GROWTH PERFORMANCE OF BROILER CHICKENS FED DIET SUPPLEMENTED WITH BIONIC PREBIOTIC (HILYSES) AND HARDCORE YEAST CELL WALL

Onunkwo, D. N[1]., Ndukwe, O[1]., Wogu, K. R[1]., Ezenyilimba, B. N[2]., and Mbah, I. K[1].
[1]College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria
[2]Department of Animal Science, Nnamdi Azikiwe University, Awka.
Corresponding author: donunkwo1@gmail; +2348033388622

ABSTRACT
In a bid to boost productivity, several dietary manipulations have been carried out on poultry, ranging from inclusion of growth promoters, hormones, organic acids, enzymes (Chuka and locally sourced additives Thus, this study was carried out to assess supplementation of regular diet of broiler chickens with bionic prebiotic (Hilyses) and hardcore Yeast Cell Wall (Immuno Wall). The experiment utilized a Completely Randomized Design (CRD) with 120 unsexed day-old chicks randomly allocated into four treatment groups (T1, T2, T3, and T4), each consisting of 30 chicks and replicated three times. The initial live weight of the broiler chicks at day old was recorded. The birds were weekly weighed to determine the live weight and weight gain. The quantity of feed offered to the birds daily and the left over the next morning were measured to ascertain feed intake. Mortality was noted. Over the 56-day experimental period, the results demonstrated notable improvements in various performance traits attributable to the inclusion of prebiotic and yeast supplements, except for the initial weight, which exhibited not statistically significant ($P>0.05$) difference among the treatment groups. Significant ($p<0.05$) differences were observed in the final weight, with birds fed diet 4 displaying the highest final weight, reaching 2680.85g. In contrast, the final weights of birds fed diet 3 and 2 were 2525.55g and 2450.10g, respectively, while those on diet 1 had the lower final weight of 2407.65g. It is worth noting that as the inclusion levels of prebiotic and yeast increased across the dietary treatments, a significant ($p<0.05$) enhancement in final weight was consistently observed. The findings of this study unequivocally demonstrate the favourable growth performance of the treatment diets across all parameters examined. Specifically, it is evident that T4, with a 0.75% inclusion of prebiotics and yeast cells, yielded the highest final bod weight than both the other trial diets and the control diet. These findings highlight the potential for enhanced broiler chicken performance and overall health when incorporating these dietary additives.

Keywords: Broiler chicken, Growth performance, Bionic prebiotic, Hardcore yeast

INTRODUCTION

Poultry meat production still ranks as one of the most evolving industries in the world (Berri, 2007). Despite this status, it has not been able to meet the demand of the ever-increasing human population, who depend directly on the meat for animal protein and consequently essential amino acids. In a bid to boost productivity, several dietary manipulations have been carried out on poultry, ranging from inclusion of growth promoters (Mokhtari *et al*., 2010), hormones (Al-Dobaib and Mousa, 2009), organic acids (Ghazalah *et al*., 2011), enzymes (Chuka, 2014; Hossain *et al*., 2014), locally sourced additives (Dim *et al.,* 2018), etc. Because most of these growth enhancers are either carcinogenic or have a residual carryover effect with the attendant health implications in man (Camila *et al*., 2012), it is therefore, pertinent to search for their alternatives which will not only enhance growth of the birds but also ensure safe meat for the consuming populace. A popular alternative is the use of probiotics, which has been proven in poultry to compete and exclude bacterial pathogens in the gastrointestinal tract of the birds (Murry *et al*., 2004).

MATERIALS AND METHODS

The experiment was carried out in the Poultry unit of the Teaching and Research farm, Michael Okpara university of Agriculture, Umudike, Abia State. Umudike is located on latitude 05° 21' N and longitude 07° 33'E, with an elevation of about 112m above sea level (Meteorological Station, NRCRI, Umudike, 2022). The experiment was conducted with a total of 120-day-old unsexed chicks, which

were purchased from a distributor in the study area. The experiment lasted for the period of 56 days. The chicks were weighed and randomly allotted to four equal treatments groups (T1, T2, T3, and T4) each having 30 chicks. Each treatment was replicated three times of 10 chicks each. The experimental design for the experiment was Completely Randomized Design (CRD). Data were collected on initial, weekly, and final weights of the broiler chickens. The quantity of feed offered to the birds and the left over the next morning were measured to ascertain feed intake. Data were collected on initial, weekly, and final weights of the broiler chickens. The quantity of feed offered to the birds and the left over the next morning were measured to ascertain feed intake. All data generated were subjected to statistical analysis using analysis of variance (ANOVA) and means that are significantly different were separated using Duncan Multiple Range Test according to Steel and Torrie (1980).

Table 1: Ingredient and Nutrient Composition of Experimental Straight Broiler Diet

INGREDIENTS	**T_1 (0.00%)**	**T_2 (0.25%)**	**T_3 (0.50%)**	**T_4 (0.75%)**
Maize Meal	48.00	48.00	48.00	48.00
Soybean Meal	32.00	32.00	32.00	32.00
Palm Kernel Cake	8.30	8.30	8.30	8.30
Wheat Offal	5.00	5.00	5.00	5.00
Fish Meal	3.00	3.00	3.00	3.00
Bone Meal	3.00	3.00	3.00	2.75
Prebiotic	0.00	0.25	0.50	0.75
Premix*	0.25	0.125	0.00	0.00
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Common salt	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**
ME (Kcal/kg)	2871.85	2871.85	2871.85	2871.85
Crude Protein (%)	23.17	23.17	23.17	23.17
Calcium (%)	1.20	1.20	1.20	1.11
Phosphorus (%)	0.77	0.77	0.77	0.74
Lysine (%)	0.95	0.95	0.95	0.95
Methionine (%)	0.45	0.45	0.45	0.45

Vit/Min premix (1kg) contained vitamin A (5000.00IU), vitamin A 3 (1,000,00), vitamin E (16,00mg), vitamin K (800mg), vitamin B1 (1200mg), vitamin B2 (22,000mg), Niacin (22,000mg), calcium pantothenate (4600mg), vitamin B6 (2000mg), vitamin B12 (10g), folic acid (400mg), Biotin (32mg), cholinv chloride (200,000mg), Manganese (948,000mg), iron (40,000mg), Zinc (32,000mg), Copper (3400mg), Iodine (600mg), Cobalt (120mg), Selenium (48mg), Anti-oxidant (48,00mg).

RESULTS AND DISCUSSION

Growth performance of broiler chickens was evaluated in response to dietary supplementation with prebiotic and hardcore yeast cells, as presented in Table 2. The results demonstrated notable improvements in various performance traits attributable to the inclusion of prebiotic and yeast supplements, except for the initial weight, which exhibited no significant P>0.05) difference (among the treatment groups. It is worth noting that as the inclusion levels of prebiotic and yeast increased across the dietary treatments, a significant ($p<0.05$) enhancement in final weight was consistently observed. This observed increase in final weight, particularly in diet 4, can be attributed to the positive effects of prebiotics, which likely facilitated nutrient digestion and, consequently, promoted growth. This finding aligns with the research by Onunkwo *et al.* (2023), who emphasized the importance of prebiotic supplementation in releasing bound nutrients within the gastrointestinal tract for efficient absorption. Similarly, Selle and Ravindran (2007) have supported this notion, highlighting that the addition of yeast cells to diets enhances bird growth performance, improves digestibility, and reduces nutrient excretion into the environment.

Significant ($p<0.05$) differences were observed in the final weight, with birds fed diet 4 displaying the higher final weight, reaching 2680.85g. In contrast, the final weights of birds fed diet 3 and diet 2 were 2525.55g and 2450.10g, respectively, while those on diet 1 had the lowest final weight of

2407.65g. It is worth noting that as the inclusion levels of prebiotic and yeast increased across the dietary treatments, a significant ($p<0.05$) enhancement in final weight was consistently observed. This observed increase in final weight, particularly in diet 4, can be attributed to the positive effects of prebiotics, which likely facilitated nutrient digestion and, consequently, promoted growth. This finding aligns with the research by Onunkwo *et al.* (2023), who emphasized the importance of prebiotic supplementation in releasing bound nutrients within the gastrointestinal tract for efficient absorption. Similarly, Selle and Ravindran (2007) have supported this notion, highlighting that the addition of yeast cells to diets enhances bird growth performance, improves digestibility, and reduces nutrient excretion into the environment. The findings presented in this study underscore the beneficial impact of prebiotic and yeast supplementation on the growth performance of broiler chickens, as evidenced by the significant improvements in final weight, aligning with previous research in the field (Selle and Ravindran, 2007; Onunkwo *et al*., 2023). This study sought to assess the influence of various dietary regimens, encompassing the supplementation of prebiotics and yeast cells, on the growth performance of broiler chickens. The metric employed to gauge overall growth was the weight gained per bird. Among the treatment diets, diet 4 emerged as the most effective in promoting weight gain, with birds in this group exhibiting the highest weight gain of 2638.40g. Following closely, diet 2 yielded a weight gain of 2401.90g, while diet 3 resulted in a weight gain of 2474.90g. In stark contrast, birds subjected to the control diet demonstrated the lowest weight gain, registering at 2363.25g. These results unequivocally indicate that diet 4 was the most efficacious in fostering weight gain among the treatment diets, while the control diet led to the least weight gain.

Table 2: Growth Performance of Broiler Chickens supplemented with prebiotic (hilyses) and hardcore yeast cell.

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	S.E.M
Initial weight (g/bird)	44.50	48.10	50.75	42.55	1.65
Final weight (g/bird)	2407.65^{c}	2450.10^{c}	2525.55^{b}	2680.85^{a}	25.80
Weight gained (g/bird)	2363.25^{c}	2401.90^{b}	2474.90^{b}	2638.40^{a}	26.74
Average Daily Weight Gained (g/bird)	48.32^{c}	49.11^{c}	50.58^{b}	53.94^{a}	3.55
Average Daily feed intake (g/bird)	158.35^{a}	146.25^{a}	128.95^{b}	120.65^{c}	1.76
Feed conversion ratio (FCR)	3.38^{a}	2.98^{b}	2.67^{b}	2.37^{c}	0.06

^{a,b,c} Means across rows with different superscripts differ significantly at $P<0.05$; S.E.M: Standard Error of the Mean

Moreover, the incorporation of prebiotic and yeast cell supplements in the treatment diets exhibited a synergistic positive impact on the birds in comparison to those on the control diet. This augmentation in weight gain underscores the role of prebiotic inclusion in stimulating broiler growth throughout the experimental period. This observation aligns harmoniously with previous research findings, as Onunkwo *et al*. (2023), Sims and Sefton (1999), and Sefton *et al.* (2002) have previously reported analogous growth-promoting effects resulting from the inclusion of supplemental prebiotics in poultry diets.

The results obtained from this study demonstrate significant enhancements in bodyweight gain, as indicated by the improved feed conversion ratio (FCR) when compared to the control treatment. These findings underscore the superior performance and efficiency of avian subjects that were fed with diet 4 (FCR of 2.37) during the rearing period. Notably, the stimulation of beneficial gut bacteria growth through a combination of prebiotics and yeast cells proved to be an exceptionally effective strategy in this study (Onunkwo *et al*., 2021).

According to the findings obtained from this study, including prebiotics and yeast cells in the diets of finishing birds at concentrations of up to 0.75% does not negatively affect parameters such as weight gain (BWG), feed intake (FI), or feed conversion efficiency. These findings strongly support the notion that supplementing broiler chicken diets with prebiotics and yeast is a highly recommended approach for improving growth performance, particularly about increasing overall weight gain and enhancing feed conversion efficiency.

CONCLUSION

The findings of this study unequivocally demonstrate the favourable growth performance of the treatment diets across all parameters examined. This study has underscored the superior growth

performance achieved by the birds fed the trial diets when compared to those on the control diet. Specifically, it is evident that diet with a 0.75% inclusion of prebiotics and yeast cells (T4), yielded the highest final bod weight than both the other trial diets and the control diet. These findings highlight the potential for enhanced broiler chicken performance and overall health when incorporating these dietary additives.

REFERENCES

Al-Dobaib S.N. and Mousa H.M. (2009). Benefits and risks of growth promoters in animal production. Journal of. Food Agric. Environ., 7 (2), 202-208.

Berri C., Le Bihan-Duval E., and Debut M., (2007). Consequence of muscle hypertrophy on characteristics of pectoralis major muscle and breast meat quality of broiler chickens. J. Anim. Sci., 85, 2005-2011.

Camila B., Rafael A., Ana U., Jacques N. and Luis G.B. (2012). The benefits of probiotics in human and animal nutrition, new advances in the basic and clinical gastroenterology. In: Tomasz Brzozowski (ed.), ISBN: 978-953-51-0521-3, InTech. Retrieved from: http://www.intechopen.com/books/new-advances-inthe-basic-and-clinical-gastroenterology/the-benefits-ofprobiotics-in-human-and-animal-nutrition, 28 Oct. 2001.

Chuka E. (2014). Comparative study of the effects of probiotuc and commercial enzyme on growth rate, haematology and serum biochemistry of broiler chicken. J. Food Process. Technol., 5, 367.

Dim C.E., Akuru E.A., and Egom M.A., (2018). Effect of dietary inclusion of biochar on growth performance, haematology, and serum lipid profile of broiler birds. Agro-Science, 17 (2), 9-17.

Ghazalah A.A., Atta A.M., Elkloub K., Moustafa M.E.L. and Shata R.F.H. (2011). Effect of dietary supplementation of organic acids on performance, nutrients digestibility and health of broiler chicks. Int. J. Poult. Sci., 10 (3), 176-184.

Gibson, G. R., and Roberfroid, M. B. (1995). Dietary modulation of the human colonic microbiota: introducing the concept of prebiotics. The Journal of Nutrition, 125(6), 1401–1412.

Hossain M.A., Islam A.F. and Iji P.A. (2014). Impact of microbial enzymes on growth performance, micronutrient digestibility, tissue protein contents and endogenous enzyme activities of broiler chickens fed on vegetable protein diets. Int. J. Poultry Sci., 13 (10), 555-561.

Hosseini SM, Nazarizadeh H, Ahani S, and Azgheadi MV, (2016). Effects of mannan oligosaccharide and Curcuma xanthorrhiza essential oil on the intestinal morphology and stress indicators of broilers subjected to cyclic heat stress, Arch. Anim. Breed., 59, 285-291. 20.

Maiorano G, Stadnicka K, Tavaniello S, Abiuso C, Bogucka J, and Bednarczyk M, (2017). In ovo validation model to assess the efficacy of commercial prebiotics on broiler performance and oxidative stability of meat, Poult Sci, 96, 511-518

Mokhtari R, Yazdani A, and Kashfi H, (2015). The effects of different growth promoters on performance and carcass characteristics of broiler chickens, J. Vet. Sci., 7, 271-277.

Mokhtari R., Yazdani A., Rezaei M. and Ghorbani B. (2010). The effects of different growth promoters on performance and carcass characteristics of broiler chickens. J. Anim. Vet. Adv., 9 (10), 2633-2639.

Murry A.C., Murry A.C. Jr., Hinton A. and Morrison H. (2004). Inhibition of growth of Escherichia coli, Salmonella typhimurium and Clostridia perfringens on chicken feed media by Lactobacillus salivarius and Lactobacillus plantarum. Int. J. Poult. Sci., 3 (9), 603-607.

Onunkwo, D. N., Amaduruonye, W., and Daniel-Igwe, G. (2018). Assessment of abattoir wastes (bovine blood and rumen content) on carcass characteristics, internal organs and organoleptic properties of broiler birds. Nigerian Agricultural Journal, 49(1), 201-209.

Onunkwo, D. N., Daniel-Igwe, G., Afam-Ibezim, E., Ezenyilimba, B. N., and Udokwu, I. U. (2020). Carcass characteristics and organ proportions of broiler chickens fed different plant protein sources in an Acha grain-based diet. Nigerian Journal of Animal Production, 47(6), 108–112.

Onunkwo, D. N., Nwokolo, C. P., Mmadubugwu, C. A., and Okocha, O. I. (2023). Growth performance, organ and carcass traits of broiler chickens fed diet containing probiotics Direct Fed Microbial (DFM). The International Journal of Agriculture, Management and Technology, Vol 7(1), 672-680.

Onunkwo, D. N., Udokwu, I. U., Ekundayo, E. O., Ezenyilimba, B. N., Omumuabuike, J. N., and Ezeoke, F. C. (2022). Carcass and internal organ changes in broiler chickens administered water

containing various medicinal plant leaf methanol extracts. Nigerian Journal Animal Production, 49(2), 140-149.

Sefton, A. E., and Sims, A. M. (1999). Comparative effects of mannan oligosaccharides and antibiotics on performance of broilers during experimental coccidial infection. Journal of Avian Nutrition, 3(4), 232-237.

Sefton, A. E., Jackson, M. E., and Ferket, P. R. (2002). The effects of dietary mannan oligosaccharide, bacitracin, and virginiamycin on the development of the immune system in broiler chickens. Poultry Science, 81(5), 647-653.