

Weight Test of Broiler Chicks Placed on Probiotic-fortified Composite Feed, Standard Commercial Starter Mash and Cornmeal

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Abstract: The study was carried out to compare growth performance results among broiler chicks placed on probiotic-fortified animal feed (G3), Feed Mill of Nigeria starter mash (G1) (conventional feed) and cornmeal (G2) diets. A total of thirty 1-day-old mixed-sex Agricol broiler chicks were randomized into three groups of 10 chicks each and placed on 600g (300g morning, 300g evening) of the respective diets. Feeding test was carried out for the duration of four weeks. The chicks were weighed weekly and data collected was statistically analyzed using a one-way Analysis of variance to check for significant differences in weight among groups. From data analyzed, chicks in groups G3 – probiotic-fortified feed and G1 – Feed Mill of Nigeria starter mash, showed no significant difference in parameters (weight) analyzed ($p < 0.05$) and performed better in comparison to chicks placed on cornmeal diet (G2). This study shows that probiotic-fortified feed can be used as a substitute to conventionally-produced feed and yield similar growth performance without the use of feed additives which have adverse effects on animals being fed.

Keywords : Animal feed, food waste, probiotics, agricultural waste, growth performance, poultry.

I. INTRODUCTION

It is common knowledge that conventionally-produced feed, even while yielding good growth performance results in poultry, has been implicated in the rapid spread of antibiotic resistance genes [1-2] and in the bioaccumulation [3] and biomagnification of toxic feed additives included as feed additives. Because of these consequences, it has become necessary for a shift from conventional feed to safer, environmentally friendly options, which would yield similar, if not better results in terms of animal productivity. Animal feeding tests in which feed material, supplemented with probiotic organisms were used, have been reported to yield positive results in animal growth performance [4-7]. Resistance to some identified diseases [8] and treatment of drinking water [9] may also be the motivation for supplemented feed materials. With high growth performance results, supplemented feed materials or direct-fed microbial have begun to be used in place of conventional feed. Moreover, the effects of supplemented feed materials will help to provide sustainable agricultural wastes [10]. Details on the effects of alternative feeds on broilers such as the use of fennel extract additions can be sourced from [8].

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II. MATERIALS AND METHODS

Ethical approval for this study was obtained from the Health and Research Ethics Committee, Covenant University (CHREC/007/2019). Composite feed was formulated from food and agricultural waste material sourced from Cafeteria 2, Covenant University, Ogun State. Proximate analysis test was carried out on waste materials and feed was formulated using the Pearson's square. 1.5×10^5 CFU/g live culture of the probiotic organism *Lactobacillus fermentum* was inoculated into composite feed and incubated at 37°C for 24hrs to acidify to the pH of 4.2

Thirty 1-day-old Agricol broiler chicks were weighed on day of birth and randomized into 3 groups of 10 chicks each and fed daily with a weighed quantity of diets - G1 – Feed Mill of Nigeria (FMN), G2 – Cornmeal and G3 – Probiotic-fortified composite feed respectively per group. The chicks were cared for under the guidelines laid down by the Covenant University Health and Research Ethics Committee. Growth comparison feeding test was carried out for 4 weeks, with chicks being weighed weekly. Statistical analysis of data (weight) collected was statistically analyzed using the one-way Analysis of Variance test and Tukey's HSD multiple comparison tests in SPSS version 25 to test for significant differences among groups.

III. RESULTS AND DISCUSSION

From raw data collected, progression in weight of chicks on the respective diets shows that chicks fed Feed Mill of Nigeria starter mash (G1) and probiotic-fortified composite feed (G3) diets performed better in terms of growth performance when compared to chicks placed on cornmeal (G2). Differences in mean weights and standard error of mean weights of chicks in groups G1 and G3 differ less than mean weights of chicks in group (G2). Data on mean weight obtained from chicks in G1 and G3 show that diets yielded similar results in terms of growth performance (Table 1).

Table 1: Mean weight and standard error of mean weight of chicks in G1, G2 and G3.

	Group		
	G1	G2	G3
	Mean	Mean	Mean
Week 0	36.56	37.11	36.15
Week 1	87.2	64.8	75.9
Week 2	167.1	105.6	168.1
Week 3	338.7	186.7	321.9

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Week 4 369.9 213.1 367.4

G1 – Feed Mill of Nigeria starter mash, G2 – cornmeal, G3 – probiotic-fortified composite feed

A Tukey’s HSD multiple comparison test (**Table 2**) was carried out to determine exact groups with significant differences across weeks.

Groups G1 and G3 show no significant difference in growth performance of chicks ($p < 0.05$) when compared to chicks in group G2.

This shows the feasibility of substituting conventionally-produced feed (G1) with probiotic-fortified feed (G2) with similar results in growth performance of chicks occurring. Shareef and Al-Dabbagh [11] obtained an improved growth rate on feeding poultry probiotic supplemented diets. Increased feed conversion was observed by Hassanein and Soliman [12] when poultry was fed yeast supplemented diets.

IV. CONCLUSION

The research has shown that with probiotic-fortified feed performing as well as conventionally produced feed as seen in the data obtained from weight analyzed. There is the possibility of substituting conventional feed which has been implicated in adverse health benefits to the animal being fed and ultimately to the consumer of the animal, with the probiotic-fortified feed formulated in this study.

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Table- 2: Multiple comparison test for significant differences in weight among groups across weeks

Multiple Comparisons						
Tukey HSD						
Dependent Variable	(I) Group	(J) Group	Mean	Std. Error	Sig.	95% Confidence Interval

			Difference (I-J)		Lower Bound	Upper Bound	
Week 0	G1	G2	-.55000	1.36913	.915	-3.9446	2.8446
		G3	.41000	1.36913	.952	-2.9846	3.8046
	G2	G1	.55000	1.36913	.915	-2.8446	3.9446
		G3	.96000	1.36913	.765	-2.4346	4.3546
	G3	G1	-.41000	1.36913	.952	-3.8046	2.9846
		G2	-.96000	1.36913	.765	-4.3546	2.4346
Week 1	G1	G2	22.4222*	7.2567	.013	4.347	40.497
		G3	11.3111	7.2567	.282	-6.764	29.386
	G2	G1	-22.4222*	7.2567	.013	-40.497	-4.347
		G3	-11.1111	7.4452	.312	-29.656	7.434
	G3	G1	-11.3111	7.2567	.282	-29.386	6.764
		G2	11.1111	7.4452	.312	-7.434	29.656
Week 2	G1	G2	61.5000*	15.7428	.002	22.186	100.814
		G3	-1.0429	17.3477	.998	-44.365	42.279
	G2	G1	-61.5000*	15.7428	.002	-100.814	-22.186
		G3	-62.5429*	17.3477	.004	-105.865	-19.221
	G3	G1	1.0429	17.3477	.998	-42.279	44.365
		G2	62.5429*	17.3477	.004	19.221	105.865
Week 3	G1	G2	152.0000*	34.5021	.001	65.838	238.162
		G3	16.8429	38.0194	.898	-78.103	111.788
	G2	G1	-152.0000*	34.5021	.001	-238.162	-65.838
		G3	-135.1571*	38.0194	.004	-230.103	-40.212
	G3	G1	-16.8429	38.0194	.898	-111.788	78.103
		G2	135.1571*	38.0194	.004	40.212	230.103
Week 4	G1	G2	156.7889*	42.1771	.003	51.461	262.117
		G3	2.5250	43.5424	.998	-106.213	111.263
	G2	G1	-156.7889*	42.1771	.003	-262.117	-51.461
		G3	-154.2639*	44.6046	.006	-265.654	-42.873
	G3	G1	-2.5250	43.5424	.998	-111.263	106.213
		G2	154.2639*	44.6046	.006	42.873	265.654

*. The mean difference is significant at the 0.05 level.

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