The Value, Mode and Promotion Path of the Informatization of Veterinary Drug Production and Supervision

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Abstract. The veterinary drug industry is closely related to people’s lives. The production and sale of counterfeit and inferior veterinary drugs, the illegal use of prohibited drugs, and the non-prescribed use of veterinary drugs have affected the prevention of animal epidemics and affected the quality of animal products, which will finally affect people’s physical health. The intelligent management system for veterinary drug production and supervision (the system) can supervise the production, management and use of veterinary drug in an all-dimensional and multi-level manner in a wide range of fields. It has great research significance and broad application prospects. This paper mainly analyzes the significance of the system from three perspectives, studies its application prospects in different market entities, and analyzes the application and promotion of the system from two aspects.

1. Introduction
In animal husbandry, all kinds of veterinary drugs are often used to ensure the healthy growth of animals. However, the illegal use of veterinary drugs and the use of fake and inferior veterinary drugs will seriously affect the quality of animal products, which will affect the health of the general public [1]. Therefore, it is of great social value to achieve all-directional, multilevel and wide-ranging supervision of veterinary drugs. In today’s society, people pay more and more attention to food safety. Therefore, the implementation of the system has certain economic value for consumers, producers of animal products, as well as producers, operators and users of veterinary drugs. The system has a broad application prospect.

Veterinary drug residue is an important factor affecting the quality and safety of animal products. In recent years, the incidents of excess residue of veterinary have occurred from time to time, which not only threaten the health of urban and rural residents, but also affect the import and export trade of livestock products in China, and even cause social panic. The production and sale of counterfeit and inferior veterinary drugs, the illegal use of illegal veterinary drugs, and the non-prescribed use of veterinary drugs will not only affect the effectiveness of prevention and treatment of animal epidemics, but will also cause excess drug residue in animals and affect the quality and safety of animal products. This in turn affects people’s physical health [2]. The invention and application of the system will directly promote the standardization of production, circulation, sale and use of veterinary drugs and enhance process supervision, which will be conducive to safeguarding the quality and safety of animal products [3].
2. Value analysis of informatization of veterinary drug production and supervision

2.1. Help to prevent and control the risks of drug residue and ensure the quality and safety of livestock products

The application of the system can not only ensure the identification and determination of key control points for veterinary drug production and the establishment of a complete detection indicator system for them, but also achieve efficient control and management for drug production, resulting in truly “low toxic and efficient” veterinary drugs. It can use the one-to-many split correlation model of the large unit packaging label and the small unit packaging label to efficiently and accurately track the circulating information of the veterinary drugs through the split correlation information formed by it. In turn, it promotes traceability of the veterinary drugs in the delivery, transportation and circulation process. The system will also monitor the veterinary drugs during their sale and use to prevent drug residue. The implementation of the system can form an effective veterinary drug quality and safety tracing system, which can effectively ensure the normal use of veterinary drugs in livestock and poultry breeding, and promote the production of safe and high-quality animal products.

2.2. It is conducive to building intelligent animal husbandry and promoting the modernization of agriculture

The modernization of agriculture in China needs to speed up the integration of information technology, automation technology, management technology and intelligent equipment to form an animal husbandry industry with intelligent management. Veterinary drug supervision is one of the key points in this industry. The system will integrate the Internet of Things technology with the traditional veterinary drug industry, establish a pioneering intelligent model for veterinary drugs management, and make the traditional veterinary drug industry online and data-intensive. The implementation of the system can realize the dynamic monitoring of the whole process of veterinary drug, the visualized display of dynamic process and intelligent management; the collection of information of veterinary drug production, operation, storage and use and the establishment of a national data center for veterinary drugs can provide data support for the analysis and processing of veterinary drug control data. The realization of intelligent supervision and collaborative sharing of big data in the whole process of veterinary drug management is conducive to the construction of intelligent animal husbandry [4].

The development of the system has innovatively applied Internet + technology such as Internet of Things technology, two-dimensional code marking technology, big data technology, cloud platform technology, and smart terminals to agriculture. It integrated key technologies for smart management of veterinary drugs and formed a system for the intelligent supervision of them, realizing automated supervision of veterinary drug production, circulation traceability, guaranteed environment, and effective counterfeit drugs prevention. It solved problems such as old methods of veterinary drug production and management, asymmetric information, and lax supervision. It strengthened the effectiveness of supervision over the use of veterinary drugs during the periods of withdrawal and prohibition, effectively reduced the residue of veterinary drugs, strengthened food safety, and raised the level of standardization, intelligence, refinement and precision in the production and management of veterinary drugs, thus boosting the modernization of China’s agriculture and offering a pair of wings of science and technology into the modernization of agriculture.

2.3. It is conducive to the intelligent management of veterinary drugs and leads the demonstration effect of related industries

The system adheres to the concept of “one drug to one code, one animal to one code, one to one correspondence, and whole-process traceability”, and formed a whole-process traceable system from veterinary drug production to circulation, storage and use through the printing of two-dimensional marking codes on the packaging of veterinary drug products. It can effectively solve the problem of mismatch between the actual flow of veterinary drugs and their production and marketing, and truly
realize drug traceability from the source of production to their use on animals [5]. At the same time, the establishment of a comprehensive smart service platform for veterinary drugs provides veterinary drug tracing, supervision, data analysis, and three-dimensional display, providing comprehensive decision support and visualized services for veterinary drug science supervision, which is conducive to the management of veterinary drug intelligence.

The implementation of the system will improve the traditional mode of veterinary drug production supervision, enhance the veterinary drug industry, and establish a large-scale, information-based and intelligent system for the production, management and use of veterinary drugs. A series of standards and norms for data sharing, processing and analysis, and technology sharing will be formed. And a set of technology demonstration models can be promoted, replicated, and applied. The technological achievements resulting from the project can provide reference and have radiation effects in fodder, pesticides, chemical fertilizers, human medicine, and agricultural product quality and safety traceability systems, and form innovative technology and application models for production and operation technologies in new fields, thus to improve the level of agricultural information construction in China and promote the simultaneous development of “Four Modernizations” [6].

3. Analysis of application mode of informatization of veterinary drug production and supervision

The system will be applied in all links, processes and fields of veterinary drug production, circulation and use. It is a whole-process, full-element, and system-wide supervision of veterinary drugs. It has made comprehensive use of modern information technologies such as the Internet of Things, big data, cloud computing and mobile interconnection. And its implementation has important application value and guiding significance for veterinary drug managers, producers, operators and consumers, and will produce huge economic, social and ecological benefits. It will vigorously standardize the production and management, promote precise use and intelligent supervision of veterinary drugs. It will effectively improve the development of veterinary drug informatization in China. Therefore, the system has broad application prospects.

After the system is established and introduced online, the farm can read the two-dimensional code information marked on the veterinary drug product through a smartphone and trace the management system through veterinary drug. The whole process from production, distribution, transportation, storage to distribution to breeding enterprises will be under the supervision and traceable. The consumer confidence and loyalty will be increased. It can prevent fake and shoddy products on the market and prevent serial shipments, purify the veterinary drug market, maintain normal business order, ensure the safety of animal drug use, severely crack down on illegal production and business operations, promote the healthy development of the industry, and ensure the safety and effectiveness of veterinary drug products. It plays an important role in stabilizing the development of animal husbandry, ensuring the safety of aquaculture, food quality and safety, and maintaining social stability. The retrospective application of the two-dimensional code can give the product a unique “identity card”, increase the cost of counterfeiting by using one drug and one code mode, and achieve the purpose of anti-counterfeiting, making the product safer. It can provide reliable basis for animal husbandry production and early warning, and timely analyze the abnormal production and sales status of a veterinary drug variety, warn the occurrence and changes of an animal epidemic, and predict the price, supply and demand of an animal and its products, having significant economic benefits.

The system has important application value to different market entities. For veterinary drug producers, this system can strengthen the process management of production, improve the level of standardization of production processes, ensure the quality of veterinary drug production, and reduce unnecessary losses; for veterinary drug operators, this system can ensure the quality of veterinary drug, reasonable distribution of storage, transportation and delivery, and improve their management level and profit level; for veterinary drug users, this system can obtain the true information of veterinary drug production, prevent the use of fake and inferior veterinary drugs, and improve the level of safe drug use, so as to ensure the quality and safety of animal products; for consumers of animal products,
with this system, the whole process of animal products production can be traced back. Their confidence will be increased and the food safety will be ensured; for veterinary drug managers, this system can strengthen the intelligent and smart supervision of veterinary drugs, prevent the risk of drug residues and outbreak of animal diseases, realizing early detection, early warning, and early prevention and control. For related industries, this system can produce greater reference and radiation-driven effects, such as: feed, fertilizer, seed and other agricultural inputs, as well as the construction of a retrospective system for the quality and safety of agricultural products. Therefore, the application prospects of the system are broad.

4. Analysis on the promotion path of veterinary drug production and supervision informatization

4.1. System demonstration and application
First, three chemical drug plants and two raw drug plants will be selected and used as a base for the promotion and application of technologies and equipment related to veterinary drug data interaction and dynamic extraction systems. Technical tests will be conducted and equipment and system platform applications will be evaluated. Secondly, a business enterprise that can be used as a base for the promotion and application of cold chain logistics technology and system engineering integrating the functions of handling, storing, transporting, distributing, selling and information processing of veterinary drugs. Relevant technical tests will also be carried out. The application of relevant cold chain logistics technology will be evaluated. And the base will be used as a demonstration site for key constructions to achieve the monitoring and management of the cold chain logistics of veterinary drugs. Finally, one provincial and two county-level veterinary drug surveillance agencies, and institutions such as the China Supervision Institute will be selected to use the system on veterinary drug evaluation and monitoring, and use veterinary drug traceability technology and equipment to carry out veterinary drug evaluation and monitoring and veterinary drug tracing.

4.2. Further technical improvement and upgrading
Real-time monitoring of key control points for veterinary drug production based on GMP is realized to improve standardization of veterinary drug production; real-time monitoring of veterinary drug management based on GSP is realized to improve the standardization of veterinary drug marketing process. At the same time, GIS visualization technology for veterinary drug flow will be used to strengthen the monitoring and management of the whole process of veterinary drug production, to achieve the traceability of veterinary drug flow and visualized display. During the implementation of the system, 1-2 System application bases with significant achievements will be selected as demonstration sites for key construction to improve GMP-based veterinary drug production standards so as to achieve real-time monitoring of key control points; select 1-2 of the veterinary drug evaluation and monitoring departments or traceability technology department with more significant achievements of using the system as demonstration sites to carry out key construction, so as to achieve the full-process traceability of veterinary medicine, really achieving the traceability from the source to the animal.

5. Conclusion
The use of veterinary drug is very important for animal husbandry and its products. How to use veterinary drug safely and efficiently is a matter of constant concern for both animal husbandry and food industry in China. The illegal use of veterinary drugs, the use of counterfeit and inferior veterinary drugs and the abuse of veterinary drugs have occurred from time to time. Therefore, it is very necessary to supervise the production, management and use of veterinary drugs, and it has great social and economic value. Good supervision of veterinary drugs can ensure the quality and safety of animal products by controlling the risks of drug abuse, which is conducive to building intelligent animal husbandry and promoting the modernization of agriculture. It is beneficial to animal drug
intelligent management and leads the demonstration effect of related industries. Nowadays, people pay more attention to food safety. Therefore, the intelligent management information system of veterinary drug production and supervision has broad application prospects. The application of the system has a practical significance for consumers of animal products and farms, veterinary drug producers and veterinary drug operators. The prospects of the system can also promote the promotion and application of the system. Some enterprises and government agencies are selected among the veterinary drug manufacturers, veterinary drug management manufacturers, breeding farms, and veterinary drug supervision departments, to promote, upgrade and improve the system.

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References
[1] Liu, Y.B. (2007) Thinking on Strengthening the Construction of Veterinary Drug Supervision System in China. J. Chinese Journal of Veterinary Drug., 41(1): 38-39.
[2] Wang, T.J. (2005) Veterinary Drug Supervision and Human Health. J. Chinese Poultry., 27(7): 10-12+3.
[3] Mu, K., Wang, Z.Y. (2011) Discussion on Improving Veterinary Drug Supervision System. J. Chinese Poultry., 33(13): 48-50.
[4] Hao, H.G., Gao, L.J., Zhang, J.H., Liu, L., Tang, J., Li, X.P., Zhao, D.L. Research on the construction of veterinary drug data platform based on veterinary drug electronic tracing. J. Chinese Journal of Veterinary Medicine., 51(3): 4-10.
[5] Long, X.F., Chen, N.Y. (2015) Promote the construction of a two-dimensional tracking system for veterinary drug products to strengthen supervision of the quality and safety of veterinary drug products. J. Hunan Animal Husbandry Veterinary., 2015(3): 3-5.
[6] Wu, Y.L. (2016) Research on the Development and Construction of National Veterinary Drug Industry Informatization Management Based on the Internet of Things. J. China Management Informatization., 19(16): 51-51.