INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print) 2222-5234 (Online)
http://www.innspub.net
Vol. 26, No. 5, p. 148-152, 2025

RESEARCH PAPER OPEN ACCESS

Effect of Chinese Malunggay (*Sauropus androgynus* L.) leaf meal on hematological parameters of broiler chickens

Mekka A. Galuyo*[1], Jay-Mar S. Cacayan[2], Mark Joker L. Marcos[2]

[1]*Central Graduate School, Isabela State University, Echague, Isabela, Philippines*

[2]*College of Agriculture, Isabela State University, Echague, Isabela, Philippines*

Key words: Broiler, Chinese malunggay leaf meal, Hematological characteristics, SDG- 12

http://dx.doi.org/10.12692/ijb/26.5.148-152 Article published on May 05, 2025

Abstract

The study was carried out to investigate the hematological characteristics of broiler chicken as influenced by Chinese malunggay (*Sauropus androgynus* L.) leaf meal (CMLM) aligns to SDG 12 - Responsible Consumption and Production. The broilers were allotted into five dietary treatments of ten broilers distributed into three replicates each. The diets formulated with CMLM were included at 0%, 3%, 6%, 9%, and 12% levels respectively following in a Completely Randomized Design. The blood samples were collected from each of the 30 broielrs. Three ml blood samples were taken through the vein in the neck using a syringe, put in labeled sterile bottles containing EDTA tube and taken to the laboratory for analysis to determine hematological indices. Collection was done on the morning before the study terminated. No significant differences in hematological parameters were identified. The RBC and hematocrit readings were lower than the reference ranges, although the WBC and hemoglobin levels were greater. The study showed that CMLM had no positive influence on the hematological parameters of broiler chickens and was safe to use as a broiler feed additive.

* **Corresponding Author:** Mekka A. Galuyo ✉ galuyomhaccoy22@gmail.com

Introduction

The poultry industry in the developing countries is facing some challenges, one of which is increase in the cost of feed because of high prices of protein and energy sources (Abbas, 2013).

Livestock feed costs in developing countries are a continuing challenge. The high and increasing prices for animal feeds have compelled researchers to direct their attention to non-conventional feed sources, with particular emphasis on protein substitutes. The use of leguminous multipurpose trees and shrubs has been suggested to be a viable alternative source of proteins, vitamins and minerals for poultry feeding. Plant leaves are commonly processed into leaf meals for use as poultry feed. Examples of the leaf meals which have been widely used in feeding non-ruminant animals include *Leucaena leucocephala*, *Gliricidia sepium*, *Sesbania sesban* and *Manihot esculenta* (Gadzirayi *et al.*, 2012).

One herbal plant whose leaves are suitable for feeding to livestock and poultry is Chinese malunggay (*Sauropus androgynus* L. Merr). The vegetable plant known as Chinese malunggay (*Sauropus androgynus* L. Merr) is frequently seen in Southeast Asia. It is rich in nutrients, has antimicrobial properties, and is an active source of beta carotene along with other phytochemical components, saponins, flavonoids, tannins, and isoflavonoids. According to (Santoso, 2009), saponins have a high nutritional content (23.13% crude protein), and their bioactive components include phenols, flavonoids, alkaloids, tannins, terpenoids, and steroids. Saponins have also been demonstrated to be effective as anti-cancer, anti-microbial, and immune system enhancers in the body (Mashayekhi *et al.* 2018).

In broiler chickens, flavonoids can boost immunity and function as antioxidants (Kamboh *et al.,* 2016). Red blood cell formation can be stimulated and free radical damage can be prevented by saponins (Manjaniq *et al.*, 2017). According to Santoso (2000), Bidura *et al.* (2007), and Nasution *et al.* (2014), adding katuk leaf meal to rations can enhance poultry performance, boost ration usage efficiency, and decrease fat formation in the abdomen, liver, and carcasses. It can also lower *Salmonella* sp. and *Escherichia coli* in waste products, but boosts beneficial microorganisms such *Lactobacillus* sp. and *Bacillus subtilis* (Santoso *et al.,* 2001).

Haematology has been defined as the study of blood and an important part of clinical pathology as well as diagnostic process (Lutz and Pryluski, 2008). Haematology includes not only the examination of the cellular and fluid portions of blood, but also includes a study of the tissues that form, store and circulate blood cells. However, the serum is the component that is neither a blood cell nor a clotting factor. It is the part of blood that is like water and that contains substances (called antibodies) that fight disease. Serum includes all proteins not used in blood clotting and all the electrolytes, antibodies, antigens, hormones and any exogenous substances (Martin, 2007).

The result of haematology and serum analysis is usually used to assess the health status of an animal. Haematological and serum parameters have been observed as good indicators of the physiological status of animal and their changes are important in assessing the response of such animal to various physiological situations (Khan and Zafar, 2005). Hence, the study was conducted to evaluate the haematological profile of broiler chicken fed diet containing Chinese malunggay leaf meal in terms of white blood cells count, red blood cells count, differential count, hemoglobin count and hematocrit.

Materials and methods

One hundred fifty 3 -day old broiler chickens were randomly distributed to five treatments with 10 broilers per replicate. The broilers were fed with 4 dietary treatments of Chinese malunggay leaf meal (CMLM) levels and 1 control group described as follows: Treatment 1- 0% CMLM, Treatment 2- 3% CMLM, Treatment 3- 6% CMLM, Treatment 4- 9% CMLM, and Treatment 5- 12% CMLM.

A total of fifteen (15) cages were used and prepared measuring 3 × 5 feet. The poultry house was made from locally available material 1×2 and 2×2 lumber, welded and amazon screen was used in the experimental study and each cage was supplied by 25 watts incandescent bulb.

Fresh Chinese malunggay leaves were collected in the different areas of San Guillermo, Isabela.

After harvest, the leaves were immediately chopped and air dried in a plastic net, turning the leaves occasionally for uniform dryness. The dried leaves were hammer-milled through 2-mm sieve. This was mixed to other feed ingredients to make a formulated ration appropriate for the broilers.

The experimental diets were formulated to meet the recommended nutrients for broiler following the standard set by PHILSAN on Feed Reference Standards (4th Ed.). The diets were made isonitrogenous and isocaloric. The ingredients used are corn meal, rice bran, fish meal, salt, vitamins, limestone and Chinese malunggay leaf meal. For the first week the feed was placed on an old newspaper. And for the rest of the experimental period it was placed in a plastic feeder. *Ad libitum* feeding was practiced throughout the study.

The blood samples were collected from each of the 30 birds. Three ml blood samples were taken through the vein in the neck using a syringe, put in labeled sterile bottles containing EDTA tube and temporarily stored in a coolbox, then taken to the laboratory for analysis to determine hematological indices such as the red blood cells count, white blood cells count, hemoglobin and hematocrit. Collection was done on the morning before the study terminated. The samples were brought to the laboratory for the analysis.

Data gathered and statistical analysis

The blood characteristics of broiler in the different treatment groups were evaluated based on the blood cells count, white blood cells count, hemoglobin and hematocrit.

All the data gathered were subjected to Analysis of Variance using the Statistical Tool for Agricultural Research (STAR) following a Completely Randomized Design (CRD).

Results and discussion

Hematological indices of broiler chicken

The result of the hematological profile of broiler chicken fed with Chinese malunggay leaf meal is shown in Table 1. Heamatology is available in assessing the physiological responses of chicken (Akintomide *et al.*, 2021; Mitruka and Rawnsley, 1977).

Red blood cell (RBC)

RBC transports oxygen to animal tissues for the oxidation process to release energy and transport carbon-dioxide out of the tissues (Omiyale *et al.*, 2012) and the manufacture of haemoglobin.

The results did not show any significant variation among treatments with the observed mean values range between 1.75 – 2.15 *10^9/L which is within the normal range for healthy broiler chicken. This shows the CMLM enabled proper functioning of the RBC in respiration, expiration supply of nutrients and manufacture of hemoglobin which indicates a better health status. The no significance variance in RBC could be due to nutrient content such as iron and the crude protein present in the leaf meal. Iron is essential in body functions such as formation of haemoglobin and myoglobin (El-bashier *et al.*, 2012). These rich nutrients have blood boosting ability and a rich blend of amino acids.

White blood cell (WBC)

White Blood Cell (WBC) defends the body against invasion by foreign organisms and to supply antibodies for immune response. The WBC values obtained in this study range between 61.72 – 79.80 *10^9/L which is higher than the reference ranges for chicken. All the inclusion levels were higher than the normal range indicating that the CMLM influenced the broiler's immune status being an intrinsic body defense system and will optimize under stressful condition. Animals with high WBC values can

generate antibodies and a high degree of disease resistance (Soetan and Oyewol, 2009). The increase in WBC could also be attributed to the presence of some Phytochemicals in bitter leaf which induces the animal to respond as if it had an infection (Onunko *et al.*, 2022) or due to the presence of residual anti-nutrients which induces production of more antibodies that stimulate more WBC production to fight the infection being a defense system. Birds with low WBC are exposed to high risk of disease infection while an increase can produce antibodies in the process of phagocytosis and have a higher degree of disease resistance (Soetan and Oyewol, 2009). The increase in WBC indicates a superior disease fighting ability showing that the CMLM did not compromise the bird's immunity (Eroschenko, 2000).

Table 1. Hematological characteristic of broiler fed diet with Chinese malunggay leaf meal

Hematological indices	Reference ranges	CMLM Levels					CV %	Pr (> F)
		1 (0%)	2 (3%)	3 (6%)	4 (9%)	5 (12%)		
Red blood cells 10^9/L	3.22 – 5.26	2.06	1.75	2.09	2.15	1.86	12.27	0.2995
White blood cells 10^9/L	30.53 – 39.03	73.98	68.03	61.72	79.80	67.50	12.62	0.2014
Hematocrit %	30.00 – 45.00	24.00	20.83	19.20	24.60	21.37	11.47	0.1194
Hemoglobin g/dL	8.93 – 10.45	9.67	8.53	8.10	10.13	9.40	11.80	0.2093

Hematocrit

Hematocrit or Packed Cell Volume (PCV) is involved in the transport of oxygen and absorbed nutrients round the body delivering it to target cells or tissues. The hematocrit values in this study ranged between 19.20 – 24.60% which is lower than the reference ranges. The obtained lower values could be due to sex. Onunko *et al.* (2022) reported that the female chick tends to have a lower value than the male as estrogen level impairs erythrocyte synthesis (Fair *et al.*, 2007) or due to dehydration since PCV represents an increase in the number of RBCs or a reduction in the circulatory plasma volume (Chineke *et al.*, 2006). Dehydration results in a low fluid in the blood and therefore, a high RBC and its associated parameters. It is indicative that the experimental birds were not anaemic since Hb and RBC values were within the normal range for healthy broiler chicken Onunko *et al.* (2022), but there could have been dehydrated; this condition will be reversed when the water intake improves.

Haemoglobin (Hb)

Haemoglobin (Hb) values of the experimental broiler chickens are 8.10-10.13 g/dL which are within the normal range. Haemoglobin is the oxygen carrying protein in the RBC. An Hb level is a direct reflection of the amount of oxygen in the blood. Increased Hb is seen in dehydration, chronic obstructive pulmonary disease etc. while a decrease results in anaemia, blood loss, liver disease etc. (Onunko *et al.*, 2022).

Conclusion

Based on the results of the study, no significant differences in hematological parameters were identified. The RBC and hematocrit readings were lower than the reference ranges, although the WBC and hemoglobin levels were greater. The study showed that CMLM had no positive influence on the hematological parameters of broiler chickens and was safe to use as a broiler feed additive.

References

Abbas TE. 2013. The use of *Moringa oleifera* in poultry diets. Turkish Journal of Veterinary and Animal Science **37**, 492–496.

Akintomide AA, Osho IB, Onibi GE. 2021. Growth performance and haematology of broiler chickens fed enzyme supplemented neem leaf meal-based diets. Nigerian Journal of Animal Production **48**, 152–164.
https://doi.org/10.51791/njap.v48i5.3196

Bidura IGNG. 2007. Effect of using katuk (*Sauropus androgynus*) and garlic. Pet Scientific Magazine **10**, 17–21.

Chineke CA, Ologun AG, Ikeobi CON. 2006. Haematological parameters in rabbit breeds and crosses in humid tropics. Pakistan Journal of Biological Sciences **9**(11), 2102–2106.

El-Bashier OM, Hashish SM, Ali RA, Arafa SA, El-Samee LDA, Olemy AA. 2012. Effects of feeding organic zinc, manganese and copper on broiler growth, carcass characteristics, bone quality and mineral content in bone, liver and excreta. International Journal of Poultry Science **11**(6), 368–377.

Eroschenko VP. 2000. Di Fiore's atlas of histology with functional correlations (9th ed.). Lippincott Williams and Wilkins, USA.

Fair J, Whitaker S, Pearson B. 2007. Source of variation in hematocrit in birds. Scientific Journal of British Ornithologists' Union **149**(3), 535–552.

Gadzirayi CT, Masamha B, Mupangwa JF, Washaya S. 2012. Performance of broiler chickens fed on mature *Moringa oleifera* leaf meal as a protein supplement to soybean meal. International Journal of Poultry Science **11**(1), 5–10.

Khan TA, Zafar F. 2005. Haematological study in response to varying doses of estrogen in broiler chicken. International Journal of Poultry Science **10**, 748–751.

Lutz C, Pryztulski K. 2008. Nutrition and diet therapy (4th ed.). Jaypee Brothers Medical Publishers, New Delhi, pp. 312.

Manjaniq A, Wihandoyo, Dono ND. 2017. The effect of dietary violet roselle flower and moringa leaf meal supplementation on the blood profile of broiler chickens. The 7th International Seminar on Tropical Animal Production, Yogyakarta, Indonesia, 12–14 September 2017.

Martin P. 2007. The moringa tree. Echo, North Fort Myers, FL, USA. http://www.echonet.org

Mashayekhi H, Mazhari M, Esmaeilipour. 2018. Eucalyptus leaf powder, antibiotic and probiotic addition to broiler diets: Effect on growth performance, immune response, blood component, and carcass traits. Animals **12**, 2049–2055.

Mitruka BM, Rawnsley HM. 1977. Clinical, biochemical and haematological reference value in normal experimental animals. Masson Publishing.

Nasution RAP, Atmomarsono U, Sarengat W. 2014. The effect of using katuk leaf flour (*Sauropus androgynus*) in rations on the performance of broiler chickens. Journal of the Bachelor of Animal Husbandry Study Program, Faculty of Animal Husbandry and Agriculture, Diponegoro University, Semarang.

Omiyale CA, Yisa AG, Ai-Dunkrah LA. 2012. Haematological characteristics of Yankasa sheep fed fonio (*Digitaria iburua*) straw-based diets. Proceedings of the 37th Annual Conference of Nigerian Society of Animal Production.

Onunkwo DN, Ufot UE, Ezenyilimba BN, Omumuabuike JN, Ezeoke F. 2022. Blood profile of starter broiler chickens fed diet containing leaf meal composite as alternative to commercial broiler premix. Nigerian Journal of Animal Science **24**(2), 103–110.

Santoso U, Sartini. 2001. Reduction of fat accumulation in broiler chickens by *Sauropus androgynus* (katuk) leaf meal supplementation. Asian-Australasian Journal of Animal Science **14**, 346–350. https://doi.org/10.5713/ajas.2001.346

Santoso U. 2000. Effect of early feed restriction-refeeding on growth, body composition and lipid accumulation in mixed-sex broiler chicks. Research Reports, ITSF, Jakarta.

Soetan K, Oyewol O. 2009. The need for adequate processing to reduce the antinutritional factors in plants wild yam (*Dioscorea* spp.). Tropical and Subtropical Agroecosystems **8**, 319–325.