



Daniellia Oliveri Leaf Extract: A Review on The Effect on Growth Performance, Carcass Characteristics, Caeca Microbial Population and Blood Profile of Broiler Chickens

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Abstract

Medicinal plants contain bioactive chemicals which are capable of producing a positive physiological action in the body of human and animals and they represent a great potential for the discovery and development of drugs. The present review focuses on the effect of *Daniellia oliveri* leaf extract on growth performance, carcass characteristics, caeca microbial population and blood profile of broiler chicken. *Daniellia oliveri* extract has significant therapeutic effects including antimicrobial, anti-inflammatory, antioxidants, hepato-protective, anti-nociceptive, cytotoxic, neuroprotective, chemoprotective, antispasmodic, antifungal, hypolipidemic and hypotensive activity. It is also loaded with minerals, vitamins, amino acids and phytochemicals conferring it the ability to perform multiple biological activity. The extract is relatively cheap, effective, and safe and could be used as an alternative to antibiotics. It can be concluded that *Daniellia oliveri* leaf extract could be used to bridge the gap between food safety and production. Thus, preventing environmental contamination and high case of diseases.

Keywords: *Daniellia oliveri*; food safety; carcass; phytochemicals; performance; microbes

Introduction

Medicinal plants are plants which contains substances or biologically active compounds that could be used for therapeutic purposes or which are precursors for the synthesis of useful drugs [1-3]. They are reservoirs of bioactive chemicals which have been used for the treatment of various ailments in human and animals [4,5] The pharmacological benefits of medicinal plants are primarily due to the presence of phytochemicals produced in the plant tissues as primary and secondary metabolites. Primary metabolites includes protein, chlorophyll and common sugars while alkaloids, terpenoids, flavonoids, saponins, phenols and tannins are included in secondary constituents [3,5-8]. Scientific studies have shown that phytochemicals exhibit various important pharmacological activities i.e., antimicrobial [9,10], cytotoxic [11-13], antitumor [14,15], antioxidants [16,3], antifungal [17], antispasmodic [18,19], antiviral [3], immune-modulator [20,21], hypolipidemic [22-24], neuroprotective [25,26], hepato-protective

[27,28] and chemo preventive properties [29-31]. World health organization (1991) reported that there are over 25,000 species of medicinal plant globally which have been traditionally used for the treatment of malaria, gastrointestinal diseases, wounds, anaemia, cough etc. [32-34]. Phytochemical constituents in plants depends on the age, method of extraction, geographical location, antinutrients, harvesting season, storage conditions and part of plants used [35-37]. Many of these herbal plants have been reported to be relatively cheap, effective and safe, thus encouraging food safety [38,39]. Among the potential plant is *Daniellia oliveri*. *Daniellia oliveri* (Rolfe) is an evergreen uncultivated copiously available tree, particularly in the savannah zone of Nigeria [40]. The tree can grow up to 18 – 24 m in height, the leaves are with a glabrous common stalk of 0.15 – 0.46 m long swollen base, 4-9 pairs of leaflets 0.06 – 0.15 m long by 0.04 – 0.08 m [41]. Its flowers are whitish, sweet smelling in appearance and also characterized

by flat terminal panicles with alternate horizontal branches up to long up to 0.01 m broad. 1 large petal is 0.008 – 0.015 m long (Keay 0.15 m long, the whole inflorescence glabrous, sepals 0.01 – 0.02 m et al., 1964) (Tables 1-3).

Table 1: Phytochemical components (mg/100g) of Daniellia oliveri leaf meal.

Parameters	Composition	SFL
Alkaloids	1.52	2.13
Flavonoids	61.11	122.1
Phenols	56.08	88.3
Condensed tannins	1.09	2.56
Hydrolysable tannins	2.66	1.88
Saponin	4.71	7.02
Phytate	1.88	23.4
Steroids	0.04	0.1
Oxalate	0.01	0.54

Table 2: Vitamin composition of Daniellia oliveri leaf meal.

Vitamin	Composition (mg/ 100 g)
Ascorbic acid	34.09
β -carotene	811.3
Niacin	1.16
Thiamine	1.21
Riboflavin	1.02
Folic acid	2.77

Table 3: Effect of Daniellia oliveri leaf extract on the performance, carcass characteristics, caeca microbial population and blood profile of broiler chicks.

Plant extract/parameters	Doses	Effect on broiler chicks
Ethanollic extracts of Daniellia oliveri leaf		
Growth performance	80 ml/liter	*Higher growth in broiler chicks at 56 days
		*Better feed conversion ratio
		*No mortality recorded
Carcass/organ weight	80 ml/liter	*Higher dressing percentage and weight
		*No noticeable inflammation on the kidney, liver, lungs, heart and other internal organs
Caeca microbial population	80 ml/liter	*Reduction in E.coli, Salmonella typhi, Pseudomonas aeruginosa, Salmonella aureus count (pathogenic microorganisms)
		*Increase in Lactobacillus count
		*Competitive exclusion
Haematological traits	80 ml/liter	*Increasing the efficiency of existing digestive processes.
		*Normal count in RBC, PCV, Hb, WBC and its differentials within the physiological range for birds.
		*No deleterious effect on haematological paramaters
Serum biochemical indices	80 ml/liter	*Higher total protein value
		*Reduction in serum enzyme values (ALT, AST and ALP)
		*Urea and Creatinine values were within the physiologic range, indicating that the kidney and liver were not negatively affected.

Taxonomical classification

Kingdom: Plantae

Sub-kingdom: Tracheobionta

Division: Magnoliopsida

Class: Magnoliopsida

Subclass: Rosidae

Order: Fabales

Genus: Daniellia

Species: *oliveri* (Rolfe)

Proximate, mineral, phytochemical, vitamins and amino acid composition of mature *Daniellia oliveri* leaf

According to [7], *Daniellia oliveri* leaves contains dry matter (89.11 %), crude protein (18.95 %), crude fibre (13.11 %), ether extract (4.78 %), ash (6.10 %), acid detergent fibre (28.10 %), neutral detergent fibre (47.50 %) and nitrogen free extract (46.17 %) respectively while mineral analysis revealed the presence of calcium, potassium, phosphorus, magnesium, sodium, iron, manganese, copper, zinc and cobalt at 12.17 mg/100g, 36.88 mg/100g, 42.21 mg/100g, 44.52 mg/100g, 37.18 mg/100g, 1.44 mg/100g, 0.78 mg/100g, 0.51 mg/100g, 6.14 mg/100g and 0.10 mg/100g respectively. Amino acid composition of *Daniellia oliveri* showed the presence of threonine, leucine, lysine, valine, tryptophan, glycine, phenylalanine, histidine, methionine, alanine, serine, proline, aspartic acid, glutamic acid, tyrosine and cysteine at 1.89, 5.11, 2.88, 5.93, 1.03, 4.33, 5.61, 6.33, 0.77, 5.89, 4.09, 6.08, 7.11, 10.22, 1.04 and 1.00 (%) respectively [8].

Pharmacological properties of *Daniellia oliveri* leaf extract

a. Antimicrobial/ Antifungal properties

Studies on the aqueous, methanolic and ethanolic extract of dried leaves of *Daniellia oliveri* leaves showed its ability against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas* spp and *Tricophyton rubrum* [42,43]. This could probably be due to the presence of alkaloids and flavonoids. According to Faizi et al. (2003a), medicinal plants exhibit antimicrobial properties due to their ability to intercalate deoxyribonucleic acid (DNA) of microorganisms. Flavonoids have antifungal activity in vitro [44]

b. Antioxidant properties

Chemical analysis of the leaves of *Daniellia oliveri* yielded phenols which are strong antioxidants [45,46]. They also have the capacity to scavenge free radicals, thus preventing diseases [47,48].

c. Antispasmodic properties

The antispasmodic activity of the n-butanol soluble part of aqueous portion of the ethanol extract of leaves of *Daniellia oliveri* on isolated guinea pig ileum against three spasmogen (acetylcholine, histamine and barium chloride). The extract inhibited acetylcholine and histamine induced spasms in the animals [49,50].

d. Anti-nociceptive properties

Aqueous extract from *Daniellia oliveri* leaves showed a significant ($P < 0.05$) anti-nociceptive activity against acetic acid induced writhing in mice at a tested doses of 50 mg/kg, 100 mg/kg and 200 mg/kg (i.p). From the experiment, it was discovered that at 200 mg/kg i.p caused a total anti-nociception up to 120 minutes [22,4].

e. Anti-hyperglycaemic properties

Study on administration of aqueous *Daniellia oliveri* leaf extract at 250 mg/kg body weight in rat compared with a standard drug, glibenclamide revealed that the test dose of the extract caused a significant ($P < 0.05$) lowering of blood sugar level in alloxan diabetic rats within six hours; from 261.00 ± 3.02 to 65.00 ± 5.40 and from 302.75 ± 79.62 to 119.00 ± 20.30 after three weeks. The same dose did not show blood sugar lowering effect in normoglycaemic rats. The experiment concluded that *D. oliveri* is a good option for alternative medicine in the management of diabetes mellitus [49].

f. Anti-diarrheal properties

Study results on the n-butanol extracts of *Daniellia oliveri* extracts was carried out on perfused isolated rabbit jejunum and castor oil-induced diarrhea in mice. The n-butanol extracts: NBD and NBF (0.16- 3.2mg/ml) caused a dose-dependent relaxation of isolated rabbit jejunum. The acute toxicity test for NBD and NBT in mice established an i.p LD50 of > 4000 mg/kg for *D. oliveri* and 1131.4mg/kg for *F. sycomorus*. In castor oil induced diarrhea, 80% protection was observed for *D. oliveri* at doses of 200mg/kg and 60% protection was observed at 100mg/kg and 50mg/kg respectively. For *F. sycomorus* 100% protection was observed at doses of 120mg/kg and 60mg/kg, for the n-butanol extract. The antidiarrheal activity was comparable to loperamide 5mg/kg. The result revealed that the extracts have pharmacological activity against diarrhea [51]. RBC: red blood cell; PCV: pack cell volume; Hb: haemoglobin; ALT: Alkaline transaminase; AST: Alanine serum transaminase; ALP: Alkaline phosphatase [52-66].

Conclusion

Medicinal plants are the cheapest and the most available sources of nutrients, supplying the body with protein, energy, minerals, vitamins and amino acids. They also contain bioactive

chemicals or phytochemicals (alkaloids, flavonoids, tannins, saponins, phenols, terpenoids etc.) with therapeutic properties, thus making them function as: antimicrobial, anti-inflammatory, antioxidants, antiviral, antifungal, anticancer, hepato-protective activities. There are several medicinal plants that have been worked on, yet, some are still underexplored. Among the potential plant is *Daniellia oliveri* leaf.

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Conflicts of Interest

The author declares no conflict of interest.

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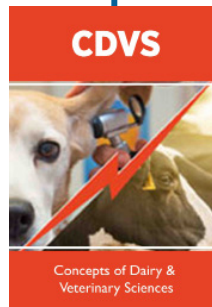
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