NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

EFFECT OF SODIUM HYDROXIDE TREATED RICE HUSK MEAL WITH ENZYME SUPPLEMENTATION ON THE CARCASS AND ORGAN CHARACTERISTICS OF BROILER FINISHER CHICKENS

Ikpe, J. N.*, Okonkwo, V. N., Ahaotu, E. O.***, Oko, E. C.*, Abdullahi, J.* Mbachu, M. U.******

* Department of Agricultural Technology, Akanu Ibiam Federal Polytechnic, Unwana, Ebonyi State.

**Department of Animal Science and Fisheries, Imo State University, Owerri.

***Department of Animal Production Technology, Imo State Polytechnic Umuagwo, Ohaji, Imo State.

****Department of Agriculture, Alvan Ikoku Federal College of Education, Owerri, Imo State.

Corresponding Author: Ikpe, J. N. julianankpe@gmail.com +234 803 492 8358

Abstract

The current high cost of conventional feed ingredients has necessitated the exploration into application of different treatments on agro waste products in the bid to harness their potentials to fit in as feed ingredient in feeding broilers. Such treatments could impact on carcass and organs of the birds. A 3-week trial was therefore conducted to determine the effect of NaOH treated rice husk meal with enzyme supplementation on the carcass and organ characteristics of broiler finisher chickens. Four (4) experimental broiler finisher diets were formulated such that the control diet (B_1) did not contain rice husk, while B_2, B_3 and B_4 had NaOH treated rice husk at 5, 10 and 15% respectively with 0.1% enzyme supplementation. A total of one hundred and twenty (120) Anak strain of finishing broiler chickens of 28 days post hatch were assigned to four (4) dietary treatments. Each treatment had fifteen (30) birds, which was replicated three (3) times with 10 broilers per replicate. The birds were managed under deep litter system and fed *ad-libitum* for 28 days. At termination of the experiment, the birds were slaughtered for carcass and organ assessment. The result showed that there was no significant ($P<0.05$) difference in carcass and organ parameters analyzed except for eviscerated weight. It was concluded that NaOH treated Rice Husk meal can be included in broiler diet up to 15% with 0.1% enzyme supplementation without deleterious effect on carcass and organ parameters.

Key words: Carcass, Diet, Enzyme supplemented, NaOH treatment, Organ

INTRODUCTION

The soaring cost of raising poultry has led to the quest for cost reduction leading to inclusion of agro waste products which are abundant and not expensive in poultry feeding. Unfortunately, agro-waste products have inherent qualities that negates their use. This has resulted to exploration and use of different treatment technologies in order to surmount the undesirable inherent qualities. Rice husk is one of the agro waste products which is obtained during the milling of rice grain. Rice husk is currently obtainable in large quantity in Nigeria due to the current increase in rice production (Knoema, 2020; Statista, 2020). This has resulted to rising heaps of rice husks at most milling locations. This is an impending environmental pollution and hazards to the population and environment (Haryana, 2018). Rice husk has potentials to serve as feed ingredient in poultry feeding but has a challenge of high fibre and abrasive nature (Onyenuga, 1968; Jacquie, 2015). Different treatment technologies like alkaline hydrolysis (Ikpe, Oko and Ujah, 2018) and exogenous enzyme supplementation (Alabi et al., 2019) has been identified as avenues for enhancing the utilization of high fibre diets. Nutrition however, has been reported to exert immense influence on the development of carcass and organs (Aletor

et al., 1989; Poultry World., 2017). Carcass quality is a major trait for assessment of broilers (Oshibanjo, 2010), while examination of organs like the liver gives an insight into the toxicity level of the diet to which the birds were fed (Ayhan et al., 2017). This research therefore, explored the effect of diets containing different levels of enzyme supplemented 2% NaOH on the carcass and organ characteristics of finisher broiler chickens.

Materials and Methods

The research was conducted at the Teaching and Research Farm, Department of Agricultural Technology, Akanu Ibiam Federal Polytechnic Unwana, Afikpo, Ebonyi State. Afikpo is in the tropical rain forest zone of Nigeria and lies within latitudes 5.89^0N and longitude 7.94^0E, at an elevation of 115 meters above sea level. Afikpo has an annual temperature range of 25^0C – 38^0C during dry seasons and 16^0C – 28^0C during the raining season, an annual relative humidity that is between 75% and 85% and an annual rainfall range of 1750mm – 2250mm (NIMET 2017).

Collection and treatment of Rice Husk

Rice husk was obtained from Eke Market Rice mill dumpsite in Afikpo, Ebonyi State, Nigeria. The degradation of rice husk using 2% NaOH was carried out adopting the method of (Ikpe et al., 2018). A solution of NaOH was formed at 2% w/v solution of sodium hydroxide (NaOH). 60Kg of the rice husk was soaked in 180 litres of the solution in a container with lid. The mixtures was stirred properly to allow for eveness, covered with the lid of the container and left for 24 hours under room temperature. The treated rise husk was dryed under the sun until it was well dried and was then used as part of the ingredients for the formulation of the experimental diets.

Experimental Birds and Design

The total of 120 Anak breeds of finisher broilers of 28 days post hatch were used for the experiment. The broilers were randomly assigned to four (4) treatment groups in a Complete Randomized Design (CRD). Each treatment group was replicated 3 times to obtain a total of 12 groups of 10 broilers each. The groups were B_1 which was the control group, B_2, B_3 and B_4 groups. The groups were assigned to an experimental unit of 1m by 1m each partitioning and raised in a deep liter system. Feed and water were given *ad-libitum* and proper routine management practice and medication were strictly followed. The feeding trial lasted for 28days.

Experimental Diets

A total of four experimental diets were formulated for the research. Diet 1 which was the control contained 0% Rice husk. Diets B_2, B_3, and B_4 contained Nutrizyme® enzyme supplementation with rice husk treated with 2% Sodium hydroxide (NaOH) included at 5, 10 and 15% respectively. The Rice husk was added on weight-to-weight basis. The enzyme was supplemented in the diets at 100g/100kg feed. The ingredient composition of the diets is presented in Table 1.

Table 1. Ingredient composition of the experimental diets

Ingredient	Dietary Levels in %			
	B_1 (0 TRH)	B_2 (5TRH)	B_3 10TRH)	B_4 (15 TRH)
Maize (9% CP)	55.00	55.00	55.00	55.00
Soya-bean meal (44 CP%)	5.00	5.00	5.00	5.00
Groundnut cake (45 CP%)	13.00	13.00	13.00	13.00
2% NaOH Treated Rice husk (6.42CP%)	0.00	5.00	10.00	15.00
Brewers dried Grain (27 CP%)	15.00	10.00	5.00	0.00
Fish meal (63 CP%)	3.00	3.00	3.00	3.00

Blood-meal (77 CP%)	3.00	3.00	3.00	3.00
Bone meal	5.00	5.00	5.00	5.00
*Vit/mineral premix	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25
Nutrizyme®	??	??	??	??
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated nutrient composition of the diets.				
Crude protein (%)	21.25	20.22	19.19	18.16
Crude fibre (%)	7.79	7.58	7.39	7.17
Crude fat (%)	4.91	4.82	4.73	4.65
Metabolizable energy (Kcal/kg)	2939.26	2970.91	3002.56	3024.21

*Note: *Contain the following: vit A 10,000IU, vit D_3 1500 IU; vit E 10,000mg, vit k_3 1500mg, vit B_1 1600mg, vit B_2 4000mg, pentothenic acid 10mg; nicotinic acid 2.5mg chlorine 3.5mg; folic acid 1mg; magnesium 56mg; lysine 1mg; iron 20mg; zinc 50mg; cobalt 1.25mg, biotin 7.5mg copper 30mg, manganese 40mg, selenium 2mg antioxidant 1250mg. **M.E of Afzelia Africana meal was calculated according to* (Pauzega, 1985) ME = *35 × % cp + 81.8 × % E.E + 35.5 × % NFE, where, M.E = metabolizable energy, CP = crude protein, EE = ether extract, NFE = nitrogen free extract.*

Data collection and analysis

At the end of the 28-day feeding trial, 3 broilers were randomly selected from each replicate for carcass and organ assessment. The broilers were starved for 12 hours prior to slaughter while water was provided. The broilers were weighed to obtain their live weight and then slaughtered by severing the jugular vein with a sharp knife. The carcass was dressed, eviscerated, cut into parts and weighed. The weights obtained were expressed as a percentage of live weight. The organs were also collected, weighed and also expressed as percentage of live weight. Data obtained were subjected to statistical analysis using one way analysis of variance procedure at 0.05% significant level. Significant means were separated using Duncan's Multiple Range Test (DMRT, 1955). The data were computed with IBM SPSS statistical 22 of 2013 software.

Results and Discussion

The result of the carcass characteristics is presented in Table 2. It showed that there was no significant (P>0.05) difference in all parameters among the treatment groups except for eviscerated weight. The eviscerated weight was highest in treatment B_4 which was similar with the control and B_2 groups but significantly (P<0.05) higher than B_3. The B_3 however was similar (p>0.05) with the control and B_2. Also, the carcass of vital economic impact in broiler which is the breast muscle (Scheuermann, 2003) was not affected significantly across the treatment groups. The test ingredient therefore did not impact negatively on the carcass of the broilers. The result conforms to that obtained by (Olusiyi et al., 2018).

Table 3. Carcass characteristics of broiler finisher chickens fed varying levels of NaOH treated rice husk with enzyme supplementation

Parameters	Treatment Level (%)				
	B_1(ORH)	B_2(5RH)	B_3(10RH)	B_4(15RH)	SEM
Live weight (Kg)	2.43	2.62	2.57	2.73	0.21
Dressed weight (%lw)	92.07	90.26	94.9	91.47	2.52
Eviscerated wt (%lw)	81.50^{ab}	81.56^{ab}	80.27^{b}	87.27^{a}	2.64
Breast muscle (%lw)	22.73	24.70	24.73	23.67	2.07
Thigh & drumstick (%lw)	22.7	25.03	22.97	24.10	3.39
Wing (%lw)	8.57	7.77	7.63	7.90	1.09
Back (%lw)	12.43	11.97	12.46	12.90	1.47

Shank (%lw)	3.97	4.37	4.63	4.10	0.30
Neck (%lw)	5.57	5.67	5.10	5.30	0.34
Head (%lw)	2.40	3.20	2.50	2.60	0.25

Note: without superscript = not significant ($p<0.05$). SEM = Standard Error Mean. Lw = live weight.

Organ Characteristics

The result of organ characteristics of broiler finisher chickens fed different levels of NaOH treated rice husk with enzyme supplementation is presented in Table 3. The result showed that there were no significant ($P>0.05$) differences in organ characteristics across the treatments. This is an indication that the test ingredient did not impact on the organs of the broiler. The liver is an organ responsible for detoxification of toxins and as such it may increase in size when broiler diets contain anti-nutrients or toxins (Njidda and Isidahomen, 2011). This was not the case for chickens in all treatment groups.

Table 3. Organ characteristics of broiler finisher chickens fed varying levels of NaOH treated rice husk with enzyme supplementation

Parameters	Treatment levels (%)				SEM
	B_1(ORH)	B_2(5RH)	B_3(10RH)	B_4(15RH)	
Gizzard & Proventriculus(%LW)	3.27	3.27	3.07	2.83	0.47
Heart (%lw)	0.40	0.43	0.40	0.50	0.05
Vent (%lw)	2.70	3.37	3.40	3.53	0.88
Liver/gall/bladder	2.07	2.70	1.97	2.30	0.48

Note: without super script = not significant. Mean in the same row with different super script differ significant ($p<0.05$). sem= standard error mean.

Conclusion and Recommendation

Based on the results of this research, it was concluded that NaOH treated rice husk can be included in broiler diets at 15% inclusion level with 0.1% enzyme supplementation. This could reduce cost of feed production as rice husk is a readily available agro-industrial waste which treatment with 2% NaOH does not affect organ or carcass characteristics.

References

Alabi, O. O., Shoyombo, A. J., Akpor, O. B., Oluba, O. M. and Adeyonu, A. G. (2019). Exogenous Enzymes and the Digestibility of Nutrients by Broilers: A Mini Review. *International Journal of Poultry Science*, 18: 404-409.

Aletor, V. A., Laseinde, E. A. O. and Ogunyemi, O. O. (1989). Equi-protein replacement of fishmeal with soybean meal in the diets for broiler chickens: effect on performance, protein utilization and economic of production. *Nigerian Technological Resources*, 1 (1):1-6.

Ayhan, F., Begun, Y., Ozgur, K. and Ufuk, T. S. (2017). Mycotoxins in Poultry. Poultry science. Chapter 4. https://www.intechopen.com/books/poultry-science/mycotoxins-in-poultry

Haryana, (2018). *Mills dump rice husk ash in open, release waste water in empty plots—The Tribune News Service*. Retrieved Feb 5, 2018,

fromhttps://www.tribuneindia.com/news/haryana/mills-dump-rice-husk-ash-in-open-release-waste-water-in-empty-plots/538668.html

Ikpe, J. N., Oko, E. C. and Ujah, F. A. (2018). Potentials of 8%NaOH Treated Rice Husk Meal as a Replacement to Brewers Dried Grain on the Performance, Carcass and Blood Indices of Finisher Broilers. *Ijsr Volume 7 Issue 9* Pp 251-255.

Jacquie, J. (2015). Common Feed Ingredients in Poultry Diets. Available from http://articles.extension.org/pages/68432/common-feed-ingredients-in-poultry-diets

Knoema, (2020). Nigeria - Rice, paddy production quantity https://knoema.com/atlas/Nigeria/topics/Agriculture/Crops-Production-Quantity-tonnes/Rice-paddy-production

NIMET (2017). Nigeria climate review bulletin. Nimet.gov.ng/content/ nimetweather.

Njidda, A. A. and Isidahomen, C. E. (2011). Haematoligical parameters and carcass characteristics of weaning rabbits fed sesame seed meal (sesame indicum) in a semi arid region. *Pakistan Veterinary Journal.* 31:35-39.

Olusiyi, J. A., Olaleye, K. J., Ademu, I. A. and Zaklag, D. U. (2018). Carcass Characteristics of Broiler Chickens Fed Graded Level of Rice Milling Residue As A Partial Replacement For Wheat Offal *IOSR Journal of Agriculture and Veterinary Science 2319-2372. Vol 11, Issue 11. PP 58-62*

Oshibanjo, D. O. (2010). Yield and keeping quality of breakfast sausage as affected by time post-mortem. A Master Dissertation Submitted to the Department of Animal Science, University of Ibadan.

Oyenuga, V. A. (1968). Nigeria feed and feedstuffs (3rd ed.). Ibadan University Press.

Pauzenga, U. (1985). Feeding parent stock. *Zootecnia International*, 22-25.

Poultry World, (2017). Carcass quality affected by nutrition and management. https://www.poultryworld.net/Nutrition/Articles/2017/6/Carcass-quality-affected-by-nutrition-and-management-149538E/

Scheuermann, G. N., Bilgili, S. F., Hess, J. B. and Mulvaney, D. R. (2003). Breast muscle development in broiler chicken. *Poultry Science* 82; 1648-1658.

Statista, (2020). Production of milled rice in Nigeria from 2010 to 2020https://www.statista.com/statistics/1134510/production-of-milled-rice-in-nigeria/