Research on the Development of Smart Animal Husbandry in Beijing

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Abstract   With the rapid development of agricultural science and technology, animal husbandry, as an important pillar in the field of agriculture, is gradually moving towards a new era of smart animal husbandry with the deep integration of informatization and digitalization. This transformation not only breaks through the traditional production mode of animal husbandry, but also promotes it to a new form under the Internet ecology, draws a new blueprint for the development of agriculture and animal husbandry, and gives birth to numerous potential business opportunities for the development of new agriculture. However, the practice and promotion of smart animal husbandry is not a smooth road, and many challenges and problems need to be solved urgently. On the basis of an in-depth investigation of the development status of smart animal husbandry in Beijing, this paper comprehensively analyzes the current problems, including the difficulty of technology integration, the lack of talent reserve, and the need to improve the policy environment. In view of these problems, it puts forward a series of practical suggestions, in order to speed up the development of animal husbandry in Beijing to the direction of smart development, and realize the sustainable development of animal husbandry.

Key words   Smart animal husbandry, Sustainable development, Existing problems, Development recommendations

1 Introduction

In order to promote the high-quality development of agriculture in the capital, Beijing issued the implementation plan for the key work of rural revitalization in 2024, pointing out that it is necessary to improve the agricultural science and technology innovation system and continuously enhance the leading role of the capital's agricultural science and technology innovation. With the rapid development of high-tech and information integration such as the Internet, the intelligence of animal husbandry has become its future development direction. In the study, we found that the smart animal husbandry in Beijing is also facing many problems and challenges, such as slow technology development, high technology cost, lack of talent and so on, so how to solve the problems. Through the analysis of the development environment and key factors of smart animal husbandry in Beijing, we came up with pertinent recommendations for accelerating the development of smart animal husbandry in Beijing.

2 Analysis of the environment for the development of smart animal husbandry in Beijing

2.1 Analysis of policy environment   In recent years, the Chinese government has provided increasingly perfect policy support for the development of smart animal husbandry, which has significantly promoted the deep integration of animal husbandry and modern technology. In particular, it is worth mentioning that in the *Imple-* *mentation Plan for the Rural Revitalization Strategy of Beijing during the Fourteenth Five-Year Plan Period*, Beijing clearly put forward and planned in detail the development blueprint of digital farms, smart animal husbandry and smart farming. Since then, the *Fourteenth Five-Year Plan for the Development of National Agricultural and Rural Informatization* promulgated by the Ministry of Agriculture has further emphasized the strategic significance of the construction of smart pastures and the digital upgrading of large-scale farming. These policies not only provide a broad stage for the application of modern science and technology in animal husbandry, but also inject a strong impetus into the vigorous development of animal husbandry.

2.2 Analysis of economic environment   With the rapid development of science and technology and the acceleration of urbanization in China, people's consumption concept is undergoing profound changes, and the demand for nutritional and healthy food continues to grow. Especially, the demand for high-quality animal products is particularly prominent, which undoubtedly plays a positive role in promoting the development and circulation of animal products, and then accelerates the rapid development of animal husbandry.

2.3 Analysis of social environment   China is a big animal husbandry country, and animal husbandry occupies a pivotal position in China's national economy. The results of the seventh national census show that the permanent resident population of Beijing has exceeded 21 million, which has increased significantly in the past ten years and formed a huge consumer market. In addition, as an important window of international trade, the total output value of agriculture, forestry, animal husbandry and fishery in Beijing reached 16.84 billion yuan in the first three quarters of 2023, of which animal husbandry accounted for 17.47%, providing abundant food and materials for the market. It is expected

that the total output value of animal husbandry in Beijing will continue to grow, providing a broader market space for the development of smart animal husbandry.

2. 4 Analysis of technical environment Beijing has performed well in the technical support of smart animal husbandry. At present, there are 29 agriculture-related research institutions, as well as 13 municipal and 110 district and county agricultural technology extension organizations in Beijing. Besides, there are 11 national key laboratories, 8 national engineering and technology research centers and many municipal key laboratories in Beijing. These institutions and research institutes provide strong technical support for the development of smart animal husbandry. However, according to the *Report of China Smart Animal Husbandry Development 2022*, China's smart animal husbandry still faces problems such as weak information hardware facilities, low information sharing and low information utilization. In the future, with the rapid development of Internet of Things (IoT) and smart technology, China will realize the information supervision from breeding to dining table, and promote the development of animal husbandry to high quality.

3　The core driving force for the development of smart animal husbandry in Beijing

With the rapid development of science and technology and the surging tide of information technology, smart animal husbandry, as a new development model, has emerged globally. As the capital of China, Beijing has become a leader and demonstrator in this transformation by virtue of its unique position and resource advantages.

3. 1 Leading of technological innovation Technological innovation is the core engine to promote the development of smart animal husbandry. Beijing, as the highland of scientific and technological innovation, brings together many well-known universities, top scientific research institutions and scientific and technological enterprises, which provide solid technical support for the development of smart animal husbandry. Driven by these innovative forces, Beijing's animal husbandry is gradually realizing fine and smart management to ensure the safety and stability of animal product quality. For example, by integrating advanced technologies such as IoT, big data and artificial intelligence, Beijing Animal Husbandry Big Data Platform has realized all-round monitoring and smart decision-making of animal husbandry, greatly improved monitoring efficiency and reduced operating costs. For example, the pig herd system solution developed by Beijing Institute of Animal Husbandry and Veterinary Medicine, Chinese Academy of Agricultural Sciences combines smart management with planning strategy to achieve precise management and service for each pig.

3. 2 Environmental protection and sustainable development Under the guidance of the concept of "lucid waters and lush mountains are invaluable assets", Beijing's animal husbandry industry is gradually shifting from the simple pursuit of production efficiency to the development path of environmental protection, green, high output and high efficiency. After long-term research,

Pinggu Comprehensive Experimental Station and experts have successfully implemented the mixed sewage purification project, which not only reduces the cost, but also realizes the saving and recycling of water resources. These measures fully reflect the firm determination and practical action of Beijing's animal husbandry in environmental protection and sustainable development.

3. 3 Promotion of international cooperation and exchange International cooperation and exchanges are an important driving force for the development of smart animal husbandry. As an international metropolis, Beijing, with its strong international influence and broad development space, actively carries out cooperation and exchanges with advanced animal husbandry countries and technical personnel. By introducing international advanced animal husbandry technology and management experience, Beijing's animal husbandry is gradually realizing the innovation and upgrading of technology and management experience. Such open and inclusive attitude not only helps to promote the healthy and orderly development of animal husbandry in Beijing, but also contributes valuable "Beijing wisdom" and "Beijing Solution" to the development of animal husbandry in the whole country and even in the whole world.

4　Challenges faced by the development of smart animal husbandry in Beijing

4. 1 Unbalanced development of informatization Although Beijing Smart Animal Husbandry has made remarkable progress in recent years, in some areas, the imbalance of information development is still prominent. As a result, the accuracy and timeliness of data collection and analysis are restricted in key links such as breeding, production and marketing, thus affecting the scientificity and effectiveness of decision-making.

4. 2 Technology integration and application level to be improved Smart animal husbandry covers many frontier technologies, such as IoT, big data, artificial intelligence, *etc.*, but in practical application, the integration and application level of these technologies still need to be improved. Especially in some areas where capital, technology and management experience are relatively scarce, the problem of technology application is particularly prominent, and it is difficult to effectively integrate advanced technology into the production practice of smart animal husbandry.

4. 3 Talent shortage becoming a constraint The development of smart animal husbandry needs the support of professionals in information technology, agricultural engineering, animal science and other fields. However, the current talent reserve is insufficient, especially in some remote areas, the lack of talent has become a key factor restricting the development of smart animal husbandry.

4. 4 Low efficiency and weak support of policy implementation Although the central and local governments have issued a series of policies to support the development of smart animal husbandry, in practice, the efficiency and support of policy implementation still need to be strengthened. To a certain extent, the low efficiency and weak support have affected the healthy development of smart animal husbandry.

4.5 High cost restricting the popularization of smart animal husbandry The initial investment of smart animal husbandry, including equipment purchase and technology introduction, is relatively high. For most small and medium-sized farmers, due to limited financial resources, it is difficult to fully adopt smart technology, which restricts, to a certain extent, the popularization and development of smart animal husbandry.

4.6 Data security risks With the further development of smart animal husbandry, a large number of data are collected, stored and analyzed, and the problem of data security has become increasingly prominent. Data security risks may not only have a serious impact on the production and sales of animal husbandry, but also cause a crisis of social trust and bring challenges to the sustainable development of smart animal husbandry.

To sum up, the development of smart animal husbandry in Beijing is still facing many challenges. In order to promote the healthy and sustainable development of smart animal husbandry, it is necessary for the government, enterprises and all aspects of society to work together and cooperate to strengthen policy guidance, technical support and talent training.

5 Recommendations for promoting the development of smart animal husbandry in Beijing

When promoting the development of smart animal husbandry in Beijing, we should adhere to the principle of excellence and take scale, standardization, automation, intellectualization and digitalization as the development goals. In order to realize this grand blueprint, it is necessary to make full use of the policy of strengthening agriculture and benefiting farmers and rich farmers, strengthen original technological innovation, accelerate the transformation of scientific and technological achievements, and deepen the standardized production process, so as to lay a solid foundation for great-leap-forward development of the animal husbandry.

5.1 Strengthening the policy support and increasing the capital investment The government should further strengthen the policy support, and provide strong policy guarantee and financial support for the informatization and smart upgrading of animal husbandry through diversified means such as financial subsidies, tax incentives, and financial support.

5.2 Promoting scientific and technological innovation and technological upgrading It is necessary to encourage universities, scientific research institutions and enterprises to deepen cooperation and jointly carry out research and development and application demonstration of key technologies of smart animal husbandry. In addition, we should increase capital investment, enhance the integration and application level of technology, and provide solid technical support for the rapid development of smart animal husbandry.

5.3 Strengthening personnel training and quality improvement It is required to strengthen professional skills and quality education to improve the overall quality of practitioners. Besides, it is necessary to strengthen the training and introduction of talents in information technology, agricultural engineering, animal science and other fields to provide talent guarantee for the sustainable development of smart animal husbandry.

5.4 Deepening the international cooperation and exchange It is recommended to strengthen the cooperation and exchange of animal husbandry at home and abroad, learn from advanced technology and management experience, and promote the international development of smart animal husbandry in Beijing. Through international cooperation, Beijing can better integrate into the global trend of animal husbandry development and enhance the international competitiveness of its smart animal husbandry.

5.5 Reinforcing the data security management It is recommended to build a sound big data management system and system, strengthen data security protection, and ensure the security and privacy of animal husbandry data. By strengthening data security management, it can provide a solid data guarantee for the steady development of smart animal husbandry in Beijing.

5.6 Enhancing the publicity and promotion Beijing should take full advantage of various new media channels, strengthen the publicity and promotion of smart animal husbandry, and improve the awareness and acceptance of smart animal husbandry by animal husbandry producers. Through publicity and promotion, it is able to better gather consensus and strength, and promote the steady development of smart animal husbandry.

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