##### GGGROWTH AND BODY MORPHOMETRIC PARAMETERS OF BROILER CHICKENS ORALLY ADMINISTERED VARYING LEVELS OF

**LEMONGRASS EXTRACT, AT FINISHER PHASE**

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Description automatically generatedAbstract

*The growth and body morphometric parameters of broiler chickens orally administered varying levels of lemongrass extract at finisher phase was evaluated. A total of 150-day old broiler chicks were used for this study in a CRD design. The birds were allotted into five treatments of 30 chicks in each treatment with three replications of 10 chicks per replicate. The control (T1) group was not administered antibiotic nor lemongrass extract and treatment group T2 was administered 0.2mls of antibiotic while T3, T4 and T5 treatment groups were administered 0.2mls, 0.4mls and 0.6mls of lemongrass extract respectively. Data on the growth and morphometric parameters were collected. There was no significant difference (P>0.05) in the growth parameters with an exception of the average initial body weight. The average final body weight (g) in T1, T2, T3, T4 and T5 were 1781.48, 1767.59, 2061.90, 1897.62 and 1898.31 respectively. The average body weight of broiler birds in T3 was higher as compared to those in T1, T2, T4 and T5. The body weight gain in T1, T2, T3, T4 and T5 were 1249.78, 1266.22, 1458.24, 1386.54, and 1420.91 respectively. The birds in treatment groups T3, T4 and T5 recorded higher weight gain than T1 (control group) and T2 (0.2mls antibiotic). The feed intake (g) were 359.87, 3152.33, 4039.16, 3777.33, 4063.40 in treatment T1, T2, T3, T4 and T5 respectively. The treatment group T5 consumed more feed (4063.40g) compared to the other treatments. Feed conversion ratio was higher in T5 (2.82) as compared to T1 (2.81), T2 (2.49), T3 (2.77) and T4 (2.73). However, there were significant (P<0.05) differences in average initial body width, final body girth, final shank length and shank length gain compare to other parameters such as initial body length, final body length, body length gain, body width gain, final body width, initial shank length, initial neck length, final neck length, which were not significantly affected. It can be concluded that the use of lemongrass extract at the levels 0.6mls and 0.2mls proved to have improved the growth performance as well as better performance of the morphometric parameters.*

Key words: Growth, Morphometric, Broiler chicken, oral Administration, lemongrass extract, Finisher phase

Introduction

Antibiotics have been routinely utilized as a growth promoter to improve growth and overall performance in poultry and livestock production for decades. Antibiotic use as a growth stimulant particularly at subtherapeutic dosages, has resulted in bacterial resistance, cross resistance, and multiple resistance (Gould, 2008). According to Van de Bogaard and Stobberingh (2000), resistant bacteria can be spread from chicken products to the human population by consumption or handling of contaminated poultry meat. As a result of this, strict

regulations have been placed on antibiotic growth promoters, hence a lot of interests were now focussed on the search for substitute to antibiotic growth promoters.

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Description automatically generatedOne of the natural alternatives to antibiotic which has been observed to increase performance in poultry is lemongrass (Peter and Babu, 2012). Lemongrass is a herb that has been shown to offer medical and therapeutic advantages. Shah *et al*. (2011) noted that it contains phytochemical compounds like flavonoids, phenolic compounds, and essential oils like citral, nerolgeraniol, citronellal, terpinolene, and geranylmethyl heptenone, which may be responsible for its antibacterial, antidiarrheal, antifungal, antioxidant, and growth promoter properties. Previous researchers had considered the use of lemongrass leaf meal in broiler diets. Mmereole (2010) noted that, the addition of lemongrass in the diet of poultry as feed additive gave improved performance of broiler chickens. However, lemongrass has a high fibre content of about 9.30% (Thorat *et al.*, 2017), which is less than the 5% requirement for broilers (Olomu, 2011). This high fibre content thus will limit the utilization of lemongrass meal as a growth promoter despite its potential, thus reducing the ability of lemongrass meal to promote growth maximally due to the fact that minute quantity of the feed is being consumed by the birds because of the high fibre. It is on this thought that this research contemplated the oral administration of lemongrass extract which contain no fibre. The mode of administration as well will ensures maximum intake and hoped to maximize the already established potential of lemongrass as growth promoting alternative, as should be evident in the growth and morphometric parameters of the broiler chickens.

Materials and Method

The experiment was carried out at the poultry unit of the Extractching and Research Farm, Federal University of Technology, Minna, Gidan kwano, Minna, Niger State. Minna is located at 09° 36' 50” north latitude and 06° 33' 25” east longitude, in degrees minutes' seconds. It is 700,000 meters above sea level and is surrounded by a river that travels from the northwestern to the southwestern parts of the state. It is located in the country's Southern Guinea Savannah agro-ecological zone. The daytime temperature ranges from 38° C in the start of the wet season to 28° C in the middle. The yearly rainfall average is 1209.7 mm (Minna Niger Geography, 2004 - 2017).

Source of Experimental Materials

One hundred and Fifty (150) day old broiler chicks were purchased from Agrited hatchery Ibadan, Oyo State. Lemongrass was harvested from households in Minna, Niger State, dried at room temperature to a moisture content of 10% and grinded into powder form to make the extract. Commercial feed containing 18-20% crude protein and 2950-3210kcal/kgDM (finisher

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feed) was purchased from an accredited feed dealer in Minna, Niger State.

Management of Experimental Birds and Design

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Description automatically generatedThis research utilized a Completely Randomized Design (CRD) arrangement with five treatments, each with three replicates and ten birds per replicate. Thus, a total of 150 broiler chickens was used. The study lasted for 4 weeks of the finisher phase. A week before the birds arrived, the pen and cage were cleaned and disinfected. Before the birds arrived, the feeders and drinkers were cleaned before the arrival of the birds, charcoal stoves were used as sources of heat during the brooding period. Lamp was used as source of light. Washing drinking and feeding troughs, removing litter items, and providing feed were all done on a regular basis.

Preparation of experimental lemongrass extract

Fresh Lemongrass leaves were dried under room temperature to a moisture content of about 10% and ground. 20g of the lemongrass was boiled in water 1 litre of water at 100oC for 10 minutes and then allowed to cool for 12 hours before orally administering it to the birds. The levels of administration of the lemongrass extract is shown in table 1.

Experimental Diets

The birds were given a commercial feed and clean drinking water *ad libitum* throughout the duration of the study. Starter feed containing 22-24% crude protein and 2800-2900kcal/kgDM was given for a period of 4 weeks. Finisher feed containing 18-20% crude protein and 2950- 3210kcal/kgDM was given from the fifth to eight week.

Data collection

Data on growth parameters collected were body weight, body weight gain, feed intake and feed conversion ratio. The body morphometric traits that were assessed were body length (BL), body girth (BG), shank length (SL), body width (BW), neck length (NL)

Table 1. Levels of lemongrass extract administered

Treatments Levels of lemongrass extract administered

T1 0% antibiotic & 0% lemongrass extract (negative control)

T2 0.2 mls of synthetic antibiotic (positive control)

T3 0.2 mls of lemongrass extract

T4 0.4 mls of lemongrass extract

T5 0.6 mls of lemongrass extract

Data analysis

All data collected were statistically analyzed using one-way analysis of variance (ANOVA) of SPSS 16.0 program (statistical package for the social sciences). Duncan multiple range testing was used to separate mean values where they arise.

Results

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Description automatically generated*Growth performance of Broiler chickens administered varying levels of lemongrass extract at finisher phase.*

The results of the growth performance of broiler chickens orally administered varying levels of lemon grass extract at finisher phase is shown in table 2. The results obtained showed that the initial body weight (at 5th weeks) was significantly different (p<0.05) across the treatments. The highest initial body weight was obtained in T3 (603.67g) of birds administered 0.2ml of lemon grass extract and the lowest initial body weight was recorded in T5 (477.40g) administered 0.6ml of lemon grass extract. However the feed intake, weekly feed intake, daily feed intake, feed conversion ratio, final body weight body weight gain, weekly body weight gain and daily weight gain were not significantly (P>0.05) affected. The highest feed intake (4063.40g), weekly feed intake (1015.85g), daily feed intake (145.12g) and feed conversion ratio (2.82) were observed in T5 of birds administered 0.6ml of lemon grass extract. The least feed intake was obtained in T1 (359.87g) control group. The lowest weekly feed intake, daily feed intake and feed conversation

Table 2. Growth performance of broiler birds administered varying levels of lemongrass extract at finisher phase

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameters | T1 | T2 | T3 | T4 | T5 | SEM | LS |
| AFI (g) | 359.87 | 3152.3 | 4039.1 | 3777.33 | 4063.40 | 201.52 | NS |
|  |  | 3 | 6 |  |  |  |  |
| AWFI (g) | 898.22 | 788.08 | 1009.7 | 944.33 | 1015.85 | 55.04 | NS |
|  |  |  | 9 |  |  |  |  |
| ADF I(g) | 128.32 | 112.59 | 144.26 | 134.91 | 145.12 | 7.86 | NS |
| FCR | 2.81 | 2.49 | 2.77 | 2.73 | 2.82 | 0.99 | NS |
| AIBW (g) | 531.70a  b | 501.38a  b | 603.67a | 511.08ab | 477.40b | 17.21 | \* |
| AFBW (g) | 1781.4 | 1767.5 | 2061.9 | 1897.62 | 1898.31 | 46.42 | NS |
|  | 8 | 9 | 0 |  |  |  |  |
| ABWG (g) | 1249.7 | 1266.2 | 1458.2 | 1386.54 | 1420.91 | 39.65 | NS |
|  | 8 | 2 | 4 |  |  |  |  |
| AWBWG (g) | 312.44 | 316.56 | 364.56 | 346.64 | 355.23 | 9.91 | NS |

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ADBWG (g) 44.63 45.22 52.08 49.52 50.75 1.42 NS

Key-SEM: standard error of mean, LS: level of significance; NS: No significant difference; \*: There is significant difference; TI; control, T2 ; 0.2mls of antibiotic,T3; 0.2mls of LMGT, T4; 0.4mls of LMGT, T5; 0.6mls of LMGT, LMGT = lemongrass extract, AFI = average feed intake, ADFI = average daily feed intake, FCR = feed conversion ratio, AIBW = average initial body weight, AFBW = average final body weight, ABWG = average body weight gain, AWBWG = average weekly body weight gain, ADBWG = average daily body weight gain.

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Description automatically generatedwere obtained in T2 of birds administered synthetic antibiotics as 788.08g, 112.59g and 2.49 respectively. The least final body weight was observed in T2 (1767.5g) of birds administered synthetic antibiotic. The lowest body weight gain, weekly body weight gain and daily weight gain were obtained in T1 (control) as 1249.78g 312.44 and 44.63g respectively.

Morphometric performance of broiler chickens orally administered varying levels of lemongrass extract at finisher phase

The results of the morphometric parameters of broilers birds orally administered varying levels of lemon grass extract is shown in table 3. The results obtained showed that the initial body width, final body girth, final shank length, shank length gain, weekly shank length gain and daily shank length gain were significantly (p<0.05) different with T2 having the highest initial body width (16.99cm) while T5 recorded the least (15.58cm).T3 had the highest final body girth (42.63cm) while T5 recorded the least (40.74cm). the highest final, shank length gain, weekly shank length gain and daily shank length gain were recorded in T1 (control) as 18.63cm, 6.89cm, 1.72cm and 0.25cm respectively while the lowest final, shank length gain, weekly shank length gain and daily shank length were observed in T5 as 17.50cm,5.47cm, 1.36cm and 0.19cm respectively. However there were no significant differences (P>0.05) in the initial body length, final body length, body length gain, weekly body length gain, daily length gain, final body width, body width gain, weekly body width gain, daily body width gain, initial body girth, body girth gain, weekly body girth gain, daily body girth gain, initial shank length, initial neck length, final neck length, neck length gain, weekly neck length gain and daily neck length gain.

Discussion

There was no significant (P>0.05) difference in the growth performance of broiler chickens administered varying levels of lemongrass extract considering growth parameters such as feed intake, weekly feed intake, daily feed intake, feed conversion ratio, final body weight, body weight

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Description automatically generatedTable 3. Morphometric parameters of broiler birds administered varying levels of lemongrass extract at finisher phase

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PARAMETERS (cm) | T1 | T2 | T3 | T4 | T5 | SEM | LS |
| Average initial body length | 24.66 | 24.31 | 25.06 | 24.50 | 24.60 | 0.15 | NS |
| Average final body length | 39.96 | 39.45 | 40.01 | 41.50 | 39.42 | 0.53 | NS |
| Average body length gain | 15.29 | 15.14 | 14.95 | 17.00 | 14.82 | 0.55 | NS |
| Average weekly body length | 3.82 | 3.79 | 3.74 | 4.25 | 3.71 | 0.14 | NS |
| gain |  |  |  |  |  |  |  |
| Average daily body length gain | 0.54 | 0.54 | 0.53 | 0.61 | 0.53 | 0.02 | NS |
| Average initial body width | 16.85a | 16.99a | 16.79a | 16.43a | 15.58b | 0.17 | \* |
| Average final body width | 27.56 | 26.97 | 27.62 | 26.15 | 26.75 | 0.27 | NS |
| Average body width gain | 10.71 | 9.97 | 10.83 | 9.72 | 11.17 | 0.27 | NS |
| Average weekly body width | 2.68 | 2.49 | 2.71 | 2.43 | 2.79 | 0.07 | NS |
| gain |  |  |  |  |  |  |  |
| Average daily body width gain | 0.38 | 0.36 | 0.39 | 0.35 | 0.39 | 0.01 | NS |
| Average initial body girth | 24.51 | 24.57 | 24.48 | 24.77 | 24.01 | 0.25 | NS |
| Average final body girth | 41.95a  b | 41.42ab | 42.63a | 41.11ab | 40.74b | 0.27 | \* |
| Average weekly body girth gain | 4.36 | 4.21 | 4.54 | 4.09 | 4.18 | 0.07 | NS |
| Average daily body girth gain | 0.62 | 0.60 | 0.65 | 0.58 | 0.59 | 0.01 | NS |
| Average initial shank length | 11.73 | 11.39 | 12.28 | 12.32 | 12.03 | 0.20 | NS |
| Average final shank length | 18.63a | 17.83ab | 18.29ab | 17.54b | 17.50b | 0.16 | \* |
| Average shank length gain | 6.89a | 6.45ab | 6.01ab | 5.22b | 5.47ab | 0.25 | \* |
| Average body girth gain | 17.43 | 16.85 | 18.15 | 16.34 | 16.74 | 0.27 | NS |
| Average weekly shank length | 1.72a | 1.61ab | 1.50ab | 1.31b | 1.36ab | 0.06 | \* |
| gain  Average daily shank length gain | 0.25a | 0.23ab | 0.21ab | 0.18b | 0.19ab | 0.01 | \* |
| Average initial neck length | 8.19 | 7.75 | 7.60 | 8.24 | 7.63 | 0.14 | NS |
| Average final neck length | 14.94 | 15.41 | 15.96 | 15.59 | 15.31 | 0.19 | NS |
| Average neck length gain | 6.75 | 7.66 | 8.36 | 7.36 | 7.68 | 0.28 | NS |
| Average weekly neck length | 1.69 | 1.92 | 2.09 | 1.84 | 1.92 | 0.07 | NS |
| gain |  |  |  |  |  |  |  |
| Average daily neck length gain | 0.24 | 0.27 | 0.29 | 0.26 | 0.28 | 0.01 | NS |

Key- SEM: standard error of mean; LS: Level of significance; NS: No significant difference;

\*: there is significant difference; LGT; Lemongrass extract. TI; control, T2; 0.2mls of antibiotic, T3; 0.2mls of LMGT, T4; 0.4mls of LMGT, T5; 0.6mls of LMGT.

gain, weekly body weight gain, and daily body weight gain with an exception of the initial body weight which was significantly (p<0.05) different and differs across the treatment groups. This result was however, at variance with Mmereole (2010), who reported that the inclusion of *cymbopogon citratus* (lemongrass) leaf meal in poultry diet resulted in a significant difference in the performance of the growth parameters of the broiler birds. The disagreement could have been due to the mode of lemongrass administration. The author administered lemongrass as feed additive and this could have resulted in the continuous feeding and accumulated effect of the lemongrass, that could have reflected in the significant difference observed in the growth parameters as against the oral administration of lemongrass extract at weekly bases carried out

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in this study.

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Description automatically generatedThe results of the morphometric parameters of broilers birds orally administered varying levels of lemon grass extract showed that the initial body width, final body girth, final shank length, shank length gain, weekly shank length gain and daily shank length gain were significantly (p<0.05) different with T2 having the highest initial body width (16.99cm) while T5 recorded the least (15.58cm). T3 had the highest final body girth (42.63cm) while T5 recorded the least (40.74cm). the highest final, shank length gain, weekly shank length gain and daily shank length gain were recorded in T1 (control) as 18.63cm, 6.89cm, 1.72cm and 0.25cm respectively while the lowest final, shank length gain, weekly shank length gain and daily shank length were observed in T5 as 17.50cm,5.47cm, 1.36cm and 0.19cm respectively. However, there were no significant differences (P>0.05) in the initial body length, final body length, body length gain, weekly body length gain, daily length gain, final body width, body width gain, weekly body width gain, daily body width gain, initial body girth, body girth gain, weekly body girth gain, daily body girth gain, initial shank length, initial neck length, final neck length, neck length gain, weekly neck length gain and daily neck length gain. The variation in the results recorded in this study could have been due to different levels of administration of lemongrass extract. Conclusion

Based on the available results, it is concluded that lemongrass extract used in this experiment

gave similar and some cases better performance than the synthetic antibiotic. Antibiotic administration had no superiority over lemongrass extract on the performance of the broiler chickens. The results of this study show that 0.6ml and 0.2ml of lemongrass extract can be recommended to give better performance of birds in terms of feed intake, body weight, body weight gain, average final body girth and average shank length gain.

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