



Research Paper

The Effects of Oyster Mushroom and Bacto-Gene Probiotic on Blood Parameters in Broiler Chickens

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Extended Abstract

Introduction The poultry industry is progressively moving towards alternatives to antibiotics due to increasing concerns over antibiotic resistance and the associated public health risks. Medicinal plants and probiotics are among the most studied natural alternatives for promoting growth, enhancing immunity, and improving overall health in poultry. Oyster mushrooms (*Pleurotus ostreatus*) are known to possess rich nutritional and medicinal properties including bioactive compounds such as polysaccharides, beta-glucans, phenolics, and antioxidants. Probiotics such as *Bacto-Gene*, a commercial preparation containing heat-resistant spores of *Bacillus subtilis*, have demonstrated beneficial effects on gut health, immunity, and nutrient utilization. This study investigates the individual and combined effects of dietary inclusion of oyster mushroom powder and Bacto-Gene probiotic on hematological and biochemical blood parameters in broiler chickens. The hypothesis is that such supplementation could improve health markers and potentially reduce dependency on antibiotics in broiler production.

Methods A total of 360 one-day-old male and female broiler chicks (Ross 308) were randomly allocated into ten dietary treatments arranged in a 2×5 factorial design, consisting of two probiotic levels (0 and 0.04%) and five mushroom powder levels (0, 1, 2, 3, and 4%). Each treatment was replicated three times with 12 birds per replicate. The birds were reared under similar environmental and management conditions for 42 days. Diets were formulated to meet the nutritional requirements of broilers according to NRC (1994) guidelines. Oyster mushrooms were dried at 60°C, ground into powder, and incorporated into the diets. The blood samples were collected from randomly selected birds at the end of the trial for hematological and biochemical analyses using automated analyzers. The measured parameters including total white blood cells (WBC), red blood cells (RBC), hemoglobin (HB), hematocrit (HCT), lymphocytes, monocytes, basophils, eosinophils, and heterophils,

heterophil to lymphocyte (H/L) ratio, serum cholesterol, triglycerides (TG), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). Statistical analyses were performed using SAS software (version 9.1) and treatment means were compared using Duncan's multiple range test at 5% significance.

Results and Discussion The inclusion of oyster mushroom powder in broiler diets significantly influenced several blood parameters. Although no significant changes were observed in RBC count, Hb, HCT, HDL, LDL, TG, lymphocytes, monocytes, basophils, and eosinophils, the levels of serum cholesterol, WBC count, heterophil percentage, and the H/L ratio were significantly affected ($P<0.05$). A consistent decline in serum cholesterol was observed with increasing levels of mushroom powder, with the lowest level noted in the 4% mushroom group. This hypocholesterolemic effect is attributed to lovastatin and other bioactive compounds in mushrooms which influence lipid metabolism. Additionally, the number of WBCs increased with mushroom inclusion, indicating an enhanced immune response, though the effect plateaued at levels above 2%. A significant reduction in heterophil percentage and H/L ratio was also recorded, reflecting reduced physiological stress and improved immune function. Probiotic supplementation (0.04% Bacto-Gene) also exerted significant effects on several parameters. Notably, TG, LDL, cholesterol, heterophil percentage, and H/L ratio decreased significantly, while WBC and lymphocyte counts increased ($P<0.05$). The proposed mechanisms include bile salt deconjugation, increased short-chain fatty acid production, and inhibition of cholesterol absorption all contributing to improved lipid profiles and immunity. The H/L ratio, often used as a reliable stress indicator, was lower in birds receiving probiotic and mushroom treatments, suggesting reduced stress and better resilience to infections. The synergistic effects of mushrooms and probiotics were evident in certain parameters, particularly in the group receiving 4% mushroom and 0.04% probiotic, where the most pronounced improvements in cholesterol and immune markers were observed. The results align with previous studies that reported the benefits of functional feed additives like mushrooms and probiotics in improving blood lipid profiles, enhancing immune responses, and promoting overall poultry health.

Conclusion This study demonstrates that dietary supplementation with oyster mushroom powder and Bacto-Gene probiotic can significantly improve hematological and biochemical parameters in broiler chickens. The improvements included reduced serum cholesterol, triglycerides, LDL, and stress indicators (heterophils and H/L ratio), alongside increased WBC and lymphocyte counts. These findings support the potential of such natural additives as viable alternatives to antibiotics in poultry diets, contributing to healthier birds and safer meat production. The combined use of oyster mushroom and probiotic appears particularly promising and may be considered a strategic approach for antibiotic-free broiler production systems. Further research may be warranted to explore their long-term impacts on meat quality and microbiota modulation.

Keywords: Blood parameters, Broiler, Oyster mushroom, Probiotic bacto-gene

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