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**Review Article**

# Review of the Current Status of Pasture-based Livestock Industry in Mongolia

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## ABSTRACT

Mongolian herders rely significantly on grazing their animals, such as goats, sheep, cattle, horses, yaks, and camels, in broad rangelands throughout the year. The availability of appropriate forage, the amount of hay and forage to be kept, and whether the animals will acquire physical strength from the pasture to make it through the impending cold season are all determined by the meteorological conditions of the year. Herders' principal source of income is animals, therefore preventing mortality is a top priority. In Mongolia, meadows are a major element determining cattle live weight. However, in the summer of 2022, Mongolia faced a drought, which resulted in inadequate pastures and starved cattle. Livestock might lose weight in these situations due to a lack of supplemental feeding.

**(Key words**: Pasture, Livestock, Forage, Grazing)

## Ⅰ. INTRODUCTION

Mongolia has a vast grassland ecosystems that are sparsely populated but subjugated by agriculture, assisting isolated population groups dependent on natural resources (Reading et al., 2010). For most of human history, Mongolian pastoralists maintained their traditional systems of extensive pastoralism without seriously intimidating the region's biodiversity.

Extensive pastoralism has helped sustain natural grasslands, and Mongolia has the lowest population density in the world (approximately 2.2 people per ha in 2022; NSO.MN, 2022) and maintains huge areas of natural grasslands. Infrequent population growth has helped preserve natural biodiversity (Dress et al., 2022).

Mongolia has a long tradition of nomadic pastoralism and has been the main agricultural sector for centuries. Approximately 83% of the territory (1.3 million $km^2$) is rangeland including grasslands, shrublands, forest steppes, and deserts that are grazed by domestic livestock (Munkhzul et al., 2021; Suttie, 2005) supporting 71 million livestock [118.7 million Sheep Units (SU) (NSOM, 2022)].

Administratively, the Mongolia is organized into 21 provinces. The territory is divided into the Western, Khangai, Central and Eastern regions (Fig. 1), with each region including the following provinces. Western region: Govi-Altai, Bayan-Ulgii, Uvs, Zavkhan and Khovd aimag; Khangai region: Bulgan, Arkhangai, Orkhon, Bayankhongor, Uvurkhangai and Khuvsgul aimag; Central region: Dornogovi, Govisumber, Dundgovi, Darkhan-Uul, Selenge, Umnugovi and Tuv aimag; Eastern region: Dornod, Sukhbaatar and Khentii aimag. The Capital Ulaanbaatar has the status of an independent city administration consisting of several city districts (Batjargal, 2022).

Until 1990, the number of livestock was 25.8 million (54.3 million SU). However, decentralization began after the institutional and societal changes in the 1990s, and herders were allowed to privatize their livestock. Since then, the number of livestock, especially sheep and goats, has increased dramatically due to cashmere's high market value. Livestock density has increased more than threefold, from 32 SU per 100 ha in 1961 to 99 SU in 2017 (NSO.MN, 2018). A national report on the rangeland health of Mongolia estimated that 58% of the rangeland areas have been degraded. According to the field monitoring data, 14% was slightly degraded, 21% was moderately degraded, 13% was severely degraded, and 10% was completely degraded (Densambuu et al., 2018).

Mongolia's livestock industry continues to be an important (though declining) part of the Mongolian economy (Angerer et

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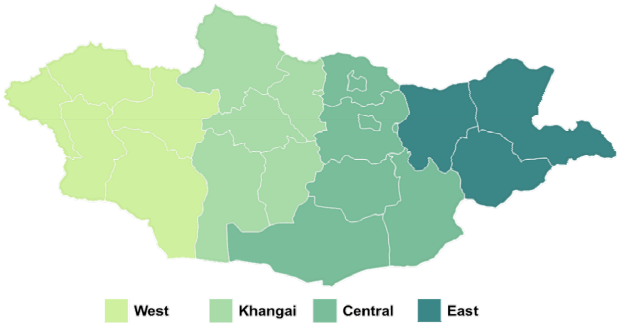



Fig. 1. Mongolian map.

al., 2008), which remains dominated by large-scale livestock that is almost entirely dependent on natural forage (World Bank, 2009). The animal husbandry industry has been the mainstay of Mongolian agriculture, economy and culture for thousands of years.

In recent years, intensive livestock farming has increased, and in this regard, the area for cultivated forage crop production has been increasing year by year. Forage crops are cultivated individually or in mixed cropping using annual and perennial cereals and legumes (Jigjidsuren, 2003) harvested in the form of forage at the most nutritious growing stages (for cereals from stem elongation to milk maturity and legumes from flower bud formation to flowering). The objectives of this paper are to discuss the current status of pasture, livestock and forage crop cultivation in Mongolia.

## Ⅱ. STATUS OF PASTURE AND LIVESTOCK

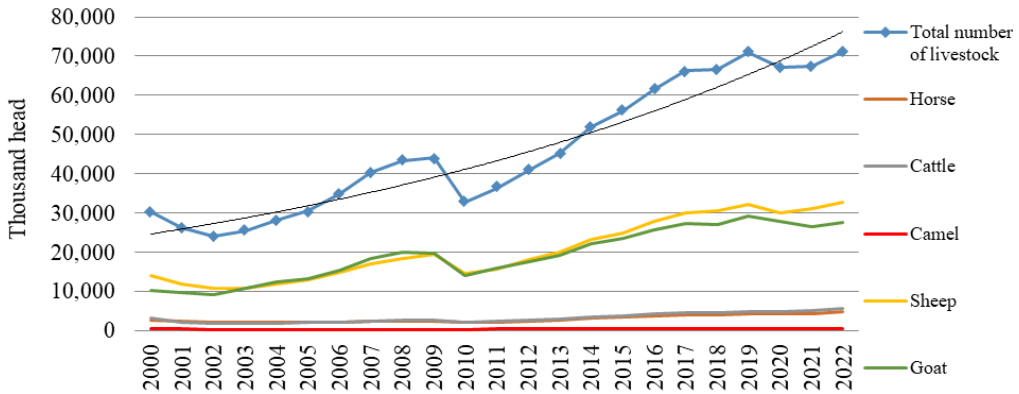
Only peer-reviewed manuscripts published in indexed journals and reports by reputed government and non-government organizations were considered to ensure the quality of the data and information sources. Primary and secondary data were obtained from the Mongolian Ministry of Food, Agriculture & Light Industry (MoFALI) and National Statistics Office of Mongolia (NSO.MN), National Agency Metrology and Environment Monitoring data, and Land Authority data.

The concept of a SU has traditionally been used in Mongolia to facilitate the planning, analysis, and administration of forage for grazing livestock. A SU is multiplied by 6 for cattle, 0.9

Table 1. Pasture and hay fields

| | Total pasture Area (Million ha) | Rural encampment area (Thousand ha) | Hay field (Thousand ha) |
|---|---|---|---|
| Western region | 34.0 | 441.6 | 55.1 |
| Khangai region | 20.1 | 589.8 | 233.5 |
| Central region | 33.8 | 3485.0 | 1012.0 |
| Eastern region | 21.9 | 922.2 | 405.2 |
| Ulaanbaatar | 0.4 | - | 5.5 |
| Total | **110.2** | **5438.6** | **1711.3** |

Source: National Statistics Office of Mongolia 2022.




Source: National Statistics Office of Mongolia 2022.

Fig. 2. Changes in livestock numbers in Mongolia.

for a goat, 5 for a camel, 7 for a horse, and 1 for a sheep (MOFALI, 2019).

Mongolia has a total of 110.2 million ha of pasture and 1.7 million ha of hay fields combining high mountains, khangai (mountain range in central and north of Mongolia), steppe (treeless tract of land characterized by grassland vegetation), and Gobi zones (desert) (Agipar et al., 2019) (Table 1). It occupies 97% of agricultural land, 52.0 million ha of the field are used in winter and spring, and another 60.0 million ha are used in summer and autumn respectively.

The number of livestock in our country reached the highest level of 71 million heads in 2019, although it decreased to 67.1 million heads (114.4 million SU) in 2020 (Fig. 2). In recent years, the number of livestock has increased due to intensive farming. Over the past 22 years, the total number of livestock in the dzud (the Mongolian term for when the animals of the Steppe die in vast numbers following dry hot summers and icy winters) and drought years of 2000-2002 and 2010 has decreased, while in other years, it has increased. In the last 5 years, growth has slowed and stabilized.

As identified by the Livestock Science and Research Institute, Mongolia can breed 86 million SU of livestock as the average annual pasture volume in a year with normal climatic conditions, indicating that the water supply needs to be improved (Tserendash, 2020) (Table 2).

According to a survey by the National Statistic Office in 2018, livestock adjusted to the grazing capacity of Mongolia was calculated (Sejhuu, 2018); as of 2020, the average grazing capacity of the total territory exceeded 41.7% (35906.5 thousand SU) (Table 2).

According to the 6-year results of the grassland photo-monitoring survey conducted since 2015, 44.2 million ha of the total 94.4 million ha of grassland are generally normal in terms of grassland use, while 20.6 million ha of grassland have improved as a result of the introduction of proper utilization technologies. It has been estimated that there are 29.5 million hectares of severely degraded grasslands that require fundamental changes in the utilization, current loads and regimes (ALAMGC, 2022).

As of 2022, out of 110.2 million hectares of grassland, 13.6 million hectares have not lost their original natural appearance, 57.2 million hectares are slightly degraded, 18.2 million hectares are moderately degraded, 15.7 million hectares are severely degraded and 5.5 million hectares are severely degraded (ALAMGC, 2022). Comparing the 2017 and 2022 results of the state of grasslands, grasslands that have not lost their original natural appearance have decreased by 17.6% and slightly degraded grasslands by 1.7%, respectively. However, moderately degraded pastures increased by 3.8%, severely degraded pastures by 10.4%, and severely degraded pastures by 5.1%, respectively.

## Ⅲ. STATUS OF CURRENT FORAGE PRODUCTION

The grassland occupy more than 70% of Mongolia's territory and are the basis for the existence of a domestic culture and economy based on nomadic livestock raising, the livelihood of pastoralists and the basic food supply of the population. Natural grass hay constitutes a large part of the livestock feed in our country, which varies annually depending on the climatic conditions and hay preparation. The amount of hay produced is continuously increasing because of increased livestock. In 2022, 1,562,500 tons of hay have been prepared (Fig. 3).

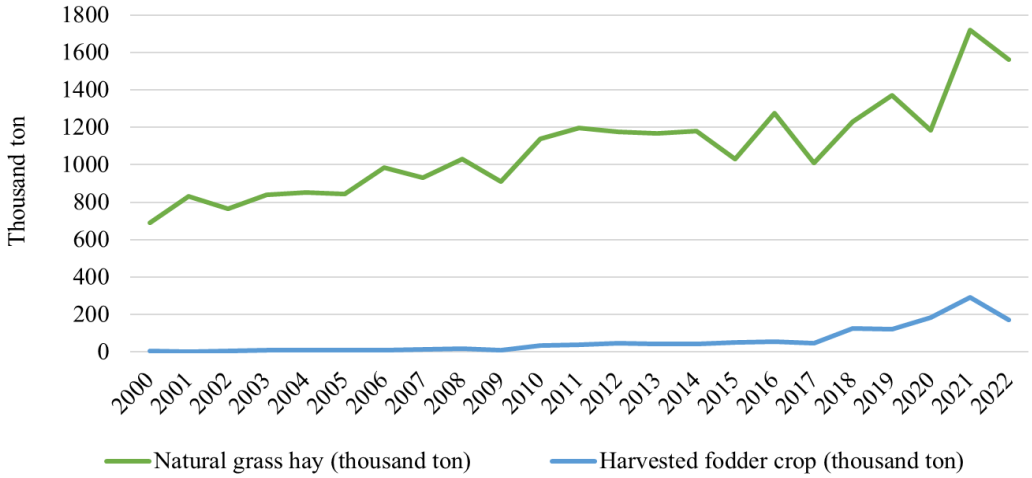
**Table 2. Overgrazing in Mongolia, 2022**

| | Total livestock (Thousand SU) | Number adjusted to grazing capacity (Thousand SU) | Exceeds grazing capacity | |
|---|---|---|---|---|
| | | | Difference | Percent |
| Western region | 24951.6 | 22996.2 | 1955.4 | 8.5 |
| Khangai region | 43646.4 | 23106.5 | 20540.0 | 88.9 |
| Central region | 27476.8 | 20040.6 | 7436.2 | 37.1 |
| Eastern region | 24623.9 | 19820.1 | 4803.8 | 24.2 |
| Ulaanbaatar | 1215.9 | 44.7 | 1171.1 | 2620.0 |
| Total | 121914.6 | 86008.1 | 35906.5 | 41.7 |

Source: National Statistics Office of Mongolia 2022.

As of 2016, it accounted for only 6% of the total cultivated area and 7% of the entire crop (Erdenebolor, 2017), although this will increase to 8.6% and 17.7% in 2022, but the position of forage cropping in the agricultural sector is quite insignificant (Fig. 3). This relationship emerges from the dominance of wheat cropping, which results from the comparative advantage of wheat cropping caused by the government subsidy on wheat. Wheat is subsidized by the government in order to maintain self sufficiency in flour and keep it affordable because flour is widely consumed in Mongolia, thus being declared a strategic product (Law on Food of Mongolia, 2012). The crops within the broad categories used in statistics, as shown in Table 2, include (exact proportions of each crop within the categories are unknown): Green forage: mostly oat, but also barley, rye, Sudan grass and mixtures of these crops; Perennial crops: mostly alfalfa, but also brome grass and clover; Silage crops: maize and sunflower; Other crops: pea, soy, rape and white mustard. Forage crops are cultivated individually or in combination using annual and perennial cereals and legumes (Bayarsukh and Dorligsuren, 2021).

Recently, the cultivation of forage crops has increased. In 2021, 108342.4 ha of the field were cultivated, which is four times higher than it was four years ago (Table 3). In 2022, Mongolia will experience extreme weather conditions that adversely affect its ability to stock hay and forage for livestock during the winter (Kimura et al., 2022). The amount of forage cultivation is closely related to the climate of the year. The




Source: National Statistics Office of Mongolia 2022.

**Fig. 3. Produced hay and cultivated forage for the last 22 years.**

**Table 3. Overview of forage crops cultivating in the period 2016 to 2022**

| Forage crops/Years | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| Sown area, ha | | | | | | | |
| Annual crops | 19311.5 | 13808.1 | 37891.9 | 31232.9 | 75655.2 | 100168.8 | 69125.1 |
| Perennial crops | 3985.5 | 3335.8 | 4934.8 | 7675.2 | 3756.2 | 4793.6 | 2814.5 |
| Silage crops | 255.8 | 414.6 | 1405.2 | 1847.0 | 1466.5 | 1236.8 | 744.0 |
| Other | 6340.6 | 8664.1 | 2077.1 | 3043.9 | 3659.7 | 2143.2 | 829.5 |
| Total area | 29893.4 | 26222.6 | 46309.0 | 43799.0 | 84537.6 | 108342.4 | 73513.1 |
| Forage yield, tons | | | | | | | |
| Annual crops | 34393.2 | 28276.1 | 103689.7 | 85182.5 | 159997.6 | 272294.7 | 158117.0 |
| Perennial crops | 11263.2 | 9576.4 | 11840.9 | 11658.3 | 11380.3 | 10118.8 | 8553.9 |
| Silage crops | 2221.9 | 2654.8 | 6599.3 | 21735.0 | 7257.5 | 8272.4 | 2184.7 |
| Other | 5545.6 | 7387.5 | 1710.1 | 2541.5 | 3455.2 | 2990.4 | 2332.1 |
| Total yield | 53423.9 | 47894.9 | 123839.9 | 121117.2 | 182090.5 | 293676.3 | 171187.7 |

Source: National Statistics Office of Mongolia 2022.

Table 4. Intensive farming in the period 2016 to 2021

| | Cattle | | Sheep | | Pig | | Poultry | | Bee | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of house-holds | Number of livestock | Number of house-holds | Number of livestock | Number of house-holds | Number of livestock | Number of house-holds | Number of livestock | Number of house-holds | Number of livestock |
| 2016 | 1650 | 78696 | 174 | 91404 | 980 | 35704 | 1269 | 880114 | 445 | 9276 |
| 2017 | 1963 | 102865 | 1511 | 353165 | 915 | 28440 | 1157 | 798439 | 397 | 11492 |
| 2018 | 2229 | 99011 | 1687 | 440447 | 792 | 29442 | 1139 | 1247392 | 344 | 8848 |
| 2019 | 2972 | 134596 | 1591 | 459335 | 587 | 21346 | 1471 | 956016 | 877 | 12250 |
| 2020 | 2619 | 126223 | 3045 | 483563 | 754 | 22272 | 1361 | 991822 | 577 | 13500 |
| 2021 | 3376 | 132988 | 90 | 34523 | 446 | 21652 | 1190 | 1028977 | 680 | 13708 |

Source: The Mongolian Ministry of Food, Agriculture & Light Industry 2022.

cultivation of forage crops is expected to decrease in 2022 compared to 2021. Due to these unfavorable weather conditions and insufficient reserves for livestock production, compounded by the economic crisis due to global market distortions in fuel and food supplies, it is estimated that 80% of rural households are at risk of losing their livelihoods (United Nations Mongolia, 2023). Mongolia is heavily dependent on the agricultural sector.

## Ⅳ. STATUS OF FORAGE ENTERPRISES AND INTENSIVE ANIMAL HUSBANDRY

There are a total of 50 forage production enterprises and cooperatives throughout Mongolia. Of these, 37 enterprises and cooperatives are currently operating, and 13 are closed down. Since 1996, enterprises and cooperatives began to produce feed specializing in animal feed, and since 2011, the production of forage has increased intensively, and the number of enterprises has increased 5 times compared to 1996 (MoFALI, 2021).

If we consider the total number of enterprises by region, then 43.2% are located in the Khangai region, and 35.1% are in the Central region. However, there are currently no operating forage enterprises in the Eastern region. The total installed capacity of 50 enterprises in 14 provinces and the city of Ulaanbaatar in Mongolia is 176.1 thousand tons of feed per year. Of this, the used capacity is 55762.5 tons per year, and feed is produced at 31.6% of the total installed capacity. About 80% of the raw materials are supplied domestically and 20% are imported. Of these, about 70% of enterprises grow their own raw materials, while the remaining 30% purchase raw materials domestically or import.

Based on the current number and average consumption of intensive animal husbandry, a total of 187.4 thousand tons of forage are needed in the country. If we assume that the produced forage will be used only for intensive farming, then the supply of forage is 53.4%. Due to the high prices of domestic forage especially pig and poultry, and the lack of availability of some additional raw materials, farmers in this area mainly import primary and additional forage raw materials (MoFALI, 2021).

As can be concluded from the overview of the situation above, the productivity and efficiency of livestock production is low, the output of products per animal is low, the supply and availability of animal feed is extremely insufficient, and the income, profit and loss of intensive livestock producers are low, so most farms the unit is about to stop working. For example, in 2016, the number of pigs was 35.7 thousand, and in 2017 it decreased to 21.6 thousand (Table 4).

In recent years, activities aimed at increasing the number of highly productive livestock, increasing the export of livestock products, supporting the lives of pastoralists have intensified, and issues such as reducing pasture degradation, determining the condition of pastures and bringing them to an appropriate level, introducing pasture utilization technologies based on the regeneration potential of pastures, as well as protecting and rehabilitating pastures are still being discussed.

## Ⅴ. CONCLUSIONS

Mongolia has approximately 71.1 million livestock, exceeding

the carrying capacity of pasturelands in the country by 41.7%. The livestock breeding sector of Mongolia depends entirely on pasture yield, hay, and forage in winter and spring. Similar to that in other countries, the animal forage sector relies on four main sources: natural pastures, hay, forage crops, and produced forage. Recently, growth in the number of livestock, pasture overload, and forage preparation problems have been highlighted by the government, herder households, and association entities; therefore, it is necessary to evaluate the rational number of animals according to grazing capacity, total forage required, cultivation of forage crops, current status of production, and further tendencies. The growth in the number of livestock in intensified farming has a strong impact on forage demand and supply.

## Ⅵ. ACKNOWLEDGMENTS

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