

The Importance of Chitozan Suctinat in Lamb Colibacteriosis

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Received 2022 February 2; Revised 2022 March 20; Accepted 2022 April 24

Аннотация

Мақолада кўзилар колибактериозига қарши ГОА формоль вакцина ва хитозан сукцинат ассоциацияси қўлланилганда организмда иммун тизим барқарор бўлиши ҳамда табиий шароитда колибактериоздан зарарланган кўзиларда патологоанатомик ва гистологик ўзгаришларнинг натижалари келтирилган.

Аннотация

В статье представлены результаты патологоанатомических и гистологических изменений у ягнят, пораженных колибактериозом в естественных условиях, а также стабильность иммунной системы в организме при применении формольной вакцины ГОА и хитозан сукцинатной ассоциации против колибактериоза ягнят.

Summary

The article presents the results of pathological and histological changes in lambs affected by colibacillosis under natural conditions, as well as the stability of the immune system in the body with the use of GOA formol vaccine and chitosan succinate association against lamb colibacillosis.

Калит сўзлар:

колибактериоз, иммуноглобулин,
агглютинация, хитозан, иммуностимулятор,
вакцина, плазмочит, лимфобласт,
фибробласт, ателектаз, экссудат, гемостаз,
плазморрагия.

Key words:

colibacillosis, immunoglobulin,
agglutination, chitosan, immunostimulant,
vaccine, plasmocyte, lymphoblast, fibroblast,
atelectasis, exudates, hemostasis,
plasmorrhagia.

Introduction

The economy of our nation suffers greatly from colibacillosis in young animals, as can be seen over time on the example of all farms. Colibacillosis in young animals is observed to be 13-50.8 % in the United States, 11-29 % in Canada, 6 % in the Netherlands, 58 % in France, 4 % in the United Kingdom, 6 % in Australia, and 6-47 % in Israel, according to B.F. Bessarabov and E.S. Voronin (2007).

Our research focuses on developing market-competitive biopreparations using regional resources, taking into account the dearth of veterinary medications in private, subsidiary farms and the surge of imports from other nations. It is feasible to avoid spending state

money on foreign imports by using the biopreparations created by the Veterinary Research Institute.

The national economy currently places a high value on the usage of natural, organic, and pure ecological products. Pure natural ecological products are especially crucial in the fields of agriculture, veterinary medicine, medicine, and biotechnology. The inherent resistance in an animal's body is increased and the immune system is stabilized when veterinary medications are enriched with organic, ecologically pure natural components.

Colibacillosis is an acute infectious disease that affects young animals and is characterized by colitis, severe diarrhea, septicemia, and weakness. It most commonly affects newborn calves between the ages of 2 and 7 years, piglets, lambs, and chickens between the ages of 1 and 3 months, as well as fur animals between the ages of 1 and 5 who are regularly exposed to *E. coli*.

It is normal for the animal's immune system to be compromised, which makes infections and invasive diseases more likely to occur (respiratory, gastrointestinal). In particular, when lambs contract colibacillosis, this illness exacerbates the economic harm. The immune system, morphopathological state, and morpho-functional state of the body are all negatively impacted by antibiotics used to treat this type of disease.

Object, materials and methods of research

The research was conducted in the laboratories of Microbiology and patanatomy of the Veterinary research institute, Immunology laboratory of the Samarkand diagnostic center "Sangzor", the Department of patanatomy of the Samarkand medical institute and the farm "Nurli Diyor" in Konimeh district of Navoi region.

Enrichment of the vaccine against colibacillosis with a natural, ecologically pure compound "chitosan succinate" is the main criterion of our experience. To study the prophylactic efficacy of chitosan succinate (4%) in the "GOA formol vaccine against colibacillosis of farm animals" prepared in the Laboratory of Microbiology of Veterinary Research Institute in the experiment, serological and immunological reactions in the body of lambs vaccinated with the vaccine + chitosan, as well as pathoanatomical and histological studies in their natural disease were studied in 30 head of lambs divided into 3 groups.

Ten experimental group I lambs were injected subcutaneously with the addition of a natural organic, environmentally friendly chitosan succinate (4% solution) to the GOA formol vaccine against farm colibacillosis.

10 animals were vaccinated in Experimental Group II only with "GOA Formol Vaccine against Colibacillosis of Agricultural Animals".

Group III was the control group and no drugs were administered to them.

Results of research

The body's fight against microbes is determined by the amount of immunoglobulins and their effect on pathogens. Immunoglobulin-E and immunoglobulin-D are almost undetectable in farm animals (F.J. Bourne et al. 1978). IgM from macroglobulins occurs in the early stages of immune reactions. IgG is the main immunoglobulin in the serum, there are two types of Ig-G1 and Ig-G2. In addition to immunoglobulins, the main cell elements of the body are

macrophages (monocytes), as well as active T and V lymphocytes, which ensure the body's resistance to microorganisms and viruses (Grin S.A., Albulov A.I., Ruban E.A., Grin A.V.). Antibiotics used in the treatment of the disease adversely affect the morphological and pathological condition of tissues and cells of the body. Although environmentally friendly, pure chitosan preparations have been extensively studied in the plant kingdom, the extent of their effects on animals and their concomitant use with vaccines have not been studied.

An experiment to study the effectiveness of the vaccine against colibacillosis in lambs with the addition of a solution of chitosan succinate (4%) was conducted in 30 lambs. To do this, lambs were divided into 3 groups of 10 heads, the first group was vaccinated subcutaneously with 1 ml of GOA formol vaccine against colibacillosis and Ch: succinate (4%) association, (revaccination-2 ml), the second group was vaccinated subcutaneously in an amount of 1 ml (revaccination-2 ml) of GOA formol vaccine against colibacillosis. The third group was under control and no drugs were administered to them (Table 1).

Study of the effectiveness of the association of GOA formol vaccine and chitosan succinate against lambs colibacillosis

Table 1

Groups	Num ber of anim als	Drug and quantity to be sent	Place	The causative agent of the disease	The amount of damage	Result
I experimenta l group	10	Vaccine + Chitosan succinate 3 ml	intramuscu larly	E.coli	LD ₁₀₀ (25 billion microthane)	96,2
II experimenta l group	10	Vaccine 3 ml	intramuscu larly	E.coli	LD ₁₀₀ (25 billion microthane)	94,3
III control group	10	—	intramuscu larly	E.coli	LD ₁₀₀ (25 billion microthane)	0

As shown in the table, lambs in all groups were infected with E. coli on the 21st day of the experiment in the amount of 25 billion microbial bodies. As a result, no deaths were observed in the first group of lambs. In the second group, symptoms of the disease appeared in two head lambs on days 3-4 of the disease. Lambs in this group with symptoms were treated with "hyperimmune serum against colibacillosis and salmonellosis of farm animals." All control lambs were affected on days 5 and 7 of the experiment and showed signs of disease. They lost 2 animals as a result of slow heartbeat and difficulty breathing. The remaining animals were treated with "hyperimmune serum against colibacillosis and salmonellosis of farm animals".

The results of these studies showed that, depending on the agglutination reaction and the date of formation of immunoglobulins, if in lambs using a 4% association of chitosan

succinate with the GOA formol vaccine against colibacillosis, the duration of immunity was high and the efficacy was 93.6%, in the second group where the GOA formol vaccine against colibacillosis was administered, the efficacy was found to be 87.4% (the difference between the two experimental groups was studied to be 1.07 times).

The studies analyzed the agglutination response, S-reactive protein, and immunoglobulins (IgM and IgG) in lambs before and after vaccination before the administration of the GOA formol vaccine against colibacillosis and the 4% association of "naturally activated" chitosan succinate. The research was conducted in the laboratories of microbiology of the Veterinary Research Institute and immunology of the diagnostic center "Sangzor" in Samarkand.

***Chitosan succinate preparation and vaccine association
immunological analysis.***

Table 2

Groups	Number of animals	Types of analysis				
		AR titer (average before experiment)	AR titer (average after experiment)	the norm of reactive protein C 0,1- 0,3 mg/l	IgM norm 0.4-2.3 mg/l	IgG norm 7-16 mg/l
I experime ntal group	10	1:37,6	1:880	0,34±0,025	2,7±0,22	19±0,95
II comparati ve group	10	1:35	1:760	0,28±0,015	2,2±0,143	16±1,152
III Control group	10	1:40	1:17,2	0,1	0,35	6

Table 2 shows that in the first group of experimental animals, the AR (average) titer increased 1: 37.6 times before the experiment and 1: 880 after vaccination, i.e., the titer increased 23.4 times after vaccination, in the second experimental group (comparatively studied), the AR (average) titer increased 1:35 before the experiment and 1: 760 after vaccination, i.e., the titer increased 21.7 times after vaccination, in the control group of the third group, the AR (average) titer was found to be 1:40 before the experiment and 1: 17.2 after the experiment period. According to the table, the mean level of colibacillosis pathogens in immunoglobulin IgM in the lambs of experimental group I was 0.4 mg/l higher than the norm in this group, in the comparative experimental group II is normal, the lambs in group III were 1.03 less than the norm. The amount of C-reactive protein was found to be 1,133 times higher than normal in experimental group I. In the II comparative experimental group was at the norm level, the first group was found to be 1.21 times higher than in the II comparative experimental group. When the chronic course of the disease was determined by changes in IgG, it was found that experimental group I was 1.65 times higher than normal, and group II

was 1.19 times higher than normal. In particular, these indicators showed high levels of IgM and IgG in the first group, a small difference compared to group II, and a much higher efficiency than in group III.

In the conditions of production at the farm "Nurli Diyor" located in Konimeh district of Navoi region, the internal organs of lambs naturally infected with colibacillosis were studied using pathological and histological methods.

On pathohistological examination of the internal organs of lambs, the main changes are often in the parenchymal organs, and they are characterized by a strong development of hemodynamic and dystrophic processes. Cardiovascular dilation, vascular wall cells swollen, endothelial migration, cell clusters of histiocytes, lymphoids, and leukocytes around some vessels were observed. The muscles were divided into fibers, and some fibers underwent granular dystrophy (Fig. 1).

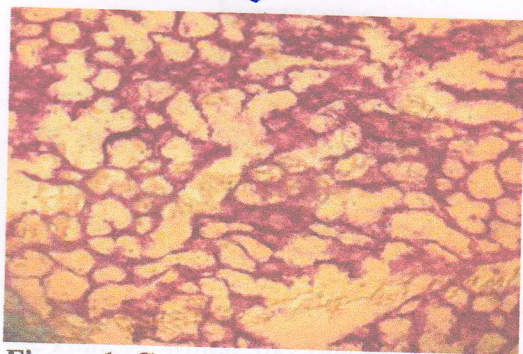


Figure 1. Granular dystrophies in the myocardium

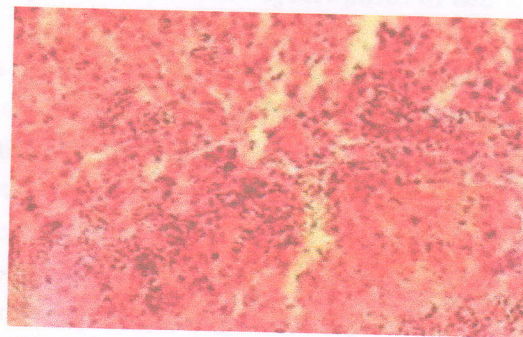


Figure 2. Hemorrhagic necrosis of the lungs .

Hemorrhagic necrotic pneumonia is also strongly developed in the lungs. Most alveolar cavities are filled with erythrocytes. The inter-alveolar capillary networks dilated and filled with blood, resulting in thickening of the barriers as well as the binding of connective tissue fibers. As a result of these changes, a significant portion of the lung parenchyma underwent atelectasis. The interstitial tissue is also swollen in all parts of the lung (Fig. 2).

Necrotic foci formed in the liver are often located near large blood vessels, the central part of which consists of cell detritus, chromatin granules. The periphery of necrotic foci is bordered by lymphoid, histiocyte, and neutrophil leukocytes. Alternatively, hemodynamic and dystrophic changes were observed (Fig. 3).

Pathohistological changes in the spleen were characterized by vascular fullness, slight swelling of the trabeculae, uncertainty in the appearance of fibers. The boundary of the red pulp is widened. In some places, small hemorrhages and lymphoid bundles were seen to have accumulated. These changes are the effect of a general pathohistological process taking place in the body.

Histological changes in the lymph nodes are not the same in all nodes. Significant changes occurred in the nodes between the portal, mesenteric, and pulmonary wall of the intestine, where serous edema, serous-hemorrhagic lymphadenitis, and extravasations of various sizes developed. In the lymph nodes located close to the parts of the lungs where severe pathological processes occur, along with bleeding, the sinuses are filled with

lymphocytes and leukocyte bundles, the size of the follicles is enlarged, the number of lymphocytes is increased.

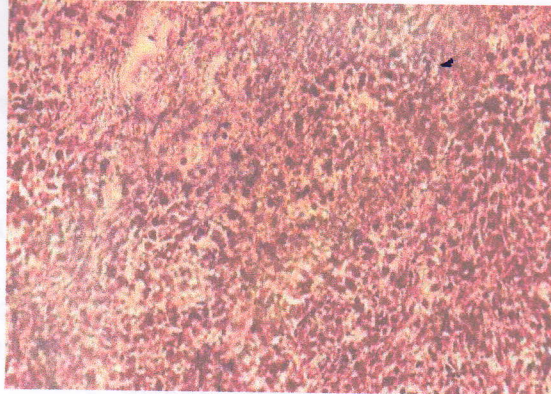


Figure 3. Dystrophic changes in hepatocytes.

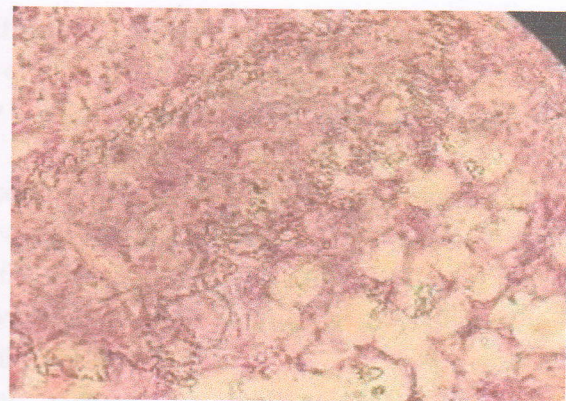


Figure 4. Granular dystrophies in the kidney.

The pathohistological changes that occur in the kidneys are mainly general pathological processes. These processes often consist of hemodynamic and granular, and in some places fatty dystrophy of the epithelium of the renal tubules. As a result of the expansion of the capillary networks of the renal glomeruli, only bundles of erythrocytes are visible under the microscope. The capsules around the balls are enlarged, filled with fibrinous exudate. The chambers and straight tubes do not know their boundaries as a result of the enlargement of the epithelium. Epithelial nuclei undergo rexis and lysis. Morphological changes also occur in the kidneys, which, like other organs, undergo irreversible processes (Fig. 4).

Gastrointestinal changes in the acute form of the disease have a complex histological appearance, and *E. coli* excitation mainly affects these organs. These changes include serous-catarrhal, catarrhal-hemorrhagic inflammation, dystrophic and wound-necrotic processes in the intestinal mucosa.

The cuticle layers of the anterior sections of the lambs, mainly from one week to one month of age, are large desquamative fragments from which they migrated. The cytoplasm of epithelial cells are not well stained, in the state of nuclear pycnosis, lysis, and rexis. These changes indicate the development of general necrobiotic processes. It was noted that the mucous membrane is desquamated, there are various hemorrhages, the mucus is very secreted, the digestive glands are in a dystrophic state.

Pathohistological changes in the intestine are mainly characterized by deeper changes in the solitary follicles and Peyer buds in the mesenteric lymph nodes. The nodes are swollen, the central parts of some are necrobiotic and necrotic, with numerous focal hemorrhagic foci.

In short, colibacillosis causes small horned animals to undergo specific changes in the body. In particular, hemodynamic, dystrophic processes are strongly developed in various organs of lambs, and it was found that these changes occur in the acute form in complex histological cases.

Колибактериозга қарши ГОА формоя вакцина ва 4%ли Хз сукцинат ассоциацияси тери остига юборилганда самарадорлик 90 фоиздан юқори бўлиши ҳамда АР титри ва қўзилар организми иммун тизими барқарорлиги, колибактериозга қарши фойдаланиладиган вакцина қўлланган II гуруҳ хайвонларидаги иммунфаолликка

нисбатан юқори эканлиги, назоратдаги ҳайвонлардан эса ҳар иккала гуруҳдагилар кескин фарқлангани аниқланди.

Conclusions:

- high prophylactic effect (93.7%) is effective when lambs are vaccinated with the addition of natural organic, environmentally friendly, pure chitosan succinate (4%) to the "GOA formol vaccine against colibacillosis".

- in group I lambs vaccinated with vaccine + chitosan, antibodies were found to have a titer of 1: 880, only in vaccinated group II vaccinated with a titer of 1: 760.

- the amount of C-reactive protein was found to be 1.133 times higher than the norm in experimental group I, the norm in comparative experimental group II, and 1.21 times higher than in comparative experimental group II of the first group.

- typical pathological, anatomical changes in the complex course of pathomorphological, hemodynamic changes, dystrophic and necrotic processes in the liver and gastrointestinal tract of calves, specific to lambs with colibacillosis under natural conditions.

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