MONETARY COST ANALYSIS OF REPLACEMENT VALUE OF ACHA (*Digitaria exilis* Staph) FOR MAIZE IN BROILER CHICKENS DIETS

Wumnokol, D.P, Latu, M. Y and Magaji, S.T
Department of Animal Health and Production Technology, College of Agriculture, P.M.B 001 Garkawa, Plateau State, Nigeria
Email: satimagaji2009@yahoo.com

ABSTRACT
An experiment was conducted to investigate the cost of replacement value of acha (Digitaria exilis Staph) for maize in broiler diets. Five diets were formulated which unprocessed acha replaced maize at 0, 25, 50, 75 and 100% for the starter and finisher phase. Two hundred and twenty-five unsexed marshal broiler chicks were weighed and randomly allotted to five dietary treatments with three replicates per diet. Treatment 1 had the highest monetary value of ₦240.32 as cost of the feeds as compared to Acha with monetary value of ₦215.29, ₦223.05, ₦232.72 and ₦238.85 in feed 2,3,4 and 5 respectively (25%,50%,75% and 100% Acha); this trend indicated that the diets consisting of Acha had lower feed cost. The money saved from the production of the birds indicated that more money was saved in feed 3 (50% Acha) in the process of production. It can be concluded that unprocessed acha could replace maize especially at 50% level of inclusion in the diets of broilers with concomitant reduction in cost of feed/kgLWG.
Keywords: Acha, replacement, broilers

INTRODUCTION

The state of nutrition of the populace in Nigeria is predominantly marked by inadequate protein intake both in quantity and quality. The shortage has given rise to high price of animal protein (Taiwo *et al*., 2005). The high cost of animal proteins is mainly due to unavailability and high cost of raw material for feed industry especially maize. Abundant animal production also hinges on availability of cheap, available, acceptable and balance feeds. Feed quantity and quality affect how many animals can be raised and how fast they can reach the market weight. Depending on locality feed input is 80-90% the cost of producing eggs, chickens, pigs and rabbits (Aduku, 1992). Therefore, the potential of non-conventional feed resources must be assessed with the objectives of expanding the feed-base for the livestock, and thereby, reducing the cost of feeding farm animals.

The problems of high feeds cost calls for more research in developing new feed resource and upgrading the conventional ones. Preston and Leng (1986) rightly suggested that it is a better objective to make livestock production with available resources. The cost and sometimes scarcity of maize which is the conventional energy source of feedstuff has warranted the need to find alternative sources of energy to meet the demand by feed mill industries. In a bid to find alternative energy sources for broiler diets Agboola (1992) and Ogundipe *et al*. (1990) reported that millet competes favorably with maize in terms of percentage crude protein and percentage ash with no significant adverse effects on the performance of the birds.

Acha (*Digitaria exilis* Staph) is said to be the oldest indigenous West African cereal with cultivation dating back to 500BC but it is not known in a wild state Purseglove (1975). Acha (*Digitaria exilis* Staph) is popularly grown in about six States of Nigeria namely, Plateau, Nassarawa, Bauchi, Kaduna, Kebbi, Niger and the Federal Capital Territory (F.C.T). The crop is the staple food in some of these areas where the very small grain processed into different menus. The greatest diversity of this crop in Nigeria, exist mostly in Plateau State (Kwon-Ndung, 2003). Certain Acha varieties mature so fast that they are ready for harvest long before all other grains, making it to reduce misery, during "hungry times" (Kwon-Ndung, 2003).

In view of the economic value of Acha enjoyed by the rural farmers and its potential for increasing feed supply, the crop has received little attention from national and international scientists. Acha (*Digitaria exilis* Staph) deserves a much greater recognition because it can serve as food crop for the future and a good alternative source of energy for broilers. The objective of this study therefore was to analyze the monetary cost of replacement value of acha (*Digitaria exilis* Staph) for maize in broiler chicken diets.

Materials and Method

Acha (*Digitaria exilis* Staph) was bought in Mushere District of Bokkos Local Government Area of Plateau State. Yellow maize, soyabeans and salt were obtained from local market in Garkawa while bone meal, methionine, lysine, vitamins premixes and drugs were purchased from Jos town. Marshall Broiler chicks numbering 225 were obtained from Zartech Farms, Bukuru in Jos, Plateau State. Feed formulation was done manually and mixing was done in Plateau State College Agriculture, Garkawa feed mill.

The birds were brooded for one week which led to removing of the weak birds and 225 birds were finally used for the experiment. Five diets for the starter was formulated in which Acha replaced maize at 0, 25, 50, 75 and 100% levels designated as diet 1, 2, 3, 4 and 5 respectively. The CP content for starter was 23 crude proteins with maize at 45% in the control diet for the starter. The 225 Marshall birds were randomly assigned to five (5) treatments containing three (3) replications with 15 birds. Tables 1 and 2 showed the percentage composition of broiler starter and finisher.

Data collected were analyzed for cost value of feed per live weight using variance (ANOVA) techniques. Where significant differences were detected, means were separated using the Duncans New Multiple Test (DNMRT).

RESULTS AND DISCUSSIONS

The values of feed cost in naira (₦) per kilograms of feed (Table 3) ranged from 44.15 – 47.03, as the level of Acha (*Digitaria exilis* Staph) increases in the diet, feed cost per kilogram of diet decreases, though not very much due to the low differences in cost price of both ingredients in consideration. The total feed cost for rearing the birds from 1 – 8 weeks was presented in Table 3. The value ranged from ₦215.29 - ₦240.32 from treatment 1, 2, 3, 4 and 5 respectively. Treatment 1 has the highest value of ₦240.32 cost of the feeds; this trend indicated that the diets consisting of Acha had lower feed cost. The money saved from the production of the birds indicated that more money was saved in feed 3 (50% Acha) in the process of production.

It was found that the more the Acha inclusion, the feed intake increases and the less the cost of production. Acha has the advantage in storing ability over maize. The general trend showed that using unprocessed acha grains can reduce the cost of production of broiler chickens which was shown by the fact that least feed cost, high (diet 3) weight gain/kg and more in diet 5 money was saved in diet 3 (₦33.57) and diet 5 (₦31.91). Alabi *et al*. (2014) in a similar research stated that the inclusion of rice husk supplemented with commercial enzymes in the diets of broilers reduced the cost of production and hence increased profit. Similarly, an inclusion of Cassava peels up to 75% showed no adverse effect on the performance of broiler finishers and could lead greater reduction in cost (Abubakar and Ohinege, 2011).

In conclusion, Acha (*Digitaria exilis* Staph) could completely replace maize in broiler diet. Feed cost per kg body weight gain decreases with increases levels of Acha (*Digitaria exilis* Staph) in broiler diets and it was more profitable to produce broilers at 50% level of inclusion.

Based on the results, it was recommended that Acha (*Digitaria exilis* Staph) is a suitable substitute and also an alternative energy source to conventional maize for broiler production, particularly if purchased during the harvesting period.

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Table 1: Percentage Composition of Broiler Starter (1-5 weeks) diets (23% cp)

Ingredients	**1**	**2**	**3**	**4**	**5**
	% Level of Replacement of Maize by Acha				
	0	**25**	**50**	**75**	**100**
Yellow Maize	45	33.75	22.5	11.25	0
Acha	0	11.25	22.5	33.75	45
Soya bean (full fat)	39	39	39	39	39
Wheat offal	5	5	5	5	5
Fish meal	7.8	7.8	7.9	7.8	7.8
Bone meal	2.5	2.5	2.5	2.5	2.5
Salt	0.25	0.25	0.25	0.25	0.25
Vit/Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated Analysis					
ME (Kcal/Kg)	2776/100	2764	2758	2745	2738
Crude Protein (%)	23.52	23.28	23.08	22.00	22.00
Crude Fibre (%)	3.88	3.86	3.95	4.03	4.13
Calcium (%)	0.85	0.92	0.99	0.99	1.1
Total p (%)	0.55	0.55	0.56	0.56	0.56
Lysine (%)	1.44	1.41	1.42	1.35	1.32
Methonine (%)	0.48	0.46	0.43	0.41	0.38
Cystene (%)	0.34	0.32	0.30	0.29	0.27
Met + cys (%)	0.82	0.78	0.73	0.70	0.65

Premix used biomix. Each kg of premix contained the following ingredients. Vit. A. I.U 5,000,000.00 Pantothenic acid (mg) 4,000; Vit. D3 I.U 1,000,000 Biotin (mg), 32 Vit E (mg) 20,000 Vit.B12 (mg), 10Vit, K3 (mg) 1,000 folic acid (mg), 4,000 Vit.B1 (mg) 1,200 Choline Chloride (mg), 1,200 Vit B2 (mg), 2,400 manganese (mg), 4,000 Vit. B6(mg), 2,400 Iron (mg), 20,000 Niacin (mg), 16,000 Copper (mg), 800 Cobalt (mg), 100 Iodine (mg), 620 Selenium (mg), 40.

Table 2: Percentage Composition of Broiler Finisher (5-9 weeks) diets (20%cp)

Ingredients	**1**	**2**	**3**	**4**	**5**
	% Level of Replacement of Maize by Acha				
	0	**25**	**50**	**75**	**100**
Yellow Maize	50	37.5	25	12.5	0
Acha	0	12.5	25	37.5	50
Soya bean (full fat)	31.8	31.8	31.8	31.8	31.8
Wheat offal	10	10	10	10	10
Fish meal	5	5	5	5	5
Bone meal	2.5	2.5	2.5	2.5	2.5
Salt	0.25	0.25	0.25	0.25	0.25
Vit/Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	**100**	**100**	**100**	**100**	**100**
Calculated Analysis					
ME (Kcal/Kg)	30.35	2975	2925	2876	2824
Crude Protein (%)	20.35	20.34	20.80	19.00	19.00
Crude Fibre (%)	4.10	3.71	3.42	3.12	2.83
Calcium (%)	0.84	0.92	1.0	1.0	1.1
Total p (%)	0.53	0.51	0.53	0.54	0.55
Lysine (%)	1.19	1.16	1.13	1.10	1.06
Methonine (%)	0.40	0.38	0.35	0.32	0.30
Cystene (%)	0.31	0.29	0.27	0.25	0.23
Met + cys (%)	0.71	0.67	0.57	0.57	0.53

Premix used biomix. Each kg of premix contained the following ingredients. Vit. A. I.U 5,000,000.00 Pantothenic acid (mg) 4,000; Vit. D3 I.U 1,000,000 Biotin (mg), 32 Vit E (mg) 20,000 Vit.B12 (mg), 10Vit, K3 (mg) 1,000 folic acid (mg), 4,000 Vit.B1 (mg) 1,200 Choline Chloride (mg), 1,200 Vit B2 (mg), 2,400 manganese (mg), 4,000 Vit. B6(mg), 2,400 Iron (mg), 20,000 Niacin (mg), 16,000 Copper (mg), 800 Cobalt (mg), 100 Iodine (mg), 620 Selenium (mg), 40.

Table 3: Cost analysis of broilers production using graded levels of Acha based diets

	1	2	3	4	5
	Levels of replacement of maize by Acha (%)				
Parameters	**0**	**25**	**50**	**75**	**100**
Total feed intake (kg)	5.11	4.64	4.9	5.19	5.41
Feed cost per N/kg	47.03	44.00	45.52	44.84	44.15
Total cost of feed consumed N/kg	240.32	215.29	223.05	232.72	238.85
Total weight gain (kg)	1.65	1.81	1.99	1.98	2.10
Feed cost (kg) live weight gain	145.32	118.94	112.08	117.54	113.74
Money saved	-	26.71	33.57	28.1	31.91
% Saving	-	18.15	22.87	19.12	21.73