Dietary Inclusion of Organic and Inorganic Chromium Supplementation on Serum Cholesterol Levels in Japanese Quails*

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(Received : 31-05-2017 198/17 Accepted : 13-07-2017)

Abstract

An experiment was conducted to study the influence of dietary organic and inorganic chromium on serum cholesterol levels of Japanese quails for a period of six weeks with seven hundred day-old quail chicks. These quail chicks were randomly grouped into seven treatment groups with four replicates consisting of 25 quail chicks in each replicate. They were provided with feed supplemented with inorganic chromium and organic chromium in the form of chromium with azolla and chromium with yeast at 500 and 1000 ppb levels and a control diet without chromium supplement from day old to six weeks of age. Blood samples were collected at six weeks of age for estimating serum cholesterol level. The serum cholesterol level was lowest in 500 ppb of inorganic chromium supplemented group and the higher level of serum cholesterol was recorded in the control group.

Key words: Japanese quails, Organic, Inorganic chromium, Serum cholesterol

The higher economical benefit attracted most of the farmers towards quail farming. In recent years, there is a considerable research interest in the utilization of Chromium in the animal feed. The beneficial effects of chromium have been linked with improved nutrient digestion and enhanced metabolism. Chromium supplementation may improve function of various digestive organs such as liver and pancreas with regards to secretion of digestive enzymes.

The beneficial effects of chromium can be observed more efficiently under environmental, dietary and hormonal stresses. Chromium is an essential element required for carbohydrate, lipid, protein, and nucleic acid metabolisms, activating certain enzymes and stabilizing proteins and nucleic acids. The primary role of chromium in metabolism is to potentiate the action of insulin as a component of Glucose Tolerance Factor (GTF).

Materials and Methods

A total of 700, day old Japanese quail chicks were randomly divided into seven treatment groups with four replicates consisting of 25 quail chicks in each replicate. They were fed with different levels of chromium enriched Japanese quail feed from day old to six weeks of age. The experimental treatment groups as follows,

T1 (Control group) - No chromium supplementation in Japanese quail feed

T2 Group - Japanese quail feed with chromium enriched azolla (500ppb chromium)

T3 Group - Japanese quail feed with chromium enriched azolla (1000ppb chromium)

T4 Group - Japanese quail feed with chromium enriched yeast (500ppb chromium)

T5 Group - Japanese quail feed with chromium enriched yeast (1000ppb chromium)

T6 Group - Japanese quail feed with inorganic chromium (500ppb chromium)

T7 Group - Japanese quail feed with inorganic chromium (1000ppb chromium)

At six weeks of age, six birds from each treatment were randomly selected and 2 ml of blood was collected and the collected blood sample was kept undisturbed for two hours for serum separation. Serum cholesterol was estimated using A15 Biosystem Auto Analyser by using AGAPPE Diagnostics Ltd based on CHOD-PAP methodology (Allain et al., 1974)

*Part of M.V.Sc Thesis submitted by the first author to TANUVAS, Chennai.

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Data collected on various parameters were statistically analysed by one way ANOVA by using SPSS.20.

Results and Discussion

The mean values of serum cholesterol level (g/dl) in Japanese quails as influenced by different sources and different levels of chromium are presented in Table I.

Lesser value of serum cholesterol was observed in all chromium supplemented groups than control group. As the level of chromium increased, the serum cholesterol level decreased in case of organic chromium supplemented group. The lowest serum cholesterol level was observed in the T6 group and the higher level of serum cholesterol was recorded in the control group. Sahin et al. (2001) and Yildiz et al. (2004) recorded lowest serum cholesterol in Japanese quails on supplementation of 1200 and 1000 ppb of chromium picolinate in the diet respectively. Kim et al. (2001) and Kim et al. (2007) also reported lowest cholesterol level in chromium supplemented groups. These findings were in accordance with the results obtained in this study.

The reduction in the serum cholesterol level of chromium supplemented quails observed in this study might be attributed to the main response of lipid metabolism influenced by the chromium which may be on account of an enhanced activity of insulin that decreases lipolysis and increases fatty acid assimilation in the adipocytes (Vincent, 2001). Both organic and inorganic chromium had beneficial effect on reducing the serum cholesterol levels in Japanese quails.

References


Table I: Cumulative Serum cholesterol level (g/dl) of Japanese quails as influenced by different sources and different levels of chromium (Mean±S.E) at six weeks of age (n=6)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Serum cholesterol level (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 - control</td>
<td>187.33±8.24</td>
</tr>
<tr>
<td>T2 - 500 ppb of Cr with Azolla</td>
<td>168.00±9.53</td>
</tr>
<tr>
<td>T3 - 1000 ppb of Cr with Azolla</td>
<td>162.50±7.30</td>
</tr>
<tr>
<td>T4 - 500 ppb of Cr with Yeast</td>
<td>171.83±9.90</td>
</tr>
<tr>
<td>T5 - 1000 ppb of Cr with Yeast</td>
<td>157.83±15.72</td>
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<tr>
<td>T6 - 500 ppb of Inorganic Cr</td>
<td>147.50±4.66</td>
</tr>
<tr>
<td>T7 - 1000 ppb of Inorganic Cr</td>
<td>151.50±6.70</td>
</tr>
<tr>
<td>F- value</td>
<td>3.338*</td>
</tr>
</tbody>
</table>

Mean values bearing same superscript in columns did not differ significantly; *Significant (p<0.05)