
CARCASS YIELD AND GUT CHARACTERISTICS OF BROILER CHICKENS FED DIFFERENT TYPES OF PHYTOGENIC PLANT LEAF EXTRACT AS FEED ADDITIVES

By

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ABSTRACT

An experiment was designed to evaluate the effect of some herbal plant extracts additives as alternatives growth promoters for broiler chicks. Three different phytogetic plants were collected i.e. Azadiracta indica, Gueiria senegalensis and Commiphora kerstingii were sundried and grounded into powder form and their extracts were fed to broilers with synthetic antibiotics fed as control diet. One hundred one week old unsex Arbor broiler chicks were randomly allotted to the three dietary treatments with another treatment serving as control. The birds were fed with experimental diets for eight weeks. Carcass traits were evaluated. Results showed that live weight (1050.00-1450.00g), dressed weight (55.00-85.94%), thigh (16.96-19.70%), breast (12.24-14.51%), liver (1.81-1.88%), abdominal fat (0.37-1.26%) and gizzard (1.72-2.12%) were affected by the different type of pathogenic plants ($P < 0.05$). The broiler chickens utilized all the medicinal plants like they utilize the synthetic additive. It can be concluded that out of the three medicinal plants, Commiphora kerstingii gave the highest performance and it can be recommended as source of additive for broiler production in the tropics; this will provide availability of the materials since they are sourced locally in the environment and reduce the cost of production.

INTRODUCTION

Animal nutritionists in Nigeria have generally agreed that poultry production is the fastest means of bridging the protein deficiency gap prevailing in the country (Maidala and Istifanus, 2012). Poultry meat is an important source of nutrients as it contains all the essential amino acid, fatty acids, vitamins, minerals especially selenium, iodine, phosphorus, potassium, iron and zinc. The vitamins and minerals present in poultry meat help to boost the immune system, digestion and metabolism, strengthen bones and skin, build, maintain and repair body tissues (Atteh, 2002). Antibiotics were

routinely used in broiler diets at low than therapeutic doses as to improve bird's performance (Kim *et al.*, 2008). This practice derives from observations made since 1946, that incorporation of antimicrobial growth promoters improved feed efficiency in intensive poultry production (Peterolli *et al.*, 2012). The use of antibiotics in poultry feed as growth promoter and for health maintenance can cause drug resistance bacteria and antibiotic residue effects (Wray and Davies, 2000). There was a ban on the use of all antibiotics and chemotherapeutic drugs as growth promoters in the European Union on Jan 1st 2006; this ban has caused

increase in the search for alternative growth promoters. Plant active principles are chemical compounds present in the entire plant or in specific part of the plant that confers them therapeutic activity or beneficial effects (Martins *et al.*, 2000). Growth promoters are chemical and biological substances which are added to poultry feed with the aim to improve the growth, improve the feed utilization, stimulation of the immune system and increased vitality, regulation of the intestinal microflora, reduced morbidity and mortality due to various diseases (Thomke and Elwinger, 1998) and in this way realize better production and financial results. Growth promoters are generally liver tonics which optimize hepatic functions of the birds (Mishra, 1991).

In Nigeria millions of naira is spent every year in the purchase of feed additives in the poultry industries. Therefore researches should be directed toward the use of natural phytogetic plants to reduce the cost of production in the poultry industries. Phytogetic feed additives are herbs, spices and products derived thereof and are mainly essential oils. Natural products of plant origin like spices, herbs and many plant extract can be considered as alternative to antibiotics as growth promoters in improving broiler performance (Hernandez *et al.*, 2004). Spices and herbs of various plants extract have appetizing and digestion stimulating property and antimicrobial effects. Abdulmanan (2012) concluded that herbs are valuable substitutes for health and nutrition in poultry industry. They can stimulate feed intake, the endogenous secretion, or may have antibacterial or anticoccidial activities. A wide range of plant metabolites that belong to class isoprene derivatives, flavonoids and a large number of these compounds may act as antibiotics and antioxidants (Shin, 1995). As an alternative of antibiotic medicinal plants like garlic, ginger, neem, *Guerra senegalensis* and *Commiphora kerstingii* etc are the most popular option for growth promoters ((Elangovan *et al.*, 2000; Esonu *et al.* (2006) Hanus *et al.*, 2005; Goji

et al., 2009; Somboro *et al.* 2011). Different parts of plants, their extracts viz. oil, leaves, bark, seed, roots and other vegetative parts etc. have been experimentally used in poultry as a growth Promoters. Certain herbal formulations have showed encouraging results reported significant improvement with respect to weight gain, feed efficiency, lowered mortality and increased livability in poultry birds. Nigeria is blessed with vast resources of herbal plant that can be used as growth promotants, plants like neem (*Azadiracta indica*), *Guerra senegalensis* and *Commiphora kerstingii* are throughout the savanna regions of Nigeria. This study was undertaken to evaluate phytogetic feed additive extract on growth performance and economics of production of broilers chickens.

MATERIALS AND METHODS

The experiment was conducted at Poultry Research Center of School of Undergraduate Studies, College of education, Azare, Bauchi state. Katagum local government is situated in the northern part of Bauchi state, Nigeria. It is located between latitudes $11^{\circ} 42'$ and $11^{\circ} 40'$ and longitude $10^{\circ} 31'$ and $10^{\circ} 11'$ east (Anon, 2009). It shares common boundary with Itas/Gadau local government in north west, Jama'are to the west, Dambam to the east, Misau to the south west, Giade to the south and Shira to the southwest (Azare, 2013). It has a landmass of 1,120 square kilometers (NPC, 2006). The climate of the study area is controlled by inter tropical convergent zone (ITCZ) which is marked by the rainy and dry season. The major climate elements that influence the climate of the study area and affecting the farming system are temperature and precipitation (rainfall), the annual temperature ranged between $22-33^{\circ}$ C from April to May (Bashir *et al.*, 2001). The mean annual rainfall ranged between 615.6-985mm with peak between July- Augusts. The study area is in the Sudan savanna, the vegetation is greatly determined by the nature of the soil. The soil in the study area is aerosol

with sandy and loamy sand texture and a high percolation rate. One hundred (100) Anak 2000 day old chicks (DOC) were used for this research work. Before the arrival of the chicks, the pens were cleaned, washed and disinfected with antiseptic liquid (Dettol). Three days to the arrival of the chicks to the pens after brooding fresh dry saw dust was spread on the floor to serve as litter material. Two days before the arrival of the day old chicks, the brooding pen was arranged. Heat and light sources were provided using 200 watts electric bulb but in case of electric failure, a rechargeable lantern and a kerosene stove were used to supply light and heat for the chicks. The birds were vaccinated with Gumboro and Lasorta vaccine at the required age of vaccination.

Phytogenic plants leaves i.e. *Azadiracta indica*, *Guerra senegalensis* and *Commiphora kerstingii* were harvested fresh and subjected to manual extraction. Exposure to sunlight was avoided to prevent the loss of active components. The leaf extract was obtained by cutting one kilogram of fresh leaves each of the phytogenic plants, the leaves were separated from the stalk, washed, drained, chopped and pound in a mortar. After which, it was further squeezed with hand to get the deep green extract which was filtered with filter paper to obtain a homogenous extract. The different phytogenic plants leaf extracts were add to the drinking water of the birds at 5% per liter each of water respectively as their level of inclusion (0ml liter of water) served as the control. The experimental diets include; treatment 1 control (0% medicinal plant, keprocyll is given in drinking water), treatment 2 (neem leaves extract), treatment 3 (*Guerra senegalensis* leaves extract) and treatment 4 (*Commiphora kerstingii* leaves extract). Formulated broiler starter and finisher were given to the birds at the starter and finisher respectively. The diets were isocaloric and isonitrogenous. The percentage composition of the experimental diets is shown in Table 1 and 2 for broiler starter and finisher respectively. After the brooding

period for one week (7 days) the chicks were weight and assigned to 4 experimental treatments. Each of the treatment was replicated five times in a completely randomized design (CRD). The birds were weighed at the beginning and end of the experiment. Fresh, clean water and feed were supplied adlibitum. Data on daily feed consumption, daily weight gain, feed conversion ratio and economics of production based on the prevailing market conditions at the time of the experiment were recorded. All the data obtained were subjected to analysis of variance for completely randomized design (Steel and Torrie, 1980) using Mini tab analysis software. Where statistical significance was observed, the means were compared using the Duncan's New Multiple Range Test (Duncan's 1955).

RESULTS AND DISCUSSION

Table 1 and 2 showed the percentage composition of the experimental diets for broiler starter and finisher respectively and the crude protein and Metabolizable energy were adequate for broiler chickens in the tropics (Aduku, 2004). The carcass weight of broilers fed different phytogenic plants is shown in Table 3. Results showed that the live weight of birds fed phytogenic feed additives was significantly affected across the treatments ($P < 0.05$) this is in agreement with the earlier reports of Jacela *et al.*, 2010 and ToshiWati *et al.*, 2015 that phytogenic feed additives improve performance of livestock and poultry. The highest live weight was obtained on birds fed *Commiphora kerstingii* (1450.00g) (Table3). The slaughter weight (78.75-85.94%), pluck weight (55.00-67.50%) and dressed weight (51.00-63.51%) followed the same trend being higher in birds fed phytogenic feed additives than the control diet ($P < 0.05$) with higher values in birds fed *Commiphora kerstingii*. The increase in the carcass yield of the broiler chicken was also observed by Zeinab (2003) who reported increase in carcass yield of broilers when fed with *Eruca sativa* supplemented diet.

Abdel (2006) in case of *Trigonella foenum graecum*, Sultan *et al.*, 2009 in case of *Allium sativum* and Javed *et al.*, 2009 reported that carcass characteristics and yield improved in broiler chickens fed with different levels of aqueous extract of *Zingiber officinale*. The cuts of parts of broilers fed phytogetic feed additives were affected by the different types of phytogetic plants ($P < 0.05$) with higher values in plant fed phytogetic leaf extracts. The gut characteristics of broiler chickens fed different types of phytogetic extract is shown in table 4. Results showed that liver weight was significantly higher in broilers fed neem extract (1.88) and this can be attributed to chemicals present in the liver such as

azandiractin, nimbin, nimbinene, 6-desacetylnimbiene, nimbandiol, nimbolide and quercetin (Mitra *et al.*, 2000) which are known to affect metabolism. The abdominal fat was highest in broilers fed neem leaf extract (1.26%) which is an indication of poor meat quality (Medugu *et al.*, 2010). Similarly gizzard weight was relatively higher in broilers fed neem leaf extract ($P < 0.05$) than those fed control diet and phytogetic leaf extracts. Other gut characteristics were statistically similar ($P > 0.05$). The broiler chickens utilized all the medicinal plants like they utilize the commercial additive, commiphora kerstingii gave the best performance.

Table 1: Percentage composition of experimental diets fed to broiler starter age 1-5 weeks of age

Parameters	Control 1	Neem leaves 2	Guairá leaves 3	Commiphora leaves 4
Maize	42.35	42.35	42.35	42.35
soyabean	41.75	41.75	41.75	41.75
Wheat offal	10.00	10.00	10.00	10.00
Fishmeal	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00
Sodium chloride	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
Vitamin mineral premix*	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis (%)				
Crude protein	23.00	23.00	23.00	23.00
Metabolizable energy	2809	2809	2809	2809
Crude fibre	6.25	6.25	6.25	6.25

* Each kilogram contains; vit. A, 10,000,000 IU, vit. D3 2,000,000 IU, Vit. E 23,000mg, Vit. K3 2,000mg, Vit. B1 1,800mg, Panthothenic Acid 7,500mg, Vit. B6 3,000mg, Vit. B12 15mg, Folic acid 750mg, Biotin 11260mg, Choline Chloride 300,000mg, Cobalt 200mg, Copper 3,000mg, Iodine 1,000mg, iron 20,000mg, Manganese 40,000mg, Selenium 200mg, Zinc 30,000mg, Antioxidant 1,250mg

Table 2: Percentage composition of experimental diets fed to broiler finisher age 5-8 weeks of age

Parameters	Control 1	Neem leaves 2	Guerra leaves 3	Commiphora leaves 4
Maize	58.71	58.71	58.71	58.71
soyabean	22.29	22.29	22.29	22.29
Wheat offal	15.00	15.00	15.00	15.00
Fishmeal	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00
Sodium chloride	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
Vitamin mineral premix*	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis (%)				
Crude protein	20.00	20.00	20.00	20.00
Metabolizable energy	2860	2860	2860	2860
Crude fibre				

*Each kilogram contains Vit A 3600, 000 IU. Vit. D3 600.000 IU. Vit E 4.000.000mg. Vit B1-B6 640, 1600, 600, 4.00mg. Panthothenic acid 2000mg, Biotin 300mg. Manganese 16000mg. Manganese 16000mg. Selenium 80mg. Vit. K3 600mg. Cobalt 80mg. Copper 1200mg. Zinc 12,000mg. Folic acid 200mg. Choline chloride 700000mg. Antioxidant 500mg.

Table 3: Carcass characteristics of broilers fed phytogetic leaf extract to broiler chickens

Parameters	Control 1	Neem leaves 2	Gueiria leaves 3	Commiphora leaves 4	SEM
Live weight (g)	1050.00 ^d	1200.00 ^c	1350.00 ^b	1450.00 ^a	*46
Slaughter weight (g)	78.75 ^b	82.86 ^a	84.57 ^a	85.94 ^a	*6.28
Pluck weight (g)	55.00 ^b	65.00 ^a	60.77 ^a	67.50 ^a	*6.28
Dressed weight %	51.00 ^b	61.00 ^a	56.78 ^b	63.51 ^a	*7.28
Wings %	6.69	8.48	6.74	7.66	*3.29
Thigh %	16.96 ^b	18.24 ^a	15.31 ^b	19.70 ^a	*4.25
Breast %	12.24	12.48	10.76	14.51	*3.25
Back %	2.78	3.28	2.64	2.90	*2.31
Neck %	4.30 ^b	4.63 ^b	2.76 ^b	7.01 ^a	*2.89
Chest %	4.57	4.45	4.29	5.70	*2.45

SEM=Standard error of means, NS= Not significant. Means bearing different superscripts within the same row are statistically different (P<0.05)

Table 4: Gut characteristics of broilers fed phytogetic leaf extract to broilers

Parameters	Control 1	Neem leaves 2	Gueiria leaves 3	Commiphora leaves 4	SEM
Initial weight (g)	106.23	106.50	105.90	106.67	NS
Final weight (g)	1050.00 ^d	1200.00 ^c	1350.00 ^b	1450.00 ^a	*46
Liver	1.81 ^a	1.88 ^a	1.83 ^a	1.63 ^b	*0.23
Abdominal fat %	0.37 ^b	1.26 ^a	0.83 ^b	0.42 ^b	*0.45
Gizzard	2.12	2.81	1.72	1.77	*0.45
Drumstick	6.06	6.94	6.20	7.56	NS
Small intestine %	0.84	1.38	1.37	2.14	NS
Large intestine %	106.48	108.60	107.28	107.00	NS

SEM=Standard error of means, NS= Not significant. Means bearing different superscripts within the same row are statistically different (P<0.05)

CONCLUSION

Considering the result of this study, it can be concluded that out of the three medicinal plants, *Commiphora kerstingii* gave the best performance.

RECOMMENDATIONS

Commiphora kerstingii is recommended as source of additive for broiler production in the tropics; this will provide availability of the materials since they are sourced locally in the environment and reduce the cost of production.

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