Hygienic Problem of Environmental Pollution by Waste of Animal and Poultry Complexes

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Abstract: The article presents digital material illustrating the sanitary and hygienic problem that arose as a result of environmental pollution (atmospheric air, water, soil) with livestock and poultry waste due to imperfect technology for keeping farm animals (ventilation system, optimization of the microclimate and disposal of solid and liquid production waste). It is shown how much and what waste products are excreted by farm animals (poultry, pigs, cattle) during different periods of ontogenesis and what volumes of them, not utilized, are stored, polluting the habitat of animals and humans with substances harmful to their health (ammonia, hydrogen sulfide, urea, protein decomposition products, etc.). With manure, droppings, and wastewater, numerous pathogenic organisms enter the soil, underground and surface waters, maintaining their viability and virulence for a long time, supporting the circulation of pathogens of dangerous diseases of farm animals and humans (salmonellosis, brucellosis, tuberculosis, helminthiases, coccidiosis, and others). The large number of animals in agricultural complexes with suboptimal growing technology contributes to the spread and maintenance of various dangerous diseases that reduce the productivity and vitality of animals. The authors of the article, stating the problem, convincingly propose to move to environmentally and economically optimal technologies for raising farm animals based on modern, scientifically developed technologies of agricultural production. To optimize the microclimate of livestock premises, it is necessary to more intensively introduce methods of ionization, ozonation and the use of microorganisms that utilize waste products of farm animals and microorganisms that are antagonists to pathogens. Innovative technologies for keeping animals on a scientific basis should combine animal husbandry, soil science and crop production into a single cycle, which will minimize the circulation of pathogens in the environment and ensure environmental and food security in the Republic of Uzbekistan.

Keywords: Environment, pathogens, farm animal waste, preservation of soil fertility, environmental and food security.

1. ANALYSIS OF RESULTS

The concentration of large numbers of livestock in livestock farms and the transfer of livestock farming to an industrial basis are global in nature; complexes for fattening pigs and cattle with a capacity of 20–30 thousand to 250 thousand operate. heads About 70% of the meat entering the market is produced in large industrial livestock complexes with more than 1000 heads of cattle [1–4].

The program for the development of the agricultural sector of the Bukhara region for 2021–2025 plans 61 new facilities for 25,320 cattle places and the reconstruction of 17 facilities. In the Bukhara region, the number of cattle is more than 54,740 thousand heads.

Industrial methods of livestock farming are cost-effective and make it possible to quickly solve the problem of supplying the population with meat and dairy products. However, the operation of existing livestock complexes has raised a number of serious issues related to environmental protection. This problem is complex and requires a joint solution by specialists in hygienic, technological, agricultural and construction fields.

The main sources of environmental pollution (air, soil, water) are air emissions and liquid effluents from livestock complexes and farms. The conditions for removing manure from livestock buildings and the arrangement of local ventilation of polluted air from manure collection channels determine the state of the microclimate of livestock buildings, which has a significant impact on the health and productivity of animals [18].

Analysis of diseases of farm animals shows that diseases such as coccidiosis, colibacillosis, salmonellosis and others largely depend on the manure removal system and the state of the microclimate of the premises. Air pollution with ammonia and microorganisms causes respiratory diseases in young animals. Bronchopneumonia and infectious rhinotracheitis of young animals arise mainly due to imperfect functioning of the ventilation systems. The method of

manure removal and ventilation of premises affects the state of the indoor air environment. Liquid manure pollutes the environment much more than solid manure due to its physical characteristics: greater fluidity and the survival of pathogenic microorganisms in it. Obtaining solid manure in the livestock buildings themselves significantly reduces its negative impact on the environment. It was shown that with natural ventilation and hydraulic methods of manure removal, the concentration of ammonia in fattening pigsties reached 52 mg/cub.m, and with forced removal of contaminated air in similar premises, the ammonia content was only 14 mg/cub.m. m. In modern ventilation systems, an increase in air exchange is inevitably associated with an increase in environmental pollution. Thus, in air samples at a distance of 100 m from the pigsty, ammonia was found in a concentration of up to 3-4 mg/cu. m, hydrogen sulfide-0.112 mg/cub.m., mercaptan-16.7 mg/cub.m. m, the number of microorganisms in a cubic meter of air is up to 8263 [5,7].

When areas are densely built with livestock buildings, the degree of pollution of the surrounding atmosphere increases significantly compared to the area of operation of small livestock farms. The degree of influence of livestock waste depends on many factors: the concentration of pollutants in air emissions, the strength and direction of the wind, vegetation surrounding the complex, etc. Pollutants were found in open water bodies and soil within a radius of up to 15 km from the livestock facility. With a pavilion arrangement of pig-breeding buildings in complexes with a population of 10 to 40 thousand pigs with an exhaust ventilation system, up to 6.05 kg of dust and up to 83.4 billion microbial bodies are released within an hour [10].

From a feeding complex for 2 thousand heads of cattle in winter, 8.7 billion microbial bodies and 0.75 kg of dust enter the atmosphere in one hour per 10 thousand. heads – 103.9 billion microbial bodies and 6.2 kg of dust [11,13].

In the air of poultry farms, from 1.5-104 to 8-107 microbial bodies per m3 were detected, at a distance of 100 m from the buildings - up to 8.3-103 microbial bodies per m3 [13], at a distance of 400 m this figure is only half as much [14, 15]. According to other researchers, at a distance of 250 m from the production buildings of livestock complexes, there are up to 1000 or more microorganisms (including pathogenic ones) in one cubic meter of atmospheric air [12].

The soil of agricultural lands in areas where livestock and poultry farming complexes are located is contaminated with pathogenic microorganisms and helminths.

When studying wastewater from livestock farms, Salmonella was found in 3.3–90% of samples. Brucella, Leptospira, Yersinia, mycobacteria, clostridia, actinomycetes, filamentous fungi and yeasts, and various viruses (foot-and-mouth disease virus, Aueszky's disease virus) were found in wastewater samples [17].

In a layer up to 20 cm in summer, up to 20–25 trichocephalus eggs per 1 kg of soil were found. Bacterial contamination of the soil was 2-106 microbial bodies/g, and the coli titer was 0.001. Up to 9.2% of the studied soil samples from these fields contained salmonella. At a normal irrigation rate of 300 m3/livestock drainage, salmonella were found viable at a depth of 50 cm of the soil horizon for two years [6].

It was noted that undisinfected wastewater contained in 1 liter from several tens to several tens of thousands of viable eggs of helminths (ascaris, strongylate, esophagostoma, trichocephalus, trichinella, taenia, whipworm) and cysts of pathogenic protozoa.

It has been shown that the period of preservation of the viability of pathogenic microorganisms and helminth eggs is quite long. The causative agent of listeriosis remains viable and virulent for three months in the autumn-summer months, and up to seven months in the autumn-winter period. The causative agent of paratyphoid fever in cattle survives in liquid manure for up to 85 days in summer, and up to 158 days in winter and spring.

Brucella died in liquid manure of cattle and pigs in summer and spring after 3-4 months, in autumn and winter - after 6-8 months. Mycobacterium tuberculosis in the same manure remained viable for more than 1.5 years. The foot-and-mouth disease virus retains the ability to cause disease in experimental animals in the summer for 42 days, and in frozen manure for up to 192 days. Leptospira, entering water bodies with wastewater from livestock farms, remains viable for 20-30 days, and remains virulent in moist soil for more than 6 months [1, 2]. The most resistant viruses can persist for a long time in wastewater, as well as in the water of water bodies contaminated by it. Enteroviruses retain infectious properties at +9 ... +15 ° C for up to 200 days. Helminth eggs can remain viable for a longer period of time. In undisinfected pig manure, ascaris eggs die only after 12–15 months from the start of its storage, and eggs of cattle helminths (fasciola, strongylate, moniesia) die in liquid manure only after 6–8 months[17]. When storing liquid manure

in manure storage tanks, helminth eggs remain viable for more than a year [8, 9]. Experimental data from the All-Union Institute of Helminthology show that the liquid fraction of manure supplied to irrigation fields contains about 30% helminth eggs, which remain invasive for more than two years at the depth of the arable soil layer [3].

Consequently, there is a real danger of the accumulation of pathogenic pathogens in the soil, in fodder crops, groundwater, atmospheric air and open water bodies, which can cause diseases in animals and people. To eliminate the epidemiological danger and negative impact on the environment, manure must be subjected to pre-treatment, which would ensure, in addition to deodorization and mineralization of organic compounds, its disinfection. Long-term storage of livestock waste in manure storage facilities does not give the desired effect. It is known that the colititre and titer of enterococcus in standing fluid after 6 months exceeds by 2-4 orders of magnitude, the number of helminth eggs decreases by 2.8 times only after 10 months.

Pollution of surface and groundwater with waste from large livestock complexes and industrial farms is one of the most important problems of environmental pollution. Massive emissions of waste from modern livestock production worsen the general sanitary condition of water bodies and deprive the population of traditional sources of water supply. Consumption of water from such reservoirs causes gastrointestinal and other diseases in humans and animals. Fish are dying in rivers and ponds where livestock waste is discharged.

Thus, the information presented on the pollution of the habitat of farm animals and humans by pathogens from waste from livestock enterprises predetermines the development of methods for interrupting the pathogen cycle “animal - waste - environment - feed - animal”

Modern methods of treating infectious diseases using chemicals such as antibiotics, sulfonamides, nitrofurans and others do not always have specificity of action on pathogens and the duration of prolongation contributes to adaptation and the emergence of more virulent strains of pathogens.

Preventive methods do not effectively protect farm animals from pathogens, which is due to imperfect housing technology (microclimate, feeding, disposal of livestock waste) and the adaptability of pathogens.

Finding innovative methods of treatment, prevention, maintenance of farm animals and disposal of their waste are the main problems of animal husbandry, the solution of which will contribute to both the productivity of farmed animals and the improvement of the quality of products obtained from them.

To optimize the microclimate of livestock premises, more effective and environmentally friendly methods should be more intensively introduced: ionization, ozonation, the use of microorganisms that utilize waste products of farm animals and microorganisms with a wide range of antagonistic effects on pathogens

The use of natural herbal remedies with antimicrobial, antiviral and immunomodulatory properties will minimize the incidence and carriage of pathogens in farm animals, the main sources of maintaining pathogen populations in the environment.

The rational use of agricultural waste as a secondary resource to optimize soil fertility will ensure the environmental and industrial safety of agricultural production in the Republic of Uzbekistan.

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