Pathomorphological changes in the body of karakul sheep with gossypol toxicosis

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Abstract. In the article we provide examples of the essence of accumulation in the body of gossypol in sheep. The influence due to the accumulation of gossypol in the digestive tract has been revealed. The characteristics of poisoning with meal and husks when feeding sheep are given, and methods for the prevention of diseases caused by gossypol are described. There is still a need to obtain high-quality astrakhan skins, which are obtained after fattening sheep. During fattening, significant mortality is often observed with the diagnosis of gossypol toxicosis and to date, gossypol poisoning has not been fully studied. Purpose of the study: The research was carried out in a special complex for fattening astrakhan sheep and obtaining astrakhan sheep in the Samarkand region of Uzbekistan. To study pathomorphological changes in fattening Karakul sheep with gossypol toxicosis.

1 Introduction

The study of toxic damage by gossossexual toxicosis according to the proposed method is one of the most serious veterinary problems, which causes a high level of morbidity and economic costs for the treatment process. In this regard, the relevance of the study is aimed at the prevention of gossypol toxicosis in sick Karakul fattening sheep. In Central Asia, including Uzbekistan, astrakhan sheep breeding is most widespread, which, in addition to meat, produces highly valuable astrakhan sheep and broadtail. At the same time, pathomorphological changes in the body of Karakul sheep with gossypol toxicosis, these animals are not used enough, as evidenced by the presence of infertility in sheep, insufficient production of lambs and valuable fur.

The main reasons for this situation, in addition to the creation of conditions that meet the evolutionarily developed physiological needs of the body, are insufficient knowledge in the body of sheep, as well as the lack of scientifically based methods of clinical signs in sheep, which would make it possible to make the most of the biological characteristics of animals and prevent them. An analysis of the mortality of ewes in recent years has shown that diseases with clinical poisoning occur annually, although the percentage of incidence and mortality differ sharply depending on climatic conditions, the presence of green mass

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in the diet and the quality of meal and husks. During long winters, sheep receive only cotton meal and husks, and the incidence of disease increases sharply.

Cotton seed cake contains the toxic substance glucoside gossypol. Poisoning occurs when feeding large quantities of cake for a long time. All types of animals are sensitive, especially young animals; poisoning of newborns through mother's milk has been observed. Gossypol has the ability to accumulate in the body, so poisoning occurs 10 to 30 days after stopping feeding. The potential danger of cotton meal produced at the main enterprises of Uzbekistan in the occurrence of gossypolotoxicosis in sheep has been determined. The relationship between the level of free gossypol in the meal and the nature of the physiological effect has been clarified. It has been proven that in the polytropic mechanism of the toxic effect of gossypol on the body of sheep, the central place is occupied by liver pathology, membrane toxicity, and its adverse effect on the blood and digestive system. A pronounced gonadotoxic and embryotoxic effect of gossypol on productive animals has been established, and for sheep it is selective. Rules for veterinary and sanitary examination of slaughter products for gossypolotoxicosis of sheep have been developed. Based on a comprehensive study of the characteristics of the toxic effect of gossypol-containing feed on farm animals and poultry, the maximum permissible levels (MAL) of gossypol in feed for fattening groups of sheep, which are 0.26, have been scientifically substantiated; 0.28 mg/kg weight, respectively. For the first time, as a result of a comprehensive study of the characteristics of the pharmacological action, its high detoxification activity in relation to gossypol in feed was established, leading to a decrease in their toxicity to the body of sheep. The theoretical significance and practical value of the work is determined by the fact that, based on a comprehensive study of the characteristics of the toxic effect of gossypol-containing feed on the animal body, the importance of using gossypol cotton feed in diets as an effective detoxifier of gossypol and reducing negative effects has been scientifically substantiated and experimentally proven. It also consists of developing recommendations for the prevention of gossypolotoxicosis in sheep and their implementation in sheep farms of Uzbekistan; in establishing safe periods for slaughtering sheep that have suffered gossypol poisoning for meat for food purposes and maximum permissible levels of poison in cotton feed.

2 Materials and methods

To study clinical signs and pathomorphological changes, two groups of 30 heads of sheep each were allocated.

1-Group of sheep during the fattening period (3-4 months) were intensively fed only meal and husks.

2-Group of sheep, along with cotton-produced feed, also received green fertilizer, and sometimes were released to pasture.

After 2.5-3 months in the 1st experimental group, approximately 20-25% of sheep showed lameness in one or two limbs, more often in the hind limbs.

Gradually the disease progressed. Some sheep had conjunctivitis and alopecia of the skin. In group 2, two sheep fell ill.

3 Results

When examining the carcasses of killed animals of the 1st group, attention was drawn to the low fatness of most animals, the yellowish tint of the subcutaneous fatty tissue, and the presence of exudate in the abdominal cavity. The liver is unevenly colored: gray-red areas
alternate with yellow-brown ones. Often there are grayish necrotic foci that penetrate deeply into the parenchyma. The liver is swollen and fragile.

Histological examination reveals a vascular reaction in the form of stagnation and hemorrhages. The walls of the vessels are loosened and thickened. Discomplexation of the hepatic beams is observed with the development in some cases of a cirrhotic process. The development of parenchymal degeneration in hepatocytes and the appearance of yellow-brown granular pigment in the cytoplasm of macrophages is also characteristic. Cells with granular pigment are found in the inter-rod space, around the central vessels. The number of such cells varies.

The buds are flabby, sometimes softened, swollen, the capsule can be removed easily, the color is uneven, dark clay. On the section, the parenchyma protrudes sharply to the surface. Histological changes are characterized by vascular congestion and necrosis of the convoluted tubules of the kidneys.

In some sheep, necrosis is diffuse; in others, only individual tubules are necrotic. At the same time, there is an expansion of interstitial connective tissue. Brown pigment is detected in the epithelium of the tubules.

The cavity of the cardiac membrane often contains 50-100 ml of a cloudy, viscous liquid. Sometimes there are pinpoint hemorrhages under the epicardium, the coronary vessels are full of blood. The myocardium is flabby. The myocardial muscle fibers are thinned, unevenly colored, and the striations are shaded. The stomachs are filled with dryish food mass, consisting of husks and meal; the leaves of the book are easily torn. The mucous membrane of the abomasum is pale with isolated pinpoint hemorrhages.

In 10 sheep, small focal ulcerations were noted on the abomasal mucosa. Serous enteritis occurs.

In most experimental sheep, changes were found in the joints of the limbs, most often the pelvic, femoral and knee. They are increased in volume, mobility is limited, the synovial fluid is cloudy, yellowish, viscous, the articular surface is reddened. There are isolated hemorrhages in the joint capsule.

4 Discussion

A biological feature of the Karakul breed of sheep is to prevent them from gossypol toxicosis, which is associated with evolution in certain climatic conditions, aimed at preserving the species.

This is generally known.

However, the essence of this process has not been revealed. And, in particular, the features of pathomorphological changes in the body of Karakul sheep with gossysexual toxicosis have not been studied. We are the first to present the opportunity to study and examine pathomorphological changes in the body of Karakul sheep with gossypol toxicosis.

4.1 Bottom of the stomach of sheep

Hematoxylin-eosin staining:

- Mucous membrane - catarrhal-hemorrhagic changes.
- Submucosa.
- Muscular layer.
- Serous membrane.
- Epithelium.
- Lamina propria of the mucous membrane.
- Muscular plate of the mucous membrane.

Fig. 1. Bottom of the stomach of sheep.

4.2 Pylorical part of the stomach of sheep

Hematoxylin-eosin staining:
- Mucous membrane - catarrhal-hemorrhagic changes.
- Submucosa.
- Muscular layer.
- Lamina propria (contains glands).
- Pits in the mucous membrane.
- Muscular plate of the mucous membrane.

Fig. 2. Mucous membrane - catarrhal-hemorrhagic changes.

4.3 Bottom of the stomach, Pylorical part of the stomach

Hematoxylin-eosin staining:
- Epithelium brown pigment is detected in the tubules, serous enteritis occurs in ulceration.
• Pits in the mucous membrane.
• Glands in the lamina propria.

![Fig. 3. Epithelium brown pigment is detected in the tubules, serous enteritis occurs in ulceration.](image)

5 Conclusion

• Gossysexual poisoning in sheep occurs due to monotonous and excessive feeding of cotton-based feed.
• The first clinical signs are arthritis, accompanied by lameness; body weight decreases in the 2.5-3rd month of experience.
• Gossysexual poisoning of sheep is pathomorphologically characterized by dystrophic-necrotic processes in the liver and kidneys, serous catarrh of the gastrointestinal tract, and arthritis. In case of gossypol poisoning of sheep, a yellow-brown granular pigment is constantly detected in the macrophages of the liver and the epithelium of the convoluted tubules of the kidneys.
• The main pathomorphological disorders in gossypolotoxicosis of small ruminants were vascular changes, characterized by dystrophic lesions of the walls of blood vessels, increasing their depravity
• severe hemodynamic disorders, the appearance of edema and hemorrhages in organs, as well as dystrophic and necrobiotic changes in the cells of the liver, kidneys, heart, lungs, spleen with phenomena of catarrhal-hemorrhagic inflammation of the mucous membrane of the stomach (abomasum) and small intestine.
• Gossypolotoxicosis is characterized by a high degree of material accumulation of poison in the body of animals. At the same time, the storage organs in laboratory animals are: liver, thymus, lymph nodes and kidneys, then, in descending order - adipose tissue, testes and muscles. The highest levels of free gossypol are found in the spleen and liver of sheep, and lower levels in the myocardium and muscle tissue. Introduced into the body of animals. The duration of circulation of gossypol in the body of sheep is, on average, 30-35 days.
• The safe time for slaughtering Karakul sheep that have suffered gossypol poisoning for meat for food purposes is 35 days after cessation of contact with cotton feed.
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