Fenugreek Residue as Feed Additive for Broilers

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Abstract
A study was conducted to ascertain the efficacy of fenugreek residue (FR) as feed additive in broiler rations. A total of 210 day-old Vencobb broiler chicks were divided into seven treatment groups, each treatment group had three replicates with ten birds in each replicate. The treatments were 0, 0.5, 1.0, 1.5 and 2.0 % FR with antibiotic (AB · 500 g of 10% Oxytetracycline/ton) and 1.5 and 2.0 % FR without AB. In the overall phase, the body weight gain, feed consumption and feed efficiency at all levels of FR with and without AB were comparable with control. Slaughter studies revealed that dressing %, giblet % and abdominal fat % did not vary among the groups. The blood glucose and muscle cholesterol levels were found to be reduced at 2% and 0.5% and 1.0% FR with AB respectively. The intestinal coliform and bacterial count was found to reduced due to incorporation of FR. FR at 2% with AB, found to reduce the feed cost/kg body weight gain when compared to control.

Key words: Fenugreek residue, broiler, growth biochemistry, microbes.

Various feed grade antibiotics are used to exploit maximum production and productivity in broilers. Due to the problem of antibiotic residue in the meat and development of bacterial resistance in human subjects, alternative to antibiotics is researched. Herbs, spices, and various plant extracts have received increased attention as possible alternatives to antibiotic growth promoters (AGP), since they are considered natural products (Henandez et al., 2004). Seeds of Fenugreek (Trigonella foenum-graecum L.) are reported to have antimicrobial properties (Bash et al., 2003; Safaa, 2007). It has a high proportion of protein - 20 to 30%, carbohydrates - 45 to 65% of which 15% is galactomannan (a soluble fibre). Fenugreek residue is a product available after the separation of the galactomannans. It is available in large quantities in human nutraceutical production units. Objective of this study was to evaluate the effects of fenugreek residue (FR) as a replacement for antibiotic and anti-cholesterolaemic property in broilers.

Materials and Methods
Biological trial of 0 to 42 days of age was conducted with 210 day-old Vencobb broiler chicks. The broiler chicks were divided into seven treatment groups: each treatment group had three replicates with 10 birds (seven numbers of males and females) in each replicate. The treatments were 0, 0.5, 1.0, 1.5 and 2.0 % FR with antibiotic (500 g of 10% Oxytetracycline/ton) and 1.5 and 2.0 % FR without antibiotic. The birds were housed in deep litter pens, feed and water were provided ad libitum. The ingredients used for preparation of experimental rations (Table 1) were analyzed for protein as per AOAC (1995).

The feed offered and mortality (if any) was recorded daily and fortnightly bird weight and feed consumption were recorded and feed efficiency was calculated. Blood was collected on 42nd days of age from five birds per treatment for studying the glucose and cholesterol contents and slaughtered for recording the dressing %, giblet % and abdominal fat %. Intestinal samples were collected from two birds per replicate and the oocyst, bacterial and coliform counts were carried out. The costs of different experimental rations were worked out based on the actual cost of the feed ingredients, supplements and additives. The cost of feed per unit gain in weight in different groups was calculated and

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The data collected on various parameters were statistically analyzed as per the method of Snedecor and Cochran (1989) and the means of different experimental groups were tested for statistical significance by Duncan's multiple range test (Duncan, 1955).

**Results and Discussion**

Weight gain, feed consumption, feed efficiency and feed cost/weight gain of birds fed different levels of fenugreek residues are presented in Table II. The weight gain of the birds between 0-2, 0-4 and 0-6 weeks of age fed fenugreek residue (FR) with antibiotics were comparable to the control diet fed birds. However, FR supplemented at 1.5 and 2% without AB resulted in poor weight gain (P<0.05) in the first week of the experiment. In the subsequent weeks, the weight gain in these groups (1.5 and 2% FR without antibiotics) was comparable to the control whereas FR with AB improved the performance at 0.5 and 2% level. This was in agreement with results of Azouz (2001).

FR supplementation up to 1% had comparable feed consumption to the control. However, the feed consumption at 1.5% and 2% of FR inclusion with and without AB birds had higher (P<0.05) feed consumption than the control in the first two weeks. In the 0-4th week period, FR residue up to 1.5% had comparable feed consumption, but in 2% FR with antibiotics and groups fed without antibiotic had higher (P<0.05) feed consumption. However, in the 0-6th week, feed consumption was comparable with the control. Similar results were reported by Shalash and Azouz (2002).

The feed efficiency in the first 2 weeks was comparable to control when FR was fed up to 1%. At higher levels namely, 1.5% and 2%
Table II. Weight gain (g), feed consumption (g), feed efficiency (FCR) and feed cost/weight gain of birds fed different levels of fenugreek residue (FR) with and without AB*.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Days</th>
<th>0 - 2nd week</th>
<th>0 - 4th week</th>
<th>0 - 6th week</th>
<th>0 - 2nd week</th>
<th>Feed Consumption (g)</th>
<th>Feed Conversion Ratio (FCR)</th>
<th>Economics (₹)</th>
<th>Cost of feed / kg weight gain</th>
<th>Difference in feed cost over the control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight gain (g)</td>
<td></td>
<td>396.4±8.03</td>
<td>392.7±7.90</td>
<td>388.6±7.01</td>
<td>386.2±7.38</td>
<td>391.8±5.05</td>
<td>361.1±6.75</td>
<td>374.2±8.24</td>
<td>20.4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 - 4th week</td>
<td>1036.5±29.99</td>
<td>1042.2±21.41</td>
<td>1004.5±19.85</td>
<td>1015.1±25.99</td>
<td>1005.9±17.41</td>
<td>970.3±17.74</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 - 6th week</td>
<td>1957.8±53.85</td>
<td>2021.1±46.32</td>
<td>1891.9±59.48</td>
<td>1968.4±68.63</td>
<td>2046.3±52.94</td>
<td>1925.6±51.05</td>
<td>1963.5±45.79</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 - 2nd week</td>
<td>532.0±13.68</td>
<td>556.4±15.29</td>
<td>547.4±15.46</td>
<td>560.9±4.65</td>
<td>573.7±11.93</td>
<td>568.1±19.05</td>
<td>590.0±5.89</td>
<td>36.9</td>
<td>-</td>
</tr>
<tr>
<td>Feed conversion (g)</td>
<td>0 - 4th week</td>
<td>1654.59±9.49</td>
<td>1670.70±18.74</td>
<td>1620.69±9.71</td>
<td>1663.07±8.17</td>
<td>1744.48±8.92</td>
<td>1721.59±28.30</td>
<td>1747.78±7.61</td>
<td>46.3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 - 6th week</td>
<td>3499.30±3.93</td>
<td>3517.41±22.92</td>
<td>3539.85±29.82</td>
<td>3509.69±21.71</td>
<td>3588.67±27.19</td>
<td>3573.15±37.71</td>
<td>3567.70±13.46</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 - 2nd week</td>
<td>1.33±0.03</td>
<td>1.42±0.06</td>
<td>1.41±0.07</td>
<td>1.50±0.02</td>
<td>1.46±0.03</td>
<td>1.57±0.02</td>
<td>1.59±0.02</td>
<td>0.12</td>
<td>-</td>
</tr>
</tbody>
</table>

Values in a row with atleast one common superscript is not significant (P>0.05).

Body weight gain (g) - Each value is the mean of 30 observations.
Feed consumption (g) and Feed Efficiency (FCR) - Each value is the mean of 3 observations.

*AB - Antibiotic (Chloramphenicol 10% added at 50g/100kg feed).

FR with and without AB the feed efficiency was poor (P<0.05). The feed efficiency at the end of the 4th and 6th weeks in all treatment groups was comparable. FR at higher levels resulted in poor performance in first two weeks. The overall performance in terms of weight gain and feed efficiency at the end of experiment was comparable. The earlier work by Aygun et al. (2011) suggested that FS supplementation resulted in poor feed conversion ratio.

The cost of feed / kg weight gain was comparable in all the birds fed FR at different levels with and without AB. FR at 2% with AB had lowest (P<0.05) feed cost/body weight gain (₹ 44.90/-) and the difference with the control was (₹1.40/-) when compared to control.

The slaughter parameters (%), blood glucose (mg/dl), blood cholesterol (mg/dl), total bacterial count and coliform count of birds fed with different levels of FR are presented in Table III. The dressing %, giblet % and abdominal fat % were not influenced by inclusion of FR up to 2% with AB and 1.5% and 2% without AB.

The blood glucose level was reduced when 2% FR was fed with AB. This study concurred with the earlier works of Abaza (2007), Safaee (loc cit.) and Awadein et al. (2010). The blood cholesterol was significantly lower when FR was incorporated at 0.5 and 1% with AB. This result was in agreement with the findings of earlier worker (Abbas, 2010). None of the treatments had oocyst to be recorded. The coliform and bacterial counts were found to reduce due to incorporation of FR with and without AB.

Summary

The incorporation of fenugreek residue (FR) in broiler ration upto the level of 2% resulted in comparable production and productivity performance and yield of edible parts even without antibiotics supplementation. The intestinal total bacterial and coliform counts were reduced due to fenugreek residue feeding. The cost of feed per kilo of body weight was lowered, when supplemented fenugreek residue at 2% with AB.

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### Table III. The slaughter parameters (%), blood glucose (mg/dl), blood cholesterol (mg/dl), total bacterial count and coliform count of birds fed with different levels of fenugreek residue (FR) with and without AB.

<table>
<thead>
<tr>
<th>% Fenugreek</th>
<th>Dressing %</th>
<th>Giblet %</th>
<th>Abdominal fat %</th>
<th>Blood glucose (mg/dl)</th>
<th>Blood cholesterol (mg/dl)</th>
<th>Total bacterial count</th>
<th>Coliform count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% FR with AB</td>
<td>70.30 ± 1.79</td>
<td>4.42 ± 0.20</td>
<td>0.83 ± 0.11</td>
<td>244.4 ± 11.81</td>
<td>97.84 ± 6.40</td>
<td>1.56 x 10^6</td>
<td>9.4 x 10^6</td>
</tr>
<tr>
<td>0.5% FR with AB</td>
<td>68.83 ± 0.23</td>
<td>4.20 ± 0.28</td>
<td>0.86 ± 0.15</td>
<td>218.2 ± 18.41</td>
<td>76.62 ± 5.15</td>
<td>1.13 x 10^6 (27.56)</td>
<td>7.8 x 10^6 (17.02)</td>
</tr>
<tr>
<td>1% FR with AB</td>
<td>69.45 ± 4.99</td>
<td>4.03 ± 0.32</td>
<td>1.03 ± 0.15</td>
<td>240.2 ± 7.46</td>
<td>78.21 ± 5.16</td>
<td>3.6 x 10^6 (99.77)</td>
<td>3.2 x 10^6 (99.97)</td>
</tr>
<tr>
<td>1.5% FR with AB</td>
<td>70.30 ± 0.70</td>
<td>4.50 ± 0.19</td>
<td>0.99 ± 0.14</td>
<td>226.2 ± 13.53</td>
<td>95.67 ± 5.94</td>
<td>4.0 x 10^6 (99.74)</td>
<td>3.0 x 10^6 (99.97)</td>
</tr>
<tr>
<td>2% FR with AB</td>
<td>70.01 ± 0.61</td>
<td>4.30 ± 0.20</td>
<td>1.37 ± 0.20</td>
<td>195.4 ± 12.06</td>
<td>88.99 ± 6.12</td>
<td>8.0 x 10^6 (99.95)</td>
<td>5.0 x 10^6 (99.95)</td>
</tr>
<tr>
<td>1.5% FR without AB</td>
<td>70.67 ± 0.76</td>
<td>4.73 ± 0.31</td>
<td>1.14 ± 0.13</td>
<td>212.2 ± 11.65</td>
<td>86.58 ± 7.41</td>
<td>1.1 x 10^6 (99.93)</td>
<td>9.0 x 10^6 (99.90)</td>
</tr>
<tr>
<td>2% FR without AB</td>
<td>70.03 ± 0.83</td>
<td>3.89 ± 0.22</td>
<td>1.25 ± 0.27</td>
<td>228.6 ± 10.93</td>
<td>101.08 ± 1.43</td>
<td>1.8 x 10^6 (95.85)</td>
<td>5.0 x 10^6 (99.45)</td>
</tr>
</tbody>
</table>

**Slaughter parameters - Each value is the mean of 5 observations.**
**Total bacterial and coliform count - Each value is the mean of 6 observations.**
Values in a column with at least one common superscript is not significant (P<0.05).
Values in the parenthesis are the percent reduction in microbial load in comparison with the control.

### References


