EFFECT OF MIMOSA PUDICA LEAF EXTRACT ON RECTAL TEMPERATURE AND FOOTPAD OF BROILER CHICKENS

***Akinosun, A.A., Balogun, A.S., Omojowo, D. D., Akanmu, O.C., Raji, M.O., Akingbade, Z.O. and Azeez, S.A.**
Department of Animal Health and Production Technology
Oyo State College of Agriculture and Technology, Igboora, Oyo State
**Corresponding author: akinbola_akin2113@yahoo.com; +2348035607241*

ABSTRACT
A study was carried to determine the effect of Mimosa pudica leaf extract (MPLE) on rectal temperature and footpad dermatitis of broiler chicken. A total number of three hundred (300) unsexed day-old broiler Marshal ® chicks were purchased from a reputable hatchery. 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 results showed no significant (P>0.05) differences was obtained on rectal temperature while significant (P<0.05) differences were obtained both at the 4th and 8th week for footpad dermatitis using A. Butterworth (University of Bristol, North Somerset, UK) grading system. At the 4rd week, T2 (10mls) had the highest mean value 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 obtained. It was concluded that Mimosa pudica leaf extract inclusion in drinking water of broiler chicken had no detrimental effects on the rectal temperature and footpad dermatitis of broiler birds and the level of pododemertitis noticed were mainly due to liter management. Thus, it can be included up to 40mls/liter for regular welfare attribute in broiler production
Keywords: Broiler, Rectal temperature, Footpad, Dermatitis, Chick, *Mimosa pudica*

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, are 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 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 characterized 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 high temperature, FPD and other health issues in poultry has heavily relied on antibiotics and 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 Organization (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. Phytogenic feed additives, derived from plants, have shown promise due to their natural bioactive compounds and minimal side effects (Windisch *et al.,* 2017). *Mimosa pudica*, commonly known as the sensitive plant, is a tropical legume recognized 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). Recent studies have begun to explore its potential in veterinary applications, particularly in improving poultry health. . thus, the study aims to determine the phytogenic potentials of *Minosa pudica* leaf extract on the welfare of broiler chicken

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 from Igbo-ora community and environs. The leaf with the stem was rinsed with clean water then and weighed. 1kg of the harvested plant was added to 2Litres 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

Experimental animal managements

A total number of three hundred (300) Marshal® day-old male 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 10days. On arrival, chicks were carefully removed from their boxes and randomly allotted into groups. Water and feed were supplied ad libtum. 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 diets that was used until 28 days of age and a finisher diet till 56 days of age. All diets for each period were prepared with the same batch of ingredients and all diets with the same composition.

Experimental Design

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

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 $^{\circ}$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 week experimental period, 3 birds per treatment were randomly selected from each treatment for footpad evaluation after slaughtering. Scoring scale for pododermatitis in broiler chickens was used for the evaluation. The feet of each bird was 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 ranges 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.

RESULTS

The results of the effects of *Mimosa pudica* leaf extract (MPLE) on rectal temperature of broiler chicken is presented in Table 1. The result of the rectal temperature of the birds showed there were no significant

(P>0.05) difference at both starter and finisher phases of the study. The temperature ranged between 41.18 – 41.73 at both phases.

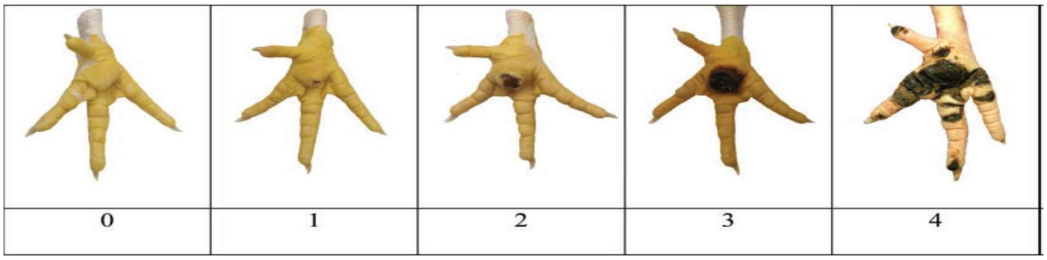

Plate 1: Photograph from A. Butterworth (University of Bristol, North Somerset, UK).

Table 1: 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

The results of footpad dermatitis of broiler birds fed *Mimosa pudica* leaf extract (MPLE) is presented in **Table 2.** 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 4rd week, T2 (10mls) had the highest mean value 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 obtained

Table 2: Effects of *Mimosa pudica* leaf extract (MPLE) on the footpad dermatitis of broiler chicken at 4 weeks and 7 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 (7weeks)	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

DISCUSSION

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 the stimulating and carminative properties, causing a reflex flow of saliva, with increased secretion of gastric juice and improved appetite. Gastro-intestinal movements are augmented, with consequent eructation of gas and relief of colic. In sufficient doses, the plant dilates the superficial vessels of the skin, causing a feeling of warmth followed by diaphoresis and some reduction of temperature (www.henriettesherbal.com).

However, for the footpad, the results strongly show a significant level of footpad dermatitis across the treatment groups 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. One of the most important factors in broiler production is the litter quality. Litter plays several very important roles such as moisture absorption, thermal insulation and allows bird-scratching (Grimes *et al.*, 2002; Bilgili *et al.*, 2009). It affects general health status, productive parameters, carcass quality, and welfare of broilers (Eichner *et al.*, 2007; Bilgili *et al.*, 2009).

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). This indicates that potentially painful conditions are present in the flock level, which may thereby compromise animal welfare (Danbury *et al.*, 2000; Weeks *et al.*, 2000; Sanotra *et al.*, 2002; Caplen *et al.*, 2013; Hothersall *et al.*, 2016).

CONCLUSION

It was concluded that *Mimosa pudica* leaf extract inclusion in drinking water of broiler chickens had no detrimental effects on the rectal temperature and footpad dermatitis of broiler birds and the level of pododemertitis noticed were mainly due to litter management. Thus, it can be included up to 40mls/liter for regular welfare attribute in broiler production.

ACKNOWLEDGEMENT

I want to sincerely appreciate the financial support for this research which was provided by the TERTIARY EDUCATION TRUST FUND (TETFUND), OSYCATECH, Igboora.

REFERENCES

Bassler, AW, Arnould, C, Butterworth, A, Colin, L, De Jong, IC, Ferrante, V, Ferrari, P, Haslam, S, Wemensfelder, F and Blokhuis, HJ 2013. Potential risk factors associated with contact dermatitis, lameness, negative emotional state, and fear of humans in broiler chicken flocks. *Poultry Science*, 92, 2811–2826.

Bilgili, S. F., Hess, J. B., Blake, J. P., Macklin, K. S., Saenmahayak, B and Sibley, J. L. (2009). Influence of bedding material on footpad dermatitis in broiler chickens. *The Journal of Applied Poultry Research*, *18*(3), 583–589. https://doi.org/10.3382/japr.2009- 00023

Caplen, G, Colborne, GR, Hothersall, B, Nicol, CJ, Waterman-Pearson, AE, Weeks, CA and Murrell, JC 2013. Lame broiler chickens respond to non-steroidal anti-inflammatory drugs with objective changes in gait function: a controlled clinical trial. *The Veterinary Journal*, 196, 477–482.

Danbury, TC, Weeks, CA, Chambers, JP, Waterman-Pearson, AE and Kestin, SC 2000. Self-selection of the analgesic drug carprofen by lame broiler chickens. *Veterinary Record*, 146, 307–311.

Eichner, G., Vieira, S. L., Torres, C. A., Coneglian, J. L. B., Freitas, D. M., & Oyarzabal, O. A.(2007). Litter Moisture and Footpad Dermatitis as Affected by Diets Formulated on an All-Vegetable Basis or Having the Inclusion of Poultry By-Product. *The Journal of Applied Poultry Research*, *16*(3), 344–350. https://doi.org/10.1093/japr/16.3.344

FAO. (2021). "Global poultry production statistics." Food and Agriculture Organization.

Grimes, J.L., Smith J and Williams. C.M. (2002). Some alternative litter materials used for growing broilers and turkeys. World's Poultry Science Journal 2002;58:515-526.

Hothersall, B, Caplen, G, Parker, RMA, Nicol, CJ, Waterman-Pearson, AE, Weeks, CA and Murrell, JC 2016. Effects of carprofen, meloxicam and butorphanol on broiler chickens' performance in mobility tests. *Animal Welfare*, 25, 55–67

Kittelsen, KE, David, B, Moe, RO, Poulsen, HD, Young, JF and Granquist, EG 2017. Associations between gait score, production data, abattoir registrations and post mortem tibia measurements in Norwegian broiler chickens. Poultry Science, 96, 1033–1040.

Sanotra, GS, Lund, JD and Vestergaard, KS 2002. Influence of light-dark schedules and stocking density on behaviour, risk of leg problems and occurrence of chronic fear in broilers. *British Poultry Science*, 43, 344–354.

Weeks, CA, Danbury, TD, Davies, HC, Hunt, P and Kestin, SC 2000. The behaviour of broiler chickens and its modification by lameness. *Applied Animal Behaviour Science*, 67, 111–125.

WHO. (2018). "Antibiotic resistance: Multi-country public awareness survey." World Health Organization.

Windisch, W., Schedle, K., Plitzner, C., & Kroismayr, A. (2017). Use of phytogenic products as feed additives for swine and poultry. *Journal of Animal Science*, 86(14_suppl), E140-E148.