

Phytogenic potentials of *Mimosa pudica* leaf extracts on blood profiles, rectal temperature and footpad of broiler chicken

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ABSTRACT: A study was conducted to determine the effects of *Mimosa pudica* leaf extracts (MPLE) on blood profiles, rectal temperature and footpad of broiler chicken. 300 day-old marshal broiler chicks were purchased from the hatchery. Chicks were allotted randomly into 5 feeding treatments of 60 birds each in a completely randomized design and subdivided into 6 replicates of 10 birds each. For all parameters under studied for blood profile, the results of biochemical composition of the birds indicated a significant ($p < 0.05$) difference only in globulin while other parameters such as Total protein, Albumin, Aspartate aminotransferase (AST), Alkaline phosphate (ALP), Alanine aminotransferase (ALT), High density lipoprotein (HDL) and Cholesterol, Total protein and Total globulin had range of values ($p > 0.05$) across the treatment groups. For haematological indices, no significant ($p > 0.05$) effects on red blood cells ($\times 10^9/\text{dl}$), Packed cell volume (%), haemoglobin (g/dL), white blood cells ($\times 10^3/\text{dl}$) ($p < 0.05$), heterophil as well as lymphocyte (%), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) across the treatment groups,. Also, no significant ($p > 0.05$) difference was obtained on rectal temperature, while significant ($p < 0.05$) differences were obtained both at the 4th and 8th week for footpad dermatitis. At the 4th week, T2 (10mls) had the highest mean of 2.33, followed by T4 (30mls) (1.87), T5 (40mls) (2.00), while T3 (20mls) (1.67) had means which were not different from the means obtained in T2, T4 and T5. The 8th week also showed that T2 (10mls) (1.33) had the highest and T1 (control) with the least mean. It can be concluded that MPLE in water of broiler chicken up to 40mls per litre had no detrimental effects on the parameters measured; MPLE's haematological stability reflects its dual role as an immunomodulator and antioxidant, as validated by recent in vitro and in vivo studies.

Keynotes: Albumin, haematology, serum, rectal temperature, treatment.

INTRODUCTION

The poultry industry is a vital component of global agriculture, supplying a significant portion of the world's meat and eggs. Poultry, particularly broiler chickens, is a major source of protein for millions of people worldwide. According to the Food and Agriculture Organization (FAO), global poultry meat production was estimated at over 130

million tonnes in 2020, reflecting the industry's substantial contribution to food security and the agricultural economy (FAO, 2021). However, the intensive rearing conditions required to meet production demands often expose broilers to various stress factors that can negatively impact their health, welfare and productivity. Among these, heat

stress is a major concern, particularly in regions with high ambient temperatures. Broiler chickens are also susceptible to a range of health issues resulting from high atmospheric conditions, such as footpad dermatitis (FPD), which significantly impacts their welfare and productivity. FPD is characterised by lesions and inflammation on the footpads, leading to pain, reduced mobility, and lower feed conversion rates (Hashemipour *et al.*, 2016). The conventional approach to managing various health issues in poultry has heavily relied on antibiotics and other synthetic additives. These substances have been used extensively to promote growth, prevent diseases, and improve feed efficiency in poultry production. However, the emergence of antibiotic-resistant bacteria poses a significant threat to both animal and human health. The World Health Organisation (WHO) has highlighted the urgent need to reduce antibiotic use in agriculture to combat antibiotic resistance (WHO, 2018). Additionally, consumer demand for antibiotic-free products has prompted the exploration of alternative solutions that are both effective and sustainable. Phytogetic feed additives, derived from plants, have shown promise due to their natural bioactive compounds and minimal side effects (Windisch *et al.*, 2008). Nature has been a source of medicinal agents for thousands of years. Various medicinal plants have been used for years in daily life to treat disease all over the world (Nair *et al.*, 2005). Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness (Balakumar *et al.*, 2011). There are many herbs, which are predominantly used to treat cardiovascular problems, liver disorders, central nervous system, digestive, metabolic disorders and welfare issues. *Mimosa pudica*, commonly known as the sensitive plant, is a tropical legume recognised for its medicinal properties. It has been traditionally used in various cultures for its anti-inflammatory, antimicrobial, and wound-healing effects. The plant leaves, roots, and seeds are rich in bioactive compounds such as flavonoids, tannins, and alkaloids, which contribute to its therapeutic potential (Gul *et al.*, 2017).

Phytochemistry of *Mimosa pudica*

Medicinal plants play a significant role in the treatment of numerous diseases due to their bioactive constituents. All parts of these plants are effective in managing ailments and contribute to the discovery of new therapeutic agents. In Nigeria, rigorous ethnobotanical studies and preclinical research have identified over 115 plant species traditionally used for diabetes management; roughly one-third of these have demonstrated hypoglycemic activity in laboratory models, highlighting their phytochemical potential as natural antidiabetic agents (Ezuruike and Prieto 2014)

Mimosa pudica contains a diverse range of secondary

metabolites, including alkaloids, glycosides, carbohydrates, steroids, flavonoids, phenols, quinones, fats, resins, triterpenes, and C-glycoflavonoids (Adurosakin *et al.*, 2023). Phytochemical screening of *Mimosa pudica* root revealed the presence of tannins and toxic alkaloids such as mimosine in its ethanolic extract, while the raw root material also contained calcium oxalate crystals and ash, confirming the chemical diversity reported by Ramesh *et al.* (2022). Additionally, the seeds yield a glucuronoxylan mucilage composed mainly of D-xylose and D-glucuronic acid (Muhammad *et al.*, 2016). Total phenolic content in *Mimosa pudica* extracts varies significantly with solvent choice; for example, a study by Patro *et al.* (2016) found that the ethyl acetate extract of leaves had the highest phenolic content, exceeding those in methanol and aqueous extracts (22–28 mg GAE/g range) (Patro *et al.*, 2016). Furthermore, *Mimosa pudica* has been found to contain β -sitosterol, linoleic acid, oleic acid, and various free amino acids, which contribute significantly to its medicinal properties (Adurosakin *et al.*, 2023). However, there seems to be little or no information on its use in livestock, more importantly, poultry. Therefore, recent studies have begun to explore its potential in veterinary applications, particularly in improving poultry health.

MATERIALS AND METHODS

Location of the study

The study was conducted at the Poultry Unit of the Teaching and Research Farms, Oyo State College of Agriculture and Technology, Igboora, Nigeria.

Collection and preparation of *Mimosa pudica* leaf extract (MPLE)

Fresh *Mimosa pudica* plant was harvested by wearing protective gloves because of the thorny nature of the plant to avoid injuries from Igbo-ora community and environs. The leaf with the stem was rinsed with clean water and allowed to drain, then 1 kg of the plant was added to 2 litres of water and allowed to boil for 10 minutes; it is then allowed to cool down, filtered, and the filtrate (extract) is kept at room temperature prior to use. This preparation was carried out at an interval of 5 days to prevent fermentation.

Experimental animal managements

A total number of three hundred (300) broiler chicks was purchased from a reputable farm, prior to the purchase, the rearing house was cleaned thoroughly, fumigated, and allowed to rest for about 10 days. On arrival, chicks were

carefully removed from their boxes and randomly allotted into groups. Water and feed were supplied ad libitum. The *Mimosa pudica* leaf powder (MPLP) in its all-encompassing nature will serve as source of antibiotic, antiviral and antifungal for the treatment groups except the control. The feeding program consisted of the starter diet that was used until 28 days of age and a finisher diet till 56 days of age. All diet for each period was prepared with the same batch of ingredients and all diets with the same composition.

Experimental design and experimental diet

Chicks were allotted randomly into 5 feeding treatments of 60 birds each in a Completely Randomized Design and then subdivided into 6 replicates of 10 birds each. The field study lasted for 56 days.

T1 = Control

T2 = 10 ml of *Mimosa pudica* leaf extract (MPLE) + 1 litre of water)

T3 = 20 ml of *Mimosa pudica* leaf extract (MPLE) + 1 litre of water)

T4 = 30 ml of *Mimosa pudica* leaf extract (MPLE) + 1 litre of water)

T5 = 40 ml of *Mimosa pudica* leaf extract (MPLE) + 1 litre of water)

Phytochemical analysis

Phytochemical analysis of the *Mimosa pudica* leaf extract was carried out to determine the various metabolites present using a standard laboratory protocol as provided for the different phytochemicals.

Data collection

Haematology and serum analyses

Blood samples were collected at the 4th and 8th week of the experiment, one bird per replicate was randomly selected and 2 mls of blood sample was collected from the jugular vein of each bird using sterilized 5 mls syringe and 18 gauge needle, this was emptied into sterilized bottles for serum analysis and another set of bottles containing EDTA (Ethylene diamine tetracetic acid) for haematological analysis. Haematological parameters that were determined include haemoglobin concentration (Hb Conc), packed cell volume (PCV), white blood cell (WBC) count and red blood cell (RBC) count. The PCV was determined by the micro-haematocrit method described by Schalm *et al.* (1975) and Mitruka and Rawnsely (1997) using a micro-haematocrit centrifuge and reader (Hawksley and Sons Ltd, England). The Hb was

determined using a haemoglobinometer (Marienfeld, Germany) while the WBC counts was carried out by the haemocytometer method using an improved Neubauer counting chamber (Hawksley, England) and avian RBC and WBC diluting fluids as described by Campbell and Coles (1986) and Lamb (1991). Serum metabolites (total protein (TP), glucose albumin, globulin, creatinine, and cholesterol will be determined according to the methods described by Campbell and Coles (1986).

Determination of rectal temperature (RT)

Rectal temperatures were collected at the 4th and 8th week of the experiment; 3 birds per replicate were randomly selected from each treatment. The rectal temperature was determined with the aid of a digital thermometer. The sensitive tip of the thermometer was disinfected with methylated spirit and inserted into the rectum of the birds at the display of low °C by the thermometer (which indicated that the thermometer was set for temperature reading). The rectal temperature was recorded after the sound of the alarm.

Determination of footpad dermatitis

At the end of the 4th and 8th weeks experimental period, 3 birds per replicate were randomly selected from each treatment for footpad evaluation after slaughtering. A scoring scale for pododermatitis in broiler chickens was used for the evaluation. The feet of each bird were washed with clean water, inspected and given a score based on the photograph they most closely resemble. The scores show an increase in the severity of pododermatitis and range from 0 (representing no evidence of pododermatitis) to 4 (representing severe pododermatitis). Based on the Welfare Quality Project (Welfare Quality, 2009).

Statistical analysis

All data collected were subjected to analysis of variance (ANOVA) using the Statistical Analysis System (SAS, 2012) software. Significantly different means were separated using Duncan's Multiple Range Test (DMRT) of the same software.

Experimental model

$$Y_{ij} = \mu + T_i + e_{ij}$$

Y_{ij} = Effect of j^{th} birds given i^{th} levels of *Mimosa pudica* leaf extract; μ = Overall mean; T_i = i^{th} effect of treatment at varying levels of *Mimosa pudica* leaf extract; e_{ij} = Random residual error.



Plate 1. Picture of *Mimosa pudica* plant on field.

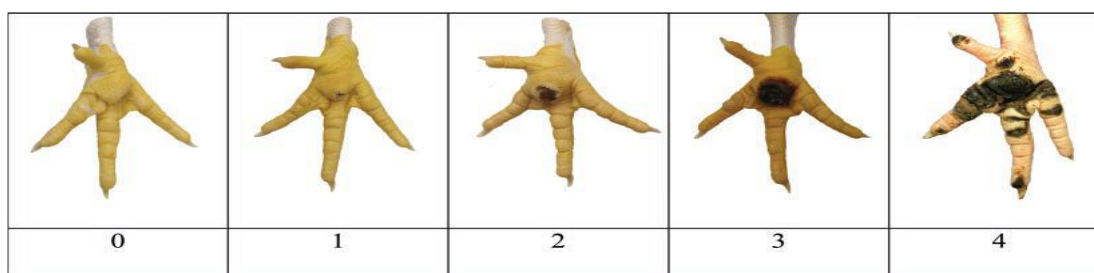


Plate 2. Photograph from A. Butterworth (University of Bristol, North Somerset, UK).

RESULTS

Plate 1 shows the picture of *Mimosa pudica* whole plant that was taken on the field where they were harvested from. Plate 2 shows the photograph from A. Butterworth (University of Bristol, North Somerset, UK) downloaded and used for footpad dermatitis grading. Table 1 shows the Ingredients and nutrients composition of starter and finisher diet (%) used during the study. Table 2. Also present results of the laboratory analysis of the Qualitative and Quantitative phytochemical screening of selected metabolite in *Mimosa pudica* plant. The results of the effects of *Mimosa pudica* leaf extract (MPLE) on the haematology of broiler chicken are presented in Table 3. From the table, *Mimosa pudica* leaf extract (MPLE) inclusion in water had no significant ($p > 0.05$) effects on red blood cells (RBC) ($\times 10^9/\text{dl}$), Packed cell volume (PCV) (%), haemoglobin (Hb) (g/dL), white blood cells (WBC) ($\times 10^3/\text{dl}$) ($p < 0.05$), heterophil as well as lymphocyte (%), monocyte (%), eosinophil (%) and basophil (%), mean corpuscular volume (MCV) (fl), mean corpuscular haemoglobin (MCH) (fmol/cell) and mean corpuscular haemoglobin concentration (MCHC) (g/l) across the treatment groups.

For RBC, the mean value ranged between 2.16 – 2.87. For PCV, the highest value was 228.00 (T3) and the lowest was 24.67 in T4. Hb value was highest in T3 (9.10) and lowest at T4 (7.77). WBC, the highest value was 14517.00

(T3) and the lowest was 13283.00 (T4). The mean obtained for heterophil ranged from (33.00 – 39.33) in T3 to T4. Lymphocyte was also highest in T3 (60.00) and lowest at both T4 (52.33). Similarly, monocytes were highest with values ranging from 2.33 – 3.67. Eosinophil was also high at the T2 (30mls) and lowest in 60 mls (T3). Basophil had a mean of 0.33 across the treatment. MCV mean values range from 97.68 – 116.86, while the mean value for MCH ranged from 30.97 – 36.95 in T1 and T4, respectively, and lastly, MCHC values were found to range from 31.54 – 32.50.

The results of the effects of *Mimosa pudica* leaf extract (MPLE) on serum profile of broiler chickens are presented in Table 4. The results of biochemical composition of the birds indicated that significant ($p < 0.05$) differences was obtained only in globulin while other parameters such as Total protein, Albumin, Aspartate aminotransferase (AST), Alkaline phosphatase (ALP), Alanine aminotransferase (ALT), High density lipoprotein (HDL) and Creatinine (Cr) Cholesterol (chol), Total protein (TP) and Total globulin (TG) had ranges of values ($p > 0.05$) across the treatment groups.

Globulin was significantly ($p < 0.05$) different across the treatment groups. T4 (30ml/L MPLE) had the highest mean, although T1 (0mls MPLE) compared favourably with the mean obtained in T2 (10 ml/L MPLE), T3 (20 ml/L MPLE) and T5 (40 ml/L MPLE). Total protein ranged between (3.33 – 3.67), albumin (1.23 – 1.27), A/G ratio

Table 1. Ingredients and nutrients composition of starter and finisher diet (%).

Ingredient	Starter (1-28 days)	Finisher (29-56 days)
Maize	58.00	63.80
Soybean meal	34.50	28.40
Soya oil	3.30	3.70
Di-calcium phosphate	1.70	1.70
Limestone	1.80	1.70
Salt {NaCl}	0.25	0.25
Methionine	0.15	0.15
Premix*	0.30	0.30
Total	100	100
Calculated composition (%)		
Crude protein	22.10	19.18
Energy (MEKcal/kg)	3030	3100
Ether extract	5.79	6.34
Crude fibre	2.62	2.51
Calcium	1.04	1.00
Phosphorous	0.46	0.45
Methionine	0.53	0.45

*Premix supplied per kg diet: vitamin A 15,000 I.U, vitamin D3 13000 iu, thiamin 2 mg, Riboflavin 6 mg, pyridoxine 4 mg, Niacin 40 mg, cobalamine 0.05 g, Biotin 0.08 mg, choline chloride 0.05g, Manganese 0.096 g, Zinc 0.06 g, Iron 0.024 g, Copper 0.006 g, Iodine 0.014 g, Selenium 0.24 mg, Cobalt 0.024 mg and Antioxidant 0.125 g. NFE = Nitrogen free extract.

Table 2. Qualitative and quantitative phytochemical screening of selected metabolite in *Mimosa pudica* plant.

Parameters (g/100g)	Qualitative	Quantitative mean	Remark
Flavonoids	+++	0.58	AA
Saponin	+	0.19	TA
Tannin	+++	1.72	AA
Cardiac glycoside	+	0.10	TA
Alkaloids	+++	0.40	AA

Key: + = Positive, +++ = strongly positive, AA = Appreciable amount, TA =Traceable amount.

(0.53 – 0.59), AST (181.00 – 186.00), ALT (21.00 – 26.00), ALP (304.33 – 316.67), Creatinine (0.43 – 0.50), Glucose (244.70 – 274.70), Cholesterol (138.70 – 200.67), Triglycerides (71.00 – 77.67), HDL (77.30 – 91.70), LDL (38.67 – 61.10) and lastly Uric acid (0.05 – 0.07).

The results of the effects of *Mimosa pudica* leaf extract (MPLE) on the rectal temperature of broiler chicken are presented in Table 5. The result of the rectal temperature of the birds showed there were no significant ($p > 0.05$) differences at both starter and finisher phases of the study. The temperature ranged between 41.18 – 41.73 at both phases.

The results of footpad dermatitis of broiler birds fed *Mimosa pudica* leaf extract (MPLE) are presented in Table 6. The results showed significant ($p < 0.05$) differences were obtained both at the 4th and 8th week using A.

Butterworth (University of Bristol, North Somerset, UK) grading system. At the 4th week, T2 (10 mls) had the highest mean value of 2.33, followed by T4 (30 mls) (1.87), T5 (40 mls) (2.00), while T3 (20 mls) (1.67) had means which were not different from the means obtained in T2, T4 and T5. The 8th week also showed that T2 (10 mls) (1.33) had the highest and T1 (control) with the least mean.

DISCUSSION

Blood profile

The non-significant changes in WBC counts (lymphocytes, heterophils, monocytes) observed in broilers fed MPLE suggest immunomodulatory rather than immunosuppressive

Table 3. Effects of *Mimosa pudica* leaf extract (MPLE) on haematology of broiler chicken.

Parameters	T1(Control)	T2 (10mls) MPLE	T3 (20mls) MPLE	T4 (30mls) MPLE	T4 (40mls) MPLE	SEM ±	P-value
RBC (x10 ⁹ /dl)	2.66	2.45	2.87	2.16	2.53	0.21	0.29
WBC (x10 ³ /dl)	13717	13567	14517	13283	13338	49.28	0.43
PCV (%)	26.00	26.00	28.00	24.67	25.03	1.37	0.50
H.b (g/dl)	8.20	8.20	9.10	7.77	7.94	0.45	0.35
Platelet	1540.00	1833.33	1260.00	1910.00	1877.00	340.42	0.69
Herophils (%)	38.00	35.00	33.00	39.33	39.00	2.24	0.39
Lymphocytes (%)	57.33	60.67	59.33	57.33	58.67	3.46	0.89
Monocytes (%)	3.67	3.00	3.33	2.33	3.33	0.56	0.45
Eosinophils (%)	3.67	5.00	3.33	4.67	4.47	0.82	0.35
Basophils (%)	0.33	0.33	0.33	0.33	0.33	0.33	1.00
MCV (fl)	98.09	106.87	97.68	116.86	115.07	4.28	0.26
MCH (fmol/cell)	30.97	34.04	31.73	36.95	36.73	2.07	0.35
MCHC (g/l)	31.54	31.87	32.50	31.54	31.54	0.45	0.44

Note: mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC), Packed cell volume (PCV), Haemoglobin (Hb), Red blood cell (RBC), White blood cell (WBC).

Table 4. Effects of *Mimosa pudica* leaf extract (MPLE) on serum biochemistry of broiler chicken.

Parameters	T1(Control)	T2 (10mls) MPLE	T3 (20mls) MPLE	T4 (30mls) MPLE	T5 (40mls) MPLE	SEM ±	P-value
T. P (g/dL)	3.57	3.57	3.43	3.67	3.50	0.09	0.49
Albumin	1.23	1.30	1.27	1.27	1.27	0.10	0.99
Globulin	2.33 ^{ab}	2.23 ^b	2.23 ^b	2.40 ^a	2.26 ^b	0.16	0.05
A/G Ratio	0.53	0.59	0.53	0.53	0.53	0.04	0.67
AST(I.U/L)	185.00	186.33	181.00	184.00	182.00	2.65	0.59
ALT(I.U/L)	23.33	26.00	21.00	23.00	23.33	2.26	0.58
ALP(I.U/L)	304.33	306.67	308.67	316.67	313.33	6.06	0.58
Bun	4.20	4.23	4.23	4.33	4.23	0.15	0.91
Crt(mg/dL)	0.50	0.47	0.43	0.50	0.50	0.02	0.22
Glucose	269.70	257.00	244.70	274.70	254.00	25.98	0.85
Chol(mg/dL)	145.00	143.30	138.70	200.67	198.33	23.72	0.38
Triglycerides	73.33	75.67	71.00	77.67	76.33	9.51	0.96
HDL mg/dl	91.70	87.00	77.30	91.00	90.00	14.48	0.90
Uric acid mg/dl	0.06	0.06	0.05	0.07	0.06	0.01	0.79
LDL mg/dl	38.67	41.20	47.10	61.10	57.20	14.90	0.76

^{ab} = Means in the same row with different superscripts are significantly ($p < 0.05$) different. AST - Aspartate aminotransferase, ALT - Alanine aminotransferase, ALP - Alkaline Phosphate, Chol - Cholesterol, T.P - Total protein, T.G - Total globulin, HDL - High density lipoprotein, Crt - Creatinine.

effects. Recent studies indicate that MPLE's bioactive compounds (e.g., flavonoids, mimosine) may enhance innate immunity by stimulating macrophage activity and cytokine production (e.g., IL-10, IFN- γ) without triggering inflammatory cascades (Munasi *et al.*, 2024). The normal ranges for PCV (24.9–45.2%), hemoglobin (7.77–9.10 g/dL), and RBC counts confirm MPLE's safety and nutritional efficacy. Stable RBC counts indicate unimpaired oxygen delivery, which is corroborated by Mandal *et al.* (2022), where MPLE's iron content (308.47 mg/L)

supported erythropoiesis without inducing anemia. Albumin levels (1.23–1.30 g/dL) may reflect breed-specific metabolism rather than hepatotoxicity, as MPLE has demonstrated hepatoprotective effects in chicks at doses $\leq 2,560$ mg/kg (Nghonjuyi *et al.*, 2016). The significant change observed in globulin at the level obtained suggested that MPLE does not disrupt liver/kidney function or protein synthesis. Mandal *et al.* (2022) opined that MPLE's L-mimosine showed high binding affinity (–5.7 to –6.1 kcal/mol) to bacterial proteins (e.g., *E. coli* DNA

Table 5. Effects of *Mimosa pudica* leaf extract (MPLE) in drinking water on rectal temperature of broiler chicken.

Parameters	T1 (Control)	T2 (10mls) MPLE	T3 (20mls) MPLE	T4 (30mls) MPLE	T5 (40mls) MPLE	SEM ±	P-value
R.T (°C) at 4weeks	41.27	41.20	41.18	41.47	41.42	0.15	0.63
R.T (°C) at 8weeks	41.73	41.60	42.43	42.07	42.23	0.23	0.18

Note: RT – Rectal Temperature.

Table 6. Effects of *Mimosa pudica* leaf extract (MPLE) on the footpad dermatitis of broiler chicken at 4 weeks and 8 weeks.

Parameters	T1 (Control)	T2 (10mls) MPLE	T3 (20mls) MPLE	T4 (30mls) MPLE	T5 (40mls) MPLE	SEM ±	P-value
Footpad (4weeks)	0.67 ^c	2.33 ^a	1.67 ^{ab}	1.87 ^b	2.00 ^b	0.449	0.096
Footpad (8weeks)	0.31 ^c	1.33 ^a	1.31 ^b	1.31 ^b	1.03 ^b	0.309	0.074

^{abc} = Means in the same row with different superscripts are significantly ($p < 0.05$) different.

gyrase), potentially reducing infection-driven globulin spikes. Moreover, improved feed conversion ratios (FCR) in broilers fed similar phyto-genic additives support MPLE's role in metabolic efficiency (Arisha *et al.*, 2024).

Welfare parameters

The carminative property of *Mimosa pudica* leaf extract can be related to the results observed in the rectal temperature. The plant has a high degree of stimulating and carminative properties, causing a reflex flow of saliva, with increased secretion of gastric juice and improved appetite. *Zingiber officinale* enhances gastrointestinal motility—relieving colic and gas via belching—and in adequate doses causes superficial vasodilation, warmth, sweating, and mild temperature reduction (Kausar *et al.*, 2021). However, for the footpad, the results strongly show a significant level of footpad dermatitis across the treatments though at a minimal level at the finisher phase which might have being due to any of the following assertions: litter management (litter material and litter depth), ventilation and temperature control, water supply and water management, stocking density, feed and nutrition. The results strongly support that there is a complex relationship between the overall flock health status and the production environment. The results show that a substantial proportion of broilers displayed moderate condition of pododermatitis, which is in accordance with previous studies (Bassler *et al.*, 2013; Kittelsen *et al.*, 2017). The highest FPD score in T2 (10 mL), followed by T5 (40 mL), suggests a biphasic (hormetic) effect of the intervention of *Mimosa pudica* extract. The biphasic response observed aligns with the principle of hormesis, a well-documented dose–response relationship where low doses of a bioactive compound stimulate beneficial biological effects, while higher doses produce neutral or even inhibitory effects (Mattson, 2008). The study also

highlights how plant-derived compounds (e.g., resveratrol, green tea polyphenols) induce hormetic responses across multiple species (Calabrese, 2021). The lowest FPD score in T3, where 20 mL/L of *Mimosa pudica* extract was administered, aligns with findings that mid-range doses of *Mimosa* leaf extracts optimally strengthen intestinal barrier function—via suppression of TNF- α and COX-2—and reduce systemic inflammation, thereby mitigating peripheral tissue damage (Silva *et al.*, 2018; Silva *et al.*, 2021). The decline in footpad development observed in T5 (40 mL/L) suggests a rebound effect, consistent with reports that excessive doses of plant-derived phytochemicals may impair wound healing rather than promote it. High concentrations of bioactive compounds can disrupt the delicate balance of pro-inflammatory and anti-inflammatory signalling, ultimately interfering with tissue regeneration. This biphasic or hormetic response is well documented in wound healing literature (Thangapazham *et al.*, 2016). Scores >2 (Butterworth scale) indicate clinical relevance. The week-4 T2 score (2.33) suggests mild pain, but resolution by week 8 aligns with 2023 AWIN protocol benchmarks. However, the decline in FPD scores across all groups by week 8, especially in T2 (from 2.33 to 1.33), may be an indication of an adaptive immune activation. Kowalczewski and Mikulski (2024) opined that phyto-genics like *Mimosa pudica* induce T-regulatory cell proliferation by week 6, resolving early inflammation also. By week 8, the plant extract treatment caused a significant shift in litter microbial communities—as revealed by metagenomic sequencing—marked notably by a reduction in *Clostridium* spp., which are strongly associated with increased footpad dermatitis severity” (Díaz Carrasco *et al.*, 2016)

Conclusion

It can be concluded that MPLE in water of broiler chicken

up to 40 mls per litre had no detrimental effects on blood profile, rectal temperature and footpad dermatitis of broiler birds. Also that MPLE's haematological stability reflects its dual role as an immunomodulator and antioxidant, as validated by recent *in vitro* and *in vivo* studies.

Recommendation

It is thus recommended that further research should explore optimal dosing and synergistic formulations with other phytochemicals.

CONFLICT OF INTEREST

No conflict of interest before, during and after the study of the experiment.

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