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Influence of Unconventional Feedstuff on Gut Health in Giriraja Birds

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A B S T R A C T

An experiment was conducted to study the influence of unconventional feedstuff on gut health in giriraja birds. A total of three hundred one day- old chicks were distributed into five treatment groups each consisting of four replicates with fifteen chicks each. Basal diet (T_1) and the experimental diets were prepared by incorporating mulberry leaf powder at 5 % (T_2), moringa leaf powder at 5 % (T_3), sesbania leaf powder at 5 % (T_4) and azolla powder 5 % (T_5). The duration of the experiment was 8 weeks. Two birds from each replicate in different treatment groups respectively was sacrificed and intestinal contents from small intestine were taken aseptically. Samples were used for enumeration of bacteria as per spread plate method. Specific media such as MacConkey agar was used for *E. coli* count, whereas *Lactobacillus* spp. was assessed on Brain Heart Infusion agar. The bacterial counts were expressed as log_{10}cfu/gm of sample. Inclusion of mulberry, moringa and sesbania at 5 per cent revealed significant ($P \leq 0.05$) reduction in *E. Coli* count compared to control and azolla fed group whereas *Lactobacillus* count was significantly ($P \leq 0.05$) increased. It was concluded that inclusion of mulberry and moringa at 5 per cent level was beneficial in improving gut health in Giriraja birds.

Introduction

Poultry industry is highly dependent on the feed price because of feed cost which has a major proportion ranging between 60 to 70 per cent of total production costs. Besides, the price of conventional protein feed resources such as groundnut cake, fish meal and soybean meal are in high cost. A possible way to reduce poultry feed costs is finding alternatives to conventional protein sources that are economical, cost-effective and locally available (Shelke *et al.*, 2018). Various plants have been studied and many are reported to contain aromatic properties that have an impact on gut micro-flora, nutrient digestibility, intestinal morphology and meat quality of poultry (Cross *et al.*, 2007). Furthermore, broilers require a minimal amount of fibre in the diet to maintain gizzard activity and gastrointestinal tract (GIT) functionality (Jiménez-Moreno *et al.*, 2010).

Mulberry leaves are nontoxic natural therapeutic agents known to possess antidiabetic, antimicrobial, antimutagenic, antioxidant, anticancer, anxiolytic, anthelmintic, antistress, immunomodulatory,

hypocholesterolemic, nephroprotective and hepatoprotective activities (Devi *et al.*, 2013). The effect of *Moringa oleifera* leaf meal on growth performance, nutrient utilization efficiency, gut integrity and carcass yield have been assessed in several studies at graded levels as either an alternative protein source or an extract used individually or in combination with extracts from other plants (Zanu*et al.*, 2012). Azolla is a potential feed ingredient for broilers (Singh and Subudhi, 1978). Use of Azolla in broiler diets improved feed conversion ratio and energy efficiency compared to control group (Basak*et al.*, 2002). The higher abundance of *Bacteroides, Prevotella,* and *Megamonas* in the chicken gut suggests that using mulberry leaf powder as feed additive in chicken could be beneficial for chicken health (Chen *et al.,* 2019). Thus, the objective of this study was to investigate the effects of mulberry, moringa, sesbania and azolla on gut health of Giriraja birds.

Materials and Methods

The experiment was conducted at the Department of Poultry Science, Veterinary College, Hebbal, Bengaluru. A total of 300 one day old Giriraja birds were distributed into five treatment groups with four replicates in each group and fifteen birds in each replicate. Chicks were reared under deep litter system with supply of *ad libitum* feed and water. The trial duration was for 8 weeks (56 days). A standard broiler pre-starter, starter and finisher rations were formulated as per BIS (2007) recommendation. Basal diet (T_1) and the experimental diets were prepared by incorporating mulberry at 5 per cent (T_2), moringa at 5 per cent (T_3), sesbania at 5 per cent (T_4) and azolla at 5 per cent (T_5). Standard managemental practice was followed during the experiment. At end of experiment (56^{th} day), two birds from each replicate in all treatment groups were sacrificed. Intestinal content from small intestine were taken aseptically for microbial count. Samples were subjected for enumeration of bacteria as per spread plate method (Postgate, 1969). Specific media such as MacCankey agar was used for *E. coli* count, whereas *Lactobacillus* was assessed on Brain heart infusion agar by pour plate method (Mackie and Mccartey, 1996).

Results and Discussion

Gut microbial count

E. *coli* count

The intestinal *E. coli* counts (log_{10} CFU/g) in groups T_1, T_2, T_3, T_4 and T_5 were 7.19, 6.59, 6.57, 7.04, and 7.14, respectively. The significant ($P \leq 0.05$) difference was observed in the intestinal *E. coli* counts among the treatments. The highest *E. coli* counts was observed in groups T_1 when compared to other treatment groups. The *E. Coli* count (log_{10} CFU/ g) was significantly lower ($p \leq 0.05$) in the treatment groups T_2 and T_3 compared to other treatment groups. There was no significant difference ($p > 0.05$) in the *E. coli* count among T2 and T3 and between T4 and T5 and also in the groups of T1 and T5 (Table 1 and Fig. 1).

Lactobacillus count

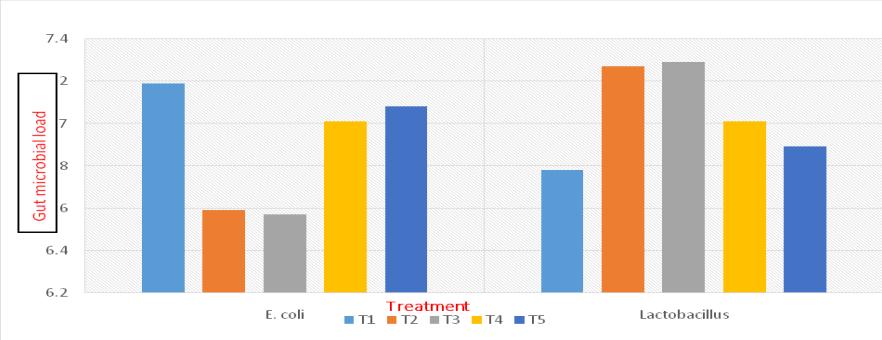
The intestinal *Lactobacillus* counts (log_{10} CFU/g) in groups T_1, T_2, T_3, T_4, and T_5 were 6.78, 7.27, 7.29, 7.01 and 6.89, respectively. The significant ($P \leq 0.05$) difference was observed in the intestinal *Lactobacillus* counts among the treatments. The *Lactobacillus* count (log_{10} CFU/ g) was significantly ($p \leq 0.05$) higher in the groups T2 and T3 compared to the other groups. There was no significant difference ($p > 0.05$) in the *Lactobacillus* count among the groups (T2, T3), (T4, T5) and also among the groups T1 and T5 (Table 1).

Table.1 Effect of supplementation of *Morus alba* leaf powder, *Moringa oleifera* leaf powder, *Sesbania grandiflora* leaf powder *and Azolla* pinnata leaf powder on gut microbial load (log_{10} CFU/g)(Mean ± SE) in Giriraja Birds

Experimental group	Description of the treatment	*E. coli* count	Lactobacillus count
T_1	Basal diet	7.19 ± 0.042^{a}	6.78 ± 0.049^{c}
T_2	5% *Morus alba* leaves powder in basal diet	6.59 ± 0.059^{c}	7.27 ± 0.022^{a}
T_3	5% *Moringa oleifera*leaves powder in basal diet	6.57 ± 0.055^{c}	7.29 ± 0.013^{a}
T_4	5% *Sesbania grandiflora* leaves powder in basal diet	7.04 ± 0.029^{b}	7.01 ± 0.016^{b}
T_5	5% *Azolla pinnata* leaves powder in basal diet	7.14 ± 0.011^{ab}	6.89 ± 0.021^{bc}

^{a,b,c} Means in the same column with no common superscript differ significantly ($P \leq 0.05$)

Fig.1 Effect of supplementation of *Morus alba* leaf powder, *Moringa oleifera* leaf powder, *Sesbania grandiflora* leaf powder and *Azollapinnata* leaf powder at different age intervals on gut microbial count (log_{10} CFU/g) at the 56th day in Giriraja birds



In similar to the present study the supplementation of *Moringa oleifera* leaf powder at various doses that is at 0.4 per cent and 0.6 per cent level may be helpful in boosting up the immunocompetence and gut health of birds in terms of reduced coliform counts and total viable counts of the intestinal contents of birds (Laxman, 2016). The present study is also in agreement with Divya *et al.*, (2020) who conducted the experiment and found that *Azolla pinnata* extract incorporated yogurt would be a recommended probiotic food with higher nutritional value such as rich source of probiotic bacteria and protein content. The beneficiary *Lactobacillus spp.* were good for gut health. This probioticated yogurt would have additional medicinal values because of the addition of *Azolla pinnata.* The higher abundance of *Bacteroides, Prevotella* and *Megamonas* in the chicken gut suggests that using mulberry leaf powder as feed additive in chicken could be beneficial for chicken health (Chen *et al.*, 2019), the study is in agreement with the above findings.

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