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Blood profile of broiler chickens fed with sweet leaf meal under range management system

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Abstract

The experiment was conducted to investigate the blood profile of broiler chickens fed sweet leaf meal (SLM) under range management system, in line with Sustainable Development Goal 12: Responsible Consumption and Production. One hundred fifty-seven-day-old broiler chickens were randomly assigned to five (5) treatments of ten (10) broilers each, with three replications containing 0, 3, 6, 9, and 12% SLM put out in a Completely Randomized Design (CRD). Blood samples (3ml) were drawn from one broiler per replicate on the last day of the study. The broilers were bled through the marginal wing vein. The samples were taken and place in a labelled sterile universal bottle containing 1.0 mg/ml ethylenediaminetetraacetic acid and used for haemato-logical analysis. The results revealed that the various levels of SLM had no effect on the red blood cell count (RBC), white blood cell count (WBC), hematocrit (PCV), or hemoglobin. The detected blood profile readings are within typical physiological standards, with the exception of WBC, which is higher. The findings of this study suggest that adding varying levels of SLM to broiler rations under range management has no negative effect on the blood profile.

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Introduction

In poultry production industry, rearing chickens in range systems is a profitable alternative for small and medium farmers, as their products are sold to a niche market where a large number of consumers is willing to pay higher prices for them. In general, one of the main factors affecting the purchase decision mentioned by consumers of range chicken products is taste, which is considered different from those of conventionally produced broilers, whereas price is considered secondary (Zanussi and Dionello, 2003).

Range broiler is applied to broilers fed exclusively plant ingredients of plant origin, and the use of growth promoters is not allowed. Broilers are reared in paddocks and slaughter at a minimum of 8 weeks of study.

In general, the carcass composition of range broilers presents variations that are influenced by several factors, such as genetics.

Studies on carcass and cuts yield present useful information to guide the producer to the choice of the bird's strain and management to adopt, in order to meet the expectations of the consumers, who prefer chickens with higher breast, thigh and drumstick yields.

In production chain, the search for alternative feedstuffs that may adequately and economically replace the traditionally used feed ingredients allows the economic viability of range broilers. In many countries different types of plant extracts have been used in traditional medical systems to treat for microbial disease. Some researcher reported that phytochemicals present in those plants having antimicrobial and antioxidant properties are the reason for this ability to use them in disease treatments. Antimicrobial activities of some phytochemicals present in such plants have been investigated and the possibility of using them to develop new antimicrobial drugs has also been studied (Akinmoladun *et al.*, 2007; Dalukdeniya *et al.*, 2016; Bukar *et al.*, 2010; Adriani *et al.*, 2015). Phytochemical compounds contained in it include saponins, flavonoids, and tannins (Santoso *et al.*, 2005) and several other phenolic compounds that have antimicrobial activity (Bukar *et al.*, 2010).

It has been known that some particular foliages contain a number of bioactive compounds that are beneficial for the health of chickens (Rama Rao *et al.*, 2019). These compounds include vitamins, phenolic acids, flavonoids, isothiocyanates, tannins as well as saponins (Vergara-Jimenez *et al.*, 2017). In this regard, the use of leaf meal in rations may not only reduce the cost of feeds, but also elicit the health-promoting effect on broiler chickens. Apart from their benefits, the use of leaf meals in broiler diets may be limited by their high content of crude fibre (Santoso and Sartini, 2001; Ubua *et al.*, 2019). In general, broiler chickens showed low tolerance to dietary fibre, and therefore feeding diets containing high levels of leaf meal may impose in compromised nutrient digestibility and thus alleviated growth performance of broilers (Buragohain, 2018).

With the use of the sweet leaf meal on range broiler production, it will support the Sustainable Development Goals (SDG) of the United Nations on SDG 1: No poverty, SDG 2: Zero Hunger, SDG 12: Responsible Consumption and Production as it will provide knowledge to small-scale farmers to achieve established food security, as well as enhance the competitiveness of their businesses to increase their income and welfare. Hence, the study was conducted to evaluate the blood profile of broiler chicken fed sweet leaf meal in terms of white blood cells count, red blood cells count, hemoglobin count and hematocrit under range management system.

Materials and methods

Experimental ranged area

A total of fifteen (15) cages were constructed and provided with fenced yard used in the study. The ranging area has a dimension of 280 cm length x 300 cm width. It was established with the use of locally available materials such as lumber, bamboo and other usable materials and each cage was supplied by 25 watts incandescent bulb. Plastic net was used as divisional fence for the open yard. Its surrounding was thoroughly cleaned and disinfected before stocking.

Processing of SLM

The fresh leaves of green sweet leaf (SL) leaves were harvested in different areas of Lamut, Ifugao. The leaves were later sundried for five days to obtain about 10% moisture. They were thereafter milled by passing through 1mm hammer mill, before been used to formulate the experimental diets.

Experimental diets

Five experimental diets assigned as T1, T2, T3, T4 and T5 were formulated to contain 0, 3, 6, 9, 12 levels of SLM both in the starter and finisher phase.

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 sweet 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.

Blood profile analysis

Blood samples (3ml) were drawn from one broiler per replicate on the last day of the study. The broilers were bled through the marginal wing vein. The samples were taken and place in a labelled sterile universal bottle containing 1.0 mg/ml ethylenediaminetetraacetic acid and used for haemato-logical analysis at the laboratory.

Data gathered and statistical analysis

The blood profile of broiler in the different treatment groups were evaluated based on the red 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).

Results and discussion

Hematological indices are health properties that can be used to assess the effectiveness of diet supplements as reported by Króliczewska *et al.* (2008). According to Adegoke *et al.* (2018), chickens with good health status are likely to show good performance. Moreover, good blood profiles can act as pathological indicators of chickens' responses to toxic substance exposure, as well as organ function.

The blood profile of broilers fed with sweat leaf meal under range management is presented in Table 1. The results obtained from this study shows that the different dietary treatments had no significant effect on all observed on blood parameters. The values for RBC obtained in this experiment ranges from 1.35 to 2.01 * 10^9/L which falls within normal range for healthy broiler chicken. According to the report of Emenalum *et al.* (2009) and Ogbuewu *et al.* (2008) that the number of erythrocytes of animals in good health varies with species, age, sex, diets and clinical conditions of the animal.

Table 1. Blood profile of broiler chicken fed with sweet leaf meal under range management system

Hematological indices	Reference ranges	SLM Levels					CV %	Pr (> F)
		1 (0%)	2 (3%)	3 (6%)	4 (9%)	5 (12%)		
Red blood cells 10^9/L	3.22 – 5.26	1.81	1.90	1.35	2.01	1.64	27.23	0.5510
White blood cells 10^9/L	30.53 – 39.03	63.65	62.88	49.08	66.27	68.30	32.34	0.7872
Hematocrit %	30.00 – 45.00	21.13	15.13	22.30	17.97	21.37	26.99	0.5094
Hemoglobin g/dL	8.93 – 10.45	5.88	9.17	6.67	9.73	8.40	32.93	0.3777

The values for WBC obtained in this experiment of the broiler chicken fed with sweat leaf meal under range management ranges from 49.08 to 68.30 * 10^9/L. It was observed that the present findings were higher than the normal physiological range. Leucocytes are part of the body's defense system that can move after its formation, leucocytes enter the bloodstream and go to the parts of the body that need it. The high value of leucocytes in this study was probably caused by the chicken sample of the study

under stress during blood collection. An increase in the number of WBC/leukocytes indicates that the body's high ability to respond to infections or foreign bodies. Soeharsono *et al.* (2010) suggested that a high number of leukocytes indicate the body is able to fight infection. WBC are used as indicators of stress response and sensitive biomarkers crucial to immune functions (Adeyemo and Sani, 2013), this implies that the birds were not immunologically challenged.

Hematocrit or PCV signifies the presence of blood volume filled by RBC and thus, a measure of oxygen carrying capacity of the blood. The Hb values (5.88 to 9.17 g/dL) observed were above normal ranges (7 - 13g/dl) of chickens (Ameen *et al.*, 2007; Bounous and Abubakar, 2011). The hematocrit values in this study ranged between 15.13 – 22.30% which is lower than the reference ranges. The broilers fed 6% SLM had a higher PCV than the broilers fed 3% SLM. 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).

The hemoglobin is the protein in RBC that transport oxygen to the body's tissue (Lailaba and Aliyu, 2024). The Hb values across all treatments were not significantly different with a mean values ranging from 5.88 to 9.17 g/dL which falls within the reference range. Mitruka and Rawnsley (1977), and Ameen *et al.* (2007) reported in their studies hemoglobin values of 7.0 – 13.0 g/dl and 6.5 – 9.4 g/dl, respectively.

Conclusion

It can be concluded that the various levels of SLM had no effect on the red blood cell count (RBC), white blood cell count (WBC), hematocrit (PCV), or hemoglobin. The detected blood profile readings are within typical physiological standards, with the exception of WBC, which is higher. The findings of this study suggest that adding varying levels of SLM to broiler rations under range management has no negative effect on the blood profile.

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