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ECONOMIC ANALYSIS OF ROSS 308BROILER CHICKENS FED DIETS CONTAINING LACTIC ACID BACTERIA PROBIOTIC

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ABSTRACT

Economic analysis on the effects of orally fed Lactic Acid Bacteria Probiotics (LABP) on 200 Ross 308 broiler birds kept in battery cages for 56 days was investigated. Four dietary treatments (T1, T2, T3, T4, and T5) containing 0.0 × 10^8 CFU as control, 7.2 × 10^8 CFU Lactobacillus plantarum, 4.2 × 10^7 CFU Pediococcuspentosaceous, 1.8 × 10^8 CFU Lactobacillus fermentum and combination of Lactobacillus plantarum, Pediococcus pentosaceous and Lactobacillus fermentum, respectively as minimum presence for lactic acid bacteria probiotic (LABP) for every ml replicated four times with ten birds in each in a completely randomized design were used. Economic analysis for starter phase revealedsignificant (P<0.05) disparity in final live weight, energy and protein cost₦*/bird and no significant variations were noted for finisher phase in terms of feed cost and net income ratio. Significant (P<0.05) reductions in energy and protein cost were eminent in treatment 5 in both phases of production.Cost input minimization and output maximization was achieved as cost reduction was notable inchickens fed mixture of Lactic acid bacteria probiotic (L. plantarum, P. pentosaceous and L. fermentum) that yieldedsignificant (P<0.05) higher returns in total revenue, net income and return on naira invested per bird at the finisher phase.*

Keywords: *Economic analysis, probiotics, bacteria, broiler chickens*

INTRODUCTION

One of the securesegmentsin the poultry industry in Nigeria that has rapid return on investment is broiler production.The success of the sector has been negatively affected by soaring price of feed stuffs as feeding constitutes over 70 75 % cost of production (Van der Klis *et al.* 2010). Ramlah and Tan (1995) reported that freeze-dried Lactobacillus culture supplementation through drinking water increased the earnings of broiler birds by 11.76% per bird and more feasible and economical returns for broilers birds fed protexin (Anjum *et al*., 2005). Kalia *et al* (2017) reported increased in cost-effectivefor broiler birds fed probiotic. This study was conducted to investigate economics analysis of Ross 308 broiler chickens fed lactic acid bacteria probiotic (LABP).

MATERIALS AND METHODS

Location, bird's management, diets and experimental Design

The feeding trial was conducted at the Poultry Unit of Plateau State College of Agriculture, Garkawa on latitude 8^0 58E and longitude $9^0$45N, from August to September, 2019. Standard management and protocol of raising broiler birds in a battery cagewas duly followed with feed and water supplied without restriction and no medication. Lactic acid bacteria were isolated from local chickens (Guluwa, 2021). The experimental treatments contained lactic acid bacteria probiotic (LABP) minimum presence of: T1 = 0.0 × 10^8 CFU as control, T2 = 7.2 × 10^8 CFU L. plantarum, T3 = 4.2 × 10^7 CFU *P. pentosaceous*, T4 = 1.8 × 10^8 CFU L. fermentum and T5 = Combination of L. *plantarum, P. pentosaceous* and L. *fermentum* for every ml. The nutritive content of the experimental diets is given in Table 1. Two hundred day old broiler chicks obtained from a reputable hatchery were randomly allocated to five treatments with four replicates and ten birds each in a completely randomized design and brooded for four weeks.Freeze dried LABPs were then re-constituted

with 100 ml of normal saline and one (1) ml was given to the birds orally and repeated weekly at both phases of the study.

Data collections

The following economic indices: feed, energy and protein cost; total cost of production, prevailing market price, total revenue, net income, net income ratio and return on naira invested were determined according to the procedures outlined by Ogundipe and Sanni (2002).

Statistical Analysis

Records collected were subjected to analysis of variance (ANOVA) using SPSS Version 21 (2012) software package. Where significant differences existedbetween treatments, the meanswere separated using Duncan's Multiple Range Test option in the same package.

RESULTS AND DISCUSSION

Presented in Table 2 is economic of production of Ross 308 broiler birds fed Lactic Acid Bacteria Probiotics (LABP) at both phases of production. The starter phase revealed significant ($P<0.05$) differences in energy and protein cost ₦/bird and broiler chicks fed mixtures of lactic acid bacteria probiotics had the lowest energy and protein cost of production. Not a hint of significant ($P>0.05$) variationswere observed instarter feed cost, variable cost, fixed cost, total revenue, total profit, net income ratio and returned on naira invested per birds (Guluwa, 2021).The finisher phase revealed significant ($P<0.05$) differences for most economic parameters except feed cost (₦/kg), fixed cost (₦/bird), prevailing market prices(₦/kg) and net income ratio. At the finisher phase, much significant ($P<0.05$) reductions were observed in Ross 308 broiler birds fed treatment 5 (multiple LABPs) in energy and protein cost (₦/bird), variable cost and total cost of production.Multiple LABP's supports the stability of useful microbes which aided inreduction in feed cost of birds. This agrees with the reports of Anjum *et al.* (2005) and Kalia *et al.*(2017) that feed cost was less in broiler chickens fed protexin probiotic and indigenous microbial organisms.Higher total revenue and net income in treatment 5 was a direct biological effect of nutrient absorption for tissue development. Return to naira invested was due to reduction in total operating costas reported by Guluwa (2021).

CONCLUSION AND RECOMMENDATION

Higher final live weight of broiler chickens fed multiple LABP's orally provide basis for higher total income, net income and return to naira invested due to reduction in accumulative feed cost and total operating cost.Improvement in economic returns of broiler chickens fed multiple lactic acid bacteria probiotic is hereby recommended because of reduction in feed cost and increase in final live weight that gave greater market value resulting in higher total income, net income and return to naira invested.

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Table 1: Ingredients and Nutrient Composition of Broiler Starter (0-4 weeks) and Finisher (5-8 weeks) Diet (as fed basis)

Ingredients	Experimental treatments (Starter phase)					Experimental treatments (Finisher phase)				
	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
Maize	41.26	41.26	41.26	41.26	41.26	47.48	47.48	47.48	47.48	47.48
GNC	32.38	32.38	32.38	32.38	32.38	22.28	22.28	22.28	22.28	22.28
SBM	5.00	5.00	5.00	5.00	5.00	7.33	7.33	7.33	7.33	7.33
Rice offal	7.70	7.70	7.70	7.70	7.70	12.01	12.01	12.01	12.01	12.01
Fish meal	3.00	3.00	3.00	3.00	3.00	2.67	2.67	2.67	2.67	2.67
Bone meal	2.20	2.20	2.20	2.20	2.20	1.70	1.70	1.70	1.70	1.70
Limestone	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95
*Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.16	0.16	0.16	0.16	0.16	0.23	0.23	0.23	0.23	0.23
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
SCM (%)	5.00	5.00	5.00	5.00	5.00	3.00	3.00	3.00	3.00	3.00
Palm oil	1.55	1.55	1.55	1.55	1.55	1.60	1.60	1.60	1.60	1.60
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
IMOs	0.00	*L.p*	*P. p*	*L. f*	Cock tail	0.00	*L.p*	*P. p*	*L. f*	Cock tail
Calculated nutrients										
Price/kg	172.36	177.36	177.36	177.36	177.36	156.93	161.93	161.93	161.93	161.93
Price/ME	57.35	57.35	57.35	57.35	57.35	52.2	52.2	52.2	52.2	52.2
Price /CP	7.49	7.49	7.49	7.49	7.49	7.83	7.83	7.83	7.83	7.83
Dry matter	86.88	86.88	86.88	86.88	86.88	85.39	85. 39	85. 39	85. 39	85. 39
ME (Kcal/kg)	3005.48	3005.48	3005.48	3005.48	3005.48	3005.99	3005.99	3005.99	3005.99	3005.99
Crude protein (%)	23.00	23.00	23.00	23.00	23.00	20.03	20.03	20.03	20.03	20.03
Crude fibre %	4.90	4.90	4.90	4.90	4.90	4.45	4.45	4.45	4.45	4.45
Ether extract (%)	7.05	7.05	7.05	7.05	7.05	7.02	7. 02	7. 02	7. 02	7. 02
Lysine (%)	1.09	1.09	1.09	1.09	1.09	1.01	1.01	1.01	1.01	1.01
Methionine (%)	0.50	0.50	0.50	0.50	0.50	0.55	0.55	0.55	0.55	0.55
Meth + cyst %	0.81	0.81	0.81	0.81	0.81	0.84	0.84	0.84	0.84	0.84
Calcium%	1.17	1.17	1.17	1.17	1.17	1.37	1.37	1.37	1.37	1.37
Available P %	0.71	0.71	0.71	0.71	0.71	0.87	0.87	0.87	0.87	0.87

GNC = ground nut cake, SBM = soya bean meal, SCM = sugar cane molasses, Kg = Kilogram, ME = metabolizable energy, IMO= Indigenous microbial organisms (%) = percentage, *L.p = Lactobacillus plantarum,* P.p = *Pediococcuspentasaceous*L.f = *L. fermentum*, cock tail = *L. plantarum, Pediococcuspentasaceous and L. fermentum.**Vitamin-Mineral premix (BIOMIX(R)) supplied per kg diet; Vit. A 500IU; Vit. D_3 888, IU; Vit. E_{12}, 000mg; Vit. $K_3$15000mg; Niacin 12000mg; Pantothenic acid 2000mg, Biotin 1000mg; Vit b12 3000mg; Folic acid 15000mg; Choline chloride 6000mg, Manganese 1000mg; Vit. Iron 15000mg; Zinc 800mg; Copper 400mg; Iodine 80mg; Cobalt 400mg; Selenium 8000mg

Table 2: Economic analysis of broiler chickens fed diets containing Lactic Acid Bacteria Probiotics (LABP)

Cost indices	Starter Phase							Finisher Phase						
	Trt 1	Trt 2	Trt 3	Trt 4	Trt 5	SEM	P. Value	Trt 1	Trt 2	Trt 3	Trt 4	Trt 5	SEM	P. Value
FLW	0.32	0.28	0.29	0.29	0.34	0.0	0.04	19.50[a]	1.79[b]	1.92[ab]	1.92[ab]	2.14[a]	0.0	0.04

kg/bird	ab	b	b	b	a	1	*	b					4	*
S/FFC	162.	125.	157.	114.	153.	2.1	0.70	7722.	736.1	701.8	721.8	680.2	7.1	0.06
₦/kg	75	60	61	42	70	0	NS	44	8	4	2	2	6	NS
EC	54.1	50.4	48.3	49.7	44.7	0.9	0.02	240.3	237.3	226.2	232.6	219.2	2.5	0.03
₦/bird	5[a]	9[a]	3[ab]	0[ab]	4[b]	4	*	1[a]	2[a]	5[ab]	9[ab]	8[b]	0	*
PC	7.01	6.59	6.44	6.49	5.84	0.1	0.02	36.05[a]	35.59	33.94[a]	34.90[a]	32.89	0.3	0.03
₦/bird	a	a	ab	ab	b	2	*		a	b	b	b	7	*
VC	492.	491.	485.	490.	480.	2.1	0.29	1460.	1467.	1446.	1436.	1420.	5.9	0.04
₦/bird	69	38	81	64	06	0	NS	71[a]	82[a]	59[ab]	57[ab]	20[b]	3	*
FC	32.0	32.0	32.0	32.0	32.0	-	-	64.00	64.00	64.00	64.00	64.00	-	-
₦/bird	0	0	0	0	0									
TCP	524.	523.	517.	522.	512.	2.1	0.29	1524.	1531.	1510.	1500.	1484.	5.9	0.04
₦/bird	69	38	81	64	06	0	NS	71[a]	82[a]	59[ab]	56[ab]	20[b]	3	*
PMP								1000.	1000.	1000.	1000.	1000.	-	-
₦/kg	-	-	-	-	-	-	-	00	00	00	00	00		
TR	650.	650.	650.	650.	650.	-	-	1946.	1792.	1920.	1922.	2142.	39.	0.04
₦/bird	00	00	00	00	00			67[ab]	50[b]	00[ab]	50[ab]	50[a]	85	*
NI	125.	126.	132.	127.	137.	2.1	0.29	421.9	260.6	409.4	421.9	658.3	42.	0.01
₦/bird	31	62	19	36	94	0	NS	5[b]	8[b]	1[b]	4[b]	0[a]	24	
NIR	3.94	3.89	3.70	3.88	3.48	0.0	0.31	3.64	19.25	3.73	3.59	2.67	2.5	1.32
						8	NS						7	
RONI	0.24	0.24	0.25	0.24	0.27	0.0	0.28	0.28[b]	0.17[b]	0.27[b]	0.28[b]	0.44[a]	0.0	0.01
						1	NS						3	

*[a, b,] = Means on the same row with different superscripts are significantly different (P< 0.05), NS = Not significant (P> 0.05), SEM = Standard error of mean, P.V = probability value, Trt = treatment, Trt*1* = Control, Trt *2* = *Lactobacillus plantarum,* Trt 3 = *Pediococcuspentasaceous*Trt 4 = *Lactobacillus fermentum,* Trt *5*= cock tail of *L. plantarum,* Pediococcus*pentasaceous and L. fermentum*, FLW = final live weight, S/FFC = starter/finisher feed cost, EC = energy cost, PC = protein cost, VC = variable cost, FC =fixed cost, TCP = total cost of production, PMP = prevailing market price, TR = total revenue, NI = net income, NIR = net income ratio, RONI = return on naira invested, ₦/bird = naira per bird, ₦/kg = naira per kilogram.