PREFORMANCE OF PULLETS FED HIGH-FIBRE DIETS SUPPLEMENTED WITH VARYING LEVELS OF DRIED YEAST

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Summary
One hundred pullets at point of lay were used to study the effect of five levels of yeast supplementation on high- fibre (rice bran) diets on egg production and egg characteristics. The birds were divided into five treatments (T_1 to T_5) of 20 birds per treatment. Each treatment was replicated twice, with each replicate containing 10 birds. Birds in the control treatment (T1) were fed 0.00% yeast supplement while T_2, T_3, T_4 and T_5 had 0.25, 0.50, 0.75, and 1.00% yeast respectively. Eggs were collected twice daily, counted and weighed for twelve weeks. Three eggs of the current week's collection per replicate were randomly picked for egg quality analysis fortnightly. The result obtained showed there were significant effects ($p<0.05$) on body weight, egg weight and albumen weight in which pullets in treatment 4 performed best. Birds fed high fibre diet supplemented with 0.75% yeast performed better than the control (T_1) and other levels (0.25, 0.50, 1.00%) with respect to body weight, egg weight and albumen weight.

Introduction
Maize, most often, constitutes the highest proportion of ingredients in diet formulation of any poultry ration (Maisonnier *et al.*, 2001., Agbede *et al.*,2002, Nworgu *et al.*, 2002). The high inclusion rates translate to high cost of feed, because of the seasonality of maize production and competition for its use by man (Agbede *et al.*, 2002). A cheap supplement to maize could be rice bran, which is readily available in Niger State. It is known, however, that rice bran is lower in energy than maize (Oyenuga 1968). Nevertheless, this can be improved by the inclusion of high-energy source such as oil in the feed. High- fibre and lignin contents of rice bran are capable of reducing nutrient utilization and precipitate metabolic dysfunction, with the attendant growth reduction when ingested by non ruminants (Agbede *et al.*,2002). However, this problem can be reduced with dried yeast (yeast culture). Yeast culture, by definition, is the dried product composed of yeast and the media it is grown on, and dried in such a manner as to preserve the fermenting activity of the yeast. The benefit of the yeast culture comes from the metabolites produced during the fermentation process. Dried yeast supplementation improved body weight of chicks, and feed conversion efficiency (Onifade and Babatunde, 1996). Consequently, the objective of the present study was to determine the performance of laying pullets fed high fibre diets supplemented with varying levels of dried yeast.

Materials and methods
A total of 100 birds at point of lay (15 weeks old) with mean weight of 88.2g were randomly distributed into five treatments, with each treatment divided into two replicates. Ten birds were allocated to each replicate.

Table 1 shows the composition of the diets. Dried yeast (*Sacharomyce cerevisiae*) was added to the diets to aid fibre break down and to enhance protein build up. A basal high – fibre diet containing 13.85% rice bran without dried yeast constituted the control diet (T_1). Four increasing levels (0.25,0.50, 0.75 and 1.00%) of dried yeast were incorporated into the basal high – fibre diet and designated T_2,T_3, T_4 and T_5 respectively.

Source of Ingredients and feed preparation
Feed ingredients (Table 1) were purchased from various centres within Minna township. Maize, fishmeal, salt, dried yeast, palm oil were bought from Minna main market. Rice bran was obtained from a rice miller in Minna, while groundnut cake was procured from a groundnut oil miller along old airport road, Minna. Bone meal and other synthetic ingredients such as lysine, methionine and premix were bought at Agro – allied shop along old Airport road

Minna.

The ingredients were weighed and thoroughly mixed to ensure uniformity, after which they were spread and left for two days to give room for fermentation. The prepared feed was packed in 50kg bags, which were stored on a raised platform in an airy and dry corner of the feed mill. The feed was compounded every three weeks to ensure its quality.

Statistical analysis

All data on the performance of birds and egg quality characteristics were pooled and subjected to analysis of variance (ANOVA) and test of significance difference, according to Duncan (1955), using SPSS computer package, as outlined by Steel and Torrie (1980).

Results and Discussion

General Performance Indices

The chemical composition of the five different diets used in feeding the pullets is as shown in Table 2. The analysis showed that the different diets met the crude protein (16 – 21%) requirement as recommended by Oluyemi and Roberts (1979) for birds in the tropics. The crude fibre, however, was higher in treatments 2 and 5 than the 10 – 15% recommended by Oluyemi and Roberts (1979). The crude fiber in other treatments was within the range given by Oluyemi and Roberts (1979).

Table 3 indicates that the mean feed intake by pullets was not significantly different (P>0.05) between the dietary treatments. However, the consumption was within the range reported by Oluyemi and Roberts (1979). Although consumption by birds on T_4 was not significantly different (P>0.05) from the others, the birds on T_4 consumed highest quantity of feed. This result was in agreement with the result of Onifade and Babatunde (1996) who reported higher feed intake by broilers fed high fibre diet supplemented with dried yeast. Also, intake of diets with yeast supplementation were higher than the control, which supported the findings of Glade and Sist (1988), that high intake of feed was as a result of improved quality of feed due to the supply of additional β - complex vitamin by yeast. The level of crude fibre observed did not exert significant effect (P>0.05) on the mean feed consumption of birds at all levels. This result agreed with the work of Onifade and Babatunde (1996) who found similar response of broiler chicks fed high fibre diet supplemented with antibiotic. This might also be attributed to better utilization of energy and other nutrients as reported by Bradley and Savage (1995).

There were no significant differences (P>0.05) between the treatments in the Hen – house production. However, values of the Hen - house production obtained in this experiment were slightly higher than the 62% value obtained by Atteh and Adedoyin (1993), but within the 75% range obtained by Ojo (2003). The value of the control, although not significantly different (P>0.05) from those of the other treatments, appeared to be slightly higher. Onifade and Babatunde (1996) observed that yeast supplementation significantly improved general performance of birds. Generally, in this study, the Hen – day production was slightly higher than 68% value obtained by Ojo (2003) and much higher than 62.21% obtained by Esonu *et al.* (2004). Hen – day production in T_4 was higher than in the other treatments but the differences were not significant (P>0.05) (Table 3). Also, all treatments with yeast supplementation, although not significantly different (P>0.05), were slightly higher than the control (T_1). This implies yeast supplementation might have effect on the Hen – house production probably due to its phytase activity (Savage *et al.*, 1985).

The cracked – egg percentage values were not significantly different (P>0.05) in all treatments. This result was at variance with that reported by Oluyemi and Roberts (1979), who suggested that percentage cracks of all eggs should not exceed 5%. The result is, however, in line with that observed by Muhammed (2002), who reported a range of 5.49 to 11.16%.

There was no significant difference (P>0.05) in egg weight between T_1, T_2, T_3 and T_5. The significant difference (P<0.05) obtained between T_4 and the other treatments, however, suggests that yeast inclusion at 0.75% in high – fibre diet could have influenced the increase in weight of egg as a result of its ability to enhance the dietary utilization of gross energy and minerals (Bradley and Savage, 1995). The lower egg weight in T_1, although not significantly different (P>0.05) from T_2, T_3, and T_5, indicated that dried yeast incorporation could affect the weight of egg (Savage *et al.*, 1985).

The significant difference in the weight of albumen in T_4 might be the reason why the egg weight also differed significantly in the same treatment. This is in line with the report of Olori and Sonaiya (1992) who observed a strong relationship between albumen weight and egg weight over all other egg components. This positive relationship also suggests that an increase in albumen could translate to increase in egg weight. The superior egg weight and albumen weight might be attributed to better nutritional balance of the diet as enhanced by the addition of yeast.

The result of this study, showed that rice bran could be used to reduce the cost of egg production by replacing certain portion of maize with rice bran. In addition 0.75% inclusion of dried yeast to high-fibre diets such as used in this study would be a better rate to use, especially if eggs and chicken would be sold on weight basis.

References

Agbede. S.O., Ajaja.K. and Aletor, V.A. (2002). Influence of roxazyme G. supplementation on the utilization of sorghum dust based diets for broiler chicks. *Proceeding of the 27th Annual conference of NSAP*. March 17 – 21. Federal University of Technology, Akure, Nigeria. 105 - 108.

AOAC (1990). Official methods of analysis. 15th edition. Association of analytical chemists. Washinton. D.C.

Atteh, J.O. and Adedoyin, D.D. (1993). Effects of replacing dietary fish meal with maggots on performance and nutrient retention of laying hen. *Journal of Animal Production 20:* 50 –55.

Babatunde, G.M. and Fetuga, B.L. (1976). Effect of protein levels in the diets of layers on egg production and the chemical composition of poultry eggs in the tropics. *Journal of Science Food Agric* 27:454 – 462.

Bradley, G.L. and Savage, T.F. (1995). The effect of autoclaving a yeast culture of *saccharomyces cerevisiae* on turkey poult performance and the retention of gross energy, and selected minerals. *Animal Feed Science Technology 55:* 1 – 7.

Duncan D.B. (1955). Multiple range and multiple F- tests. Biometrics 11: 1- 2.

Esoun, B.O., Azubike J.C. and Ukwu A.O. (2004). Evaluation of *Microdesmis puberula* leafmeal as feed ingredient in laying hen diets *International Journal of Poultry Science* 3 (2): 96 – 99.

Glade, M.J. and Sist, M.O. (1988). Dietary yeast culture supplementation enhance urea recycling in equine large intestine. *Nutrition Reproduction International*. 37:11 – 17.

Muhammed, A.M. (2002). Egg production and egg quality characteristics of pullets fed graded levels of cotton seed cake. M. Tech, Agriculture Thesis. Department of Animal production, Federal University of Technology, Minna, Niger- State, Nigeria.

Ojo, A.K. (2003). Effect of different commercial diets on egg production and egg quality characteristics. M.Tech. Agriculture Thesis, Department of Animal Production, Federal University of Technology, Minna, Niger State, Nigeria.

Olori, V.E. and Sonaiya, E.B. (1992). Composition and shell quality of white and brown egg of the Nigerian indigenous chicken. *Nigerian Journal of Animal Production*. 19:12 – 14.

Oluyemi, J.A. and Roberts, F.A. (1979). Poultry production in warm wet climates. The Macmillian. Press Ltd, Hong kong pp1-5, 124-139.

Onifade, A.A. and Babatunde, G.M. (1996). Supplemental value of dried yeast in high fibre diet for broiler chicks. *Animal Feed Science Technology 62;* 91 – 96.

Oyenuga, V.A. (1968). Nigeria's feed and feeding stuff their chemistry and nutritive value. 3rd edition. Ibadan University press. Pp 65

Savage, T.F., Nakaue, H.S. and Holmes, Z.A. (1985). Effects of feeding live yeast culture on market turkey performance and cooked meat characteristics. Nutr. Rep. Int. 31:695 – 703

Steel, R.G.D. and Torrie, J.H. (1980). Principles and Procedures of statistics. Approach, 2nd edn. Mcgraw – Hill, New York.

Table 1. Composition of experimental diets (%)

Feed ingredients	T_1	T_2	T_3	T_4	T_5
Maize	50.00	49.75	49.50	49.25	49.00
Groundnut cake	20.00	20.00	20.00	20.00	20.00
Rice bran	13.85	13.85	13.85	13.85	13.85
Oysters shell	2.00	2.00	2.00	2.00	2.00
Bone meal	7.00	7.00	7.00	7.00	7.00
Salt	0.50	0.50	0.50	0.50	0.50
Premix*	0.25	0.25	0.25	0.25	0.25
Yeast	0.00	0.25	0.50	0.75	1.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Oil	2.00	2.00	2.00	2.00	2.00
Lysine	2.00	2.00	2.00	2.00	2.00
Methionine	2.00	2.00	2.00	2.00	2.00

*Premix supplied the following vitamins and minerals per kg of the diet: vitamin A, 10000IU; vitamin D,3000IU; vitamin E; 8.0 IU; vitamin K, 2.0mg; vitamin B,2.0 mg; vitamin B_6, 1.2mg; vitamin B_{12}, 0.12mg; niacin, 1.0mg; pantothenic acid, 7.0mg; folic acid, 0.6mg; choline chloride, 500mg; Fe, 60mg; Mn, 100mg; Mg, 100mg; Cu, 8.0mg; Zn, 50mg; Co, 0.45mg; Se, 0.1mg.

Table 2: Chemical composition of experimental diets

Parameters (%)	T1	T2	T3	T4	T5
Dry matter (DM)	94.02	93.38	92.42	92.70	93.03
Crude protein (CP)	18.26	18.57	18.57	21.05	19.41
Crude fibre (CF)	12.00	18.00	14.00	15.00	18.00
Ash	10.91	13.15	12.08	10.78	11.78
Nitrogen free extract	49.83	38.28	45.35	45.17	40.81
Ether extract (EE)	9.00	12.00	10.00	8.00	10.00
Energy (Kcal/100g)	437.60	445.03	437.51	436.37	440.93

Table 3: General performance indices of birds (pullets) fed high fibre diet supplemented with varying levels of dried yeast for twelve weeks

Parameter	T1	T2	T3	T4	T5	SEM	SIG LEVEL
Weekly feed intake (g)	680.00	700.00	714.00	777.00	738.00	±32.0	NS
Body weight of birds (g)	1585.0^{a}	1690.0^{ab}	1690.0^{ab}	1700.0^{b}	1670.0^{ab}	±20.2	*
Hen-house production (%)	85.0	75.00	77.1	74.27	66.42	±3.5	NS
Hen-day production (%)	75.00	78.75	75.71	82.25	78.15	±6.0	NS
Cracked eggs (%)	5.00	00.00	0.00	7.50	7.50	± 0.2	NS
Egg weight (g)	52.24^{a}	56.92^{a}	56.00^{a}	66.28^{b}	57.80^{a}	± 0.0	*
Albumen weight (g)	41.64^{a}	41.64^{a}	42.03^{a}	53.08^{b}	36.70^{a}	± 0.3	*

^{NS} = Not significant (p.0.05)
^{ab} = means in the same row with different superscripts are significantly different (P<0.05)
* = Significant (p<0.05)