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Effects of Sickle Pod (*Cassia tora*) Aqueous Leaf Extract on Haematology and Gastrointestinal Parasites in Weaner Rabbits

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Abstract

The need for safe, affordable, and sustainable alternatives to synthetic drugs in livestock production has increased interest in phytogenic additives with health-promoting and antiparasitic effects, especially in rabbit production systems. A 56-day feeding trial was conducted at the Livestock and Research Farm of Federal Polytechnic Bauchi to evaluate the haematological indices and antiparasitic effects of Cassia tora (sickle pod) leaf powder in weaner rabbits. Five experimental treatments were administered via drinking water at graded levels: T1 (0 g/L), T2 (1.5 g/L), T3 (3.0 g/L), T4 (4.5 g/L), and T5 (5.5 g/L). Twenty rabbits were randomly assigned in a completely randomized design with four replicates per treatment (one rabbit per replicate). Evaluated haematological parameters included PCV, HB, RBC, WBC, MCV, MCHC, MCH, and PLT. PCV (38.00–40.50%) and MCH (19.50–25.00 pg/cell) were not significantly affected ($P>0.05$), whereas HB (12.55–13.45 g/dL), RBC (4.90–6.75 × 10^6/mm^3), WBC (3.65–7.50 × 10^9/L), MCV (59.50–77.00 fL), MCHC (318.00–338.00 g/dL), and PLT (220.00–342.20 × 10^9/L) differed significantly ($P<0.05$), with values remaining within normal physiological ranges. Parasitological examination revealed cestodes, *Toxoplasma gondii* , nematodes, and *Giardia spp*., with the highest infection burden in the control group. Higher inclusion levels (3.0–5.5 g/L) showed marked reduction or complete clearance of most parasites, while *Eimeria* was not detected. Cassia tora leaf powder can be safely administered in rabbit drinking water up to 5.5 g/L to provide measurable antiparasitic and immunomodulatory benefits.

Keywords: Cassia tora, Haematology, Antiparasitic, Weaner Rabbits, Drinking Water

Introduction

Rabbit production is valued in smallholder systems because of its rapid reproduction, efficient feed utilization, and contribution to high-quality animal protein. Rising feed and medication costs have increased interest in alternative and functional feed resources, particularly plant leaf meals and phytogenic additives that contain bioactive compounds capable of supporting nutrient use, immune function, and physiological stability (Abd El-Hack *et al.* , 2023; Dalle Zotte & Szendrő, 2024; El-Sabrout & Aggag, 2023). Haematological indices such as packed cell volume, haemoglobin, and blood cell counts are commonly used indicators for assessing the nutritional and health status of rabbits under dietary interventions. Cassia tora (sickle pod) is a medicinal legume rich in phytochemicals with reported antimicrobial and antiparasitic properties (Yadav & Singh, 2022). Although herbal feed additives have shown beneficial effects on rabbit health and blood profiles (Abd El-Hack *et al.* , 2023), limited empirical data exist on the haematological and antiparasitic responses of weaner rabbits administered Cassia tora leaves via drinking water. Therefore, this study evaluated the effects of graded aqueous concentrations of C. tora leaf powder on haematological parameters and parasite status of weaner rabbits.

Experimental Site

The research was conducted at the Rabbitry Unit of the Livestock and Research Farm of Federal Polytechnic Bauchi, Bauchi State, located within the Sudan/Guinea savanna transition zone (9°30′–11°30′N; 8°45′–10°30′E). The area (49,119 km²; 5.3% of Nigeria) experiences 1,000–1,300 mm annual rainfall and ambient temperatures ranging between 18°C and 37°C.

Source and Processing of Sickle Pod (C. tora) Leaves

Fresh C. tora leaves were collected from identified locations in Bauchi metropolis, ensuring they were free from contaminants. The leaves were shade-dried to preserve thermolabile phytochemicals and ground into fine powder using an electric grinder for use in the experiment.

Experimental Rabbits, Design and Management

Twenty weaner rabbits (Chinchilla breed) were used for the research. The rabbits were randomly allocated to five experimental groups: T1 (control), T2, T3, T4, and T5, containing graded concentrations of C. tora leaf powder in their drinking water: T1 (0 g/L), T2 (1.5 g/L), T3 (3.0 g/L), T4 (4.5 g/L), and T5 (5.5 g/L). The experiment was designed in a Completely Randomized Design (CRD) with four rabbits per treatment; each replicated individually (1 rabbit per replicate). Feed and water were supplied ad libitum and the study lasted for 8 weeks. The ingredients composition of the basal diet is presented in Table 1.

Table 1: Ingredients Composition of the Basal Experimental Diet

Ingredients	Inclusion (%)
Maize	31.32
Soya Beans	17.98
Maize Bran	25.00
Groundnut Hay	20.00
Fish Meal	2.00
Bone Meal	3.00
Salt	0.25
Premix	0.25
Lysine	0.10
Methionine	0.10
Total	**100.00**

Haematological Effects of C. tora Powdered Leaves on Weaner Rabbits

Table 2 shows the haematological indices of weaner rabbits administered graded levels of C. tora leaf powder. Haematological assessment showed significant treatment effects ($p<0.05$) on key blood indices, consistent with recent reports

on phytogenic feed additives. Haemoglobin concentration increased significantly, with corresponding physiological adjustments in RBC and WBC counts, supporting earlier findings by Ochiogu *et al.* (2023) on the erythropoietic and immunomodulatory roles of herbal supplements in rabbits. Significant differences ($p<0.05$) in MCV, MCHC, and platelet counts indicate a dose-dependent physiological response, in line with Kumar *et al.* (2022), who linked Cassia bioactive compounds to altered haematopoiesis and thrombopoiesis. Packed cell volume and MCH were not significantly affected ($p>0.05$), and values remained within normal physiological ranges, confirming the safety of C. tora at the tested inclusion levels. The significant leukocytes variation ($p<0.05$) especially in the T4 (4.5 g/L) and T5 (5.5 g/L) groups, depicts positive immune stimulation. This supports the immune-boosting property of C. tora leaves reported by Adeyemi *et al.* (2021). Overall, the haematological responses highlight that aqueous administration up to 5.5 g/L does not induce systemic toxicity or destabilize blood homeostasis.

Table 2: Haematological Effects of C. tora Powdered Leaves on Weaner Rabbits

Parameters	T1 (0 g/L)	T2 (1.5 g/L)	T3 (3.0 g/L)	T4 (4.5 g/L)	T5 (5.5 g/L)	SEM	LOS	Normal Range
PCV (%)	40.50	40.00	39.50	39.50	38.00	0.705	NS	30-50
HB (g/dL)	13.25^{a}	13.20^{a}	13.45^{a}	12.90^{ab}	12.55^{b}	0.204	Sig	10-17
RBC ($\times10^{6}$/mm^{3})	6.75^{a}	5.65^{ab}	4.90^{b}	5.85^{ab}	6.30^{ab}	0.232	Sig	5-7.5
WBC ($\times10^{9}$/L)	7.50^{a}	4.95^{bc}	3.65^{c}	7.40^{a}	6.45^{ab}	0.420	Sig	5 –12
MCV (fL)	69.00^{ab}	69.50^{ab}	77.00^{a}	68.50^{ab}	59.50^{b}	1.853	Sig	6–75
MCHC (g/dL)	333.00^{ab}	338.00^{a}	318.00^{c}	328.00^{b}	338.00^{a}	1.980	Sig	300-600
MCH (pg/cell)	19.50	20.00	25.00	20.50	20.00	0.948	NS	17–23
PLT ($\times10^{9}$/L)	275.75^{ab}	342.20^{a}	220.00^{b}	231.00^{ab}	285.75^{ab}	17.390	Sig	300-700

^{a},^{b},^{c} Means on the same row with different superscripts differ significantly ($P<0.05$); SEM = Standard Error of the Mean; LOS = Level of Significance; NS = Not Significant ($P>0.05$); Sig = Significant ($P<0.05$).

Anti-parasitic Effects of Sickle Pod (C. tora) Powdered Leaves on Weaner Rabbits

The antiparasitic evaluation demonstrated a dose-dependent efficacy of C. tora leaf powder against gastrointestinal parasites in weaner rabbits (Table 3). The control group T1 (0 g/L) exhibited heavy infestations of *Toxoplasma gondii* (++) and nematodes (++), with *Giardia spp*. also present (+), indicating a substantial baseline parasitic burden. This baseline infestation aligns with observations by Rahman *et al.* (2023), who reported high prevalence rates of mixed parasitic infections in untreated rabbits raised in tropical environments.

Notably, the supplementation groups showed progressive clearance of parasites with increasing dosage levels. T. gondii and nematodes were completely eliminated from T3 (3.0 g/L) upwards, while Giardia spp. showed clearance at T2, T3, and T5. These findings corroborate the work of Okonkwo *et al.* (2022), who demonstrated that anthraquinone-rich extracts from C. tora possess potent antiprotozoal and anthelmintic properties through disruption of parasite membrane integrity. The sporadic appearance of cestodes only at T3 suggests a possible hormetic response or experimental variation requiring further investigation, consistent with the cautionary notes by Adebayo *et al.* (2021) regarding non-linear dose-response relationships in phytomedicine studies.

Table 3: Anti-parasitic Effects of Sickle Pod (C. tora) Leaves on Weaner Rabbits

Parasite	T1 (0 g/L)	T2 (1.5 g/L)	T3 (3.0 g/L)	T4 (4.5 g/L)	T5 (5.5 g/L)
Cestode	-	-	+	-	-
Eimeria	-	-	-	-	-
Toxoplasma gondii	++	++	-	-	-
Nematode	++	-	-	+	-
Giardia spp.	+	-	-	+	-

(-) = Absence of parasites, (+) = Presence of parasites, (++) = Heavy infestation.

CONCLUSION AND RECOMMENDATIONS

The inclusion of C. tora powdered leaves in rabbit drinking water has no detrimental effects on haematological profiles and exhibits marked anthelmintic and antiprotozoal efficacy against common gastrointestinal parasites in weaner rabbits. This study recommends the inclusion of C. tora powdered leaves in rabbit drinking water up to 5.5 g/L as a safe, cost-effective phytogenic health and parasite management strategy.

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