.05)

CONCLUSION

It was concluded that inclusion of up to 10% maize cob meal in pig ration had no detrimental effect on their performances.

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