Production of mare's milk in Mongolia

NAIDANKHUU MINJIGDORJ AND DAG AUSTBØ
Institutt for husdyr- og akvakulturvitenskap, Universitetet for miljø- og biovitenskap, 1432 Ås.

Introduction

Mongolia stretches across central Asia and occupies an area of 1.6 million square kilometers of mountains, steppe and desert and has practiced livestock production since ancient times under extensive management systems. Five traditional kinds of livestock (camels, horses, cattle, sheep and goats) are kept in Mongolia. On January 1, 2004 the total livestock number was 24.0 million head. Native Mongolian livestock species were formed under conditions of migratory husbandry, with year round grazing. The specific biological features of native Mongolian horses are characterized by: High viability, adaptation to the harsh continental climate (-25 - -35°C in winter and + 25 - +30°C in summer), ability to graze on poor vegetation (they can survive even when they lose during winter and spring 25 percent of their autumn live weight) and fast recuperation.

Natural zones

Mongolia's location between the Sibirian Taiga and the Central Asian deserts has resulted in great variations in Mongolia's soil and vegetation structure. Close to 80 percent of the country' s total land area, 129.2 million ha, is natural pasture land. The major source of animal feed is grassland. (Jigjidsuren & Douglas, 2003)

Table 1. Natural vegetation zones of Mongolia.

Natural zones	Area (thousand sq.km)	% of total land area	Annual precipitation (mm)	Number of growing days
Alpine	7017.92	4.48	400-500	60-70
Taiga	6093.68	3.89	300-400	65-90
Forest steppe	36468.12	23.28	200-300	79-112
Steppe	40509.69	25.86	125-250	112-125
Desert steppe	34337.68	21.92	100-125	125-130
Desert	24030.11	15.34	≤100	≥130

Forest steppe

These zones streches from the lower slopes of the Altai, Khuvsgul, Khangay and Khentei mountains to the steppe zone. Carbonated and non-carbonated, fine, black-brown soil is widespread in these zones. The forest steppe is dominated by

perennial grasses (Feather grass, Cleistogenes and Festuca), forbs and shrubs (Artemisia). Fertile ripirian meadows are located along the rivers. The forest steppe is highly suitable for farming and intensive animal husbandry.

Steppe
Xerophytic vegetation is a characteristic feature of the steppe zone and is dominated by shrubs and sub-shrubs such as Caragana and Artemisia. Fertile carbonated and non-carbonated black and sandy soils prevails in this zone. Rangelands in this zone are used for grazing by horses and small livestock, and this zone is also famous for beef cattle farming.

Desert steppe
The brown soil of the steppe prevails in the desert-steppe zone and only the northern edges are covered with carbonated fine soil. Salt marshes are common. Horses, camels and small livestock (especially goats) are raised in this zone.

Horse husbandry

The horse population accounts for 8.4 % of the total livestock population. The Mongolian horse is a dual-purpose horse, traditionally used for riding, herding of livestock, carting, racing, hunting and draught. But the horse is also used for meat and milk production. A common flock size is: 10 to 30 mares, 10 to 15 foals, 8-12 two olds and 5 to 7 three year old young females and males and 5 to 10 geldings, and they are controlled by one stallion. Typical physical characters of the Mongolian horse are: a short and powerful neck, abundant mane and a dense coat, small eyes, heavy body, somewhat thick legs and strong back. The breed comprises several strains like: Galshar (eastern part of the area), Darkhad (high mountain of the north area), Tes and Myangad (western of the Mongolia) and Jargalant (central part of Mongolia). Strains differ from each other by their appearance, endurance, performance and speed records. (Minjigdorj & Naidankhuu, 2001) Mongolian horses have comparatively a small body. The average liveweight of adult Mongolian horse is 360-380 kg. A good fattening horse weight is 400 kg. The average wither height of males is 128 cm, females 127 cm, but body size varies with environmental conditions. The main coat colour is bay, black, brown, reddish and greyish. Horses' growth continues till they reach 7 years of age. Mongolian horses are tireless and possess remarkable working ability. Sadlle horses can cover 70 - 80 km a day with a maximum of 200 km.

Mare’s milk production

One of the main products of Mongolian horses is mare’s milk. 8.0 million litres mare’s milk are produced annually and the main product is the Mongolian traditional drink named Airag (fermented mare’s milk). Mares usually foal in

March, Aprile and May on natural pastures. Birthweight of male foals are 34.3 kg (31.5-37.5) and female foals are 32.9 kg (23.8-42.0). Mare's milk production has strong seasonality. Mares are milked from middle of June until end of October. During milking season, mares are milked by hand, every 2 hours during daytime and 6-8 times per day. Foals are tied separately from their mothers in summer from 6 am to 11 pm and in autumn from 9 am to 11 pm. The rest of the time, foals follow their mothers and can succle freely. Milk yield of mare for single milking is 0.52-0.76 liter and daily milk yield waries from 3.1 to 6.0 liters. Average milk yield of mares for 4 months lactation is 371-600 liters. Daily milk yield depends of mare's age, lactation, pasture condition, breed, seasons and natural zones.(Indra, 2000)

Table 2. Daily milk yield of Mongolian mares (liters)

Season	Khangay	Steppe	Gobi
Summer (june, july and august)	3.6-6.8	3.8-7.2	3.6-6.4
Autumn (september and october)	3.1-4.4	3.6-4.8	3.4-4.2

Mare's milk is very special, it has a pure, sweet and fresh taste. Mare's milk contains a large amount of unsaturated fatty acids. The high content of sugar has a positive effect considering digestibility. Content of lactose in mare's milk is 1.5-4 times more than cow's milk. In mare's milk the caseins represent 50% of the total protein content (but correlation between caseins and albumin is 1:1) and mare's milk is classified as albumin milk, since it contains more serum albumin than milk from other animals. The essential amino acids constitute 51.4% of all amino acids in mare's milk. Sodium, potassium, calcium, phosphorous and iodine are present in mare's milk. It is also rich in vitamins and enzymes.(Sjaastad et al., 2003). For many years, nomadic Mongolians have been using mare's milk not only for making fermented airag, which is an exquisite beverage, but also as a treatment for several diseases like tuberculosis, gastro-intestinal disease, cirrosis and rheumatism.

Table 3. Chemical composition of mare's milk in Mongolia (g/l)

Season	Regions	Lactose	Fat	Protein
Summer	Khangay	65±0.14	22±0.13	22±0.14
	Steppe	67±0.12	21±0.15	22±0.16
	Gobi	70±0.96	24±0.93	28±0.26
Autumn	Khangay	66±0.15	23±0.14	23±0.91
	Steppe	68±0.14	22±0.12	23±0.11
	Gobi	72±0.94	25±0.86	29±0.21

As seen in table 3, the content of fat, lactose and total protein in mare's milk is somewhat higher in autumn than in summer. Comparison of the chemical composition of mare's milk in 3 regions shows that in the Gobi region there is

high content of fat, lactose and protein. It could be connected with the fact that the Gobi pastures are rich with such grasses as Allium polyrrhizum, Allium mongolicum and Allium anisopodium.

Mongolians drink Airag is known worldwide by the name koumiss. By Mongolian traditional method, a leather bag (huhuur) made of processed skin of bulls with capacity of 80-140 liters is being used to ferment the milk. These kinds of skin bags have an advantage for aeration and keeping temperature regime in preparation of airag in felt tent (Ger), which is a traditional living house of Mongolians. Hand preparation of Airag is common.

Table 4. Chemical composition of Airag (g/l)

Season	Regions	Lactose	Fat	Protein	Alcohol
Summer	Khangay	21±0.25	18±0.14	17±0.64	15±0.64
	Steppe	28±0.82	19±0.43	22±0.53	20±0.53
	Gobi	19±0.84	21±0.32	26±0.55	18±0.45
Autumn	Khangay	23±0.28	17±0.26	18±0.93	18±0.36
	Steppe	29±0.62	20±0.52	23±0.84	21±0.54
	Gobi	20±0.71	22±0.25	28±0.53	20±0.53

Mongolia has big possibilities to increase mare's milk production by producing dried mare's milk for export by using milking machine and freeze drying technology in addition to the fermented products.

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