

PERSICARIA ODORATA LEAF EXTRACT AS ALTERNATIVE TO ANTIBIOTICS: EFFECT ON THE GROWTH PERFORMANCE OF BROILER CHICKS

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Abstract: This research was carried out to investigate the effect of *Persicaria odorata* leaf extract on the growth performance of broiler chicks. Three hundred one day-old broiler chicks (Ross 308) were randomly distributed into five groups (6 replicates with 10 birds each). Birds were fed basal diet which was formulated according to the requirement of broilers. Broilers in group A was given basal diet without *Persicaria odorata* leaf extract, group B - Basal diet with 2 mL *Persicaria odorata* leaf extract per liter of water; group C - Basal diet with 4 mL *Persicaria odorata* leaf extract per liter of water; group D - Basal diet with 6 mL *Persicaria odorata* leaf extract per liter of water and group E - Basal diet with 8 mL *Persicaria odorata* leaf extract per liter of water. Animals had unrestricted access to feed and water throughout the 28 days experimental period. Qualitative analysis of *Persicaria odorata* leaf extract revealed the presence of flavonoids, phenolic compounds, tannins, alkaloids and saponins. Final body weight values which varied from 877.7 - 1050.9 g/b was higher in group D and E, intermediate in group B and C and lower in group A ($p < 0.05$). Total feed consumption (1751.3 - 1780.9 g/b) were not significantly ($p > 0.05$) affected by the treatment. Best feed conversion ratio was recorded among birds in group D and E relative to the other groups ($p < 0.05$). In conclusion, feed broiler chicks *Persicaria odorata* leaf extract contains several essential phyto-components and could be included up to 8.0 mL/liter of water without causing any negative effect on their performance.

Keywords: Broilers; Growth; Performance; Requirement; *Persicaria odorata*; Phyto-components

1 INTRODUCTION

Sub-therapeutic use of antibiotics as growth promoters in animal feed has received widespread concern and even been banned from use in many countries due to the increase in cases of antimicrobial resistance, possible presence of toxic residues in animal products as well as environmental pollution [1]. Presently, plant-based natural therapies are of increased popularity, because consumers are becoming aware of concerns regarding synthetic additives as well as the dangers of antibiotic use. *Persicaria odorata* is a potential herbal plant belonging to the family Polygonaceae. The plant is a tender perennial herb native to Southeast Asia and it grows in wet environments with a rich, moist soil shady places [2]. The taste of *Persicaria odorata* leaves and essential oils has been described as being pungent and spicy, and its smell is similar to coriander with hints of a lemon scent [3,4].

Persicaria odorata are used as traditional herbs to treat fever, nausea, promoting hair growth, swelling, gastrointestinal problems, headache, inflammations and treat wounds, sores and ulcers [5,6]. The plant parts (stem bark, roots and leaves) are rich in phytochemicals such as, phenolic compounds, flavonoids, tannins, alkaloids, saponins amongst others which show antimicrobial, antiviral, antifungal, hepato-protective, gastro-protective, anti-inflammatory, antitumor, immune-stimulatory and antioxidant activities [7]. Extracts from the leaves of *Persicaria odorata* have been reported to inhibit the activities of *Salmonella choleraesuis*, *Enterococcus faecalis*, *Enterococcus faecium*, *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Bacillus cereus* and *Listeria monocytogenes* [8,9].

Previous studies have shown that plant extracts can help to prevent and control gastrointestinal pathogens and/or improve the performance and productivity of production animals through different mechanisms [10,11]. They is however, little or no report on the effect of feeding *Persicaria odorata* leaf extract on the growth performance of broiler chicks. In order to harness the potential benefits of *Persicaria odorata* and promote them as viable alternatives to antibiotic growth promoter, their quality, safety, efficacy and optimum level must be investigated.

Therefore, this research was carried out to ascertain *Persicaria odorata* leaf extract as alternative to antibiotics: effect on the growth performance of broiler chicks.

2 MATERIALS AND METHODS

2.1 Description of Experimental Site and Ethical Approval

The poultry section of Audu Bako College of Agriculture, Dambatta, Kano state, Nigeria was used for the experiment and all experimental guidelines and procedures were approved by the ethics committee at the Department of Animal Health and Husbandry of the same institution with reference number AD/009/2024.

2.2 Collection and Processing of *Persicaria Odorata* Leaf Extract

Fresh leaves of *Persicaria odorata* were harvested within the premises of Audu Bako College of Agriculture, Dambatta and authenticated at the department of Crop production of the same institution. Thereafter, it was spread on a plastic tray and air dried for 12 days. On the 13th day, dried leaves of *Persicaria odorata* was grinded into powder using an electric blender. 100 grams of powdered *Persicaria odorata* leaf was soaked into 500 mL of distilled water and heated on a hot plate at 30°C with continuous stirring for 10 minutes and kept for 48 hours and passed through Whatman qualitative filter paper No. 1 for filtration. After filtration, extracts was kept in a refrigerator set at 4°C, awaiting further analysis.

3 QUALITATIVE EVALUATION OF PHYTO-COMPONENTS IN PERSICARIA ODORATA LEAF EXTRACT

3.1 Test for Tannins

One milliliter of aqueous iron III chloride was added to 2 ml of *Persicaria odorata* leaf extract in a test tube. The sample was shaken for 2 minutes. A visual check for the development of a blue-green colour indicated the presence of tannins.

3.2 Test for Saponins

Two milliliters of distilled water was added to 2 ml of *Persicaria odorata* leaf extract and shaken thoroughly for 30 seconds. The formation of foam indicated the presence of saponins.

3.3 Test for Flavonoids

To 2 ml of *Persicaria odorata* leaf extract, 1 ml of diluted ammonia was added and mixed after which 1 ml of concentrated H₂SO₄ was subsequently added. There was no incubation condition due to the instantaneous colour development. A visual check for the development of a yellow colouration indicated the presence of flavonoids.

3.4 Test for Alkaloids

To 2 ml of *Persicaria odorata* leaf extract, 1 ml of 10 % potassium iodide was first added and mixed. Immediately, 2 drops of iodine solution were added to each and mixed for 1 min. A visual check for the development of a red or brown colouration indicated the presence of alkaloids.

3.5 Test for Phenols

To 2 ml of *Persicaria odorata* leaf extract, 1 ml of 1 % of sodium hydroxide was added and mixed for 1 min. No incubation condition as the colour development is instantaneous. A visual check observing the development of a red colouration indicated the presence of phenols.

4 ANIMAL MANAGEMENT AND EXPERIMENTAL DESIGN

Three hundred one day-old broiler chicks (Ross 308) of mixed sex were sourced from a reputable hatchery in Kano State and transported very early in the morning to the poultry section at Audu Bako College of Agriculture, Kano. On arrival to the farm, chicks were unboxed and weighed using a digital to obtain their average initial body weight. The birds were randomly distributed into five groups (6 replicates with 10 birds each) and placed in already disinfected battery cage. Birds were given glucose and vitamins for 3 days and also fed basal diet was formulated according to the requirement of broilers [12] presented in Table 2. Birds were given ad libitum access to feed and water throughout the 42 days experimental period. Vaccines were administered according to the prevailing disease condition in the institution (Table 3). A completely randomized experimental design was adopted for the experiment and the experimental group received the following:

Group A - Basal diet without *Persicaria odorata* leaf extract

Group B - Basal diet with 2 mL *Persicaria odorata* leaf extract per liter of water

Group C - Basal diet with 4 mL *Persicaria odorata* leaf extract per liter of water

Group D - Basal diet with 6 mL *Persicaria odorata* leaf extract per liter of water

Group E - Basal diet with 8 mL *Persicaria odorata* leaf extract per liter of water

4.1 Growth Performance Parameters Determined during the 42 Days Experimental Period

Chicks were weighed at the start and end of the experiment and body weight gain was calculated as the difference between the final body weight and initial body weight. Average daily weight gain was estimated by dividing the body weight gain by the duration of experiment in days. The total amount of feed consumed per bird was determined as the difference between the feed offered and refused. Average daily feed consumed was determined by dividing the total feed consumed by the duration of experiment in days.

4.2 Proximate Evaluation of Experimental Diet

Proximate content of experimental diet was carried out using methods outlined by AOAC (2000).

4.3 Statistical Analysis

Data collected on growth performance was subjected to one-way analysis of variance (ANOVA) using SPSS version 25. The differences among the treatment means were determined ($P < 0.05$) by Duncan multiple range test of the same software.

5 EXPERIMENTAL RESULTS

Qualitative analysis of phyto-components in *Persicaria odorata* leaf extract is presented in Table 1. Results obtained showed the presence of phenols and flavonoids as the major phyto-components followed by alkaloids, saponins and tannins in that order. These compounds possess medicinal properties; anti-inflammatory, antioxidant, antimicrobial, hypolipidemic, immune-stimulatory, antiviral, anti-fungal, anti-helminthic, amongst others [13,14]. Species, age of plant, method of extraction, processing method and geographical location could influence the concentrations of phyto-components in medicinal plants [15,16]. Phenolic compounds have strong antioxidant activities and can prevent the body against disease and infections [17,18]. They can also inhibit the activities of pathogens and support the proliferation of beneficial bacteria's in the intestinal flora of animals [19,20]. Flavonoids can prevent heart disease by lowering dietary cholesterol and antibacterial properties [21,22]. According to [23,24], saponins have gastro-protective, anti-cancer and anti-helminthic activities. Tannins and alkaloids have been reported have anti-bacterial, immune-modulatory and antidiarrheal activities [25,26]. The presence of alkaloids in plant makes it useful for the treatment of fever, malaria, stomach ache, tooth ache amongst others [27,28]. Result obtained in this study is in agreement with the reports of Starkenmann et al. [29]; Chotinantakul and Srichairatanakool; Nguyen et al. [30].

Table 1 Qualitative Analysis of Phyto-Components in *Persicaria Odorata* Leaf Extract

Phyto-components	Outcome
Phenols	+++
Tannins	+
Flavonoids	+++
Saponins	+
Alkaloids	++

+Present, ++moderately present, +++highly present

Ingredient and chemical composition of experimental diet (Table 2) revealed that crude protein (23.11 %), crude fibre (3.40 %), ether extract (3.50 %), calcium (1.43 %), phosphorus (0.61 %) and metabolizable energy (2903.3 Kcal/kg). These values are in line with the recommendation of NRC for broilers [12].

Table 2 Ingredient and Chemical Composition of Experimental Diet

Ingredients	Starter mash (0-28 d)
Maize	50.00
Wheat bran	5.80
Groundnut cake	10.00
Soya bean	24.00
Fish meal	6.00
Di-calcium phosphate	2.50
Limestone	1.20

DL-methionine	0.25
Lysine	0.25
*Mineral-vitamin premix	0.25
Salt	0.30
Total	100.0
Chemical composition	
Crude protein	23.11
Crude fibre	3.40
Ether extract	3.50
Calcium	1.43
Phosphorus	0.61
Metabolizable energy (kcal/kg)	2903.3

*2.5 kg Mineral/vitamin premix for starter contains: Vit. A, 12000000 IU; Vit.D3 1800000 IU; Vit.E, 15000 mg; Vit.K3, 1000 mg; Vit.B1, 1200 mg; Vit.B2, 5100 mg; Vit. B6, 1500 mg; Vit.B12, 10mg; biotin, 50mg; pantothenic acid, 10000 mg; nicotinic acid, 30000 mg; folic acid, 1000 mg; choline chloride, 250000 mg; Mn, 60000 mg; Zn, 50000 mg; Fe, 30000 mg; Cu, 10000 mg; I, 1000 mg; Se, 100mg; Co, 100mg

Table 3 Vaccination Schedule for Broilers Reared for 28 days

Vaccines	Date of administration (in days)	Route of administration
Newcastle disease vaccine (Lasota) 1 st dose	5	Oral
Gumbroro vaccine (1 st dose)	9	Oral
Newcastle disease vaccine (Lasota) 2 nd dose	13	Oral

Effect of *Persicaria odorata* leaf extract on the growth performance of broiler chickens for 28 days is presented in Table 4. Final body weight of birds in group B (basal diet with 2 mL *Persicaria odorata* leaf extract per liter of water) was similar ($p>0.05$) to those in group C (basal diet with 4 mL *Persicaria odorata* leaf extract per liter of water). Similarly, final weights of birds in group D (6 mL *Persicaria odorata* leaf extract per liter of water) and group E (8 mL *Persicaria odorata* leaf extract per liter of water) were non-different ($p>0.05$) but significantly higher ($p<0.05$) than other treatments. Values were highest in group D and E, intermediate in group B and C and lowest in group A (control; without *Persicaria odorata* leaf extract). These result suggests that feeding birds *Persicaria odorata* leaf extract at 6 mL and 8 mL significantly influenced the activities of digestive enzymes in the gut for better utilization of nutrients in birds. Though birds that received 4 mL and 6 mL were also influenced but were significantly lower than those in group D and E. This implies that 2 mL and 8 mL are the optimum level required by birds. The modulation of these digestive enzymes could be attributed to the synergy in the activities of phyto-components (Muritala et al., 20220. Results obtained was similar to those reported by Musa *et al.* [31] when *Balanites aegyptiaca* and *Alchornea cordifolia* stem bark mixture was fed to broiler chicks. Alagbe et al. [32] also recorded a final body weight (800.7 - 1090.2 g/b) for chicks fed *Albizia lebbbeck* stem bark aqueous extract. Total feed consumed were not affected ($p>0.05$) by the treatment, values obtained varied from 1751.3 - 1780.9 g/bird. Result obtained was contrary to the reports of Alagbe when *Prosopis africana* stem bark was fed to broiler chicks[33]. Shittu et al. recorded a higher feed intake (1366.0 - 1800.7 g/b) among broilers fed *Sida acuta* leaf extract. The variation in results could be attributed to the nature of phyto-components in test ingredients, dose administered as well as method of extraction [34].

Table 4 Effect of *Persicaria Odorata* Leaf Extract on the Growth Performance of Broiler Chickens for 28 days

Variables	A	B	C	D	E	SEM
Initial body weight (g/bird)	47.18	47.11	47.09	47.02	47.01	0.02
Final body weight (g/bird)	877.7 ^c	1061.3 ^b	1061.3 ^b	1046.7 ^a	1050.9 ^a	61.23
Body weight gain (g/bird)	830.52 ^c	1014.2 ^b	1014.2 ^b	1049.6 ^a	1051.8 ^a	56.08
Average daily weight gain	29.66	36.22	36.22	37.70	37.85	0.02

(g/bird)						
Total feed consumption	1751.3	1770.1	1775.3	1778.2	1780.9	72.11
(g/bird)						
Average daily feed consumption (g/bird)	62.54	63.22	63.40	63.50	63.60	0.03
Feed conversion ratio	2.10 ^a	1.74 ^b	1.74 ^b	1.69 ^c	1.69 ^c	0.01

Means in the same row with different superscript letters are significantly different ($p < 0.05$); Group A - Basal diet without *Persicaria odorata* leaf extract; Group B - Basal diet with 2 mL *Persicaria odorata* leaf extract per liter of water; Group C - Basal diet with 4 mL *Persicaria odorata* leaf extract per liter of water; Group D - Basal diet with 6 mL *Persicaria odorata* leaf extract per liter of water; Group E - Basal diet with 8 mL *Persicaria odorata* leaf extract per liter of water

6 CONCLUSION

It was concluded that *Persicaria odorata* leaf extract contains numerous essential phyto-components with therapeutic properties that are safe and effective. This extract can be fed to broiler chicks up to 8 mL per liter without compromising their growth performance.

CONFLICT OF INTEREST

The authors have no relevant financial or non-financial interests to disclose.

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