

# The Evaluation of Immune Response to Parasitic Agents in Sheep

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## Abstract

The study was been performed to emphasizing the dynamics of immunological parameters in healthy and parasitically infested youth sheep from different private herds from Timiș district. The researches were been made on 20 youth sheep 10-11 months aged from Țurcana breed divided in two groups: first group (M) comprised 10 healthy sheep periodic treated with antiparasitic drugs and the second group (E) contained 10 sheep who never received any antiparasitic drugs. All animals are clinical healthy, but those of E group are more skinny and have long and bristled fleece. From both groups were been taken blood samples in the view of evaluation the dynamics of unspecific immune response, represented by some parameters, like seric properdine, seric lysozime, phagocytic index and leucogramme. The obtained results confirm that immune system in infected animals always tried to counteract the noxious action of parasitic agents through increased values of studied parameters. A coproscopic examination of both studied groups identified first instar larvae of *Dictyocaulus filaria* and *Trichostrongylus* spp. in E group.

**Keywords:** leucogramme, phagocytic index, seric lysozime, seric properdine

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## 1. Introduction

The parasitism is a very complex phenomenon that involves host and parasite and established relations between them (2). At the moment of parasite penetration in the host organism, between the both creatures are establishing relations that follow to a conflict or not, more or less clinical or through lesions externalized. Usually, between host and parasite appear conflicts that follow to parasitic disease. The parasite has pathogen actions, through specific means against host that try to counteract through defending reactions implicating immune system (4, 5). All implicated reactions of the parasite on host result in more or less severe alterations externalized through body

weight decreased, low organic resistance and productions. This study try to emphasize the necessity of antiparasitic treatment application on farm animals, especially in spring and summer season and in zones where in every year there are problems related favorable conditions for parasites development. There are also emphasized the changes in immune system cellular parameters in incipient stages of parasitic diseases that can contribute to a precocious diagnostic establishing (5).

## 2. Materials and methods

The study was been performed on 20 youth Țurcana breed sheep 10-11 months aged from two private herds in Timiș district. In one of the private herds were been made antiparasitic treatments, while in the second herd there was made no antiparasitic treatments. From the first

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herd was been constituted the experimental group M, with 10 sheep prophylactic treated against parasitic diseases and from the second herd provided 10 sheep constituting the E experimental, never prophylactic treated against parasitic diseases. From the both groups of sheep were been taken blood samples for seric properdine, seric lysozyme, phagocytic index and leucogramme performing and evaluation. Seric properdine was isolated through inulin complexation and treated with biuret reactive, the intensity of color being colorimetric determined. Seric lysozyme was been performed on a Petri plaque with 2% nutrient agar with a culture of *Micrococcus lysodeicticus* incorporated on which were applied in similar made holes the serum extracted from blood samples. Through seric lysozyme diffusion in culture medium appear inhibition areas around serum application, their diameters being proportional with lysozyme concentrations that destroy *Micrococcus lysodeicticus* incorporated in culture medium. The phagocytic index is an indicator of some especialized cells functional capacity, like neutrophiles and lymphocytes and monocytes. The values of leucogramme offer data regarding alterations appeared in cellular defending system like a result of parasitic aggressions. Were been also taken faeces samples from both experimental groups and was made a coproscopic examination in the view of parasitic eggs or larvae discovering.

### 3. Results and discussion

The obtained results in the case of seric properdine, seric lysozyme and phagocytic index in M experimental group emphasized the fact that these animals are healthy and all studied parameters are between normal limits ( $11.92\pm 1.26$ ,  $6.21\pm 0.07$  and  $44\pm 1.23$ ) demonstrating that all animals are healthy (table 1). In the E group the situation is completely different because all studied immune parameters registered higher values, in comparison with the M group ( $17.88\pm 0.77$  seric properdine,  $11.41\pm 0.38$  seric lysozyme and  $45.88\pm 1.88$  phagocytic index) demonstrating a stimulation of these immune unspecific parameters secretion in correlation with severity of harmful effects of parasites (table 2). The sheep organism try to fight

against parasites actions through unspecific protective humoral factors like enzymes (lysozyme), glycoproteines (properdine) and cellular factors promoters of phagocytosis (phagocytic index). Leucogramme is also modified in the case of E group sheep with higher values in comparison with M group sheep (table 3). It is known that in parasitic diseases one of main mechanisms of immune system is the increase and activation of eosinophiles ( $3.2\pm 1.1$  in M group and  $10.1\pm 2.3$  in E group) initiated by some soluble mediators released by parasites and activated T lymphocytes (limphokines). These activated eosinophiles participate in starting of inflammatory reactions being degranulated and released enzymes and substances that take part in inflammation process. Neutrophiles registered an increase in E group ( $26.7\pm 3.2$ ) in comparison with M group ( $22.7\pm 2.1$ ) demonstrating an activation process of phagocytosis phenomena. Lymphocytes, cells implicated in immune specific response register a specific dynamics in the way of their number increasing ( $61.2\pm 7.8$  in M group and  $69.3\pm 4.7$  in E group). Lymphocytes are cells that in the course of immune response elaboration have the capacity to recognize the antigen, having on their surfaces molecules with receptor role, capable to specific recognizing of foreign antigenic determinants (6). Total leucocytes registered a numeric increasing in E group ( $12.1\pm 5.8$ ) in comparison with M group ( $10.3\pm 1.8$ ) because in parasitic diseases these immune cellular compounds through diapedesis initiate a migration phenomena out of blood vessels in the view of inflammatory sites localization, are implicated in defending processes (6). Monocytes had also increased values in E group ( $2.9\pm 0.4$ ) in comparison with M group ( $2.1\pm 0.6$ ) demonstrating their major effect in immune response in parasitic diseases, in incipient stages of this, with a decisive part in effecting phases through monocyte-macrophage system. After coproscopic examination were been discovered first instar larvae of *Dyctiocaulus filaria* and *Trichostrongylus* spp. in faeces samples provided from E group sheep. These are parasites from Nematoda class, Dictyocaulidae and Trichostrongylidae families, cylindrical worms who are localized in respiratory system (*Dyctiocaulus filaria*) and small intestine (*Trichostrongylus* spp.) in ruminants. Sheep from E group had also a

visible body weight decreased in comparison with those from M group and bristled long fleece. All these demonstrate the necessity of antiparasitic treatments application two times on every year, especially in endemic zone of parasitic diseases evolution, where last years were been registered parasitic infestations (1, 3). Cannot be obtain

sheep productions in herds where are not applied antiparasitic drugs, because parasitic infestation represents a constant stress for animals, blocking their normal consumption, productions, sometimes being lethal but always managing to economic losses.

**Table 1.** Obtained results in the case of M experimental group

Animals (n=10)	Seric properdine	Seric lysozime	Phagocytic index
1	13.89	6.13	43.66
2	12.93	6.19	43.11
3	12.14	6.16	44.19
4	13.66	6.16	47.06
5	11.00	6.22	45.60
6	11.08	6.15	45.09
7	11.77	6.20	45.88
8	12.00	6.30	45.11
9	10.66	6.28	44.02
10	10.11	6.36	43.55
<b>X±Sx</b>	<b>11.92±1.26</b>	<b>6.21±0.07</b>	<b>44±1.23</b>
<b>C.V.</b>	<b>10.61</b>	<b>1.13</b>	<b>2.75</b>

**Table 2.** Obtained results in the case of E experimental group

Animals (n=10)	Seric properdine	Seric lysozime	Phagocytic index
1	19.14	11.20	45.40
2	18.93	11.10	44.05
3	18.66	10.78	44.80
4	17.36	10.98	46.12
5	18.26	11.20	49.30
6	17.52	11.66	45.22
7	17.89	11.64	47.00
8	17.00	11.70	49.00
9	16.88	11.87	43.68
10	17.21	11.95	44.20
<b>X±Sx</b>	<b>17.88±0.77</b>	<b>11.41±0.38</b>	<b>45.88±1.88</b>
<b>C.V.</b>	<b>4.35</b>	<b>3.36</b>	<b>4.11</b>

**Table 3.** Leucogramme in M and E experimental group

Specification	Specification	M group	E group
Total leucocytes (10 <sup>3</sup> /mm <sup>3</sup> )		10.3±1.8	12.1±5.8
Polimorphonucleares (%)	Neutrophiles	22.7±2.1	26.7±3.2
	Eosinophiles	3.2±1.1	10.1±2.3
	Basophiles	-	-
Mononucleares (%)	Lymphocytes	61.2±7.8	69.3±4.7
	Monocytes	2.1±0.6	2.9±0.4

#### 4. Conclusions

The unspecific immune response average parameters (seric properdine, seric lysozime, phagocytic index) in M group are comprised between normal limits (11.92±1.26, 6.21±0.07, 44±1.23) while in E group are registered higher values (17.88±0.77, 11.41±0.38, 45.88±1.88), in

correlations with severity of harmful effects of parasites. Leucogramme, also modified in the case of E group sheep emphasized the numeric increases and activation of eosinophiles (3.2±1,1 in M group to 10.1±2.3 in E group), neutrophiles (22.7±2.1 in M group to 26.7±3.2), monocytes (2.1±0.6 in M group to 2.9±0.4 in E group), lymphocytes (61.2±7.8 in M group to 69.3±4.7 in

E group) demonstrating the major role of these cells in immune response elaboration, phagocytosis phenomena, antigen recognizing and, in one word, defence against parasites. The obtained results are sustained by first instar larvae of *Dictyocaulus filarial* and *Trichostrongylus* spp. discovered after examination of E group sheep faeces. The aspect of E group sheep correlated with the obtained results emphasized the necessity of antiparasitic treatments application in all sheep herds, two times every year, in the way of obtaining healthy animals, with normal consumption and high levels of productions.

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