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Probiotic Effect of Yeast (*Saccharomyces cerevisiae*) on Hen-Day Egg Performance, Serum and Egg Cholesterol Levels in Laying Chicken

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Abstract: This study evaluated the effect of varied levels of probiotc (*Saccharomyces cereviae*) on total serum and egg cholesterol levels in laying birds. The impact of this probiotic on hen-day egg performance was also studied. A total of 100 layers were randomly divided into 4 groups (A, B, C and D) of 25 layers each. The diets for groups A, B and C were supplemented with probiotic at varied levels of 0.6, 0.8 and 1.0 g/kg of feed, respectively. Group D diet had no probiotic (Control). The layers were given 120 g of feed per bird per day in two divided doses (morning and afternoon). Eggs were collected three times daily (morning, afternoon and evening). All the eggs collected from each group were weighed and recorded daily. Five birds were randomly selected from each group and 5.0 ml of blood was collected from each bird. The blood samples were allowed to clot in a sample bottle and serum harvested was used to determine the total serum cholesterol content with the aid of a commercial kit. Five eggs were also randomly collected from each group and used to determine the total egg cholesterol content following standard procedure. The result showed that the probiotic fed groups had a significant ($p \leq 0.05$) reduction in serum cholesterol levels than the control (group "D"). The least mean serum cholesterol level was group "A" (108.33±9.28 mg/dl) followed by group "C" (112.67±7.88 mg/dl) and group "B" (115.00±14.34 mg/dl). Group "D" (control) had a significantly higher mean serum cholesterol level of 166.67±8.82 mg/dl. Group "C" had a significantly higher ($p \leq 0.05$) hen-day egg performance of 85.00±10.00%, followed by group "B" with 70.00±9.35% hen-day egg performance. Group "A" had a hen-day egg performance of 68.00±8.93% while group "D" (the control) had the least hen-day egg performance of 65.00±5.00%. Probiotic inclusion of 1.0 g/kg of feed was therefore recommended for effective reduction in serum and egg cholesterol levels and optimum hen-day egg performance.

Key words: Feed, probiotic, layers, eggs, cholesterol

INTRODUCTION

Background of the study: In most developing countries, there is decreasing animal protein intake as a result of poverty and overpopulation. Thus, the great need for a radical approach to livestock production. The present daily protein allowance for Nigerians according to Atsu (2002) has decreased from 14 g to 4.5 g of protein per head per day which is abyssimally low compared to the FAO (1997) recommendation of 35 gm of animal protein per head per day. Measures to solve this problem are geared towards improving the production of livestock species that have the potential for rapid growth rate and short generation time such as poultry (Smith, 1990). While efforts are made to increase production, the problem of insufficient animal protein intake is further compounded by the fear and refusal to eat eggs because of its cholesterol content. This phobia is due largely to ignorance especially among the people of the developing world.

Probiotic use has gained widespread interest since the finding that newly hatched chicks could be protected against colonization by *Salmonella enteritidis* by dosing a suspension of gut contents derived from healthy adult chicken (Nurmi and Rantala, 1973). However, the mechanism of action of probiotics is not yet clearly understood and is still subject to further research, though there are several hypotheses (Ahmad, 2006). In addition to increasing the quantity of eggs produced, the fact that this probiotic can reduce egg cholesterol level may encourage people especially in developing countries to consume more eggs and enjoy good health as well as other benefits derived from chicken egg. The objective of this study was to determine the optimum level of inclusion of the probiotic in the pullet's diet for minimum serum and egg cholesterol levels and maximum egg production.

MATERIALS AND METHODS

A total of 100 layers (Dominion breed) were randomly divided into 4 groups (A, B, C and D) of 25 birds each. The diets for groups A, B and C were supplemented with probiotic at varied levels of 0.6, 0.8 and 1.0 g/kg of feed, respectively. Group D diet had no probiotic (Control). The layers were given 120 g of feed per bird per day in two

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Table 1: Serum, egg cholesterol levels and hen-day egg performance of layers fed diet supplemented with varied levels of probiotic

	Group A 0.6 g yeast/kg	Group B 0.8 g yeast/kg	Group C 1.0 g yeast/kg	Group D No yeast (Control)
Serum cholesterol (mg/dl)	108.33±9.28	115.00±14.34	112.67±07.88	166.67±8.82
Egg cholesterol (mg/dl)	510.60±7.50	595.70±06.43	476.60±09.84	824.50±3.86
Hen-day egg performance (%)	68.00±9.35	70.00±09.35	85.00±10.00	65.00±5.00

divided doses (morning and afternoon). Eggs were collected three times daily (morning, afternoon and evening). All the eggs collected from each group were weighed and recorded daily. Five birds were randomly selected from each group and 5.0 ml of blood was collected from each bird. The blood samples were allowed to clot in a sample bottle and serum harvested was used to determine the total serum cholesterol content with the aid of a commercial kit. Five eggs were also randomly collected from each group and used to determine the total egg cholesterol content following standard procedure.

RESULTS

The results of serum cholesterol level, egg cholesterol level and hen-day egg performance are presented in Table 1. The results showed that group C had a significantly ($p \leq 0.05$) higher hen-day egg performance of 85±10.00%, followed by group B with 70±9.35% hen-day performance. Group A recorded a hen-day performance of 68±8.93%, while group D (the control) had the lowest hen-day performance of 65±5.00%. Probiotic-fed groups (A-0.6 g yeast/kg, B-0.8 g yeast/kg and C-1.0 g yeast/kg) had significant ($p \leq 0.05$) reduction in serum cholesterol level than the control (group D). The lowest mean serum cholesterol level was group A (108.33±9.28 mg/dl). Group D (control) had a significantly ($p \leq 0.05$) higher mean serum cholesterol level of 166.67 mg/dl.

Eggs from the supplemented groups also had significantly ($p \leq 0.05$) lower cholesterol content compared to the control. Their egg cholesterol levels were (A-D) 510.60±7.50 mg/dl, 595.70±6.43 mg/dl, 476.60±9.84 mg/dl and 824.50±3.86 mg/dl, respectively. Thus, group C eggs had the least cholesterol content (476.60±9.84 mg/dl) and Group D (control) eggs had the highest cholesterol content (824.50±3.86 mg/dl).

DISCUSSION

There was significant increase ($p \leq 0.05$) in egg production among the probiotic supplemented groups A, B and C. Group C had the highest hen-day egg performance of 85.00±10.00%. This result agrees with earlier reports by Glade and Sist (1988), Martin *et al.* (1989); Adejumo *et al.* (2005) and Ezema (2007) who differently observed that probiotic improves efficiency of feed utilization in livestock.

The results also revealed that probiotic fed groups (A-0.6, B-0.8 and C-1.0 g yeast/kg) showed significant ($p \leq 0.05$) reduction in serum cholesterol level than the control (group D). Reduction in circulating cholesterol with supplemental yeast (*S. cerevisiae*) was remarkable and agrees with the results of other researchers (Onifade *et al.*, 1999; Onifade, 1997) that the addition of innocuous micro-organisms including yeast to diets of rabbits and broiler chickens decreased serum cholesterol, triglycerides and phospholipids. De Smet *et al.* (1998) reported that probiotics could contribute to the regulation of serum cholesterol concentration by deconjugation of bile acids. Since the excretion of deconjugated bile acid is enhanced and cholesterol is it's precursor, more molecules are spent for recovery of bile acids. As a result of increased synthesis of these acids, it is expected that the level of serum cholesterol will be reduced. Klaver and Van Der Meer (1993) also suggested that co-precipitation with bile acid might be of importance in decreasing serum cholesterol concentrations.

Conclusion: The probiotic (*S. cerevisiae*) at an appropriate level of inclusion significantly reduced serum as well as egg cholesterol levels and improved hen-day egg performance. Therefore, probiotic (*S. cerevisiae*) inclusion level of 1.0 g/kg of layers mash is recommended for optimum hen-day egg performance and minimum serum and egg cholesterol content.

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