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Effect from Aerosol Readjustment Air Environment on Productivity and Biochemical Blood Parameters of Young Sheep.

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ABSTRACT

The purpose of this study was to study the effect of aerosol air sanitation on the basis of the biocidal preparation Roksacin in carrying out preventive sanitation of premises in the presence of animals on the body and the productivity of young sheep. By the effectiveness of the bactericidal effect on the sanitary-indicative microflora, the preparation does not have a negative effect on the animals' organism during repeated use, promotes the sanitation of the air environment of livestock buildings and respiratory tracts of animals. The results obtained on the indicators of productivity and biochemical parameters of blood in lambs in livestock housing with aerosol air sanitation indicate an increase in the live weight and average daily growth, activation of biochemical processes, protective forces of the body, which indicates a fairly good adaptation of the organism to external influences.

Keywords: Roksacin, sheep, aerosol air sanitation, biochemical parameters of blood, productivity.

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INTRODUCTION

In modern conditions of industrial livestock complexes, the cultivation of agricultural animals is associated with the deterioration of zoohygienic parameters of the content. Most problems are related to the prevention and treatment of infectious and non-contagious animal diseases, which is caused by the accumulation of significant amounts of microflora in the air and on the production surfaces of livestock facilities [1]. Therefore, obtaining high economic indicators and using the full genetic potential of farm animals requires not only a good level of feeding and proper use of medicines, but also strict compliance with veterinary and sanitary measures [3].

In order to organize the stable veterinary and sanitary well-being of livestock, we were tasked with developing a set of measures for indicating microorganisms in the airspace of livestock premises, which allowed us to anticipate and prevent the possibility of the emergence, development and spread of diseases.

One of the most common methods for controlling microbial contamination during the cultivation and maintenance of animals is the disinfection of air and indoor surfaces. Among the methods of disinfection, the most effective is aerosol, which involves the use of low-toxic disinfectants from various chemical groups, sprayed onto particles of 10-35 microns in size. Widespread use of aerosols for veterinary disinfection is due to a number of advantages of this method (low drug consumption, high penetrating ability of aerosol particles to all hard-to-reach places of the room, reduction of labor intensity during processing, etc.).

An equally important aspect of disinfectology as a molecular-epidemiological trend in the fight against infections is its safety for human and animal health. The most radical way to reduce the risk of adverse effects of disinfection measures is to find biologically active chemicals and develop appropriate drugs that have a higher selectivity for toxic effects on pathogenic microorganisms to be destroyed with minimal toxicity to animals and humans.

Taking into account the above, it is necessary to conduct a search and approbation for the aerosol sanitation of new biocidal disinfectants harmless to animals and humans. Therefore, the issue of determining the effect of aerosol air sanitation on the basis of Roksacin in the conduct of preventive disinfection (sanitation) of premises in the presence of animals on the body and the productivity of young sheep is relevant.

MATERIALS AND METHODS

The studies were carried out in the premises for sheep in the conditions of the training and experimental station of StGAU (Demino, Shpakovsky district) and in parallel at the experimental station VNIIOK (Tsimlyansky, Shpakovsky district) located in the territory of the Stavropol Territory. 7 days prior to the beginning of the birth campaign, mechanical cleaning was carried out in an isolated room: walls and ceilings were treated with chlorine lime, the windows were closed, where the experimental livestock of animals was subsequently kept. To disinfect the air and surfaces of livestock buildings in the presence of animals, an aerosol air sanitation was used with the help of the TF 35 IGEB A Geraetebau GmbH hot mist generator. As a disinfectant, a new, certified, biocidal Roksacin drug from UNIFARM company, Slavyansk-on-Kubani, Krasnodar Territory, Russia, with a concentration of 2% by active ingredient and exposure time of 12 hours was used. In the premises quality control was carried out using the device developed by us Catcher of microorganisms -1 (patent №. 2397242), as well as by determining the indication of the microbial background of the air medium [8]. The object of the study was the young sheep of the North Caucasian meat and wool breed aged from birth to 4 months. During the lambing period of the queens, two groups of lambs were formed, each with 15 heads in each: I-experienced; II-control. The growth and development of young animals in different periods of postembryogenesis were evaluated. Biochemical and blood parameters were studied, including determination of the serum protein level, refractometric, and its fractional composition by colorimetric methods; activity of transamination enzymes - aspartate aminotransferase (AST) and alanine aminotransferase (ALT), creatinine, cholesterol - were established using a set of reagents "LAHEMA"; the urea concentration was detected with a set of reagents "DIAHIM-UCHEVINA"; activity of alkaline phosphatase - a set of reagents "DIAHIM-SHCHF"; the content of glucose - a set of reagents "GLUCOSE - FKD". Blood samples for laboratory tests were taken from the jugular vein in the morning hours before feeding at the age of 2 months.

RESULTS AND DISCUSSION

According to the results of the conducted studies, it was found that in experimental premises the concentration of microorganisms is much less than in control ones, which had a certain influence on the growth and development and immunity of experimental animals in the studied periods of ontogeny.

The data obtained during the processing of livestock premises indicate that the additional use of aerosol disinfection contributes to the likely reduction of bacterial contamination in airspace, which inhibits and inhibits the development of opportunistic microflora, and also prevents the possibility of aerobic transport of microorganisms (Table 1). The revealed regularity favorably affected the productive qualities and clinical state of the lambs under investigation.

Table 1: The content of microorganisms in the air of livestock buildings

Study period (2014 year)	Educational-experimental station of StGAU, Demino, Shpakovsky district, Stavropol Territory			Experimental station VNIIOK, Tsimlyansky, Shpakovsky district, Stavropol Territory		
	Number of microbial bodies in 1 liter of air			Number of microbial bodies in 1 liter of air		
	An experience		Control	An experience		Control
	Before disinfection	After disinfection		Before disinfection	After disinfection	
March	135	72	147	138	87	114
April	114	54	144	108	63	111
May	90	44	150	84	48	117
June	93	42	145	81	42	108

The intensity of growth and development of the lambs studied was judged by integral indicators-the live weight and the average daily gain [10]. The analysis of the obtained data made it possible to detect ontogenetic changes in the studied parameters in the lambs of the experimental and control groups and to determine their differences in growth due to different conditions of detention. When forming the young in groups in newborn lambs, no significant intergroup changes in the size of the live mass were detected. However, at the age of 2 months, the greatest increase in live weight was found in experimental animals in comparison with control animals, which amounted to 5.2-6.7% among bunnies; among the women - 5.0-5.7%. The revealed regularity in the size of the live mass between the compared groups of animals was preserved at the age of 4 months, that is, the superiority of the experienced lambs over the youngest of the control group was 5.6% among the lambs; among the women - 5.8-6.1% (Table 2).

As for the average daily increments of the groups of animals being compared, attention is drawn to the ambiguity of the value of the indicator studied both in connection with the ontogeny periods and the different conditions of growing young animals. The value of the average daily growth of the animals studied indicates that the youngest of the experimental groups, which differed in the largest live weight, was characterized by the highest growth rates. Thus, the growth rate of animals in the experimental groups over the lambs of the control groups was 8.6% in the period from birth to 2 months of age among the sheep, 5.6-9.1% among the youngsters, respectively, from birth to 4 months of age 6, 4-7.6 and 6.3-8.1%.

Table 2: Dynamics of age-related changes in live weight, average daily growth in lambs grown under livestock housing conditions using aerosol air sanitation

Index	Age periods, months	Group of animals			
		I experienced	II control	I experienced	II control
		male lamb		female lamb	
Educational-experimental station of StGAU, Demino, Shpakovsky district, Stavropol Territory					
Live weight, kg	at birth	4,77±0,31	4,88±0,28	4,35±0,31	4,20±0,34
	2 months	16,29±0,46	15,48±0,36	14,94±0,45	14,23±0,24
	4 months	25,88±0,74	24,50±0,83	24,67±0,98	23,30±0,77
Average daily gain,	from birth to 2	192,0	176,7	176,5	167,2

g	months				
	from 2 to 4 months	159,8	150,3	162,2	151,2
	from birth to 4 months	175,9	163,5	169,3	159,2
Experimental station VNIIOK, Tsimlyansky, Shpakovsky district, Stavropol Territory					
Live weight, kg	at birth	5,10±0,38	4,98±0,30	4,50±0,17	4,60±0,16
	2 months	17,40±0,53	16,30±0,42	15,96±0,27	15,10±0,39
	4 months	26,98±0,85	25,54±0,84	25,65±0,70	24,17±0,61
Average daily gain, g	from birth to 2 months	205,0	188,7	191,0	175,0
	from 2 to 4 months	159,7	154,0	161,5	151,2
	from birth to 4 months	182,3	171,3	176,3	163,1

The examined questions on the patterns of growth and development of animals contained in different conditions allow us to assume sufficient adaptation of the young growth of the experimental groups, which is confirmed by the greater size of the live weight and average daily growth in all the studied periods of ontogenetic development.

The changes in the magnitude of the living mass detected during the period of observations, the increments in the animals studied are mostly quantitative. Since the basis of the development of the body is not only quantitative, but also qualitative characteristics (metabolism, resistance, etc.), which ultimately determines the productivity of animals, we studied the indicators characterizing the level of protein, carbohydrate, lipid metabolism.

Table 3: Biochemical indicators of blood in young sheep, grown in conditions of livestock premises with the use aerosol sanitation of air

Index	Group of animals	
	I experienced	II control
Total protein, g / l	68,61±1,16	66,15±1,28
Albumins, g / l	37,51±1,08	35,99±2,14
Globulins g / l	31,10±0,96	30,16±2,42
α- globulins, g / l	6,16±0,63	6,02±0,52
β- globulins, g / l	8,08±0,80	8,17±0,88
γ- globulins, g / l	16,86±1,98	15,97±1,03
Ratio of albumins to globulins A/G	1,21	1,19
Urea, mmol / l	2,69±0,48	3,29±0,52
Creatinine, mmol / l	123,04±3,05	126,47±3,69
Aspartate aminotransferase (ACT), μkat / l	0,380±0,04	0,324±0,07
Alanine aminotransferase (АЛТ), μkat / l	0,210±0,09	0,196±0,06
Alkaline phosphatase, μkat / l	4,64±0,17	4,45±0,15
The level of glucose, mmol / l	3,57±0,16	3,19±0,32
Cholesterol, mmol / l	2,52±0,08	2,31±0,18

One of the main indicators of protein metabolism in the animal body are serum proteins, their qualitative and quantitative characteristics. The study of the serum protein level showed that the lambs of the studied groups showed certain differences in its content. Among the compared groups of animals, the maximum content of total protein was noted in the lambs of the experimental group (68.61 g / l), which is higher than in the juvenile of the control group by 3.7%. The revealed regularity of the increase in the serum protein level in the animals of the experimental groups was preserved by the concentration of albumins and globulins. Thus, in the blood of young animals, a larger content of albumins and a total amount of globulins is established - by 42% and 3.1% than in the blood of the lambs of the control group.

Of particular interest are changes in individual globulin subfractions in young sheep, grown in cattle-breeding premises with aerosol air sanitation. Thus, no significant changes were detected in the level of the α-

and β -globulin fraction in the serum of the compared groups of animals. As for γ -globulins, in the blood of the lambs of the experimental groups, a significantly higher level of this immunological indicator was found, compared with the control group, by 5.6%. In this case, the albumin-globulin coefficient is within the physiological norm, and its fluctuations were from 1.19 to 1.21, which indicates a directionality in metabolic processes.

With regard to the final products of nitrogen metabolism (urea, creatinine), it was found that a low concentration of studied metabolites (18.2 and 2.7%) was observed in the blood of lambs of experimental groups in comparison with the animals in the control group. The revealed regularity, probably, is connected with more active inclusion of nitrogen of blood proteins in the metabolic processes of a growing organism.

Numerous conjugated biochemical processes in a living organism take place with the active participation of enzymes, which determine not only the direction and speed of the course of biochemical reactions, but also create, by its lability, the possibility of adapting metabolic processes to environmental conditions [6, 8, 9].

We studied the activity of enzymes for transamination of blood serum - aspartate aminotransferase (AST) and alanine aminotransferase (ALT) in sheep under different conditions of concentration, the concentration of which reflects the level of protein metabolism in the body. Thus, the highest enzymatic activity of AST and ALT was detected in experimental lambs, which significantly exceeded the activity level of the young sheep of the experimental group by 17.3 and 7.1%.

When studying the activity of alkaline phosphatase, it was found that its somewhat higher concentration is typical for lambs of the experimental group of 4.64 $\mu\text{kat} / \text{l}$ compared to the control group by 4.3%.

We also considered it necessary to study the indices of the concentrations of some metabolites of lipid and carbohydrate metabolism in the blood of the animals being studied. With the help of the obtained data, we tried to compare the intensity of energy metabolism in the organism of lambs grown in premises that had been disinfected.

The results of our studies showed that the level of cholesterol in the blood of the lambs of the experimental group was 9.0% higher than the level of metabolites studied in the blood of the lambs of the control group. It was found that the highest concentration of glucose was observed in the serum of the lambs of the experimental group, which is 11.9% higher than in the lambs of the control group.

Summarizing the comparative study of the metabolites of protein, lipid and carbohydrate metabolism in young sheep grown under different conditions of content, certain differences were revealed. In the blood of the lambs of the experimental group, a higher concentration of protein metabolites (total protein, albumins, globulins, transamination enzymes) and energy metabolism (cholesterol, glucose) was observed than in the lambs of the control group. It can be assumed that the animals of the experimental group more actively use the energy fund of blood (lipids, carbohydrates) for biosynthetic processes during their growth and development. In addition, an increase in the level of γ -globulins in the serum of lambs of the experimental group indicates a higher protective capacity of their body to produce antibodies.

CONCLUSIONS

The conducted researches give us the reason to believe that the use of aerosol air sanitation on the basis of a biocidal preparation for the preventive disinfection of livestock premises helps to reduce the overall microbial air pollution and enclosing structures. By the effectiveness of bactericidal action on the sanitary-indicative microflora, the preparation does not have a negative effect on the animal organism during repeated use, promotes the activation of biochemical processes, the protective forces of the organism, which ensure their intensive growth and development, as evidenced by an increase in live weight and average daily growth in young growth groups in all periods of ontogeny.

Since the positive effects of disinfection on the lambs have been found, it is advisable to recommend the sheep farms when raising young sheep in the early ontogenesis (from birth to weaning), to carry out

preventive disinfection of livestock premises by applying aerosol sanitation of air on the basis of a biocide preparation four times with an interval of 30 days.

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