Influence of Unconventional Feedstuff on Gut Health in Giriraja Birds

J. Raghuraman1*, M. C. Shivakumar2, H. C. Indresh1 and Jayanaik1

1Department of poultry science, Veterinary College, Hebbal, Bangalore, India
2Department of Livestock production management, Veterinary College, Hassan, India

*Corresponding author

ABSTRACT

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 (T1) and the experimental diets were prepared by incorporating mulberry leaf powder at 5% (T2), moringa leaf powder at 5% (T3), sesbania leaf powder at 5% (T4) and azolla powder 5% (T5). 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 log10 cfu/gm of sample. Inclusion of mulberry, moringa and sesbania at 5 per cent revealed significant (P ≤ 0.05) reduction in E. Coli count compared to control and azolla fed group whereas Lactobacillus count was significantly (P ≤ 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.

Keywords
Gut health, Broilers, E. coli, Lactobacillus, Giriraja

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 (Basaket 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 (T1) and the experimental diets were prepared by incorporating mulberry at 5 per cent (T2), moringa at 5 per cent (T3), sesbania at 5 per cent (T4) and azolla at 5 per cent (T5). Standard managemental practice was followed during the experiment. At end of experiment (56th 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 Mccarrey, 1996).

**Results and Discussion**

**Gut microbial count**

**E. coli count**

The intestinal E. coli counts (log10 CFU/g) in groups T1, T2, T3, T4 and T5 were 7.19, 6.59, 6.57, 7.04, and 7.14, respectively. The significant (P ≤ 0.05) difference was observed in the intestinal E. coli counts among the treatments. The highest E. Coli count was observed in groups T1 when compared to other treatment groups. The E. Coli count (log10 CFU/g) was significantly (p ≤ 0.05) lower in the treatment groups T2 and T3 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 (log10 CFU/g) in groups T1, T2, T3, T4, and T5 were 6.78, 7.27, 7.29, 7.01 and 6.89, respectively. The significant (P ≤ 0.05) difference was observed in the intestinal Lactobacillus counts among the treatments. The Lactobacillus count (log10 CFU/g) was significantly (p ≤ 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

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Description of the treatment</th>
<th>E. coli count</th>
<th>Lactobacillus count</th>
</tr>
</thead>
<tbody>
<tr>
<td>T(_1)</td>
<td>Basal diet</td>
<td>7.19 ± 0.042(^a)</td>
<td>6.78 ± 0.049(^c)</td>
</tr>
<tr>
<td>T(_2)</td>
<td>5% <em>Morus alba</em> leaves powder in basal diet</td>
<td>6.59 ± 0.059(^c)</td>
<td>7.27 ± 0.022(^a)</td>
</tr>
<tr>
<td>T(_3)</td>
<td>5% <em>Moringa oleifera</em> leaves powder in basal diet</td>
<td>6.57 ± 0.055(^c)</td>
<td>7.29 ± 0.013(^a)</td>
</tr>
<tr>
<td>T(_4)</td>
<td>5% <em>Sesbania grandiflora</em> leaves powder in basal diet</td>
<td>7.04 ± 0.029(^b)</td>
<td>7.01 ± 0.016(^b)</td>
</tr>
<tr>
<td>T(_5)</td>
<td>5% <em>Azolla pinnata</em> leaves powder in basal diet</td>
<td>7.14 ± 0.011(^ab)</td>
<td>6.89 ± 0.021(^bc)</td>
</tr>
</tbody>
</table>

\(^{a,b,c}\) Means in the same column with no common superscript differ significantly (P ≤ 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 56\(^{th}\) 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.

References


How to cite this article: