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The Current Situation of Quality Supervision and Production Safety of Aquatic Products in Nanjing City

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Abstract In recent years, the work of quality supervision and production safety of aquatic products in Nanjing City has been carried out rapidly, and the system of "origin exit, market access, sign traceability, real-time monitoring" has been basically formed, initially realizing the whole-process monitoring on the quality safety of aquatic products from "pond to table". We take the current situation of quality supervision and production safety of aquatic products in Nanjing City as the study object, take the basic work of supervision on aquatic products in Nanjing City and advancing both in scope and in depth as breakthrough point, to sum up the results achieved in the work of quality supervision and production safety of aquatic products in Nanjing City in recent years; make initial exploration and research, in order to consolidate the existing achievements, and further enhance the level of supervision on quality safety of aquatic products in Nanjing City.

Key words Quality control, Production safety, Basic work, Advancing both in scope and in depth

Issues concerning the quality of aquatic products are major issues related to people's health and long-term development of fisheries, having become hot spot issues in society^[1]. In recent years, the Nanjing municipal government and the leadership attach great importance to the quality safety of aquatic products. Under the strong support of the provincial and municipal departments, the work of quality safety of aquatic products in Nanjing City moves forward steadily. The system of "origin exit, market access, sign traceability, real-time monitoring" is established, initially realizing the whole-process monitoring on the quality safety of aquatic products from "pond to table". This article reviews and summarizes the quality supervision and production safety of aquatic products in Nanjing City, mainly from two aspects (basic work, advancing both in scope and in depth), and makes useful exploration for further improving the work of supervision and production safety.

1 The basic work of supervision on aquatic products in Nanjing City

1.1 The aquaculture permit is issued In order to strengthen the macro management of the aquaculture industry, safeguard the legitimate rights and interests of fishery culturist, and promote continuous and healthy development of the aquaculture industry, Nanjing City set up the leadership teams and working groups for the implementation of water and mudflat aquaculture permit system in May 2003, in accordance with national regulations on implementing water and mudflat aquaculture permit system. These leadership teams and working groups are responsible for unified coordination, guidance, supervision and inspection on the implementa-

tion of work in districts and counties.

In 2005 , the city issued a total of more than 1 300 copies of the aquaculture permit, and the certification area nearly reached 40 000 hm² , fully completing the work of approving and issuing aquaculture permit in the non-controversial waters. In August 2005 , the Ministry of Agriculture awarded the title of Advanced Unit of the National Aquaculture Permit System Construction Work to Nanjing City. The implementation of the system is of great significance to rationally planning the layout of the farming industry, and ensuring the continuous and healthy development of the aquaculture industry in Nanjing City.

1.2 The identification and certification advance rapidly

1.2.1 The identification of pollution-free base. In 2002, Nanjing City carried out the identification work of municipal pollution-free bases of aquatic products. In this year, it vigorously built 13 pollution-free breeding bases with scale reaching 667 hm² , and 7 of them passed the identification of municipal pollution-free production bases. In September 2003, Gaochun County was identified as the overall advancement pilot county of pollution-free production bases of aquatic products in Jiangsu Province, with an identification area of 13 300 hm² . As of 2009, there were 49 units and 64 bases in total completing the identification of pollution-free bases in Nanjing City, with an identification area of 26 667 hm² , accounting for 70% of the area that can be identified.

1.2.2 Certification of pollution-free, green and organic products. In March 2002, "Wucheng" freshwater shrimp, and "Guchun" crab species were the first batch of certified provincial pollution-free products. In July 2003, "Jinniu" Aristichthys nobilis and "Qishui" crab became the first batch of pollution-free products certified by the Ministry of Agriculture. In 2007, "Gucheng Lake" crab obtained geographical indication protection, and the organic crab breeding base won the bronze metal of "National Organic Crab Research and Education Demonstration Base"

issued by the Organic Food Authentication Center of the State Environmental Protection Administration (SEPA). As of 2010, the city registered 36 brands of aquatic products, including 1 national well-known product, 2 provincial well-known products, 9 municipal well-known products; there were 35 aquatic products passing pollution-free certification, 20 green aquatic products and 4 organic aquatic products.

1.3 The effect of establishing standards and implementing standards is significant According to the Agricultural Standardization Development Plan in Nanjing City during the Tenth Five-Year Plan Period, Nanjing City organized scientific and technolog-

ical personnel to formulate 16 local quality standards and production technical operation rules on the main breeding species, such as crab, shrimp, tilapia and freshwater orbfish, based on the actual situation of Nanjing City (Table 1).

At the same time, it has fostered a batch of standardized production bases of aquatic products, and built 13 standardized production demonstration areas (Table 2), including 4 national-level demonstration areas, 3 provincial-level demonstration areas, and 6 municipal-level demonstration areas, achieving "production, coming into the market and circulation according to the standard", ensuring the production safety of aquatic products in Nanjing City.

Table 1 Agricultural standards in Nanjing City (aquaculture)

Order number	Name of standard	Standard No.
1	<i>Eriocheir sinensis</i> and <i>Gucheng Lake Hairy Crab</i> Breeding Technical Norm	DB3201/T 005 – 2002
2	<i>Eriocheir sinensis</i> and <i>Gucheng Lake Hairy Crab</i> Product Quality Standard	DB3201/T 006 – 2002
3	<i>Modern Fishing Demonstration Zone Construction Norm</i>	DB3201/T 011 – 2002
4	<i>Pollution-free Agricultural Products and Channel Catfish Breeding Operation Rules</i>	DB3201/T037 – 2003
5	<i>Pollution-free Agricultural Products Collossomabryopomum Breeding Technical Operation Rules</i>	DB3201/T035 – 2003
6	<i>Pollution-free Agricultural Products and Fresh-Water Denuclearize Pearl Pond Breeding Operation Rules</i>	DB3201/T036 – 2003
7	<i>Pollution-free Agricultural Products Siniperca chuatsi Breeding Operation Rules</i>	DB3201/T053 – 2004
8	<i>Goldfish Breeding Technical Operation Rules</i>	DB3201/T047 – 2004
9	<i>Cyprinus carpio</i> Breeding Technical Operation Rules	DB3201/T048 – 2004
10	<i>Pollution-free Agricultural Products and Wuchang Fish Breeding Operation Rules</i>	DB3201/T054 – 2004
11	<i>Pollution-free Agricultural Products and Spualiobarbus Curriculus Breeding Technical Rules</i>	DB3201/T066 – 2004
12	<i>Water Enclosure Breeding Technical Norm</i>	DB3201/T067 – 2004
13	<i>Tilapia Breeding Technical Rules</i>	DB3201/T085 – 2005
14	<i>Leiocassislongirostris Breeding Technical Rules</i>	DB3201/T115 – 2007
15	<i>Aristichthysnobilis Breeding Technical Rules</i>	DB3201/T134 – 2008
16	<i>Rice-Shrimp (Palinuridae) Continuous Cropping Production Technical Rules</i>	DB3201/T129 – 2008

Table 2 Standardized production demonstration zones (aquaculture)

Order number	Level	Name of demonstration zone
1	National	River Crab Ecological Breeding Standardized Demonstration Zone
2	National	<i>Aristichthysnobilis</i> Standardized Demonstration Zone
3	National	Pearl Standardized Demonstration Zone
4	National	<i>Eriocheir sinensis</i> Ecological Breeding Standardized Demonstration Zone
5	Provincial	<i>Collossomabryopomum</i> Standardized Demonstration Zone
6	Provincial	Freshwater Shrimp Standardized Breeding Demonstration Zone
7	Provincial	<i>Micropterus salmonides</i> Standardized Demonstration Zone
8	Municipal	Freshwater Shrimp Standardized Breeding Demonstration Zone
9	Municipal	Special Aquatic Product Standardized Breeding Demonstration Zone
10	Municipal	<i>Eriocheir sinensis</i> Standardized Demonstration Zone
11	Municipal	<i>Micropterus salmonides</i> Standardized Demonstration Zone
12	Municipal	<i>Penaeus vannamei</i> Boone Standardized Demonstration Zone
13	Municipal	Freshwater Shrimp Large-scale Efficient Standardized Breeding Demonstration Zone

1.4 Initial formation of "three-level" inspection network

Nanjing Aquatic Products Quality Supervision and Inspection Station was built in 2001. In recent years, on the basis of improving the infrastructure and equipments, it focuses on system establishment, reinforces system and lays great emphasis on effectiveness building. At the same time, it improves the operational training for the internal management and inspection personnel, effectively enhancing the detection capability and operational level.

At present, it can conduct the determination of 124 items, such as pesticide residues, heavy metal and antibiotics. In 2005, it became a designated inspection agency of pollution-free agricultural products after passing the examination of the Ministry of Agriculture. In 2008, through on-site assessment by the review group of Quality Supervision Bureau, the qualification accreditation of the station's laboratory was smoothly carried out. In March 2008, it smoothly passed the on-site assessment of provincial designated agency of seafood quality safety organized by the Jiangsu Provincial Oceanic and Fishery Bureau, and it was included in the list of the

At present, it can conduct the determination of 124 items,

first batch of accredited seafood quality safety testing organizations in Jiangsu Province. It has participated in the monitoring work of aquatic products quality safety for many consecutive years in Jiangsu Province.

Relying on the equipment and technical force of Nanjing Aquatic Products Quality Supervision and Inspection Station, Nanjing City has established rapid detection chambers in two large-scale wholesale markets in the city, and helped county and district fishery departments and the bases with size up to 667 hm² to establish detection chambers. "Three-level" quality safety test network of aquatic products has been initially established, with municipal inspection station as a leader, district and county inspection station as backbone, and rapid detection chamber in origin as complement.

1.5 The establishment and application of the traceability system Nanjing actively promotes the quality safety traceability system of aquatic products, and relies on the IC card recognition technology, to store the relevant information on aquatic products for sale in the IC card. At the same time, it has established the quality safety network of agricultural products in Nanjing City, and opened 800 free inquiry call, so that the consumers can conduct information inquiry and tracing at any time.

The construction of the traceability system not only provides convenience for consumers, but also plays a role in supervising the production and processing of aquatic products, forming a virtuous circle, thereby achieving the whole-process monitoring on the quality safety of aquatic products from "pond to table".

2 Advancing of supervision on aquatic products and safe production both in scope and in depth

Nanjing City has been actively finding the problems and deficiencies in the basic quality safety work of aquatic products. It pays attention to the weak links, intensifies supervision, strengthens the monitoring means, and creates long-term management mechanism of quality safety of aquatic products, constantly advancing the work of supervision on aquatic products and safe production both in scope and in depth in Nanjing City.

2.1 Scientific use and supervision of aquaculture inputs

The scientific use of aquaculture inputs is an important link in the quality safety management process of aquatic products, and the important work for the long-term management after the origin identification and product certification.

Nanjing City has mainly taken the mode of "strengthening management + strengthening guidance".

(1) Strengthening management. In the sales link, it is necessary to strengthen the inputs market regulation, strictly prohibit the operation and use of feed with no labeling of name of the manufacturer, or date of production, or means of correspondence; feed additives; deteriorated feed; fake fishery drug; the drug prohibited by the Ministry of Agriculture. In the production link, it is necessary to issue practical manuals for fishermen, establish inputs use file system, and comprehensively carry out the construction of "two systems" (pond file system and fishery drug prescription system) in Nanjing's pollution-free bases.

(2) Strengthening guidance. The fishery technology extension departments should strengthen publicity, use typical examples and real effectiveness to attract the majority of farmers, and improve the farmers' awareness of and ability to use science and technology to get rich.

2.2 Aquaculture disease prevention system The epidemic prevention work of aquatic animals is an important part of public health cause, related to people's health and life safety; an important measure to improve the health level of aquatic animals and safety level of animal products, and ensure the quality safety of aquatic products.

Taking the veterinary management system as an opportunity, Nanjing City carried out a series of reforms on the original aquatic disease prevention system in 2006, and established Nanjing Aquatic Animal Disease Prevention and Control Center. The specific work carried out is as follows:

2.2.1 Central laboratory building. Through several years of special funds input, the central laboratory building has initially taken shape.

(1) Strengthening the infrastructure construction, and improving the hardware equipments. Currently, according to functions, the central laboratory boasts pathogen detection chamber, the cell chamber, the bacteria chamber, RNA chamber, molecular biology chamber, and electrophoresis chamber, with an area of 400 square meters, buying a number of high-end equipments.

(2) Actively introducing talents, and creating high-quality disease prevention team. The center now has 3 senior engineers, 4 engineers, 4 on-job doctorates, and 7 personnel with master's degree, who are engaged in the aquatic animal disease inspection and quarantine work.

(3) According to the management approach of pathogenic microbiology laboratory, improving the management system, to provide institutional guarantee for efficient and safe operation of the laboratory.

(4) Actively carrying out major disease detection, prevention and control work. In recent years, according to the idea of vigorously developing the crayfish industry in Nanjing City, the central laboratory has carried out disease detection and test work in Nanjing's major breeding areas of crayfish; actively carried out epidemiological studies, and vigorously carried out major disease detection, prevention and control work.

2.2.2 Base fish hospital and telemedicine system building. The base of center's disease prevention work is at the grass-roots level, and strengthening the link with the grass-roots units can make the disease prevention work carried out with a well-defined objective. The specific practices are as follows:

(1) Taking the fish disease hospital as the starting point, it has strengthened the construction of aquatic animal's epidemic prevention capacity in large-scale breeding bases. In accordance with the requirements of *Veterinary Medicine Quality Management Specification, formulating Aquatic Animal Epidemic Prevention System and Fish Disease Hospital Construction Standards in Nanjing City*, and building standardized fish disease hospital in Nanjing's 13 large-scale industrial bases.

(2) It has established telemedicine system for fish disease,

applied the computer image information-based technology to achieve network-based management, enhanced information exchange and interaction between the municipal fish disease hospitals and base fish disease hospitals, improved the diagnosis and treatment level and efficiency of each fish disease hospital, and provided express channel for the center to timely know about the grass-roots epidemic development.

2.3 Management system building of improved variety of aquatic products

The fry is the material basis for the development of aquaculture. From the perspective of quality safety, it is one of the inputs for the aquaculture production safety, therefore, the work of quality supervision and production safety should be based on fry.

The relevant agricultural departments in Nanjing City have always attached great importance to the construction of aquatic fingerlings improvement system. Since the 1950s, the special funds for the construction of aquatic fingerlings improvement system have been arranged annually, to support the construction of breeding base at all levels. Currently, the city has 1 national breeding farm (Yangtze River Eriocheir sinensis), 2 provincial breed improvement farms (freshwater shrimp, herring, grass carp, chub and *Hypophthalmichthys molitrix*), 2 provincial breeding farms (tropical fish, crab), and 7 municipal fry breeding farms.

In terms of management, five management systems are strictly implemented. The specific practices are as follows:

(1) The fry improvement farm registration system. Carrying out the qualification administrative approval registration of the fry production units.

(2) The production permit system. Issuing the production licenses for the fry production enterprises in accordance with the requirements of having places, technical personnel, sufficient number of parents and sound management system.

(3) Fry epidemics quarantine system. The municipal aquatic animal epidemic disease prevention and control center is responsible for implementing quarantine inspection on the fry produced by the enterprises, and issuing quarantine certificate; the fry without being quarantined must not be sold and circulated.

(4) The regular inspection system. Annually, the agricultural departments organize the related leaders and technical experts to carry out inspection of the implementation of various systems in the fry production enterprises, and assess the inspection results, taking it as the basis for granting funds or reporting and declaring the provincial breeding farm.

(5) Special inspection system. In recent years, the agricultural departments have organized special inspection on the use of illegal drugs by some enterprises in the process of fry production, destroyed the fry produced using prohibited drugs, and punished these enterprises.

3 Consolidating existing achievements and further enhancing the level of supervision on quality safety of aquatic products in Nanjing City

Strengthening the management of quality safety of aquatic products is of great significance to protecting the health of consumers,

and promoting the sustainable development of fishery. Through several years of rapid development, the quality safety supervision and production safety work of aquatic products in Nanjing City has made great achievements, but in order to form long-term management, and further enhance the level of supervision, we need to focus on the following aspects.

3.1 Making the duties and responsibilities clear and strengthening government regulation

In the current quality safety supervision mechanism of aquatic products, the responsibilities are vague, the supervision is not adequate, and the phenomenon of repeated sampling and testing is widespread^[2]. Therefore, under the principle of power and responsibility consistency, we should make the duties and responsibilities of various administrative departments clear, improve management at different levels, and improve the operating mechanism^[3], which is the prerequisite for further improving the quality safety work of aquatic products.

3.2 Increasing capital input and improving the construction of the two systems

The aquaculture disease prevention system and the aquatic product quality detection system are two technical support systems for improving the quality safety and production safety work of aquatic products. The two are mutually independent, but complementary. According to the actual situation of Nanjing City, the advancement of two systems is different and the construction focus is also different. For the disease prevention system, the focus of its construction should be placed in the central laboratory building, to adapt to the requirements of modern fishery disease prevention and control. For the aquatic product quality detection system, we should strengthen the monitoring capacity of the county and market, purchase new equipments, and carry out rapid testing and market self-test work, to further enhance the strength of "three-level" inspection network.

3.3 Strengthening training to enhance the quality of the practitioners

Improving the quality safety of aquatic products relies on improvement in the quality of aquaculture practitioners^[4]. Therefore, in order to ensure the quality safety of aquatic products, we must take effective measures to carry out extensive publicity, education and training, to comprehensively improve aquaculture practitioners' awareness of product quality safety. We should focus on the training for the aquaculture practitioners, especially the large breeding households, so that the awareness of quality safety of aquatic products is spread to departments at all levels, and the employees in the links of production, transportation and sales, making the production of pollution-free products become the spontaneous behavior, the producers organize production consciously in accordance with standards, and strictly control the quality safety of inputs^[5].

3.4 Improving consumers' awareness of quality safety and forming social supervision

The consumer is the ultimate goal of the entire quality supervision of aquatic products. Consumers' attitude towards the safety of aquatic products and their propensity to consume will have a profound impact on the government and aquatic product enterprises' behavior selection^[6]. Therefore, through a variety of media, it is necessary to publicize the information and knowledge on quality safety of aquatic products for the

ence and technology into tangible product, which will bring the company both social and economic benefits. On the other hand, the cooperation between scientific research and company satisfies the demand of technologies in different position and improves teachers' teaching skills. Secondly, cooperation provides company with vital financial insurance and realizes resources sharing outside the company. In response to the limited finance and incomplete facilities in private companies, school will invest certain amount of money in getting more equipments in the lab and in return, companies would provide training base for schools, in which way school and company will have win-win situation. Such win-win mode meets the aim of study for work and work for the study and the talented students groups are considered to be the personnel bank for companies.

In recent years, Langfang Polytechnic Institute has established partner relationship with more than ten agricultural companies and achieved satisfactory results.

2.2.2 Supporting government's agriculture-oriented work and serving "three agricultural programs". Since 2009, Langfang Polytechnic Institute has founded agricultural development training center. According to work in urban agricultural center, the school organized various activities to support the three pastoral programs, namely helping agriculture, farmer and countryside. The school designated technicians to the countryside to over consultation service. On the one hand, technicians go to qualified rural cooperative centers to give lecture and solve technological questions. On the other hand, the school subsidize the green vegetable production demonstration center in Guangyang, Anxi, Dacheng and Yongqing, etc., which made significant contribution to local economy. Those cooperatives and production demonstration bases in return offer places to train students. Almost all the practical skills for gardening major can be arranged, such as vegetable plantation, pests diagnosis and prevention, soil fertilizer, medicine use skills and shed construction technological standards, etc.

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consumers, highlight the importance of quality safety of aquatic products, and improve the consumers' awareness of quality safety, in order to form strong social supervision, and promote the level of quality supervision of aquatic products in Nanjing City.

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3 Main experiences and achievements

3.1 Benign circulation of teaching-production-market mode

Based on the training base within and outside of campus, the production training base on the market is established. Teaching training facility is used in production to improve utilization of facilities. The productive training base is closely connected with marketing to ensure the upgrade of facilities synchronizing with other companies. The training base concentrates on production with one side connecting teaching practice and another side connecting with the market. Production process is the teaching process. The production, management process and adaptability to market are the key professional skills. Whether it's the choice of training content or equipment maintenance, the training base has improved a lot, which realizes benign circulation of training base construction.

3.2 Training effects and quality The science and technology brooder and a win-win mode are the concrete realization of open construction. The practice is closely related to the market, which makes students not only to understand company's culture and production process, but also to learn more about the current situation and development trend of their major. The infusion into industry and construction of accessible training base gives students realistic work experience, ameliorates training effect, makes training more accurate, realistic and effective, and insures the training effect and quality.

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