The influence of supplementation food with “Bio-Chrome” and “Sel-Plex” over the quantitative and qualitative collagen matter from broiler muscles

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Abstract
This experimental study has been made on 3 groups of broilers 30 days old (control batch, supplement with Sel-Plex and supplement with Bio-Chrome), each group containing 7 broilers. The supplement of the diet of broilers (Romanian fodder combine 21/1), with Sel-Plex in quantity of 200 μg/kg mix feed for 30 days of broilers determined a non-significant increase of total collagen contents from pectoral muscles, remarking a tendency of insoluble and soluble collagen non-significant increased. Insoluble/soluble collagen ratio increases highly with 26.23% in comparison with control lot. Thigh-shank muscles, total collagen increases non-significant, the insoluble and the soluble one increases non-significant, while insoluble/soluble collagen ratio decreases with 0.87%.

The supplement with Bio-Chrome was done by administering in the diet of broilers, 400 μg/kg mix feed, for 30 days. We remarked that Bio-Chrome product stimulated collagen biosynthesis especially the one in pectoral muscles, and an increased which was due of an increased content of insoluble collagen and soluble collagen. The same result was also in the collagen from thigh-shank muscles but in much lower intensity. The total collagen increased and the insoluble non-significant modification, while soluble collagen significant increased. We have to mention that the increase in the contents of collagen in thigh-shank muscles takes place especially on the basis of soluble collagen contents. Insoluble/soluble collagen ratio decreases with 28.45% in comparison with control lot, a decrease due the increase of soluble collagen quantity.

Introduction
Collagen represents 15-50% from the total conjunctive tissue and 30-35% from the total protein of the body. The quantity of collagen is generally constant in adults but in certain physiologic conditions and especially physiopathologic conditions some quantitative and qualitative modifications of collagen take place. Quantitative and qualitative modifications are highly important in the understanding of different biologic processes such as growth and development or pathologic processes with the implication of this protein, which is spread very much in the body. Both quantitative and qualitative variations of collagen influence the nutritional characteristics of meat and meat products. Besides the external factors action (food level, pathogens etc.), collagen forming is very early and during embryo life the total quantity of collagen increases in various organs till the adult age and sometimes till the old age (Smith et al., 1976; Curcă et al., 1980).

Experimental research carried out considering the influence of Bio-Chrome (Alltech product) supplement in the mix feed based on the use of trivalent organic chrome which is implied in many metabolic processes especially in the tolerance in the body in comparison with glucose, in the stimulation of insulin activity and in obtaining stress situation both in young animals and in grown-ups (Mertz, 1992; Hossain, 1995; Mooney and Cromwell, 1997; Hossain, 2000a; 2000b).

The product Sel-Plex (Alltech product) represents an organic selenium formula, 50% seleno-methionine, the rest seleno-amino-acids and protein, which ensure a good function of heart muscle, stimulating immunity and gonadic function. It prevent skeleton muscle miodistrophia, by its participation in the content of the following antioxidants: superoxide-dismutase, catalase, glutathione peroxidase participating at the same time in the formation of...
active tiroxine (T₃), preventing the lowering of membrane lipoproteins and the formation of free radicals formation with toxic action (Patterson et al., 1957; Muth et al., 1958).

**Materials and Methods**

This experimental study has been made on 3 groups of broilers 30 days old: control batch, supplement with Sel-Plex and supplement with Bio-Chrome, each group containing 7 broilers. The supplement with Sel-Plex was done by administrating in the diet of broilers (romanian fodder combine 21/1) 30 days old, 200 μg/kg mix feed for 30 days. The supplement with Bio-Chrome was done by administrating in the diet of broilers, 400 μg/kg mix feed, for 30 days.

Collagen determination was carried out by indirect biochemical method, which considers hydroxyproline dosing in accordance with the method described by Neuman and Logan, 1950. Collagen quality was evaluated by the Hill’s method, based on determining of collagen solubility in ¼ of warm Ringer solution (Goll et al., 1963).

**Results and Discussion**

The supplement of the diet with Sel-Plex determined a non-significant increase of total collagen contents from pectoral muscles (9.21%) remarking a tendency of insoluble collagen increasing with 24.99% and of soluble collagen decreasing with 8.8%. Insoluble/soluble collagen ratio increases highly with 26.23%, in comparison with control batch (Figure 1). Thigh-shank muscles total collagen increases in a reduced proportion with 3.25%, the insoluble one with 7.49% and the soluble one with 9.08%, while insoluble/soluble collagen ratio decreases with 0.87% (Figure 2).

![Figure 1](image)

**Key:** n.s. – non-significant difference (P>0.05); * – significant difference (P<0.05); ** – distinctive significant difference (P<0.01)

We remarked that Bio-Chrome product stimulated collagen biosynthesis especially the one in pectoral muscles, which increased with 40.95% in comparison with control batch. This change was due of an increased content of insoluble collagen, which was 62.73% higher in comparison with non-supplemented diet with Bio-Chrome – while soluble collagen increase 27.59% (Figure 1).

The same results were also in the collagen from thigh-shank muscles but in much lower intensity. The total collagen increased with 25.12% and the insoluble one with only
5.23%, while soluble collagen increased with 48.26%. We have to mention that the increasing of collagen in thigh-shank muscles takes place especially on the basis of soluble collagen contents.

Insoluble/soluble collagen ratio decreases with 28.45% in comparison with the control batch change due the increase of soluble collagen quantity (Figure 2).

**Figure 2**

THE TOTAL, INSOLUBLE AND SOLUBLE COLLAGEN CONTENT OF THE THIGH MEAT IN BROILERS SUPPLIED WITH “SEL–PLEX” AND “BIO–CHROME” (mg/100 g fresh tissue)

<table>
<thead>
<tr>
<th></th>
<th>Total collagen</th>
<th>Insoluble collagen</th>
<th>Soluble collagen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>613,496</td>
<td>663,981</td>
<td>329,906</td>
</tr>
<tr>
<td>Selenium</td>
<td>767,598</td>
<td>613,496</td>
<td>309,349</td>
</tr>
<tr>
<td>Chromium</td>
<td>384,632</td>
<td>347,155</td>
<td>420,443</td>
</tr>
</tbody>
</table>

* n.s. – non-significant difference (P>0.05); * – significant difference (P<0.05)

**Key:**

**References**


