Histological modification at the caecum level generated by introducing medicinal plants and essential oils in broilers feed

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ABSTRACT
Medicinal plants and extracts including in monogastric animals feeding represents a current practice because phyto-additives can represent an alternative to antibiotics using. In this way was been performed an experiment on 6 weeks, respectively from hatching to 42 days of age, on 120 broiler chickens, divided on four experimental variants (LEU, LEP, LEUP and LM) with 30 individuals each of them. The used hybrid was Ross 308. In LEU group were incorporated essential oils of Coriandri fructus, Satureja hortensis, Hipophae rhamnoides, 250 mg at 1 kg compound feed. In LEP group were included in compound feed structure a plants premix (Mentha piperita, Salvia officinalis, Melissa officinalis) in 2% proportion and in LEUP was included a mixture by plants premix and essential oils. The medicinal plants utilization and of essential oils in broiler chicken nourishment stimulates the caecal mucouse, generating an hypertrophic process manifested by glandular apparatus development, through capillary net hypertrophy and through leukocytic infiltrate stimulation, with role in local defending.

Key words: medicinal plants and extracts, caececum, broilers

INTRODUCTION
An alternative to antibiotics administration in animal fodder like breeding promoters can be represented by many plants (phyto-additives), extracts or oils from plants, with antimicrobial, antifungal effects and digestive processes stimulators, things already known and used in naturist medicine in humans (F. Benazet cited by P. Balaci, 1981, Wetscherek, 2000).

Phytobiotics may be explained as plant derived products added to the feed in order to improve performance of agricultural livestock. This definition addresses mainly the purpose of use in terms of a feed additive to healthy animals under common practical conditions of production of food of animal origin rather than the veterinary use for prophylaxis and therapy of diagnosed
health problems. Phytobiotics comprise a very wide range of substances with respect to biological origin, formulation, chemical description and purity.

The plants active substance contain differs from a species to another, every plant having the proper specific protection against bacteria, in comparison with pharmaceutical antibiotics, who have different action against limitation or destruction of a microbial population (Wenk, 2000).

Some subgroups may be classified, such as herbs (product from flowering, non-woody and non/persistent plants), botanicals (entire or processed parts of a plant, leaves, bark), essentials oils and oleoresins. (Windisch W., Kroismayr A., 2006).

Stimulation of digestive secretions such as saliva, digestive enzymes, bile and mucus is often considered to be a core mode of action of phytobiotics. (Lee et all, 2003). Feed additives decreased microbial activity at the end of the ileum, caecum and colon.

**MATERIAL AND METHODS**

The experiment has been performed in the section of Nutrition and animal feeding discipline from Timisoara Didactic Station, on 6 weeks, from hatching until 42 days of age, on 120 broiler chickens divided into three experimental variants and one control (LM), with 30 chickens each. The used hybrid was Ross 308.

The experimental organization scheme is showed in table 1.

**Table 1. Experimental organization scheme**

<table>
<thead>
<tr>
<th></th>
<th>Period 0–3 weeks</th>
<th>Period 3-6 weeks</th>
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</thead>
<tbody>
<tr>
<td><strong>LM</strong></td>
<td><strong>LEU</strong></td>
<td><strong>LEP</strong></td>
</tr>
<tr>
<td>Compound feed 0-3 weeks</td>
<td>Compound feed 0-3 weeks + 250 mg + plants premix 2% weeks + premix plants essential oil of <em>(Mentha piperita, Salvia)</em> 2% + 250 mg essential <em>Coriandri fructus, officinalis</em> and <em>Melissa</em> oil / kg compound feed, similarly with <em>Hipophae rhamnoides/kg</em> compound feed</td>
<td>Compound feed 3-6 weeks + 250 mg + plants premix 2% weeks + premix plants essential oil of <em>(Mentha piperita, Salvia)</em> 2% + 250 mg essential <em>Coriandri fructus, officinalis,</em> <em>Satureja hortensis, officinalis</em> <em>Hipophae rhamnoides/kg</em> compound feed</td>
</tr>
</tbody>
</table>
From table 1 data can be observed that in LEU group were incorporated essential oils of *Coriandri fructus*, *Satureja hortensis*, *Hipophae rhamnoides* in quantity of 250 mg to 1 kg compound feed, in LEP group was included in compound feed structure a plants premix in proportion of 2%and in LEUP group was included a mixture of plants and essentials oils. These quantities are valuable for all the breeding period. Also, in this experiment was included a control group (LM) who received no only compound feed, without essential oils and medicinal plants.

Histological research of intestinal wall was performed by following of some morphological methods, described in table 2.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Methods</th>
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<tbody>
<tr>
<td>Recovery</td>
<td>Samples were drawn at 42 days from caecum</td>
</tr>
<tr>
<td>Fixation</td>
<td>Alcohol 80°</td>
</tr>
<tr>
<td></td>
<td>Dehydration (in three baths of absolute alcohol)</td>
</tr>
<tr>
<td></td>
<td>Clarification (the removing of alcohol who was replaced by benzene)</td>
</tr>
<tr>
<td>Inclusion</td>
<td>The piece was imbued in paraffin</td>
</tr>
<tr>
<td>Section</td>
<td>Cutting of pieces in micronic fragments with the Minot microtone</td>
</tr>
<tr>
<td>Colouring</td>
<td>Haematoxylin Eosin and Trichromic Gomori</td>
</tr>
</tbody>
</table>

**RESULTS AND DISCUSSION**

*VI (control group)*

The wall of the caecum segment is structured in concordance with a common organization plan with the small intestine segments, being compounded by four superposed tunics, the mucous, the submucous, the muscular and the serous, in this case the mucous is much thinner, with approximately 356,25 µ thickness. The tubular glands are depth, with a disposition almost parallel and are covered with a monostratificated epithelium, composed by calceiform and prismatic cells. Interglandular spaces are reduced and contain fibers of fine collagen and lymphoid infiltrate. In the basal chorion there are lymphoid follicles.

The mucous muscular is obvious, consisted by two fine layers smooth miocytes, one circular and one longitudinal.

The submucous is formed by conjunctive tissue rich in colagen fibres, among which are disposed numerous fibroblasts, vascular packages compounded by arterioles, venules, capillaries and lymphoid follicles.

The muscular is organized on two thinly layers, superposed, one longitudinal layer and one circular, both of them consisted by smooth miocytes.
In the case of individuals from the LEP experimental group, the mucous of the caecal segment has an equal depth with that of control group, with dimension of approximately 358.15 μ. With all these, between the two groups there are a few differences regarding the morphological aspect of the mucous. Thus, in the case of individuals from LEP experimental group, the tubular glands are more rare, but very deep and with a more large lumenus (figure. 2). On extended surfaces, the epithelium that covers the glands is crossed by infiltrative cellular elements. In the large interglandular chorion is concentrated very much lymphoid tissue and are developed capillaries with more large lumenus. Similarly results were obtaining by Mojzi and all, 2004.

In the submucous of the caecal wall there are large lymphoid follicles, separated through conjunctive-muscular septa.

In the case of individuals from LEU experimental group, the microscopic images emphasized an easy hypertrophic process of caecal mucous, with an approximately 403.75 μ, thickness, and in basal chorion and in submucous is developed lymphoid tissue (fig. 3).
In the case of individuals from the LEUP experimental group, caecal mucous is easy hypertrophic because of glandular apparatus development in comparison with precedent groups. Periglandular and interglandular is emphasized a hypertrophy of vascular net, and the presence of a great number
of lymphoid follicles (fig. 4) and of infiltrative cells. The submucous contains large vascular packages.

Figure 4. Section through caecal wall – LEUP (HE, 200x)

CONCLUSIONS
1. In the case of individuals from LEP experimental group, in comparison with control group, tubular glands are more rare, but very deep and have more large lumens. On extended surfaces, the glandular epithelium is crossed by infiltratives cellular elements and in interglandular large chorion are concentrated very much lymphoid tissue and are developed capillaries with more large lumens.

2. In the case of individuals from LEP and LEUP experimental groups, the microscopic studies emphasized an easy hypertrophic process caecal mucous, more evident in the case of LEUP experimental group because of glandular apparatus development leukocytic infiltrate stimulation.

3. The medicinal plants utilization and of essential oils in broiler chicken nourishment stimulates the caecal mucous, generating an hypertrophic process manifested by glandular apparatus development, through capillary net hypertrophy and through leukocytic infiltrate stimulation, with role in local defending.
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