

# **Agricultural Economy**

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## Chapter 7

### Agricultural Economy

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The main objectives of this chapter are to contribute to a better understanding of Hokkaido's agriculture sector and the role it plays in the economy.

#### **1. Food self-sufficiency ratio and producer support in Japan**

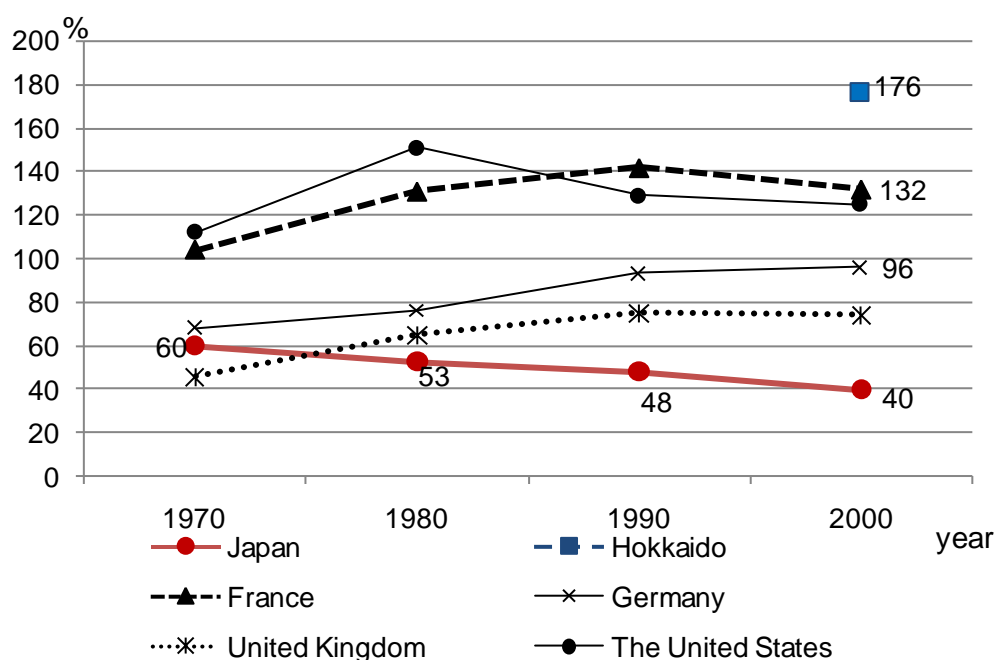
##### (1) Food self-sufficiency ratio in Japan

Japan's food self-sufficiency ratio is the lowest among the major advanced countries (Fig. 7-1). Japan's food self-sufficiency ratio on a calorie basis has decreased from 60% in 1970 to 40% in 2000. This reduction was due to the tendency of domestic production to shift to relatively higher value added agricultural products such as vegetables and livestock products (MAFF, 2007a). The changes in dietary habit and increased imports of agricultural products have also caused a decline in the food self-sufficiency ratio.

##### (2) The level of producer support in Japan

The Japanese government seems reluctant to reduce Japan's agricultural trade barriers because Japan has a comparative disadvantage in agricultural production compared to relatively land-abundant developed countries such as the United States and Australia, or relatively labor-abundant developing countries such as China (Yamamoto, Sawauchi and Masuda, 2007). Therefore, Japan has been using tariff and non-tariff trade barriers in order to increase domestic producer prices of agricultural products and increase domestic agricultural production. Increased producer prices have led to more intensive agricultural systems in Japan.

Table 7-1 shows that high tariffs remain on farm and food-sector



**Fig. 7-1. Food self-sufficiency ratios on a calorie basis**

Source: MAFF, Website ([http://www.maff.go.jp/j/zyukyu/zikyu\\_ritu/012.html](http://www.maff.go.jp/j/zyukyu/zikyu_ritu/012.html), [http://www.maff.go.jp/j/zyukyu/zikyu\\_ritu/013.html](http://www.maff.go.jp/j/zyukyu/zikyu_ritu/013.html), [http://www.maff.go.jp/j/zyukyu/zikyu\\_ritu/zikyu\\_10.html](http://www.maff.go.jp/j/zyukyu/zikyu_ritu/zikyu_10.html)).

**Table 7-1. Ad Valorem tariffs of different commodities on bilateral basis (1997)**

Commodity	Unit:%	
	Japanese tariffs on imports from Korea	Korean tariffs on imports from Japan
Rice	409	5
Wheat	249	3
Cereal grains	20	304
Other crops	38	74
Raw milk	0	0
Cattle & sheep	149	31
Other livestock	5	10
Rum meat	36	75
Other meat	58	22
Dairy products	287	26
Other food	38	45
Resource products	7	10
Manufacturing products	2	8
Services	0	0

Source: GTAP Database Version 5.4.

commodities in Japan (Yamamoto, Sawauchi and Masuda, 2007). The highest Japanese tariffs on imports from Korea are levied on rice (409%). Commodities whose tariffs are higher than 100% in Japan are rice, wheat, cattle & sheep and dairy products.

The percentage Producer Support Estimate (PSE) is the key indicator used to measure support to agricultural producers (OECD, 2008a). It expresses the estimated monetary value of policy transfers from consumers and taxpayers to producers as a percentage of gross farm receipts. The percentage PSE is suited to analyze changes in the level of support in the OECD area across time, as well as the levels of support across individual OECD countries.

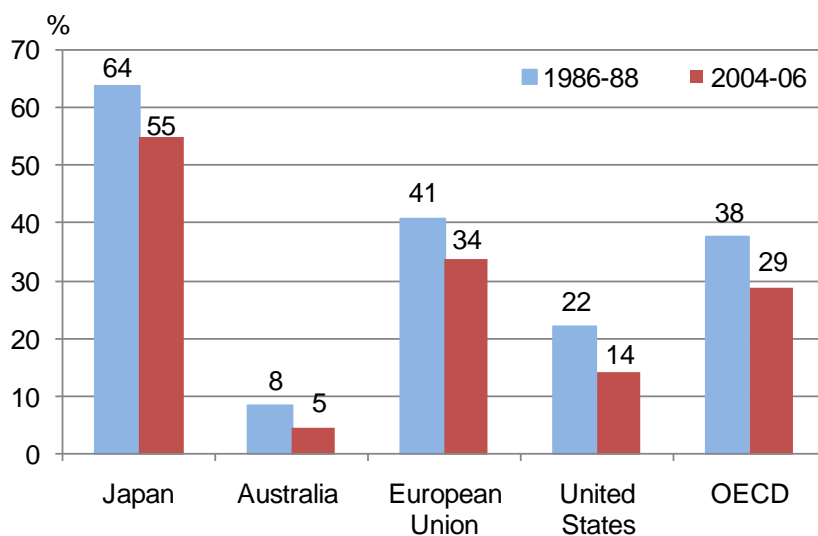
In the OECD countries, support to producers, as measured by the percentage PSE, was 29% in 2004-06, implying that agricultural support increased farmers' gross receipts in OECD countries by more than one quarter (Fig. 7-2). In Japan, PSE has declined from 64% in 1986-88 to 55% in 2004-06, but almost twice the OECD average. There continued to be a considerable diversity in the level and composition of support among OECD countries. This reflects in part the wide variations in farm structures, natural environments, socio-economic conditions and trade positions (OECD, 2008a). In 2004-06, Australia and the United States had percentage PSE of 20% or below, while Japan and the European Union had support levels that were 30% or above.

## **2. Hokkaido's agriculture in Japan**

### **(1) Agriculture's share of Economy**

While Hokkaido's agriculture has played an important role in Hokkaido's regional economy, the size of agriculture has declined relative to the rest of the economy. Total economic output in Hokkaido has grown faster than its agricultural output, leading to a decline in agriculture's share over time.

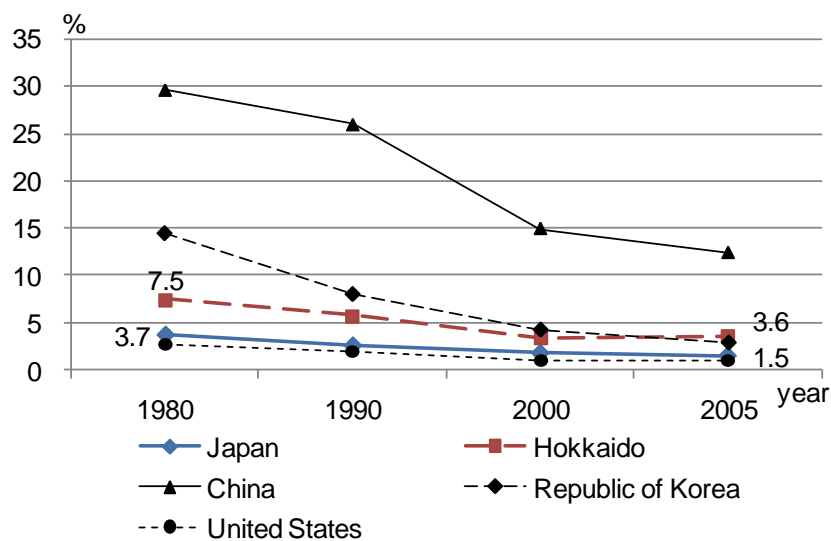
Gross value added for agriculture, forestry and fisheries as a percentage of total Gross Prefectural Product for Hokkaido have declined from 7.5% in 1980 to 3.6% in 2005 (Fig. 7-3). Gross value added for agriculture, forestry and fisheries as percentage of total Gross Domestic Product for Japan has declined from 3.8% in 1980 to 1.5% in 2005. The trends of relative decline in agriculture's



**Fig. 7-2. Producer support estimates by countries**

Source: OECD, *PSE/CSE database*.

Note: Data show the percentage share of Producer Support Estimates in GDP.



**Fig. 7-3. Agricultural share of economy**

Source: United Nations Statistics Division, *National Accounts Main Aggregates Database*. Economic and Social Research Institute Cabinet Office, *Annual Report on National Accounts and Annual Report on Prefectural Accounts*.

Note: Each value shows agricultural share of Gross Domestic Product in Japan, China, Republic of Korea, and the United States, and agricultural share of Gross Prefectural Product in Hokkaido.

share of economy are also found in other countries such as China, Republic of Korea and the United States.

## (2) Contributions of Hokkaido to Japan's agriculture

While the trends of relative decline in agriculture's share of economy are found in Hokkaido, Hokkaido has played the most important role in Japan's agriculture.

Hokkaido is called 'Japan's biggest food supplier' for products such as wheat, soybeans, adzuki beans, sugar beet, corn, carrot, potatoes, onion, pumpkin, milk, beef, and racehorse. Average size of Hokkaido's farm household is the biggest in 47 prefectures of Japan mainly due to relatively abundant land resources compared with the rest of Japan.

An examination of the relative contributions and characteristics of Hokkaido's agriculture to Japan reveals that (Table 7-2):

-about one quarter of Japan's cultivated land and more than 80% of Japan's grasslands exist in Hokkaido;

-average cultivated land per farm in Hokkaido is more than ten times of the average cultivated land per farm in Japan;

-around 10% of agricultural gross output is produced in Hokkaido;

-Hokkaido produces more than 40% of Japan's raw milk, more than 60% of Japan's wheat and potatoes, and more than 80% of Japan's adzuki beans and sugar beet; and

-around half of Japan's dairy cattle exist in Hokkaido.

## **3. Farms in Hokkaido**

### (1) Number of farms

The number of commercial farm households<sup>1)</sup> in Hokkaido declined from 95 thousand in 1990 to 52 thousand in 2005 (Table 7-3). The number of commercial

**Table 7-2. Comparisons between agriculture in Hokkaido and Japan**

Content	Unit	Hokkaido A	Japan B	A/B	Sources	
					Year of Survey	Reference
<b>Land area</b>						
Cultivated land	1,000 ha	1,166	4,671	25.0%	2006	MAFF
Paddy field	1,000 ha	227	2,543	8.9%	2006	
Upland field	1,000 ha	939	2,128	44.1%	2006	
Grasslands	1,000 ha	523	627	83.4%	2006	
Cultivated land per farm	ha	19.8	1.3	1523.1%	2005	
<b>Income</b>						
National (prefectural) income	billion yen	14,308	361,013	4.0%	2004	Economic and Social Research Institute , Hokkaido
Agricultural income	billion yen	397	3,263	12.2%	2005	MAFF
<b>Gross agricultural output</b>						
Gross output ( A )=( B )+( C )	billion yen	1,066	8,806	12.1%	2005	MAFF
Crop output ( B )	billion yen	564	6,037	9.3%	2005	
Livestock output ( C )	billion yen	502	2,702	18.6%	2005	
<b>Quantity of agricultural production</b>						
Rice	1,000 t	644	8,546	7.5%	2006	MAFF
Wheat	1,000 t	514	837	61.4%	2006	
Potato	1,000 t	2,008	2,598	77.3%	2006	
Soy bean	1,000 t	70	231	30.3%	2006	
Azuki bean	1,000 t	56	63	88.9%	2006	
Sugar beet	1,000 t	3,923	3,923	100.0%	2006	
Raw milk	1,000 t	3,798	8,134	46.7%	2006	
Beef	1,000 t	74	500	14.8%	2005	
<b>Number of livestock raised</b>						
Dairy cattle	1,000 head	856	1,635	52.4%	2005	MAFF
Beef cattle	1,000 head	467	2,755	17.0%	2005	
Pig	1,000 head	522	9,620	5.4%	2005	
Layer	1,000 head	7,787	176,955	4.4%	2005	

Source: Hokkaido prefectural government, *Agriculture in Hokkaido, Japan 2007*.

farm households in Japan declined from 3,835 thousand in 1990 to 1,963 thousand in 2005 (Table 7-4). The number of commercial farm households in Japan and Hokkaido declined by about 50% between 1990 and 2005.

In 2005, about half (52%) of Hokkaido's commercial farm households engaged in full-time farming. More than three quarters (77%) of Japan's commercial farm households engaged in part-time farming.

## (2) Income of farm households

In Japan, until 1998 the key policy statements described the main objective of agricultural policy as "to enable farmers through increased farm income to enjoy equal standards of living with workers in other industries" (OECD, 2003).

Fig. 7-4 illustrates total income per farm household in Hokkaido and the rest of Japan. In 2005, total income per farm household in Hokkaido (6,551 thousand yen) was about 1.3 times larger than in the rest of Japan (4,971 thousand yen). Agricultural income per household in Hokkaido (5,150 thousand yen) was about 4.7 times larger than in the rest of Japan (1,101 thousand yen). However, non-agricultural income in the rest of Japan was larger than in Hokkaido.

Hokkaido was developed by immigrants from other parts of Japan after the Meiji Restoration. It has maintained its proportion of full-time farm households because the decline in the number of farm households has led to an increase in average farm size (Tama and Carpenter, 2007). The economic theory says that farm households that can support themselves on agricultural income alone will remain and others will leave farming; it has worked in the case of Hokkaido. This theory, however, has not held true for others parts of Japan, where small-scale farming has been maintained by compensating for income shortfalls from farming with off-farm employment by household members.

## (3) Size of farms

Fig. 7-5 and Fig. 7-6 show the shares of number of rice farm households by size of cultivated land in Hokkaido and in the rest of Japan. The size of rice farm households in Hokkaido is much larger than in the rest of Japan. In 2005, the



**Table 7-3. Number of farm households classified by full-time and part-time in Hokkaido**

Unit: thou. household, %

Year	Total a=b+c	Full-time farm household		Part-time farm household	
		b	b/a*100	c	c/a*100
1990	95	43	45%	53	55%
2000	63	29	46%	34	54%
2005	52	27	52%	25	48%
2005/1990	0.54	0.64	-	0.47	-

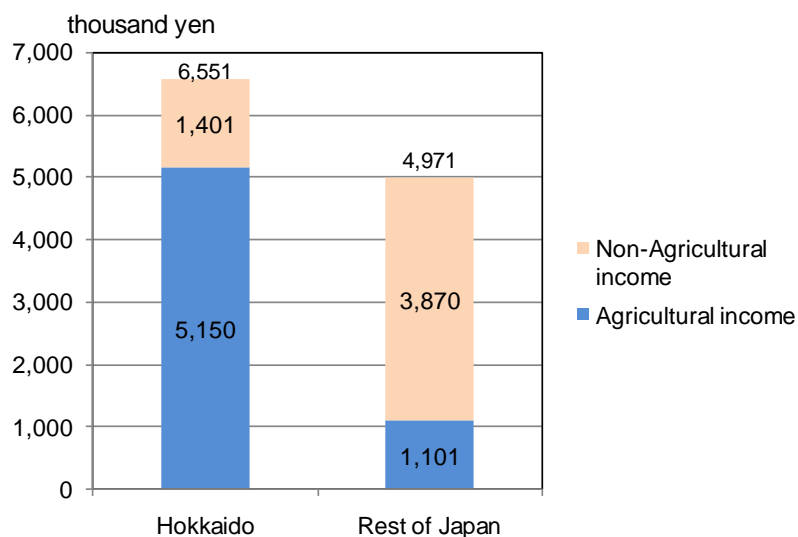
Source: MAFF, *Census of Agriculture and Forestry*.

**Table 7-4. Number of farm households classified by full-time and part-time in Japan**

Unit: thou. household, %

Year	Total a=b+c	Full-time farm household		Part-time farm household	
		b	b/a*100	c	c/a*100
1990	3,835	592	15%	3,243	85%
2000	2,337	426	18%	1,911	82%
2005	1,963	443	23%	1,520	77%
2005/1990	0.51	0.75	-	0.47	-

Source: MAFF, *Census of Agriculture and Forestry*.



**Fig. 7-4. Total income of farm household per farm (2005)**

Source: MAFF, *Report of Statistical Survey on Farm Management and Economy (Statistics on Type of Management)*.

Note: Non-agricultural income = non-agricultural income + income of relational agriculture + annuity, presents, gifts, etc.

share of number of rice farm households that cultivated more than 10 ha was 44% in Hokkaido. In the rest of Japan, the share of rice farm households that cultivated more than 10 ha was less than 1%. In 2005, the share of number of rice farm households that cultivate less than 1 ha was 52% in the rest of Japan.

Fig. 7-7 and Fig. 7-8 show the shares of number of the dairy farm households by herd size in Hokkaido and in the rest of Japan. The size of dairy farm households in Hokkaido is much larger than in the rest of Japan. In 2005, the share of number of dairy farm households that raised 50-99 milking cows was about half (47%) in Hokkaido. In the rest of Japan, the share of dairy farm households that raised 50-99 milking cows was only 12%.

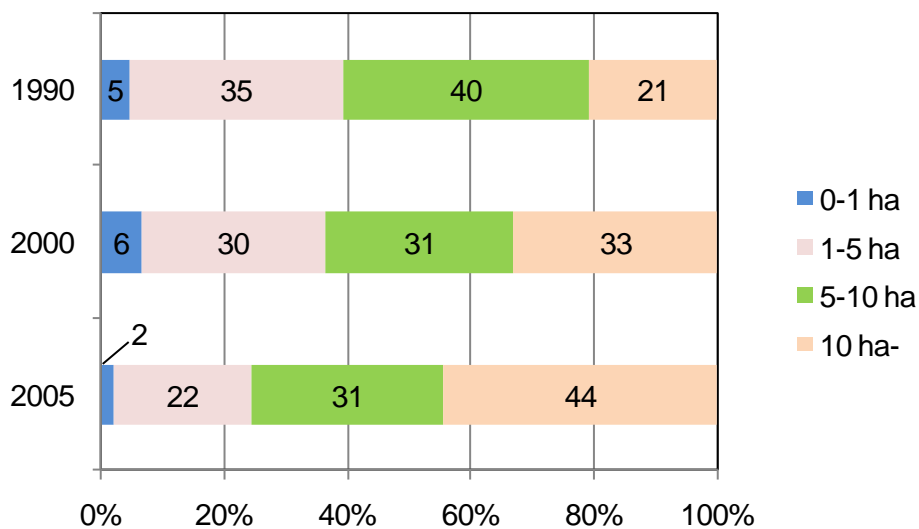
#### (4) Costs of production

Fig. 7-9 and Fig. 7-10 show the production costs per 60 kg of brown rice and per 100 kg of raw milk in Japan and Hokkaido. Costs of rice as well as raw milk production are lower in Hokkaido than in Japan since the size of farms in Hokkaido is larger than in Japan. As per famous economic law 'economies of scale', larger is the size of farms, lower is the production cost per agricultural output.

#### **4. Multifunctionality of agriculture**

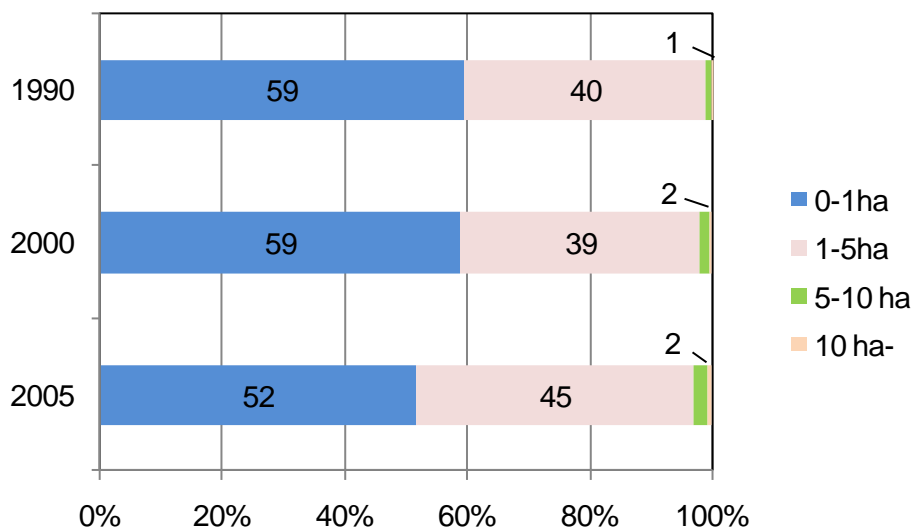
The concept of "multifunctionality of agriculture" recognizes important potential benefits of agriculture in addition to the production of food, which is essential for human living. Agriculture and rural areas in Hokkaido besides producing agricultural products are playing a number of important roles including preservation of the natural environment and biodiversity, development of favorable landscapes, provision of recreational and educational opportunities to urban people, etc. Such benefits from multifunctionality of Hokkaido's agriculture was estimated at around five hundred billion yen per year, which is about half of the gross agricultural output value in Hokkaido (Demura, Sato and Iwamoto, 1999).

There is growing concern about fulfillment of the multifunctionality of agriculture due to stagnation of agricultural production and the decline in



**Fig. 7-5. Share of number of rice farm households by size of cultivated land in Hokkaido**

Source: MAFF, *Census of Agriculture and Forestry*.



**Fig. 7-6. Share of number of rice farm households by size of cultivated land in rest of Japan**

Source: MAFF, *Census of Agriculture and Forestry*.

community functions (MAFF, 2007a). More efforts should be directed to further promote the understanding of the multifunctionality of agriculture.

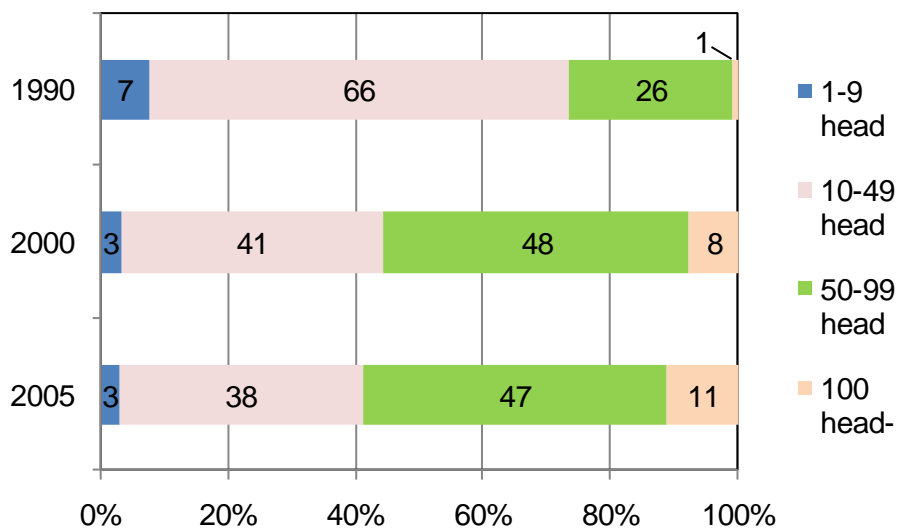
#### Notes

1) The term of “farm household” used here refers to a household that operates farming with 10 ares and more of cultivated land on the survey date or a household whose agricultural product sales amount to a specific value (e.g. 500,000 yen in 2005) and over in a year prior to the survey date, even with its cultivated land being below 10 acres (MAFF, 2007b). Since 1990 Census, the “farm household” is further divided in two categories: “commercial farm household”, which is a farming household mainly producing agricultural products for sales, and “noncommercial farm household”, which is a farming household mainly producing agricultural products such as rice for its own use (MAFF, 2007b).

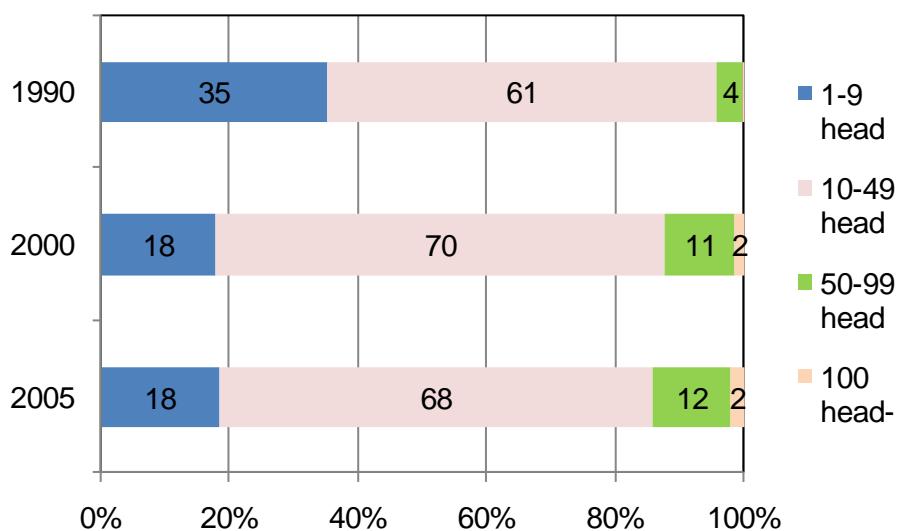
The “full time farm household” applied in the statistics on number of commercial farm households is defined as a farm household, which has no household member engaged in other jobs than farming (MAFF, 2007b). The “part-time farm household” is defined as a farming household, which has one or more household members engaged in other jobs than farming (MAFF, 2007b).

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**Fig. 7-7. Share of number of dairy farm households by herd size in Hokkaido**  
 Source: MAFF, *Census of Agriculture and Forestry*.

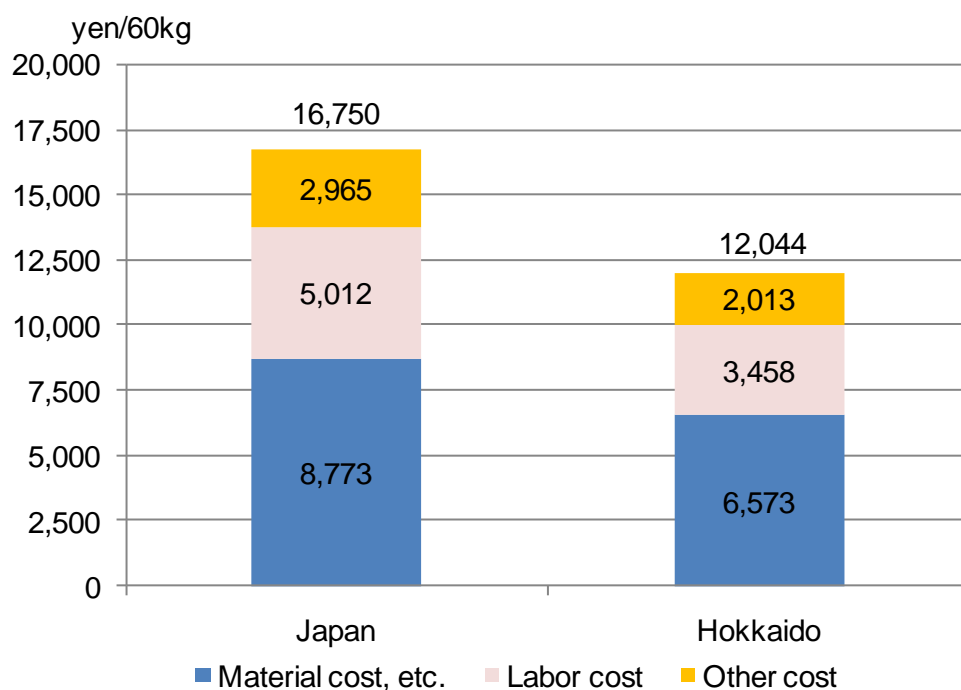


**Fig. 7-8. Share of number of dairy farm households by herd size in the rest of Japan**  
 Source: MAFF, *Census of Agriculture and Forestry*.

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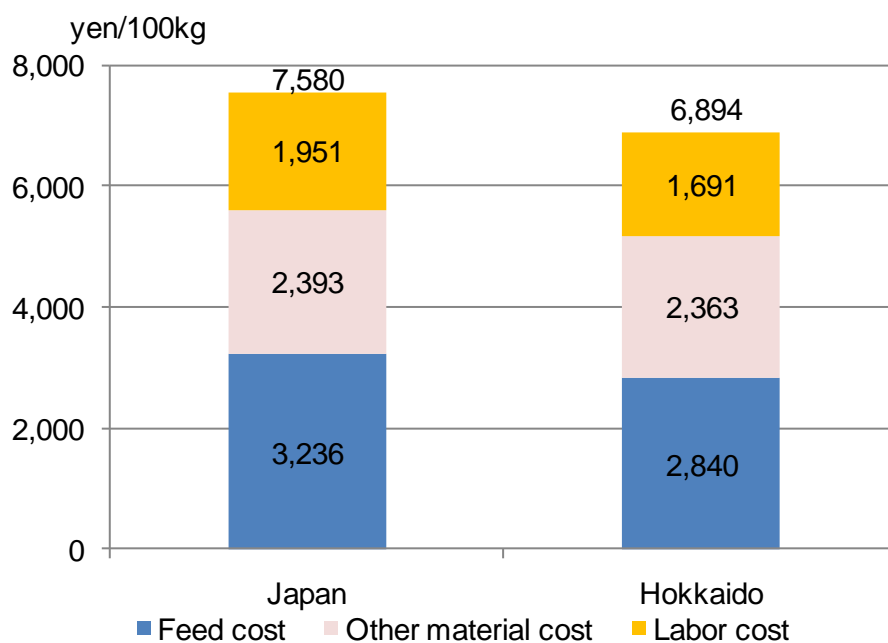
### **Acknowledgement**

The author thanks Dr. Daisuke Sawauchi for invaluable assistance in collecting and processing data and constructive comments on earlier drafts.



**Fig. 7-9. Production cost of rice (2005)**

Source: MAFF, *Report of Statistical Survey on Farm Management and Economy (Production Cost of Rice Wheat and Barley)*.



**Fig. 7-10. Production cost of raw milk (2006)**

Source: MAFF, *Report of Statistical Survey on Farm Management and Economy (Production Cost of Livestock)*.