Optimization Study on Breeding Patterns of Dairy Supply Chain in Inner Mongolia

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Abstract. The dairy industry has been the sunrise industry in China. However, since a series of quality and safety issues occurred in recent years, it suffered a serious hit and periodical low because of the invasion of foreign dairy companies. The key to solve the problem of quality and safety of dairy products depends mainly on the upstream of dairy supply chain, therefore, the study on breeding patterns of the dairy supply chain is particularly important. This paper aims at summarizing the breeding patterns of dairy supply chain in Inner Mongolia, analyzing the factors that affect the development of existing breeding pattern and seeking appropriate development methods and proposing constructive solutions, which will generate certain significance for Inner Mongolia region and other provinces which are abundant in dairy products.

Introduction

There are plenty of quality and safety problems during the development of dairy industry in China. To restore the prosperity of dairy industry, we should study the upstream of dairy supply chain and completely solve its problems of quality and safety. This paper studies on the upstream of dairy supply chain, analyzes its breeding model and explores new patterns for dairy industry of China.

With the improvement of economic and living standards, an increasing number of people are seeking nutritional and healthy products, so, the dairy industry has gained rather rapid development. But, meanwhile, problems of quality and safety occur, such as melamine incident and Mengniu aflatoxin incident, which has aroused general concern of the whole society. The emergence of those questions first threaten the interests of dairy farmers, as the feed price stays high and labor cost and other farming cost goes up; the instability and decline of milk price, as well as the excessive uses of imported milk powder instead of local milk source, results in the depression of dairy industry. And followed by downturn of domestic market and invasion of foreign milk powder, Chinese dairy industry suffered severe impact. Faced with this situation, not only the Chinese consumers were snapping up foreign milk powder, but some well-known domestic dairy companies have built factories abroad, selling foreign milk to China, which increased the cost of logistics and resulted in poor management of logistics supply chain. It may ease consumers’ crisis of confidence for Chinese dairy industry, but consequently, Chinese market would be invaded by foreign dairy companies and go to extreme. As a kind of special food, dairy products are characteristics with nutrient-rich, long industrial chain, susceptible to microbial contamination, therefore, any node of the supply chain has an impact on the overall quality of dairy products, especially the upstream of supply chain. So exploring the breeding patterns of upstream and controlling the quality and safety of dairy supply chain from this perspective have become the key problems to be solved. As the abandon of free-range pattern is the inevitable trend of the development of dairy industry, we should learn from advanced experience from abroad to find suitable breeding patterns according to China's national conditions, and develop dairy industry to fundamentally improve its quality and safety according to regional differences and local conditions.
Analysis of Development Status of Breeding Patterns of Dairy Supply Chain at Home and Abroad

With a history of more than 100 years, great dairy countries have accumulated rich experience and good practice, and owned its unique characteristics and modes comparing with the traditional dairy breeding patterns. The dairy breeding pattern of America is in an intensive way of land, capital and technology. The dairy breeding pattern of New Zealand is grassland grazing, depending mainly on land input. The dairy breeding pattern of Dutch is capital and technology-intensive family ranch of mechanization. The dairy breeding pattern of Japan is technology-intensive of mechanization and specialization and in a moderate-scale way. The dairy breeding pattern of India is free-range in a labor-intensive way of small-scale cooperatives. The patterns of those great dairy countries share three characteristics: First, the breeding capacity of almost great dairy countries, except India, is basically more than 50 heads. Second, the integration of the whole industry is realized by mutual equity or cooperative way of those countries. Third, in great dairy countries, except India, the breeding scale matches the grass and forage planting, and is consistent with the ecological environment and economic development. Dairy breeding mode in developed countries for our reference and reference for the development of dairy breeding in the future. All those patterns of great dairy countries provide reference to ours.

From perspective of the international dairy production, the overall situation of dairy products market is in a stage of oversupply, and the price of raw milk continues to decline. Affected by the higher price, experts have estimated that from 2015 to 2020, an increase of 11 million tons of milk gives rise to the potential yield of 8%. IFCN once estimated that, in the next five years, the price of milk will drop from $0.548 / kg to $0.445 / kg in 2020, into the downlink channel by 19.1%. In 2020, the demand gap of dairy products in China will be offset by the growth of international dairy market supply, and the competitive dairy products from international market will impact on Chinese dairy industry. Without the policy intervention of the government, the number of importing countries and imports will continue to grow.

Dairy farming link is weak at present in China, mainly because of the extensive style in the development process of cow industry. The extensive way, in the process of the development of the dairy industry refers to the only one-sided pursuit of an increase in the number of cows whereas ignoring the improvement of quality. Recently, many dairy products processing enterprises are affected by the shortage of fresh milk supply, and the operating rate declines, which has already become the constrain that restricts the further development of dairy industry. Therefore, dairy companies began to regard fresh milk as the foundation for survival. And the focus of enterprise competition is the competition of high-quality raw milk. For example, the incident of infant milk powder in 2008 was caused by the contention of raw milk and the vicious competition. Therefore, to effectively solve the bottleneck problems affecting the development of dairy industry and maintain the sustainable and healthy development of Chinese dairy industry, we must pay attention to the source of the dairy industry development so as to promote the sound and fast development of Chinese dairy breeding industry.

Breeding Pattern of Dairy Supply Chain in Inner Mongolia

Breeding patterns of Inner Mongolia mainly include retail breeding pattern, breeding zone pattern, dairy cooperative breeding pattern, family ranch breeding pattern and large-scale ranch breeding pattern.

Retail breeding pattern is the most primitive one, because most dairy farmers rely on the experience of feeding, breeding, milking to support family. But there are plenty of problems in this pattern, such as the passive situation of the farmers, unreasonable way of raising, non-compliance of health standards and poor ability to cope with risks, and large-scale development of the dairy industry would highlight these issues and influence dairy farmers’ interests, forcing them to quit this pattern. There is no essential difference between breeding zone pattern and retail breeding pattern, except changes in form. Centralized management and milking replace retail breeding, which, to
some degree, avoid the shortcomings of retail breeding pattern, but cannot fundamentally solve the problems of retail breeding, because these two kinds of patterns share same essence. Dairy cooperative breeding pattern uses the way of sharing cows. Dairy farmers offer cows as share to cooperative community, which provides equipment and technical support. The two parties would share interests in accordance with the proportion of investment by the end of year. Dairy cooperative breeding pattern carries out the principle of sharing interests together, which reduces the risk of dairy farmers. However, there are many drawbacks in Inner Mongolia region, when their interests conflict, they would blame each other and dairy farmers’ interests cannot be guaranteed. In addition, cooperative community’s equipment is not complete, so this pattern remains be improved. Dairy farmers with economical basis and conditions would run family ranch breeding pattern, which regards rural households as main business, and they would hire employees depending on the scales. The use of intensive production, commercialization management, centralized management, advanced technology and equipment can basically guarantee the quality and safety of dairy products. Therefore, this pattern should be actively promoted in Inner Mongolia. Large-scale ranch breeding pattern, generally financed by enterprises of sufficient financial and technical support, is much more scale and technology-intensive than family ranch breeding pattern. Many dairy companies in developed dairy countries adopt this pattern, regarding the pasture as business asset with self-financing and independently bear the safety and quality of dairy products to avoid quality and safety problems of dairy products. But this pattern has higher demands for funds, equipment, technology and employees’ quality. The development of this pattern depends on the economy level.

Following table is the comparative analysis among the five breeding patterns:

Table 1. The comparative analysis among the five breeding patterns.

<table>
<thead>
<tr>
<th>Breeding patterns</th>
<th>Features of breeding patterns</th>
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</thead>
<tbody>
<tr>
<td>Retail breeding pattern</td>
<td>Independent management and self-financing</td>
</tr>
<tr>
<td>Breeding zone pattern</td>
<td>Centralized construction, household breeding, centralized milking and management</td>
</tr>
<tr>
<td>Dairy cooperative breeding pattern</td>
<td>Shareholders, share bonus, and advanced equipment and technical guidance provided by cooperatives, joint adventures</td>
</tr>
<tr>
<td>Family ranch breeding pattern</td>
<td>Rural householders as business subjects, family members as main labors; intensive production, commercialization management and appropriate breeding scale</td>
</tr>
<tr>
<td>Large scale ranch breeding pattern</td>
<td>Funded by enterprises, pasture as business asset, chain management of the whole industry</td>
</tr>
</tbody>
</table>

The Factors Affecting the Development of Breeding Pattern of Dairy Supply Chain in Inner Mongolia

In the development of various breeding patterns of dairy supply chain, many problems remain to be solved. We should find out the causes that affect the quality and safety of dairy products from the source to really solve the essential problems. The main affecting factors are as following:

The Economic Factor

Firstly, one-sided pursuit of interests in the process of breeding and the unreasonable diet structure can raise the breeding cost, and indirectly increase the production inputs, bringing burden of production cost. Secondly, when the quality and safety problems of dairy products appear, the impact of imported milk powder forces and reverses the enterprises to buy imported milk, which will undoubtedly increase the cost of production, so as to improve the purchase price of the raw milk. Finally, the lack of productivity is the root cause that affect the dairy products, because the development of dairy industry relies on the development level of productivity, and thus indirectly affects the quality of dairy products.
The Policy and Social Factors

First of all, the state’s support and positive system will provide policy support for the development of dairy industry, enhance the confidence of the dairy companies, and encourage them into the sunrise industry of the country. Second, the state's subsidy policy will also provide support for the development of dairy industry, and, to a certain extent, reduce the burden of dairy companies. Finally, in terms of society, the demand level of the society, the construction of social service system, the consumers’ trust of dairy industry and environmental protection consciousness will have an effect on the development of dairy supply chain.

The Technical and Management Factors

First of all, the investment of advanced technology and high-end equipment will improve the quality and safety of dairy products. Advanced technology can better help us control the quality and safety of dairy products from the source. Secondly, a complete medical system is the important factor affecting the development of breeding pattern of dairy supply chain, because there are many inevitable diseases in the process of cow breeding with bacterial infections. Complete medical system and advanced medical conditions can effectively control this problem so as to improve the quality and safety of dairy products. Finally, in terms of management level, production efficiency, the degree of the standardization of the aquaculture, the quality of managers and education level of the staff all have important effects on the development of dairy supply chain of breeding model.

Suggestions on Breeding Patterns of Dairy Supply Chain in Inner Mongolia

This paper study the breeding patterns of dairy supply chain in Inner Mongolia, find out the factors affecting the development of breeding patterns, and put forward some suggestions for its development as following.

Choose the Regional Distribution of Industry Agglomeration of planting, breeding and producing and aggregation effect

The economic and reasonable layout of planting base and breeding base should be in a radius within 5 km, so it can reduce the logistics costs and the pollution risks of the feed transportation to improve the insurance degree of feed nutrition, and this mixed method is beneficial for green environmental protection and ecological cycle. And the reasonable layout of breeding base and processing base should be in a radius within 100 km, so it can also reduce the logistics costs and the pollution risks of raw milk transportation to improve the quality of downstream products. Such kind of regional distribution is advantageous to cultivate technology service system of socialization and industrialization, improving the industrial operation efficiency under the condition of social professional division. And it also benefits the gathering of professional talents and promote the innovation ability of the talents team.

Choose the suitable climate and environment conditions for the breeding of high-quality dairy cows

The most suitable temperature for dairy cows is -20 to 20 degrees centigrade, and the most suitable environment condition is dry place with long-time sunshine. The suitable climate and environment condition is beneficial for the breeding and milking of dairy cows. It can improve the yield of cows, as well as the quality of raw milk.

Raise the refinement level of scientific breeding and improve the welfare level of dairy cows

First, the refinement level of scientist breeding should be enhanced. We should make a reasonable diet structure rather than supply only concentrate for nutrition or increase the roughage to reduce the cost. Studies show that high-quality mixed roughage is the healthiest way of breeding. Second, we should improve the welfare level of dairy cows and attaches great importance to the cud and necessary sport of dairy cows. Finally, we should prevent and control the diseases of dairy cows timely and pay more attention on the sanitary condition of the cows and the breeding environment.
Introduce international advanced technology, innovate development mode and improve the technological level of breeding

We should draw lessons from the advanced experience from powerful countries of dairy, use their advanced technology for reference and apply moderately to domestic breeding pattern of dairy supply chain. At the same time, we should explore suitable technology, innovate existing development mode to improve the technological level of breeding.

Strengthen the team construction and improve the management level

Team construction includes not only the improvement of technological and equipment level, but the construction of human resources. The first step to strengthen team construction is to improve professional quality of the staff and actively cultivate professional technical team. Advanced professional level should be used to lead the development of dairy industry, in order to motivate the specialization of breeding pattern and the construction of talented team.

To improve the management level of breeding pattern, we should improve the quality of the managers, because brilliant managers can lead the team to the road of specialization and standardization, making enterprise develop with high efficiency and low cost.

The government should enhance the support level and strengthen the construction of social service system

The government should increase support for dairy industry and strengthen the subsidy to motivate the construction of breeding social system, including the vaccination, calving, the feed supply and the acquisition of raw milk. Besides, the perfection of disease protection, fine breed and technical guidance should be carried forward to make sure of farmers safe and professional production in order to improve the breeding efficiency.

Conclusion

Breeding patterns of dairy supply chain have been in a condition without a fixed pattern. The breeding patterns of dairy supply chain in Inner Mongolia include retail breeding pattern, breeding zone pattern, dairy cooperative breeding pattern, family ranch breeding pattern and large-scale ranch breeding pattern. While the retail breeding pattern will be abandoned and the large-scale ranch breeding pattern is not suitable for most enterprises. Study has shown that the family ranch breeding pattern is the most suitable one in Inner Mongolia. This paper analyzes and compares kinds of breeding patterns in Inner Mongolia, find out the factors that affect the development of breeding patterns, put forward some constructive suggestions and draw a conclusion. It shows that family ranch breeding pattern should be used widely in Inner Mongolia, together with the breeding zone pattern and dairy cooperative breeding pattern. But in the future, the family ranch breeding pattern will be the first choice in the development of breeding pattern. With the advanced productivity and management level, this pattern will be better used to open up new opportunities for the dairy industry of Inner Mongolia and even China.

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