NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

LIPID PROFILE OF BROILER CHICKENS FED UZIZA LEAF (*PIPER GUINEENSE*) AND UDA SEED (*XYLOPIA AETHIOPICA*) SUPPLEMENTED DIETS AS AN ALTERNATIVE TO ANTIBIOTIC-SUPPLEMENTS

Chinwe U. Nwachukwu, Michael C. Orgi and Peace A. Nlemuwa
Department of Agricultural Science Education, School of Vocational and Technical Education, Alvan Ikoku Federal College of Education, Owerri, Imo State, Nigeria. +2348036788019;
ORCID- 0000-0002-8233-093X; mikyorgi@yahoo.com +2347083374067;
peacenlemuwa5@gmail.com +2347045504189.
*Author for correspondence: Chinwe U. Nwachukwu, chiamas007@gmail.com;
+2348036788019.

ABSTRACT

Herbal plants like Uziza (Piper guineense) and Uda (Xylopia aethiopica) can be used for its biological, therapeutic and pharmacological properties without any toxicity. The use of antibiotics as growth promoter in animal production poses a threat to human health due to its residual effects in animal products. The study determines effect of Uziza leaf and Uda seed supplemented diets on lipid profile of broiler chickens. One hundred and twenty broiler chicks (Ross 308) were randomly allocated to five dietary treatments (24 birds/replicate). The Treatment 1 was fed with basal diet (positive control), Treatment 2, Treatment 3, Treatment 4 and Treatment 5 were received the basal diet plus Oxytetracycline 1g/kg (negative control), Uziza leaf powder 5g/kg, Uda seed powder 5g/kg and Uziza leaf and Uda seed 3g/kg each, respectively. The experimental trial lasted for six weeks. Blood samples of broiler chickens were collected and evaluated for lipid profile. The data were subjected to statistical analysis of one-way analysis of variance using completely randomized design. The lipid profile of broiler chicken fed Uziza leaf and Uda seed supplemented diets were significantly affected ($p<0.05$) by the lactate dehydrogenase, total cholesterol, triglyceride, low-density lipoprotein and high-density lipoprotein.: This study has shown that supplementation of Uda seed and Uziza leaf improved lipid profile of broiler chickens when added at the rate of 5g/kg in poultry ration.

Keywords: Broiler chickens, Feed additives, Supplementation, Uziza leaf, Uda seed.

INTRODUCTION

In the recent times, animal nutrition has focused more on the utilization of plant nutrients for feed cost reduction, easy digestibility and absorption of nutrients (Windisch et al., 2008). Plant nutrients are more easily digested than those from animal origin (Windisch et al., 2008). Natural feed additives from plant herbs and spices could be used to replace antibiotic growth-promoter in broiler chicken production (Hashemi and Davoodi, 2011). Among many alternatives, plant herbs and spices have been considered as an alternative feed additive to antibiotics for the health-enhancing and nutritional properties of the poultry owing to their pharmaceutical and medicinal properties with strong efficacy and low cost. The use of antibiotics as growth promoting in animal production poses a threat to human health due to its residues in animal products and is a major threat in the commercial poultry sector (Kamphues, 1999). The ban in the use of antibiotic growth-promoters has led to the manipulation of poultry feed ingredients by the feed mill industry to improve and balance up their profit margin. African medicinal plant herbs and spices like Uziza (*Piper guineense*) and Uda (*Xylopia aethiopica*) within piperaceae and annonaceae are

known for their biological, therapeutic and pharmacological properties with little or no toxicity (Mgbeahuruike et al., 2019). The leaves, seeds, fruits, barks, and roots of these African medicinal plants are known and used for various nutraceuticals and functional effects according to African folk medicine (Mgbeahuruike et al., 2019). For instance, Uziza (*Piper guineense*) and Uda (*Xylopia aethiopica*) have been known to contain phytochemical substances such as Alkaloids, Tannins, Saponins and Flavonoids (Fategbe et al., 2021). The leaves, seeds, barks, and roots of *Piper guineense* and *Xylopia aethiopica* has been reported to have antibacterial, antifungal, anti-plasmodial, anti-hypertensive and diuretic effects (Butt et al., 2013). Previous reports have shown that the seed extracts of *Piper guineense* and *Xylopia aethiopica* contain plant lipids that enhance healing from diverse ailments due to their antioxidant and anti-inflammatory properties (Obiri and Osafo, 2013). Interestingly, *Piper guineense* and *Xylopia aethiopica* seeds are beneficial to man's health as immunostimulants and immune boosters (Nwozo et al., 2011). The study aimed to investigate the effects of lipid profile of broiler chickens fed Uziza leaf (*Piper guineense*) and Uda seed (*Xylopia aethiopica*) supplemented diets.

MATERIALS AND METHODS

Experimental location

The institutional research committees of Alvan Ikoku Federal College of Education, Owerri approved the animal study and its experimental protocols which was performed in accordance with standard guideline of college animal scientific procedure. The feed trial was conducted at the poultry unit of the teaching and research farm of AIFCE, Imo State, Nigeria.

Experimental birds

A total of 120 commercial day-old broiler chicks (Agrited breed: Ross 308) with an initial body weight of 366g ± 2g (after 14 days brooding) was randomly assigned to 5 dietary treatments such that each treatment have 24 broiler chicks (50:50 males and females) housed (7 x 7 x 4 feet) in pen. At the initiation of the study, broiler chicks in each treatment was blocked by initial body weight and gender (either male or female). The broiler chicks were vaccinated of against infectious bursal disease and Newcastle disease (Hester Bioscience limited, Gujarat India) at day 7 and 15 in their drinking water. Coccidiostat was not included in the basal feed. The birds were kept in a deep litter system (24 birds/pen/treatment). Feed delivery were limited to 83g/bird at the initiation of the study and gradually increased until *ad libitum* consumption is achieved. The experimental feeds and water (free from antibiotics or any drugs) were both available.

Experimental diets

The starter and finisher diets were prepared in a mash form and made throughout the feeding trial. The Uda seed (*Xylopia aethiopia*) and Uziza leaf (*Piper guineese*) (test ingredients) were added and mixed thoroughly after feed formulation according to each treatment inclusion rate. The basal diet was composed of feed ingredients that meet the nutrient requirements of broiler chicks based on the (National Research Council, 2012) recommendation. The experimental diets include: - Treatment 1: Basal diet with no treatment (positive control), Treatment 2: Basal diet with Oxytetracycline 1g/kg (negative control), Treatment 3: Basal diet with Uziza leaf 5g/kg, Treatment 4: Basal diet with Uda seed 5g/kg, Treatment 5: Basal diet with Uziza leaf 3g/kg and Uda seed 3g/kg.

Blood collection and lipid profile analysis

At the end of the experimental trial, blood samples were collected from the birds' wing vein using a 5mL syringe and placed in sterilized bottles without ethylenediaminetetraacetic acid (EDTA: anticoagulant) for determining the lipid profile.

Statistical analysis

All the data were checked for normality and heterogeneity of variance before analysis. The data values were presented as mean ± SEM (standard of error of mean) from replicated experiments. All blood analysis were replicated six times (n=6/treatment). The result data were subjected to statistical analysis using one-way analysis of variance (ANOVA) using completely randomized design. Treatment means were compared by Least Significance Difference test through IBM SPSS statistics, version 21. Differences at $P<0.05$ were considered statistically significant.

RESULTS

The lipid profile of broiler chickens fed Uziza leaf (*Piper guineense*) and Uda seed (*Xylopia aethiopica*) supplemented diets is presented in Table 1. All lipid profile of broiler chickens were influenced ($p<0.05$) by Uziza leaf (*Piper guineense*) and Uda seed (*Xylopia aethiopica*) supplemented diets. Supplementation of Uziza leaf and Uda seed in broiler chicken diets were significantly affected ($p<0.05$) by the lactate dehydrogenase, total cholesterol, triglyceride, low density lipoprotein and high-density lipoprotein while glucose tends to be significant ($p=0.08$).

Discussion

Biochemical index reveals the physiological, pathological, and nutritional status of farm animals as the changes in blood protein levels depends on the alterations in the diet (Tóthová *et al.*, 2019). Uziza leaf and Uda seed can enhance the immunological potentials in farm animals like poultry. Glucose in our study tends to be significantly reduced by the dietary Uda seed and its combined supplemented diets. Our result agrees to Yatoo *et al.* (2012) who observed a significant reduction in blood glucose when 1% black cumin when added in broiler diets. Study on ginger powder supplementation led to a significant decrease in the serum glucose which is in agreement with our findings (Shewita and Taha, 2018). This might explain the significant reduction as inhibition of hepatic phosphorylase enzyme by Uda seed supplemented diet in our study as the breakdown of hepatic glycogen storages. Our test ingredients can stimulate the activity of the enzymes by improving glycogen synthesis (Zhang & Tan, 2003). The lactate dehydrogenase of broiler chickens fed Uda seed and Uziza leaf supplemented diets were significantly higher than other dietary treatments. Our study agrees with a study of Emadi and

Table 1: The lipid profile of broiler chicken fed Uziza leaf (*Piper guineense*) and Uda seed (*Xylopia aethiopica*) supplemented diets

Parameter	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	SEM	P-value
Glucose (mmol/l)	8.93^{ab}	9.20^{a}	9.50^{a}	8.45^{b}	8.87^{ab}	0.55	0.08
Lactate dehydrogenase (u/l)	391.62^{ab}	320.72^{b}	430.82^{a}	495.90^{a}	374.55^{ab}	26.08	0.04

Total cholesterol (mg/dl)	136.31^{ab}	149.92^{a}	132.00^{ab}	135.33^{ab}	123.25^{b}	3.42	0.04
Triglyceride (mg/dl)	74.22^{ab}	96.67^{a}	83.11^{a}	75.22^{ab}	71.33^{b}	4.51	0.01
Low-density lipoprotein (mg/dl)	67.79^{ab}	71.42^{a}	52.71^{b}	69.12^{ab}	56.6^{b}	3.69	0.05
High-density lipoprotein (mg/dl)	53.67^{b}	65.83^{ab}	71.00^{a}	54.50^{b}	65.67^{ab}	3.62	0.04

a, ab, b: Mean in the same row with different superscripts are significantly ($p<0.05$) different.
Treatments (n = 6). SEM: Standard error of mean.
Treatment 1: Basal diet (Positive control)
Treatment 2: Diet 1+ Oxytetracycline 1g/kg (Negative control)
Treatment 3: Diet 1+ Uziza leaf 5g/kg
Treatment 4: Diet 1+ Uda seed 5g/kg
Treatment 5: Diet 1+ Uziza leaf 3g/kg and Uda seed 3g/kg

Kermanshahi (2007) stated that the serum activities of lactate dehydrogenase enzymes increased in broiler chickens fed turmeric powder at rates of 2.5 and 5g/kg of the basal diet. Our result revealed that addition of Uziza leaf, Uda seeds and its combination significantly decreased the serum concentration of triglycerides, total cholesterol and low-density lipoprotein in blood of broiler chickens in comparison to control diet. The decrease in triglycerides, total cholesterol and low-density lipoprotein shows the oxidative effects of Uda seed and Uziza leaf in our study diets. Our results corroborate with Eidi *et al.* (2006) findings who reported that garlic extract significantly decreased the total cholesterol, triglycerides in diabetic rats. Our result agrees with Quiles *et al.* (2002) and Wienterish *et al.* (2002) findings who reported that turmeric supplementation in rabbit diets decreased plasma concentrations of triglycerides, total cholesterol and low-density lipoprotein. Addition of Uda seed and Uzizia leaf in the amount of 5g/kg in a supplemented diet decreased the serum concentration of triglycerides, total cholesterol and low-density lipoprotein in blood. This effect can be explained by the possible mechanism of antioxidant and antiperoxide lowering action on hepatic production which serves as the precursor in the blood circulation (Kim *et al.,* 2009). High-density lipoprotein was significantly higher in Uziza leaf diet compared to control diet. Our study agrees to Issa and Omar (2012) findings who showed that Cobb broilers that received 0.2% and 0.4% garlic powder had high-density lipoprotein level increased compared to the control. Our result is in accordance with the findings of Bolukbasi *et al.* (2010) who reported a significant increase in plasma levels of high-density lipoprotein in broilers consumed thyme 200mg/kg. Toghyani *et al.* (2010) found that the feeding of the broilers with 10g/kg thyme resulted in a marked increase in high-density lipoprotein concentration compared to other treatments.

CONCLUSION AND RECOMMENDATION

Based on the obtained results, it is concluded that supplementation of Uziza leaf and Uda seed diets improved the lipid profile of broiler chickens when added at the rate of 5g/kg of broiler ration. Uziza leaf and Uda seed had positive effect and can be a viable alternative feed additive to antibiotics in the nutrition of broiler chickens.

REFERENCE

Bolukbasi, C., M.K. Erhan and A. Özkan (2006). Effect of dietary thyme oil and vitamin E on growth, lipid oxidation, meat fatty acid composition and serum lipoproteins of broilers. South African Journal of Animal Science, 36(3): 189-196.

Butt, M. S., Pasha, I., Sultan, M. T., Randhawa, M. A., Saeed, F. & Ahmed, W. (2013). Black pepper and health claims: a comprehensive treatise. Critical Review in Food Science and Nutrition, 53**,** 875-86. https://doi.org/10.1080/10408398.2011.571799.

Emadi M and Kermanshahi H. (2007). Effect of turmeric rhizome powder on the activity of some blood enzymes in broiler chickens. International Journal of Poultry Science 6: 48–51.

Fategbe, M. A., Avwioroko, O. J. & Ibukun, E. O. (2021). Comparative Biochemical Evaluation of the Proximate, Mineral, and Phytochemical Constituents of Xylopia aethiopica Whole Fruit, Seed, and Pericarp. Preventive Nutrition and Food Science, 26**,** 219-229. https://doi.org/10.3746/pnf.2021.26.2.219.

Hashemi, S. R. & Davoodi, H. (2011). Herbal plants and their derivatives as growth and health promoters in animal nutrition. Veterinary Resource Communication, 35**,** 169-80. https://doi.org/10.1007/s11259-010-9458-2.

Issa K. J, Omar J. M. A. (2012). Effects of garlic powder on performance and lipid profile of broilers. Open Journal of Animal Science; 2: 62-68.

Kamphues, J. (1999). Antibiotic growth promoters for the view of animal nutrition. Berl Munch Tierarztl Wochenschr, 112**,** 370-9.

Mgbeahuruike, E. E., Holm, Y., Vuorela, H., Amandikwa, C. & Fyhrquist, P. (2019). An ethnobotanical survey and antifungal activity of Piper guineense used for the treatment of fungal infections in West-African traditional medicine. Journal of Ethnopharmacology, 229**,** 157-166. https://doi.org/10.1016/j.jep.2018.10.005.

National Research Council (2012). Nutrient requirements of poultry, National Academies Press.

Nwozo, S. O., Orojobi, B. F. & Adaramoye, O. A. (2011). Hypolipidemic and antioxidant potentials of Xylopia aethiopica seed extract in hypercholesterolemic rats. Journal of Medical Food, 14**,** 114-9. https://doi.org/10.1089/jmf.2008.0168.

Obiri, D. D. & Osafo, N. (2013). Aqueous ethanol extract of the fruit of Xylopia aethiopica (Annonaceae) exhibits anti-anaphylactic and anti-inflammatory actions in mice. Journal of Ethnopharmacology, 148, 940-5. https://doi.org/10.1016/j.jep.2013.05.047.

Quiles J.L., Dolores M.M., Ramírez-Tortosa C.L., Aguilera C.M., Battino M., Gil Á., Ramírez-Tortosa M.C. (2002). Curcuma longa extract supplementation reduces oxidative stress and attenuates aortic fatty streak development in rabbits. Arteriosclerosis Thrombocytopenia, 22: 1225–1231.

Shewita R.S. and Taha A.E. (2018). Influence of dietary supplementation of ginger powder at different levels on growth performance, haematological profiles, slaughter traits and gut morphometry of broiler chicken, South African Journal of Animal Science, 48 (No. 6), 997-1008.

Toghyani, M., M. Tohidi, A.A. Gheisari and S.A. Tabeidian (2010). Performance, immunity, serum biochemical and hematological parameters in broiler chicks fed dietary thyme as alternative for an antibiotic growth promoter. African Journal of Biotechnology., 9: 6819-6825.

Tóthová C, Sesztáková E, Bielik B, Nagy O. (2019). Changes of total protein and protein fractions in broiler chickens during the fattening period. Veterinary World; 12(4), 598–604.

Wientarsih I., Chakeredza S., and Meulen U. (2002). Influence of curcuma (Curcuma xanthorrhizaRoxb) on lipid metabolism in rabbits. Journal of Scientific Food Agriculture, 82: 1875–1880.

Windisch, W., Schedle, K., Plitzner, C. & Kroismayr, A. (2008). Use of phytogenic products as feed additives for swine and poultry. Journal of Animal Science, 86**,** E140-8. https://doi.org/10.2527/jas.2007-0459.

Yatoo MA, Sharma RK, Khan N, Rastogi A, and Pathak AK. (2012). Effect of fenugreek and black cumin seeds as feed additives on blood biochemical profile and performance of broilers. Indian Journal of Animal Nutrition; 29(2):174-178.

Zhang, X.F. and Tan, B.K.H., (2003). Effects of an ethanolic extract of Gynurapro cumbens on serum glucose, cholesterol and triglyceride levels in normal and streptozotocin- induced diabetic rats. Singapore Medical Journal 41, 1-6.