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Effect of Different Alternatives to Antibiotics on the Performance and Haematological Parameters of Broiler Chickens

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Abstract

A field trial was carried out to determine the effect of different alternatives to antibiotics on the performance and blood parameters of broiler chickens. One hundred and eighty one day-old broiler chicks were used for the experiment. The chicks were allotted to 5 dietary treatments of 3 replicates each with 12 birds per replicate. The treatments were treatment 1 (positive control) where birds were given oxytetracycline, treatment 2 birds were given 600 g of *Moringa oleifera* leaf meal in 100 kg of feed, treatment 3 birds were given 400 g of biomin in 100 kg of feed, treatment 4 birds were given 1000 g of ginger in 100kg of feed and treatment 5 which was the negative control where no additive was added to the feed. Total feed intake, final weight, weight gain (g) and FCR did not differ ($p>0.05$) across the treatments. Concentrations of lymphocytes, eosinophils, heterophils and monocytes differed ($p<0.05$). In conclusion, moringa, ginger or biomin could replace oxytetracycline in broiler production.

Keywords: Moringa, biomin, ginger, oxytetracycline, antibiotic.

Introduction

Additives in poultry diets are primarily included to improve the efficiency of the birds' growth, prevent diseases and improve feed utilisation. These lead to improved performance and better meat quality. Antibiotics are naturally-occurring synthetic or semi-synthetic compounds with antimicrobial activity and have been an integral part of the poultry industry for more than sixty years. They have been used as feed additives in the poultry industry to enhance gut health and to control subclinical diseases (Nasir and Grashorn, 2010). The use of these substances offered possibilities to improve animal performance and increased economic output of livestock producing units.

However, antibiotic growth promoters in poultry have been banned in some countries because of objectionable harmful and side effects. Such harmful effects include the development of microbial resistance to these products (Botsoglou and Fletouris, 2001; McCartney, 2002). Consequently, alternatives like prebiotics, probiotics, organic acids, herbs, spices and various plant extracts considered to be natural products that the consumers would accept are now receiving attention. Medicinal plants are now being incorporated into poultry diets to enhance the performance of birds (Ali Asghar Saki *et al.*, 2012). They have been shown to activate digestion, strengthen the immune system and have antibacterial properties. Some herbal feed additives such as oregano, garlic and thyme have been indicated as alternatives to antibiotic growth promoters in broiler production. This study compared the efficacy of different alternatives to antibiotics with a synthetic antibiotic.

Materials and Methods

The experiment was conducted at the poultry unit of the Institute of Agricultural Research and Training, Ibadan, Nigeria. Ibadan is in Southwestern Nigeria and it lies on the geographical coordinates of 7° 23'16"N and 3° 53'47"E. One hundred and eighty (180) day-old broiler chicks were used for the experiment. The chicks were individually weighed, tagged and randomly allotted to 5 dietary treatments of 3 replicates each. Each replicate had 12 birds. The chicks were offered a vitamin/electrolyte solution (vitalyte) upon arrival. The birds were reared in a disinfected, well-ventilated and illuminated poultry house on deep litter. Routine management and vaccination against Infectious Bursal Disease and New Castle Disease were done. Fresh feed was supplied *ad libitum* and the birds had access to cool, clean and fresh water. The experimental design was Completely Randomized Design. Intake was measured on a weekly basis. Body weight gain, feed intake and feed conversion ratio (FCR) were obtained by calculation. The experiment lasted 56 days.

The diet was a corn/soya diet and was formulated to meet the NRC (1994) nutrient requirements for broiler starters and finishers. Fresh *Moringa oleifera* leaves were harvested and air-dried till the fifth day by which the leaves became dry and crisp before they were milled. Ginger rhizomes were bought, air-dried and also milled while biomin (an acidifier) was bought from a livestock supplies shop.

The 5 dietary treatments include ;

Treatment 1 – positive control where birds were given an antibiotic (oxytetracycline @ 1 g/4 kg feed)

Treatment 2 – diet contained 600 g of *Moringa oleifera* leaf meal (MOLM) in 100 kg of feed.

Treatment 3 - diet contained 400 g of biomin in 100 kg of feed.

Treatment 4 – diet contained 1000 g of ginger in 100 kg of feed.

Treatment 5 – negative control where the birds were not given any additive.

At the end of the experiment, 5 millimeters of blood was collected from each of 3 randomly selected birds from each replicate via the jugular vein into specimen bottles. Blood samples for haematological analysis were collected into sterilised bottles containing ethylenediaminetetraacetic acid (EDTA) as anti-coagulant while those used for serum biochemical analysis were collected into plain specimen bottles and centrifuged before analysis. Packed cell volume (PCV) was determined using the microhaematocrit method while the haemoglobin content was determined with the cyanomethaemoglobin method. Red blood cell count was determined using the Neubauer haemocytometer.

All data generated were subjected to one-way Analysis of Variance (ANOVA) using the General linear model of SAS (1999) and means, where significant, were separated using the Duncan Multiple Range Test (Duncan 1955).

Results and Discussion

There were no significant difference ($p > 0.05$) across the treatments except for feed intake. This agrees with the findings of Juniar *et al* (2008) who reported that the inclusion of *Moringa oleifera* leaf meal at amounts up to 10% in broiler diets did not produce significant effects on body weight, feed conversion ratio, carcass weight, production efficiency factor and income over feed cost. However, broilers on T2, and T4 had higher feed intake than birds on T1. The results are in accordance with observations of Gadzirayi *et al.* (2012) who reported an increase in feed intake of broilers receiving solvent-extracted soybean meal supplemented with *Moringa oleifera* leaf meal.

Table 1: Performance Parameters of broilers fed the experimental diets

Parameters	T1	T2	T3	T4	T5	SEM
Initial weight(g)	41.6	41.4	40.9	42.3	41.9	0.18
Final weight (g)	1877.1	1948.7	1893.3	2107.0	1995.4	39.77
Total weight gain (g)	1835.5	1907.3	1852.4	2064.7	1853.5	36.44
Total feed Intake (g)	2266.64 ^b	2318.3 ^{ab}	2170.58 ^b	2333.21 ^{ab}	2486.88 ^a	8.78
FCR	1.23	1.21	1.17	1.13	1.34	0.07

^{ab} Means along the same row with different superscripts differ ($p < 0.05$) significantly

The PCV, haemoglobin, red blood cell and white blood cell values for birds on the treatments did not differ significantly ($p > 0.05$). The PCV values were highest for birds on T4 (26.78) and lowest for birds on T3 (25.66). These values are similar to those given by Latimer *et al.* (2014) (Merck Veterinary Manual). The authors place the PCV of avian at 32. Haemoglobin values ranged from 8.95 (T3) to 9.68 (T4) even though there were no significant differences among the values for the birds on the different treatments. It has been reported however that broilers fed ginger-based diets have higher counts of haemoglobin which is the oxygen-carrying protein matrix in the RBC. The Red blood cell values across the diets ranged between 3.27 (T4) to 3.36 (T5). The values did not differ significantly but were all lower than the reference range reported in Merck Veterinary Manual which puts it at 1.7. The white blood cell (WBC) counts were not significantly ($p > 0.05$) different. This shows that the experimental diets neither impaired nor enhanced the birds' ability to ward off infection (Olugbemi *et al.*, 2010).

Table 3: Hematological parameters of broilers fed the experimental diets.

Parameters	T1	T2	T3	T4	T5	SEM
PCV (%)	26.67	26.44	25.66	26.78	25.77	2.06
HB (g/dl)	9.66	9.11	8.95	9.68	9.14	0.53
RBC ($\times 10^3/\mu\text{L}$)	3.31	3.31	3.35	3.27	3.36	0.03
WBC ($\times 10^3/\mu\text{L}$)	19.0	16.61	17.29	16.34	16.43	6.49
Lymphocytes ($\times 10^3/\mu\text{L}$)	62.43 ^{ab}	66.65 ^a	67.88 ^a	64.44 ^{ab}	57.0 ^b	20.26
Heterophils ($\times 10^3/\mu\text{L}$)	33.22 ^{ab}	27.11 ^b	27.44 ^b	30.88 ^{ab}	37.00 ^a	26.78
Monocytes ($\times 10^3/\mu\text{L}$)	2.22 ^b	3.33 ^a	2.22 ^b	2.11 ^b	2.55 ^{ab}	0.36
Eosinophils ($\times 10^3/\mu\text{L}$)	1.55 ^b	2.89 ^a	2.44 ^{ab}	2.33 ^{ab}	2.66 ^{ab}	0.53
Basophils ($\times 10^3/\mu\text{L}$)	0.22	0.11	0.44	0.22	0.44	0.12
Platelets ($\times 10^3/\mu\text{L}$)	140333	138555	136667	149444	143888	3.50

^{ab} Means along the same row with different superscripts differ ($p < 0.05$) significantly

Values of lymphocytes, heterophils, monocytes and eosinophils differed significantly ($P < 0.05$). Although the lymphocyte values were high as against the report of Talebi *et al.*, (2005) who reported 22.32 for Arbor Acres broilers and it is known that when lymphocytes increase in number, it most likely shows that the broilers are fighting an infection especially a viral infection. This can be seen more in birds on T2 (66.63) and T3 (67.88) which were given moringa and biomin-based diets, respectively.

Heterophil values were also significantly different ($p < 0.05$). Birds on T5 (37.00) had the highest value which was significantly ($p < 0.05$) different from the values obtained for birds on T1 (33.22), T4 (30.88), T2 (27.11) and T3 (27.44). Values obtained shows that birds on T2 and T3 had the least challenge from infections even though they were far from values reported by Talebi *et al.* (2005) which was 7.99 for Cobb strain of broilers. Eosinophil values also differed significantly across the treatments. The values ranged between 1.55 (T1) and 2.89 (T2) which was close to the values reported by Talebi *et al.* (2005) who put it at 1.76 for 8 week-old Ross broilers. This implies that the broilers fed moringa; ginger and biomin based diet responded more to allergies or hypersensitivity.

Conclusion

Considering the haematological parameters, broiler birds fed the moringa-based diet compared with those fed the other diets. Birds fed diets which contained alternatives to antibiotics showed better performance in terms of heterophil, monocytes and eosinophils. The performance parameters also show that broilers fed moringa and ginger-based diets performed better than other diets in terms of total weight gain, feed conversion ratio and total voluntary feed intake. This study suggests that combining moringa and ginger in synergy will give a very good performance from the broilers and subsequent studies will try to evaluate the effect of combination of the antibiotic alternatives on broilers.

References

- Ali Asghar Saki., Reza Nassein Harcini., Enayat Rahnatnejad., and Jalal Salary (2012). Herbal additives and organic acids as antibiotic alternatives in broiler chickens diet for organic production. *Afri. J. Biotech.* 11: 2139 – 2145.
- Botsoglou, N.A., Fletouris, D.J., (2001). Drug resistant in food pharmacology. Food Safety and analysis, Marcel Dekker Inc. New York. Pp 541 – 548.
- Gadzirayi C T, Masamha B, Mupangwa J F and Washaya S (2012). Performance of broiler chickens fed on mature *Moringa oleifera* leaf meal as a protein supplement to soyabean meal. *International Journal of Poultry Science*, 11 (1): 5–10.
- Juniar, I., Widodo, E. and Sjoftan, O. (2008). Effect of *Moringa oleifera* leaf meal in the feed on broiler production performance. *Jurnal Ilmu Peternakan Brawijaya*, 18: 238–242.
- Latimer, K.S., Mahaffey, E.A. and Prasse, K.W. (2014). Duncan and Prasse's Veterinary Laboratory Medicine: Clinical Pathology, 4th ed., Wiley-Blackwell, Merck Veterinary Manual.
- Mc Carteny, E. (2002). The natural empire stroks book. *Poult. Int.* 41:36 – 42.

- Nasir, Z. and Grashorn, M.A. (2010). Alternatives to in-feed antibiotics: Do we really have some alternatives? A paper presented at the World Poultry Congress, Brisbane, Australia.
- Olugbemi, T.S., Mutayoba, S.K. and Lekule, F.P. (2010). Effect of Moringa (*Moringa oleifera*) inclusion in cassava-based diets fed to broiler chickens. *International Journal of Poultry Science*, 9: 363–367.
- Talebi A., Asri-Razaei S., Rozeh-Chai R. and Sahraei R. (2005). Comparative studies on haematological values of broiler strains. *International Journal of Poultry Science* 4(8): 573-579, 2005. ISSN 1682-8356.