

Growth performance and carcass characteristics of finisher broiler chickens served carrot leaf extract as a supplementary source of vitamins and minerals

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Abstract

An experiment was carried out to study the effects of carrot leaf extract (CLE) supplementation as sources of vitamins and minerals in finisher broiler chickens. A total of two hundred and eight (208), 7 day old birds were used. The birds were grouped into four (4) treatments of fifty-two (52) chicks, each replicated four times with thirteen (13) chicks in a completely randomized design (CRD). Parameters measured and evaluated included feed intake, body weight, body weight gain (BWG), feed conversion ratio (FCR) and mortality. The effects of CLE on carcass characteristics and organs weight were also evaluated. Significantly ($P < 0.05$) higher daily feed intake (92.13g/b) was recorded on the birds received 80ml of CLE compared to any other treatments. The best weight gain was observed on birds served 80ml levels of CLE per litre of water compared to vitality (1831.25g/bird) and control (1418.75g/birds) groups. Result showed no significant difference ($P > 0.05$) for the carcass parameters evaluated except for dressing percentage. On the organs weight, no significant effect on heart, pancreas, lung, intestine and spleen were recorded ($P > 0.05$). Based on the result of the study, it could be concluded that giving CLE at 80 ml/litre to finisher broilers in drinking water resulted in better weight gain, feed efficiency and increases feed intake, body weight and carcass yield without adverse effect on the organs and can be used in place of conventional vitamin-mineral premix.

Keywords: Carcass, organs, vitamins, minerals and carrot

Description of Problem

Over the years, plant extracts have been widely used in the diets of poultry as a means of reducing the cost of conventional feeds [1] as well as growth promoter [2]. Plant extracts do not only serve as protein source but also provide some necessary vitamins and minerals which could complement the inadequacies of most feedstuffs [4,5]. Bello *et al.* [5] reported that leafy vegetables such as onion bulbs supply useful minerals and vitamins that could have enhanced the palatability of feed and consequently impacted positively on the bird's growth performance. Carrot (*Daucus carota*)

commonly called “Karas” in the northern Nigeria is a root vegetable crop cultivated for its leaves and tuber. By-products obtained from the plant features high concentration of minerals (Ca, P, Fe, Na, K, Mg, Cu and Zn) and vitamins (C, D, E and K) [6,7], which are good antioxidants. The growth promoting effect, antimicrobial and antioxidant activities may confirm the potential of carrot waste as a function feedstuff that could replace the role of antibiotic growth promoter for poultry. Trial demonstrated inclusion of carrot leaf extract in the drinking water of broiler chickens increased feed intake and body weight gain

[8]. It is also rich in phyto-nutrients that may be essential to control and modulate the population of pathogens in the gastrointestinal tract of both human and animals [9]. The supply of vitamins and minerals for animal's use is of dietary importance, since poultry cannot synthesized them by their body and has to be included in the diets [10]. Synthetic premix or vityalte is costly and its supply from agro-allied is inadequate to meet poultry requirement, thus the need to search for cheap and available supplements.

Materials and Methods

Study area

This study was conducted at the poultry research unit of the Department of Animal Science, Kebbi State University of Science and Technology, Aliero. Aliero is located within latitude 12⁰ 06⁰ North and longitude 4⁰ 3⁰ 10' of the equator [11]. Aliero Local Government area is geographically found in the South Eastern part of Kebbi State. The average

rainfall is 750mm and the dry season starts in March and ends in May. The major ethnic groups are Fulani, Hausa, Arawa, Kabawa, Gimbanawa and Zabarmawa. However, Aliero is an agrarian town with about 70% of the population engaged in Onion farming.

Management of birds and experimental design

A total of two hundred and eight (208) 28-day old broiler chicks were randomly assigned into four treatments: water only (control), water + 5g vityalte, water + 40ml CLE and water + 80ml CLE per litre of water for treatments 1, 2, 3 and 4 respectively. Birds in each treatment groups were further subdivided into four (4) sub group of thirteen birds to serve as replicate in a completely randomized design (CRD). Feed and water were given ad libitum. Data on feed intake, body weight gain, feed conversion ratio and mortality were recorded. The experimental diet fed to the broiler chickens were shown in Table 1.

Table 1: Composition of the experimental diet for starter and finisher phases

Ingredient (S)	Starter (%)	Finisher (%)
Maize	55	54
Groundnut cake	30	24
Wheat offal	5.0	12
Blood meal	5.0	4.0
Bone meal	2.0	2.5
Limestone	2.0	2.5
Premix	0.3	0.3
Methionine	0.2	0.2
Lysine	0.2	0.2
Salt	0.3	0.3
	100	100
CP (%)	24.65	22.07
ME (kcal/kg)	2950	2840
Ca (%)	1.3	1.59
P (%)	0.37	0.35
CF (%)	0.37	0.35
EE (%)	5.4	5.1

Collection and preparation

The fresh carrot leaves were collected from the carrot sellers at Aliero metropolis. 2 kg of carrot leaves were weighed, washed, drained, chopped and pounded in a mortar and pestle. This was then squeezed and sieved to obtain the homogenous CLE. The extracts were prepared at four days interval, the CLE obtained thereafter were preserved in the refrigerator. The birds in group 1 and 2 were offered CLE at 40 and 80ml per litre of water respectively. After consumption, fresh water was served for the remaining period of the day.

Birds in group 3 were given vitalityte® through drinking water according to the manufacturer's recommendation of 5g per litre of drinking water while group 4 were kept as control.

Statistical Analysis

The data collected were subjected to analysis of variance (ANOVA) using SPSS computer software package and means separation was carried out using least significant differences (LSD).

Results and Discussion

Table 2: Performance indices of broiler chickens at finisher phase fed CLE

Parameters	Treatments				SEM
	40ml/L	80ml/L	5gVTL/L	CTR	
Initial body weight (g/b)	849.15	849.10	849.12	849.15	24.79
Final body weight (g/b)	1887.50	1937.50	1790.00	1832.50	296.40
Body weight gain (g/b)	1956.25 ^b	2368.75 ^a	1831.25 ^b	1418.75 ^c	106.35
Total feed intake (g/b)	2968.00 ^{ab}	3003.75 ^a	2928.00 ^b	2942.00 ^b	101.30
Daily feed intake (g/b)	89.77	92.13	89.76	88.98	4.75
FCR (g feed g ⁻¹ gain)	1.60	1.53	1.64	1.62	0.04
Mortality (%)	9.62	9.61	9.62	7.69	4.45

abc= mean values along the same row with different superscript are significantly different (p<0.05).

FCR=Feed Conversion Ratio; SEM= Standard Error Mean ; CTR= Control ;VTL= Vitalyte

The results for feeding trials indicated that administration of vitalityte and CLE to finisher broiler chickens significantly (P<0.05) increased body weight gain and total feed intake. Birds served 80ml CLE per litre of water had similar total feed intake with birds on T3 (40ml) and this was significantly (P<0.05) higher than the total feed intake values of birds on T1 (control) and T2 (vitalyte). The different responses of birds to the levels of CLE with respect to feed intake may be as a result of the availability of useful vitamins and minerals inherent in the extract. [11] reported that the incorporation of both micro and macro nutrients in poultry diets enhances feed intake and utilization. The best weight gain was observed on birds served 40ml or 80 ml of CLE per litre of water compared to vitalityte (1831.25g/bird) and

control (1418.75g/birds) groups. The higher weight gain of birds fed CLE could be as result of higher digestion of the nutrient consumed by the birds and greater efficiency in the utilization of feed which resulted in enhanced growth. [12] had earlier reported that plant extracts possess digestion stimulating properties. Also, [13] reported that herbs reduced some harmful bacteria in the GI tract of broilers which leads to higher efficiency and utilization of feed and consequently higher weight gain. Birds on T1 (control) had the lowest weight gain and this may be attributed to none inclusion of either vitalityte or CLE. This finding agrees with earlier reports of [1] and [4] that leaves extract contain active ingredients which are beneficial to the growth of the birds. [5] reported similar findings for broiler finisher birds fed onion bulbs extract.

Table 3: Carcass characteristics of broiler finisher chickens served CLE

Parameters	Treatments				SEM
	(40ml CLE)	(80ml CLE)	(5g VTL)	(CNT)	
Live weight (g)	1600.00	1625.00	1525.00	1625.00	116.67
Carcass weight (g)	563.85	653.63	532.05	654.05	52.99
Dressing percentage (%)	65.52 ^c	80.97 ^a	54.91 ^d	80.03 ^a	4.91
Breast muscle (g)	225.00	313.45	226.10	326.93	44.13
Thigh muscle (g)	166.03	156.75	144.20	153.88	21.37
Shank (g)	33.08	33.03	29.98	32.28	2.89
Neck (g)	80.05	89.88	74.35	82.40	14.05
Wing (g)	59.70	60.53	57.43	58.57	7.13

abc= mean values along the same row with different superscript are significantly different (p<0.05)

CNT= Control VTL= Vitalyte SEM=Standard Error Mean!!

The carcass characteristics of broiler chickens is presented in Table 4. Result indicated that administration of CLE to finisher broilers significantly (P<0.05) increased the dressing percentage and had no any effect on live weight, carcass weight, breast and muscle weight, neck and wing. Furthermore, there was an increase in the values of these parameters as levels of CLE in the diets increased. This finding agrees with the earlier report that plant leaves contain medicinal properties which allowed chickens to grow strong and healthy [14]. The superior value of the dressing percentage of birds served 80ml CLE per litre

of water is an indication that total edible meat from birds on this treatment is higher than the meat yield from other treatments. The significance differences observed in this parameter could be due to nutritional and health benefits of the carrots which are beneficial to the growth of the birds. The finding is in harmony with the report of [15]. The higher value weight of shank obtained in this present study on birds served 40ml CLE compare to vitalityte and control group may suggest that the absorption of calcium in carrot may be best in this inclusion.

Table 4: Organ characteristics of broiler finisher chickens served CLE

Parameters (g)	Treatments				SEM
	(40ml CLE)	(80ml CLE)	(5g VTL)	(CNT)	
Liver	3.83	2.30	2.25	2.58	2.46
Heart	6.67	5.95	5.75	5.98	0.43
Pancreas	2.73	3.43	2.00	2.55	0.36
Lung	8.05	8.40	7.38	7.70	0.59
Gizzard	37.05	41.75	35.65	35.18	4.04
Spleen	0.95	2.43	0.92	0.70	0.38
Intestine	69.50	68.63	65.63	67.13	5.91
Proventriculus	8.13	7.85	6.65	8.00	0.80

abc= mean values along the same row with different superscript are significantly different (p<0.05)

CNT= Control VTL= Vitalyte SEM=Standard Error Mean

Table 4 shows the organs weights of broiler finishers offered CLE. Result showed no significant differences (P>0.05) on internal

organs of birds that served levels of CLE, vitalityte and control group. Birds on treatment 1 (40ml of CLE) recorded higher weights of

liver, heart and intestine other organs like pancreas, lung and spleen were found to be heavier on birds served 80ml CLE. Findings of this present study shows that all organs performed well due to anti-microbial nature of carrot which may have prevented any harmful effect to the organs. These findings however, did not agree with [1, 4] who reported that medicinal plants usage have been associated with organs damage due to toxic substances produce by the plant. The increase in these parameters is attributed to the fact that body organs are known to absorb drugs first before releasing them to entire cells for use. This may be the reason why CLE groups have more organ weights than the vitality and control group. The finding did not favour the earlier report of [15] who reported that the supplementation of pawpaw leaves extract (10ml/L) in finisher broiler diet showed significant effect on internal organs.

Conclusion and Applications

1. Carrot leaf has the potential to be a good natural premix source for animal feed industry application.

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