



Growth performance and carcass traits of weaner pigs fed diets supplemented with varying levels of wonderful kola (*Buchholzia coriacea*)

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ABSTRACT

The need to reduce cost of production of meat has necessitated the use of plant materials with medicinal properties as feed additives capable of minimizing the influence of pathogenic microbes and improving performance of the animal through better feed utilization. The study was conducted to assess the performance and carcass traits of weaner pigs (8 weeks old) fed powdered wonderful kola (*Buchholzia coriacea*) seed as a dietary supplement at 0, 5, 10, 15 and 20g/kg feed for treatments 1, 2, 3, 4 and 5 respectively. Sixty (60) weaner pigs of mixed sexes were randomly allotted to five (5) dietary treatments of three replicates each. Record of feed intake and weekly weight were documented and used to determine average daily feed intake, daily weight gain and feed conversion ratio. After six weeks feeding trial, fecal samples were collected and processed for nutrient digestibility evaluation. Two animals per replicate were randomly selected, fasted, slaughtered, dressing and cut to parts for carcass evaluation. Blood samples were collected, before slaughtering and were used for blood analysis. Results showed significant differences ($p < 0.05$) in terms of average final live weight (FLW), average weight gain (WG), feed gain ratio (FGR), dressing percentage (DP) and proportional weights of carcass cuts across all dietary treatments. Pigs fed diets supplemented with wonderful kola had better FLW, WG, FGR, DP and increased cut-parts proportions compared to the control group. Only ether extract that was significantly ($P < 0.05$) reduced as supplementation level increased while the serum biochemical parameters were not ($P > 0.05$) affected except ALT which gradually increased ($P < 0.05$) as supplementation level increased. Pigs fed diet supplemented with 15g/kg wonderful kola had the highest value in all parameters measured. It can be concluded from the study that powdered wonderful kola seed could be used as an additive in weaner pigs' diet up to 15g/kg diet.

INTRODUCTION

The use of local plant materials of phyto-genic properties as feed additives in recent times is often aimed at improving animal performance by increasing their growth rate, improving their feed efficiency and reducing the incidence of disease and mortality in livestock (Zomrawi *et al.*, 2013). This has thus increased the economic returns from livestock farming (Flint and Garner, 2009) and served as a viable replacement for antibiotics which has been discouraged due to its residual effect on livestock product (Oyekunle Owonikoko, 2002).

Wonderful kola (*Buchholzia coriacea*) is an example of phyto-genic feed additive which has been reported to have anti-helminthic, antimicrobial and cytotoxicity effect on micro organisms (Ajaiyeoba *et al.*, 2003; Ezekiel and Onyeoziri, 2009). The plant was named after R.W. Buchholz, who harvested it in the late 19th century (Keay, 1989). It has been used over generations to treat variety of illness, thus suggesting its use as a broad spectrum antibiotic against diseases as well as improving growth. There is therefore the need to conduct studies on the potential use of wonderful kola in swine feeding. The objective of the study is to evaluate the effect of wonderful kola

supplementation on the performance, nutrient digestibility and carcass traits of weaner pigs.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Piggery Unit of Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso, Oyo State in the derived savanna zone of Nigeria.

Preparation of Test Ingredient and Experimental Diets

Fresh wonderful kola seeds were purchased from a farm in Ikirun, Osun state. The seeds were cleaned of dirt, cut into small fractions to increase the surface area and then air dried until maximum dryness and constant weight was achieved. The dried material was then milled into powder and used in formulating the experimental diets. Five experimental diets were formulated using conventional feed ingredients and supplemented with the test ingredient such that diets 1, 2, 3, 4 and 5 contain wonderful kola at the rate of 0, 5, 10, 15 and 20g/kg feed respectively (Table 1).

Table 1: Gross composition of experimental diets varying supplementation levels of wonderful kola

Ingredients (Kg)	Diets				
	1 (0g/kg)	2 (5g/kg)	3 (10g/kg)	4 (15g/kg)	5 (20g/kg)
Maize	55	55	55	55	55
Soyabean	24	24	24	24	24
Fish meal	2	2	2	2	2
Blood meal	3.25	3.25	3.25	3.25	3.25
Wheat offal	10	10	10	10	10
Bone meal	3	3	3	3	3
Oyster shell	1.5	1.5	1.5	1.5	1.5
Salt	0.5	0.5	0.5	0.5	0.5
Premix*	0.3	0.3	0.3	0.3	0.3
Methionine	0.25	0.25	0.25	0.25	0.25
Wonderful kola	-	+	+	+	+
Total	100	100	100	100	100

Premix composition : Vitamin A, 10,000.000 1 μ /kg, Vitamin D₃, 2, 000/ μ /kg, Vitamin E, 4, 000Mg/Kg, Vitamin K₃, 900Mg/Kg, Vitamin B, 500Mg/Kg, Vitamin B₂ 2000Mg/Kg, Vitamin b₃ 5,200Mg/Kg, Vitamin B₆, 500Mg/Kg, Vitamin B₁₂4Mg/Kg. Vitamin pp, 18,000Mg/Kg, Folicacid 400Mg/kg chlorinechloride 150,000Mg/Kg, Anti-oxidant BHT 0.05%, Iron 1.80%, Copper 0.20%, Manganese 2.40%, Cobat 0.04%, Zinc 2.80%, Iodine 0.04%, Selenium 0.016%, Calcium 12.8570%.

Experimental Animals, Design and Management

Sixty (60) weaner pigs (8weeks old) were procured from a reputable farm. They were weighed on arrival and randomly allotted to five dietary treatments according to weight and sex in a completely randomized design. Each treatment was replicated thrice with four animals per replicate. Feed and water were provided *ad-libitum*. Necessary health management practice like vaccination and prophylactic treatments were also carried out. The experiment lasted for six (6) weeks.

Data Collection

Data were collected on feed intake and the weekly weight. These were used to determine the weight gain and the feed to gain ratio.

Nutrient digestibility

Towards the end of the 6th week, six (6) pigs per treatment (two pigs per replicate) were randomly selected and acclimatized for 3 days in a metabolic cage. Excreta were collected at day 40 to 42, sampled, weighed and oven dried and used to determine the

proximate composition followed by digestibility of dry matter, crude protein and energy (AOAC, 2000).

Carcass Evaluation

At the end of the experiment, two pigs were randomly selected from each replicate, tagged, fasted for 12 hours and their final live weight was taken. They were stunned and slaughtered by severing their jugular vein and complete bleeding was ensured. The carcasses were scalded, eviscerated and cut into parts; ham, picnic shoulder, jowl, boston butt, belly and loin. The bled, eviscerated, carcass and cut-parts weights were recorded accordingly. The weights of the cut parts were expressed relative to the carcass weights and the dressing percentage was calculated as thus:

$$\text{Dressing percentage} = \frac{\text{Carcass weight} \times 100}{\text{Final live weight}}$$

Data collection on serum biochemistry

At the end of the experiment, blood samples were collected from two pigs per replicate. The animal was restrained with the snout rope while the neck was stressed upward and collection from the external jugular veins was made into bottles free of anti-coagulants. The blood samples were analyzed for the Albumin, Total protein, Alanine amino transaminase, aspartate amino transaminase, alkaline phosphatase, Triglycerides and Cholesterol content.

Statistical Analysis

Data obtained were subjected to one way analysis of variance using statistical package (SAS,

2007) while the significant means among treatments were separated using Duncan Multiple Range Test of the same statistical package at 5% significant level.

RESULTS AND DISCUSSION

Results

Table 2 presented the growth performance of weaner pigs fed wonderful kola (WK) based diets. The results showed that pigs fed diets supplemented with wonderful kola had higher ($p < 0.05$) values of final live weight (FLW), weight gain (WG) and improved ($p < 0.05$) feed to gain ratio (FGR) compared to those fed with control diet. The FLW and WG increased ($p < 0.05$) as the level of wonderful kola supplementation in the diet increased but pigs on treatment 4 (15g/kg) had the highest values. This finding revealed that a growth promoter effect was exerted by the phytogetic feed additives similar to the antibiotic growth promoter. Wonderful kola also improved the FGR of pigs similar to the antibiotic growth promoter. There have been several reports that herbal extract could increase the broiler performance by improving live weight gain and FCR of broiler chicken (Jamroz and Kamel, 2009; Jamroz *et al.*, 2003; Al-Kassie and Jameel, 2009). The observed improved performance of the animal in this study could be attributed to various antimicrobial properties of wonderful kola. Fred *et al.* (Fred *et al.*, 2012) reported wonderful kola to contain bioactive compounds which are inhibitory to bacterial growth. The improved feed to gain ratio may be as a result of improved digestion of nutrients.

Table 2: Growth performance of weaner pigs fed varying dietary inclusion of powdered wonderful kola

Variables	T1	T2	T3	T4	T5	SEM
Average initial weight (kg)	15.70	15.70	15.60	15.15	15.27	0.87
Average final live weight (kg)	29.70 ^d	33.62 ^c	35.20 ^{bc}	40.85 ^a	35.43 ^b	0.73
Average weight gain (kg)	0.25 ^b	0.32 ^{ab}	0.35 ^{ab}	0.46 ^a	0.36 ^{ab}	0.03
Average feed intake (kg)	0.92	0.84	0.73	0.92	0.92	0.14
Feed to gain ratio	3.68 ^a	2.63 ^b	2.09 ^b	2.00 ^b	2.56 ^b	0.20

^{abc}: means within the same row bearing different superscripts differed significantly ($p < 0.05$)

Table 3 presented the results of the nutrient digestibility of weaner pigs fed wonderful kola based diets. It was revealed from the study that dietary supplementation of wonderful kola had no significant effect ($p > 0.05$) on the nutrient digestibility of the pigs except for ether extract digestibility. The ether extract digestibility was lower ($p < 0.05$) for pigs fed wonderful kola compared to those fed the control diet. However,

pigs on Treatment 2 (5g/kg WK) had similar ($p > 0.05$) value with those in Treatment 1 (control diet). The similarities in digestibility of dry matter and most nutrients across the treatment groups is an indication that nutrient utilization efficiency of weaner pigs given different concentrations of wonderful kola were not adversely affected. This suggests that there is no alteration of intestinal microflora that can be attributed

to the activity of enzymes, which was similar to the report of Gippert *et al.* (1992); Luick *et al.* (1992) and Ojebiyi *et al.* (2006) that addition of growth promoters had no adverse effect on nutrient digestibility.

Table 3: Nutrient digestibility of weaner pigs fed varying dietary inclusion of powdered wonderful kola meal

Parameters (%)	T1	T2	T3	T4	T5	SEM
Crude protein	64.89	56.11	63.92	60.99	58.47	1.75
Crude fibre	64.12	60.51	55.07	63.63	59.93	1.77
Ether extract	63.70 ^a	57.62 ^{ab}	53.92 ^b	54.55 ^b	53.92 ^b	1.32
Ash	64.82	55.86	58.70	55.82	60.36	1.36
Dry matter	78.86	70.24	82.20	74.34	74.46	2.01

^{ab}: means within the same row bearing different superscripts differed significantly ($p < 0.05$)

The results of the carcass characteristics of weaner pigs fed wonderful kola based diet were shown in Table 4. Pigs fed wonderful kola had higher ($p < 0.05$) dressing percentage and cut-parts (jowl, boston butt, belly and loin) proportions than the control diet. Pigs on T4 (15g/kg diet) had the highest ($p < 0.05$) values in all the parameters measured. However, pigs fed the control diet (T1) had similar ($p > 0.05$) values of picnic shoulder, loin and ham compared to those on T2 (5g wonderful kola /kg feed). There was an increasing trend in all the values obtained for various variable measured as the level of wonderful kola supplementation in the diet increased (with exception

to T5 which had lower values than T4). The significant increase in the dressing percentage in dietary treatments with wonderful kola could be due to an optimum antioxidant level of wonderful kola (*Bucchozia coriacea*) which aid protein synthesis in the pigs as earlier narrated by Ibrahim and Fagbohun (2013) who reported that antioxidant activities of wonderful kola promotes growth and increase weight gain. The improved cut-parts weight of the pigs fed wonderful kola supplemented diets compared to the control diet may be due to the improved protein digestion and utilization of amino acids especially lysine which is critical for muscle development (2013).

Table 4: Carcass characteristics of weaner pigs fed varying dietary inclusion of powdered wonderful kola

Parameters (%)	T1	T2	T3	T4	T5	SEM
Final live weight (kg)	26.29 ^d	29.73 ^c	30.80 ^{bc}	35.89 ^a	31.52 ^b	0.73
Dressing percentage	56.78 ^c	59.40 ^b	59.79 ^b	78.21 ^a	59.77 ^b	1.80
Jowl	3.50 ^e	4.11 ^d	4.61 ^c	6.24 ^a	5.68 ^b	0.24
Picnic shoulder	6.05 ^d	6.31 ^d	6.82 ^c	8.62 ^a	8.09 ^b	0.24
Boston butt	2.42 ^e	3.35 ^d	4.27 ^c	6.72 ^a	4.59 ^b	0.33
Belly	6.82 ^d	8.84 ^c	8.98 ^c	12.06 ^a	10.05 ^b	0.40
Loin	11.09 ^d	12.09 ^{cd}	12.83 ^{bc}	16.03 ^a	13.64 ^b	0.41
Ham	12.16 ^b	12.41 ^b	12.79 ^b	14.67 ^a	13.05 ^b	0.25

^{abc}: means within the same row bearing different superscripts differed significantly ($p < 0.05$)

Serum biochemical parameters of grower pigs fed wonderful kola (Table 5) showed no significant ($p < 0.05$) effect except for alanine amino transaminase (ALT) and cholesterol. The values of ALT remained the same across all dietary treatments but however increased ($p < 0.05$) at 20g/kg supplementation level (Treatment 5). The decrease ($P < 0.05$) in cholesterol values obtained for pigs fed wonderful kola supplemented diets agrees with the findings of Ademola *et al.* (2009) who found a significant decrease in blood serum cholesterol with feeding

chicks up to 6% ginger. Effects of supplementation can be used to lower risk factor at the cardiovascular disease and cancer either in animals or human (Adeola *et al.*, 2009). Unequivocally, the antidiabetic and anti cholesterolenic properties of wonderful kola seeds (Ibrahim and Fagbohun, 2013) were demonstrated in these results. The results of the liver enzymes evaluation were within the range of documented normal values (Cole, 1986) and do not indicate hepatic damage or toxicity as a result of the administration of wonderful kola seed powder.

Table 5: Serum biochemical parameters of weaner pigs fed dietary supplementation of wonderful kola

Parameters (%)	T1	T2	T3	T4	T5	SEM
Albumin (g/dL)	2.82	2.58	2.88	2.73	2.57	0.05
Total protein (g/dL)	3.85	4.25	3.80	3.72	3.64	0.16
Alanine amino transaminase (iu/L)	51.71 ^b	51.40 ^b	55.93 ^b	58.38 ^b	76.24 ^a	3.11
Aspartate amino transaminase (iu/L)	57.72	63.16	71.76	75.79	68.07	5.11
Alkaline phosphatase (iu/L)	38.59	15.99	17.39	14.04	19.90	3.72
Triglycerides (mg/dL)	86.77	71.65	78.96	77.96	82.52	2.69
Cholesterol (mg/dL)	124.92 ^a	103.33 ^{ab}	81.27 ^b	81.27 ^b	97.78 ^b	7.29

^{ab} means within the same row bearing different superscripts differed significantly ($p < 0.05$)

CONCLUSIONS AND APPLICATION

The results obtained from the study showed that supplementing weaner pigs diets with wonderful kola enhanced growth performance especially at 15g/kg level. Wonderful kola dietary supplementation also resulted in improved carcass traits of the pigs as well as assisting in lowering the blood cholesterol.

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