

Research Application Summary

Growth promotive effects of neem and stinging nettle in indigenous chickens in Kenya

Bwana, M.O.¹, Njagi, L.W.¹, Nyaga, P.N.¹, Mbuthia, P.G.¹, Bebora, L.C.¹, Wahome, M.W.¹,
Mutinda, W.U.³ & Kitale, P.M.²

¹Department of Veterinary Pathology, Microbiology and Parasitology, University of Nairobi
P. O. Box 29053 00625, Kangemi, Nairobi, Kenya

²Department of Veterinary Public Health, Pharmacology and Toxicology, University of
Nairobi, P. O. Box 29053 00625, Kangemi, Nairobi, Kenya

³State Department of Veterinary Services (Government of Kenya), Regional Veterinary Laboratories,
P. O. Box 204 - 80113 Mariakani, Mombasa, Kenya

Corresponding author: bwanamoses@gmail.com

Abstract

The study was designed to investigate the role of aqueous suspensions of Neem (*Azadirachta indica*) and Stinging Nettle (*Urtica dioica*) powders fed in drinking water on the growth performance of indigenous chicken. Twelve indigenous chicks were randomly allocated into three groups 1, 2 and 3, each consisting four chicks. All the birds were raised in deep litter for 14 days before transfer into individual cages. Group 1 and 2 were treated with aqueous suspensions of Neem and Stinging Nettle powders respectively in drinking water while Group 3 served as control and was given pure water *ad lib*. The Neem and Stinging Nettle powders were reconstituted at a rate of 10g/litre of water, boiled, filtered and fed in their crude forms. The experiment lasted 8 weeks. Weekly weights were measured and used as the response parameters for growth. Differences in mean weights between groups were compared using student's t-test and $p < 0.05$ was considered statistically significant. Higher numerical weight gains were found in the Neem group (510.75g at 64g/week) compared to the Stinging Nettle group (483.25 at 60g/week). There was however no significant difference ($P > 0.05$) between the mean weekly weights of the Neem and Stinging Nettle groups. The present findings suggest that Neem supplementation in routine diets of indigenous chicken offer better prospects of enhancing the productivity of indigenous chicken in Kenya.

Key words: Aqueous suspensions, growth performance, indigenous chickens, Neem and Stinging Nettle

Résumé

Le travail a été conçu pour étudier le rôle des suspensions aqueuses de Neem (*Azadirachta indica*) et poudres d'Ortie (*Urtica dioica*), nourris à partir de l'eau potable sur la performance de croissance du poulet indigène. Douze poussins indigènes ont été répartis au

hasard en trois groupes 1, 2 et 3, comprenant chacun quatre poussins. Tous les oiseaux ont été nourris dans la litière profonde pendant 14 jours avant le transfert dans des cages individuelles. Les groupe 1 et 2 ont été traités avec des suspensions aqueuses de Neem et des poudres d'Ortie respectivement dans l'eau potable tandis que le groupe 3 a servi pour le control a reçu de l'eau pure *ad lib*. Les poudres Neem et Ortie ont été reconstitués à un taux de 10g / litre d'eau, bouilli, filtré et nourri dans leurs formes brutes. L'expérience a duré 8 semaines. Les poids hebdomadaires ont été mesurés et utilisés comme paramètres de réponse pour la croissance. Les différences dans les poids moyens entre les groupes ont été comparées en utilisant le t-test des étudiants et $p < 0,05$ a été considérée comme statistiquement significative. Des gains plus élevés en poids numériques ont été trouvés dans le groupe de Neem (510.75g à 64g / semaine) par rapport au groupe Ortie (483,25 à 60g / semaine). Il n'y avait cependant pas de différence significative ($P > 0,05$) entre les poids hebdomadaires moyennes des groupes Neem et Ortie. Les présents résultats suggèrent que le complément de Neem dans les régimes alimentaires de routine de poulet indigène offrent de meilleures perspectives d'amélioration de la productivité du poulet indigène au Kenya.

Mots clés: suspensions aqueuses, les performances de la croissance, les poulets indigènes, Neem et Ortie

Background

Poultry farming contributes 7.8% of Kenya's total GDP, the bulk of which is contributed by indigenous chicken (Nyaga, 2007). Indigenous chicken are kept in rural village settings by almost 90% of the rural communities in small flocks of upto 30 birds in free range and small scale production systems (Kiprop, 2013). They occupy a vital position in the back-borne of rural economies by contributing about 71% of the total egg and poultry meat produced in Kenya (Nyaga, 2007). Indigenous chicken are known for their low productivity which is attributed mainly to genetics and environmental factors (Magothe *et al.*, 2011; Menge *et al.*, 2005). Increasing their productivity in terms of eggs, weight gains and feed efficiency therefore remains critical in ensuring food security for rural and urban populations in developing countries.

Kenya has embarked on several genetic improvement programs for indigenous chicken but with limited success since little has been done to improve on environmental factors such as nutrition and disease control, which also play key roles in the overall performance of this category of chicken in local settings (Khobondo *et al.*, 2014). The possibility of improving their productivity while conserving their genetic resources does not only lie in the recent desperate and mostly blind cross-breeding programs but also in the modification of their environment (Khobondo *et al.*, 2014; Bett *et al.*, 2012). The environment in this case encompasses good husbandry practices and feed supplementation with natural and locally available growth promoting agents that are known to confer rapid growth rates and disease resistance (Magothe *et al.*, 2011). The application of traditional and locally available herb-based therapy and growth promoters has gained pre-eminence in poultry production systems due to their sustainability, low cost, lack of residual effects and freedom from antimicrobial residues which would result from use of antimicrobials as growth promoters; which would

lead to development of antimicrobial resistance (Dharma *et al.*, 2015). Phytobiotics and various extracts from plant leaves, tubers and roots have been shown to enhance growth in poultry by combating microbial activity and stress (Dharma *et al.*, 2015).

Studies on plant-derived extracts of Neem (*Azadirachta indica*) and Stinging Nettle (*Urtica dioica*) have highlighted their possible antiviral, growth promoting (Alam *et al.*, 2015) and immune modulating properties mainly in commercial poultry i.e. broilers and layers (Jawad *et al.*, 2013; Kwawukume *et al.*, 2013). The leaves of Stinging Nettle (*Urtica dioica*) have been reported to be an excellent source of easily available protein and vitamins (Eskedar *et al.*, 2013; Bekele *et al.*, 2015) making them suitable for feeding chickens. In this study we investigated the possible growth performance improving effects of the locally available and perennial plant extracts of Neem and Stinging Nettle in indigenous poultry.

Materials and methods

Study birds. Day old indigenous chicks (n=12) were obtained from a local hatchery, raised in deep litter brooders for 14 days and transferred to individual cages where they were given feed (Chick and Duck Mash) for 8 weeks.

Experimental design and study site. This was a randomised controlled trial set at the Department of Veterinary Pathology, Microbiology and Parasitology of the University of Nairobi; involving weekly measurements of bird weights as a response parameter for growth. The birds were randomly allocated into three groups as follows: Group 1 (n=4) received Neem (10g/litre of drinking water), Group 2 (n=4) received Stinging Nettle (10g/litre of drinking water) and Group 3(n=4) pure water *ad libitum*. Neem and Stinging Nettle suspensions were made by boiling 10 g of leaves of these plants in 1liter of water, cooling and filtering using gauze before feeding in their crude forms throughout the experimental period (8 weeks). The birds were wing tagged and weighed weekly in the morning between 7.00am and 8.00am prior to feeding using a Swan Digital scale (capacity of 5Kg; weighing span: 1-5030grams; Graduation: 1gram) one at a time.

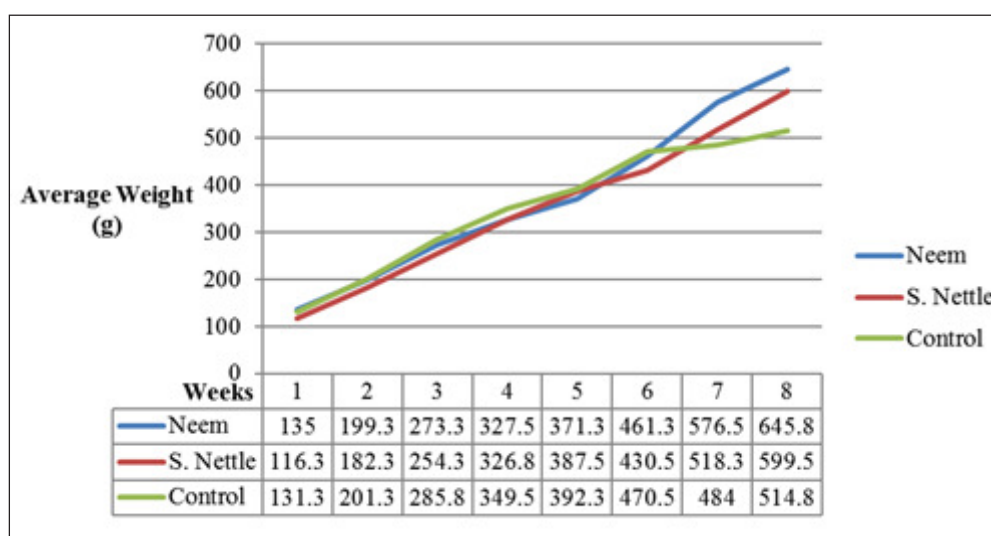
Data management and statistical analysis. Data on weekly weights were entered into an excel 2010 Spread sheet and analysed using the Instat+ v3.36 statistical package for mean weights per group per week to obtain trends in weight gain. Differences in mean weights between groups were compared using student's t-test and $p < 0.05$ was considered statistically significant.

Results and discussion

There was a general increase in the average weight among the supplemented and control birds with the Neem Group (1) recording the highest weight gains (510.75g) compared to the Stinging Nettle (483.25g) and control groups (383.5g) (Table 1 and Fig. 1). Over the same period, the Neem group had the highest weekly weight gains (64g/week) compared to the control (47.9g/week) and Stinging Nettle (60.4g/week) groups (Table 1). This is in line with studies in broilers that have reported similar increases in live body weights, body weight

Table 1. Overall and weekly Body weight gains in Indigenous chicken on Neem and Stinging Nettle

Variable	Group 1 (Neem)	Group 2 (S.Nettle)	Group 3 (Control)
Mean initial body weight (g)	135±17.19	116.25±18.8	131.25±34.944
Mean final body weight (g)	645.75±62.38	599.5±126.94	514.75±166.95
Total weight gain (g)	510.75	483.25	383.5
Mean weekly gains (g/week)	63.8	60.4	47.9

**Figure 1. Trend of Growth Promotive effects of Neem and Stinging Nettle in indigenous chickens**

gains and feed efficiency (Alam *et al.*, 2015) and can be attributed to the synergistic action of various bio-active molecules in Neem which stimulate growth of beneficial bacteria by preventing growth of pathogenic ones and improve the production and activity of digestive enzymes (Dharma *et al.*, 2015). There was however no significant difference ($P > 0.05$) between the mean weekly weights of the Neem and Stinging Nettle groups for the 8 weeks suggesting an almost equal growth promoting effect in Indigenous chicken.

The Stinging Nettle group (2) also showed better weight gains compared to the control with higher body weight gains from the sixth week which is in agreement with Bekele *et al.* (2015) who reported higher weight gains from the sixth week when Stinging Nettle Leaf Meal (SNLM) supplemented in broilers feed at various concentrations. Bekele *et al.* (2015) also reported higher weight gains from the fourth week in broiler chicken fed SNLM at 6% and 9% respectively which is contrary to our findings of higher weight gains from the sixth week. This delay in response can be attributed to the mode of delivery (in water versus feed), the concentration of Stinging Nettle bioactive molecules in the preparations and genetic differences of the chicken (Cross *et al.*, 2007).

Figure 1 shows Neem group with numerically higher average weights from week 1 to 4 and from week 6 to 8, and registering the highest average weights in the last two weeks compared to Stinging Nettle and control groups. This can be attributed to the antimicrobial and immune stimulatory properties of Neem that help reduce the microbial load of the birds and enhance growth (Kharde and Soujanya, 2014).

Conclusion

Neem has demonstrated better numerical outcomes in enhancing weight gains hence productivity of indigenous chicken compared to Stinging Nettle. Further studies should be commissioned to validate their possible antiviral, immune modulating properties and effects on egg yields in indigenous chicken.

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