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Three-dimensional ecological breeding mode and key technology of fish-frog symbiosis

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Abstract
This paper introduces the mode and key technology of fish-frog symbiosis. Pond fish-frog aquaculture technology is on the basis of conventional pond fish, through the pond, the implementation of bullfrog without land farming, pond fish-frog symbiotic system, realize the pond fish-frog stereo culture, the method has covers an area of less, low cost, enemy, breeding density, bullfrog, fast growth, easy to manage, high comprehensive benefit advantages.

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1. Introduction

As a bullfrog introduced earlier in China, although its development has experienced many twists and turns, with the development of the industry, bullfrog once became a hot breeding variety in recent years [1]. Bullfrog delicious meat, has high nutritional value, is a better source of high quality protein, its nutritional value and economic value have great development potential [2]. With the improvement and development of the bullfrog industry chain, especially with the pull of bullfrog catering, a wave of bullfrog consumption boom has been set off, which has greatly stimulated the consumption of bullfrog products. In addition, prefabricated vegetables also drive the consumption of bullfrogs, which is an important reason for promoting bullfrog breeding. However, the discharge of tail water from bullfrog breeding has always been an important problem troubling the development of the industry. At present, the main problem is the breeding mode or rice field cage breeding. Due to high density breeding and high feeding, the environmental problems caused by waste excretion are becoming more and more prominent [3]. Therefore, the industrial transformation needs a new breeding mode to replace it.

Fish-frog symbiotic cage culture is an efficient ecological breeding model promoted in recent years [4], mainly with silver carp, bighead carp, crucian carp, grass carp and other varieties as the main breed of the pond, the pond surface set up cages to raise bullfrog breeding mode. The main advantage of this breeding mode is that the excrement, shedding and feed residue of bullfrog can provide bait for the fish in the pond, and the breeding tail water can be properly treated, and at the same time, it can also increase the efficiency and income of the pond fish breeding varieties, effectively improving the economic benefit of pond breeding [5].

2. Fish-frog symbiotic cage breeding technology in pond

Fish stocking and management were conducted according to the conventional high-yield technique of pond fish farming [6]. According to the pond conditions to determine the main fish object, implement many varieties of fish mix, reasonable density, rotation, science, natural feed and artificial feed, both cages frog technical requirements, regular change, new water, regular pond drug disinfection, keep pond water cool, live, fat, moderate, promote the healthy and rapid growth of fish.

3. The structure of fish-frog symbiotic cage culture was determined

The cages for raising bullfrogs are open cages. The seedling cage is made of nonflexible polyethylene mesh, and the specifications are 6.0m × 6.0m × 1.5m and 12m × 4.0m × 1.5m. The three species size of the bullfrog breeding cage is 8.0m × 3.0m × 1.5m, 6.0m × 3.0m × 1.5m and 12m × 4.0m × 1.5m. The cage is fixed into a square with wooden piles and bamboo piles, the water depth is 60~70cm, and the exposed surface is 70~80cm (the water depth of the incubation cage is about 50cm). The seedling cage should be used as feed platform in the metamorphosis period and frog breeding cage, and the area is 20%~30% of the water surface of the cage. At 1.5m from the water surface, the sunshade net should be laid.

4. Installation area of fish-frog symbiotic cage

The area of the set cage was determined according to the pond conditions. Generally, the area of the cage should not exceed 5% of the pond area, and the silver carp and bighead carp, the cage area can reach about 10%.

5. Reasonable stocking density of fish-frog symbiotic cage

Before entering the cage, the tadpoles were washed with 10 mg/L potassium permanganate solution, and the cage was carefully checked for damage. The ecological conditions of frogs in pond cage are obviously better than those of frogs in soil pond, and the dissolved oxygen and plankton are relatively rich, and the stocking density can be increased appropriately. Generally, 100~200 tadpoles are raised per square meter, and they are put on enough at one time, and the tadpoles are required to be similar in age, neat in specifications, and no trauma in health. The tadpoles were fed the next day after entering the cage, and the feed variety was the same as the tadpoles raised in the pool. Feed twice a day, and adjust it according to the water quality, climate and water temperature of the pond in the early and middle stages of the growth. In the period of metamorphosis, multivitamins are often added to the feed to prevent the occurrence of nutritional deficiency.

6. Feed feeding method of fish-frog symbiotic cage breeding

Feed feeding adhere to the timing, fixed point, fixed quality, quantitative, focus on mastering the reasonable amount of bait. The bait-feed amount was about 3% of the bullfrog's body weight. Feed 2 times a day, generally to feed within 1~2 hours to eat the bait is appropriate.

7. Daily management of fish-frog symbiotic cage farming

During the breeding period, we should strengthen management, regularly inspect and observe the weather and the changes of bullfrog feeding, often clean the bait table of the cage, keep the bait table clean and the communication inside and outside the cage, often check whether the cage is firm or damaged; if the bullfrog is sick, take timely measures to prevent the spread of the disease, often spray disinfectant and feed bait, and use small cage to observe and feed drugs. After 100 days of breeding, the bullfrogs can weigh more than 300g.

8. Analysis of the advantages of pond-fish-frog stereoscopic culture

From the point of view of pond resource utilization, pond to fish, set cage frog, do not occupy farmland, technology is convenient. From the perspective of feed use, the pond set cage frog, established the pond frog symbiotic system, pond water can provide more stable ecological conditions and natural food sources, to save frog feed and frog healthy growth, and the frog of food and feces, dissolved into the pond water, can directly or indirectly for breeding fish, fully improve the utilization rate of feed. The fish-frog three-dimensional breeding process does not use any disease control drugs, and is provided to consumers. It can be seen that the fish-frog three-dimensional breeding mode can not only provide healthy food, but also stabilize the water quality and maintain the dynamic balance of the original natural water body. For example, large-scale cage farming can adjust the ecological balance in the test area to a certain extent, and effectively control the diseases and insect pests and their water environment in the area, so as to promote the virtuous cycle of the ecosystem.

9. Attention should be paid to the problem of pond fish-frog culture

9.1. Establish the dominant position of pond fish farming and stabilize the basic income of the pond

The market price of pond fish is relatively stable, and the management risk is relatively small. According to the specific conditions of the pond and the structure of the fish species should be determined, the area of cages and the density of bullfrogs, so as to make full use of the pond resources without affecting the growth of the fish, so as to truly achieve the purpose of increasing production and income.

9.2. According to the market forecast, determine the number of cage raised bullfrogs

In terms of production, the future market price of the cage should be predicted, and the scale of the cage frog should be determined, and the best timing of the frog should be mastered through reasonable stocking density, scientific feeding and growth rate control.

9.3. Reasonable stocking, to establish the symbiotic system of fish-frog three-dimensional breeding

The area of cage and the density of bullfrogs are limited, that is, no more than 100 bullfrogs per square meter, and the cage area should not exceed 5% of the pond area; for the pond of silver carp and bighead carp, the cage area should be controlled below 10% of the pond area. Only through reasonable stocking can the best feed efficiency, the highest growth rate and survival rate be obtained, and the symbiosis of fish and bullfrog in the pond, complementary advantages and increasing production and income can be realized.

10. Main risk analysis of pond fish-frog stereoscopic aquaculture

10.1. High incidence of breeding diseases

High-density breeding will naturally bring disease problems, especially with the joining of beginners and the innovation stage of breeding mode, which may be helpless for some diseases and bring great losses.

10.2. Management risk issues

Due to the high incidence of diseases and parental degradation, it is difficult to raise bullfrogs. Many people will take some unconventional ways to become potential risks in

management. Scientific, reasonable and compliant breeding is the future development road.

10.3. Financial risk problems

As a lot of new farmers to join the industry, in the seedling, the acquisition of the port must be polished eyes, to prevent being cheated.

10.4. The risk of immature breeding technology

Breeding technology is not mature, will lead to the probability of failure, or blind breeding? Temper the breeding technology, combined with the actual production to find their own breeding farm breeding technology is the key.

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12. References

1. Li W, Fan G, Sun K, Liu J, Liu J, Wang Y. Microbial community structure dynamics of invasive bullfrog with meningitis-like infectious disease. Frontiers in Microbiology. 2023;14:1126195.
2. Chen CJ, Jiang SF, Peng XH. Brief description of the healthy breeding technology and mode of bullfrog. Contemporary Aquatic Products. 2023;48(09):79-80.
3. Seixasfilho JTD, Hipolito M, Pereira MM. Liver histopathological changes in breeding bullfrogs. Acta Scientiarum Biological Sciences; 2013;35(4).
4. Wu Yi. Key points of fish and frog culture in pond. Guide to getting Rich in Fisheries. 2019;(04):54-55.
5. He F, Huang XG. Frog-fish cage interbreeding experiment. Beijing Aquatic Products. 2002;(02):16-17.
6. Zheng SZ, Zheng ZG, Shen HD. High-yield technique for bullfrog cages in fish ponds. Fujian Aquatic Products. 2004;(02):55-56.