ECONOMIC ANALYSIS OF PROBIOTICS AND HIGH FIBRE DIET IN BROILER STARTER CHICKS' PRODUCTION

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ABSTRACT
Effects of probiotics and high fibre diet on economics of production of broilers chickens was examined using a total number of one hundred and eighty (180) day old Cobb 500 breed of broilers. The birds were randomly assigned to six (6) dietary treatments replicated three (3) times. Each replicate comprised ten (10) birds. The experiment was a 2x3 factorial laid in a completely randomized design, which comprised 2 levels (0 and 2mls) of essential microbes and 3 levels (2.5, 5and7.5%) of fibre at starter phase. Birds were given the same quantity of feed measured in grams, for the treatment's combination T1, T2, T3, T4, T5 and T6, respectively. The results for the main and interaction effects of probiotics and fibre on economic of production of broiler starter chicks showed significant (P<0.05) increase in the total cost of production (634.69 vs. 574.71₦/bird). Birds fed on 2ml effective microorganisms activated solution (EMAS) diet had the highest cost of production than the 0ml based birds. Effect of fibre on economics also indicated significant (P<0.05) increase in the TCP (601.79, 610.68 and 603.83₦/bird). Birds on 5% fibre (610.68₦/bird) had higher total cost of production than 2.5 and 7.5% fibre. Similarly, the interactive effect indicated significant (P<0.05) increase in the TCP at T5 (642.73₦/bird) followed by control birds T1 (640.79₦/bird) compared with other treatment diets.
Keywords: Economic, Probiotics, High fibre, Broiler, Chick.

INTRODUCTION

The poultry industry in the developing countries like Nigeria is faced with the challenges of meeting the demand of protein for the consumption of a geometrically rising population. Yakubu *et al*. (2010) suggested that the quickest potential for bridging protein supply-demand gap lies in the production of highly prolific animals that are efficient converters of feed to flesh and have short generation interval such as broilers. In the light of this and the inherent challenges faced by the industry in the area of meeting critical needs of feeds which constitute over 70% of production cost and legislation against the use of antibiotics (Casewell *et al.,* 2003). Many advances in poultry production have been made through the use of nutritional supplements and that of probiotics compound into poultry feeds and water.

The use of probiotics is one method receiving considerable recent attention as a natural alternative to chemicals in enhancing animal productivity and improving product safely as well as feeding of viable microorganisms (Brashears *et al*.,2005). Similarly, the advantages of direct fed microbial consumption in humans have been documented (Mackowiak, 2013). However, their application and efficiency in livestock operations have only recently been pursued.

The influence of probiotics in fibre digestion has also been documented (Pérez-Burillo *et al.,* 2019). The essence of this study therefore is to see the viability of supporting farmers who usually mix the concentrate feeds with high fibre materials in an attempt to reduce cost of feeds supplied. Therefore, this study seeks to evaluate the effect of probiotics in the digestion of high fibre diets by broilers.

MATERIALS AND METHODS

Study Location

The study was conducted at **Ibas farm Keffi**. The area is located in the Guinea Savanna zone of the North Central Nigeria. It is found in latitude 08^0 35'N and longitude 08^0 33'E. The mean monthly maximum and minimum temperature is 35.06^0 and 20.16^0c respectively while the mean monthly relative humidity and rainfall is 74.6% and 168.9mm respectively (NIMET, 2021).

Experimental Birds and Management

A total of one hundred and eighty (180) day old Cobb 500 breed of broilers from Chikun Farm Kaduna, Kaduna state were used for this experiment. The birds were randomly assigned to 6 dietary treatments replicated 3 times. Each replicate comprised 10 birds. Prior to the arrival of the birds, disinfectant (Morigad) was used to disinfect the pen. All the experimental birds were weighed (to determine the initial weight) and they were provided with feed and water *ad-libitum*. Routine management practice was carried out throughout the period of the experiment. At the age of 2 and 3 weeks, the chicks were vaccinated against Gumboro disease and Newcastle disease (NCD), respectively.

Source of experimental materials
The essential microbes (EM) were procured from Songhai farm in Port Novo, Benin Republic. All other ingredients such as Maize, Soybeans, Wheat Offals, fish meal, bone meal, premix, methionine, salt and lysine were procured from Star Mega Feed Meal Limited, Karu Local Government Area of Nasarawa State, Nigeria.

Experimental design and diets
The experiment was a 2 x 3 factorial laid in a Completely Randomized Design. The design comprised 2 levels (0 and 2ml) of Essential Microbes and 3 levels (2.5, 5, and 7.5%) of fibre at starter phase. The birds were given the same quantity of feed measured in grams; water was given *ad libitum*. Records of feed consumption, weight gain and feed conversion ratio were taken. The starter diets were fed for 4 weeks (1 – 28 days). Experimental diets were formulated to be isocaloric and isonitrogenous having 2850 kcal and 22% crude protein (CP). The experimental diets were formulated using least cost feed formulation software (Feed win).

Table 1: Gross composition of experimental diet for broiler starter

Ingredients	T1 (2.5%cf)	T2 (2.5%cf)	T3 (5%cf)	T4 (5%cf)	T5 (7.5%cf)	T6 (7.5%cf)
Aflatoxin binder	4.85	4.85	0.05	0.05	0.05	0.05
Blood meal	6.00	6.00	1.00	1.00	3.00	3.00
Bone meal	2.50	2.50	3.50	3.50	1.60	1.60
Fish meal	5.50	5.50	4.00	4.00	5.00	5.00
Ground nut cake	0.00	0.00	4.00	4.00	5.00	5.00
Limestone	0.00	0.00	0.22	0.22	0.50	0.50
Lysine	0.00	0.00	0.00	0.00	0.00	0.00
Maize	52.00	52.00	41.90	41.90	37.00	37.00
Maize bran	0.00	0.00	5.55	5.55	0.15	0.15
Methionine	0.15	0.15	0.13	0.13	6.00	6.00
Molasses	0.50	0.50	0.00	0.00	0.20	0.20
Palm kernel cake	0.00	0.00	3.00	3.00	6.00	6.00
Palm oil	1.00	1.00	0.70	0.70	1.60	1.60
Premix	0.20	0.20	0.25	0.25	0.25	0.25
Rice bran	0.00	0.00	2.06	2.06	10.00	10.00
Salt	0.30	0.30	0.30	0.30	0.25	0.25
Sorghum	11.00	11.00	0.00	0.00	1.00	1.00
Soya beans toasted	16.00	16.00	26.64	26.64	15.00	15.00
Soya oil	0.00	0.00	0.00	0.00	0.00	0.00
Wheat bran	0.00	0.00	6.70	6.70	7.00	7.00
TOTAL	100	100	100	100	100	100
Essential microbe	0 ML	2ML	0ML	2ML	0ML	2ML
Nutrient and Energy composition						
ME/Kcal/Kg	3000.20	3000.20	3000.80	3000.80	3000.00	3000.00
Crude protein (%)	21.45	21.45	22.00	22.00	21.50	21.50
Crude fibre (%)	2.50	2.50	5.00	5.00	7.50	7.50
Ether extract (%)	7.70	7.70	8.45	8.45	8.25	8.25
M+C (%)	0.91	0.91	0.89	0.89	0.90	0.90
Calcium (%)	1.20	1.20	1.00	1.00	0.82	0.82
Phosphorus (%)	0.81	0.81	0.80	0.80	0.77	0.77
Lysine (%)	1.30	1.30	1.20	1.20	1.16	1.16
Methionine (%)	0.53	0.53	0.51	0.51	0.52	0.52

CF= crude fibre. ML= mile.The vitamin- mineral premix supplied the following per 100kg of diet: vitamin A15,000 I.U, vitamin D3 300,000 I.U.,vitamin E 3,000 I.U., vitamin K 2.50mg, vitamin B_1 (thiamin) 200mg, Riboflavin (B_2) 600mg, pyridoxine (B_6), Niacin 40.0mg, vitamin B_{12} 2mg, Pantothenic acid 10.0mg, folic acid 100mg, Biotin 8mg, choline chloride 50mg, anti-oxidant 12.5mg, manganese 96mg, zinc 6mg, Iron 24mg, Copper 0.6mg, Iodine 0.14mg, Selenium 24mg, cobalt 214mg.

RESULTS AND DISCUSSION
The results for the main and interaction effects of essential microbes and fibre on economic of production of broiler starter chickens are shown in Table 2. The result for the effect of *effective microorganisms activated solution* (EMAS) indicated significant ($P<0.05$) increase in the total cost of production (634.69 vs. 574.71₦/bird). Birds fed on 2ml EMAS diets had the highest cost of production than the 0ml based birds. Effect of fibre on economics also indicated significant ($P<0.05$) increase in the TCP (601.79, 610.68 and 603.83₦/bird). Birds on 5% fibre

(610.68₦/bird) had higher total cost of production than 2.5 and 7.5% fibre. Similarly, the interactive effect indicated significant (P<0.05) increase in the TCP at T5 (642.73₦/bird) followed by control birds T1 (640.79₦/bird) compared with other treatment diets. The significant increase in the total cost of production of birds fed 2ml EMAS than the 0ml birds was due to the higher cost of EMAS that was supplemented in their diets. This agrees with the work of Omar, (2014) who studied economic evaluation of probiotic (lactobacillus acidophilus) use in different broiler breeds and reported that Probiotic (L. acidophilus) plays an important role in improving the economic and productive efficiency of poultry farm although it constitutes small cost portion from the total or variable costs of poultry production. The significant increase in the total cost of production for birds on 5% fibre (610.68₦/bird) compared with birds on 2.5 and 7.5% fibre could be due to the level at which fibre was added to the diets. This is supported by the work of Alu *et al.* (2012) who investigated the effect of sugarcane scrapings meal-based diet on growth, nutrient digestibility and cost implication of Japanese quail chicks and observe increase in cost of production when enzyme was supplemented in the diets. Similarly, the interactive effect significantly increases TCP at T5 (642.73₦/bird) followed by control birds T1 (640.79₦/bird) than other treatment diets.

Table 2. Main and interactive effect of essential microbes and fibre on economic production of broiler starter

PARAMETERS		FC/kg	FC/WG	TCP	REV	GM
EMAS	0ml	156.44	253.72	574.71^{b}	754.79	120.10
	2ml	156.44	249.13	634.69^{a}	763.54	184.65
	SEM	0.00	9.43	1.54	28.24	27.76
FIBRE	2.5%	157.46	240.81	601.58^{b}	762.66	154.84
	5%	157.07	254.47	610.68^{a}	753.12	142.44
	7.5%	154.77	258.99	603.83^{b}	761.71	159.86
	SEM	0.00	11.55	1.88	34.59	34.00
EMAS* FIBRE	T1	159.76	237.51	640.79^{a}	766.62	125.84
	T2	159.76	243.90	578.64^{c}	726.41	147.78
	T3	155.16	258.60	620.54^{b}	717.91	97.37
	T4	155.16	244.12	562.36^{d}	758.69	183.84
	T5	154.39	265.03	642.73^{a}	779.83	137.10
	T6	154.39	259.38	583.12^{c}	805.51	222.34
	SEM	0.58	6.11	7.68	18.25	19.20
SOURCES OF VARIATION						
Emas		NS	NS	*	NS	NS
Fibre		NS	NS	*	NS	NS
Emas * fibre		NS	NS	*	NS	NS

FG/kg= feed cost per kilogram, FC/WG= feed cost per weight gain, TCP= total cost of production, REV= revenue, GM= gross margin, NS= no significant, * =significant.
abc means with the different superscripts on the the same row are significantly different (p<0.05).

CONCLUSION

The results in this present research revealed significant increase in the total cost of production (610.68₦/bird) of birds fed 2ml probiotics than the 0ml birds was due to the higher cost of probiotics that was supplemented in their diets.

RECOMMENDATION

Further research should be carryout to ascertain the effects of probiotics and dietary fibre on economics of production of broilers for both starter and finisher phase.

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