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THE EFFECT OF ACORUS CALAMUS PREPARATIVE FORMS ON THE BLOOD MORPHOLOGY AND BIOCHEMISTRY

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Influence of preparative forms of Acorus calamus on morphological and biochemical parameters of sheep blood at strongylatosis of gastrointestinal tract is determined. Tincture, decoction and extracts contribute to the normalization of morphological and biochemical blood parameters, high therapeutic efficacy in strongylatosis of the gastrointestinal tract.

Anthelmintic intervention is necessary in most parasitic disease cases, however, only beneficial to the extend its effects do not outweigh the benefits. Plant based solutions offer an alternative. Herbal medicine works like that. That is the reason why people try to find new medicinal herbs, they make a research and use these herbs in a vet medicine practice.

Our objective is: to determine the effect of preparative forms (decoction, tincture, liquid and thick extract) of sweet flag on morphological and biochemical sheep blood counts.

The research was conducted among sheep aged 1-2 years, invaded by strongylata of the gastrointestinal tract. We formed 6 groups. Each of them included 10 sheep.

We made an enteral drug administration to all sheep: Group 1 – decoction of calamus (dose: 5 ml/kg 2 times a day for 3 consecutive days); Group 2 – tincture of calamus (dose: 0,5 ml/kg body weight twice with an interval of 24 hours); Group 3 – liquid extract of calamus (dose: 0,2 ml/kg body weight twice with an interval of 24 hours); Group 4 – a dense extract of calamus (dose: of 0,1 mg/kg body weight twice with an interval of 24 hours); 5th Group – 20% tetramizole granulate (dose: 3,75 mg/kg body weight, once). Sheep of the 6th group served as a control and did not receive the drug. Blood was taken for blood counts before the administration of the drugs and on 1, 3, 5, 10 and 14 days after their use.

We measured the number of RBC and hemoglobin in all the invasive animals before the drug administration. The number of red blood cells was from 5,1 ± 0,57*10^{12} /l to 5,9±1,1 10 *12 / l and hemoglobin from 80,1±1,19 g/l to 85,0 ± 1,33 g/l. The new results were less than the acceptable level for healthy animals.

After the drug administration of preparative forms of calamus we determined an increasing number of red blood cells and hemoglobin among animals of the experimental groups by 5 days: group 1 – 29,3% and 31,1%, group 2-22% and 16%, group 3-30% and 37,9%, group 4-28% and 25,1%. Group 6 did not get preparative forms of calamus that’s why their blood counts were on the same level.

On the 3rd day of the experiment the level of leucocytes (groups 1, 2, 3, 4) increased – 10%, 11,9%, 19,1%, 14,9%. By the end of the experiment, number of leukocytes in all experimental groups decreased to a normal level: 1st – by 65,3%, 2nd – by 56,9%, 3rd – by 41,7%, 4th – by 46,4% if we compare with the numbers in the beginning of the experiment.

The level of eosinophils before the experiment was high. However, by the 3rd day of the experiment, the level of eosinophils in all the experimental groups started to decrease as compared with the control by 29,3%, 19,9%, 20%, 32,2, and 48,4%, respectively. By the 14th day - the number of eosinophils in animals of the experimental groups decreased by 40,3%, 50%, 52,8%, 54,9% and 70,8%, respectively.

Studies have shown that the use of 20% tetramizole granulate decreased the level of leukocytes and eosinophils by the end of the experiment. The level of hemoglobin and red blood cells increased.

Sick sheep had decreased level of total protein content (by 9,79%) and albumin level (by 26,64%) and a lower amount of urea in the blood serum (by 30,28%).

By the 10^{th} day of the experiment we have determined changes of the protein metabolism of experimental animals. All the animals who got preparative forms of sweet flag had increased level of albumin and urea. At the same time sheep which got 20% tetramizole had decreased level of albumin and urea.

By the 14th day of the experiment we have determined changes of the level of the total protein. All the animals who got preparative forms of medicinal plants had increased level of the total protein by 6,3% if you compare with the level before treatment. Moreover, the concentration of albumin was within the reference values.

Sick animals: the glucose level and the concentration of triglycerides were decreased (by 37,8% and 52,0%) and the total cholesterol level was higher by 23,07% (as compared with) as compared with healthy sheep.

By the 10th day after anthelmintic treatment, sheep who received herbal preparations had increased level of the glucose concentration (4,05±0,74 mmol/l) by 56,2%, triglycerides (0,71±0,24 mmol/l) – by 28,5%.

By the 14th day after anthelmintic treatment, using preparations based on medicinal herbs, sheep from groups 1-4 had the glucose level in the blood serum from 3,06-4,62 mmol/l, triglycerides – 0,58-0,74 mmol/l. These counts are normal for clinically healthy sheep.

At the same time, sheep treated with tetramizole (group 5), even by day 14, did not restore the integral indicators of energy exchange, glucose continued to decrease (31,8% lower if you compare with the period before treatment), the level of triglycerides decreased by 14,6%, the total cholesterol content also was decreased.

We have analyzed the activity of enzymes of invasive animals before the drug administration. The activity of alkaline phosphatase and alanine aminotransferase was higher than healthy animals had.

During the first 10 days of the drug administration, when invasive sheep were treated with herbal preparations and tetramizole, we did not find

significant changes of the activity of the enzyme system. From the 10th day of experiment we have noticed a decreased activity of alkaline phosphatase, ALT and GGT. Some increasing level of AST activity was found too. By the 14th day of the experiment all sheep, who received herbal preparations, had the normal level of alkaline phosphatase. ALT activity also decreased and AST activity increased, which led to the alignment of the AST/ALT ratio of healthy animals. The activity of GGT in animals treated with herbal preparations for 14 days was (30,68±4,56 U/L), which is close to the enzyme activity in healthy animals (31,13±1,45 U/L).

It should be noticed that sheep who were treated with tetramizole as a drug, by the 14th day, had the enzymatic activity of blood serum which is close to sick animals levels. Thus, even being treated a strong invasion, metabolic processes of animals who got tetramizole did not recover after 14 days of experiment.

Conclusion. 1. The use of preparative forms of rhizome of calamus contributes to the normalization of the number of red blood cells and hemoglobin in the sheep blood, which indicates the activation of hematopoiesis.

2. Infection of sheep with strongylates of the gastrointestinal tract leads to decreased level of total protein by 9, 79%, albumin – by 26, 64%, urea – by 30, 28%, glucose – by 37, 8%, triglycerides – by 52, 0% as compared with healthy animals.

3. The drug administration of decoction, tincture, liquid and thick extract of rhizome of calamus led to the normalization of all the main metabolic parameters by the 14th day of experiment.

4. Sheep who got tincture, liquid extract and thick extract based on rhizome of calamus had more pronounced normalization of metabolic processes, than ones who got decoction.

5. Preparative forms of rhizomes of calamus are effective for strong invasion treatment.

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STUDY OF THE INFLUENCE OF SILVER NANOPARTICLES ON THE MORPHOLOGY OF BACTERIAL CELLS OF *ESCHERICHIA COLI* BY ATOMICALLY POWER MICROSCOPY

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Over the past decades, methods of scanning probe microscopy, including atomic force microscopy (AFM), have become rapidly developed, which have become an effective tool for solving a variety of research problems. The use of AFM in microbiological studies made it possible to obtain important and even unique information about the properties of the studied objects, to measure the morphological characteristics of biological objects, to determine the features of small-sized systems, to visualize the surface profile of the sample with nanometer resolution and obtain high-quality images of bacterial cells [2–4].