State of the body of rabbits suffering from psoroptosis receiving Sel-Plex

Biology and Medicine

Research Article

Volume 6, Issue 3, Article ID: BM-043-14, 2014
Indexed by Scopus (Elsevier)
State of the body of rabbits suffering from psoroptosis receiving Sel-Plex

Claudia Aleksandrovna Sidorova*, Elena Nikolaevna Maslova, Natalia Anatolievna Cheremenina, Vladimir Nikolaevich Domatsky, Larissa Aleksandrovna Glazunova
State Agrarian University of North Zauralya, Street of Republic, 7, 625003, Tyumen, Russia.

*Corresponding author

Citation: Sidorova CA, Maslova EN, Cheremenina NA, Domatsky VN, Glazunova LA (2014) State of the body of rabbits suffering from psoroptosis receiving Sel-Plex. Biol Med 6(3), Article ID: BM-043-14, 5 pages.

Received: 25th Sep 2014; Accepted: 4th Dec 2014; Published: 19th Dec 2014

Abstract
The aim of our work was to study the manifestation of a pathological process taking into account changes in the dynamics of the blood of rabbits suffering from psoroptosis and to determine the role of selenium in the development of this invasion. There are changes in the morphological and biochemical composition of the blood of rabbits infested with psoroptosis. We studied the effect of organoselenium Sel-Plex feed additive on the growth and hematological parameters of rabbits. The results showed that administration of the Sel-Plex feed additive to the diet of rabbits reduces the risk of decreased productivity including the reduction of weight gain in rabbits. We revealed a significant increase in hemoglobin, erythrocytes, segmented neutrophils, total protein, glucose, magnesium, and zinc concentration.

Keywords: Rabbits; psoroptosis; Sel-Plex; morphological and biochemical parameters of blood.

Introduction
Psoroptosis is a widespread disease among rabbits that is caused by parasitic cutaneous mites – Psoroptes cuniculi. In most parasitic diseases, a host organism is a victim of “attack” of parasites. At the same time, the course of most infestations is similar to general pathologies of the body – they cause significant metabolic disorders in the host organism. Under the influence of the presence of parasites and the impact of their excreta, exo- and endotoxins host organism feels discomfort. Besides, it develops significant deviations from physiologically based normal ranges typical for these biological species. These changes are the basis of the manifestation of the pathological process in most parasitic diseases [1,2].

Balanced diet should be one of the necessary conditions for the rapid recovery of the animals. The lack of minerals and vitamins in feed reduces immune responses, efficient use of nutrients, causes diseases and mortality, worsens quality of meat and pelts of fur animals.

The reserve of selenium is important for the health of all animals. Selenium deficiency is most commonly seen in young animals immediately after birth. Selenomethionine is a form of selenium that is the most suitable for the physiological processes in the tissues of animals. It has enormous advantages over inorganic forms of selenium in terms of the viability of young animals, their health and productivity. It also improves a meat quality [3].

Sel-Plex is an organic form of selenium yeast. It is a proprietary of the Alltech Company, the only one approved by the Food and Drug Administration. It was the first form of organic selenium approved by the European Union.

The relevance of the discussed issues as well as the lack of information on the effect of organoselenium Sel-Plex feed additive on the body of rabbits suffering from psoroptosis were motivating factors in writing this paper.

Methods
The experimental work was carried out in 2002-2013 years on the rabbit farm JSC “Roshinsky” of the Tyumen region, as well as in
the departments of State Agrarian University of North Zauralya.

We took into account clinical signs of the disease, epizootological data as well as microscopic examination of scrapings of the animal skin when diagnosed rabbits with psoroptosis.

Experiments on the effect of Sel-Plex feed additive on the weight gain of rabbits were performed in a production environment of JSC Roshinsky – department No. 1 and No. 3. For this purpose, we selected 150 rabbits at the age of 2-4 months and divided them into three groups (two experimental groups and one control group) with 50 animals in each group. All the groups had similar housing and feeding conditions. Besides rabbits from the first experimental group received Sel-Plex feed additive. In November, mites, P. cuniculi, were put in the ears of all animals from experimental groups. Accounting of the results was carried out in a period of 4 months from December to February inclusive. Every month animals were weighed and body weight gain was determined and accounted for.

Samples of blood for the morphological and biochemical tests were taken from the vein of the outer surface of the ear following by their investigation using conventional methods.

Results and Discussion

According to the results of the research (2002-2013 years), it was established that psoroptosis in the rabbit farm JSC Roshinsky has the annual spread with an extent of infestation (EI) equal to 48.4 ± 4.2% on the average. The incidence of psoroptosis was recorded throughout the whole calendar year. Infestation of animals by psoroptosis pathogen depends on the age of the former. So, young rabbits are more susceptible to the disease than adult ones. If an extent of infestation of adult animals was 43.6 ± 3.8% on the average, the infestation of young in terms of extensiveness value was 53.2 ± 4.5%.

Along with the study of the extent and dynamics of infestation of rabbits by psoroptosis, we have analyzed the degree of severity of the disease including those animals that received the Sel-Plex feed additive. Preliminarily rabbits from departments 1, 2, 3, and 4 were arbitrarily divided into two groups. Rabbits from departments 1 and 2 received Sel-Plex feed additive. Results of the research are presented in Figures 1 and 2.

From Figures 1 and 2, we can see that rabbits not receiving Sel-Plex feed additive have the disease of medium form of severity (52.2%). A mild form was typical for 32.9% of animals, severe form – for 14.9%. In rabbits treated with the Sel-Plex feed additive there is domination of a mild form of psoroptosis (53.2%). The form of a medium severity was observed in 41.8% of cases, and severe form – in 5%.

The dynamics of change of a live weight has particular importance in the study of the manifestation of the invasion process.

As a result of experiments, it was found that the rabbits experienced a decrease in the average daily weight gain compared to average values of animals from the control group (apparently healthy): in the first group by 25.9% (2.9 g),
in the second by 29.7% (5.4 g) (Table 1). Analyzing the absolute live weight gain of rabbits during the period of experience, it should be noted that the weight gain of animals from the experimental group receiving the Sel-Plex feed additive was significantly higher than such value in the second experimental group, i.e., the rabbits that did not receive the feed additive had a weight gain by 13.7% \( (p < 0.001) \). Provision of the diet with biologically active substances reduces the risk of reducing the productivity including the reduction of weight gain in rabbits.

Blood is the body’s internal environment. Functions of blood are intended to maintain relative constancy of the composition of this medium, so blood participates in maintaining of homeostasis. Therefore, the peripheral blood composition primarily reflects the state of hematopoietic organs, as it is the derivate of such organs. At the same time, the system is closely related to the whole body and is under complex regulatory influence of humoral-endocrine and neural mechanisms \[4\]. Morphological and biochemical blood parameters are important as well as determination of natural resistance in order to assess the immunity of the organism \[5,6\].

The dynamics of changes in the morphological and biochemical blood parameters of rabbits in the manifestation of psoroptosis invasion is presented in Figures 3-5.

In rabbits infested by psoroptosis that did not receive the Sel-Plex feed additive, there is a considerable decline in the number of red blood cells and hemoglobin by 62.5% and 42.7% compared with the control group. However, in infested animals there’s significant leukocytosis and change in WBC count, namely, an increased number of eosinophils – 10.20 ± 0.7% and a decrease in the number of segmented neutrophils – down to 30.10 ± 0.6, which indicates the appearance of inflammatory and allergic processes.

Changes in blood biochemical parameters of infested rabbits are presented by the reduction in protein (55.1 ± 0.7 g/l), and hence there is a dysfunction of free fatty acids and mineral substances transport. Decrease in the amount of total protein occurs mainly due to low

### Table 1: The dynamics of weight gain in rabbits depending on the severity of psoroptosis.

<table>
<thead>
<tr>
<th>No.</th>
<th>Group of animals</th>
<th>Rabbit weight before the experiment (g)</th>
<th>Rabbit weight (g)</th>
<th>An average daily weight gain (g) (mean)</th>
<th>As % of the control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo 1</td>
<td>Experimental</td>
<td>1650.6 ± 21.0</td>
<td>3486.6 ± 31.2</td>
<td>15.3 ± 0.3</td>
<td>84.1</td>
</tr>
<tr>
<td>Photo 2</td>
<td>Experimental</td>
<td>1656.0 ± 23.8</td>
<td>3191.3 ± 23.8</td>
<td>12.8 ± 0.2</td>
<td>70.3</td>
</tr>
<tr>
<td>Photo 3</td>
<td>Control</td>
<td>1652.8 ± 27.3</td>
<td>3836.8 ± 23.1</td>
<td>18.2 ± 0.3</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Figure 3: Hematological parameters of rabbits.

- Control
- 1st test group
- 2nd test group
molecular weight fractions: α-globulins by 17.2%; β-globulins – by 54.2%; γ-globulins, which constitute the bulk of immunoglobulins, by 29.3% as compared to the control group of rabbits.

Along with these changes, there is an increase in the amount of phosphorus (1.18 ± 0.07 mmol/l) while the amount of calcium is normal (2.10 ± 0.3 mmol/l) indicating a violation of phosphoric calcium ratio, leading to the lower productivity of animals as calcium and phosphorus are structural and regulatory elements of physiological processes. Calcium also plays an important role in the normal RBC and hemoglobin concentration in blood [7,8].

There is a reduction in the amount of magnesium and zinc by 41.7% and 39.3%, respectively. The main function of zinc is to stabilize insulin molecule. In addition zinc deficiency affects color of the hair – it becomes dull, there are bald areas leading to the development of dermatitis [9,10].

Figure 4: Hematological parameters of rabbits.

Figure 5: Hematological parameters of rabbits.
Conclusion

Analyzing the research data, we can conclude that changes in the morphological and biochemical composition of the blood are typical for rabbits infested with psoroptosis. This indicates the disturbances in protein, carbohydrate, vitamin, and mineral metabolism. So, not only the affected areas are in danger, rather the whole body is affected.

In rabbits of the experimental group that received the Sel-Plex feed additive there is an absolute increase in the body weight by 13.7% compared with the control group of animals being on a normal diet. In animals of the experimental group, we have also recorded a significant increase in hemoglobin concentration by 26.24%, red blood cells – by 12.6%, segmented neutrophils – by 11.3%, total serum protein – by 13.5%, glucose – by 21.7%, magnesium – by 4.6%, and zinc – by 11.5% as compared to the rabbits of the control group.

Thus, Sel-Plex has a positive effect on the hematological and biochemical parameters of the blood of animals which indicates the activation of metabolic processes in the body of rabbits including such invasion as psoroptosis of rabbits.

References


