MON -22

Preliminary Study on the Potential of *Ficus polita* Fruits Meal as a Feed Ingredient in Broiler Diet

C.O. Obun and E. Ojinaka
Animal Production and Health, Faculty of Agriculture and Life Sciences, PMB 1020, Federal University Wukari, Taraba State, Nigeria
Corresponding author: C.O. Obun; E-mail: obunotu@yahoo.com; Phone: +2348032452529

Abstract
The nutrition and anti-nutritional composition and performance of broiler chickens fed raw and boiled *Ficus polita* fruits were evaluated. The raw and boiled fruits were analyzed for nutrient and anti-nutrients. The birds were fed 0%, 7.5% raw and 7.5% boiled *Ficus polita* fruit meals (FPFM). The analyzed proximate composition (%) of the raw fruit meal showed that the fruit 5.23% moisture, 11.88% ash, 2.09% crude fat,10.42% crude fibre,9.44% crude protein and 66.17% carbohydrate compared with boiled fruit meal with moisture content (4.80%), crude protein (8.59%), ash (9.12%), crude fibre (9.55%), fat (0.96%) and carbohydrate (70.85%. Results of the anti-nutritional factors showed that raw *Ficus polita* fruits had 1.25% phytate, 0.38% oxalate, 0.18% tannin 6.50% saponin and 10.08 mg/100 g cyanogenic glycosides compared with boiled fruits which show reduction in concentrations. The growth performance and feed conversion ratio of birds fed 7.5% boiled FPFM diets was significantly ($p<0.05$) superior compared with birds on maize based diet and 7.5% raw FPFM diet. Feed intake was higher in birds fed 7.5% boiled FPFM than control group. Inclusion of 7.5% boiled FPFM improve utilization of diet and without adverse effect on growth performance of broiler chickens and therefore further studies is recommended to determine the effect on economy of production.

Key words: *Ficus polita*, fruits meal, cyanogenic glycosides, broiler chickens

Introduction

Human quest to satisfy the protein requirement has led to increased demand for poultry meat thereby putting pressure on supply of broiler chickens. The poultry producers have experienced a rise in the cost of production due to the increasing cost of feed. Feed accounts for about 70% of the cost of poultry production and about 95% of this is used to meet the requirement for the main ingredients supplying energy and protein (Obun, 2013). The cost of the maize ingredient, which makes 60 % of the current poultry feeds, is very high (Obun, 2013).The use of unconventional feed resources could be one way of expanding the feed resource base of poultry production because the unconventional ration is cheaper than grain-based ration. *Ficus polita* fruits are lesser-known under-utilized multipurpose tree in the feeding of livestock in Nigeria. *Ficus polita* Vahl is a tropical African evergreen shrub or small tree belonging to the family *Moraceae*, and usually growing up to 15 meters tall, and sometimes to 40 meters ~~tall~~. The plant is commonly known as Heart-leaved fig, polish fig, rubber plant, wild rubber fig, wild rubber tree (SANBI, 2015).*The* fruit contains carbohydrate (67- 6%) and protein (8.57 – 9.44%) which is comparable to that of maize (SANBI, 2015). Presently, no study has been carried out on the nutritive and anti nutritive value of *Ficus polita* fruits and the use in poultry feeding.

In this respect, the study was designed to investigate chemical composition of *Ficus polita* fruits its feeding quality in broiler performance.

Materials and Materials

The study was conducted at the Poultry Unit of the Teaching and Research Farm, Federal University Wukari, Taraba State, Nigeria. Wukari is located on a geographic coordinate of latitude 7° 51' N and 9°47'E (NPC, 2006).The fruits of *Ficus polita* were collected in Wukari Metropolis between the month of September and October. The fruits were sundried, weighed and divided into two portions A and B. The B part was boiled for 10minutes and dried. The two portions A and B were cleaned by removing contaminants and crushed using local crushing machine to form Raw and boiled FPFM Three treatment diets were formulated to meet standard nutrient requirements of broiler finisher chickens. The composition of the starter and finisher diets are presented in table 1.

A total of 90 day-old Nastech strain of broiler chicks of mixed sex were was used for this study. They were randomly assigned to three treatments comprising of 30 birds each, each treatment group had three replicates of ten (10) birds in completely randomized design. The birds were raised on deep litter; feed and water were provided *ad libitum.* Initial weight and finial weight of birds were taken at the beginning and end of the experiment. Feed consumption and weight gain were measured weekly. Feed to gain ration and feed cost per kg gain were computed for each treatment. The dietary composition of the starter and finisher diets, raw and boiled FPFM were analyzed for moisture, crude protein (CP), Crude fiber (CF), ash, ether extract

(EE), nitrogen free extract (NFE), calcium (Ca), phosphorus (P) according to the methods described by AOAC (2006). The anti-nutritional factors of raw and boiled *Ficus polita* fruit were screened for qualitative and quantitative toxicity levels according to Anhwange *et al*. (2004) methods. The metabolizable energy was calculated in Kilojoules per 100g (kJ/100g) by multiplying the crude fat, protein and carbohydrate values by Atwater factors of 37, 17 and 17 respectively. The statistical analysis was carried out using Statistical Analysis System (SAS, 1995). Means were compared by using one-way Analysis of Variance) and Duncan Multiple Range Test

Table 1: Composition of experimental starter and finisher diets fed broiler chickens

Ingredient	Starter diets			Finisher diets		
	T_1	T_2	T_3	T_1	T_2	T_3
Maize	44.00	36.50	36.50	60.00	52.50	52.50
Maize bran	10.00	10.00	10.00	12.00	12.00	12.00
FF SM	38.00	38.00	38.00	20.00	20.00	20.00
FPFM	0.00	7.50	7.50	0.00	7.50	7.50
*Others	8.00	8.00	8.00	8.00	8.00	8.00
Total	100	100	100	100	100	100
Calculated analysis						
CP	22.91	22.11	22.11	18.23	18.21	18.21
ME (Kcal/kg)	2950.2	2852.0	2852.0	3006.5	2928.9	29289
Analyzed composition						
CP	23.06	23.31	23.00	19.05	19.00	19.04
CF	2.97	4.51	3.01	2.97	4.52	4.45
EE	6.92	5.90	5.94	4.00	4.38	4.41
Ash	4.00	4.61	4.42	3.65	4.00	4.03

Others: fish meal and blood meal 1%, limestone 2%, bone meal 3% , lysine, methionine, premix and common salt 0.25% each. FPFM: Ficus polita fruit meal;* FFSM: Full fat soybean meal

Results and Discussion

The results of the raw and boiled *Ficus* fruit meals are presented in table 2. The nitrogen free extract increased with boiling by 6.61%. The crude protein level obtained in the present study is comparable to those of maize, sorghum, millet and mango seed (9-13%) (Diarra *et al*., 2010; Ndelekwute *et al*., 2016). Nitrogen free extract and gross energy were high with values of 70.85 % DM and 1385.66 Kcal/kg in boiled fruit meal compared with values of 8.57 % DM and 1362.70 Kcal/kg) for raw fruits. The crude fiber mean values of 10.42 % (raw fruit meal) and 9.55% (boiled *Ficus* meal) are high when compared to those of maize, millet, sorghum and mango seed reported by Diarra *et al*. (2010) and Ndelekwute *et al*.(2016) indicating that the fruit meal will give low energy in terms of fiber. The result of the ash content in the raw (11.8%) and boiled 9.12%) *Ficus* fruit was high which suggest that there is a high deposit of mineral elements in *Ficus* fruits.

Table 2:Proximate Composition (% DM) of raw and boiled *Ficus polita* fruits

Parameter	Moisture	Crude Protein	Fat	Crude fibre	Ash	NFE	ME(Kcal/kg)
Raw fruits	5.23	9.44	2.09	10.42	11.88	66.17	1362.70
Boiled fruits	4.80	8.57	0.96	9.55	9.12	70.85	1385.66

The results of anti-nutritional factors of raw and boiled Ficus fruit meal are presented in table 3. Boiling showed reduction in all ANFs studied compared to the raw fruit. Tannin had highest reduction value of 50% followed by cyanogenic glucoside(41.37%), oxalate (28.95%. saponin (13.85%) and phytate (8.80%).The reduction of ANF in boiled fruits meal confirmed earlier report of Ravindran and Sivakanesan (1996) who asserted that soaking and boiling drastically reduced the anti-nutritional factors in mango seed kernels thereby improving its nutritional quality.

Table 3: Anti-nutrient composition of raw and cooked *Ficus polita* fruit

Parameter	Tannin (%)	Oxalate (%)	Saponin (%)	Phytate (%)	Cyanogenic glycoside (mg/100g)
Raw fruits	0.18	0.38	6.50	1.25	10.08
Boiled fruits	0.09	0.27	5.60	1.14	5.91
% Reduction	50.00	28.95	13.85	8.80	41.37

The results of the growth performance of broiler chickens fed raw and boiled FPFM are presented in table 4.The enhanced performance of birds on 7.5% boiled FPFM could be due to better amino acid in the fruit compared with maize (Arunachalam and Parimelazhagan, 2014). The total feed intake (TFI) of birds on diet T_3 (4254.70 g) was higher ($P< 0.05$) compared with birds on diets T_1 3889.60g) and T_2 (3877.50g) respectively. These could be associated boiling which weakens the anti-nutrient in the meal thereby increasing feed intake of birds on diet T_3. Larousilhe (1989) reported that boiling, roasting or soaking could eliminate the astringent taste of mango kernels, thus improving taste and acceptance by growing birds. The result of the feed conversion ratio (FCR) showed that birds on dietsT_1 (2.56) and T_3 (2.56) had superior values compared with birds on T_2 (2.76).

Table 4: Performance of broiler chickens fed *Ficus polita* fruit meal

Parameters	T_1 (0%)	T_2 (7.5%Raw)	T_3 (7.5%Boiled)	SEM
Initial weight (g)	35.10	35.00	35.15	4.65
Final body weight (g)	1600.00^{b}	1450^{c}	1700.00^{a}	38.73
Av. body weight gain (g)	1564.90^{b}	1415.00^{c}	1664.85^{a}	38.73
Daily weight gain (g/day)	24.84	22.46	26.43	6.15
Total feed intake (g)	3889.60^{bc}	3877.5^{c}	4254.70^{a}	158.02
Daily feed intake (g/day)	63.81^{a}	61.55^{b}	67.535^{a}	2.51
FCR	2.56^{b}	2.76^{b}	2.56^{b}	0.15

^{abc} *Means with different superscript on the same row differ significantly (P<0.05), SEM=Standard error of means,*

Conclusion

The raw *Ficus polita* fruit meal contains high levels of nutrients and anti- nutrients. Boiling reduced the nutritional compositions and anti nutrients in the fruit meal which was tolerated by broilers at7.5% inclusion in ration without adverse effects on performance. This study indicated that 7.5% boiled *ficus* fruit meal could serve as replacement for maize ingredient in broiler ration.

References

Anhwange, BA., Ajibola, V.O. and Oniye, S.J. (2004). Chemical studies of seeds of *Moringa oleifera and Detarium microcarpum* seeds. *Joum. Biol. Sci, Asia,* 4(6):711- 715.

AOAC (2006). Official methods of analysis of the AOAC (Horwitiz W, Editor), 18th ed. Association of Official Analytical Chemists Washington DC. USA.

Arunachalam, K. and Parimelazhagan, T. (2014).Evaluation of nutritional composition and anti-oxidant properties of underutilized *Ficus talbiti* king fruit for nutraceutical and food supplement..*J. Fd. Sci. Techn.,* 51(7):1260-1268.

Diarra, S.S., Usman, B.A. and Igwebuke, J.U. (2010). Replacement value of boiled mango seed kernel meal for maize in broiler finisher diets. *Journal of Agricultural Biological Science*, 5 (1): 1-10.

Laroussilhe, F. (1989). *Le manguier. Techniques et productions tropicales. Imprimerie A. Bontemps, Limoges*, France.

Ndelekwute, E.K., Assam, E.D., Ebenso, I.E., Ekere, P.C., Silas, E.S. and Okonkwo, A.C.(2016). Effect of African porridge fruit (*Tetrapluera tetraptera*) as a growth promoter in broiler chicks.*Proc. 21st Ann. Con. Animal Science Association of Nigeria,* March 18–22, 2016. Port Harcourt, 577-580.

NPC (2006). Report of Nigeria's National Population Commission on the 2006 Census.*Population and Development Review*, 33(1): 206-210.

Obun, C.O. (2013). Impact of raw tallow (*Detarium microcarpum*,Guill and Sperr) seed meal on performance and blood parameters in broilers. *Iranian Journal of Applied Animal Science (IJAS),* 3(2):289-294.

SAS (1995). Statistical Analysis System Institute, User's Guide. 6th Edn., SAS Institute, North Carolina, USA.

SANBI. (2015). Observations in the Species: *Ficuspolita* subsp. *Polita*. Available at: http:// www.ispotnature.org/ speciesdictionaries/sanbi/Ficus%20polita%20subsp.%20polita. [Accessed 17.11.2015].

Ravindran, V. and Sivakanesan, A.S.B. (1996). Nutrient contents of some unconventional poultry feed. *J. Anim. Science*, 55:58-61.