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

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ABSTRACT
The revelation that the utilization of antibiotics in livestock is contributing to the escalating challenge of transmitting antibiotic-resistant bacteria from animals to humans has prompted the exploration of alternatives to antibiotics. In pursuit of this objective, an investigation was conducted into the effects of supplementing broiler chickens' straight diet with Bionic Prebiotic (Hilyses) and Hardcore Yeast Cell Wall (Immuno Wall) on the serum indices of broiler chickens. The study employed a Completely Randomized Design (CRD) with 120 unsexed day-old chicks distributed across four treatment groups (T1, T2, T3, and T4), each replicated three times. Blood samples were collected into labeled sterile bottles and were used in the laboratory to determine for serum biochemical analysis such as Total protein, Albumin, Globulin, Glucose, Urea, AST and ALP. Results of the serum biochemical indices revealed non-significant (P>0.05) differences in most parameters; however, exceptions were noted in Total protein (3.27-3.57g/dL), creatinine levels (0.85-0.93mg/dl), AST (43.16-45.18U/L), and ALP (56.64-60.70U/L). The study concludes that supplementing broiler chicken diets with prebiotics and yeast at an inclusion level of up to 0.75% proves beneficial in enhancing nutrient utilization, reducing wastage, and promoting favorable blood chemistry. These findings showed the inclusion of Bionic Prebiotic (Hilyses) and Hardcore Yeast Cell Wall (Immuno Wall) in broiler chicken rations to optimize results, providing valuable insights for poultry farmers.

INTRODUCTION

Animal protein consumption is very essential for meeting protein requirements and deficiencies. The average daily protein intake is still far less than the value of 35 g per adult per day recommended by FAO (2007). Therefore, efforts are directed toward the evaluation of all reasonable options that contain the recommended level at an affordable price (Ojebiyi *et al.,* 2008). Poultry meat production still ranks as one of the most evolving industries in the world (Adu-Gyamfi *et al.,* 2021). 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.

Dietary supplements, such as prebiotics and yeast cell walls, have garnered attention due to their potential to positively influence broiler growth and health. Prebiotics, non-digestible compounds that selectively promote the growth of beneficial gut microorganisms, have demonstrated the ability to modulate gut microbiota composition and enhance nutrient absorption (Gibson and Roberfroid, 1995). Yeast cell walls, on the other hand, contain bioactive components like β-glucans and mannans, which can interact with the avian immune system and promote immune responses (Spring *et al.,* 2016).

Among the dietary supplements available, Bionic Prebiotic (marketed as HilySES) and Hardcore Yeast Cell Wall (marketed as Immuno Wall) have shown potential benefits for broiler production systems. HilySES, a proprietary prebiotic formulation, is designed to selectively stimulate the growth of beneficial gut microorganisms, contributing to improved gut health and nutrient utilization (Spring *et al.,* 2016). Immuno Wall, a yeast cell wall product, contains bioactive components that can modulate the immune system, potentially enhancing the host's resistance to pathogens (Onunkwo *et al.,* 2022).

However, while numerous studies have explored the effects of prebiotics and yeast cell walls on broiler growth and immune response, there is a gap in the literature regarding their influence on growth performance and serum indices. This research seeks to address this gap by investigating the effects of dietary supplementation with HilySES and Immuno Wall on the serum indices of broiler chickens.

MATERIALS AND METHODS

The study 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, 2023). The experiment was conducted with a total of one hundred and twenty (120) day old, unsexed chicks which were purchased from a reputable distributor in the study area. The experiment lasted for the period of 56 days. The chicks were weighed and randomly allotted to five (4) 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 used for this study was Completely Randomized Design (CRD).

Supplementation of prebiotic in the diet (Table 1) commenced on the first day of the experiment. Other management practices including prophylactic medications and vaccinations were carried out. All data collected were subjected to one-way analysis of variance (ANOVA) as outlined by Daniel (1995) with the aid of SAS (2001) and the significant means separated by Duncan's multiple range test at 5% level of significance (Steel and Torrie, 1980).

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

Ingredients	EXPERIMENTAL TREATMENTS			
	T_1 (0.00%)	**T_2 (0.25%)**	**T_3 (0.50%)**	**T_4 (0.75%)**
Maize	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 B_1 (1200mg), vitamin B_2 (22,000mg), Niacin (22,000mg), calcium pantothenate (4600mg), vitamin B_6 (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

The serum biochemistry of broiler chickens fed an experimental diet supplemented with prebiotic and hardcore yeast cell is presented in Table 2. The research investigated the impact of supplementing broiler chicken diets with prebiotic and hardcore yeast cells on serum chemistry. While most parameters showed no significant differences among experimental groups, notable exceptions included Total protein (3.27-3.57g/dL), creatinine levels (0.85-0.93mg/dl), AST (43.16-45.18U/L), and ALP (56.64-60.70U/L). The study found that diets supplemented with prebiotics and yeast led to significantly higher serum protein levels compared to the control diet. This increase in protein levels may indicate improved protein digestion and utilization, potentially enhancing immune response and overall performance in broiler chickens (Onunkwo *et al*. 2023).

However, serum albumin levels did not show significant changes, which is consistent with previous report of Onunkwo and Ugwuene (2015) and Onunkwo *et al*. (2023). Creatinine levels were significantly reduced in chickens fed trial diets, suggesting enhanced protein metabolism and waste elimination without adverse effects on renal function.
Glucose levels remained within normal ranges, indicating adequate energy supply for metabolic functions. Urea levels showed no significant differences, suggesting normal urea cycle functioning. Serum uric acid levels also fell within normal ranges (Akinmutimi *et al*., 2017) indicating no impairment in the urea cycle.

Liver enzyme levels, specifically ALP (56.64-60.70U/L) and AST (43.16-45.18U/L) decreased as the dietary inclusion of supplements increased, indicating potential hepatoprotective effects. These findings align with previous studies of Onunkwo and Ugwuene (2015) and suggest that the experimental diets may promote liver health in birds.
Overall, the research suggests that supplementing broiler chicken diets with prebiotics and yeast enhances nutrient utilization, reduces waste, and improves blood chemistry profiles, potentially optimizing poultry production and health (Onunkwo *et al*., 2019). However, factors such as sex, genetics, age, and environmental conditions can influence serum parameters in chickens, highlighting the complexity of avian physiology.

Table 2: Serum biochemical indices of Broiler Chickens fed diet supplemented with prebiotic (hilyses) and hardcore yeast cell.

Parameters	TREATMENT				
	T1	T2	T3	T4	SEM
Total protein (g/dL)	3.27b	3.48a	3.47a	3.57a	1.01
Albumin (g/dL)	1.45	1.66	1.53	1.59	0.12
Globulin (g/dL)	1.82	1.82	1.94	1.98	0.04
Glucose (mg/dL)	173.75	202.45	198.81	200.65	1.11
Creatinine (mg/dl)	0.90^{b}	0.85^{b}	0.93^{a}	0.93^{a}	0.20
Urea (mg/dL)	14.86	13.41	12.57	11.16	0.23
AST (U/L)	43.16	43.69	44.11	45.18	0.71
ALP (U/L)	59.99	60.65	60.70	56.64	1.35

abc Means within the rows with different superscripts are significantly different (P<0.05); SEM-Standard error of the mean.

CONCLUSION

Based on the findings of this study, it is evident that the treatment diets consistently performed better than the control diet across all parameters assessed in terms of the serum indices of broiler chickens. The addition of prebiotics and yeast, at an inclusion level of up to 0.75% in the broiler chicken diets, proved beneficial in enhancing nutrient utilization, reducing wastage, and promoting favourable blood chemistry. Furthermore, the experiment demonstrated that the optimal outcome was observed with T4, where the inclusion of 0.75% prebiotics and yeast cells led to the most robust immune response among all the trial diets and the control diet.

REFERENCES

Adu-Gyamfi, A., Osei-Amponsah, R., Kusi-Appiah, E., and Ocloo, E. K. (2021). Empirical Evidence on Livelihoods Diversification among Poultry Farmers in Ghana. Sustainability, 13(3), 1209.

Akinmutimi, A. H., Eburuaja, A. S., Adedokun, O. O., Ewa, E. U. and Etim, E. U. (2017). Determination of nutrients and antinutrients composition of four varieties of yam peal meal.43rd Proceedings Annual Conference of Nigerian Society for Animal Production (NSAP). Federal University of Technology Owerri, Imo State, Nigeria.Pp.148.

Duncan, D.B. (1955). Multiple range and multiple F tests. Biometrics, 11:1-42.

FAO (2007). https://www.fao.org/agrifood-economics/publications/detail/en/c/122034/ Retrieved August 25, 2023.

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.

National Root Crops Research Institute-NRCRI. (2023). Agro-meteorological Unit, National Root Crop Research Institute Umudike, Umuahia, Nigeria.

Ojebiyi O.O., Akinlade J.A., Farinu G.O., Agboola O.O., Akingbade A.A., and Aderinola O.A., (2008). Nutritive value of four accessions of Stylosanthes scabra in the derived savanna zone of Nigeria. Tropical Grasslands (42) 120–123

Onunkwo, D. N., Nathaniel, J., Ezike, J.C., Amaduruonye, W., and Daniel-Igwe, G (2019). Effect of garlic rhizome (Allium sativum) powder supplemented diets on the haematology and serum biochemistry of broiler birds at starter and finisher phases. Nigerian Journal of Animal Production, 46(1): 149-156.

Onunkwo, D. N and Ugwuene, M. C. (2015). Effects of dietary inclusion of salt on the haematology and serum biochemistry of turkey poults. International Journal of Livestock Research 5(4): 76-84.

Onunkwo, D. N., Udokwu, I. U., Ekundayo, E. O., Ezenyilimba, B. N., Omumuabuike, J. N. and Ezeoke, F. C. (2022). Serum biochemical assay of broiler chickens administered water containing various medicinal plant leaf methanol extract. Nigerian Journal Animal Production. 49(2):95-100.

Spring, P., Wenk, C., Dawson, K. A., and Newman, K. E., (2016). The effects of dietary mannanoligosaccharides on cecal parameters and the concentrations of enteric bacteria in the ceca of Salmonella-challenged broiler chicks. Poultry Science, 79(2): 205–211.

Steel, R. G. D. and Torrie, J. H. (1980). Principles and Procedures of Statistics: A Biometrical Approach 2nd ed. McGraw-Hill Book Co., Inc., New York, USA.