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Influence of Carrot Leaf Extract on Carcass Characteristics and Organ Weights of Finishers Broiler Chickens in Kebbi State, Nigeria

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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 vitalyte (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*

INTRODUCTION

Over the years, plant extracts have been widely used in the diets of poultry as a means of reducing the cost of conventional feeds (Nworgu, F.C.; Ogungbenro, S.A. and Solesi, K.S. 2007) and promote growth (Nidaullah, H., Durrani, F.R., Ahmad, S., Jan, I. U. and Gul, S. 2010). Plant extracts do not only serve as protein source but also provide some necessary vitamins and minerals to complement the deficiencies of most feedstuffs (Machebe, N.S., Agbo, C.U. and Onuaguluchi, C.C. 2010). Bello, S. Christianah A.M., Muftau M.A. and Abubakar A. 2016) reported that 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. Oluyemi and Boberts, (2000) reported that the incorporation of both micro and macro nutrients in poultry diets enhances feed intake and utilization.

Carcass is the body of a livestock animal ready for butchery, after removal of skin, visceral organs, head, feet etc. (Douglas; Harper. 2021) carcass in Online Etymology Dictionary. Modern French called it carcasse – trunk of a body, chest, and carcass. Organs are the body's recognizable structures (for example, the heart, lungs, liver, eyes and stomach) that perform specific functions. An organ is made of several types of tissue and therefore several types of cells.

Carrot *(Daucus carrota)* commonly called "*Karas*" in the northern Nigeria is a root vegetable crop cultivated for its leaves and root. 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) Doyle, E. (2001). (Bello, S., Lailaba, D.S., Usman, N. and Dabai, A.S. 2018) which are good antioxidants. The growth promoting effect, antimicrobial and antioxidant activities confirmed the potential of carrot waste as a source of feedstuff as an alternative to antibiotic growth promoter in poultry. Feed research have shown that, the inclusion of carrot leaf extract in the drinking water of broiler chickens increased feed intake and body weight gain (Nagai, T. 2003). 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 (Sinclair L.A, Edwards, R.A. and Green halgh, J.F.D. 2002). 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 (Oluyemi, J.A. and Roberts, F.A. 2000).

Cultivars of carrot differ in their essential oil contents and leaves have higher amount of essential oils than the roots. The principal compounds in the leaves were β-myrcene, α-asarone, methyl isoeugenol, β-caryophyllene, (E)-β-farnesene, limonene and sabinene (Habegger and Schnitzler, 2000).

Many vegetable leaves, including those of carrot (*Daucus carota L.*), are wasted. Carrot leaves are very rich in both nutrients such as vitamin C, β-carotene, fibers and several minerals such as Na, P, K, Ca, Mg, Mn, Zn, and Fe. They have a pleasant taste and characteristics suitable for processing. They may be used as a raw basis for the preparation of several foods. The use of the byproducts of the vegetable industry has presented technological viability, and they have been used for the formulation of cream soups made of dehydrated vegetable stalks (Couto et al., 2004).

Synthetic premix or vitalyte is costly and its supply from agro-allied is inadequate to meet poultry requirement, thus the need to search for cheap and available supplements.

Seasonality of Carrots

Early season carrots are sown in the winter and very early spring and protected with plastic or fleece covers. They are harvested from June through to August. Night temperatures of 55 degrees F and day temperature of 75 degrees F are ideal for carrots.

Materials and Methods

Study area

This study was conducted at the poultry research unit of the Department of Animal Science, located at the main campus of Kebbi State University of Science and Technology, Aliero. Aliero is located in the South East of Kebbi State and it lies between the latitude 12^0 06^0 North and Longitude $4^0 3^0 10$' South (KSUSTAM, 2015). The average rainfall is 750mm and the dry season starts in March and ends in May (KSUSTAM, 2015). 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 and Carrot farming. The Carrot leaves are abundant in the study area therefore, there is need to utilize them as alternative vitamins and minerals supplement.

Management of birds and experimental design

A total of two hundred and eight (208) 7 day old broiler chicks were randomly assigned into four treatments: water only (control), water + 5g vitalyte, water + 40ml Carrot Leave Extract (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 Collection and Analysis

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.

Collection and preparation of extract

The fresh carrot leaves were collected from the carrot sellers at Aliero metropolis. 2 kilogram (kg) wet of carrot leaves were weighed, washed, drained at 40^0C with oven, chopped and pounded using mortar and pestle. The product was then squeezed and sieved with 0.5mm/dm to obtain the homogenous CLE. The extracts were prepared at four days interval, the CLE obtained thereafter were preserved in the refrigerator at 0° F (-18° C). The birds in group 1 and 2 were offered CLE at 40 and 80 ml per litre of water, respectively and thereafter, fresh water was administered for the remaining period of the day. Birds in group 3 were given vitalyte® 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) at $P<0.05$ significance level.

Results and Discussion

The carcass characteristics of broiler chickens is presented in Table 2. Result indicated that administration of CLE to finisher broilers significantly ($P<0.05$) increased the dressing percentage, with no significant 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 earlier report that plant leaves contain medicinal properties which allowed chickens to grow strong and healthy (Doyle, 2001). 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 Dias and Carlos (2012). The higher value weight of shank obtained in this present study on birds served 40ml CLE compare to vitalyle and control group may suggest that the absorption of calcium in carrot may be best in this inclusion. Table 3 shows the organs weight of broiler finishers administered with CLE. Result showed no significant differences ($P>0.05$) on internal organs of birds that served levels of CLE, vitalyte and control group. 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 showed that all organs performed well due to anti-microbial nature of carrot which may have prevented any harmful effect

to the organs. This finding however, did not agree with Nworgu *et al*. (2007), Machebe *et al*. (2010) 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 are 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 vitalyte and control group.The finding did not favour the earlier report of Bello *et al*, (2013) who reported that the supplementation of pawpaw leave extract (10ml/L) in finisher broiler diet showed significant effect on internal organs.

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

Table 2: Carcass characteristics of broiler finisher broiler chickens fed with Carrot Leave Extract

Carcass	TREATMENT				
	CNT	5g VTL	40ml CLE	80ml CLE	SEM±
Live weight (g)	1625.00	1525.00	1600.00	1625.00	116.67
Carcass weight (g)	654.05	532.05	563.85	653.63	52.99
Dressing percent (%)	40.03[a]	34.91[d]	35.52[c]	40.97[a]	2.91
Breast muscle (g)	326.93	226.10	225.00	313.45	44.13
Thigh muscle (g)	153.88	144.20	166.03	156.75	21.37
Shank (g)	32.28	29.98	33.08	33.03	2.89
Neck (g)	82.40	74.35	80.05	89.88	14.05
Wing (g)I	58.57	57.43	59.70	60.53	7.13

1 **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 3: Organs characteristics of broiler finisher chickens served CLE

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

Conclusion

The CLE is a valuable vitamins and mineral supplement for broiler chicken as it encouraged feed intake and weight gain. It was concluded that, an increase in the quantity of CLE to 80ml leads to increase in the carcass characteristics without adverse effect on the organs.

Recommendations

Based on observations and findings from the study, the following recommendations were offered:

1. Carrot leaves are abundant in the study area therefore, there is need to utilize them as alternative vitamins and minerals supplement.
2. Higher concentrations of the CLE could be tried in other experiment to ascertain it effects on carcass characteristics and organs weight.
3. Carrot leaves extract can conveniently replace the use of some synthetic feed ingredients in broiler production to reduce the cost of synthetic feeding ingredients.

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