

Intensive Livestock Breeding Waste Pollution and Its Application Value in Ecological Environment and Pollution Control Process

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ABSTRACT. *With the increasing population and income and the acceleration of urbanization, the traditional poultry farming production system has been difficult to meet people's needs. The development of poultry farming in the direction of specialization and intensification has become an inevitable trend. What followed was the pollution problem of intensive aquaculture. All kinds of livestock and poultry discharged directly into the environment without harmless treatment are excreted and excreted, which is a great damage to the ecological environment. This paper investigates and measures the emissions of livestock and poultry excreta and pollutants in a certain area, and investigates the current treatment of excreta. On the basis of analyzing the impact of aquaculture pollution on the ecological environment and the harm to human health, the prevention and control measures for aquaculture pollution were put forward. As a result, we have come to great value in ecological farming and low-carbon farming.*

KEYWORDS: *intensive livestock farming, waste pollution, pollution control*

1. Introduction

The livestock and poultry breeding industry has gradually evolved from a family sideline business to an independent industry [1]. The role of the rural animal husbandry in the development of the rural economy has been increasingly valued by governments at all levels [2]. It has been listed as a pillar industry in some areas and has become an important source of the rural economy. In the past, the livestock industry was mostly decentralized, and the number of livestock raising was small and the scale was small. In recent years, the livestock industry has been vigorously developed [3]. Especially after the implementation of the “vegetable basket project”, a large number of intensive farms have been built in various places. In many large cities, a number of 10,000 pig farms have been built, and the intensive farming of the poultry industry has developed particularly rapidly in the economically rich areas of large and medium-sized cities [4][5]. The production system of poultry breeding industry has shown an increasingly centralized and intensive trend.

The previous small-scale livestock farming was integrated into large-scale agriculture, and the resulting livestock manure was basically digested in the planting and agricultural production systems [6]. It was put into production as a production factor, and was fully utilized in the form of resources. However, with the adjustment of the agricultural industrial structure and the development of the market economy, the production of poultry and livestock industry has gradually separated from the agricultural production system, and has moved toward an independent, intensive and specialized development path, resulting in a large amount of waste in the agricultural industrial chain [7]. These characteristics of the livestock industry have led to pollution problems that did not exist. The pollution of intensive aquaculture is now quite serious [8].

In the process of aquaculture development, the livestock manure, urine and rinsing materials are increasing, and the environmental and ecological problems brought about by this are becoming more and more prominent. It is urgent to control the ecological environment pollution of livestock and poultry breeding industry. To this end, this paper investigates the pollution situation of livestock and poultry breeding in a certain area, and proposes prevention and control measures, and analyzes the application value of ecological aquaculture and low-carbon farming.

2. Discussion on the problems of ecological environment pollution in intensive livestock breeding industry and the causes

Taking intensive pig farms as an example, commodity pigs emit large amounts of excreta per day and concentrate emissions. Even if they are used as fertilizers, they will encounter insurmountable difficulties. Intensive pig farms have a great impact on the environment, and their ecological and environmental impacts are multifaceted, polluting water bodies, producing foul odors, polluting soils, spreading germs, and breeding pests. The conversion factor of pig manure equivalent of various livestock and poultry excrement is shown in Table 1.

Table 1 Conversion coefficient of pig manure equivalent of various livestock and poultry excrement

Items	Pig manure	Pig urine	Cow dung	Cow urine	Sheep manure	Poultry manure	Rabbit manure
Pig manure equivalent conversion	1	0.52	0.68	1.31	1.24	2.08	2.96

2.1 Major pollutants produced by intensive aquaculture

In the usual feeding method, flushing water is discharged per 10,000 pigs per day for about 200m³, and most of the pig urine and a considerable portion of pig manure enter the flushing water. The concentration of wastewater in the farm is extremely

high, and it belongs to high-concentration organic wastewater. The concentration of pollutants must be reduced by more than 98% in order to meet the emission standards.

In intensive farms, livestock waste is stored in large quantities, many of which have odors or odors. The content of odorous substances such as urea, uric acid, ammonia, dimethyl disulfide, hydrogen sulfide, methyl sulfide, and dimethylamine which are produced by pig excrement itself or by microbial decomposition is very high. Sometimes the excrement in the farm cannot be cleaned up in time, resulting in the occurrence of anaerobic processes and the production of odorous gases. The range of malodors produced can reach 2km, and up to 8km in downwind.

In the general feeding method, each pig produces about 3 kg of feces per day. A farm that produces 6,000 commercial pigs a year produces about 6,500 tons of feces each year. Stacking or storage will cause serious environmental problems.

2.2 Environmental problems arising from intensive farms

Aquaculture wastewater is a high-concentration organic wastewater rich in a large number of pathogens. It is directly discharged into the water body, or the storage site is not suitable. The rainwater is washed into the water body, which may cause surface water or groundwater to deteriorate. According to Shanghai's pollution survey of the Huangpu River, the pollution of the Huangpu River by poultry farming accounts for 36% of the pollution load of the Huangpu River. Poultry farming has become one of the important reasons for water pollution.

After the organic matter enters the water body, it consumes dissolved oxygen in the water, making the water body smelly. The suspended matter makes the water body turbid, reduces the photosynthesis of algae in the water, limits the normal activities of aquatic organisms, causes the lack of oxygen at the bottom of the water body, and assimilate the water body. Nitrogen and phosphorus can make water bodies eutrophic. The eutrophic water contains high concentrations of nitrates and nitrites, which can cause poisoning if consumed by humans and animals for a long time. Under anaerobic conditions, organic matter is decomposed to produce toxic gases such as methane and hydrogen sulfide. Toxic algae emits a large amount of toxins, which may cause poisoning to fish and humans, and damage the ecological balance of water bodies. The excrement contains bacteria and viruses and is directly discharged. Into the body of water may lead to the spread of epidemics. Impact on groundwater Underwater seepage caused by livestock manure and urine will also increase the concentration of nitrate and organic matter in groundwater, causing nitrogen pollution and organic pollution of groundwater.

The livestock manure contains nitrogen, phosphorus, potassium and other nutrients. If proper fertilizer is applied, it can effectively improve soil fertility, improve soil physical and chemical properties, and promote crop growth. However, if it is applied directly, continuously or in excess, it will cause adverse effects. Poultry excrement contains high organic matter, nitrogen and phosphorus, which can cause crops to grow, greedy, and lodging, which greatly reduces production. If the

livestock manure and urine are applied to the farmland excessively, the small animals, insects, fungi, actinomycetes, bacteria, etc. inhabiting the soil will multiply and be prone to pests and diseases. The fermentation of poultry manure produces malodorous gases such as ammonia and hydrogen sulfide, which breeds mosquitoes and flies and spread diseases, which worsens rural environmental sanitation. The emission factors for defecation, urination and pollutants of various livestock and poultry are shown in Table 2.

Table 2 Emission factors of defecation, urination and pollutants of various livestock and poultry

Items	Pig	Cattle	Goat	Poultry
Defecation	396.77	7319.01	951.01	25.98
Urination	658.01	3649.02	242.97	-
BOD	25.87	192.98	2.68	1.014
COD	26.78	251.01	4.29	1.198
NH ₃ -N	2.01	24.99	0.56	0.124
TP	1.67	10.06	0.44	0.114
TN	4.42	60.98	2.21	0.269

2.3 Discussion on the causes of the pollution problem of intensive aquaculture

There are many reasons for the formation of intensive aquaculture pollution. There are both deficiencies in understanding and management measures and technical measures. The people's living standards have increased remarkably, and the demand for meat and egg-milk products has increased sharply. The traditional livestock-based industry, which is mainly distributed by farmers and appears in the form of sideline business, has developed along with the development of the market economy and the process of socialization. Quickly separated from the agricultural production system, towards specialized and large-scale production methods, the ecological and environmental problems brought about by intensive aquaculture will follow. Insufficient understanding of the rapid development of intensification and the seriousness of the problems that may arise is an important cause of problems.

Intensive aquaculture pollution is essentially agricultural pollution, and it is also an ecological environmental pollution problem. Its pollution characteristics, ecological environment impacts and solutions are significantly different from industrial pollution prevention and control. In fact, the chain of links in some aspects of agricultural production cannot make a virtuous cycle of agro-ecosystems. Therefore, it is impossible to follow the traditional management measures of industrial pollution prevention and control, and management should promote waste to return to agriculture. In terms of agro-ecological environmental protection, there is currently no national agricultural environmental protection laws and regulations. The environmental protection department has classified agricultural environmental protection into the category of natural ecological protection. The ecological environmental protection work is currently the weak link of the environmental

protection department, and the environmental protection department lacks knowledge and management experience in agricultural production. Therefore, the management of ecological and environmental problems arising from intensive aquaculture is not in place.

3. Livestock and poultry excretion treatment

The investigation found that, in addition to some organic fertilizers, a small amount of biogas fermentation and biological fermentation beds, a considerable part of livestock and poultry excreta was directly discharged into the environment without any treatment, which was extremely harmful to the environment. The amount of irrigant in the aquaculture industry is not less than the total amount of manure and urine, and almost all of it is discharged into the environment. The discharge of livestock and poultry excreta in a certain area is shown in Table 3.

Table 3 Emissions of livestock and poultry in a certain area

Items	Pig	Cattle	Goat	Poultry	Rabbit
Number	1622.79	25.00	94.01	19562.90	2547.67
Defecation	649.02	181.90	90.21	512.89	140.76
Urination	1073.68	91.02	23.12	512.09	45.98
Subtotal	1721.99	273.04	112.98	513.42	186.32
Pig dung volume	649.52	127.80	111.01	1077.76	414.23
Manure urine	547.21	711.89	28.32	1079.01	136.98

4. Application of prevention and control measures for livestock and poultry pollution

4.1 Exploring new rural economic development models

The vast rural areas have gradually changed the traditional agricultural economic development model, and actively explored the integration of intensive aquaculture pollution prevention and control with the construction of ecological agriculture and the construction of ecological demonstration zones.

The so-called ecological agriculture is based on the theory of ecology, planning, organizing and carrying out agricultural production in a certain area according to local conditions. It can also be said that ecological agriculture is to establish and manage an ecologically self-sustaining low-input, economically viable agricultural production system in accordance with ecological principles. The system can not significantly change its surrounding environment for a long time. Has the greatest productivity. In order to maintain and improve the ecological balance within the system, eco-agriculture is the main idea of the overall planning, rationally arrange

the production structure and product layout, strive to improve the fixed rate and utilization rate of solar energy, and promote the recycling and repetition of substances within the system. The so-called waste generated by the intensive aquaculture industry can be used as an intermediate output of the agro-ecosystem, and can be invested as an element in the ecosystem.

How to combine ecological agriculture technology with the construction of ecological demonstration zones to prevent pollution problems in intensive aquaculture, many regions are making useful explorations, and are trying to change the traditional agricultural growth mode.

4.2 Deepen the understanding of intensive aquaculture pollution in poultry

In order to raise awareness of the problem of intensive aquaculture pollution, it is necessary to organize relevant government departments and research institutes to conduct a comprehensive survey on the pollution status of intensive aquaculture and the status of pollution control nationwide. In order to have a comprehensive and in-depth understanding of intensive pollution in the aquaculture industry.

It is necessary to raise environmental awareness, increase investment in agricultural environmental protection, and strengthen publicity and training on agricultural environmental protection, especially to raise awareness of agricultural environmental protection among management and technical personnel at all levels of agriculture and environmental protection departments and the broad masses of peasants.

4.3 Establish ecological engineering that closely integrates farming and aquaculture

Modern closed-type large-scale farming technology has promoted the high-yield, high-quality and high-efficiency development of urban poultry and aquaculture. However, as the aquaculture industry has been separated from the planting industry, it has caused damage to the ecological environment. Therefore, in order to achieve sustainable development of large-scale poultry breeding industry, large and medium-sized farms around the city must be freed from "self-enclosure", using biotechnology and bioengineering technology, and comprehensive utilization of livestock excreta.

4.4 Establishing a large ecological farming model is of great value

Whether it can effectively solve the problem of animal-derived food safety is a major event that affects the health and safety of the people's lives and the stability of the country's society. It is necessary to raise it to the national security strategy. The sustainable development of poultry breeding industry is based on the perspective of sustainable agriculture and the actual situation of poultry industry development. On

the basis of the coordinated development of resources, environment, population, technology and poultry industry, we seek a viable path to sustainable development. In order to ensure that the needs of the current and future generations of livestock products are met, the living standards of farmers and herdsmen will be improved, and the comprehensive development of the livestock and poultry breeding industry will be promoted. The core of sustainable development of the livestock industry is development, that is, the development of productivity. The key is to protect the natural resources and ecological environment of the livestock industry. This goal is at the height of the world to build a low-carbon animal husbandry. Establishing a model of ecological livestock farming is the only way and effective way to maintain the sustainable development of the livestock breeding industry.

5. Conclusion

Preventing pollution and establishing a good urban and rural ecological environment are important contents of the current comprehensive urban and rural environment management. However, with the development of the social economy and the continuous improvement of people's living standards, the enthusiasm of farmers and enterprises for raising livestock and poultry has been greatly stimulated, and the amount of livestock and poultry farming and livestock products have steadily increased.

The comprehensive utilization technology of livestock manure is in line with the principles of ecology and ecological economics. It not only avoids the problem of livestock manure pollution, but also purifies the rural ecological environment, increases the income of farmers, and relieves rural energy tension to a certain extent, and achieves the unity of environmental, economic and social benefits, which is conducive to rural areas.

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