EFFECT OF DIETARY PHYTASE AND ANTIBIOTIC SUPPLEMENTATION ON GROWTH PERFORMANCE OF COCKERELS FED MILLET DIET

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Introduction

Maize is the most important energy source of poultry diets in many African Countries. Unfortunately maize is very expensive as not only animals but also human beings are competing for maize. In this case, an alternative feedstuff such as millet becomes more important to reduce the competition for maize especially in the southern parts of Nigeria where millet is less utilized for human consumption.

Millet however, contains some anti-nutritional factors known as non-starch-polysaccharides (B-glucans, xylans) which are viscous and indigestible by poultry (Annison and Choct 1991) but serve as a substrate for anaerobic bacteria producing methane and butyric acid in the gut. Millet also contains significant amount of phosphorus in the form of phytic acid (myoinositol hexaphosphate). Phytic acid is a strong chelating acid, which combines with minerals in the digestive tract of birds to form insoluble complexes. It also complexes with proteins and digestive enzymes under both acidic and alkaline conditions, thereby reducing their digestibility and availability in birds (Lardinan, 1979; Reddy *et al*., 1982)

There is therefore need to supplement millet-based diet for poultry with an enzyme that can breakdown phytic acid in order to make available the nutrients in the diet. Such an enzyme is microbial phytase (hexaphosphate phosphohydrolase). Dietary phytase hydrolyses phytic acid into myoinositol and 6 inorganic phosphates thereby increasing the availability of nutrients in the diet of poultry. Some data indicated that dietary phytase improved the apparent utilisation of dry matter, nitrogen and phosphorus in turkey poults (Yi *et al*., 1996), increased the retention of dry matter; P, N, and Ca in broilers (Sebastian *et al*., 1996; Ravindran *et al*., 2000) and enhances feed intake, weight gain and feed conversion ratio (Xingen *et al* 1993).However, some studies reported no improvement in some of the above parameters (Perney *et al*., 1993; Zanini and Sazzad, 1999)

This study was therefore conducted to investigate the effects of phytase and antibiotic supplementation and their combined effects in millet-based diets on the growth performance of cockerels.

Materials and methods

A total of two hundred and sixteen 8-weeks old yaffa breed cockerels were used for this experiment. The cockerels were allowed to acclimatize for a week before the commencement of the experiment. The cockerels were randomly distributed into 9 treatments at the ninth week. Each treatment consisted of two replicates with twelve birds each.

The diets were formulated according to NRC (1984) and were designed by replacing 25% maize with millet grain. The control diets consisted of maize and millet, without phytase and antibiotics, while the test diets 3, 4 and 5 consisted of 200 units of phytase (i.e 0.8g phytase per 20kg of feed); 400 units (1.6g phytase/20kg of feed) and 600 units phytase (2.4g phytase/20kg of feed) respectively. Diet 6 consisted of 0.01% Neomycin added at the rate of 2g per 20kg of feed. Diets 7, 8 and 9 consisted of 200 units, 400 units and 600 units of phytase plus 0.01% Neomycin each. The composition of experimental diets is shown in Table 1. The birds were subjected to routine cockerel management. Feed and water were given ad libitum throughout the experimental period of 7weeks. Data taken were weekly feed intake, weight gain and Feed conversion ratio. The experimental data were subjected to analysis of variance, by the general linear model (GLM), procedure of Snedecor and Cochran (1989) using completely randomized design. Proportions were analysed by chi-squared analysis.

Results and discussion

The summary of the performance of broiler chicks fed the experimental diets are shown in Table 2. The performance data showed no significant ($p > 0.05$) difference in body weight, feed intake and feed conversion ratio. The highest feed intake was found with the birds fed millet control diet (i.e diet 2). This may be due to the low energy level of the diet. The birds therefore, ate more feed to satisfy their energy requirement.

Phytase and phytase plus Neomycin did not significantly ($p > 0.05$) improve weight gain. These results agree with those found by Zanini and Sazzad (1999) who did not find significant

improvements in weight gain of chicks receiving dietary phytase in a 21-d trial. In contrast, Simon et al., (1990) obtained a significant improvement in growth of chicks fed a low-P diet supplemented with phytase at levels between 375 and 2000 units/Kg diet. Although there was no significant difference in feed conversion ratio, the best feed conversion ratio was obtained from birds fed 600 units phytase (diet 5). These results agree with the findings of Simon et al., (1990) and Perney *et al.*, (1993) who reported no significant (P> 0.05) improvements in the feed conversion ratio from chicks fed dietary phytase. The highest mortality was recorded in birds fed millet control diets but birds fed diets 6, 7, 8, and 9 had low mortality. This was probably due to the supplementation of Neomycin in their diet.

Conclusion

The results of this study indicate that phytase or phytase plus Neomycin supplementation in millet-based diet had no significant ($p>0.05$) effect on feed intake, weight gain and feed conversion ratio in cockerels when compared with the control millet-free diet.

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Table 1: Composition experimental diets(%)

Ingredients	1	2	3	4	5	6	7	8	9
Maize	25	-	-	-	-	-	-	-	-
Millet	-	25	25	25	25	25	25	25	25
Corn Bran	20	20	20	20	20	20	20	20	20
Palm Kernel meal	15	15	15	15	15	15	15	15	15
Wheat bran	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
GNC	8	8	8	8	8	8	8	8	8
Soybean meal	4	4	4	4	4	4	4	4	4
Fish meal (72%)	1	1	1	1	1	1	1	1	1
Palm oil	3	3	3	3	3	3	3	3	3
Oyster shell	4	4	4	4	4	4	4	4	4
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Grower premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lysine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bone meal	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total	100	100	100	100	100	100	100	100	100
Phytase Units	-	-	200	400	600	-	200	400	600
Antibiotics %	-	-	-	-	-	0.01	0.01	0.01	0.01
Calculated nutrients									
Crude Protein %	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Energy (Kcal/kg)	2620	2402	2402	2402	2402	2402	2402	2402	2402

Table 2: Effect of dietary treatments on performance characteristics

Parameters	1	2	3	4	5	6	7	8	9
Average Initial live wt (g/bird)	291.05	291.50	292.18	290.10	293.10	292.95	291.48	291.90	294.05
Average final wt (g/ bird)	848.04	797.18	801.78	801.66	850.95	791.48	794.71	812.28	830.11
Average weight gain (g/bird)	556.99	505.68	509.6	511.56	557.85	498.53	503.23	520.38	536.06
Average daily weight gain (g/bird)	11.37	10.32	10.40	10.44	11.38	10.17	10.27	10.62	10.94
Average daily feed intake (g/bird)	63.33	71.44	67.41	67.26	61.04	65.97	65.73	65.74	64.27
Feed conversion ratio	5.57	6.92	6.48	6.44	5.36	6.49	6.40	6.19	5.87
Mortality %	8.33	16.67	8.33	8.33	4.17	4.17	4.17	4.17	0.00

No Significant differences (P> 0.05) between the treatment groups.