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EFFECTS OF DRIED BAKER'S YEAST INCLUSION IN RICE HUSK-BASED DIETS ON PERFORMANCE AND EGG QUALITY PARAMETERS IN LAYING HENS

O.J. Alabi, E.L. Shiwoya[1], A.B. Ayanwale[1], C.A. Mbajiorgu[2], J.W. Ng'ambi and S.S.S. Egena

Department of Animal Production, University of Limpopo,
Private Bag X 1106, Sovenga 0727, South Africa.

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ABSTRACT

The study was conducted to investigate the effects of dried baker's yeast inclusion in rice husk-based diets on performance and egg quality parameters in laying hens. A total of 150 Isa brown laying hens aged 25 weeks were allocated to five dietary treatments (0.00, 0.25, 0.50, 0.75 and 1.00 % yeast inclusion level) with three replicates per treatment in a complete randomized design. The experiment lasted for twelve weeks. Hens fed diets with yeast had higher (P<0.05) final body weight, egg weight, egg albumen height and egg albumen weight than the control. The final body weight, egg weight, albumen weight and albumen height were optimized at 0.70, 0.99, 0.49 and 0.78, respectively. It was concluded that dried baker's yeast inclusion in rice husk-based diets improved egg weight, egg albumen height and albumen weight in Isa brown hens.

Key words: Laying hens, rice husk dried baker' yeast

INTRODUCTION

Maize, most often, constitutes the highest proportion of ingredients in the formation of any poultry ration (Nworgu *et al.,* 2002; Esonu *et al*., 2004*;* Oluwafemi, 2009) due to its high energy value and bulkiness (Verstegen and Van der Poel, 2009). Other alterative ingredients to maize are sorghum, millet, wheat, barley. A cheaper and readily available supplement to maize among others may be rice husk which is readily available and at little or no cost in Niger State, Nigeria. However, it is known that rice husk has high fibre content which results in monogastic animal's poor growth rate as a result of poor digestibility (Moran, 1982; Aderolu *et al*., 2004). Also, it has been observed that dried yeast supplementation in high fibre diets improved body weight gain, and feed conversion efficiency in broiler (Onifade and Babatunde, 1996). There is limited and inconclusive information on the effect of dried yeast inclusion to rich husk-based in laying hens. Bradley (1995) indicated improved egg weight in selected line of turkey breeder hens while Brake (1991) indicated no effect in the performance of broiler breeder hens supplemented with yeast, this study therefore was to determine dietary dried yeast inclusion level for optimal productivity and egg quality parameters in laying hens fed rice husk-based diets.

MATERIALS AND METHODS

The study was carried out at the Federal University of Technology Minna, Niger State, Nigeria. A total of 150 Isa brown laying hens; 25 weeks of age of an average body weight of 1230 ± 12 g were used in this study. The hens were randomly allocated to the five dietary treatments in a completely randomized design. Each treatment had three replicates and each replicate had ten hens. The hens were maintained in a deep litter system and had 16 hr of light daily. Dietary treatments had 0 (Y0.00), 0.25 (Y0.25), 0.50 (Y0.50), 0.75 (Y0.75) and 1.00 % (Y1.00) dried baker's yeast inclusion levels, respectively. The proximate and calculated energy composition of the dried yeast and rice husk used in the study are presented in Table 1. The experimental diets were formulated to meet or exceed the NRC (1994) nutritional requirements of laying hens (Table 2). All the diets were fed *ad libitum* in a mash form.

[1]Department of Animal Production, Federal University of Technology, P.M.B. 65, Minna, Nigeria.
[2]Department of Agriculture, Aniaml Health and Human Ecology, University of South African
Corresponding author, e-mail: anayochukwumbajiorgu@gmail.com

TABLE 1: Proximate composition (%) and calculated energy (Kcal/kg) of rice husk and dried yeast

	DM	CP	EE	CF	Ash	NDF	ADF	Hemicellulose	EnergyKcal/kg
Rice husk	87.05	8.04	2.21	44.15	13.90	62.50	48.60	20.6	1861.00
Dried yeast	93.36	44.90	0.52	6.21	5.68				3195.03

DM – Dry matter, CP- Crude protein, EE- Ether extract, CF - Crude fibre, NDF – Neutral detergent fibre, ADF – Acid detergent fibre.

The birds' weights were taken at the beginning of the trial and thereafter at weekly interval until the end of the trial (12 weeks). Feed intake, egg production and egg weight were recorded daily. Egg quality parameters were determined fortnightly on three randomly taken eggs from each replicate. Individual eggs were weighed and the shape indexes were calculated according to the method of Yalçýn *et al* (2008). Egg shell thickness was measured using a micrometer, the Haugh units were calculated:

HU= 100 + log (H +7.57 – 1.7 W 0.37), where HU is the Haugh unit, H is the height of albumen and W is the weight of the egg.

Chemical and statistical analysis

Proximate composition of rice husks, yeast and experimental diet were carried out using the method of AOAC (2002). Gross energy was determined using an adiabatic bomb calorimeter. Data collected were subjected to statistical analyses (ANOVA) using the general linear model procedure of statistical analysis system (SAS, 2008) and the differences ($P<0.05$) among means were tested with Least significant difference. The responses to yeast inclusion were measured using the following quadratic equation (SAS, 2008):

$$v= a + b1x + b2x2$$

Where v = the main a = intercept; b = coefficients of the quadratic equation; x = level of dried yeast supplementation, and –b1/2b2 = x value for optimum response. The quadratic model was used because it gave the best fit.

RESULTS AND DISCATIONS

Data on laying hens fed diets with differing levels of yeast inclusion are presented in Table 3. Feed intake, hen-house production, hen day production and feed conversion ratio were not ($P>0.05$) affected by yeast inclusion. The final body weight and egg weight of laying hens in Y0.75 (0.75 yeast inclusion) were higher ($P<0.05$) than the control, though the other treatments were not significantly ($P>0.05$) higher than the control, they were numerically higher. The egg weights were heavier ($P>0.05$) in laying hens on diet Y0.75 compared to other treatments.

Results of the egg quality revealed that the egg shell thickness, egg yolk weight, haugh unit and egg shape index were not ($P>0.05$) affected by yeast inclusion, however, egg albumen height and weight were significantly higher ($P<0.05$) for hens fed diet Y0.75 compared to others. Table 5 showed that the feed intake, final live weight, egg weight, egg albumen weight and egg albumen height were optimized at 0.89 (r2 = 0.70), 0.70 (r2 = 0.62), 0.99 (r2 = 0.52, 0.78 (r2 = 0.54) and 0.49 (r2 = 0.80), respectively.

Discussion

Results of the present study indicate that dried yeast inclusion in diets based on rice husk had no effect on feed intake. Yalçýn *et al* (2008; 2009) did not observe significant differences in feed intake of laying hens and quails fed different yeast supplemented diets. However, Onifade and Babatunde (1996) observed significant increase in broiler chicken feed intake when the birds were fed high fibre diets supplemented with dried yeast. In the present study, the hen-house and hen-day production were not affected by yeast inclusion and this concurs with the observation of Nursoy *et al* (2004).

The cracked egg percentage was not affected by yeast supplementation and this is in line with the report of Day *et al* (1987). The egg weight was better in all the yeast supplemented diets though only significant in diet with 0.75 % yeast inclusion; this implies that yeast supplementation has the ability to enhance the dietary rice husk utilization. The addition of rice husk at 20 points in each ration enhanced the total crude fibre content to 32.16 – 36.0 percent with the hemicellose value from 23.51 to 26.86 percent and the dietary energy was maintained by adding 2% oil. Yeast supplementation improved the nutritional content of the diets (Table 2). This is in line with the results obtained by Abou El-Ella *et al* (1996). However, Önol and Yalçýn (1995) indicated that diets that contained 5, 10 and

TABLE 2: Ingredients and chemical composition of experimental diets (%)

Ingredient (%)	Treatments Y0.00	Y0.25	Y0.50	Y0.75	Y1.00
Maize	50.00	49.75	49.50	49.25	49.00
Groundnut cake	20.00	20.00	20.00	20.00	20.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Rice husk	13.85	13.85	13.85	13.85	13.85
Oyster 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
Oil	2.00	2.00	2.00	2.00	2.00
Yeast	0.00	0.25	0.50	0.75	1.00
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Calculated analysis					
Energy (Kcal of ME/kg)	2860	2810	2801	2800	2880
Crude protein	17.10	17.20	17.16	17.36	17.47
Determine					
DM	94.02	93.38	92.42	92.70	93.03
Crude protein	18.26	18.57	18.57	18.63	18.41
Crude fibre	36.00	34.18	33.14	32.16	33.20
Ash	10.78	10.91	11.78	12.08	13.15
Ether extract	9.00	12.00	10.00	8.00	10.00
NDF	67.28	67.72	66.38	64.66	64.82
ADF	52.44	51.34	50.72	47.84	44.56
Hemicellulose	26.86	26.42	24.67	24.30	23.51
Calcium	3.30	2.97	3.08	2.83	2.85
Available phosphorus	0.34	0.42	0.68	0.71	0.73

Y0.00 Grower diet (17% CP) without yeast inclusion, Y0.25 Grower diet (17% CP) with 0.25 % yeast inclusion, Y0.50 Grower diet (17% CP) with 0.50 % yeast inclusion, Y0.75 Grower diet (17% CP) with 0.75 % yeast inclusion, Y1.00 Grower diet (17% CP) with 1.00 % yeast inclusion

TABLE 3: Effect of dried yeast inclusion in rice husk-based diets on the performance of Isa brown hens

	Treatments Y0.00	Y0.25		Y0.00	Y0.25	SEM
Feed intake (g/hen/day)	123.3	126.0	128.5	139.7	132.8	± 12.90
Initial body weight (g/bird)	1,225.1	1242.3	1235.5	1233.2	1228.3	± 12.70
Final body weight (g/bird)	1585.2a	1690.3ab	1692.7ab	1708.9b	1672.3ab	± 20.20
Hen-house production (%)	85.0	75.0	77.1	74.2	66.4	± 3.50
Hen-day production (%)	75.0	78.8	75.7	82.3	78.2	± 6.00
Cracked eggs (%)	5.0	0.0	0.0	7.5	7.5	± 0.16
Egg weight (g)	55.2a	56.9a	56.0a	66.3b	57.8a	± 1.58
Feed conversion ratio (g feed/g egg)	2.2	2.2	2.3	2.1	2.3	± 0.67

20 % of baker's yeast had no effect on egg weight of laying hen. This may probably be due to the high supplementation levels that were used their study. Paryad and Mahmoudi (2008) observed that broiler chickens' performance was reduced when level of yeast supplementation exceeded 1.5 %. In the present study, feed conversion ratio was not affected by yeast inclusion. This result is in agreement with those of Day *et al* (1987) and Brake (1991).

Data on egg quality indicated that only egg albumen height and weight were improved at 0.75 % yeast inclusion. 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 the increase in albumen could translate to increase in egg weight. The superior egg and albumen weight might be attributed to better nutritional balance

TABLE 4: Effect of dried yeast inclusion in rice husk-based diets on Isa brown egg quality parameters

	Treatments Y0.00	Y0.25	Y0.50	Y0.75	Y1.00	SEM
Egg shell thickness (mm)	0.4	0.4	0.4	0.4	0.3	± 0.04
Egg albumen height (mm)	5.6a	6.3a	6.6ab	6.9b	5.1a	± 0.34
Egg albumen weight (g)	40.6a	41.6a	42.0a	48.1b	42.7a	± 0.11
Egg yolk weight (g)	12.3	12.4	11.7	12.8	11.8	± 1.07
Egg Haugh unit	71.6	77.6	81.7	83.1	80.0	± 10.1
Egg shape index	0.8	0.8	0.8	0.8	0.8	± 0.05

TABLE 5: Effect of yeast inclusion levels in the diets of Isa brown hens on optimal feed intake (g/hen/day), final live weight (g/hen), egg weight (g/egg), egg albumen weight (g/egg) and egg albumen height (mm)

Traits	Formula	r2 values	Optimal yeast inclusion level
Feed intake	v= 121.955 + 25.469 X – 12.251 X2	0.70	0.89
Final live weight	v = 1597.086 + 271.070 X – 193.966 X2	0.62	0.70
Egg weight	v = 55.111 + 6.911 X – 3.531 X2	0.52	0.99
Egg albumen weight	v = 40.179 + 9.223 X – 5.783 X2	0.54	0.78
Egg albumen height	v = 5.435 + 5.538 X – 5.691 X2	0.80	0.49

of the diet as enhanced by yeast supplementation. Results of the current study indicate that feed intake, final body weight, egg albumen height and egg albumen weight are optimized at different levels. No similar study was found. However, a number of feed trials results revealed that different parameters are optimized at different level: Malebane *et al* (2010) (ascorbic acid supplementation on Venda chickens) and Onifade and Babatunde (1996) (Yeast supplementation on broiler chickens).

CONCLUSION

Results from this study indicate that inclusion of dried yeast into rice husk-based diets for Isa hens improved live weight, egg weight and albumen weight. Different inclusion rates of 0.89 (r2 = 0.70), 0.70 (r2 = 0.62), 0.99 (r2 = 0.52, 0.78 (r2 = 0.54) and 0.49 (r2 = 0.80) optimized the feed intake, final live weight, egg weight, egg albumen weight and egg albumen height, respectively. Thus yeast inclusion in diets for optimal productivity in Isa hens depended on the parameter in question. This has implications when formulating diets for Isa brown hens.

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