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Performance and Economic Benefit of Broilers Fed Palm Kernel Cake-Based Diet Supplemented with Probiotic

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Abstract: This study investigated the weight gain performance and economic benefit of probiotic (*Saccharomyces cerevisiae*) supplementation in PKC based broiler diet. The ideal level of inclusion for optimum broiler productivity was also determined. A total of 140 broiler chicks were randomly distributed into seven groups of 20 birds each. Each group was subdivided into four replicates of five birds each. Groups 1-5 were placed on experimental diet made of 70% basal diet and 30% PKC. Groups 1-4 had probiotic (yeast) supplement at levels of 0.4 gm yeast/kg, 0.8 gm yeast/kg, 1.2 gm yeast/kg and 1.6 gm yeast/kg of feed respectively. Group 5 had no yeast (control 1). Group 6 had no PKC but had yeast (1.2 gm yeast/kg diet). Group 7 had no PKC and no yeast (control 2). All the groups were fed *ad libitum*. Daily feed intake and weekly weight gain were determined. The duration of the study was 10 weeks. There was no significant difference in feed intake. All the supplemented groups (groups 1-4 and 6) had higher weight gain and higher feed efficiency than the controls (groups 5 and 7). Group 2 had mean weight gain of 2.695±0.086 kg/bird which was significantly heavier ($p<0.05$) than the rest. Group 2 performed significantly better than others in weight gain and efficiency of feed utilization. The cost of feed to produce 1 kg live weight gain was cheapest in group 2 (N87.62/kg) and most costly in group 7 (N138.83/kg). Probiotic inclusion level of 0.8 gm yeast/kg diet was therefore recommended for optimum broiler production and maximum economic gain.

Key words: Broiler, probiotic, weight gain, economic benefit

INTRODUCTION

The supply and consumption of animal protein in developing countries is grossly inadequate. Acholonu (1996) reported that per caput poultry meat consumption in Nigeria was 2.2 g/day. Increased poultry production has been suggested as one of the fastest and most efficient means of attaining animal protein self-sufficiency because poultry have a short gestation and generation interval, large numbers, fast growth rate, greater affordability, ease of management, absence of taboos to production and consumption (Ibe, 2004).

Nutrition and diseases are the major limiting factors in poultry production as the cost of feed alone accounts for about 80% of the total cost of production (Adegbola, 2004). A lot of research works have been performed to increase efficiency of feed utilization and maximize profit from poultry by use of feed additives. As a result of the barn on the use of antibiotic growth promoters in most parts of the world due to its deleterious effect such as microbial resistance (Chah *et al*., 2002), drug residues (Dipeolu *et al*., 2002; Dipeolu *et al*., 2004) and high lipid (fat) content in animal products (Lipstein *et al*., 1975) which are health hazards in both animals and man (Ogbe *et al*., 2005), there is increased interest in probiotics. These bioherapeutic agents (probiotics) have been shown to significantly increase feed efficiency and improve health status of livestock without any negative effects in animals or humans (Fuller, 1992; Baird, 1977; Chang *et al*., 2001; Ezema, 2007). The objective of this study was to determine the effect of probiotic (*Saccharomyces cerevisiae*) supplementation on growth performance and economic advantage in broilers fed palm kernel cake-based diet. The optimum level of this probiotic inclusion for maximum broiler productivity was also studied.

MATERIALS AND METHODS

A total of 140 broiler chicks were randomly distributed into seven groups of 20 birds each. Each group was subdivided into four replicates of five birds each. Groups 1-5 were placed on experimental diet made of 70% basal diet and 30% PKC. Groups 1-4 had probiotic (yeast) supplement at levels of 0.4 gm yeast/kg, 0.8 gm yeast/kg, 1.2 gm yeast/kg and 1.6 gm yeast/kg of feed respectively. Group 5 had no yeast (control 1). Group 6 had no PKC but had yeast (1.2 gm yeast/kg diet). Group 7 had no PKC and no yeast (control 2). All the groups were fed *ad libitum*. They were also provided clean drinking water all through the study. Daily feed intake and weekly weight gain were determined. The duration of the study was 10 weeks. The PKC used for the study was obtained from a local palm kernel processing mill and had an analyzed content of 14.8% crude protein, 2.44 Mcal/kg metabolizable energy and 20.4% crude

Table 1: Summary of mean feed intake, mean weight gain, feed conversion ratio, feed efficiency and cost of feed of broilers fed palm kernel cake-based diet supplemented with probiotic

Groups	G_1 30%pkc+ 0.4 g yeast	G_2 30%pkc+ 0.8 g yeast	G_3 30%pkc+ 1.2 g yeast	G_4 30%pkc+ 1.6 g yeast	G_5 30%pkc No yeast	G_6 No pkc+ 1.2 g yeast	G_7 No pkc No yeast
Mean Final Live Weight (Kg/Bird)	2.78^a±0.04	3.20^b±0.37	2.80^a±0.0.14	2.75^a±0.05	20.68^a±0.05	2.72^a±0.06	2.70^a±0.16
Mean Initial Live Weight (Kg/Bird)	0.4075±0.010	0.4150±0.013	0.4150±0.013	.04125±0.010	0.4075±0.0010	0.4125±0.010	0.4150±0.006
Mean Weight Gain (Kg/Bird)	2.285^a±0.039	2.695^b±0.086	2.298^a±0.146	2.245^a±0.056	2.185^a±0.056	2.225^a±0.060	2.198^a±0.159
Mean Feed Intake (Kg/Bird)	6.04±0.13	6.16±0.22	5.90±0.11	6.02±0.13	6.17±0.28	6.08±0.26	6.19±0.25
Feed Conversion Ratio (FCR)	2.64	2.29	2.57	2.68	2.82	2.73	2.82
Daily Weight Gain (g/bird/day)	40.80	48.13	41.04	40.09	39.02	39.73	39.25
Daily Feed Intake (g/bird/day)	101.20	103.36	98.68	100.86	103.54	101.93	104.76
Feed Efficiency (FE) (%)	40.30	44.60	41.60	39.70	37.70	39.00	37.50
Cost of feed (N/kg)	45.12	45.36	45.60	45.84	44.88	60.50	60.26

a,b; Different superscripts in a row indicate significant difference between the means ($p<0.05$)

fibre, while the probiotic was obtained from B.F.P. Dock Road, Felix Stowe, United Kingdom. The experimental birds were given standard routine vaccination and chemoprophylaxis as recommended by the National Veterinary Research Institute, Vom.

Data analysis: The results of the feed intake and weight gain were subjected to one way analysis of variance (ANOVA) and treatment means were separated using the Least Significant Difference (LSD) method. Level of significance was accepted at $p\leq 0.05$. The statistical package used for the analysis was the SPSS for windows 9.0 version.
Gross margin analysis was used to estimate the cost of the experimental diet (Nosiru, 2003).

RESULTS

Weight gain: The results of the weight gain are shown in Table 1. The results showed that all the supplemented groups G_1-G_4 and G_6 had higher weight gain compared to the controls (G_5 and G_7). G_2 (30% PKC + 0.8 g yeast) had the highest weight gain of 2.695±0.086 which was significantly higher ($p<0.05$) compared to other groups. Mean daily weight gain for all the supplemented groups; G1 (30% PKC + 0.4 g yeast), G2 (30% PKC + 0.8 g yeast), G3 (30% PKC + 1.2 g yeast), G4 (30% PKC + 1.6 g yeast) and G6 (No PKC + 1.2 g yeast) were 42.32 ±0.04 g, 49.64±0.09 g, 42.50±0.15 g, 41.79±0.03 g and 41.25±0.03 g respectively and these values were significantly higher ($p<0.05$) compared with the controls, G5 (30% PKC + No yeast) and G7 (No PKC + No yeast) which were 40.54±0.06 g and 40.71±0.16 g respectively.

Cost benefit analysis: From the results, the cost of feed to produce 1 kg live weight gain was cheapest in group 2 (N87.62/kg) and most costly in group 7 (N138.83/kg). Group 5 that had PKC but no yeast cost N103.69/kg. While group 6 that had no PKC but contained yeast cost N135.93/kg.

DISCUSSION

The results showed that all the supplemented groups G_1 to G_4 and G_6 had higher weight gain compared to the controls (G_5 and G_7). G_2 had the highest weight gain of 2.695±0.086 which was significantly higher ($p<0.05$) compared to other groups. This suggests that live yeast supplementation in broiler diet increased growth rate. The increased growth rate may be as a result of improved digestibility and increased efficiency of feed utilization (Glade and Sist, 1988; Martin *et al.*, 1989). The improved digestibility observed could be due to the activities of the digestive enzymes secreted by the yeast (Numan, 2001; Matsui *et al.*, 1990). It is also possible that when yeast cells die in gastrointestinal tract, they are digested by the host digestive enzymes and absorbed as microbial protein which may contribute to the increased growth rate. This observation agrees with the earlier reports of Adejumo *et al.* (2005) as well as Onifade and Babatunde (1996).
From the results, the cost of feed to produce 1 kg live weight was cheapest in group 2 (N87.62/kg) and most costly in group 7 (N138.83/kg). Group 5 that had PKC but no yeast cost (N103.69/kg). While group 6 that had no PKC but contained yeast cost (N135.93/kg). This suggests that without PKC inclusion, the supplementation with bioactive yeast is uneconomical. But with PKC, supplementation at 0.8 gm/kg gave the highest financial returns to the poultry farmer. It also means that application of this biotechnology in broiler nutrition is only for the developing countries where unconventional (high crude fibre) feed ingredients such as PKC is used (Nwokolo *et al.*, 1977; Obioha, 1992; Omeke *et al.*, 2006).

Conclusion and recommendations: Bioactive yeast significantly increased weight gain and economic returns in broilers fed palm kernel cake-based diet. Yeast (*Saccharomyces cerevisiae*) supplementation at 0.8 g/kg of diet is recommended for maximum weight gain optimum economic gain.

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