

GROWTH PERFORMANCE OF COCKEREL OFFERED ORAL ADMINISTRATION OF SOLE AQUEOUS EXTRACTS OF SCENT LEAF AND *Sida acuta*

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ABSTRACT

One hundred and thirty-five 26-day old cockerels were used to evaluate the effects of aqueous leaf extracts of scent leaf and *Sida acuta* on growth performance of starter and grower cockerels. Cockerels were randomly distributed into 5 treatment groups of 3 replicates per group. There were 9 birds in each replicate and 27 birds in a treatment. A corn soybean meal-based diet was the basal diet formulated to contain chick mash (2868.98Kcal/kg and 18.66%CP) and grower mash (2769.71Kcal/kg and 17.48% CP). Oral administration of antibiotics (Gali Fura Care Plus[®]) and coccidiostat (Q-Cox[®]) served as the control. Other treatment groups were offered aqueous leaf extracts of scent leaf at 25ml/l and 50ml/l in drinking water for T1 and T2, respectively. Oral administration of aqueous of *S. acuta* at 20ml/l and 40ml/l were given to the birds in treatment T3 and T4, respectively. The aqueous leaf extract containing 40ml/L of *Sida acuta* had the highest (99.09mg/100g) phytate, (69.94mg/100g) tannins, (96.48mg/100g) flavonoid, (31.49mg/100g) steroid and (36.39mg/100g) terpenoid. In the grower phase, oral administration of aqueous leaf extracts of scent leaf and *Sida acuta* significantly influenced feed conversion ratio ($P=0.033$), with the best (1.90) observed in cockerels offered 25ml/L of scent leaf. It is hereby recommended that aqueous leaf extract of 25 ml/L of scent leaf should be given to cockerels as an alternative to antibiotics and coccidiostat for improved feed conversion ratio.

Keywords: *Sida acuta*, Scent leaf, Aqueous extracts, Antibiotics, Cockerel.

INTRODUCTION

The tremendous increase in global human population has increased the demand for safe animal protein for human consumption. However, antibiotic resistance in livestock and residual effect on human has necessitated the need to reduce the use of antibiotics in poultry production (Anwar *et al.*, 2017). Natural medicinal plants and their extracts as feed supplements have been used as a substitute for antibiotics in poultry production. These herbs and their extracts have growth-promoting and health beneficial roles in poultry (Mahanta *et al.*, 2017). Plant extracts contain bioactive compounds (phytochemicals) which are capable of improving animals' health and performance because of their anti-bacterial (Shittu *et al.*, 2021), antioxidant, antiviral and hepatoprotective properties (Olafadehan *et al.*, 2020), and their ability to modulate gut microbiota (Hashemi *et al.*, 2009) and enhance immune responses (Chowdhury *et al.*, 2018).

Sida acuta is a tiny, erect perennial shrub that is common in Nigerian fields, wastelands, roadside ditches, and open clearings (Akobundu and Agyagwa, 1998). It is called "Udo" in Igbo, "Iyeye" in Yoruba, and "Nsukere" in Efik in Nigeria. Alkaloids (vasicine, cryptolepine, and ephedrine), phenolic compound (scopoletin, evofolin-A and B, 4-ketopinoresinol, and loliolide), polyphenol, flavonoids, coumarins, saponosides, steroids (ecdysterone, -sitosterol, stigmasterol, ampesterol), and tannins have been identified as the main bioactive components of *S. acuta* (Uduchi *et al.*, 2022). The numerous pharmacological profiles of *Sida* plants, including antioxidant, antimicrobial and antibacterial, antiparasitic, antimalarial, cardioprotective, analgesic and anti-inflammatory, antipyretic, hepatoprotective, hypoglycemic, insecticidal, and anticancer activity, have been scientifically studied (Murali and Deepa, 2022).

Scent leaf (*Ocimum gratissimum* L.), also known as African Basil, is a perennial plant in the tropics of Africa and Asia. In Nigeria, it is grown as a decorative, medicinal and vegetable plant. As a result of its fragrant taste, it is often utilized as a spice. It is used to treat a variety of conditions, including diarrhea, gastrointestinal problems, and fever (Edeoga and Eriata., 2001). In Nigeria, it is also used to treat diarrhea and epilepsy (Sofowora, 1993; Edeoga and Eriata., 2001). The liquid from the crushed leaves is used to treat catarrh, stomach discomfort, and convulsions (Ladipo *et al.*, 2010). Studies have demonstrated that the presence of the eugenol, a phenolic component, is what gives fragrance leaf its therapeutic effects (Alexander, 2016).

However, despite the promising benefits of these plants, there is limited scientific evidence regarding their effects when administered as aqueous leaf extracts in the diets of cockerels. Therefore, the current study evaluated the effect of aqueous leaf extracts of scent leaf and *S. acuta* on growth performance of starter and grower cockerels to determine their potential as an alternative to antibiotics and coccidiostat.

MATERIALS AND METHODS

Experimental Site: The experiment was conducted at the Poultry Unit, Teaching and Research Farm, LAUTECH, Ogbomoso.

Collection of the Leaves and Processing of Scent leaf and *Sida acuta* Extracts

Fresh and mature leaves of scent leaf and *Sida acuta* were collected around the Teaching and Research Farm. The leaves were cleaned under running water and sundried for 2 hours daily for 5 days, after which it was pulverized to coarse powder using electric blender. The study adopted modified method of Shittu and Alagbe, (2020). Specifically, *Sida acuta* leaf powder (100g) was soaked in 1L distilled water. After homogenization of the mixture of the leaves with distilled water, it was left for 18 hours. Thereafter, it was sieved with muslin cloth. Fifty grams (50g) of scent leaf powder was soaked in 1L of distilled water. It was homogenized and left for 12 hours based on the method of Nte *et al.* (2017). Thereafter, it was sieved with muslin cloth. The collected aqueous leaf extracts of the *Sida acuta* and scent leaf were kept in the refrigerator until required for supplementation into the drinking water of the experimental birds.

Formulation of experimental treatment

A corn soybean meal-based diet:- Chick and grower diets (%) contained 51.75, 42.00 maize, 18.20, 15.00 SBM, 12.00, 25.45 maize offal, 12.00, 12.00 wheat offal, 2.30, 1.80 fishmeal (72%CP), 2.00, 200 bone meal, 0.25, 0.25 methionine, 0.26, 0.25, 1.00, 1.00 limestone and 0.25, 0.25 salt, respectively. The chick and grower diets contained 2868.98, 2769.71 kcal/kg ME and 18.66 and 17.48% CP, respectively. Oral administration of antibiotics (Gali Fura Care Plus[®]) and coccidiostat (Q-Cox[®]) served as the control. Other treatment groups were offered aqueous leaf extracts of scent leaf at 25ml/L and 50ml/L in drinking water for T1 and T2 respectively. Oral administration of aqueous leaf extracts of *S. acuta* at 20ml/L and 40ml/L were given to the birds in treatment T3 and T4 respectively.

Management of the Experimental birds

One hundred and thirty-five day-old-cockerels were fed basal diet for 26 days prior to the study. Cockerels were randomly distributed into 5 treatment groups of 3 replicates per group. There were 9 birds in each replicate and 27 birds in a treatment. Feed and water were supplied *ad libitum* to the birds.

Experimental design

A Completely Randomized Design (CRD) was adopted for the study.

Initial live weight

Cockerel chicks were weighed to determine the initial body weight on the 26th day of age.

Final live weight

Is the weight of the experimental birds measured at the end of the experimental period. The growth phases were partitioned into starter and grower of 4 weeks respectively. The body weights of the experimental birds at 4th and 8th weeks of the study were the final body weight for the starter and grower respectively.

Weight gain

The difference between the final body weight and initial body weight was calculated to determine the weight gain as follows:

Feed Intake

The feed intake was calculated using the formula

$$\text{Feed intake (gram/bird/day)} = \frac{\text{Quantity of feed supplied} - \text{Feed leftover}}{\text{Number of birds} \times \text{Number of days}}$$

Feed Conversion Ratio

Feed conversion ratio was obtained by dividing the total feed intake with the total weight gain.

$$\text{Feed conversion} = \frac{\text{Total feed intake}}{\text{Total weight gain}}$$

Chemical Analysis

The phytochemical analysis of alkaloids, flavonoids and tannins were done using the methods of Obadoni and Ochuko (2001), Edeoga *et al.* (2005), Obadoni and Ochuko (2001) and Edeoga *et al.* (2005) respectively. Phytate, oxalate, steroid and terpenoid were analysed using the methods of Siver *et al.* (1998).

Data Analysis

Data obtained were subjected to One-way analysis of variance (ANOVA) using the SAS (2000) significant means were separated by Duncan multiple range test of the statistical package. A probability of 5% were considered significant ($P < 0.05$).

RESULTS AND DISCUSSION

The phytochemical constituents of leaf and aqueous leaf extracts of scent leaf and *Sida acuta* in Table 1. The highest of 99.09mg/100g phytate content was observed in aqueous leaf extract of 40ml/L *S. acuta* while the lowest (56.61mg/100g) was noticed in 25ml/L aqueous leaf extract of scent leaf. The aqueous leaf extract containing 40ml/L of *Sida acuta* had the highest phytate, tannins (69.94mg/100g), flavonoid (96.48mg/100g), steroid (31.49mg/100g) and terpenoid (36.39mg/100g). *Sida acuta* leaf had higher phytate (100.96mg/100g), flavonoids (87.77mg/100g) and terpenoids (38.94mg/100g) than those of scent leaf (80.27, 57.81 and 28.38mg/100g, respectively). The leaf meal of *Sida acuta* had higher phytate (100.96 mg/100g) and flavonoids (87.77mg/100g) than leaf meal of scent leaf (80.27mg/100g and 57.81 mg/100g, respectively). The 99.09mg/100g phytate content was lower than 230mg/100g observed in the findings of Shittu and Alagbe, (2020) for *Sida acuta* aqueous leaf extract. The highest phytate (100.96mg/100g) observed in *Sida acuta* leaf was lower than 570mg/100g observed in the finding of Shittu and Alagbe, (2020) for *Sida acuta* leaf. The 3.33mg/100g oxalate observed in the *Sida acuta* leaf was lower to 1.01% (= 1010mg/100g) reported by Shittu and Alagbe, (2020).

Table 1: Phytochemical properties of varying inclusion level of *Sida acuta* and scent leaf aqueous extract

Parameters	T1		T2		T3		T4	
	Scent leaf		<i>Sida acuta</i>		Scent leaf		<i>Sida acuta</i> leaf	
	25ml/L	50ml/L	20ml/L	40ml/L	25ml/L	50ml/L	20ml/L	40ml/L
Phytate (mg/100g)	56.61	59.63	82.78	99.09	80.27	57.81	100.96	99.09
Oxalate (mg/100g)	5.34	2.75	3.25	3.72	4.44	3.33	3.33	4.44
Tannin (mg/100g)	50.81	63.26	56.38	69.94	58.69	57.81	87.77	69.94
Flavonoid (mg/100g)	40.91	76.69	77.31	96.48	57.81	87.77	96.48	96.48
Alkaloid (mg/100g)	4.11	6.39	4.99	7.75	4.92	5.625	7.75	7.75
Steroid (mg/100g)	9.55	15.59	25.24	31.49	25.55	31.59	31.49	31.49
Terpenoid (mg/100g)	11.49	31.43	42.44	36.39	28.38	38.94	36.39	36.39

The tannin contents in leaf and extracts (54.85-69.94mg) observed in the present study was lower than 125.00mg of *Sida acuta* leaf extract reported by Raimi *et al.* (2014) and 573.28mg for ethanolic extract of *Sida acuta* observed in the finding of Enechi *et al.* (2021). However, the tannin contents in *Sida acuta*, scent leaves and their aqueous extract were lower compared to 91.46mg/100g reported by Nwankpa *et al.* (2015). The findings align with assertion of Shittu and Alagbe (2020), who stated that the presence and concentration of phytochemicals in plants can vary significantly due to factors such as variety and age at harvest. These phytochemicals play critical roles in health and nutrition, with flavonoids known for their antioxidant and anti-allergic properties (Prabhavathi *et al.*, 2016) and tannins for their antimicrobial activities (Richa and Sharma, 2014).

The growth performance of cockerels offered oral administration of aqueous leaf extract of scent leaf and *Sida acuta* at starter phase is displayed in Table 2. Dietary treatment did not significantly influence the measured parameters for growth at starter phase. However, starter cockerels offered antibiotics and coccidiostat (control) had the numerically ($P = 0.711$) highest final body weight (561.75g/bird).

Table 2: Growth performance of cockerels offered oral administration of aqueous leaf extracts of scent leaf and *Sida acuta* at starter phase

Parameters	Control	T1		T2		T3		T4	P. Value	SEM		
		Scent leaf		<i>Sida acuta</i>		Scent leaf					<i>Sida acuta</i>	
		25ml/L	50ml/L	20ml/L	40ml/L	25ml/L	50ml/L				20ml/L	40ml/L
Initial body weight	163.67	164.22	164.74	162.59	166.59	166.59	166.59	166.59	0.666	1.90		
Final body weight	561.75	560.79	537.72	535.50	531.28	531.28	531.28	531.28	0.711	19.99		
Weight gain	398.08	396.57	372.98	372.91	364.68	364.68	364.68	364.68	0.669	19.64		
Feed intake	1090.12	1525.31	1353.59	1319.43	1319.43	1319.43	1319.43	1319.43	0.552	174.10		
FCR	2.78	3.85	3.67	3.67	3.68	3.68	3.68	3.68	0.688	0.56		

FCR= Feed conversion ratio

The growth performance of cockerels offered oral administration of aqueous leaf extract of scent leaf and *Sida acuta* at grower phase is displayed in Table 3. Oral administration of aqueous leaf extracts of scent leaf and *Sida acuta* significantly influenced feed conversion ratio ($P=0.033$).

Table 3: Growth performance of cockerels offered oral administration of aqueous leaf extracts of scent and *Sida acuta* at grower phase.

Parameters	Control	T1	T2	T3	T4	P. Value	SEM
	0	Scent leaf 25ml/L	50ml/L	<i>Sida acuta</i> 20ml/L	40ml/L		
Initial body weight	561.75	560.79	537.72	535.50	531.28	0.711	19.99
Final body weight	972.50	974.60	981.94	833.02	919.56	0.063	35.31
Weight gain	710.75	713.81	744.23	597.53	688.28	0.102	34.78
Feed intake	2274.36	1349.81	1917.14	2326.50	1730.11	0.158	279.60
FCR	3.21 ^{ab}	1.90 ^c	2.56 ^{bc}	3.92 ^a	2.55 ^{bc}	0.033	0.38

^{abc}: Means along the same row with different superscripts are significantly different ($p<0.05$)

The best (1.90) feed conversion ratio was observed in cockerels offered 25ml/L of scent leaf. The most impaired feed conversion was observed in cockerels offered 20ml/L aqueous leaf extract of *Sida acuta*. This finding was in line with the observation of Essien and Udoh, (2021) who reported best feed conversion ratio of 1.98 for broiler finishers fed scent leaf meal at 100g/kg. However, Egbeyale *et al.* (2021) observed the best feed conversion ratio (FCR) of 2.72 fed broiler chickens at 400g of fresh scent leaf. Egbeyale *et al.* (2021) attributed the influence of scent leaf on FCR to the potential of phytobiotics. Olobatoke and Okaragu (2021) suggested that antinutritional factors such as saponin present in scent leaf meal might disrupt performance for chicks. However, as the birds grow, their ability to handle such factors may have increased, hence, the improvement in feed intake during the grower phase. The aroma from the *Ocimum*, which is mainly due to eugenol methyl cinnamate, camphor and thymol (Nakamura *et al.*, 1999), might have some feed digestive properties that influence the feed utilization. Phytochemicals have beneficial effects on nutrient utilization possibly by stimulating digestive enzymes and improving gastrointestinal morphology (Upadhaya *et al.*, 2016). The effects expected of herbs and plant extracts on growth performance are also varied and this might have been responsible for the differences in the findings of the present study and previous authors. Other factors that influence the potency of the phytochemicals may include the plant parts, the genetic, age and harvest time of the plant, and extraction method (Yang *et al.*, 2015).

CONCLUSION AND RECOMMENDATION

Oral administration of aqueous leaf extracts of *Sida acuta* and scent leaf did not significantly affect growth performance of cockerel starter phase. In the grower phase, oral administration of aqueous leaf extracts of 25 ml/L of scent leaf significantly ($P=0.033$) improved feed conversion ratio. It is hereby recommended that aqueous leaf extract of 25 ml/L of scent leaf should be given to cockerels as an alternative to antibiotics and coccidiostat for improved feed conversion ratio.

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