



ABSTRACT

The study was conducted to determine the effects of a probiotic (*Bacillus licheniformis*) on the growth performance, carcass yield, organ weights, meat quality, hematological, metabolites, and histomorphological measurements of the small intestine and meat of the broiler birds. The culture bank of the Institute of Industrial Biotechnology, GCU Lahore, provided the lyophilized dry cell mass of probiotics. The lyophilized biomass was then supplemented in a poultry trial to determine its impact on total broiler chick growth. For this experiment trial, 75 one day broiler chicks were randomly allocated into three groups. (n = 25) designated as control (basal diet), antibiotic (900 mg/ton of antibiotic amoxicillin in the basal diet) and probiotic (5.6×10^6 cell/ton of feed of *Bacillus licheniformis* in the basal diet). For a total of five weeks, the experimental trial was conducted, and growth performance, slaughtering characteristics, hematological, histological, and metabolite parameters were evaluated. In comparison to the control and antibiotic group, the probiotic group had significantly higher carcass yield percentage, average daily weight gain, and body weight (BW). The control group's feed conversion rate (FCR) was higher (1.932 ± 0.10) than the antibiotic (1.84 ± 0.10) and probiotic (1.714 ± 0.10) groups, so chicks supplemented with probiotics achieved more weight gain while consuming comparatively less feed. After the conclusion of the trial, the birds were slaughtered and further parameters were evaluated. Probiotic-supplemented chicks had no significant difference in the weight of their hearts, livers, spleens, and gall bladders as compared to control and antibiotic-supplemented chicks. The control had the longest intestinal length (213.5 ± 15.22 cm), while the probiotic had the shortest (194 ± 5.51 cm). The chicks supplemented with *B. licheniformis* improved the temperature and pH after 20 min of slaughter value (30.75 ± 1.75 and 6.05 ± 0.05) compared to the antibiotic (29 ± 1 and 5.65 ± 0.15) and control group (29 ± 0.5 and 5.8 ± 0.3), but decreased the shear force (17.265 ± 0.82) in the Brest muscle compared to the antibiotic (21.085 ± 6.78) and control group (21.455 ± 3.14). For the breast muscle probiotic, there was higher lightness (L*), yellowness (b*), and cooking loss, but there was a lowering shear force and redness (a*) as compared to the antibiotic and control. Blood parameters (RBC, WBC, hemoglobin, and packed cell volume) were found to be highest in birds supplemented with probiotics. The levels of cholesterol, triglycerides, HDL, total protein, creatinine, ALT, AST, and Urea level for the chicks fed with probiotics were found to be the



lowest in comparison to both antibiotics and control. But the glucose level for the chicks fed with probiotics was found to be high. A morphological evaluation of the small intestine demonstrated an increase in villus height, villus width, villus surface area, crypt depth, and villus height: crypt ratio (VH: CD) in all segments of the probiotic group. Poultry is one of the most extensively consumed meats on the globe, so it's important to understand the metabolic response of the chickens to new feed formulas, supplements, illnesses, and treatments. Prior to 600MHz ¹H-NMR spectra, metabolic extractions of breast and leg meat were done, 23 metabolites were unequivocally identified. The total metabolite content of probiotic chicken breast and leg meat was significantly greater. So, based on the results, the study indicates that *Bacillus licheniformis* can improve the growth performance, carcass yield, organ weights, meat quality, hematological, metabolites, and histomorphological measurements of the small intestine and meat of the broiler birds and therefore can be employed as an alternative growth promoter to antibiotics.