



Study on the Constraints and Practical Knowledge for Intensive Dairy Cattle Farming in Mongolia

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The given text highlights the importance of managing the intensive farming of Mongolian dairy cattle effectively to improve the quality of dairy products and promote the livestock industry's comprehensive development. The livestock industry is a crucial pillar of Mongolia's economy, contributing about 12% to the annual GDP. However, Mongolia's dairy industry has not been fully developed, and there has been a significant increase in the quality and demand for dairy products in recent years due to urbanization. The text also discusses the challenges faced by Mongolian livestock farming, such as the extensive farming practices, harsh winters, and lack of management and planning. The author suggests standardizing the standards for large-scale ranch management operations and practical operations of modern ranch management systems to enhance the livestock industry's intensification, scaling, organization, socialization, and industrialization. The text also highlights the need to improve the management level of breeders, plan the construction of breeding farms rationally, strengthen the inspection efforts of relevant departments, and enhance technical

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research to address the problems existing in intensive management. Overall, the text provides a comprehensive study on developing the livestock industry and promoting the healthy and sustainable development of the livestock economy.

Keywords: Dairy farm; cattle breeding; Mongolia's livestock industry; industry; dairy farms.

1. INTRODUCTION

1.1 Analysis of the Current Situation of Dairy Cattle Farming in Mongolia

Mongolia's intensive livestock farming developed earlier, and the mechanized dairy farms with high milk yields experienced rapid development in the 1960s. At that time, intensive agriculture aimed to meet the domestic demand for food with its grain production [1]. However, since 1990, the government has failed to implement long-term policies for the agricultural sector, leading to losses in milk production, with significant reductions in the number of dairy cows and milk production [2]. Fortunately, the government recognized this situation, initiated efforts to provide food to the nation, and enacted various resource policies, bringing the issue of intensive development back to the strategic level. By the end of 2022, Mongolia had a total livestock population of about 71.1 million, of which 5.5 million were cattle [Data source: National Statistics Office of Mongolia]. Among these were 3.7 million dairy cows and 1.5 million purebred dairy cows. Meanwhile, Mongolia domestically needs about 490 million liters of milk annually but can only obtain about 120 million liters from local farms. It must also import milk powder from countries such as South Korea, Russia, and New Zealand annually. According to the Mongolian Ministry of Health, an individual consumes about 430g of milk daily. Statistics show that urban consumption exceeds rural consumption by four times. This indicates the high demand for milk in Mongolia [3]. However, foundational issues, seasonal perpetuity, lack of industrial processing, and other factors affect the supply of dairy products.

The Mongolian government provides the following support to dairy farms:

1. As part of the implementation of the 2020-2024 action program, "To increase the supply of raw milk in the cold season, the procedure for providing monetary incentives to dairy farmers and intensive livestock breeders who supply raw milk that meets the requirements of technical regulations to dairy processing plants and

workshops" [4] was approved. Within the regulation's framework, herders and intensive farmers are given a bonus of 500 MNT per liter of milk supplied to qualified dairy factories only in the winter season from November 1st to March 31st every year.

2. National program to support the development of intensive animal husbandry [5]: Multifaceted measures are being taken to develop and organize intensive dairy and beef cattle farming in a complex cluster and improve technology.

Milk produced in Mongolia almost entirely comes from cattle farms. Recently, the government has strengthened livestock production, enhanced economic effects and productivity, improved residents' food supply, and reduced livestock product imports. At the same time, it has increased investment and production domestically and drafted a dairy improvement plan in 2016, aiming to ensure dairy product availability for all nationals [6]. Many dairy farms have been established in Mongolia, but the market has faced various difficulties since the transition. Although there has been an improvement in the productivity and production capacity of the dairy farming industry to some extent, and the problems facing the dairy farming industry have been identified, it is of great significance. It is evident that the current dairy farming in Mongolia mainly adopts small-scale, extensive farming practices, and the industry's development is still relatively backward.

2. THE NECESSITY AND FEASIBILITY OF INTENSIVE DAIRY FARMING

Mongolian scholars primarily focus on the importance of livestock farming to the Mongolian economy, the current issues faced by Mongolia's livestock industry in sustainable development, and the strategies for achieving sustainable development of Mongolia's livestock economy. Due to the low level of intensive management in Mongolian livestock farming and its late start, there is little research on the subject [7]. The analysis of the sustainable development of Mongolia's livestock industry points out factors

affecting its sustainability, including the decline in the productivity of grassland livestock, the need for improvement in product prices, adverse natural environments, etc. Specifically, mining activities damage the grasslands, global climate change affects the production of quality forage, an unreasonable structure of livestock products, weak processing capabilities involving the price increase of livestock products, and insufficient investment in livestock infrastructure, reducing capacity to withstand natural disasters [8].

2.1 Necessity

There is a significant difference between farm animal husbandry and traditional practices. The sustainable food supply in urban areas and the intensive development of agriculture are closely related. With the rapid pace of urbanization, the labor force involved in traditional pastoralism or the livestock industry is continuously decreasing. Therefore, developing the farm industry is highly necessary [9].

2.2 Feasibility

Firstly, from the demand perspective. With the socio-economic development and the continuous increase in urbanization, the demand for high-quality milk and dairy products that meet hygiene standards for the urban population is continuously increasing [10]. However, milk production is seasonal, with the potential for "supply interruption" in winter and surplus milk in summer. Developing dairy farms can stabilize the supply levels and prices despite seasonal influences, secondly, regarding labor. For the development of Mongolia's livestock industry, sufficient labor is needed [11]. An increasing number of herders are learning to operate agricultural machinery. Moreover, in the farm field, many professionals are bringing more specialized knowledge to livestock development. However, it is essential to note that intensive livestock farming is a labor-intensive industry that can create employment opportunities for many people. Therefore, the development of intensive agriculture can increase the income and production of farms.

3. ANALYSIS OF THE RESTRAINING FACTORS FOR INTENSIVE CATTLE BREEDING

This study investigates the challenges faced by the livestock industry in Mongolia. Despite a

continuous increase in livestock numbers, there is significant fluctuation in output, and the value of production in the national economy is on a downward trend. The primary reasons are natural disasters, epidemics, outdated processing capabilities of enterprises, and poor transportation conditions, all of which prevent the full potential of production from being realized. For the development of Mongolia's livestock industry, it is necessary to start from these aspects: enhance the capability to withstand natural disasters and epidemics, improve the livestock industry system, strengthen infrastructure construction, and use international platforms to expand the market space for livestock [12]. Firstly, the problem of overgrazing. Mongolia can achieve food security and independence by vigorously developing the livestock industry. This is because providing healthy food to the nation is closely related to national independence and security. Strengthening the development of intensive livestock farming can reduce many problems affecting pastures [13]. Adopting barn grazing can significantly improve the utilization rate of pastures. This method can effectively solve the problem of overgrazing in densely populated nomadic areas. At the same time, intensive livestock farming can naturally reduce the impact of disasters on the industry. Especially in the cold winter, barn breeding can ensure that dairy cows are not threatened by freezing disasters. Secondly, from the perspective of milk quality, standards, and assurance. According to reports by WHO and the Food and Agriculture Organization of the United Nations, the most perishable agricultural products include meat, eggs, and milk. This indicates that if milk is not properly stored, transported, and processed, it is susceptible to microbial contamination and spoilage. Furthermore, the influence of animal diseases, such as brucellosis, poses a potential transmission risk. Therefore, dairy processing is an inevitable choice for dairy products. However, in Mongolia, the quantity of products delivered to the end user is small, and nutrition and food safety issues are severe. Thirdly, regarding milk quality standards. The annual milk yield of an adult cow in Mongolia is about 1000 liters, with a high nutritional content, about 5-5.4% protein, and 6.5-8.0% fat content. In contrast, European dairy cows have an average yield of 4000 liters, with protein and fat content of about 3.3-3.4% and 3.2-3.4%, respectively. Mongolian dairy cows have more than 2.5 times the fat content of pure milk and a higher protein content. However, the problem is that the level of milk

Table 1. Number of Breeding Livestock in Mongolia (Thousands)

Years	2015	2016	2017	2018	2019	2020	2021	2022
Cow	700.91	784.66	895.49	990.04	1113.49	1226.62	1291.63	1388.8
Sheep	8257.13	9094.87	10478	11205.41	12578.62	13519.74	14223.38	14748.26
Goat	7639.71	8294.28	9421.56	10082.41	11057.8	11637.2	12346.55	12756.46

Table 2. Proportion of Milk Production by period (%)

Period	March	April	May	June	July
Percentage:	25%	30%	30%	10%	5%

contamination in Mongolia is also relatively high. Even though pasteurization is used, it cannot solve the contamination problem. From this, it is clear that intensive development of the dairy industry is necessary to improve milk quality and increase milk production effectively.

Up to 2020, the number of dairy cattle has been growing at an average annual rate of 8.2%, 1.7 times higher than in 2013, accounting for 28% of the total livestock population. The proportion of dairy cattle breeding herds has significantly decreased in recent years. Although the national livestock numbers have increased, dairy cattle breeding herds have remained the same. It can be observed that since 2016, the number of dairy cows supplying milk has grown at an average annual rate of 8.2%, which is 1.7 times higher than in 2016, as shown in Table1.

3.1 Dairy Cattle Breeds and Breeding Techniques in Mongolia

The main breeds of dairy cattle in Mongolia include the Mongolian cow and the Holstein, among others. These cattle are highly adapted to the local climate and grassland conditions, exhibiting strong resilience and adaptability [14]. Furthermore, with technological advancements and the introduction of modern farming techniques, dairy farming technology in Mongolia has been continuously improving. Techniques such as artificial insemination and the use of quality feed have effectively increased the productivity and quality of dairy cattle [15]. As of 2021, the national agricultural milk production reached 924 million liters. This includes 11,500 tons of camel milk, 8,390 tons of horse milk, 553,300 tons of cow milk, 10,380 tons of sheep milk, and 14,980 tons of goat milk, indicating that cow milk has the highest production volume. In Mongolia, the average milking period for dairy cows is from March to July, as shown in [16] Table 2.

The average milking period for Mongolian dairy cows is from mid-April to October, processing 2-5 liters of milk daily, totaling 700 liters. Approximately 50% of this milk is for feeding calves, with about 350-420 liters of milk being sold. The Department of Agriculture and Light Industry's project team studied Mongolian farm dairy cow breeds, including the Blackhead, Alatau, Simmental, and Redhead breeds. The study found that milk production peaks in April and May, reaching up to 8.2 liters per day, and drops to its lowest in November, at 4.9 liters. This variation is influenced by Mongolia's livestock grazing practices during the summer and the use of barns from late October to early November. However, the study also noted cases where cows produced up to 30 liters of milk daily during the peak season, amounting to 7680 liters annually. Recent years have proven that using Mongolia's traditional pastoral farming methods to raise high-yield dairy cow breeds can achieve good results.

4. PATH CHOICES FOR INTENSIVE DAIRY CATTLE FARMING

To embark on the path of intensive development in Mongolian dairy cattle farming, efforts can be made in the following aspects, detailed as follows:

4.1 Integrating Effective Resources to Enhance Dairy Competitiveness Significantly

Currently, the price of raw milk in Mongolia is higher than that in the international market. This is due to the rise in labor and feed costs. Mongolia's current situation is constrained by land capacity and water and grass resources, leading to high dairy farming costs. Therefore, only by establishing comprehensive equipment and adapting to large-scale and intensive dairy farming can the value of raw milk gain competitive optimization internationally.

4.2 Increase Publicity to Encourage Young People to Enter the Industry

The current annual consumption of milk and dairy products per household in Mongolia is about 143.2kg/year. This figure seems high, but there is room for improvement for a significant milk-producing country. Thus, the government needs to increase publicity to make more citizens aware of the nutritional value of dairy products. Considering the efficiency of Mongolian dairy farmers at this stage, encouraging young people to engage in the milk production industry is essential. The milk price can be effectively increased through dairy cooperatives or special training programs, enabling the most advanced or effective young industry practitioners to adopt necessary incentives to improve industry progress [17]. A rise in milk prices can enhance efficiency, as most farmers consider dairy farming their primary source of income, thus focusing all their energy on dairy farming and significantly increasing production efficiency. For example, farmers could be encouraged and trained to grow and store high-protein feed, such as moss and sweet potato vines, on their farms to reduce reliance on expensive purchased feed. Further training on how to make hay can better meet feed needs during the dry season. New technologies like hydroponic feed and the promotion of vaccines and teat dips can also help prevent diseases [18]. Therefore, the government and other stakeholders should focus on training breeders in disease prevention methods.

4.3 Encourage Farmers to Process Dairy Products and Increase Sales Efforts

Encouraging farmers to process dairy products to increase added value is crucial. Although there is still some profit margin for various dairy farming institutions at this stage, the government and farming institutions must have a long-term market vision [19]. By accurately grasping the market, they can effectively enhance their ability to resist external risks. Mongolia must also firmly hold a robust national brand of dairy products, encourage farmers to undertake deep processing of dairy products, quickly change the supply mode of fresh milk, and increase product-added value. Additionally, Mongolia should leverage its geographical advantage to sell dairy products. Using the geographical location advantage, cost-effective dairy products can be promoted globally. Also, establishing connections with major deep-processing enterprises to develop

and strengthen local brands and introduce well-known brands can open up sales channels and ensure the development of the dairy farming market [20].

5. CONCLUSION

In summary, an analysis of the current state of the dairy cattle market in Mongolia reveals steady growth in the number of dairy cattle and production, with large-scale farming becoming the mainstream trend and opening up market prospects. However, it is also essential to understand the industry's internal problems and external pressures, such as rising costs, decreasing grasslands, and intense competition. Therefore, the dairy farming industry must continuously reform and innovate to improve its quality, effects, and ability to resist risks.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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