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Air-Dried Neem Leaf Extract: It's Effect on the Growth Performance of Broiler Chicken

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Abstract

This study was conducted to evaluate the efficacy of aqueous extract of neem leaves on growth performance of broiler chickens. One hundred and sixty (160) broiler chicks were used for the experiment and were intensively managed. The chicks were randomly assigned to four treatment groups administered 0ml, 30ml, 40ml and 50ml of aqueous neem leaf extracts and defined as T1, T2, T3 and T4 respectively. Daily Weight Gain (g/bird), Feed Intake (g/bird), water intake (g/bird) and feed conversion ratio (FCR) were measured. Result showed a significant ($p < 0.05$) influence of aqueous neem leaf extract on feed conversion ratio at starter phase. It was concluded that the use of air-dried neem leaf extract can be adopted as a replacement for antibiotics in broiler chicken production without any adverse effect on their growth performance.

Keywords: neem leaf extract, performance, broiler chicken

Introduction

The importance of poultry industry to the socio-economic development of any country cannot be overemphasized as a result of its ability to provide animal protein at a relatively shorter duration at a reasonable cost to the consumer. Many synthetic drugs and growth promoters are supplemented to the broilers to effect rapid growth, but their use has shown many disadvantages like high cost, adverse side effect on health of birds and long residual properties (Nayaka *et al.*, 2012). Exploring new antibiotics from the medicinal plants is a priority resistance to increase the production of broilers. An attempt to combat these challenges has led to ethnoveterinary medical care. Various plant extracts have been used worldwide for a range of medicinal properties like antibacterial, antiviral, antifungal, anti-protozoal and hepato-protective without adverse effects (Kale *et al.*, 2003). One of these medicinal plants is *Azadirachta indica* (Neem). Neem tree as one of the most researched trees in the world has attracted worldwide prominence due to its vast range of medicinal properties like antibacterial, antiviral, antifungal, anti-protozoal, hepato-protective and various other properties without showing adverse effects. (Kale *et al.*, 2003).

This study was designed to investigate the effect of aqueous extracts of air-dried neem leaves on growth performance of broiler chicken.

Materials and Methods

The experiment was carried out at the poultry unit of the Directorate of University Farm of the Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. The area lies on latitude 7° 10' N and longitude 3° 2' E, it received a mean precipitation of 1037mm per annum an average temperature of 34.7°C and an average relative humidity of 82% throughout the year (Google Earth, 2017). Fresh neem leaves were collected and it was air dried until it became very dry. One litre of boiled water was added to 40g of air-dried neem leaf for 5 hours which was later sieved to get the neem leaf extract. The prepared extract was further diluted at the rates 0, 30, 40 and 50ml in one litre of water.

One hundred and sixty day-old broiler chicks were purchased. The birds were allocated to four treatment groups of forty birds each. Each treatment was sub-divided into four replicates with ten birds per replicate. The birds were fed *ad-libitum* throughout the experimental period. Diet composition is presented in Table 1. Only the birds in the control group were given antibiotics. The birds were weighed upon arrival to get their initial weight while they were also weighed on a weekly basis and recorded appropriately so as to ascertain their weight gain. Their feed intake and water intake were measured and the feed conversion ratio was calculated.

All data were subjected to one-way Analysis of Variance ANOVA as contained in SAS (2012). Means that were significantly ($p < 0.05$) different were separated by Duncan Multiple range test of the statistical software.

Table 1: Percentage composition of experimental diets (%)

Ingredients	Starter	Finisher
Maize	47.00	33.50
Soyabean Meal	18.50	16.50
Fish Meal	2.00	0.40
Groundnut Cake	17.50	13.80
Wheat Offal	10.00	10.80
Bone Meal	3.00	3.00
Oyster Shell	1.00	1.00
Vitamin Premix	0.25	0.25
Methionine	0.25	0.25
Lysine	0.25	0.25
Salt	0.25	0.25
Total	100	100
Calculated analysis		
Crude protein (%)	23.00	20.10
Crude fibre(%)	3.61	3.51
Ether extracts(%)	4.04	3.88
Metabolisable energy (MJ/Kg)	11.47	11.62

Results and Discussion

The result of the effect of neem leaf aqueous extract on the growth performance of broiler chicks at the starter phase was shown in Table 2. There was no significant ($p>0.05$) difference in all the parameters measured except feed conversion ratio (FCR). It was showed that the poorest feed conversion ratio(1.59 ± 0.04) was observed in birds that took water containing 50ml neem leaf extract while the best(1.48 ± 0.02) was observed in the birds on 0 and 40ml of neem leaf extract

Table 2: Effect of Neem leaf extract on growth performance of starter broiler chickens

Parameters	T ₁ (0ml)	T ₂ (30ml)	T ₃ (40ml)	T ₄ (50ml)
Initial weight (g)	38.30±0.51	35.05±0.58	38.48±0.99	38.33±1.37
Final weight (g)	1046.25±10.87	1036.81±14.25	1046.25±22.49	1011.5±9.18
Weight gain (g)	1007.95±10.764	998.76±13.92	1007.78±21.89	973.20±9.58
Daily weight gain (g)	35.99±0.38	35.67±0.49	35.99±0.78	34.76±0.34
Total feed intake (g)	1491.95±11.58	1545.60±15.59	1495.78±33.50	1547.64±25.03
Daily feed intake (g)	53.28±0.42	54.13±0.56	53.42±1.19	55.27±0.89
Total water intake (ml)	3394.43±17.00	3388.21±21.08	3290.14±62.36	3397.87±31.68
Daily water intake (ml)	121.23±0.61	121.01±0.75	117.51±2.23	121.35±1.13
Feed Conversion Ratio	1.48±0.02 ^b	1.52±0.01 ^{ab}	1.48±0.02 ^b	1.59±0.04 ^a

^{a,b} Means on the same row with different superscripts are significantly($p<0.05$) different.

The effect of neem leaf extract on growth performance of broiler chickens at finisher phase is presented in Table 3. There was no significant ($p>0.05$) difference in all parameters measured. The live weights ranged from 2067.63 (30ml/l) to 2175.59_g. The daily feed and water intake ranged from 121.11 to 124.39_g and 346.47 to 362.40ml, respectively.

Table 3: Effect of Neem leaf extract on growth performance of finisher broiler chickens

Parameters	T1(0ml)	T2(30ml)	T3(40ml)	T4(50ml)
Initial weight (g)	2175.59±10.77	2067.63±83.61	2174.44±42.08	2144.86±21.73
Weight gain (g)	1129.34±15.91	1030.83±85.60	1128.19±57.99	1133.33±27.85
Daily weight gain (g)	53.78±0.76	49.09±4.08	53.72±2.76	53.97±1.33
Total feed intake (g)	2389.01±25.63	2612.19±119.38	2545.17±25.49	2543.29±53.66
Daily feed intake (g)	113.76±1.22	124.39±5.68	121.19±1.21	121.11±2.56
Total water intake (ml)	7275.93±104.88	7444.27±366.09	7610.44±329.69	7337.14±292.69
Daily water intake (ml)	346.47±4.99	354.49±17.43	362.40±15.69	349.39±13.94
Feed Conversion Ratio	2.16±0.01	2.57±0.19	2.27±0.12	2.25±0.03

The live weight and weight gains of the birds in this study were higher than the values reported by Egbeyale *et al.* (2015) where the authors reported that neem leaf meal inclusion higher than 0.5% in the diet of broiler birds reduced weight gain. The comparable weight gain of the birds fed neem leaf extract and the control is an indication that quantity of toxic factors such as terpenes and limonoids was minimal to have depressed the growth of the birds. This corroborates the findings of Verma *et al.* (1998) who had earlier reported a non-significant difference in weight gain of chicks fed raw and alkali treated neem kernel meal. The weight gain recorded in this study has further revealed the potentials in leaf extracts as a source of nutrients needed by animals and as a growth promoter. The results of present study disagree with the findings of Chakeravarty and Prasad (1991) and Durrani *et al.* (2008), who reported that broilers fed diet containing neem leaves and neem leaf infusion respectively had higher body weight gain. The non-significant difference in water consumption observed in this study was not in accordance with the report of Durrani *et al.* (2008) who reported that significant difference in the water intakes of the treated groups and the control. The differences in the results of the growth indices could be attributed to the processing method of the neem leaves before extraction. Durrani *et al.* (2008) oven dried the leaves while the leaves were air-dried in this present study.

The significant difference in feed conversion ratio among the treatments shows that the neem leaves extract have an effect on nutrient availability, digestion, absorption and utilization. The poor utilization of diets containing higher levels of neem leaf extract at starter phase might be related to the inability of the bird's enzyme to break down the active and improper metabolism associated with the neem leaf as reported by Esonu *et al.* (2005).

Conclusion

The result of this study showed that neem leaf extract inclusion in the water of broiler chicken had no significant effect on the growth parameters of the broiler chickens except for the feed conversion ratio which was significant at the starter phase.

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