DIETARY SUPPLEMENTATION OF AMLA AND GRAPE SEED ON HORMONAL STATUS IN BROILER BREEDER COCKS

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ABSTRACT

The effect of dietary supplementation of amla (Emblica officinalis) and grape (Vites venifera) seed on plasma hormonal status in broiler breeder stock was assessed in this study. This trial was conducted in twenty four PRS B2 broiler breeder cocks from 32 to 37 weeks of age. Experimental birds were randomly divided into four groups viz: Control: Standard broiler ration, Treatment – I: Broiler ration + 1 per cent amla powder, Treatment – II: Broiler ration + 1 per cent grape seed powder and Treatment – IV: Broiler ration + 0.5 per cent amla powder + 0.5 per cent grape seed powder. Dietary supplementation with the combination of amla and grape seed powder indicated significantly higher testosterone concentration, but significantly reduced cortisol levels in the broiler breeder cocks.

Key words: Amla (Emblica officinalis), Grape (Vites venifera) seed, Testosterone, Cortisol- Broiler breeder stock

INTRODUCTION

India is World’s fourth largest egg producer and fifth largest producer of broilers (Sandeep saran et al., 2005). The growth rate of poultry industry in the last 15 years has been estimated to be 12 to 15 per cent in broiler sector. Rapid growth rate in broiler birds accelerated the metabolic rate and make them vulnerable to oxidative stress owing to increased free radical generation. Gallic acid and tannic acids are the phenolic acids present in both free and bound form in Emblica officinalis contributes the antioxidative activity, in addition to ascorbic acid (Suresh kumar et al., 2006). Proanthocyanins, the biologically active constituents of grape (Vites venifera) seed had a potent antioxidant activity (Nakamura et al., 2003). Many of these antioxidants act synergistically and the total antioxidatant activity of the combinations is comparatively higher than the individual dietary antioxidants (Buettner, 1993). Ascorbic acid supplementation stimulated testicular steroid dehydrogenase activity and increased plasma testosterone levels (Biswa et al., 1996). Oxidative stress showed decreased testosterone secretion by reducing the levels of enzymatic and non-enzymatic antioxidants in Leydig cells (Cao et al., 2004). Hence this feeding trial was undertaken with an objective to study the antioxidant effect of amla and grape seed.
The birds were reared in deep litter system under standard managemental practices throughout the experimental period. This experiment was approved by the Institutional Animal Ethical Committee.

Feeding trial was conducted for a period of six weeks. Experimental rations were fed to the respective treatment groups for first three weeks (treatment period). Subsequently, the experimental birds were fed with normal breeder ration without any supplementation for the next three weeks (post-treatment period).

Weekly blood samples were collected from the wing vein in sterile test tubes containing EDTA during treatment and post treatment periods and centrifuged at 50 x g for 10 min for the separation of the plasma.

The levels of testosterone and cortisol in the plasma were estimated by ELISA using ADALTIS EIAgen testosterone and cortisol kits.

Statistical analysis was done by randomized block design as per Snedecor and Cochran, (1994).

### RESULTS AND DISCUSSION

The effects of amla and grape seed supplementation on plasma testosterone and cortisol concentrations (ng/ml; Mean ± SE) in broiler cocks are presented in the Table. A significant variation was recorded during the treatment and post treatment periods of amla and grape seed supplementations. The birds supplemented with the combination of amla and grape seed showed the highest testosterone concentration followed by treatment I and treatment II. In all the treated birds testosterone concentrations was found to increase during the second and third week of treatment period, which significantly fell from the first week of post treatment period.

The result of the present study may be due to the stimulatory effect of ascorbic acid content of amla on 3â hydroxysteroid dehydrogenase (3â HSD)

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### MATERIALS AND METHODS

This trial was conducted in twenty four PRS B₂ broiler breeder cocks from 32 to 37 weeks of age. Experimental birds were randomly divided in to four groups as follows:

<table>
<thead>
<tr>
<th>Group</th>
<th>Experimental feeding</th>
<th>No. of birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Standard broiler ration</td>
<td>6</td>
</tr>
<tr>
<td>Treatment - I</td>
<td>Broiler ration + 1% amla powder</td>
<td>6</td>
</tr>
<tr>
<td>Treatment - II</td>
<td>Broiler ration + 1% grape seed powder</td>
<td>6</td>
</tr>
<tr>
<td>Treatment - III</td>
<td>Broiler ration + 0.5% amla + 0.5% grape seed powders</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

The birds were reared in deep litter system under standard managemental practices throughout the experimental period.

This experiment was approved by the Institutional Animal Ethical Committee.

Feeding trial was conducted for a period of six weeks. Experimental rations were fed to the respective treatment groups for first three weeks (treatment period). Subsequently, the experimental birds were fed with normal breeder ration without any supplementation for the next three weeks (post-treatment period).

Weekly blood samples were collected from the wing vein in sterile test tubes containing EDTA during treatment and post treatment periods and centrifuged at 50 x g for 10 min for the separation of the plasma.

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Dietary supplementation of amla and grape seed powder on hormonal status in broiler breeder cocks (n= 6)

<table>
<thead>
<tr>
<th>Group</th>
<th>Plasma testosterone concentrations (ng/ml) ; Mean ± SE</th>
<th>Plasma cortisol concentrations (ng/ml) Mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment period (Wks)</td>
<td>Post- treatment period (Wks)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.59\textsuperscript{Aa} ± 1.20</td>
<td>11.86\textsuperscript{Aa} ± 0.65</td>
</tr>
<tr>
<td>Treatment - I</td>
<td>13.04\textsuperscript{Ca} ± 0.50</td>
<td>15.72\textsuperscript{Cc} ± 0.68</td>
</tr>
<tr>
<td>Treatment - II</td>
<td>12.89\textsuperscript{Bb} ± 0.98</td>
<td>13.63\textsuperscript{Bb} ± 0.74</td>
</tr>
<tr>
<td>Treatment - III</td>
<td>16.73\textsuperscript{Dd} ± 0.72</td>
<td>17.55\textsuperscript{Dd} ± 0.30</td>
</tr>
<tr>
<td></td>
<td>78.43\textsuperscript{Ca} ± 1.22</td>
<td>77.38\textsuperscript{Ca} ± 0.95</td>
</tr>
<tr>
<td>Treatment - I</td>
<td>72.13\textsuperscript{Bb} ± 0.88</td>
<td>70.67\textsuperscript{Ba} ± 0.76</td>
</tr>
<tr>
<td>Treatment - II</td>
<td>71.33\textsuperscript{Ba} ± 1.05</td>
<td>69.23\textsuperscript{Ba} ± 0.56</td>
</tr>
<tr>
<td>Treatment - III</td>
<td>68.05\textsuperscript{Ab} ± 0.25</td>
<td>66.94\textsuperscript{Aab} ± 0.22</td>
</tr>
</tbody>
</table>

Means bearing same superscripts in a row and column do not differ significantly (P < 0.05)
activity. Steroidogenesis appeared to be ascorbic acid dependent particularly at hydroxylation steps (Tsuji et al., 1989; Goralczyk et al., 1992; Luck et al., 1995) and synergistic antioxidant activities of amla and grape seed. Biswas et al. (1996) also reported that ascorbic acid supplementation stimulated testicular steroid dehydrogenase activity and increased plasma testosterone levels.

It is reported that ascorbic acid activated the release of luteinizing hormone (LH) from the anterior pituitary gland by means of nitric oxide. LH causes the release of testosterone from the Leydig cells (Karanath et al., 2001).

Synergistic antioxidative activities of amla and grape seed may also be responsible for the significant increase in the testosterone concentrations in the birds supplemented with amla and grape seed each at 0.5 per cent level. This is agreement with the reports of Cao et al. (2004) who indicated that oxidative stress reduced the levels of key enzymatic and non-enzymatic antioxidants in Leydig cells, resulted in decline in testosterone secretion. Emilia Juan et al. (2005) also stated that the natural antioxidant of grape, trans-resveratrol had increased the serum concentration of testosterone in rats which might have shifted the levels of testosterone in this study also.

In the present study, birds supplemented with amla and grape seed powders each at 0.5 per cent level revealed a significant variation during the treatment and post treatment periods. The combination of amla and grape seed fed birds showed the lowest concentration of cortisol followed by treatment II and treatment I. In all the treated birds, cortisol concentration was found to be lower during the first three weeks of treatment period, which then significantly increased from the first week of post treatment period.

Significant reduction in the plasma cortisol concentrations in birds fed with the combination of amla and grape seed followed by amla feeding in treatment II and control revealed synergistic antioxidant activities of amla and grape seed on hypothalamic neurons causing reduction in CRH from hypothalamus and ACTH from the anterior pituitary. This is evident from the findings of Pardue et al. (1985); Kutlu and Forbes, (1993); Mcknee and Harrison et al. (1995); Sahin et al. (2002).

CONCLUSION

Synergistic antioxidative activities of amla and grape seed significantly increased plasma testosterone concentration, but significantly reduced plasma cortisol levels in broiler breeder cocks.

REFERENCES


