Global Journal of Science Frontier Research: D
Agriculture and Veterinary
Volume 20 Issue 8 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Influence of *Ageratum Conyzoides* Leaf Extract on the Growth Performance and Meat Physical Characteristics of Poultry Birds

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GJSFR-D Classification: FOR Code: 630106

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Keywords: ageratum conyzoides, plant extract, growth performance, physical properties, broiler and cockerel chicks.

I. Introduction

Poultry production is a source of income, it is a good source of protein and quick returns on investment (Kekocha, 1994). However, the industry in the developing countries is facing some challenges; these challenges include improving bird performance and increase in the cost of feed because of high prices of feed ingredients (Abbas, 2013), and preventing outbreak of diseases. Numerous attempts have been made to overcome these challenges, and one of them involves the use of antibiotics feed promoters.

Antibiotics have revolutionized the human medical world and are still often seed as the magic bullets to target pathogens without harming human body. In last decades the use of antibiotics has been increasingly used in farm animals as well, to treat diseases, to prevent diseases and to promote growth. Despite the improvement the use of antibiotics growth promoters has been criticized due to its possible residual effects and building up of antimicrobial resistance in humans (Barreto*et al*., 2008, Ogbe & John, 2012). The uses of chloramphenicol have resulted into bacteria of the genus Salmonella developing resistance to the drug (Gassner & Wuethrich, 1994). The use of Avilamycin as a growth promoter resulted in an occurrence of avilamycin resistant *Enterococcus faecium* in broiler farms (Aarestrup *et al*., 2000).

The utilization of plants and leave extracts in animal production has found widespread scientific and commercial acceptance as a strategy to reduce or replace totally the over dependence on antibiotics growth promoters and to improve the health status and performance of the animal (Nworgu, 2007). Leave extract also have appetizing and digesting stimulating properties and antimicrobial effects. Leaf and their extracts supply minerals, proteins and vitamins which could complement the inadequacies of most feed stuffs (Ifon and Basir, 1980). Ageratum conyzoides L., Asteraceae, is an annual herbaceous plant with a long history of traditional medicinal uses in several countries of the world as medicinal plant and also has bioactivity with insecticidal and nematocidalacitivity. This tropical species appears to be a valuable agricultural resource (Ming, 1999). A. conyzoides is widely utilized in traditional medicine by various cultures worldwide, although applications vary by region. In Central Africa it is used to treat pneumonia, but the most common use is to cure wounds and burns. Aqueous extracts of leaves or whole plants have been used to treat colic, colds and fevers, diarrhea, rheumatism, spasms, or as a tonic (Negrelle *et al*. 1988; Oliveira *et al*. 1993). Amadi*et al*. (2012) revealed the presence of alkaloids, flavonoids, tannins, saponins, and cyanic acid (HCN) in *Ageratum conyzoides.* Pure isolated alkaloids and their synthetic derivatives have been used as analgesic, antispasmodic and bactericidal agent. Flavonoids according have shown antibacterial, anti-inflammatory, antiallergic, anti-mutagenic, and antiviral, anti-thrombotic and vasodilatory activity (Amadi *et al*., 2012). They also have the ability to scavenge hydroxyl radicals, super oxide anions and lipid peroxy radicals (Okwu, 2004). The

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antimicrobial activity of *Ageratum conyzoides* leaf could be due to the abundant presence of alkaloids and flavonoids. Other flavonoid constituents such as aurone, chalcone, flavonoids, flavone, flavonol and leucoanthocyan in of *Ageratum conyzoides* may have aided to the antibacterial activity of the plant. Tannins have astringent properties, hasten the healing of wounds and inflamed mucous membrane (Okwu and Okwu,). Studies have shown that saponins and tannins although nontoxic, can generate adverse physiological responses in animals that consume them and could be attributed to the use of *Ageratum conyzoides* in treating wounds, prevention of blood loss. They exhibit cytotoxic effect and the growth inhibition against a variety of cell making them have anti-inflammatory and anticancer properties. They also show tumour inhibiting activity in animals (Iwu, 1989).

While there have been reports on the efficacy of some leaf extracts on the performance of broilers, providing some protection against bacteria and stimulate the immune system (Craig, 1999), however, data on the effects of A. conyzoides leaf extract on growth performance and meat physical properties of poultry chickens is limited. The objective of this study was, therefore, to determine the effect of A. conyzoides leaf extracts on growth performance and meat physical characteristics of broiler and cockerel chicks.

II. Materials and Methods

a) Plant collection and extraction

The leaves of A. conyzoides was collected from around the Kwara state polytechnic Ilorin, Kwara state, Nigeria. Taxonomic identification of the plant was carried out in the University of Ilorin, faculty of agriculture, Agronomy unit Research and Teaching laboratory. The leaves were wash and dried under shade and later oven dried to 15% moisture content. The oven dried leaves was pulverized with a blender and 25mm mesh diameter sieve was used to obtain the fine dust, 500g of the oven dried leaves was extracted in 2liter 97% ethanol. The extraction lasted for 72hours in a shaker, the extract was concentrated to a paste using rotary evaporator. At the end of the extraction 65.2g leave extract was obtained.

b) Mixing and administration of Ixora root extract

50g of the extract was mixed in 10 percent per volume of DNSO (dimethyl sulphide). That is, 50g in 60mls of DNSO followed by 540mls of distilled water in a jar. The mixture was shaken vigorously until homogenous mixture was obtained.

One hundred and five (105) each of day old broiler and cockerel chick was allocated to five treatments, 3 replicate per treatment and seven (7) birds per replicate. 1mls, 2mls, 3mls, and 4mls of the extract formulation was administered per a liter of drinking water to treatment R1, R2, R3, and R4 respectively for three days in a week, while antibiotic was given at 1gm/liter of water to the control treatment. The administration lasted for five weeks. The birds were given one week withdrawal periods before data were collected.

c) Animal management

Water and feed were provided ad libitum throughout the experimental period. Ventilation and heat were provided and adjusted according to standard broiler management procedure (Oluyemi and Roberts, 2000).

d) Growth Performance characteristics

Total weight gain (TWG) and total feed intake (TFI) was recorded at the end of the experimental trial, the feed conversion ratio (FCR) was calculated from result of weight gain and feed intake.

e) Physical Properties

The birds were fasted over night for 12hours (without feed but with water). Two chicks were randomly selected from each replicates, slaughtered, bled properly, de-feathered, eviscerated to remove the internal organs and the carcass was cut is into primal cut. Meat fillet of equal weight are severed from the breast meat which was used for the physical properties determination.

Cooking loss: meat fillet were weighed tied in a nylon bag and cook in water for 20min at 100°c to an internal temperature at 70°C.

$$\text{Cooking loss} = \frac{\text{weighed before cooking-}}{\text{weight after cooking}} \times 100 \quad \text{Weight before cooking}$$

Thermal shortening: the length of meat fillets were measured prior to cooking and after cooking. The cooked meat was allowed to cool to room temperature and the length measure again.

$$\% \text{ shortening} = \frac{\text{length before cooking-}}{\text{length after cooking}} \times 100 \text{ Length before cooking}$$

Cooking yield: this was obtained by difference between 100% and percentage cooking loss of each meat samples.

Cooking yield =100%-cooking loss

Water holding capacity: 1g of meat sample placed in two filter papers and pressed into two plexi glasses for a minute.

$$\text{W H C} = \text{water area} - \frac{\text{meat area} \times 100}{\text{Water area}}. \quad \text{(Mahendraker}\textit{etal}\text{., 1988).}$$

f) Statistical analysis

Data generated from this experiment were organized and processed for analysis of variance in completely randomized design (CRD) using (SAS, 1998) Duncan's Multiple Range Test (Duncan's, 1955) was computed to compare the difference among the treatment means at probability of (0.05).

III. Results and Discussion

Table1: Performance Characteristics of Broiler Chicks fed *A. conyzoides* leaf extract

Performance Characteristic	Control (1g antibiotic/L of water)	*A. Conyzoides* leaf extract (ml/L of drinking water)				F_{value}	sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4(4ml)		
TWG	2890.20±9.62	2889.20±1.41	2888.50±33.03	2891.90±22.39	2892.20±12.73	0.006	1.00
TFI	838.30±14.28^{ab}	798.90±39.1^{b}	788.50±21.50^{b}	886.50±9.76^{a}	873.10±12.73^{a}	6.219	0.04
FCR	3.45±0.50^{ab}	3.62±0.18^{a}	3.67±0.04^{a}	3.26±0.07^{b}	3.36±0.04^{b}	5.594	0.04

TWG=total weight gain TFI=total feed intake FCR=feed conversion ratio

Table 2: Performance Characteristics of Cockerel Chicks fed *A. conyzoides* leaf extract

Performance Characteristic	Control (1g antibiotic/L of water)	*A. Conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4(4ml)		
TWG	1151.54±36.77	1153.10±29.7	1200.34±18.69	1159.10±22.63	1141.57±27.15	1.352	0.37
TFI	293.87±29.69	306.02±41.05	355.23±31.36	330.43±41.05	330.43±26.88	0.985	0.49
FCR	3.52±0.50	3.77±0.68	3.79±0.10	3.26±0.13	3.45±0.21	0.752	0.59

TWG=total weight gain TFI=total feed intake FCR=feed conversion ratio

Table 3: Meat Physical Characteristics of Broiler Chicks fed *A. conyzoides* leaf extract

Performance characteristics	Control (1g antibiotic/L of water)	*A. conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4 (4ml)		
Cooking loss	28.57±0.01^{c}	32.32±0.03^{b}	32.60±0.28^{b}	32.53±0.06^{b}	33.33±0.47^{a}	133.87	0.000
Cooking yield	71.43±0.11^{a}	67.68±0.03^{b}	67.40±0.28^{b}	67.43±0.12^{b}	66.67±0.47^{c}	110.37	0.000
Thermal shortening	42.01±1.89^{a}	27.27±0.38^{c}	31.70±0.42^{b}	32.04±0.47^{b}	31.40±0.57^{b}	66.90	0.000
Shrinkage	51.59±1.54^{a}	41.82±1.41^{b}	51.58±0.48^{a}	52.73±1.03^{a}	51.63±0.04^{a}	35.81	0.001
Water holding capacity	43.20±3.11^{b}	27.90±2.83^{c}	55.25±0.14^{a}	54.90±5.66^{a}	55.60±7.07^{a}	14.62	0.007

Table 4: Meat Physical Characteristics of Cockerel Chicks fed *A. conyzoides* leaf extract

Performance characteristics	Control (1g antibiotic/L of water)	*A. conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4 (4ml)		
Cooking loss	29.91±0.01^{a}	22.96±0.06^{b}	22.29±0.13^{b}	22.85±0.07^{b}	22.83±0.04^{b}	928.41	0.000
Cooking yield	70.09±0.14^{b}	77.04±0.98^{a}	77.71±0.10^{a}	77.15±0.01^{a}	77.17±0.14^{a}	94.74	0.000
Thermal shortening	57.15±0.07	57.86±0.08	57.14±0.17	56.99±0.00	57.20±0.21	98.57	0.000
Shrinkage	46.23±0.18^{e}	53.33±0.18^{b}	49.15±0.21^{d}	50.00±0.00^{c}	53.85±0.07^{a}	850.68	0.000
Water holding capacity	58.75±0.06^{b}	67.33±0.14^{a}	68.23±0.16^{a}	66.94±0.06^{a}	67.23±0.33^{a}	107.68	0.000

IV. Results and Discussion

The results of growth performance characteristics of broiler and cockerel chicks fed extract of *Ageratum conyzoides* were presented in table 1 and 2 respectively. The growth performance characteristics evaluated for includes total weight gain (TWG), total feed intake (TFI) and feed conversion ratio (FCR). There was no significant effect (P>0.05) on the total weight gain of broilers fed *A. conyzoides* compared to control treatment. While addition of the extract had effects (P>0.05) on the total feed intake and feed conversion ratio. An increasing trend was observed in feed intake and feed conversion with an increase level of *A. conyzoides* extract, treatment R4 and R3 performed better than R2, R2 and the control respectively. The extract has no effect (P>0.05) on the growth performance (TWG, TFI and FCR) of cockerel chicks. The results of this study is in accordance with Sarag *et al.* (2012) who achieved highest body weight gain, feed consumption and feed conversion ratio as compared to the control treatment when offered Neem leaf extract to broiler from week one to week five of age. Almagboul *et al.* (1985) using methanolic extract of *A. conyzoides* reported the inhibitory action in the development of *Streptococusaureus, Bacillus subtilis, Eschericichia coli* and *Pseudomonas aeruginosa*. The inhibitory effect might have modify the gut performance thereby, improving performance of the birds. Kumara *etla*. (2007) reported a significant increase in the performance of broilers fed with turmeric powder which support the result obtained in this study. The better performance in broiler and cockerel fed *A. conyzoides* extract could be due to its diversified effect on intestinal micro flora, thereby avoiding stressful conditions. Onyimonyi *et al*. (2007) reported the performance of birds supplemented with papaya showed significant better results compared to control treatment.

There was significant effect *A. conyzoides* leaf extract on physical characteristics of broiler chicks. The cooking loss performed better in treatment R4 compared to treatment R3, R2 and R1, while it was low in the control group. The thermal shortening is low in the treatments which are better compared to the control. The water holding capacity and meat shrinkage was high in treatment R4, R3 and R2 compared to R1. The meat of cockerel was differently affected, the cooking loss was low in all *A. conyzoide* streatment, given the meat a retention and firmness toward heat treatment compared to control treatment. The cooking yield was inversely affected with all *A. conyzoide* streatments yielding better than the control. The thermal shortening of cockerel meat was not affected. The leaf extract affected shrinkage and water holding capacity positively, showing better shrinkage and better water retention capacity than the control. Report have shown that *A. conyzoides* shows the presence of protein noted for repair and replacement of worn out tissues, connective tissues and collagens (Onwuka, 2005). This might have resorted in the better performance of meat from both the broiler and cockerels used in this study. The amino acid profile of *A. conyzoides* leaf extract has shown to contains glycine which is important in the manufacture of haemoglob in and cytochromes, prolineis which aids in the formation of connective tissues and heart muscle, cysteine which contributes to tissue antioxidant actions, leucine plays a role in reduction of muscle protein breakdown and lysine which enables muscle tissues to use oxygen more efficiently hence delay fatigue (Amadi *et al*., 2012). These attributes of *A. conyzoides* might have contributed to the uniqueness of meat from broiler and cockerel chicks.

V. Conclusion

The inclusion of *A. conyzoides* leaf extract in drinking water has been effective in the growth performance and meat physical characteristics of broiler and cockerel chicks. However, treatment R3 and R4 with 3ml and 4ml inclusion level respectively performed better in the study. Further researches are essential to assess the medicinal, pharmaceutical activity and nutritional assay of animal fed *A. conyzoides* extract.

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