Livestock production

Hiroki Nakatsuji

Laboratory of Animal Production System
Research Faculty of Agriculture
Hokkaido University
Email:nakahiro@anim.agr.hokudai.ac.jp

Chapter 5

Livestock Production

Hiroki Nakatsuji

Hokkaido is a major area of livestock production in Japan. According to Statistics on Agriculture, Forestry and Fisheries (Table 5-1), in 2006, the livestock production of Hokkaido was of 502 billion yen, accounting for 18.6% of the total livestock output of Japan, and was the highest among Japan's 47 prefectures. Dairy farming holds a dominant position in Japan's livestock production.

There is a large area of grasslands in Hokkaido, accounting 72.7% of the national area of grasslands. In 2006, the number of dairy farmers was 8,590 and there were 859,100 dairy cattle, which meant 100 cows per farm. Dairy farms in Hokkaido are shipping 3,798,123 metric tons of milk (Table 5-2), that is, 46.7% of Japan's total milk production (Table 5-1).

1. Dairy

It is said that dairy farming in Hokkaido began with the milking of "Nanbu Cattle" in Hakodate city in 1857. In 1873, Mr. Edwin Dan, an agricultural expert from United States, arrived as an advisor with commissioner Capron. He taught the system of livestock production to Hokkaido's people for 9 years. He laid the foundation for dairy farming by introducing "Durham" (Shorthorn) cows, which were used for both milk and beef in the United States.

In 1878, the Sapporo Agricultural College imported "Ayrshire" milking cows. In 1889, for the first time in Japan, the college imported "Holstein" cattle (3 females, "Shikishima", "Sazanami" and "Chidori"; 2 males, "Akitsushima" and "Yamato": as named in Japanese). Their descendants can be seen in the present barn of the Experimental Farm, Field Science Center for Northern Biosphere (FSC), Hokkaido University (Fig. 5-1). "Holstein" is now the major

Table 5-1. Hokkaido's share of grassland area and livestock production in Japan.

	Unit	Hokkaido (A)	Japan (B)	Share (A/B), %
Land Area				
Grasslands	1,000 ha	565	777	72.7
Gross Agricultural Output				
Gross Output		1,066	8,806	12.1
Livestock Output	billion yen	502	2,702	18.6
Milk		279	666	41.9
Number of Livestock raised				
Dairy Cattle		859	1,635	52.5
Beef Cattle		467	2,755	17.0
Pig	1,000 head	522	9,620	5.4
Layer		7,959	176,867	4.5
Race Horse		10	10	95.9
Quantity of Livestock Product				
Milk	1,000	3,798	8,134	46.7
Beef	metric ton	74	500	14.8

Statistics on Agriculture, Forestry and Fisheries (MAFF, 2006)

Table 5-2. Yearly changes in livestock production in Hokkaido. (Units: head, ton)

Year	Dairy Cattle		Beef Cattle		Pig		Layer	
	No.	Milk Production	No.	Dressed Carcass	No.	Dressed Carcass	No.	Chicken Egg
1965	317,690	663,546	13,690	7,711	163,390	18,793	3,839,000	34,480
1975	614,800	1,447,640	125,460	17,778	438,010	57,400	6,041,000	78,989
1985	807,800	2,603,483	245,000	57,330	604,000	87,095	7,633,000	92,194
1995	882,900	3,443,060	430,400	92,034	582,400	78,187	8,313,000	112,581
2000	866,900	3,645,698	413,500	74,528	546,100	72,222	8,237,000	110,781
2004	863,500	3,821,238	446,800	75,050	535,400	72,390	7,474,000	107,147
2005	857,500	3,861,101	447,700	74,111	-	70,615	-	105,738
2006	859,100	3,798,123	467,000	73,613	521,900	70,617	7,959,000	106,067

Statistics on Agriculture, Forestry and Fisheries (MAFF)

1 **2** **3**

Fig. 5-1. Experimental Farm of Field Science Center for Northern Biosphere (FSC), Hokkaido University.

1. Dairy cattle barn. 2. Grazing of lactating dairy cows. 3. Milking of cows.

breed of milking cows in Japan (Fig. 5-2).

In 1960s, the westernization of the Japanese diet increased the demand for milk and dairy products. To cope with this, modernization and the expansion of dairy farms and improvement of grasslands were undertaken. Facilities equipped with modern machinery were set up.

However, as farm sizes expanded, high labor requirement in dairy farming had become a significant problem in Hokkaido (Fig. 5-3). To overcome this, a farm-helper association was set up in each region to allow farmers regular holidays and to prepare for accident and/or disease. However, certain problems as described below have been observed in the efficient utilization of the grassland ecosystem.

In Hokkaido, the number of dairy cattle has gradually increased over the past 30 years, while the area of grasslands has remained nearly constant (Fig. 5-4). The milk yield per cow per 305 days has markedly increased from 6,000 kg in the mid 1970s to the present 9,000 kg. Over the same period, the amount of concentrates fed has also greatly increased (Fig. 5-5). As a result, the self-sufficiency rate of feed (on a Total Digestible Nutrients [TDN] basis) in dairy farming has decreased from 75% in 1975 to 55% in 2004. Clearly the remarkable increase in milk production could not have been achieved in Hokkaido without the genetic improvement of Holstein cows as well as the heavy consumption of imported concentrates. The present situation has led to environmental pollution by extra feces and urine, which cannot be absorbed and utilized by plants.

The supply of safe milk can be sustained and achieved only by returning to the fundamentals of dairy farming, that is, by producing milk primarily through the soil-grass-animal interaction based on land use, without relying on the present concentrate based milk production system. Grazing is now being recognized as a sustainable production system in harmony with the environment. Grazing is a labor saving management system. The cows on pasture directly affect the soil-grass-animal interaction. The productivity grazing is generally regarded to be lower than forage harvesting. Sustainable grazing systems should aim not only to be harmony with the environment, but also to increase pasture productivity while maintaining sward characteristics.

Fig. 5-2. Holstein.

Fig. 5-3. Large-scale dairy farm "Mega farm" in Tokachi district in Hokkaido.

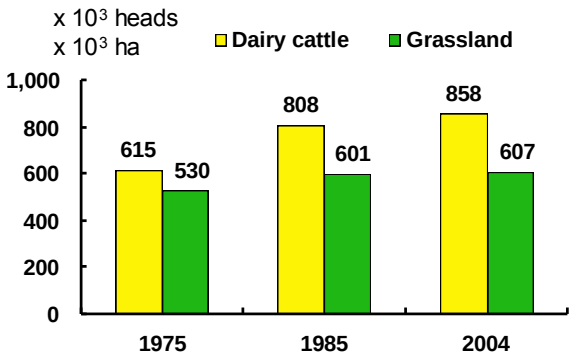

Fig. 5-4. Number of dairy cattle and area of grasslands (including forage-crop field) in Hokkaido.

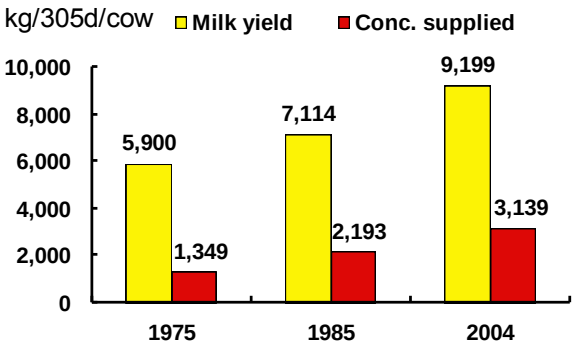

Fig. 5-5. Mean milk yield and concentrate supplied during the lactation of Holstein cows in Hokkaido.

Dairy farming is an activity based on the grassland ecosystem, in the same way as crop farming is based on the agro-ecosystem. As crop production is usually measured as the yield per unit area cultivated, the milk production should be expressed as the yield per unit area used for forage production, in addition to the yield per cow. In the case of grazing, milk production from pasture should be defined as milk yield per unit area of pasture. There have been many reports of milk production per unit area of pasture in United Kingdom and New Zealand, although only limited data are available in East Asia. However, we have almost completed compilation of such data from our researches of dairy farms in Hokkaido, and a series of grazing experiments were carried out in the Experimental Farm of FSC, Hokkaido University. Results of the studies will be discussed during the lecture.

2. Beef cattle

It is said that the raising of beef cattle was started in 1858, when “Nanbu Cattle” was introduced in Nanae town in the southwestern region of Hokkaido. “Japanese Brown Cattle” (Katsumoo-Washu) (Fig. 5-6) and “Japanese Shorthorn” (Nihon-Tankakushu) (Fig. 5-7) were also introduced to complement fishermen’s unstable incomes.

Since 1960s, with rapid economic growth the demand for beef in Japan has increased. The number of castrated male “Holsteins” as beef cattle increased the most in Hokkaido. In addition, during 1960s, new foreign breeds such as “Aberdeen-Angus” (Fig. 5-8) and “Hereford” (Fig. 5-9), which have a high ability of forage utilization, were imported and experimented with grazing and high-forage-based diets, especially in Hokkaido. The Shizunai Livestock Farm of FSC located in Hidaka district, 150 km to the southeast of Sapporo, has kept about 100 heads of “Hereford” till now. Experiments were conducted on comparison of the grass-fed-beef (lean meat) production system with grazing on the mountain-slope pasture in summer and high forage based diets including mainly corn silage in winter.

Since 1991, when the Japanese beef market was opened to foreign trade, the meat produced from Holstein and the foreign breeds lost competitiveness against the imported beef, owing to similar quality. At present, “Japanese Black

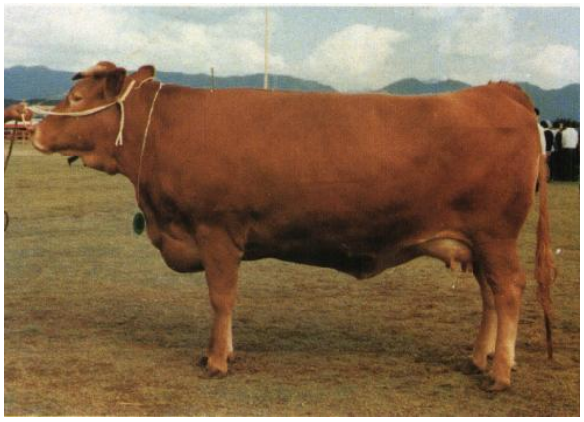

Fig. 5-6. Japanese Brown Cattle (Katsumoo-Washu).

Fig. 5-7. Japanese Shorthorn (Nihon-Tankakushu).

Fig. 5-8. Aberdeen-Angus.

Fig. 5-9. Herford.

Cattle" (Kuroge-Washu) (Fig. 5-10), which is raised and fattened by high grain based diets, is popular, producing high quality beef (with marbling) that competes with imported beef.

In 2006, the number of beef cattle farmers was 3,000 in Hokkaido. There were 467,000 heads of beef cattle and 73,613 metric tons of beef dressed carcasses were produced (Table 5-2), accounting for 17.0 % and 7.9 % of the total beef cattle raised and beef dressed carcasses produced in Japan, respectively (Table 5-1). Both the number of beef cattle raised and beef meat produced are the highest in Hokkaido among Japan's 47 prefectures.

The strategies for cost reduction, the establishment of Hokkaido Brand Beef, and the expansion of markets will be important in order to prepare for international competition. Due to globally soaring grain prices the grass-fed-beef production system with grazing and high-forage-based diets must be recognized once again as a low cost production system, which is also a sustainable production system in harmony with the environment. Like milk production, a sustainable supply of safe beef can be achieved only by returning to the fundamentals of beef production, that is, by producing beef primarily through the soil-grass-animal interaction based on land use, without relying on the concentrate-based beef production system.

3. Pigs

In 2006, Hokkaido's pig farms had 521,900 pigs, accounting for 5.4% of the national total (Table 5-1). These were distributed amongst 323 farmers, and produced 70,617 metric tons of pork dressed carcasses (Table 5-2).

Almost all pigs raised in Hokkaido are hybrids, in particular "three-way crossbreds" among "Landrace" (Fig. 5-11), "Large White" (Fig. 5-12) and "Duroc" (Fig. 5-13). Purebreeds of "Landrace" sows and "Duroc" boars can be seen at the Experimental Farm of FSC. The number of SPF (Specific Pathogen Free) pigs is increasing leading to production of safe and delicious pork.

4. Chickens

In 2006, the number of egg-laying hens was 7,959,000 in Hokkaido, accounting for 4.5% of the national total (Table 5-1). There were 93 poultry farms,

Fig. 5-10. Japanese Black Cattle (Kuroge-Washu).

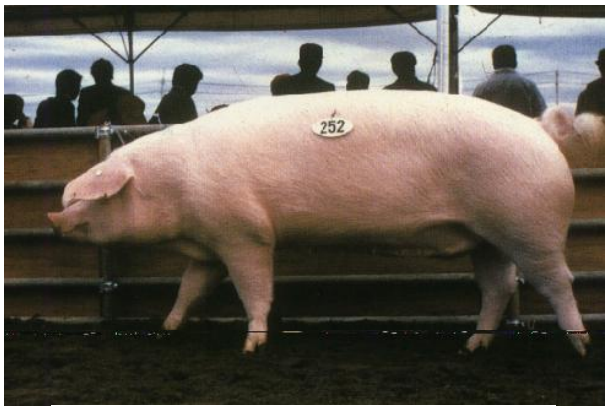

Fig. 5-11. Landrace.

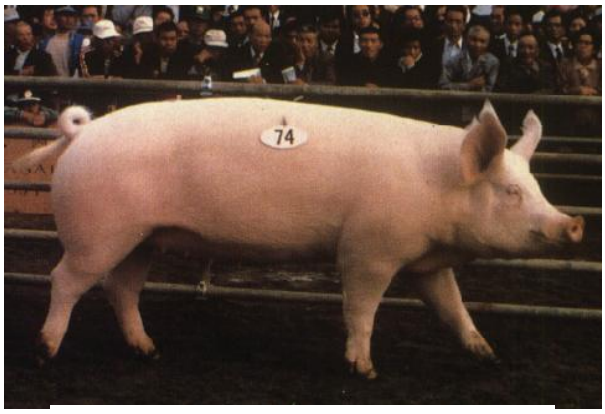

Fig. 5-12. Large White.

Fig. 5-13. Duroc.

egg production was 106,067 metric tons (Table 5-2). As the number of farmers has decreased, the scale of operation has expanded. Some breeds of egg-layers that can be seen at the Experimental Farm of FSC are “White Leghorn” (Fig. 5-14) and “Rhode Island Red” (Fig. 5-15).

Chicken meat production started in earnest in the late 1980s, when large companies moved to Hokkaido from other prefectures. The number of chickens for meat production was 30.51 million in 2005, with broiler chickens accounting 89% of the total chicken meat produced.

5. Sheep

In 2006, there were 6,452 sheep and 197 sheep farmers. The major breed of sheep for meat production is “Suffolk” (Fig. 5-16).

Almost all sheep meat consumed in Japan is now imported from Australia and New Zealand because of low prices. However, fresh and delicious lamb is becoming more popular in Hokkaido, and good quality wool is sought after for hand-made fabrics. Even though there are relatively few sheep in Hokkaido, they contribute significantly to tourism as popular sightseeing attractions.

6. Horses

Hokkaido is the center of racehorses with 9,838 “Thoroughbreds” (Fig. 5-17), accounting over 90% of the total horses in Japan. There were 1,109 horse farms in 2006. Due to the recession in Japan and increase of importation etc., the number of horses raised in Hokkaido has been declining since 1991.

There is also a native horse in Hokkaido, “Hokkaido-Washuba” (Fig. 5-18). It is dubbed “Dosanko”, which means a person born in Hokkaido. They are small in size and were introduced into Hokkaido from the main land of Japan about 200 or 300 years ago. They are kept outdoors all year round and used as packhorses. Their population was 1,468 in 2006, accounting about 75% of the total number of all Japanese native horses (8 breeds). Since 1950, the Shizunai Livestock Farm of FSC has about 80 horses of this breed, including about 30 mature mares, to maintain bloodline. Now, new usages of Hokkaido native horses are being considered, including endurance, trekking and horse riding by handicapped persons etc.

Fig. 5-14. White Leghorn.

Fig. 5-15. Rhode Island Red.

Fig. 5-16. Suffolk.

Fig. 5-17. Thoroughbred.

Fig. 5-18. Hokkaido Native Horse (Hokkaido-Washuba: “Dosanko”).