

PERFORMANCE OF BROILER FINISHER BIRDS SERVED ALOE VERA GEL EXTRACT SUPPLEMENT

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Abstract

A 4-week study was conducted to investigate the physiological response of broiler finishers to oral supplementation with aloe vera gel extract (AVGE) using one hundred and twenty (120) four-week-old unsexed broiler birds. The birds were randomly divided into five groups and assigned to five treatments of 24 birds each in a completely randomized design (CRD). Birds on treatments 1, 2, 3, 4, and 5 received ordinary water, Vitalyte, 10%, 20%, and 30% aqueous AVGE, respectively. Results showed that treatments had no significant ($p > 0.05$) effects on average daily weight gain, average daily feed intake, average daily water intake and protein efficiency ratio, but had significant ($p < 0.05$) effects on final body weight, feed conversion ratio, cost of feed per kilogram gain, and mortality%. Treatments also had significant ($p < 0.05$) effects on apparent retentions of crude protein, ether extract, crude fibre, and nitrogen-free extract, but had no significant ($p > 0.05$) effect on apparent retention of dry matter. Based on the results obtained in the present study, it was concluded that oral administration of aloe vera gel extract supplement to broiler finishers enhanced their growth performance, especially at the 20% inclusion level (0.8litre of AVGE + 4 litres of water).

Key words: aloe vera gel extract, broiler finishers, nutrient retention, growth performance, mortality.

Introduction

Poultry production has been described as one of the fastest means to achieving appreciable improvement in the nutritional standard of the Nigeria populace because of its short generation interval, quick turnover rate and relatively low capital investment (Smith, 2001; Ani and Okeke, 2011). However to achieve maximum health and performance of poultry, birds must be supplied with adequate and nutritionally balanced diets. Besides, one of the common issues with regard to back yard flocks relates to poor or inadequate feeding programmes that can lead to vitamin and mineral deficiencies in the birds. Vitamin and mineral deficiencies can produce numerous health problems for chickens including death in some cases. Thus, to prevent nutritional deficiencies, or to correct when deficiency symptoms are noted, feeding a balanced poultry ration with the required vitamins and minerals should be practiced. Moreover, oral administration of vitamins and minerals to birds is inevitable especially in the time of stress and outbreak of diseases. The use of commercially produced vitamins is costly and tends to increase the cost of poultry production. In view of this, there is increased interest by poultry farmers to search for leaves of ethno medicinal plants can serve as natural sources of vitamins and minerals. The use of various plant extracts in broiler production has been documented (Okoli *et al.*,

2001; Essien *et al.*, 2007; Nworgu *et al.*, 2007; Galib and Noor, 2010). One of such plant extracts is Aloe vera (*Aloe barbadensis*) belongs to the lily family. The use of aloe vera leaf extract in broiler production is a step in the right direction since it is a potential source of these essential nutrients that are necessary for normal well being, growth and development of birds (Mehala and Moorthy, 2008; Odo *et al.*, 2010; Muazet *et al.*, 2013). This study was therefore conducted to evaluate the growth performance of broiler finisher birds served aloe vera gel extract supplement.

Materials and Methods

The study was conducted at the Poultry Unit of the Department of Animal Science Teaching and Research Farm, University of Nigeria Nsukka. The study lasted for a period of four weeks.

Preparation of Aloe Vera Gel Extract

Fresh aloe vera leaves were collected from Mbu town in Isi-uzo Local Government Area of Enugu State. The leaves were washed with clean water to remove dirt. Aloe vera gel was extracted manually from 1kg leaves by making a cut on the leaves with a pocket knife. The gel was scooped out with a small spoon and drained into a beaker. The extract was prepared by pouring 400ml (0.4litre) of fresh gel into a glass bottle containing 1.5 litre of clean tap water. The bottle was agitated for about 2 minutes to ensure thorough mixing, after which it was kept for 30mins to 40mins at room

temperature prior to use. The homogenized gel extract was prepared at the interval of two (2) days and served to the animals fresh according to treatments.

Experimental Birds and Management

One hundred and twenty (120) four-week-old unsexed broiler birds were used for the study. The birds were randomly allotted into five treatment groups of 24 birds each in a completely randomized design (CRD). The treatments were as follows: T1 = water only; T2 = vitalityte in water; T3 = (0.4litre of AVGE + 4litre of water); T4 = (0.8litre of AVGE+4 litre of water) and T5 = (1.2litre of AVGE + 4 litre of water). Treatment 1 served as the control while T2 was commercial vitalityte which contained vitamins supplement. Each treatment was replicated three times with 8 birds per replicate placed in a deep litter pen of fresh wood shavings measuring 1.50m x 1.50m. All the groups were fed the same commercial broiler finisher diet containing 2.89Mcal/kg ME, 18.56% crude protein and 5.85 % crude fibre. Routine management practices in terms of medication and vaccination were strictly observed. Birds were fed two times a day, at 8.00am and 4.00pm. Feed, AVGE, water and vitalityte were given *ad libitum* to the birds for the 4 weeks experimental period. Birds in each replicate were weighed at the beginning of the experiment and subsequently on weekly basis to determine the weight gain of birds. Feed intake was recorded daily and was determined by the weigh-back technique, and this involved obtaining the difference between quantity of feed offered and the left over the following morning. Feed conversion ratio was calculated from the data on feed intake and weight gain as the number of grams of feed consumed per gram of weight gained over the same period.

Apparent nutrient retention determination

At week 4 of the experiment, apparent nutrient retention was determined with the birds housed individually in metabolism cages and weighed quantity of feed (90% of the daily feed intake) was offered to each bird daily. The birds were allowed for two days to adjust to the cage environment before data collection, and before droppings were collected. Daily feed consumption was recorded as the difference between the quantity offered and the quantity left after 24 hours. Faecal droppings were collected from separate cages in detachable trays placed beneath the wire mesh floor of the cages, oven-dried at 60°C and weighed over a seven day period. At the end of the period, all faecal samples from each bird were bulked and preserved for

analysis.

Proximate and Statistical Analyses

The aloe vera gel extract was assayed for proximate composition by the method of AOAC (1990). Data collected were subjected to analysis of variance (ANOVA) in completely randomized design (CRD) using a Stat Graphic Computer Package (SPSS, 2007) Model. Significantly different means were separated using Duncan's New Multiple Range Test option in SPSS.

Results and Discussion

Proximate composition of aloe vera gel extract

The aloe vera gel extract used in the study contained 55.94% moisture, 10% crude fibre, 4.40% ether extract, 20.02% crude protein, 8.99% ash and 0.65% nitrogen-free extract.

Effect of aqueous aloe vera gel extracts on growth performance of finisher broiler birds

The effect of aqueous aloe vera gel extract on growth performance of broiler finishers is presented in Table 1. Although no significant ($p > 0.05$) differences existed among treatments in average daily weight gain (ADWG), average daily and total feed intake, average daily and total water intake and protein efficiency, there were significant ($p < 0.05$) differences among treatments in final body weight (FBW), feed conversion ratio (FCR), cost of feed per kilogram gain (CFG), and mortality rate. Birds on treatments 4(0.8litre of AVGE+4 litre of water) and 5 (1.2litre of AVGE + 4 litre of water) had significantly ($p < 0.05$) higher FBW values (3.38kg and 3.41kg, respectively) than birds on treatments 1 (water) and 2(vitalyte) but these were similar ($p > 0.05$) to the FBW value (3.28kg) of birds on treatments 3 (0.4litre of AVGE+4 litre of water). Birds on treatment 2 had similar FCR value (3.46) with those on treatment 1(3.36) and this was significantly ($p < 0.05$) higher than the FCR value of birds on treatments 3, 4 and 5(3.21, 3.09 and 3.18, respectively). Birds on treatment 1 had similar FCR value (3.36) with those on treatments 3 and 5 and this was significantly ($p < 0.05$) higher than the FCR value (3.09) of birds on treatment 4. The values of FCR for birds on treatments 3 to 5 were similar ($p > 0.05$). Broilers on treatment 2 had similar CFG value (₦345.67) with birds on treatment 1 (₦336.33) and this was significantly ($p < 0.05$) higher than the CFG values of birds on treatments 3, 4 and 5(₦321.00, ₦308.67 and ₦317.66, respectively). The values of CFG for birds on treatment 1 was similar to the values obtained from birds on treatments 3 and 5(₦321.00 and ₦317.66, respectively) and this was significantly ($p < 0.05$) higher than the CFG

value of birds on treatment 4 (N308.67). Birds on treatments 3 to 5 had similar ($p > 0.05$) CFG values. Birds on treatments 2 and 3 (vitalyte and 0.4litre of AVGE+ 4litre of water), respectively had significantly ($p < 0.05$) higher mortality values (0.33% and 0.67%, respectively) than birds on treatments 1, 4 and 5 (water, 0.8litre of AVGE+4 litres of water and 1.2litre of AVGE + 4 litre of water, respectively) which had similar ($p < 0.05$) mortality values. As shown in Table 1, the performance, in terms of final body weight, feed efficiency, cost of feed per kg gain and mortality rate of birds on treatment 4 (0.8litre of AVGE+4 litre of water) was superior to those of birds on vitalyte. The observed enhanced performance could be attributed to diverse antimicrobial properties of aloe vera gel. It had been reported that aloe vera gel possesses a tonic effect on the intestinal tract, with a reduced transit time. This makes it possible for the beneficial bacterial flora in the gastrointestinal tract to survive and thrive better because of reduction in the yeasts present in the GIT and also as a result of the reduction in the GIT pH (Swaim *et al.*, 1992; Olupona *et al.*, 2010). Aloe vera also has the ability to accelerate the growth of new cells, thereby resulting in increased body weight (Olupona *et al.*, 2010; Barbak *et al.* (2011). In a study that compared Chinese herbal medicine to virginiamycin, Guo *et al.* (2004) reported higher feed conversion ratio in broilers treated with Chinese herbs on days 21 through 28. The inclusion of 0.8litre of AVGE in 4 litres of water may therefore be the optimal inclusion level of aloe vera gel in broiler finisher birds' drinking water.

Effect of aqueous alovera gel extracts on apparent nutrient retention finisher broiler birds

The effect of aqueous aloe vera gel extract on apparent nutrient retention of finisher broiler birds is presented in Table 2. There were significant ($p < 0.05$) differences in all the parameters determined with the exception ($p > 0.05$) of dry matter retained. Birds on treatments 2, 3 and 4 had similar values of crude protein retained (CPR) and these were significantly ($p < 0.05$) higher than the values for broilers on treatments 1 (control) and 5. Broilers on treatments 4 and 5 had similar ($p > 0.05$) values of crude fibre retained (CFR) and these were significantly ($p < 0.05$) higher than the CFR values for birds on treatments 1-3. Birds on treatments 1-3 (water, vitalyte, 0.4litre of AVGE+ 4litre of water) had similar ($p > 0.05$) values of

CFR. Broilers on treatment 4 (0.8litre of AVGE+4 litre of water) had the highest ($p < 0.05$) value of ether extract retained (EER), while birds on treatments 3 and 5 had similar ($p < 0.05$) values of EER and these were significantly ($p < 0.05$) higher than the values of EER for birds on treatments 1 and 2 which were also similar ($p > 0.05$). The values of nitrogen-free extract retained (NFER) of birds on treatments 1 and 2 were similar and these were significantly ($p < 0.05$) higher than the NFER values of birds on treatment 3 -5 which were also similar ($p > 0.05$). As shown in Table 2, broiler birds that received vitalyte and 0.4litre of AVGE + 4 litres of water (treatments 2 and 3, respectively) had similar crude protein retention ability than the rest of the treated broilers. The improved CP retention of birds on some of the treatments may be attributed to the antimicrobial, appetite- and digestion-stimulating properties in some plant extracts, including aloe vera extract (Kamel, 2001). The lower nitrogen-free extract retention observed in birds on treatments 3 to 5 tends to suggest that the aloe vera extract might have hindered the ability of the treated birds to retain this nutrient like their counter parts that were served water and vitalyte. Although birds on treatments 1 and 2 (water and vitalyte, respectively) retained more nitrogen-free extract than other birds, their overall performances were not superior to those of birds on treatments containing aloe vera extract. This tends to suggest that the inclusion of aloe vera extract in the birds' drinking water had a beneficial effect on the birds. Wenk (2002) reported that herbs can stimulate appetite and endogenous secretions which, in turn, improve performance. The beneficial effects of herbal extracts on farm animals may be as a result of the increase in feed intake and activation of digestive enzymes secretion of the animals, emanating from the immune stimulating, and anti-bacterial, anti-viral and anti-oxidant properties of these extracts.

Conclusion

The results obtained in the present study showed that oral administration of aloe vera gel extract supplement to broiler finishers enhanced their growth performance, especially at the 20% inclusion level (0.8litre of AVGE + 4 litres of water).

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Table 1: Effect of aqueous alovera gel extracts on growth performance of finisher broiler birds

Parameters	Treatments*					SEM
	T1	T2	T3	T4	T5	
Initial body weight(g)	1268.00	1270.00	1265.00	1267.00	1269.00	2.31
Final Body weight (kg)	3.15 ^b	3.15 ^b	3.28 ^{ab}	3.38 ^a	3.41 ^a	0.04
Daily weight gain (g/bird)	50.00	50.00	51.02	51.30	52.05	0.07
Average daily feed intake (g/bird)	173.00	176.00	170.00	170.00	170.00	0.01
Feed conversion ratio	3.36 ^{ab}	3.46 ^a	3.21 ^{bc}	3.09 ^c	3.18 ^{bc}	0.05
Daily water intake (cl/bird)	70.00	69.70	70.70	70.00	77.00	0.30
Protein efficiency ratio(PER)	1.59	1.59	1.59	1.59	1.59	0.00
Cost of 1kg of feed(₦)	100.00	100.00	100.00	100.00	100.00	0.00
Cost of feed per kg gain(₦)	336.33 ^{ab}	345.67 ^a	321.00 ^{bc}	308.67 ^c	317.66 ^{bc}	4.50
Mortality (%)	0.00 ^b	0.33 ^a	0.67 ^a	0.00 ^b	0.00 ^b	0.15

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

SEM= Standard Error of the Mean.

*T1 = water; T2 = vitalitye; T3 = (0.4litre of AVGE + 4litre of water); T4 = (0.8litre of AVGE+4 litre of water) and T5 = (1.2litre of AVGE + 4 litre of water).

Table 2: Effect of aqueous aloe vera gel extract on apparent nutrient retention finisher broiler birds

Parameter	Treatments*					SEM
	T1	T2	T3	T4	T5	
Crude protein retained (%)	80.91 ^b	91.15 ^a	91.20 ^a	91.88 ^a	83.93 ^b	1.26
Crude fibre retained (%)	22.09 ^b	34.65 ^b	32.39 ^b	38.09 ^a	36.70 ^a	2.45
Dry matter retained (%)	63.15	66.10	63.15	65.07	62.01	1.17
Ether extract retained (%)	84.64 ^c	86.94 ^c	92.813 ^b	95.86 ^a	90.29 ^b	1.13
Nitrogen-free extract retained (%)	78.35 ^a	76.72 ^a	63.52 ^b	63.24 ^b	64.25 ^b	2.15

^{a,b,c} Means on the same row with different superscripts are significantly(P<0.05) different.SEM= Standard

Error of the Mean. *T1 = water; T2 = vitalitye; T3 = (0.4litre of AVGE + 4litre of water); T4 = (0.8litre of AVGE+4 litre of water) and T5 = (1.2litre of AVGE + 4 litre of water).