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Effect of Scent Leaf (*Ocimum gratissimum*) Meal on the Growth Performance and Faecal Bacterial Load of Cockerel Chicks

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Abstract
This experiment was carried out at the Poultry Unit of Kabba College of Agriculture, to determine the effect of scent leaf meal (SLM) on the growth performance and faecal bacterial load of cockerel chicks. A total of 96 day old cockerel chicks were randomly allotted to 4 treatments, each treatment consisting of 4 replicates with 6 birds per replicate in a completely randomized design experiment. The treatments consisted of feeding SLM-supplemented diets to cockerel chicks at the inclusion rate of 0% (T_1=control), 1% (T_2), 2% (T_3) and 3% (T_4) respectively for seven weeks, after one week acclimatization period. The parameters assessed were body weight, feed consumption, feed conversion ratio (FCR), performance index and faecal total bacterial count. Data obtained were analysed using repeated measures of ANOVA. Highest feed intake was recorded in birds fed 1% SLM whereas birds fed 3% SLM had the highest body weight. Overall, birds fed SLM-supplemented diets had better FCR than birds in the control group, with the FCR improving as the level of SLM in the diet increased. Treatment had no effect on the faecal bacterial count. Results of the study showed that scent leaf meal improved the growth performance of cockerel chicks.
Keywords: Cockerels, body weight, scent leaf, bacterial count, performance index

Introduction

Antibiotics have been used widely not only to prevent and treat poultry diseases, but also for the improvement of meat and egg production (Ogle, 2013). However, many countries tend to minimize or prohibit the use of synthetic antibiotics in poultry because of their residual effects on both animals and humans. Alternatives to antibiotic growth promoters are thus necessary to ensure that animal protein production keeps pace with the expanding world population. Consequently, several non-synthetic growth promoters such as enzymes, inorganic acids, probiotics, prebiotics and biogenic additives have been advocated as alternatives (Dinner, 2004; Adams, 2005). Compared with synthetic antibiotics or inorganic chemicals, these plant-derived products have proven to be natural, less toxic, residue free and are thought to be ideal feed additives in food animal production (Hashemi *et al*., 2009). Scent leaf (*O. gratissimum*) is widely grown as a perennial herb in tropical Africa, South East Asia, India and Hawaii. Ijeh *et al.* (2004) noted that scent leaf is rich in alkaloids, tannins, phytates, flavonoids, oligosaccharides, terpenoids, thymol and saponin, with tolerable cyanogenic content. The essential oil (eugenol) present in scent leaf possesses antimicrobial activities against pathogenic strains of gram negative and gram positive bacteria, and pathogenic fungus (Matasyoh, 2007). There are some documented studies on the effects of scent leaf on laboratory animals (Arhoghro *et al*., 2009), broilers (Ogunleye, 2019) and catfish (Abdel-Tawwab *et al*., 2018). There is however, limited information on the effects of scent leaf on productive performance of cockerel chickens. The present study therefore aimed at evaluating the effect of scent leaf meal on productive performance and faecal bacterial load of cockerel chicks.

Materials and methods

Experimental location

The experiment was conducted at the livestock section of the Kabba College of Agriculture, Kabba, Kogi State, Nigeria. Kabba is located in the Southern guinea savannah ecological zone of Nigeria, between latitude 07º5ºN and longitude 6º08ºE of the equator with elevation of 424m above the sea level. The mean annual rainfall is about 1100mm per annum with annual temperature range of 18-32ºC.

Preparation of test material

To obtain the scent leaf meal used for the experiment, fresh scent leaf (*Ocimum gratissimum*) leaves were harvested, cleaned, air-dried under shade and ground into powder with a hammer mill.

Experimental birds and management

A total of ninety-six (96) Isa-brown day-old cockerel chicks were used for the experiment. The chicks, which were housed in deep litter pens, were provided with adequate lighting as well as feed and water ad *libitum*. The housing and management of experimental birds were in accordance with the guidelines of Ahmadu Bello University on animal research. The birds were randomly allotted to four treatments in a completely randomized design experiment. The treatments were scent leaf meal (SLM) added to commercial chick mash (Hybrid®) as basal diet at the rate of 0%, 1%, 2% and 3%, representing T_1, T_2, T_3 and T_4 respectively. Each treatment was replicated four times, with six birds per replicate. The experiment lasted for eight (8) weeks including one week acclimatization period.

Data Collection

The initial body weights of the chicks were recorded on day 8, after which it was recorded weekly whereas feed intake was recorded daily. Feed conversion ratio was calculated as ratio of feed intake to body weight gain. Performance index (PI) was calculated as follows (North, 1984):

$$PI = \frac{\text{Live body weight (kg) x 100}}{\text{FCR}}$$

Where PI = performance index; FCR = feed conversion ratio

The faecal bacterial load was assessed by microbiological analysis using the plate count method. Faecal samples were collected from the cloaca of birds using sterile swab. The swabs were inoculated in Eppendorf tubes containing 9 ml of 2% buffered peptone water. These were vortex-mixed for 2 min and further dilutions were done serially until 10^{-8} ratio was obtained. Then 0.1ml of dilution ratios of 10^{-2}, 10^{-4}, 10^{-6} and 10^{-8} from each treatment were plated on plate count agar using the spread plate method. The plates were incubated for 24 h at 37ºC. They were then examined for bacterial growth. Colonies were counted and compared with the dilution factor to obtain the total bacterial count for each sample.

Data Analysis

The data obtained were statistically analysed using one-way analysis of variance (ANOVA) for SAS (2001) and Duncan new multiple range test. Test of significant differences between treatments means were accepted at 0.05% level of probability.

Results

Effect of scent leaf meal on the growth performance of cockerel chicks are shown in Table 1. Birds in the control group, and those treated with 1% scent leaf meal (SLM), had the highest feed consumption rate during weeks 2, 3 and 4 but dropped below birds treated with 2% and 3% SLM in week 5. The feed consumption of the birds however improved steadily between weeks 5 and 6 of the experiment. The birds treated with 2% and 3% SLM had a near steady improvement in feed consumption from 2nd to 6th week of the experiment. Overall, birds treated with 1% SLM had the highest cumulative feed consumption per bird, thou this was not significant. Birds fed SLM-supplemented diets had significantly higher body weights, better efficiency of feed utilization and improved performance index than birds in the control group (Table 1). Furthermore, the improvements in performance parameters were dietary SLM dose-dependent, increasing as the SLM in the diets increased.Effect of SLM on fecal bacterial load of the treated birds is shown in Fig. 1. Birds that were fed diets containing SLM had lower bacterial counts than birds in the control group, the bacterial level in the feces decreasing as SLM in the diets increased.

Discussion

There was no significant difference in the feed intake of experimental birds, in agreement with the reports of Odoemelam *et al*., (2013) who also noted no significant difference in the feed intake of broilers fed scent leaf-supplemented diets. This report is however contrary to the observations of Nweze and Ekwe (2012) who reported significant difference in feed intake of broiler finisher birds drenched with scent leaf water extract. The difference in observations could be due to difference in the form of the test material used. Furthermore, the improvements in performance parameters observed in the current study may be due to the phytochemical properties and the mineral composition of SLM in the diets. The phytochemical components such as alkaloids and saponins pose antibacterial properties, and may have acted as growth promoters. Ogbu and Amafuele (2015) reported better performance of broiler chicks fed scent leaf whereas Nte *et al*., (2016) noted improved FCR in broiler chicks administered aqueous extract of scent leaf at the rate 100ml/L. Odoemelam *et al*., (2013) and Adebayo *et al*., (2019) however did not observe any difference in weight gain of broilers and West African dwarf goats fed SLM-supplemented diets respectively. The dose-dependent reduction in the faecal bacterial count of birds fed SLM-supplemented diets indicates the effectiveness of scent leaf meal in improving gut health, and may have been responsible for the enhanced productive performance of the birds. Nweze and Ekwe (2012) similarly noted a linear decrease in percentage of microbes in the stool cultures of broiler finishers drenched with scent leaf water extract. Anugom and Ofongo (2019) also reported that aqueous scent leaf extract improved growth performance and reduced gut pH and *Escherichia coli* counts in broiler chicks. The phytochemical components in SLM may have been responsible for the antimicrobial activities of the leaves.

Conclusion

Scent leaf meal added to the diets of cockerel chicks significantly improved the growth performance of the birds, and reduced faecal bacterial counts in a dose-dependent manner.

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Table 1 Effect of SLM-supplemented diet on performance of cockerel chicks

Parameter	Treatment (% SLM)				SEM
	0	1	2	3	
Ave. feed consumption/bird (g)	1946	1952	1862	1932	69.47
Ave. body weight gain/bird (g)	285.6^{c}	400.0^{b}	425.0^{a}	450.0^{a}	17.5
FCR	5.95^{a}	4.34^{ab}	3.99^{ab}	3.86^{b}	0.18
Performance Index	5.50^{c}	10.37^{b}	11.69^{ab}	12.94^{a}	11.17

^{ab}: Means within row bearing different letters are significantly different at $p \leq 0.05$; SEM = standard error of mean; CFU = colony forming unit

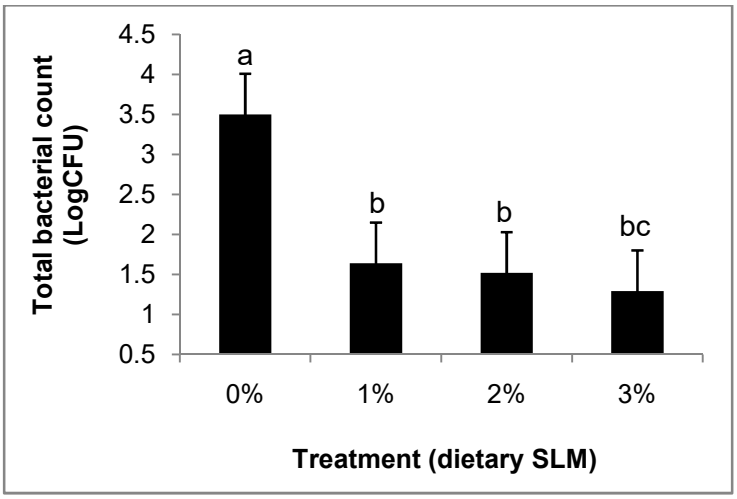

Figure 1 Effect of SLM-supplemented diets on faecal bacterial count of cockerel chicks. Bars bearing different letters are significantly different at $p \leq 0.05$; SLM = scent leaf meal; CFU = colony forming units.