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EFFICACY OF SUPPLIMENTING GARDEN EGG (*Solanum melongena*) WASTE IN THE DIETS OF BROILER FINISHER

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Abstract: **The study was conducted to evaluate the nutritional composition of garden egg waste, growth performance and carcass characteristics of finisher broiler chickens fed dietary levels of garden egg waste .eighty pieces of unsexed four weeks old ABORE ACRE broiler chickens with the average weight of 0.80kg were used for the study that lasted for four weeks. Significant (P<0.05) differences among treatment groups in weight gain, average daily feed intake, feed conversion ratio, mortality and carcass weight were observed. The study suggests that supplementing broiler diets with 10% garden egg waste is ideal in feeding finisher broiler as all the parameters observed for the performance had similar significant values with the control. However, the broiler chickens underutilized the feeds that contained 20 and 30% inclusion of garden egg waste as the values recorded for these treatments were significantly lower when compared to the control diets weight.**

Keywords: **waste; garden egg; diet; supplementing; efficacy.**

1. INTRODUCTION

Production of poultry has been greatly acknowledged because of the quickest way of bridging the protein deficiency gap in Nigeria being a developing country . (Maidala and Istifanus, 2012). Poultry meat is a crucial supply of vitamins because it consists of all of the critical amino acid, fatty acids, nutrients, minerals specifically selenium, iodine, phosphorus, potassium, iron and zinc. However, a predominant developmental problem facing chicken farmers in Nigeria is diets lack of confidence because of the excessive populace increase in Africa and developing income, the call for eggs and chicken meat has appreciably multiplied in current years throughout massive elements of the continent (WHO, 2010). Energy feed like maize, sorghum and millet are high priced feedstuff which represent approximately 50 – 55 % of each formulated poultry diet.

Maize as a first-rate factor of livestock feed in Nigeria is high-priced and its productiveness has emerge as very low because of the insurgency disaster in the north-eastern part of the country and the latest maize worm devastation recorded in a few southern state have in addition multiplied the call for-deliver hole on this energy feed resource. The livestock farmers seem maximum hit in phrases of excessive price of feed ingredients. Poultry production nevertheless stays one of the veritable methods of reaching sustainable and fast production of excessive first-rate animal protein to satisfy the growing call for of the Nigerian gaining knowledge of populace (Maidala and Istifanus, 2012). Limitation imposed with the aid of using shortage of maize and opposition from human intake have pressured many farmers into using alternative sources of energy feedstuffs for feeding poultry. However, little has been accomplished in discovering on substitute for nutrition and minerals as critical a part of meals training required through birds.

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Garden Egg Fruits (Solanum melongena)

Eggplant, additionally called Garden Egg, is an extraordinary fruit this is typically eaten as a vegetable. It is scientifically called Solanum melongena and is a member of the Solanaceae family. It is called "Igba" amongst Yorubas in Southwest Nigeria and "anara" amongst Igbos in Eastern and South-Western Nigeria. In Nigeria, garden egg leaf is used to make vegetable stews and yam dishes. In Africa, garden eggs are typically diced, boiled, and combined into a number of vegetable, meat, or fish stews and sauces. Because of the presence of cyanogenic glycosides in it, it has a bitter taste (Anwa *et al.*, 2011). Many African eggplants are candy or tasteless, mainly while eaten of their younger phases. After being cut, parboiled, and crushed, the immature culmination is regularly served in a sauce. Peeling isn't always vital due to the fact the pores and skin turns sensitive sufficient to consume with yam, plantain, or rice as soon as cooked. They consist of one of the few vegetables that most effective gain their authentic taste while they have been cooked beyond crisp (Adedeji, 2016). It is thought that garden egg is a great supply of nutritional fiber, potassium, manganese, copper, and thiamin, amongst different vitamins (Okocha and Chinatu, 2008). It's additionally excessive in folate, magnesium, and niacin, in addition to diet B6. Phytonutrients like nasunin and chlorogenic acid also are located in garden eggs. (Ezeugwu,et al,2004). Garden eggs are some of the healthiest meals which are eaten (Omotessh, et al.,2017). It is a vegetable rich in protein, carotene, nutrients B6 and E, foliate, magnesium, calcium, iron, fiber, and lots of different minerals and nutrients (Gopalan et al., 2007). Solanum popularly covered in cream and inexperienced colours. Lack of power supply and refrigeration facilities in a few rural regions wherein this crop is produced severely have an effect on the preservation of this crop such that tons of the product is lost. As garden egg matures, it will flip unique colours from its immature. The marketplace prefers garden egg while immature.

However,. However, the absence of efficient utilization of the unsold garden egg (waste), will increase the big amount which are usually generated which becomes an amazing danger to the groups and marketplace locations in which they're grown and sold, thereby inflicting a nuisance More effective means of incorporating these waste products has become necessary in view of the environmental hazards they constitute in major producing areas and markets all over the country where they are distributed during the season, some of which are in urban areas (Joel, *et al*., 2016; WHO, 1991). The contemporary practice in animal production is to apply agro with the aid of using-merchandise and agricultural wastes as non-obligatory feed components in rooster and farm animals feeding trials. The final intention is to decrease the price of feeding animals that is turning into prohibitive in view of choppy financial fortunes of growing countries. The latest boom with inside the cost of feeding animals, specifically monogastric animals, due to the appreciably elevated price of conventional feed additives has necessitated a more cognizance on growing opportunity feed components for feeding the animals. It is consequently important to channel studies attempt toward exploring avenues for using maximum of the agro waste merchandise such as inclusive of garden egg waste in feeding animals. Such flow will not only reduce production cost of animals, but might additionally function as means of efficaciously evacuating the waste that permits environmental danger and risk posed via those wastes..

2. MATERIALS AND METHOD

Experimental materials

Garden egg wastes were gathered at Eke market, Afikpo, Ebonyi state, Nigeria. The fruits were cut into pieces, sundried and milled with milling machine after which they were analyzed for their proximate composition. Then included at 0%, 10%, 10% and110% in the experimental diets.

Experimental diet

The finisher diet was formulated and fed to the experimental birds. The composition of the diet is presented in Table 1.

Table 1. Percentage composition of the experimental diets

Ingredient	T1(0%)(kg)	T2(10%)(kg)	T3(20%)(kg)	T41(30%)(kg)
garden egg waste	0.00	4.89	9.79	14.69
Maize	48.97	44.07	39.18	34.28
Wheat offal	5.44	5.54	5.62	5.26
PKC	4.03	4.03	4.02	4.05
GNC	16.14	16.09	16.06	16.21
Soya bean meal	20.17	20.13	20.08	20.26

Bone meal	4.00	4.00	4.00	4.00
Salt	0.5	0.5	0.5	0.5
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated analysis				
Crude Protein (%)	21	21	21	21
Crude Fibre (%)	4.94	4.99	5.15	5.17
Crude fat (%)	4.82	4.48	4.15	3.81
Energy Kcal/kg	2994	2897	2800	2900

** To provide the following per kilogram of feed; vit A 10,000IU; vit. D3 1,500 IU; vit. E 2 mg; riboflavin 3 mg; pantothenic acid 10 mg; nicotinic acid, 2.5 mg; choline 3.5 mg; folic acid 1mg; magnesium 56 mg; lysine 1mg; iron 20 mg; zinc 50 mg; cobalt 1.25 mg.*The metabolizable energy of the test ingredient was calculated using prediction equation as reported by Pauzenga, 1985 with the formula M.E = 37 X %CP + 81.8 X %EE + 35.5 X%NFE

Note: GNC =ground nut cake. PKC=Palm Kernel Cake. CP=crude Protein.CF=Crude Fibre.T1= control diet 0% , garden egg fruits and , mature okra fruits. T2= 10% garden egg fruits. T3= 10% garden egg fruits. T4= 10% garden egg fruits. T5= 10% garden egg frits.

Experimental birds and management

A total of eighty (80) ANAK strains of broilers of 28 days of age with an average weight of 0.83kg were used for the experiment. The broilers were randomly assigned to four treatment groups in a completely randomized design involving dietary inclusion of four levels (0%, 10%, 20% and 30%) of Garden egg waste. Each treatment group was replicated twice to obtain a total of 8 groups of 10 birds each. The chickens were randomly assigned to an experimental unit of 1m by 1m each partitioning and raised in a deep liter system of management. Feed and water were given *ad-libitum* and proper routine management practices and medications strictly adopted. The feeding trial lasted for 28 days.

Data collection and measurements

Data were collected on the growth performance, carcass and organ characteristics and the cost implication of using the dietary levels of garden egg waste in the broiler production. The day old chicks were brooded together and were weighed at the beginning of the experiment and on weekly basis thereafter. To determine the weight gain of the birds; Feed intake was recorded daily and was determined by the weigh back technique which involved obtaining the difference between quantity of feed offered and the left over the following morning. Feed conversion ratio (FCR) was calculated from the data on feed intake and weight gain as the quantity of feed taken per kilogram of weight gain over the same period. At day 28 of the experiment, one bird was randomly selected from each replicate of the treatments. Determination of the carcass characteristics was done by slaughtering the selected birds (decapitation of the neck). They were dressed and weighed to determine the dressing weight. Data collected were analyzed in a 2x3 factorial arrangement in a completely randomized design ANOVA. Differences among means were determined with Duncan's multiple-range test with 10% level of significance as described by Steel and Torrie (1980). The data were computed with IBM SPSS statistical 16 of 2013 software. Feed samples were assayed for their proximate composition by the method of AOAC (1990).

3. RESULTS

Proximate composition of experimental materials

The proximate compositions of the experimental materials and experimental diets are presented in table 2 and 3 respectively.

Table 2: proximate composition of the experimental material (dry weight bases)

Accessions	Moisture (g/100 g)	Crude protein (g/100 g)	ash (g/100 g)	Crude fiber (g/100 g)	Crude fat (g/100 g)	Carbohydrate. (g/100 g)
Garden egg waste	15.40	11.50	10.30	15.00	3.00	45.00

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Table 3. The proximate compositions of the experimental diets

Treatment	Moisture content (g/100 g)	Crude protein (g/100 g)	Total ash (g/100 g)	Crude fiber (g/100 g)	Crude fat (g/100 g)	Carbohydrate. (g/100 g)
Control	10.72	22.20	5.19	5.19	3.70	53.00
10% garden egg waste	11.21	22.30	9.11	5.25	2.47	50.13
20% garden egg waste	11.50	22.36	9.81	5.44	2.39	49.31
30% garden egg waste	12.00	22.41	9.87	5.47	2.31	50.00

T1= control diet 0% garden egg waste T2= 10% garden egg waste. T3= 20% garden egg waste. T4= 30% garden egg waste.

The results of the proximate compositions of the experimental diets reveals in table 4 that the moisture content and crude protein of the experimental diets increased as the inclusion level of garden egg waste increased however, the crude fibre and total ash increased as the inclusion level of garden egg waste increased in the diets. Furthermore, the crude fat and carbohydrate of the experimental diets decreased as the inclusion level of garden egg waste increased in the diets.

Growth performance of broiler chickens fed varying dietary levels of garden egg waste

Data on performance of finisher broiler chickens fed varying dietary levels of garden egg waste is presented in table 4.

Table 4. Performance of finisher broiler chickens fed varying dietary level of garden egg waste

Parameter	T1	T2	T3	T4
Average initial weight	0.87±0.0	1.15± 1.2	0.97± 0.1	1.00± 0.0
final live weight (kg/bird)	2.60± 0.1 ^{a}	2.44± 0.3^{ab}	1.93± 0.1^{b}	2.27± 0.3^{b}
Daily weight gain	0.04± 0.0^{ab}	0.05± 0.0^{a}	0.04±0.0^{ab}	0.05±0.0^{a}
Daily feed intake	0.14± 0.0	0.14± 0.0	0.14±0.0	0.14±0.0
Feed conversion ratio	3.15± 0.0	3.001± 0.0	3.449± 0.0	3.26± 0.2
Mortality	0.00± 0.0	0.00± 0.0	0.00± 0.0	0.00±0.0

^{a,b} Different superscripts within each row indicate significant differences ($p < 0.05$) (n =3). Without superscript = not significant.

T1= control diet 0% garden egg waste. T2= 10% garden egg waste. T3= 20% garden egg waste. T4= 30% garden egg waste.

The values recorded for the birds on 20% and 30% on average final weight of the experimental birds were significantly (P > 0.05) lower when compared with the value recorded for the control. However, no significantly difference (P > 0.05) was observed when the birds on 10%,20% and 30% inclusion of garden egg waste were compared with the control for the daily weight gain, , daily feed intake, feed conversion ratio and mortality;

Carcass yield of finisher broiler chickens fed varying dietary level of and garden egg waste

Data on Carcass yield of finisher broiler chickens fed varying dietary level of and garden egg waste are presented in table 5.

Table 5: Carcass weight of finisher broiler chickens fed varying dietary level of and garden egg waste

Parameter	**T1**	**T2**	**T3**	**T4**
Final body weight(kg)	2.45±0.3 ^{ab}	2.75±0.6 ^{a}	1.90±0.0 ^{abc}	2.60±0.1 ^{ab}
Dressed weight(kg)	2.25±0.3^{a}	2.40±0.5^{ab}	1.65±0.1^{ab}	2.30±0.0^{a}
Eviscerated weight(kg)	1.80±0.2^{a}	1.80±0.4^{a}	1.20±0.0^{ab}	1.78±0.0^{a}
Breast weight(kg)	0.60±0.1^{a}	0.45±0.3^{b}	0.35±0.1^{c}	0.50±0.0^{ab}
Thigh weight(kg)	0.45±0.1^{ab}	0.60±0.1^{ab}	0.45±0.1^{ab}	0.50±0·0^{ab}
Residual weight(kg)	0.45±0.1^{a}	0.45$^{±0}$.1^{a}	0.23$^{±}$0.0^{bc}	0.40$^{±}$0.0^{ab}
Head and neck(kg)	0.15±0.1	0.15±0.0	0.05±0.0	0.13±0.1
Wing(kg)	0.20±0.0	0.20±0.0	0.15±0.1	0.25±0.1

[a,b] Different superscripts within each row indicate significant differences (P < 0.05) (n =2). Without superscript = not significant.T1= control diet 0% and garden egg waste. T2= 10% garden egg waste. T3= 10% garden egg waste. T4= 10% garden egg waste. T5= 10% garden egg waste.

No significant difference (P > 0.05) was observed when all the treatments were compared with the control for all the parameters except for the breast weight and residual weight in which T3 was significantly lower (P < 0.05) when compared with the control. The similar values recorded for the Furthermore, the value observed for the birds on T2 were significantly (P < 0.05) lower than the control for the breast weight.

4. DISCUSSION

The results of the proximate compositions of garden egg waste and garden egg waste

The results of the proximate compositions of and garden egg waste in table 3 shows that garden egg waste are rich in nutrients like, ash; 10.30 and crude carbohydrate;45 respectively. These figures are within the range of 10.00- 10.60 and 40.00- 49.8 recorded for ripe and unripe garden egg (Ajayi, *et al*., 2020) but lower than the values recorded for some selected vegetables grown in Nigeria (Adegbenro *et al;* 2012) .moisture;15.40 and fibre; 15 were higher than 8.38% and 8.00% recorded for *Sesbibia sesban* seed (ogunbode *et al*;2013). However, the value recorded for the crude protein; 11.50 is also in the range of estimated average composition of 10 – 13% crude protein recorded for ripe and unripe garden egg. (Ajayi, *et al*., 2020)

The results of the proximate compositions of the experimental diets

The results of the proximate compositions of the experimental diets reveals in table 4 that the crude fibre (%)5.19,5.25,5.45 and 5.44 of T1,T2,T3 and T4 respectively are all within the recommended 5- 7% for finisher broiler (NRC,1994). Furthermore, the crude proteins(%) 22.20,22.30,22.36 and 22.16 for T1,T2,T3 and T4 respectively are within the estimated recommendation of 21-23% crude protein requirements for finisher broilers (NRC,1994).

Growth performance of broiler chickens fed varying dietary level of garden egg waste

The results of the Growth performance of broiler chickens fed varying dietary level of garden egg waste as shown in table 5 reveals that the birds on 20% and 30% inclusion of garden egg waste for the average final weight of the experimental birds had a significantly (P > 0.05) lower values when compared with the value recorded for the control. The declined values for these treatments on final weight could be attributed to higher anti nutritional factor and fibre level at theses level of inclusion. The non-statistically increased values observed for this parameter at these levels of inclusion is an evidence of negative effect of high anti nutritional factors and fibre in the feed. This is support the view of Aletor, 1993 who claimed that tannin in the biological system has the ability to chelate protein thereby impeding digestion. However, no significant difference (P > 0.05) was observed when the birds on 10%,20% and 30% inclusion of garden egg waste were compared with the control for the daily weight gain, , daily feed intake, feed conversion ratio and mortality;

Carcass characteristics of broiler chickens fed varying dietary level of garden egg waste

As shown in table 6 and 7, No significant difference (P > 0.05) was observed when all the treatments were compared with the control for all the parameters except for the breast weight and residual weight in which T3 was significantly lower (P < 0.05) when compared with the control. Furthermore, the value observed for the birds on T2 was significantly (P < 0.05) lower than the control for the breast weight, Eviscerated weight, thigh weight, wing weight, head and neck weight. The similar values recorded for the final body weight, dressed weight, is an indication that the experimental birds maximally utilized the experimental diets. This agrees with Ajayi, *et al.,* 2022 who argued that the optimum conversion of diet to meat in broilers could be attributed to the facilitation of the dietary nutrient balanced in the experimental diets.

5. CONCLUSION AND RECOMMENDATION

The results of the present study showed that garden egg waste can be incorporated up to 10% in feeding of finisher broiler without compromising the growth performance. Hence, the use of garden egg waste will make condemned garden egg fruits to be usable in formulating broiler diet. The utilization of condemned garden egg fruits will also be an efficient means of solving the problem of environmental hazard and danger likely to be posed by the increasing generation of the garden egg fruits waste during harvest.

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