Research Journal of Animal Sciences 6 (3): 38-41, 2012
ISSN: 1993-5269

Bitter Leaf (*Vernonia amygdalina*) as a Feed Additive in Broiler Diets

A.A. Mohammed and A.S. Zakariya'u
Department of Animal Science, Usmanu Danfodiyo University, Sokoto, Nigeria

Abstract: The research was carried out to determine the growth performance of 84 day old Hubbard broiler chicks on various levels of supplemental *Vernonia Amygdalina* (VA). Four treatments were used including the control which had 0 g VA, treatments two, three and four had 300, 600 and 900 g VA, respectively as an additive in both the starter and finisher diets. The results of the growth performance showed that there were no differences ($p>0.05$) among all the growth performance parameters analyzed. Broilers on V300 and V900 showed increased feed intake and feed conversion ratio, respectively. There was decreased mortality in broilers fed V600 diet.

Key words: Broiler, feed, additives, *Vernonia amygdalina*, diet

INTRODUCTION

Feed additives are ingredients added to poultry diets to enhance production efficiency, improve health and reduce morbidity (FAC, 1998). Feed additives are added to diets for reasons other than to supply nutrients to the animals for example antibiotics added at sub-therapeutic level in order to improve feed utilization by lowering the population of some unwanted microbes can be considered as feed additives (FAC, 1998). The economic benefit of feed additives is typically to lower production cost as a result of an improvement in production effisciency. Feed additives are typically used in small quantities and are classified into both organic and inorganic in poultry industry. The organic feed additives are products derived from plants which are used in feeding animals to improve their performance (Cuppelt and Hall III, 1998; Nakatani, 2000). The inorganic feed additives are agrochemicals such as antibiotics. Other feed additives used in poultry diets include antioxidants, emulsifiers, binders, pH control agents and enzymes, etc.

Growing concern about antibiotic growth promoters in animal nutrition has created efforts to use different alternative growth promoting agents. *Vernonia amygdalina* (VA) is a valuable medicinal plant that is widespread in East and West Africa (Ainslie, 1973; Burkill, 1985). The usage of VA as a medicinal herb started when zoopharmacologists found that sick chimpanzees with empty stomach sucked the pith and juice from the unsovoury VA stalk which was not their common diet for self deparasitization, enhanced body fitness, increased strength or appetite and reduced constipation or diarrhea especially during rainy season (Huffman *et al*., 1996). VA was reported to contain alkaloids, carbohydrates, tannins, saponins, flavonoids and non cyanogenic glycosides (Nwanjo, 2005). The genus *Vernonia* was included in plants with active antimicrobial activity (Mahady, 2002). Medicinal plants offer a tremendous potential for the development of new antimicrobials for treatment of animal borne diseases as well as use as feed additives. Numerous plant extracts, essential oils and chemical constituents have antimicrobial activity *in vitro* and *in vivo* (Mahady, 2002). There is some documentation on the beneficial use of VA in animal nutrition in Nigeria (Onwuka *et al*., 1989; Aregheore *et al*., 1998). More studies are needed to assess the activity of VA as growth promoter (Mahady, 2002). VA have been put into several uses by scientists among which are the use of VA leaf extracts to treat coccidiosis (Dakpogan, 2006). The extract from the leaf was also used to treat bacilliary white diarrhoea and bronchitis (Gbolade, 2009). The bitterness of VA might enhance the gastro intestinal enzymes especially chymotrypsin production which may enhance the digestion of sporozoites (Huffman *et al*., 1996**).** Many experimental studies on VA have revealed that the plant possesses antibacterial and anti parasitic activity (Tadesse *et al*., 1993) VA contains active complex compounds that are pharmacologically useful (Burkill, 1985; Tadesse *et al*., 1993) It was also reported that the powder of VA leaves was able to increase feed conversion efficiency of cockerels without affecting their haematological profile (Olobatoke and Oloniruha, 2009). VA may provide antioxidant benefits (Erasto *et al*., 2007). The objectives of this study were to assess the growth performance of broilers on various levels of supplemental VA and to determine the cost of feed per kg weight gain of broilers on various levels of supplemental VA.

Corresponding Author: A.A. Mohammed, Department of Animal Science, Usmanu Danfodiyo University, Sokoto, Nigeria

MATERIALS AND METHODS

The experiment was carried out at the poultry section of Sokoto State Veterinary Center located at Aliyu Jodi road in Sokoto metropolis within the months of August and September 2011. The fresh VA was purchased in Sokoto State vegetable market. It was sun dried and pounded into powder. The cost per kg of the dried VA powder was seven hundred and fifty Nigerian Naira (₦750). A gramme of the dried VA powder was therefore seventy five Nigerian kobo (75k or ₦0.75) as at the time of the research. Four diets were formulated for each of the starter and finisher phases of the experiment. For each of the phases, diet one (V0) served as control (without supplemental VA). For diets two, three and four 300 g (V300), 600 g (V600) and 900 g (V900) supplemental VA was added, respectively. The composition of the starter and finisher diets is as shown in Table 1.

About 84 days old broiler chicks of Hubbard strain were used in a completely randomized design. The chicks were brooded on deep litter using 200 W bulbs. The birds were divided into four treatments with 21 birds per treatment. Each treatment group was also replicated 3 times with 7 birds per replicate. The birds were fed starter mash experimental diets for the 1st 4 weeks. At the 5th week of age, the birds were placed on finisher mash experimental diets. Feed and water were provided *ad libitum*. The birds were vaccinated against gumboro disease at 1st and 3rd weeks as first and second doses, respectively. Also lasota vaccine was administered at the 2nd week. At the onset of the experiment, mean initial body weight of the birds were measured and recorded. Feed intake and body weight were measured weekly. Mortality was recorded as it occurred. Weight gain, average daily weight gain, feed intake, average daily feed intake, feed conversion ratio, cost of feed per kg gain were calculated. The data generated from the experiment was analyzed using SAS Statistical package.

Table 1: Ingredient and chemical composition of diet for broiler 0-6 weeks

Ingredients	Starter 0-4 weeks	Finisher 5-6 weeks
Maize	49.35	64.91
Groundnut cake	35.00	27.50
Wheat offal	10.00	2.50
Salt	0.30	0.25
Bone meal	3.52	3.25
Lysine	0.40	0.40
Methionine	0.58	0.49
M and V premix	0.25	0.25
Lime stone	0.60	0.20
Total	100.00	100.00
Calculated analysis		
Cost of feed per kg (₦)	88.75	90.58
Energy (ME kcal/kg)	2805.00	3001.00
Crude protein (%)	23.37	20.18
Crude fibre (%)	3.59	2.88
Ether extract (%)	4.42	4.33
Lysine (%)	1.15	1.00
Methionine (%)	0.86	0.75
Calcium (%)	1.00	1.07
Phosphorus (%)	0.70	0.65

*Bio-mix Broiler starter premix supplied per kg diet: Vitamin A: 5,000 I.U; Vit. D3: 1,000 I.U; Vit. E: 20 mg; Vit. k3: 1 mg; Vit. B1: 0.2 mg; Vit. B2: 2.4 mg; Vit. B6: 2.4 mg; niacin: 16 mg; calcium; pantothenate: 4 mg; Biotin: 0.032 mg; Vit. B12: 0.01 mg; folicacid: 0.4 mg; choline chloride: 120 mg; manganese: 40 mg; iron: 5 mg; zinc: 18 mg; cobalt: 0.1 mg; iodine: 0.62 mg; selenium: 0.04 mg. *Bio-mix Broiler finisher premix supplied per kg diet: Vitamin A: 5,000 I.U; Vit. D3: 800 I.U; Vit. E; 12 mg; Vit. k3: 1.5 mg; B1: 1 mg; Vit. B2: 2 mg; Vit. B6: 1.5 mg; niacin: 12 mg; pantothenateacid: 5 mg; Biotin: 0.02 mg; Vit. B12: 12 mg; folicacid: 0.3 mg; cholinechloride: 150 mg; manganese: 60 mg; iron: 10mg; zinc: 15mg; copper: 0.8 mg; iodine: 0.4 mg; cobalt: 0.08 mg; selenium: 0.04 mg; growthpromotant: 8 mg; antioxidant

RESULTS AND DISCUSSION

The results of the performance parameters of broiler from 0-6 weeks of age on various levels of supplemental VA are as shown in Table 2. There were no significant differences among all the performance parameters of broilers 0-6 weeks of age fed on various levels of supplemental VA. There were no significant differences in final weight, weight gain and average daily weight gain. However, the result can be compared with the research of Tangka (2003) who reported improved growth performance of animals fed with VA. The results obtained from V900 on final weight, weight gain and average weight gain may be as a result of higher concentration of VA which might have made the feed more bitter and caused reduction in feed intake and utilization.

The feed intake and average daily feed intake of broilers on V300 could be as a result of lesser concentration of VA which might have reduced the bitter taste of the feed and possibly lowered antinutritional factors as to make the birds consume more of the feed. This could be compared with the research of Olobatoke and Oloniruha (2009) who reported that the bitter taste of VA and the presence of antinutritional factors lowers intake of feeds in which it is incorporated.

The reduced feed intake and average daily feed intake of broilers on V900 might be as a result of higher concentration of antinutritional factors such as alkaloids

Table 2: Performance of broilers (0-6 weeks) on various levels of supplemental VA

Parameters	V0	V300	V600	V900	p-value
FBW (g/b)	605.55	664.44	641.11	600.83	0.82
W (g/b)	554.55	613.44	590.11	549.83	0.82
ADWG (g/b/day)	13.20	14.60	14.05	13.09	0.82
FI (g/b)	1836.90	1897.59	1871.00	1516.74	0.28
ADFI (g/b/day)	43.74	45.18	44.55	36.11	0.28
FCR	3.31	3.13	3.22	2.82	0.74
CF/kg (₦)	338.69	250.37	234.69	263.13	0.28
MRT (No.)	3.67	2.00	1.67	2.33	0.39

W = Weight; ADWG = Average Daily Weight Gain; ADFI = Average Daily Feed Intake; FCR = Feed Conversion Ratio; CF/kg = Cost of Feed per kg gain. MRT = Mortality; g = gramme; b = bird and d = day

saponins, tannins and glycosides in VA as reported by Arhoghro *et al.* (2009) which could be responsible for the bitter taste which hinders the ingestion of feed containing higher concentration of VA (Bonsi *et al.*, 1995; Hindrickson, 2000). Improved feed conversion ratio came from broilers on V900. Olobatoke and Oloaniruha (2009) reported that VA powder was able to increase the feed conversion efficiency of cockerels.

Reduced feed conversion ratio from broilers on V0 might be as a result of not including VA into the diet because VA was reported to enhance the gastro intestinal enzymes (chymotrypsin) production which may improve the utilization of feed and the digestion of sporozoites and other intestinal parasites that could cause decreased utilization of feed (Huffman *et al.*, 1996). VA leaves when added to soybean meal in infant weaning food was reported to increase weight gain (Agbede *et al.*, 2007). Higher meat yield was also obtained from rabbits fed 250 g VA leaves (Nyako and Magaji, 2001). Better but not significant cost of feed per kg gain came from broilers on V600. Kyvsgard (2002) reported better cost of feed per kg from broilers fed VA.

Mortality was more in birds on V0 possibly due to the fact that V0 diet contained no VA which could have added to the ability of the birds to resist some pathogens. Huffman *et al.* (1996), Dakpogan (2006), Gbolade (2009) and Tadesse *et al.* (1993) reported the lowering activity of pathogens in animals fed VA leaf. There was reduced mortality in birds on V600. Sujikara (2000) also observed reduced mortality in broilers supplemented with VA leaf powder. Changes in serological and haematological profiles from the normal ranges are among the causes of mortality in poultry birds. Owen and Amakiri (2011) fed up to 15% VA in broiler finisher diets and obtained serological and haematological profiles that were within the normal ranges. VA showed promising results in terms of cost of feed per kg gain and the survival rate of broilers.

CONCLUSION

There was neither significant positive effect nor negative effect on broilers fed the various supplemental VA. More researches should be carried out on VA as a feed additive in broiler diets by using various processing methods such as air drying, boiling and air drying, soaking and air drying or boiling and sun drying. Different strains of birds and more number of birds should also be tried in subsequent trials.

REFERENCES

Agbede, J.O., M. Adegbenro, O. Aletorb and A. Mohammed, 2007. Evaluation of the Nutrition value of *Vernonia amygdalina* leaf protein concentrates for infant weaning foods. Acta Alimentaria, 36: 387-393.

Ainslie, J.R., 1973. List of Plants Used in Native Medicine in Nigeria. Imperial Forestry Institute, Oxford Publishing Press, Oxford, UK., pp: 42.

Aregheore, E.M.K., H.P.S. Makkar and K. Becker, 1998. Feed value of some browse plants from the central zone of Delta State, Nigeria. Trop. Sci., 38: 97-104.

Arhoghro, E.M., K.E. Ekpo, E.O. Anosike and G.O. Ibeh, 2009. Effect of aqueous extract of bitter leaf (*Vernonia amygdalina* Del) on carbon tetrachloride (CCl4) induced liver damage in albino wistar rats. Eur. J. Sci. Res., 26: 115-123.

Bonsi, M.L.K., P.O. Osuji, A.K. Tuah and N.N. Umunna, 1995. Vernonia amygdalina as a supplement to teff straw (*Eragrostis tef*) fed to ethiopian menz sheep. Agrofor. Syst., 31: 229-241.

Burkill, H.M., 1985. The Useful Plants of West Tropical Africa. 2nd Edn., Vol. 2, Royal Botanic Gardens, Kew, London, Pages: 960.

Cuppelt, S.L. and C.A. Hall III, 1998. Antioxidant activity of *Labiatae*. Adv. Food Nutr. Res., 2: 245-251.

Dakpogan, H.B., 2006. Free range chick survivability in improved conditions and the effect of 3 medicinal plants on Eimeria tenella. M.Sc. Thesis, Department of Veterinary Pathobiology, The Royal Veterinary and Agricultural University, Denmark.

Erasto, P., D.S. Grierson and A.J. Afolayan, 2007. Evaluation of antioxidant activity and the fatty acid profile of the leaves of *Vernonia amygdalina* growing in South Africa. Food Chem., 104: 636-642.

FAC, 1998. Feed Additive Compendium. The Miler Publishing Co., Minnetonka, MN., USA.

Gbolade, A.A., 2009. Inventory of antidiabetic plants in selected districts of Lagos State, Nigeria. J. Ethnopharmacol., 121: 135-139.

Hindrickson, I.K., 2000. Multipurpose trees and shrubs as supplements to low quality roughage feed to ruminants in tropical countries. M.Sc. Thesis, Department of Animal Science and Animal Health, The Royal Veterinary and Agricultual University, Copenhagen, Denmark.

Huffman, M.A., K. Koshimizu and H. Ohigashi, 1996. Ethnobotany and Zoopharmacognosy of *Vernonia amygdalina*, A Medicinal Plant Used by Humans and Chimpanzees in the Wild. In: Compositae: Biology and Utilization, Caligari, P.D.S. and D.J.N. Hind (Eds.). The Royal Botanical Garden, Kew, pp: 351-360.

Kyvsgard, N.C., 2002. Rural poultry production in Nicaragua. Proceedings of the Central America and Caribbean Poultry Congress, October 1-4, 2002, Havana, Cuba.

Mahady, G.B., 2002. Are medicinal plants a potential alternative for conventional antibiotics in animal husbandry? Thai J. Phytopharm., 9: 50-62.

Nakatani, N., 2000. Phenolic antioxidants from herbs and spices. BioFactors, 13: 141-146.

Nwanjo, H.U., 2005. Efficacy of aqueous leaf extract of *Vernonia amygdalina* on plasma lipoprotein and oxidative status in diabetic rat models. Nig. J. Physiol. Sci., 20: 39-42.

Nyako, H.D. and M.Y. Magaji, 2001. Carcass characteristics and mortality of weaner rabbits fed diets containing varying proportions of *Vernonia amygdalina*. Proceedings of the 26th annual Conference of the Nigerian Society for Animal Production, March 18-22, 2001, Zaria, Nigeria, pp: 192-195.

Olobatoke, R.Y. and J.A. Oloniruha, 2009. Haematological assessment of bitter leaf (*Vernonia amygdalina*) efficiency in reducing infections in cockerels. Proceedings of the World Congress on Medicinal and Aromatic Plants, November 9-14, 2008, Cape Town, South Africa, pp: 472-473.

Onwuka, C.F., A.O. Akinsoyinu and O.O. Tewe, 1989. Feed value of some Nigerian browse plants: Chemical composition and *in vitro* digestibility of leaves. East Afr. Agric. For. J., 54: 157-163.

Owen, A.J. and A.O. Amakiri, 2011. Serological and haematological profile of broiler finishers fed graded levels of bitter leaf (*Vernonia amygdalina*) meal. Adv. Agric. Biotechnol., 1: 77-81.

Sujikara, I., 2000. Andrographis paniculata. Proceedings of the International Conference on Tropical Agriculture for Better Health and Environment, November 29-December 1, 2000, Nakorn Pathon, Thailand, pp: 7.

Tadesse, A., A. Gebie-Hiwot, K. Asres, M. Djote and D. Frommel, 1993. The *in vitro* activity of *Vernonia amygdalina* on *Leishmania aethiopica*. Ethiop. Med. J., 31: 183-189.

Tangka, J.K., 2003. Analysis of the thermal energy requirements for the extraction of leaf protein concentrate from some green plants. Biosyst. Eng., 86: 473-479.