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THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

HISTOPATHOLOGY OF BROILER CHICKENS ADMINISTERED Rolfe (*Daniellia oliveri*) LEAF EXTRACT AS AN ANTIBIOTIC ALTERNATIVE

Alagbe, J.O
Department of Animal Science, University of Abuja, Nigeria
demsonfarms@yahoo.com +2348066671794

Abstract
Phytochemicals are non-nutritive plant chemicals with a wide therapeutic potential of protecting the body against numerous infections and diseases. They play specific pharmacological effects such as: anti-inflammatory, antibacterial, antioxidants, antifungal, hepato-protective, hypolipidemic and immune-modulatory roles. This study was conducted to evaluate the effect of *Daniellia oliveri* leaf extract (DOEx) on the histopathological changes in the liver of broiler chicken. 150 1-day-old (Ross 308) broiler chicks were randomly divided into 5 groups of 30 birds each. The experiment lasted for 56 days and feed was offered *ad libitum*. Treatment 1 (T1) was fed basal diet + 1.25 g/liter of water while T2, T3, T4 and T5 were fed *Daniellia oliveri* leaf extract (DOEx) at 20, 40, 60 and 80 ml of liter of water. Histopathology was carried out on the liver of birds at the end of the experiment. Results obtained reveals that liver of birds in T1 was characterized by congestion of portal blood vessels, coagulative necrosis, abnormal hepatic lobules and edema while T2-T5 showed normal central vein, hepatic lobules and sinusoids. It can be concluded that *Daniellia oliveri* leaf extract (DOEx) could be fed to broilers up to 80 ml per liter of water without causing any negative effect on the health of birds and could be used to bridge the gap between food safety and livestock production.
Keywords: Broiler chicks, *Daniellia oliveri*, Liver, Histopathology, Phytochemicals.

Introduction
The huge demand in poultry production to meet the growing demand in Nigeria has led to the rise in antibiotic use, leading to a worrying increase in antibiotic resistance diagnosed in animals and humans through direct contact, environmental contamination and food consumption causing high cases cancer and other ailments (Singh *et al*., 2021; Alagbe, 2022). There is renewed and growing interest in quest for alternatives to antibiotics in livestock medication (Adewale *et al*., 2021). One of such alternatives is the use of medicinal plants which are found to be safe, effective and rich in several bioactive chemicals or phytochemicals. Among the potential medicinal plant is *Daniellia oliveri*, a multipurpose plant loaded with minerals, vitamins, amino acid and other secondary metabolites (Alagbe, 2021).
Daniellia oliveri (Rolfe) is an evergreen uncultivated copiously available tree, particularly in the savannah zone of Nigeria (Olafadehan and Okunade, 2019). Parts of *Daniellia oliveri* are used by several arborists to treat various ailments such as gastrointestinal disturbances, bacterial infections, breast cancer, some vaginal diseases, ear ache, syphilis, ringworm and are also used as aphrodisiac, diuretic and mouthwash for toothache and tooth diseases (Ahmadu and Agunu, 2012). *Daniellia oliveri* serves as source of protein and energy to animal body; therefore, it is used as fodder to livestock during dry season (Okunade *et al*., 2014) and its extract has been reported to inhibit the growth of pathogenic organisms (Alain *et al*., 2015).

Therefore this experiment was conducted to examine the histopathology of the liver of broiler chickens fed *Daniellia oliveri* leaf extract.

Materials and methods

Experimental site
This experiment was carried out at the Poultry unit of the University of Abuja Teaching and Research farm which is located along airport road, Gwagwalada FCT-Abuja. Gwagwalada falls within latitude 08°51 and 09°37N, longitude of 007°20 and 007°51E, and the land mass cover 6,550 km (6,500 hectares) and with annual rainfall approximately between 1100 mm to 1650mm (Balogun, 2001).

Collection of test material (*Daniellia oliveri* leaf) and preparation of the extract
Fresh and healthy *Daniellia oliveri* leaves were obtained from several strands of the trees at the premises of the University of Abuja, Gwagwalada, Nigeria. The mature leaves were dark green and slightly

glossy with a lighter mid veins and undersides. The plant was authenticated at the Herbarium Unit, Department of Biological Sciences, University of Abuja with a voucher specimen number DOS 121 – 2001. *Daniellia oliveri* leaf was rinsed thoroughly with running tap water followed by distilled water to remove soil and other bound particles, air dried until a constant weight was obtained and made into meal using a blender.

The leaf extract was prepared by putting 250 grams of *Daniellia oliveri* meal into 1000 ml of ethanol (80% BDH). The mixture was agitated using electric blender for 10 minutes (to enhance proper mixing of the solvent with the powder) and poured into air tight plastic container. The obtained extract was filtered through a normal filter paper using Whatman No.1 filter paper and kept in refrigerator at 4^{o}C for further analysis. The powdered samples and the obtained extracts were subjected to the tests explained below.

Management of birds, diets and experimental design

A total number of 150 one-day-old broiler chicks (Ross 308) were used for the experiment. Animals were sourced from a reputable commercial hatchery in Ibadan, Oyo State in Nigeria and transported to University of Abuja Teaching and Research Farm, Gwagwalada Abuja. Chicks were weighed on arrival and randomly divided into five treatments; each of the treatments had 3 replicates with 10 birds in a completely randomized design experimental model. Birds were given anti-stress (Vitalyte wsp® at the rate of 30 g to 100 litres of water) on arrival and kept under the same environmental conditions. Feed and fresh clean water was provided *ad libitum*. Birds in treatment 1 (T1) was fed basal diet + 1.25 g/litre of water while T2, T3, T4 and T5 were fed *Daniellia oliveri* extract (DOEx) at 20, 40, 60 and 80 ml per liter of water.

Histopathological examination

At the end of the experiment (8 weeks) liver sample was collected from two birds per treatment and then transferred into specimen bottles containing 10% formalin where normal H and E standard procedures were performed according to the methods of Purwanti *et al.* (2018). Small specimens of the organs liver were taken from each experimental group, fixed in normal buffered formalin, dehydrated in ascending concentration of ethanol (70, 80 and 90%) cleared in zylene and embedded in paraffin. Sections of 4-6 µm thickness were prepared and stained with hematoxylin and eosin according to Marra *et al*. (2009). The prepared slides were viewed under a microscope and photomicrograph captured using a motic camera and the photomicrograph were transferred to the computer for further pathologic reading.

Result and discussion

Plate 1-5 reveals the histopathological sections of the liver of broiler chickens fed different levels of *Daniellia oliveri* extract (DOEx). Liver is responsible for the processing of nutrient absorbed from the intestine and secretion of bile which functions in the digestion of fat and toxic substances from living organism (Oloruntola, 2018). Liver sample in plate 1 showed several hepatocellular damages including the congestion of portal blood vessels, edema, coagulative necrosis and extensive lymphocytic aggregations. The result agrees with the findings of Hayashi *et al*. (2018) while plate 2-5 showed normal hepatocellular structure, normal central vein and normal hepatic sinusoids. It is a clear indication that DOEx is non-toxic to the birds and could suppress the activities of pathogenic organisms especially bacteria (Wick *et al*., 2002). The variation in the histopathological appearances in the liver cells can be attributed to the presence of phytochemicals in DOEx (Olafadehan *et al*., 2021); Shittu and Alagbe, 2021. According to Prakash *et al.* (2012); Alagbe (2022), phytochemicals have tremendous therapeutic effect in curing various ailments and it performs multiple biological functions: antioxidants, antifungal, antibacterial, antispasmodic, hepato-protective, chemoprotective, immuno-modulator, hypolipidemic and anti-allergic roles. Gkretsi *et al*. (2007) reported that bacterial infection is the most important cause of lobular localization in the liver.

Conclusion

It was concluded that using DOEx as an alternative to antibiotics in the diet of broiler chickens had no deleterious effect on the histopathology of the liver (plate 2-5) and can be used to prevent the harmful residual toxicity of drugs observed in the food chain.

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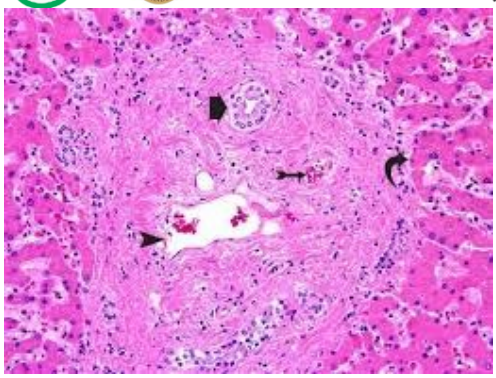

PLATE 1

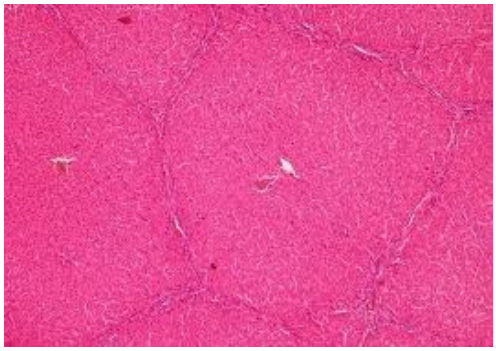

PLATE 2

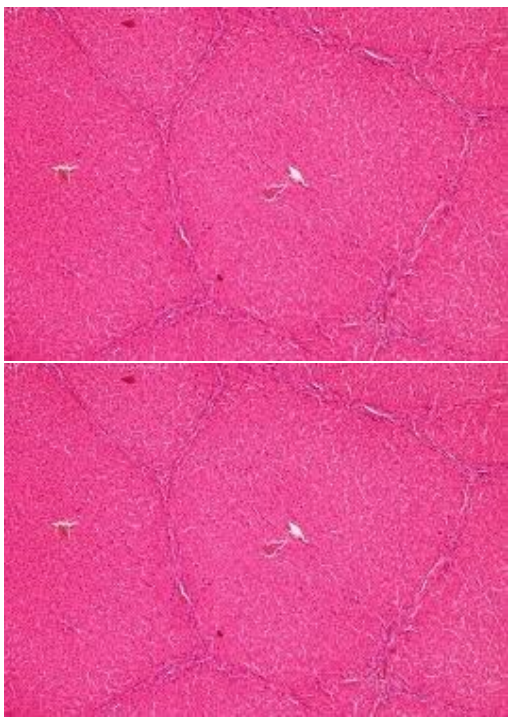

PLATE 3

PLATE 4

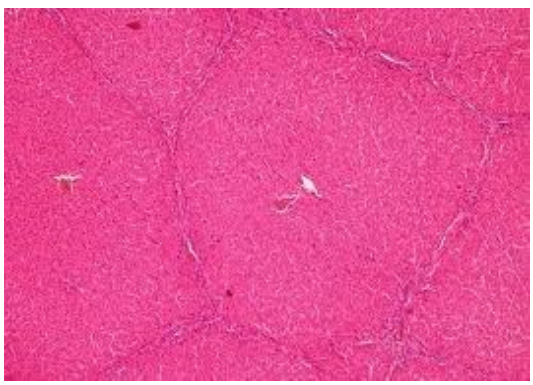

PLATE 5