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**PERFORMANCE OF BROILER STARTER FED DIETS CONTAINING SOYA BEAN  
RESIDUE SBR SUPPLEMENTED WITH ENZYME**

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**ABSTRACT**

*Feeding trial was conducted to determine the potentials of soya bean residue supplemented with exogenous enzyme at starter phase (0-28 days). A total of three hundred and sixty (360) day old Cobb 500 broiler chicks were randomly allocated to four (4) dietary treatments containing 10% soya bean residue meal supplemented with exogenous enzyme (En-lay) with different levels of supplementation designated as 0, 20, 25 and 30g. Each treatment were replicated thrice with thirty (30) birds per replica in randomize complete block design (RCBD). All routine husbandry management practices were adhered strictly and the experiment lasted for 28 days. Data were generated for feed intake, live weight gain, and feed conversion ratio, while cost benefit analysis were computed according to prices of feed ingredients procured during the experimental period and were subjected to Analysis of Variance (ANOVA). Significant difference between means were separated using Duncan's multiple range test (DMRT). Growth performance results showed no significant ( $P>0.05$ ) differences among all the treatment groups. However, broiler chicks fed SBR supplemented with 25g/100kg En-lay showed better performance (1.53) in terms feed conversion ratio (FCR) with least feed cost (N340.73) per kg gain. Therefore, SBR supplemented with En-lay have positive effect on performance and can be used in diets for broiler starter chickens as source of protein.*

**INTRODUCTION**

Poultry production currently is an enterprise gaining attention due to its short generation interval and optimum economic efficiency, particularly broiler chickens. However, feed cost has been on the increase which constituted a major challenge for the growth of the industry (Muhammad *et al.*, 2021). The use of non-conventional plant protein especially from tropical legumes as an alternative to conventional sources have been advocated by animal nutritionist in this era due to the high cost of conventional feedstuff which can augment and balance the diets for broiler chickens (Aslani *et al.* (2007). Soya bean residue is a low cost and nutritious feed for livestock which is widely available in several African and Asian countries. Competition between man and livestock for conventional feed ingredients leads to the search for alternative sources of feeds, thus, leading to assessment into soya bean residue as protein and the use of exogenous enzymes in poultry diets to improve efficiency of nutrient utilization (Anuradha and Barun, 2015; Marte *et al.*, 2021). The positive nutritional effects achieved by the addition of these enzymes could be attributed to several mechanisms, one of which is, the reduction of intestinal viscosity, higher feed conversion ratio, improved weight gain as well as reduced wet droppings in poultry (Paloheimo *et al.*, 2011). The aim of this study was to evaluate the performance and cost benefit of utilizing soya bean residue supplemented with *En-lay* in the diets broiler starter.



### MATERIALS AND METHODS

The study was conducted at the Livestock Teaching and Research Farm of the Department of Animal Science, University of Maiduguri. Maiduguri is located between latitude 11° 5' and 12° North and longitude 13°05' and 14° East at an altitude of 353 m above sea level (Marte *et al.*, 2021). Maiduguri is a typical Semi arid environment. Diurnal temperature of >35°C is not uncommon for most part of the year.

**Source and processing of soya bean residue:** Soya bean residue (SBR) were sourced within Maiduguri communities locally, a by-product from soya bean processing, known as soya bean cheese residue or *Dusar-awara*, is a left over when soya bean cheese (*awara*) is made from soya beans. The filtrate, which contains protein and fat, and is made from milled and boiled soya bean mash, called soya cheese (*awara*), while wastes are the residue. Since Soya bean residue has water content of over 80% and high protein content, therefore the common method of storing is sun-drying and bagging.

**Experimental diets and management:** Experimental isocaloric and isonitrogenous diets were formulated containing soya bean residue (SBR) 10% supplemented with enzyme (*En-lay*) for broiler starter (0-28 days). Three hundred and sixty (360) day old *Cobb 500* broiler chicks were allocated to four (4) dietary treatments with different levels of *En-lay* supplementation designated as T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> as presented in Table 1. Each treatment was replicated thrice containing 30 chicks (per replicate) in randomize complete block design (RCBD).

**Chemical evaluation;** Chemical composition of SBR, experimental diets and faecal samples were carried out according to the procedure of AOAC, (2000).

**Table 1: Ingredient Composition of the Experimental Broiler Starter Diets Containing Different Levels of *En-lay* supplementation (0 – 4 weeks)**

Ingredients (%)	Level of <i>En-lay</i> supplementation				SBR
	T <sub>0</sub> (0g)	T <sub>1</sub> (20g)	T <sub>2</sub> (25g)	T <sub>3</sub> (30g)	
Maize	46.00	40.00	40.00	40.00	
Soya bean meal	20.00	20.00	20.00	20.00	
Soya bean residue	0.00	10.00	10.00	10.00	
Groundnut cake	22.00	17.00	17.00	17.00	
Wheat offal	6.00	7.00	7.00	7.00	
Palm oil	2.00	2.00	2.00	2.00	
Bone meal	2.00	2.00	2.00	2.00	
Limestone	1.00	1.00	1.00	1.00	
Min-Vit Premix*	0.30	0.30	0.30	0.30	
Methionine	0.20	0.20	0.20	0.20	
Lysine	0.20	0.20	0.20	0.20	
NaCl	0.30	0.30	0.30	0.30	
<b>TOTAL</b>	100.00	100.00	100.00	100.00	
	<b>Calculated Analysis</b>				
ME (Kcal/kg)	3008.00	3012.00	3012.00	3012.00	2610.60
Crude protein (%)	22.07	22.08	22.08	22.08	27.80
Ener. protein ratio	140.82	135.90	135.90	135.90	-
Ether extract (%)	8.58	8.62	8.62	8.62	5.50
Crude fibre (%)	3.58	5.61	5.61	5.61	19.80
Calcium (%)	0.93	0.99	0.99	0.99	-
Avai. Phos. (%)	0.46	0.39	0.39	0.39	-
Ca.: P. Ratio (%)	2.00	2.60	2.60	2.60	-
Lysine (%)	1.15	1.19	1.19	1.19	-
Meth + cys. (%)	0.83	0.80	0.80	0.80	-
Feed Cost/25kg(₦)	3826.25	3447.75	3447.75	3447.75	-

*NFE* = Nitrogen-free extract; *ME*= Metabolizable energy



\* = Bio Mix Broiler Finisher Premix supplying the following per Kg of feed: Vitamin A=3,400,000IU, VitaminD<sub>3</sub>=600,000IU, Vitamin E=4,000mg, Vitamin K<sub>3</sub> = 600mg, Vitamin B<sub>1</sub> = 640mg, Vitamin B<sub>2</sub> = 1600mg, Niacin = 8,000mg, Pantothenic=2000mg, Vitamin B<sub>6</sub> = 600mg, Vitamin B<sub>12</sub> = 4mg, Folic acid =200mg, BiotinH<sub>2</sub> = 300mg, Choline Chloride = 70,000mg, Cobalt = 80mg, Copper = 1200mg, Iodine = 400mg, Iron = 8,000mg, Manganese =16,000mg, selenium=80mg, Zinc=12,000mg and Antioxidant=500mg.

Data were generated for feed intake, live weight gain, feed conversion ratio, nutrient digestibility, and carcass characteristic. Feed and water were given *ad-libitum*.

**Statistical Analysis:** Data collected were subjected to analysis of variance using randomized complete block design (RCBD) of the SAS package (SAS, 1999). Version 9.0. Significant differences among treatment means were compared using Duncan’s Multiple Range Test (1955).

**Results and Discussion:** The growth performance results (feed intake, weight gain, feed conversion ratio (FCR), final weight, cost per kg gain and mortality) of broiler chickens fed diets containing soya bean residue (SBR) supplemented with enzyme at 0-28 days is presented in Table 2. There were no significant ( $P>0.05$ ) differences among all the treatment groups. With the exception of birds on diet containing (0%) SBR and 0g enzyme, birds fed diets supplemented with 20, 25 and 30g/100kg levels, showed uniformity in terms final weight, daily weight gain and daily feed intake (g/bird), respectively as presented in main and interaction effects of the performance characteristic of broiler starter chickens (Tables 2 and 3). These results are in agreement with the findings of Avila *et al.* (2021) who reported that, enzymes were known to enhance feed palatability, improved nutrients digestibility and reduced endogenous losses of amino acid and consistent with the studies of Ani *et al.* (2012) and Marte *et al.* (2021) as they reported that, enzyme supplementation reduces negative effects of anti-nutritional factors and enhanced weight gain. The results obtained for feed conversion ratio (FCR) showed no significant ( $P>0.05$ ) differences among all the treatment groups, values recorded 1.63, 1.53, 1.60 and 1.63 treatments 1, 2, 3 and 4 respectively were similar but, broiler chicks fed SBR supplemented with 25g enzyme (*En-lay*) showed better performance (1.53) in terms feed conversion ration with moderate feed cost (₦350.15) per kg gain compared to control (0g) enzyme supplementation. However, the range (1.53 to 1.63) was lower than the range value (2.43 to 2.69) reported by Inuwa and Yakubu, (2021) who fed maize offal as a replacement to wheat offal (as dietary fibre sources) for broiler starter chickens. The mortality percentage was higher (5.05%) at 25g level of *En-lay*® supplementation while the least (2.02%) was recorded at 0g supplementation, however, carcass were taken to the Veterinary Teaching Hospital, University of Maiduguri, for post-mortem examination to ascertain the cause of death, and was not as a results of treatment effects but high ambient temperature during the study period (March – April), this is in agreement with the report of Marte *et al.* (2021) who stated that, Maiduguri is a typical Semi arid environment with diurnal temperature of  $>35^{\circ}\text{C}$  is not uncommon for most part of the year.

Table 2: Main effect of broiler starter chickens performance fed diets containing soya bean residue (SBR) supplementation enzyme (*En-lay*)

Parameters	Level of <i>En-lay</i> supplementation (g/100kg)				SEM
	0	20	25	30	
Initial weight (g/bird)	97.40	97.26	96.86	97.66	0.44
Final weight (g/bird)	614.00	552.00	524.00	574.00	55.49
Daily weight gain (g/bird)	24.62	21.62	20.29	20.96	5.96
Daily feed intake (g/bird)	31.0	30.63	32.08	30.72	1.62
Feed conversion ratio	1.63	1.53	1.60	1.63	0.06
Feed cost /kg gain (₦)	314.78	350.15	340.73	350.72	35.71
Mortality (%)	2.02	4.04	5.05	4.04	--



SEM=Standard error mean

Table 3: Interaction effect of enzyme type and levels of broiler starter chickens performance fed diets containing soya bean residue (SBR) supplementation enzyme (*En-lay*)

Parameters	Level of <i>En-lay</i> supplementation (g/100kg)			
	0	20	25	30
Initial weight (g/bird)	97.26±0.52	97.30±0.28	96.90±0.58	97.73±0.29
Final weight (g/bird)	552.38±20.75	571.43±8.25	552.38±46.90	564.43±28.17
Daily weight gain (g/bird)	454.11±20.90	474.12±8.53	454.81±47.31	454.72±38.94
Daily feed intake (g/bird)	28.66±2.84	31.66±0.66	30.66±0.45	30.00±1.00
Feed conversion ratio	1.63±0.08	1.53±0.18	1.60±0.10	1.63±0.06
Feed cost /kg gain (₦)	314.78±12.90	325.97±14.63	340.08±20.92	375.53±36.12
Mortality (%)	2.02±1.01	2.02±1.01	7.07±3.03	6.06±3.03

SEM=Standard error mean

**CONCLUSION:** The study concluded that, non-statistical difference observed may be attributed to the protein energy ratio and positive effect of *En-lay*® supplementation in the diets. These imply that, SBR supplemented with *En-lay*® have positive effect on performance and can be used in broiler starter chickens diet as source of protein.

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