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The Development Strategy of Chongqing Duck Industry Under the Background of Intelligent Breeding: Take Pingyalian Project as an Example

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Abstract

Through analyzing the current situation and problems of Chongqing duck industry, this study discusses the application and development of ecological breeding strategy under the background of intelligent breeding. Drawing on the practice of Pingyalian project, this study emphasizes the importance and feasibility of intelligent transformation of the duck industry by combining the new generation of information technologies such as cloud computing, big data, and the Internet of Things. The study points out the promotion of the ecological breeding industry, the use of intelligent monitoring and management technology, the strengthening of disease prevention and control, the construction of the integration platform of the industrial chain, and the strengthening of policy and financial support. Furthermore, this study explores the positive effects of smart breeding on increasing rural community participation, promoting rural revitalization, and achieving sustainable development goals. This study provides development suggestions for the Chongqing duck industry through qualitative research methods and references for researchers and practitioners in related fields.

Keywords: Development Strategy, Intelligent Breeding, Duck Industry, Sustainable Development

Introduction

In recent years, China's breeding economic output has grown rapidly and has become an important part of China's agriculture and one of the important growth fields of the rural economy. The breeding industry chain includes breeding, processing, and marketing, and breeding varieties are gradually developing towards diversification and high quality (Park & Park, 2022; Henchion et al., 2022). Currently, the new generation of information technology represented by blockchain, combined with cloud computing, big data, the Internet of Things,

and other technologies, can inject intelligent elements into the breeding industry, promote the transformation and upgrading of breeding to information, intelligence, and modernization, and accelerate the economic development of the breeding industry (Naqvi et al.,2022; Kim, 2021).
Smart breeding is an advanced form of the development of modern breeding (Kwak et al., 2020). It fully uses advanced technologies such as cloud computing, big data, artificial intelligence, and the Internet of Things to optimize and integrate in the production and management of modern animal husbandry (Zhang et al., 2022). From the production level, the analysis of intelligent breeding can be reflected in the innovation of breeding mode and the improvement of productivity (Walter et al., 2017). It can implement intelligent control for the breeding process and environment, promote the digital development of breeding production links, and realize the geographical control of accurate monitoring and disease prevention (Zhang et al.,2023; Youfu et al., 2023). To stimulate the high-quality development of animal husbandry and improve the safety guarantee ability of the supply of livestock and poultry products, intelligent breeding will further become the main development direction of China's breeding industry in the future, with broad development prospects (Wang et al., 2021).

Pingyalian Project

With the mission of "rural revitalization" and "sustainable development", the Pingyalian project adopts the rural ecosystem breeding mode to carry out a new ecological smart breeding. With the core advantage of "breeding + industrial chain + green + business + intelligence", it has achieved the healthiest and most natural ecological duck breeding by creating a new industrial chain model. Pingyalian breeding reduces the cost of using the feed. Internet technology liberates farmers, reduces time costs, and improves efficiency. Villages can actively respond to the national industrial and rural revitalization strategy through planting vegetables and fruits, rural tourism, and other projects, and developing a different ecological breeding model based on green breeding.
This ecological breeding strategy aims to form a natural ecological circulation system by planting duckweed, placing duck seedlings in paddy fields, and cultivating high-quality ecological duck and other ancillary products such as functional duckweed, ecological shrimp, and ecological lotus root. This method reduces the use of chemical feed, reduces agricultural pollution, and protects the natural environment. Still, it also realizes cost-effectiveness, reduces the cost of breeding, and improves economic benefits through recycling natural resources. In addition to ecological duck, it can also produce diversified products such as functional ping, ecological shrimp, and ecological lotus root to increase income and product-added value. The "Green breeding" education project carried out by cooperative and educational institutions has further enhanced students' environmental awareness and practical ability, promoted sustainable development education, and demonstrated this strategy's social and educational value.

Method

The main purpose of this study is to explore the ecological breeding strategy under the background of intelligent breeding, taking the Pingyalian project as an example. The research focuses on exploring feasible strategies with qualitative research suitable for research purposes. The paradigm used in this study is interpretivism, which helps to analyze the current situation and existing problems of the Chongqing duck industry and propose feasible

intelligent breeding strategies. The data for this study were derived from secondary data, including books, journals, magazines, newspapers, electronic resources, websites, reports, government records, and statistics. Based on the data collection, this study describes the Chongqing duck industry's development status and problems. In addition, it discusses the ecological compound breeding strategy based on the background of intelligent breeding.

Results and Discussion

Development status of Chongqing duck industry

Chongqing is an important city in southwest China, providing ideal conditions with its unique geographical location and mild and humid climate for agricultural production, especially the duck industry. The mountainous terrain and abundant water resources make ducks an important means to increase farmers' income. With the rapid economic growth and the rising demand for high-quality protein, the demand for duck meat and duck eggs continues to increase. Through technical guidance, financial subsidies, and the promotion of modern breeding technology, such as scientific feed ratio and disease prevention and control, the government has effectively promoted the development of the duck industry and improved production efficiency and breeding benefits. At the same time, the traditional free-range model is gradually replaced by intensive and standardized breeding models, including single space chain breeding farms to large-scale factory farms, etc. These changes not only reduce costs but improve production efficiency. Although the pig plague in 2018 and the subsequent COVID-19 epidemic affected the growth of meat duck sales, the market demand for duck meat is expected to resume growth. The government's policy support and exploration of new comprehensive breeding models in Chongqing have further promoted the healthy development of the duck industry, providing strong impetus and broad opportunities for the future of the duck industry in Chongqing.

Problems of duck industry in Chongqing

Although the duck industry in Chongqing has developed rapidly thanks to its unique geographical and climatic conditions, it also faces a series of problems and challenges in the development process, mainly including

(1) Environmental Pollution Problem

Raising ducks will produce feces and wastewater; if improperly treated, they will cause serious pollution to the surrounding water and soil. With its mountainous situation and developed water system, improper aquaculture activities may affect surface water quality and cause environmental problems.

(2) Difficulty in Disease Control

Under intensive breeding conditions, ducks are prone to infectious diseases, such as duck fever, duck cholera, etc. The outbreak and spread of these diseases will seriously affect the breeding benefits and even lead to huge losses for farmers. Moreover, disease prevention and control needs high technical support and financial investment, which is a big burden for small-scale farmers.

(3) Uneven technical and management level

Although some farmers have begun to adopt modern breeding techniques, most still rely on traditional breeding methods and lack scientific knowledge and technology of breeding

management. It leads to the unstable growth performance of ducks, low production efficiency, and product quality cannot be guaranteed.

(4) Market competition and price fluctuations
With the rapid development of the duck industry, the market competition has intensified. On the one hand, farmers need to face competition from other regions; on the other hand, the price of duck meat and duck eggs are affected by the relationship of market supply and demand, prone to large fluctuations, which bring operational risks to farmers.

(5) Lack of branding and marketing strategies
An important problem facing the duck industry in Chongqing is the lack of strong brand building and effective marketing strategy, which leads to the low added value of products, and it is difficult to occupy an advantage in the fierce market competition, especially in the competition with other regional and international brands. This situation affects the profit space of farmers and enterprises and limits the development potential of the whole industry.

(6) breeding feed costs
As an important part of the cost of breeding ducks, the feed cost has been increasing in recent years due to the continuous rise of raw material prices, which has had a significant impact on the economic benefits of the duck industry. This trend not only reduces the farmers' profit margin but also increases the operation risk of the breeding industry. In addition, it is difficult for farmers to pass on the increased feed costs to consumers, which means that they must absorb these additional costs, inevitably affecting farmers' market competitiveness.

Development strategy of Chongqing duck industry under the background of intelligent breeding
The Pingyalian project provides a new idea to solve the problems in Chongqing duck industry. Combined with the background of intelligent breeding, the following are a series of strategies for the development of Chongqing duck industry

(1) Promote the ecological breeding model
Relying on the rich natural resources of Chongqing, such as the mountainous terrain and abundant water system, and learning from the Pingyalian project, the complex ecosystem aquaculture model can effectively reduce the dependence on chemical feed to reduce the breeding cost and reduce the impact on the environment (Javaid et al., 2022; Khan et al., 2022). At the same time, by establishing a healthy ecosystem, such as the symbiotic relationship between duckweed and duck, the project realizes green breeding. It improves the quality of duck meat and duck eggs, showing a new economical and environmentally friendly breeding model (Su et al., 2021).

(2) Adopt intelligent breeding technology
Using the Internet of Things technology and big data analysis, the duck industry can implement an intelligent monitoring system to monitor the breeding environment in real time and adjust the breeding conditions promptly to ensure the healthy growth of ducks (Relf-Eckstein et al., 2019). The application of this technology not only allows the analysis and management of key data in the breeding process and optimizes the breeding mode, thus significantly improving breeding efficiency. This integrated technology method provides an

efficient and accurate management strategy and promotes the development of the breeding industry to be intelligent and data-driven.

(3) Strengthen disease prevention and control

By using intelligent systems to monitor ducks' health in real-time and establish an early warning mechanism, isolation and treatment measures can be taken immediately when health abnormalities are found, effectively reducing the spread of the disease. At the same time, the importance of popularizing scientific breeding knowledge cannot be ignored. By organizing online and offline training, farmers' understanding of disease prevention and ecological breeding methods can be significantly improved, and the breeding industry's overall health and ecological sustainability can be further enhanced (Kwon et al.,2021). This comprehensive strategy of combining advanced technology monitoring and knowledge popularization provides an effective way to improve the efficiency of breeding and protect animal health.

(4) Build an industrial chain integration platform

Using the Internet platform to connect producers and consumers, the Chongqing duck industry can establish brand awareness and enhance market competitiveness. At the same time, integrating upstream and downstream resources, from feed supply to product sales, not only improves the efficiency and transparency of the whole industry chain, but also promotes market access and the dual goal of brand construction. This comprehensive strategy enhances consumers' awareness and trust in Chongqing duck products and provides broader market opportunities and higher economic benefits for farmers and enterprises.

(5) Strengthen policy and financial support

The government can introduce relevant policies to encourage and guide the transformation of the breeding industry to ecology and intelligent direction and provide financial subsidies and technical support to those farmers who adopt ecological breeding and intelligent technology to lower the threshold for their transformation (Wigger, 2023). This combination of policy guidance and financial incentives can promote the breeding industry's sustainable development and accelerate the popularization and application of modern breeding technology to improve the competitiveness of the whole industry (Liu et al., 2018).

(6) Promoting comprehensive rural development

By combining the duck industry with rural tourism, ecological agriculture, and other projects, the diversified development of the rural economy can be promoted, and the sustainability of the projects can be further enhanced by encouraging the community to participate in the management and operation of the breeding projects (Lee et al., 2022; Karunathilake et al, 2023). This comprehensive development strategy can create new economic growth fields in rural areas, promote cooperation and exchange between community members, jointly promote the prosperity of duck industry and related industries, and provide an effective way to realize the comprehensive development of the rural economy and society.

Conclusion

With the integration of the new generation of information technology and the promotion of intelligent breeding, Chongqing duck industry faces unprecedented opportunities for transformation and upgrading. The Pingyalian project not only shows the broad prospect of

combining ecological breeding and intelligent technology but also provides a feasible path for the sustainable development of the breeding industry and the rural revitalization strategy. By promoting an ecological breeding mode, using intelligent breeding technology, strengthening disease prevention and control, building an industrial chain integration platform, and strengthening policy and financial support, the Chongqing duck industry can achieve high-quality development, improve supply security ability, eventually promote the diversification of rural economy and socially sustainable development of education. Facing the future, combined with the background of intelligent breeding, Chongqing duck industry will continue to explore the road of innovative development and contribute to realizing more prosperous agricultural production and rural revitalization.

This study investigates the smart breeding and ecological breeding strategies in Chongqing's duck industry. The theoretical contribution lies in integrating new-generation information technologies into the analysis of the breeding industry and proposing an ecological compound breeding model, providing theoretical and methodological support for the sustainable development of the breeding industry. Practically, the study offers specific strategies for the modern transformation of the breeding industry and the diversification of rural economies. However, the study has shortcomings, including a lack of empirical analysis, insufficient risk assessment, and inadequate consideration of policy and market environment changes. Therefore, while the research provides new insights for the development of the breeding industry, it needs to further deepen empirical studies, comprehensively evaluate the risks and adaptability of technology application and strategy implementation.

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