GROWTH PERFORMANCE AND ECONOMIC INDICES OF BROILERS FED BENISEED (*Sesamum indicum* L.) WASTE MEAL AS ENERGY SOURCE IN PLACE OF MAIZE (*Zea mays* LINN.)

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ABSTRACT

Eight (8) weeks feeding trial was conducted to evaluate the effects of dietary replacement of maize with beniseed waste meal (BSW) on the performance and economic indices of broiler chicken. A total of 180 day-old Marshal broiler chicks were used for the study. The birds were randomly allotted to six treatments, each having three replicates of ten birds per replicate. Six experimental diets were formulated as follows; D1 (100% Maize: 0% BSW), D2 (80% Maize: 20% BSW), D3 (60% Maize: 40% BSW), D4 (40% Maize: 60% BSW), D5 (20% Maize: 80% BSW) and D6 (0% Maize: 100% BSW) for broiler starter and finisher respectively. The average final weight, average daily weight gain, average daily feed intake significantly (p < 0.05) decreased and FCR increased (p < 0.05) by the levels of replacement of maize with BSW at both starter and finisher phases. Cost/kg feed and cost of feed/kg live weight gain reduced as the level of inclusion of BSW increased in the diets for both the starters and finishers. It was concluded that maize could be economically replaced with beniseed waste meal up to 100% level in broilers' diet.

Keywords: Beniseed waste meal, Maize, Broilers, Performance, Replacement

J. Agric. Prod. & Tech.2019; 8:28-36

INTRODUCTION

Feed alone accounts for over 75 - 80 percent of the total cost of poultry production (Oluyemi and Roberts, 2000). Energy component of the monogastric diets is also usually high. Maize is the major source of energy in the diets. This ingredient is keenly competed for by various alternetive users. Therefore, any effort to substitute maize in poultry feed will significantly reduce the cost of production. Uchegbu (2005) reported that there was need to reduce competition between man and livestock for the same feedstuffs by turning to unconventional feedstuffs on the short -run while plant breeders work towards obtaining high-yielding varieties of crop which will ensure adequate supply of quality feedstuffs for livestock.

Sesame (*Sesamum indicum* L.) is one of the most important oil seed crops, having seeds and its edible oil that are highly valued as a traditional healthy food ingredient (Snakar *et al.,* 2006). Sesame seeds are high in protein, carbohydrates, fiber and some minerals that are widely used in food items. Additionally, fat of sesame seeds contain about 2.25 times as much energy as the equal amount of carbohydrates from feed grains or forages (Choi *et al.*, 2008). Oil bearing seeds contain their reserve primarily as fat, as their name implies. Oil bearing seeds are much higher in proteins than the cereals seeds (Malik *et al.*, 2012). Borchani *et al., (*2010) reported that Sesame seed showed a high content of oil (52%), protein (24%) and ash (5%). Sesame oil comprises approximately 50% of the seed weight, large amounts of natural antioxidants, a good type of monounsaturated and polyunsaturated fatty acids (Choi *et al.,* 2008).

Beniseed waste, a residue obtained after extracting oil from the beniseed can be incorporated in the diets of broiler especially when the price of maize is on the high side. There is no competition between man and livestock for the beniseed waste. As at the time of this study, the price of beniseed waste was ₦18.00/kg while maize was sold for ₦110.00/kg. The cheaper price of beniseed waste makes it an attractive alternative to maize that the price is exorbitant and scarce. This study examined the suitability of beniseed waste meal as a cheaper alternative energy source to maize in broiler diets.

MATERIALS AND METHODS

Site of the experiment: This study was carried out at the experimental section of the Poultry unit of the Teaching and Research Farm, Joseph Ayo Babalola University, Ikeji-Arakeji, Osun State, Nigeria. Ikeji -Arakeji is situated on 350.52m above sea level at latitude 7^0 25'N and at longitude 5^0 19'E. The vegetation of the area is that of the rainforest characterized by hot and humid climate. The mean annual rainfall is 1500mm and the rain period is bimodal with a short break in August with mean annual relative humidity of 75% and mean temperature of 26-28^0 C (Laoye, 2014).

Experimental birds and management: One hundred and eighty (180) Marshal broiler day old chicks were used for this experiment. The birds were randomly assigned to six dietary treatments with 30 birds in each treatment. Each treatment was replicated three times with 10 birds per replicate. The birds were raised on deep litter in an open-sided poultry house. Experimental diets and drinking water were provided *ad-libitum*; and the study lasted for eight weeks. The water troughs were washed daily before fresh and clean water was served. Routine vaccination and necessary medications (anti-stress, antibiotics and coccidiostat) were administered to keep the birds healthy. Data collected include body weight (initial and final), weight gain, feed intake, and feed conversion ratio. Weighed amount of feed was served to each treatment on replicate basis each week and the left over at the end of the week was weighed to determine the average weekly feed intake. The weights of birds per treatment were taken at the start of the experiment and at weekly interval by the use of weighing scale. The differences observed in weight represent weight gain due to the treatment. The feed conversion ratio was calculated on the basis of feed intake (g) per unit body weight gain (g) of bird produced.

Experimental diets and design: Six experimental diets were formulated. Diet1 (D1) served as the control and contained maize and other ingredients without BSW (0%). Diets 2 (D2), 3 (D3), 4 (D4), 5 (D5) and 6 (D6) contained 10.80, 21.60, 32.40, 43.20 and 54.00% BSW respectively that replaced 20, 40, 60, 80 and 100% maize in that order. Other ingredients in the experimental diets are presented in Tables 1 and 2 of the composition of the experimental starter and finisher diets respectively. The design of the experiment was Completely Randomized Design (CRD).

Chemical analysis: Proximate analysis and energy value of the test ingredient and experimental diets were determined by the method of Association of Official Analytical Chemist (AOAC, 2005).

Data analysis: Data obtained in the study were subjected to analysis of variance (ANOVA) using SAS Statistical Package, SAS (1999). The means were separated using Duncan multiple range test.

Table 1: Gross composition of the experimental starter diets

Diets/Treatments	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**
Replacement levels (%)	**0**	**20**	**40**	**60**	**80**	**100**
Ingredients:						
Maize	54.0	43.2	32.4	21.6	10.8	0.00
Beniseed waste	0.00	10.8	21.6	32.4	43.2	54.0
Soybean meal	10.0	10.0	10.0	10.0	10.0	10.0
Full Fat soybean meal	11.0	11.0	11.0	11.0	11.0	11.0
GNC	17.3	17.3	17.3	17.3	17.3	17.3
Fish Meal (72%)	1.80	1.80	1.80	1.80	1.80	1.80
Wheat offal	1.50	1.50	1.50	1.50	1.50	1.50
Bone	2.00	2.00	2.00	2.00	2.00	2.00
Oyster shell	1.50	1.50	1.50	1.50	1.50	1.50
*Broiler premix	0.30	0.30	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Lysine	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**	**100**	**100**
Determined analysis:						
Dry matter (%)	93.20	93.45	93.56	93.65	93.74	93.82
Crude protein (%)	23.72	23.83	23.93	24.05	24.11	24.20
Ether extract (%)	4.00	8.08	8.61	10.40	11.50	11.92
Crude fibre (%)	5.80	7.95	8.60	8.80	9.20	9.82
Ash (%)	3.40	6.00	6.21	7.10	9.35	10.70
Met. Energy (kcal/kg)	3164.03	3208.04	3263.85	3299.34	3315.72	3369.00

D1 = 0% BSW; D2 = 20% BSW; D3 = 40% BSW; D4 = 60% BSW; D5 = 80% BSW; D6 = 100 BSW.
*Vitamin mineral premix contains the following; Vit. A, 10,000,000 lU; D3, 3,000,000 lU; Vit. K, 2.3g; Thiamine-Bi, 1.7g; Riboflavin-B2, 5.0g; Pyridoxine-B,3.1g; Vit. B12,16mg; Biotin, 60mg; Niacin, 31.0g; Pantothenic acid, 8g; Folic acid, 0.8g; Manganese, 85g; Zinc, 50.0g; Iron, 25.0g; Copper, 6.0g; Iodine, l.lg; Selenium, 120.0mg; Cobalt, 220.0mg; B.H.T., 60.0g; Ethoxyquin, 65.0g; Choline chloride, 200.0g.

RESULTS

The gross composition, Metabolizable energy and proximate composition of the experimental starter diets are as shown in Table 1. The ME ranges from 3164.03 to 3369.00 kcal/kg. The crude protein of the experimental diets ranged from 23.72 to 24.20%. The gross composition, the metabolizable energy and proximate composition of the experimental finisher diets are shown in Table 2 below. The metabolizable energy, crude protein, ash and ether extract of the experimental finisher diets increased as the levels of beniseed waste increased in the diets. The ME ranged from 3041.79 to 3310.13 kcal/kg and the crude protein also ranged from 21.02 to 21.82%.

The proximate composition of beniseed waste meal indicated a crude protein value of 18.89%, ether extract value of 35.70%, ash content of 13.60% and crude fibre of 15.70%. The ME of beniseed waste meal is 3984.24 kcal/kg.

Table 2: Gross composition of the experimental finisher diets

Diets/Treatments	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**
Replacement levels (%)	**0**	**20**	**40**	**60**	**80**	**100**
Ingredients:						
Maize	55.0	44.00	33.0	22.0	11.0	0.00
Beniseed waste	0.00	11.0	22.0	33.o	44.0	55.0
Soybean meal	6.90	6.90	6.90	6.90	6.90	6.90
Full Fat soybean meal	15.0	15.0	15.0	15.0	15.0	15.0
GNC	11.0	11.0	11.0	11.0	11.0	11.0
Fish Meal (72%)	1.00	1.00	1.00	1.00	1.00	1.00
PKC	6.70	6.70	6.70	6.70	6.70	6.70
Bone	2.00	2.00	2.00	2.00	2.00	2.00
Oyster shell	1.50	1.50	1.50	1.50	1.50	1.50
*Broiler premix	0.30	0.30	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Lysine	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**	**100**	**100**
Determined analysis:						
Dry matter (%)	94.00	94.17	94.24	94.38	94.44	94.52
Crude protein (%)	21.02	21.10	21.14	21.38	21.73	21.82
Ether extract (%)	4.00	6.36	7.03	8.00	8.63	9.26
Crude fibre (%)	7.60	7.84	8.14	9.20	11.72	12.80
Ash (%)	4.73	5.11	5.70	7.00	7.30	8.80
Met. Energy (kcal/kg)	3041.79	3152.00	3164.89	3270.28	3301.44	3310.13

BSW = Beniseed waste; D1 = 0% BSW; D2 = 20% BSW; D3 = 40% BSW; D4 = 60% BSW; D5 = 80% BSW; D6 = 100%BSW. *Vitamin mineral premix contains the following; Vit. A, 10,000,000 lU; D3, 3,000,000 lU; Vit. K, 2.3g; Thiamine-Bi, 1.7g; Riboflavin-B2, 5.0g; Pyridoxine-B,3.1g; Vit. B12,16mg; Biotin, 60mg; Niacin, 31.0g; Pantothenic acid, 8g; Folic acid, 0.8g; Manganese, 85g; Zinc, 50.0g; Iron, 25.0g; Copper, 6.0g; Iodine, l.lg; Selenium, 120.0mg; Cobalt, 220.0mg; B.H.T., 60.0g; Ethoxyquin, 65.0g; Choline chloride, 200.0g.

The growth performance of experimental broiler chicks and finisher broilers are as presented in Table 3 and 4 respectively. The final body weight, average daily weight gain, average daily feed intake and feed conversion ratio were significantly ($p < 0.05$) affected by the dietary treatments. The average initial body weight of experimental birds were not significantly ($p > 0.05$) different from each other and the value ranges from 51.00 – 52.33 g/b. Birds fed diet 1 (0%BSW) which is the control diet/treatment had the highest average final weight/bird (743.44g/b) at the starter phase which significantly ($p < 0.05$) reduced to 686.65, 684.69 , 652.55 , 578.40 and 565.01g/bird for broilers fed diets whose maize was replaced with 20, 40, 60, 80 and 100%BSW respectively. Average daily weight gain (ADWG) for birds on D1 to D4 were similar ($p > 0.05$) while the ADWG of those on D5 and D6 were significantly lower than what obtained for those on the control (0% BSW), D2 (20% maize replacement) and

D3 (40% maize replacement) meaning that ADWG decreased significantly for birds fed beyond 60% BSW replacement for maize. As the level of inclusion of BSW in the diet increases, average daily weight gain and average daily feed intake decreased significantly ($p < 0.05$) at both phases. Feed conversion ratio also increased significantly ($p < 0.05$) except at 20, 40 and 60% BSW for the starter; and 20% BSW at the finisher phase that were similar to the control. Both the cost per kg feed and feed cost/Kg live weight of birds fed experimental starter and finisher decreased as the level of inclusion of BSW increased in the diets.

Cost per kg feed of the control - 0% BSW (₦123.96) reduced to ₦93.18 (D6 - 100% BSW replacement for maize) at starter phase (Table 4), and from ₦116.77 (0% BSW) to ₦78.40 (D6) at the finisher phase (Table 5). Feed cost per kg live weight of birds followed the same trend, reducing from ₦240.48 (0% BSW) to ₦223.63 (D6) at the starter phase; and from ₦314.11 (0% BSW) to ₦272.83 (D6) at the finisher phase. The average final body weight, average daily weight gain, average daily feed intake and feed conversion ratio of birds fed experimental finisher diets were significantly ($p < 0.05$) different across the treatments. The average final body weight (1924.33g/b) obtained for control diet (0% BSW) significantly ($p < 0.05$) reduced to 1856.67, 1631.0, 1578.33, 1386.33 and 1374.76g/bird for birds on D2, D3, D4, D5 and D6 respectively.

Average daily weight gain, average daily feed intake, feed cost/kg and feed cost/kg of live weight followed the same trend. The average daily feed intake decreased as the level of BSW increased in the diets and were significantly ($p < 0.05$) different among the treatments. The values obtained for average daily feed intake decreased from 113.42g/b (0% BSW), 110.48g/b (20% replacement with BSW), 107.54g/b (40% replacement with BSW), 105.57g/b (60% replacement with BSW), 101.71g/b (80% replacement with BSW) and 100.69g/b (100% replacement with BSW) respectively. Feed conversion ratio (FCR) of birds on dietary treatments were significantly ($p < 0.05$) different. Birds fed diet 5 had the highest FCR (3.53) although similar to 3.48 (D6), while birds on D2 had the least value for FCR (2.64).

Table 3: Growth performance of broiler chicks fed diets containing graded levels of Beniseed waste meal-based diets

Diets	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**SEM**
Replacement levels (%)	**0**	**20**	**40**	**60**	**80**	**100**	
Parameters:							
IBW (g)	51.00	51.33	51.33	51.67	52.00	52.33	0.23
AFW (g)	743.44^{a}	686.65^{b}	684.69^{b}	652.55^{b}	578.40^{c}	565.01^{d}	38.08
ADWG g/b/d	24.73^{a}	22.69^{a}	22.62^{a}	21.46^{ab}	18.80^{b}	18.31^{b}	2.60
ADFI(g/b/d)	47.89^{a}	46.50^{a}	46.18^{a}	45.71^{b}	44.60^{c}	44.00^{c}	2.01
FCR	1.94^{b}	2.05^{b}	2.04^{b}	2.13^{b}	2.37^{a}	2.40^{a}	0.10
FC/Kg (₦)	123.96	117.00	111.65	105.49	94.50	93.18	NSA
FC/Kg LW (₦)	240.48	239.85	227.77	224.69	223.97	223.63	NSA

abc: Means within the same row with different superscripts differ significantly ($P < 0.05$)
SEM = Standard Error of Mean; IBW= Initial Body Weight, FBW= Final Body Weight, ADWG = Average daily weight gain/bird/day; ADFI = Average daily feed intake (g/bird/day), FCR= Feed conversion ratio, FC/Kg/Lw= Feed cost/ Kg Live weight of bird; FC/KG = Feed cost/Kg.

Table 4: Performance characteristics of broiler finishers fed graded levels of beniseed waste meal-based diets

Diets	D1	D2	D3	D4	D5	D6	SEM
Replacement levels (%)	0	20	40	60	80	100	
Parameters:							
IBW (g/b)	743.44[a]	686.65[ab]	684.69[ab]	652.55[b]	578.40[c]	565.01[d]	38.08
FBW (g/b)	1924.3[a]	1856.7[b]	1631.0[c]	1578.2[c]	1386.2[d]	1374.8[d]	52.89
ADWG (g/b/	42.18[a]	41.79[a]	33.80[b]	33.06[b]	28.85[c]	28.92[c]	36.61
ADFI(g/b/d)	113.42[a]	110.48[a]	107.70[b]	105.57[b]	101.71[b]	100.69[b]	1.84
FCR	2.69[c]	2.64[c]	3.07[b]	3.19[b]	3.53[a]	3.48[a]	0.22
FC/Kg (₦)	116.77	110.50	94.00	90.01	81.00	78.40	NSA
FC/KgLW(₦)	314.11	291.13	288.58	287.43	285.93	272.83	NSA

[a-c]Means within the same row with different superscripts differ significantly (P< 0.05)
SEM = Standard Error of Mean; IBW= Initial Body Weight, FBW= Final Body Weight, ADWG = Average daily weight gain/bird/day; ADFI = Average daily feed intake (g/bird/day), FCR= Feed conversion ratio, FC/KgLW= Feed cost/ Kg Live weight of bird FC/KG = Feed cost/Kg.

DISCUSSION

The feeds were formulated for the birds to meet their nutrient requirements, maintain rapid growth and development of broilers as recommended (Oluyemi and Roberts, 2000). The increasing value of metabolizable energy, crude protein, ether extract and crude fibre with the levels of substitution of beniseed waste meal for maize could be explained by the higher values of these contents in the former. The ether extract value of 35.70% and metabolizable energy of 3984.24 kcal/kg make beniseed waste meal to have a higher caloric value than the cereal grains. The energy value of beniseed waste meal is higher than that of maize (3434 kcal/kg) and whole wheat (3120 kcal/kg) which makes it a potential replacement for maize. The higher value of ash could be attributed to the fibre content of the beniseed. Indomie waste is another non-conventional feedstuff with crude fat and Ash content of 16.35% and 13.60% respectively (Eniolorunda *et al.,* 2008).

As the level of beniseed waste meal in the diet increases, the feed intake decreases for both the starters and finishers. This response agrees with the fact that under *ad-libitum* feeding condition, birds consumed feed primarily to satisfy their energy requirement (Atteh, 2004). Bawa *et al.,* (2003) had argued that it is not the absolute value of protein and energy in the diets of birds that is of paramount importance but the bioavailability. Smith (1990) observed that the feed intake of birds reduced as the energy density of feed increases, which permit better feed utilization. The oil content of the beniseed waste meal which is evident with the higher ether extract could increase the energy density of the feed and thus lowered the average daily feed intake during the experiment. According to Apata (2003), there are several factors that affects feed intake in poultry. These include form of feed presentation, nutrient content, energy level, fibre level, presence of anti-nutritional factors and health status of the birds. Choi *et al*., (2008) reported that sesame seeds are high in protein, carbohydrates, fiber and some minerals that are widely used in food items. Oil bearing seeds are much higher in proteins than are the cereals seeds (Malik *et al.*, 2012). According to Borchani *et al.,* (2010), Sesame seed had a high content of oil (52%), protein (24%) and ash (5%). This is in agreement with the findings of Choi *et* *al., (*2008). The relationship between voluntary feed intake and caloric content of animal diets is that animals eat more of a low-energy diet than a high-energy diet in an attempt to cancel out energy deficit (Ojewola and Longe, 1999). However, McDonald *et al.,* (1998) reported that sesame seed is rich in leucine, arginine and methionine, but relatively low in lysine. Thus, as with most tropical legumes, sesame seed contain anti-nutritional factors, which is known to reduce its nutritive value in poultry feed. The oil-seeds contain anti-nutritional and toxic factors that must be inactivated if their full nutritional value is to be realised. Oxalate (Oxalic acid) found in Sesame oil forms insoluble salts with calcium, magnesium and iron. It interferes with the intestinal absorption of these minerals. Phytic acid is associated with fibre. Supplementation with adequate minerals, which are affected by phytates, is usually practiced. At present, dietary supplementation of phytase enzyme (250-500 units/kg) is practiced to enhance the utilization of phytate P in poultry (McDonald *et al.,* 1998).

The relative low feed intake observed in birds fed diets containing 100% beniseed waste meal could be due to high dietary fibre level which may have exerted its depressive effect on nutrient intake by causing early gut-fill (Kass *et al.,* 1980); and that fibrous feed tend to spend a longer time in digestive tract thereby resulting in reduced feed and nutrient intake (MacDonald *et al.,* 1998). These authors reported that growth rate of animal is obviously dependent on its level of feeding, and that if the level is high, growth will be rapid and the animal reaches a specified weight at an early age. Birds fed beniseed waste meal had lower weight gain than those on control diet. Increasing the level of beniseed waste meal in the experimental diets depresses the weight gain of birds. Body weight gain at maturity is a major factor influencing feed intake and economic performance of broilers. The weight of a chicken at any point in time is a function of cumulative growth of component parts (Liu *et al.,* 1995). Birds fed diet 2, (D2) and diet 3 (D3) i.e. 11 and 22% BSW compares favourably with the control diet at the starter phase. Diets D4, D5 and D6, i.e. 60, 80 and 100% replacement of corn with BSW however differed at the starter phase. The highest daily weight gain (42.18g/b) at the finisher phase was obtained from the control diet and the lowest (28.85g/b) recorded at 80% replacement level. This result is in agreement with the reports of Adeyemo *et al.,* (2013) that birds on purely maize-based diets had the highest weight gain. Average daily weight gain followed a similar trend as average feed intake suggesting that the reduction in feed intake played an important role in the reduction of weight gain as the dietary inclusion level of beniseed waste meal increased in broilers diet. Depression in weight gain at 100% inclusion of beniseed waste meal at both starter and finisher phases could be attributed to decline in nutrient intake due to increased fibre content.

There were significant differences in the feed conversion ratio (FCR). However, dietary inclusion at 0, 11, 22 and 33 % of beniseed waste did not show any significant variation and these had the best feed conversion ratio at the starter phase. Diet D6 had the highest FCR (2.40) at starter and D5 had FCR of 3.53 during the finisher phase. The FCR is a measure of how well a flock converts feed intake (feed usage) into unit weight of meat produced. It is also the ability of livestock to turn feed mass to body mass. Birds that have low FCR are considered efficient users of feed (Adeyemo *et al.,* 2013). Several factors including nature of feed and the age of the animal are known to affect FCR.

Cost/kg of the experimental diets

and the average cost of feeding each bird decreased as the level of beniseed waste increased in the diets at both starter and finisher phases. Diet D1 (0% BSW) had the highest cost/kg feed (₦123.96) while diet D6 (100% replacement of maize with BSW) had the lowest value (₦93.18) at broiler starter phase. At the finisher phase, the cost/kg feed had similar declining trend as the level of beniseed waste increased in the diets. Control diet (0% BSW) had the highest cost/kg feed (₦116.77) while diet D6 (100% maize replacement with BSW) had the lowest cost/kg feed (₦78.40). Dietary inclusion of BSW reduced the cost of producing one kg of feed. The feed cost/kg live weight at starter and finisher phases decreased with increasing levels of inclusion of beniseed waste. This translates to ₦16.85 and ₦41.28 savings to produce one kg live weight of broiler at both starter and finisher phases respectively using 100% BSW. The main thrust in the utilization of unconventional feed ingredients is to lower the cost of production (Bawa *et al.,* 2003). The feed becomes cheaper as the level of beniseed waste meal in the diets increased. Abeke *et al.,* (2003) reported that it is not the cost per kilogram of feed that really matters but how efficient the feed can be utilized and converted to products. Therefore, cheap diets do not necessarily mean better profit margin to the farmer. The overall lowered feed cost/kg meat produced on BSW-based diets suggests that BSW is economically viable alternative feed material. The cost benefit result indicates that there is a beneficial effect when replacing maize with 100% beniseed waste meal since profit is a single index determining the economic values of keeping birds. This study agrees with the submission of Sucharita *et al.,* (1998) who reported that research efforts in developing countries should be directed towards the use of non-conventional agricultural by products.

CONCLUSIONS AND RECOMMENDATION

- There were reductions in the cost/kg feed and cost of feed per kg weight gain as the contents of beniseed waste meal for maize in the broilers' diets increased., the cheapest being at 100% level of substitution of maize with BSW (55% BSW) at both starter and finisher phases with no deleterious effects on performance. In a practical farm situation, farmers are more interested in maximizing profit and reducing cost of production, they will prefer a feed that will give the highest returns on cost.
- Beniseed waste meal substitution (55% BSW) for 100% corn was economical in broiler diets and is therefore recommended.

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