EFFECTS OF *AZADIRACHTA INDICA* AND *MORINGA OLEIFERA* LEAVES ON THE GROWTH PERFORMANCE AND PACKED CELL VOLUME OF BROILER CHICKEN

UFELE, Angela Nwogor, NWAFOR, Chidinma Judith, OFFOR, Vivian and NWANKWO, Samuel

Department of Zoology, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.

Corresponding Author: Ufele, A. N. Department of Zoology, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. **Email:** ufeleangel@yahoo.com **Phone:** +234 8038989944

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ABSTRACT

This research investigated the effect of Azadirachta indica and Moringa oleifera leaf on the growth performance and PCV of broiler chicks. Sixty four weeks old broiler chicks were used. T_1 was control which contained only chick mash, T_2 contained 20 g of neem leaf meal (NLM), T_3 contained 20 g of Moringa oleifera leaf meal (MLM) and T_4 contained 10 g of NLM and 10 g of MLM. The study lasted for 8 weeks. Result from the study showed that birds on 20 g inclusion of NLM had a significantly ($p<0.05$) higher weight gain (1800 ± 0.70) and mean weight (2650 ± 45.64) followed by the birds on a mixture of 10 g of NLM and 10 g of MLM . Similar trend followed in the specific growth rate even though the difference was not significant ($p>0.05$). The result obtained for the PCV ranged from 35.40 ± 0.07 for the 20 g inclusion of NLM, 36.50 ± 0.21 for the control treatment; 38.60 ± 0.21 for the 10 g inclusion of NLM + 10 g inclusion of MLM and 40.90 ± 0.21 for the 20 g inclusion of MLM. Analysis of variance showed no significant difference ($p>0.05$) in the PCV among the different treatment groups. From the result, it was concluded that neem leaf gave a better performance at 20 g inclusion level in terms of growth performance, followed by the mixture with Moringa at 50:50 inclusion. Also Moringa oleifera performed best in boosting the PCV of broiler.

Keywords: Broiler chicks, *Moringa oleifera*, Neem leaf, Packed cell volume, Growth

INTRODUCTION

The term poultry refers to the rearing of domestic chicken, turkey, ducks and certain other birds for their eggs, meat and feather (Wikipedia, 2020). In the past, poultry was not counted as an important occupation for in some communities, the fowl was simply used as a means of knowing the time (Padhi, 2016). Today it has developed and occupied a place of pride amongst the livestock enterprises due to its rapid monetary turnover (Laseinde, 1994). The poultry industry has become a diverse industry with varieties of business interests such as egg production, broiler production, hatchery, poultry equipment businesses and feed mills springing up (Padhi, 2016). Of all poultry business, broiler production is the fastest growing agricultural business in developing countries; therefore production of broiler is essential and a profitable venture. Broiler production involves the keeping of chicken of heavy meat breeds for the purpose of getting good quality meat. Agriculturists and nutritionists have generally agreed that developing the poultry industry in Nigeria is the fastest means of bridging the protein deficiency gap presently prevailing in the country. It is also the promising source of additional income and quick returns from investment (Oluyemi and

Roberts, 1979). However, poultry industry despite its promising future is faced with the problem of diseases which results to significant mortality. This global rise in the population of disease-causing microorganisms of livestock in general and poultry in particular which often lead to retarded growth and mortality has led to shortfalls in animal protein production and availability, particularly in the developing countries in Africa (Alabi and Isah, 2002). This has compelled research into several non-conventional plant materials with nutritional and antimicrobial properties for possible incorporation into animal feeds so as to reduce microbial loads of animals and as replacements for synthetic antibiotic growth promoters (Ubua *et al*., 2019).

In many tropical and subtropical countries, there are a number of ethnobotanical compounds that have the potential of stimulating growth by virtue of being antibacterial and antifungal (Subapriya and Nagini 2005; Tounekti *et al*., 2019). Most of the plant parts such as fruits, seeds, leaves, bark and roots contain compounds with proven antiseptic, antiviral, antipyretic, anti-inflammatory, antiulcer and antifungal activities (Bhanwra *et al.,* 2000; Subapriya and Nagini 2005). Most common among these products are *Moringa oleifera* which have been incorporated into the traditional food of humans and animals (Anhwange *et al*., 2004), and neem (*Azadirachta indica*) which is an indigenous tropical plant predominant in Nigeria with waste nutritional and medicinal potentials (Ogbuewu *et al*., 2011).

Moringa oleifera contains secondary metabolites, which are biologically active compound of importance in nutrition and pharmacology. They have high amounts of essential nutrients, vitamins, minerals and fatty acids and fibre (Abdull Razis *et al*., 2014). *M. oleifera* has been reported to have medicinal properties (Ghasi *et al.,* 2000; El-Tazi and Tibin, 2014). The medicinal effects of *M. oleifera* have been ascribed to its possession of anti-oxidants, which are known to suppress formation of reactive oxygen species (ROS) and free radicals (Ogbunugafor *et al.,* 2011).

Neem (*A. indica*), popularly known as Indian neem (Margosa) or Indian lilac of the Family Maliaceae, is a tropical tree plant which is widely distributed in Africa and available all year round (Kabeh and Jalingo, 2007; Koona and Budida, 2011; Ogbuewu *et al*., 2011). *A. indica* leaves contain compounds with proven anti-hepatotoxicity (Kale *et al*., 2003). These tropical plants are among non-conventional and available sources of feed ingredients in the tropics with great potential in the 21st century. They are tropical plants widely distributed in Africa and available all year round (Ogbunugafor *et al.,* 2011). These plants are popular because they are readily available, cheap, non-toxic to animals and humans, and efficacious against microbes.

The consumption of numerous dietary components available in these leaves has been shown to have beneficial effects on blood parameters such as the packed cell volume (Esonu *et al.,* 2006). According to Maxwell *et al.* (1990), blood parameters are important in assessing the quality and suitability of feed ingredients in farm animals. Esonu *et al.* (2001) stated that haematological parameters reflect the physiological responsiveness of the animal to its internal and external environments which include feed and feed additives. Animashahun *et al.* (2006) stated that the comparison of blood chemistry profile with nutrient intake might indicate the need for adjustment of certain nutrients upward or downward for different animal groups. An understanding of the antimicrobial effects of these leaves as reflected in the health status and growth performance of birds fed these leaf meal is imperative (Esonu *et al*., 2006). From the above, this study was design to investigate the effects of inclusion of *M. oleifera* leaf meal and *A. indica* leaf meal in diets fed to broiler chicks on their growth performance and PCV.

MATERIALS AND METHODS

Procurement of Experimental Animal: A total of 60 four weeks old Abor Acre broiler breed chicks were randomly assigned in complete randomized block design of four dietary treatments replicated thrice with five birds in each replicate. The stocking density was five birds per meter square. The animals were maintained under standard laboratory condition, that is, a well aerated room with alternating, light and dark cycle of 12 hours each. They were allowed to acclimatize with the environment for one week before the commencement of the experiment. The ethical guideline for use of laboratory animal used in this research was that of NENT (2016). The birds were given feed and water *ad libitum* after daily cleaning and washing of feeders and drinkers. Glucose and vitamins were administered through water. Birds were vaccinated at 3 days old with Newcastle disease vaccine. Then on day 5 with avian viral arthritis. The Newcastle disease and infectious bronchitis on day 7, this was repeated on 12^{th} day with infectious bursal disease vaccine, which was repeated again on 35^{th} day, this time without bursal disease vaccine. Then fowl pox vaccine was given on 24^{th} day. Birds in each group were weighed on a weekly basis and blood samples collected for PCV evaluation.

Experimental Treatments: The broiler chicks used for the experiment were randomly assigned to four treatments. T_1 was the control which were fed only chick mash (Topfeed) and this was used to feed broilers in cage A, T_2 contained 20 g of NLM and was used to feed broilers in cage B, T_3 contained 20 g of MLM and was fed to broilers in cage C and T_4 contained 10 g of NLM and 10 g of MLM and was used to feed broilers in cage D. The birds were fed twice daily at 8:00 am and 6:00 pm throughout the period of study. The experiment lasted for eight weeks.

Estimation of Growth Performance Parameters: Body weight gain was determined by subtracting initial weight from the final weight on weekly basis. Specific growth rate (SGR) was determined using the formula: SGR = Log_eW_2 - Log_eW_1 x 100 (Gous *et al.,* 1999), where W_1 = initial body weight of birds, W_2 = final body weight of birds and T = time taken between W_1 and W_2

Estimation of Packed Cell Volume: Blood samples were collected by bleeding the vein underneath the bird's wings using 2 ml sterile syringes fitted with needles. The blood was immediately drained into microheamatocrit capillary tube and the tube sealed at one end. Collected blood samples were labeled according to the groups respectively for T_1 to T_4. The labeled samples were spun in a heamatocrit centrifuge at 10,000 rpm for five minutes after which microheamatocrit reader was used to determine the packed cell volume which was expressed in percentage (Okeudo *et al.*, 2003).

Data Analysis: The data collected from the experiment was analyzed using Analysis of variance (ANOVA). Significant means were separated using a post hoc test (Least Significant Difference) (William and George, 2008).

RESULTS

The mean weight of broiler chicks fed with different dietary treatments indicated that the highest mean weight was recorded in the birds fed 20 g inclusion of NLM (2650 ± 45.64 g) followed by birds fed 10 g inclusion of NLM + 10 g inclusion of MLM (2500 ± 61.20 g), and 20 g inclusion of MLM (2200 ± 45.71 g) which all exceeded the mean weight of birds fed the control diet (Figure 1).

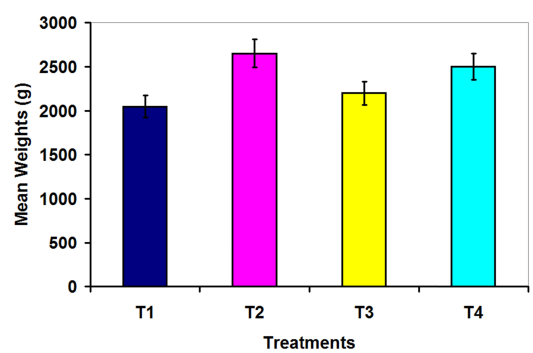

Figure 1: Mean weights of broiler chickens fed diets supplemented with *Azadirachta indica* and *Moringa oleifera* leaf meals

Analysis of variance showed that the birds fed 20 g inclusion of NLM and those fed 10 g inclusion of NLM + 10 g inclusion of MLM (T_2

and T_4) had significantly higher ($p<0.05$) mean weight than other treatments.

The mean weight gain of broiler chick fed with different dietary treatments indicated that birds fed 20 g inclusion of NLM had the highest mean weight gain (1800 ± 0.70 g), followed by the 10 g inclusion of NLM + 10 g inclusion of MLM (1750 ± 2.83) which were significantly higher ($p<0.05$) than that of birds fed 20 g inclusion of MLM (1450 ± 0.70 g) and the control diet (1300 ± 0.70 g) (Figure 2).

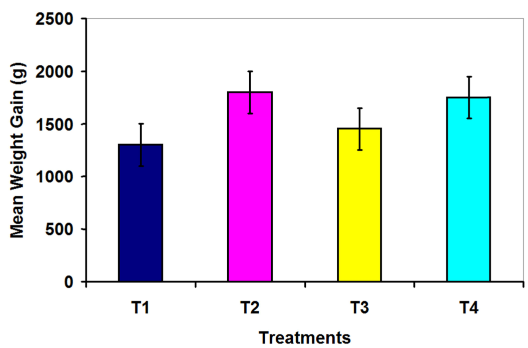

Figure 2: Mean weight gains of broiler chickens fed diets supplemented with *Azadirachta indica* and *Moringa oleifera* leaf meals

The values of specific growth rate of broiler chicks fed with different dietary treatments ranged from 4.85 ± 0.35 for the control treatment, 4.95 ± 0.21; 5.05 ± 0.33 and 5.15 ± 0.07 for the 20 g inclusion of MLM, 10 g inclusion of NLM + 10 g inclusion of MLM and 20 g inclusion of NLM respectively (Figure 3).

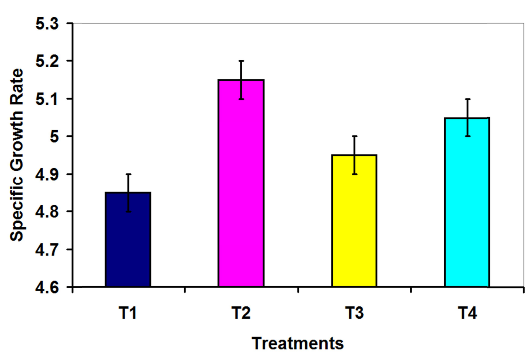

Figure 3: Specific growth rate of broiler chickens fed diets supplemented with *Azadirachta indica* and *Moringa oleifera* leaf meals

The SGR of birds in leaf meal treatment groups numerically exceeded the SGR of birds fed the control diet. Analysis of variance for the SGR showed no significant difference ($p>0.05$).

The mean PCV of broiler chicks fed with different dietary treatments ranged from 35.40 ± 0.07 % for the 20 g inclusion of NLM and 36.50 ± 0.21%, 38.60 ± 0.21 % and 40.90 ± 0.21 % for the control treatment, 10 g inclusion of NLM + 10 g inclusion of MLM and 20 g inclusion of MLM respectively (Figure 4).

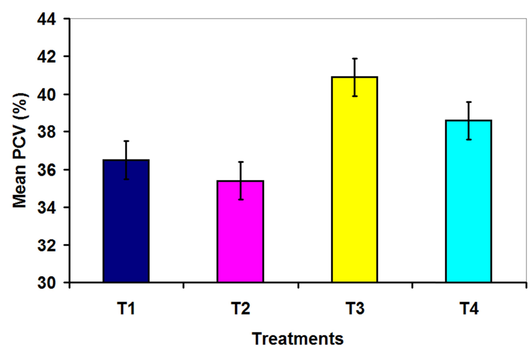

Figure 4: Packed cell volume of broiler chickens fed diets supplemented with *Azadirachta indica* and *Moringa oleifera* leaf meals

Analysis of variance showed no significant difference ($p>0.05$) in the PCV among the different treatment groups.

DISCUSSION

The results obtained from this study showed that the birds on 20 g inclusion of NLM had a significantly higher performance in terms of mean weight) and mean weight gain followed by the birds on a mixture of 10 g NLM and 10 g MLM. Similar trend was recorded in the specific growth rate even though the difference was not significant. The result obtained for this study concurred with the study of Osuoha (2011) who reported the efficacy of *Gongronema latifolium* leaf in increasing body weight of broiler birds and thus enhanced their growth performance.

The result obtained for birds fed NLM in this study may be due to antimicrobial and antiprotozoal properties of neem leaves, which help to reduce the microbial load of birds and improve the feed utilization in birds. Onyimonyi and Onu (2009) have reported that pawpaw leaf meal as protein ingredient for finishing broiler enhanced performance in poultry through increased feed intake and weight gain by significantly decreasing the bacterial counts. Surprisingly, in the present study, the birds fed a mixture of 10 g inclusion of NLM and 10 g inclusion of MLM had a better performance than for birds fed 20 g inclusion of MLM. This may imply that neem leaf is a superior herb to *Moringa* leaf in terms of poultry nutrition, and should be incorporated in the diets of birds to give optimum performance even at reduced concentrations. The result for the birds fed 20 g MLM in this study was not significantly greater than the control diet. This observation was consistent with the report of Juniar *et al.* (2008) who reported that inclusion of *M. oleifera* leaf meal up to 10 % did not produce significant effects (p>0.05) on feed consumption, body weight, feed conversion ratio, carcass weight, production efficiency factor and income over feed cost of broiler birds.

The results obtained for the PCV values of the different treatment groups are within the normal range of PCV of 22 to 35 % for broilers as outlined by Zwart *et al.* (1996). This implies that the leaf meal used for this study did not significantly increase or decrease the PCV of the birds. This finding was consistent with the finding of Mensah *et al.* (2008) who stated that changes in the constituent composition of blood when compared with normal values could be used to interpret the metabolic state of the animal as well as the quality of feed offered to that animal. The leaf meals offered to the broiler chicks had no adverse effect on the PCV, although Ufele and Ogbumuo (2018) reported that leaf meal enhances PCV of broiler chicks.

Conclusion: From the results of this study, neem leaf gave better performance at 20 g inclusion level followed by the mixture with moringa at 50:50 inclusions. This indicates that NLM proved to be a better leaf meal that can be incorporated into the diets of broilers at 10 to 20 g inclusion level without any lethal effect.

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