

## New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website [www.nzsap.org.nz](http://www.nzsap.org.nz)

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

**Share**— copy and redistribute the material in any medium or format

Under the following terms:

**Attribution** — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

**NonCommercial** — You may not use the material for [commercial purposes](#).

**NoDerivatives** — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

## A comparison of dairy farming between New Zealand and Japan

T. OZAWA, N. LOPEZ-VILLALOBOS AND H.T. BLAIR

Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand

### ABSTRACT

The productivity and financial performance of dairy farms in New Zealand and Japan (Hokkaido) were analysed. Relative to Hokkaido, New Zealand has lower yield of milk solids per cow, but higher production per hectare because of their pasture grazing systems. The value of milk solid is much higher in Hokkaido than New Zealand (NZ\$14.7 vs. NZ\$3.5/KgMS), and the total expenses of producing milk solids are much higher in Hokkaido than in New Zealand (NZ\$11.5 vs. NZ\$3.0/KgMS). New Zealand has a lower variable cost, but higher fixed expenses and higher cash surplus ratio per farm compared with Hokkaido. There is also remarkably high interest expenditure in New Zealand caused by non-subsidised loan procurement from finance organisations. Total farm expenses per cow in New Zealand is only at about 1/10 of Hokkaido expenses. There is a marked difference in financial structures between the two countries, especially in turnover ratios of gross assets. The results suggest that it is important for dairy farmers in Hokkaido to consider not only cost savings achieved through grazing systems, but also to consider that grazing systems make only poor utilisation of capital.

**Keywords:** New Zealand; Japan; Hokkaido; dairy farming; financial structure; comparative study.

### INTRODUCTION

Milk production in New Zealand is based on a seasonal system of calving that enables the seasonal supply of pasture to be closely matched with the feed requirements of lactating and growing cattle. Under these circumstances, the profitability of the New Zealand seasonal dairy enterprise is linearly related to the amount of milk solids (MS) produced per hectare of grazed grass (Holmes *et al.*, 1987; Deane, 1993). High production per hectare can be achieved with high-genetic merit cows capable of efficiently transforming the nutrients from pasture into milk, and with the skills of herd managers that make the most from both the cows and the pastures, through manipulation of the farm's stocking rate and the dates of mating periods. In New Zealand, the quantities of silage and hay fed per cow are small in comparison with dairy farms in many other countries concentrate meals are rarely fed (Holmes, 2000).

One of the first publications to introduce the New Zealand primary industry, including the dairy industry, to Japan was made by Makino & Murakami (1956), who translated the New Zealand MAF report about the industry into Japanese. In 1950's, Japanese dairy farming was still in its infancy and the dairy industry was small relative to rice production. After the settlement of Agricultural Basic Law in 1961, dairy farming was "selected for expansion sector" in Japanese agriculture and was grown rapidly to reach herd sizes which are similar to those on farms in Europe.

Some studies in Japan have reported the structure of New Zealand dairy industry. However, those studies were primarily concerned with the technical structure of the New Zealand dairy system. The first scholar to introduce New Zealand's low cost structure of dairy farming was Murata (1989). He used the statistics of the New Zealand Dairy Board and devised some financial indexes. However, these indexes were not compared to those derived from the Japanese dairy industry. The objective of this study is to compare dairy farming in New Zealand and Japan (Hokkaido) from a financial point of view.

### MATERIALS AND METHODS

Data published by Livestock Improvement (1999a, 1999b) for "owner-operated" dairy farms are utilised to represent New Zealand dairy farming because they are similar to the "family-operated" dairy farm in Hokkaido. The data reported in "production costs of milk farm economy" (MAFF 1999a) and "statistical research on the farm economy by the type of farming" (MAFF 1998) are used for the financial analysis in Hokkaido. For comparison to New Zealand farms, the classification of "80 cows and over" in the Hokkaido region is adopted due to the farm size and its dairy system (see Ozawa (2000) for a description of farm characteristics). Dairy farming in the Hokkaido region has a large area of pasture and grazing land in contrast to other regions in Japan, and 40% of total Japanese milk production is generated by Hokkaido dairy farmers.

Over 85% of raw milk produced in Hokkaido region was used for milk products such as butter and skim milk powder in 1999 (MAFF, 1999b). In Japan, it is typical to report milk prices on a per kg of liquid milk basis. Prior to April 2001, the price for milk to be used in the manufacture of butter and skim milk powder in Japan was set by the Ministry of Agriculture, Forestry and Fisheries. The price for milk used directly for liquid consumption and cheese and yoghurt production was set by negotiation between dairy companies and the farmer's cooperatives. To make comparisons with New Zealand, the price of milk was expressed per kg of milk solids (milkfat plus protein).

For the financial analysis, total cash revenue from dairy farming was classified into two main groups; variable expenses (wages, pasture and supplements, fertiliser, breeding and herd testing, family dairy expenses, electricity, animal health, weed and pest and freight) and fixed expenses (interest, standing charges, repairs and maintenance, vehicle expenses and administration). These expenses were expressed per cow and per hectare.

Asset-liability and management analyses were conducted for dairy farms in New Zealand and Hokkaido. From these analyses, several standardised management

indexes were derived according to accounting practice of Central Union of Agricultural Co-operatives (1994) and Japan Livestock Industry Association (2000).

## RESULTS AND DISCUSSION

Fundamental dairy farming structure and production is shown in Table 1. There is a difference in milking herd size, even though the effective land area in New Zealand is only 14% larger than Hokkaido. A difference is seen in the feeding program and stocking rate. Dairy cows in Hokkaido are predominantly farmed under confined “cow shed” feeding conditions, which provide the opportunity to formulate a consistent high quality ration for the milking herd throughout the year. The main factor necessitating cow confinement is the winter weather in Hokkaido. The climate in Hokkaido is dry and moderate in the summer but very cold with snow in the winter, from the middle of October to April, crops cannot be grown in the field during the winter. Nonetheless, moderate temperatures in the summer are suited for growing crops and breeding animals. This climatic situation does not allow farmers to utilize their land for grazing, but it is used to produce cut forage for silage or hay. Therefore, it is not appropriate to compare the stocking rate in the two countries.

Yield of milk solids per cow in New Zealand is only 52% of that in Hokkaido. This occurs because New Zealand farmers adopt a low-cost pastoral grazing system that limits the cow's ability to express her genetic potential for milk production. In spite of the lower productivity per cow, productivity per hectare (kg MS/ha) of the farmland in New Zealand is 13% higher than that achieved in Hokkaido. This is a result of the effectiveness of land use in New Zealand using high stocking rates combined with climatic advantages that allow cows graze throughout the year. In

**TABLE 1:** Comparison of productivity between New Zealand<sup>1</sup> and Hokkaido<sup>2</sup> for the production season 1998-99

	New Zealand		Hokkaido	(A)/(B) X 100
	(A)	(B)	(B)	
Number surveyed	221	–	–	–
Maximum cows milked	227	92	247%	
Effective area, ha	89	78	114%	
– Grazing land, ha	89	12	742%	
Feeding programme <sup>3</sup>				
% ration				
– grazed pasture	95	8	–	
– cut forage	5	47	–	
– concentrate	trace	44	–	
Stocking rate, Lactating cows/ha	2.7	1.2	–	
Production per cow				
– milkfat, kg	160	293	55%	
– milksolids, kg	278	533	52%	
Production per hectare				
– milkfat, kg	407	345	118%	
– milksolids, kg	709	627	113%	
Production per farm				
– milkfat, kg	36,234	26,927	135%	
– milksolids, kg	63,138	48,953	129%	
Value of milk				
– milkfat, NZ\$/kg	6.1	26.8	23%	
– milksolids, NZ\$/kg	3.5	14.7	24%	

<sup>1</sup>Livestock Improvement (1999b).

<sup>2</sup>MAFF (1999a) including only herds with 80 cows and over.

<sup>3</sup>Data was derived from Ozawa (2000) for the feeding program in Hokkaido.

Note: 1NZ\$ was converted 65.8 Yen.

proportion, New Zealand farmers receive only 24% of Hokkaido the price received per kilogram of milk solids by Hokkaido farmer.

Table 2 shows the total dairy revenue, total dairy cash expenses and cash surplus from dairy farming in New Zealand and Hokkaido. New Zealand dairy farming total cash revenue is only 28% (\$238,320 vs. \$860,155) of Hokkaido revenue. However, there is a difference between the variable and fixed components. Variable expenses in New Zealand are 41% of total cash revenue, compared with 60% in Hokkaido. Fixed expenses are 38% total cash revenue in New Zealand, compared with 23% in Hokkaido. Feeding cost is the one of the main components of variable expenses. In New Zealand, feeding costs are 22% (\$51,316), composed with 35% (\$297,824) in Hokkaido. Finally, the cash surplus is 21% of gross revenue in New Zealand compared with 16% in Hokkaido. Thus, New Zealand farmers have a higher proportional cash surplus than Hokkaido farmers, even though New Zealand farmers generate a small total cash revenue than Hokkaido farmers.

**TABLE 2:** Total dairy cash revenue, total dairy cash expenses and cash surplus from dairy farming in New Zealand<sup>1</sup> and Hokkaido<sup>2</sup>.

	New Zealand		Hokkaido	
	NZ\$	Proportion	NZ\$	Proportion
Total dairy cash revenue is comprised of:	\$238,320	100.0%	\$860,155	100.0%
Total variable expenses	\$97,527	40.9%	\$519,372	60.4%
Total fixed expenses	\$89,833	37.7%	\$201,166	23.4%
Cash surplus from dairy farming	\$50,960	21.4%	\$139,617	16.2%

<sup>1</sup>Livestock Improvement (1999b).

<sup>2</sup>MAFF(1999a) including only herds with 80 cows and over.

Note: Inflation adjusted to June 1999. 1NZ\$ was converted 65.8 Yen.

Total dairy cash revenue in New Zealand include the production cost of hay, crops and silage for retailing off the farm.

Table 3 shows the cost of producing milk in New Zealand and Hokkaido. Actual farm cash expenses are dramatically different between New Zealand and Hokkaido with the main differences in wages, supplementary feed and interest. On a “per cow” basis, total farm expenses in New Zealand are only 13% of those in Hokkaido. The cost of wages are much higher and a supplementary feed are much lower in New Zealand than in Hokkaido. It is common to hire farm staff for milking in New Zealand even though the farm is owner-operated. However, milking is done by family labour in Hokkaido, so that it is not common to employ people for this fundamental job. Hiring labour for family-operated dairy farm in Hokkaido is limited to part-time employment for pasture or silage harvesting. When expenses are analysed on a “per hectare” basis, New Zealand costs are 29% of those in Hokkaido, and the main differences between two countries are still in wages and supplementary feed and interest.

Over 60% of the costs were attributable to feed, interest charges and wages in New Zealand. In Hokkaido, the feed costs accounts for 73% of the total cost. Moreover, the interest cost per hectare in New Zealand is almost the same as that in Hokkaido. Yet, the proportion of total expenditure for interest in New Zealand is 25%, compared with 8% in Hokkaido. It should be noted that the interest cost in Hokkaido includes an allowance for equity interest. This is not an actual payment by the farmer but rather an estimate

**TABLE 3:** Dairy farming costs in New Zealand<sup>1</sup> and Hokkaido<sup>2</sup> for the production season 1998-99.

	New Zealand		Hokkaido		[A]/[B]
	[A]	Proportion	[B]	proportion	%
Maximum Cows Milked	227		92		
Effective Area (ha)	89		78		
Farm Cash Expenses	\$188,063	100%	\$564,452	100%	33%
Wages	\$18,940 <sup>a</sup>	10%	\$9,187 <sup>a</sup>	2%	206%
Electricity	\$4,814	3%	\$15,619 <sup>b</sup>	3%	31%
Supplement feed	\$52,799	28%	\$298,149	53%	18%
Grazing and mowing	–	–	\$110,396	20%	–
Interest <sup>c</sup>	\$46,095	25%	\$43,279	8%	107%
Standing charges	\$16,641	9%	\$32,818 <sup>d</sup>	6%	51%
Others	\$48,774	26%	\$55,004	10%	89%
Total Farm Expenses per Cow	\$828		\$6,142		13%
Wages	\$83 <sup>a</sup>		\$100 <sup>a</sup>		83%
Electricity	\$21		\$170 <sup>b</sup>		12%
Supplement feed	\$233		\$3,241		7%
Grazing and mowing	–		\$1,200		–
Interest <sup>c</sup>	\$203		\$470		43%
Standing charges	\$73		\$357 <sup>d</sup>		21%
Total Expenses per kg of MS	\$3.0		\$11.5		26%
Total Expenses per Hectare	\$2,113		\$7,230		29%
Wages	\$213 <sup>a</sup>		\$118 <sup>a</sup>		181%
Electricity	\$54		\$200 <sup>b</sup>		27%
Supplement feed	\$593		\$3,822		16%
Grazing and mowing	–		\$1,415		–
Interest <sup>c</sup>	\$518		\$555		93%
Standing charges	\$187		\$421 <sup>d</sup>		44%

<sup>1</sup>Livestock Improvement (1999b).

<sup>2</sup>MAFF(1999a) including only herds with 80 cows and over.

<sup>a</sup>Employed labour cost.

<sup>d</sup>Rent charge + goods and services tax + public obligations + land rent.

Note: 1NZ\$ was converted 65.8 Yen.

“Supplement feed” is the sum of pasture and supplement, fertilizer and weed and pest cost in New Zealand.

of the earnings forgone on money invested in farm ownership. The amount of this charge cannot be identified, however removing it would increase the difference between New Zealand and Hokkaido values. There are two main reasons that the interest cost is larger in New Zealand than Hokkaido. Firstly, New Zealand dairy farmers obtain finance from the open market by contracting funds from any banking organisation. In contrast to Japan, low-interest financial credit, subsidised by the government is not available in New Zealand. Secondly, farmland prices are gradually increasing over time in New Zealand. This means that over time, more money must be borrowed to finance farm ownership and, hence, there is a greater amount of interest paid. In contrast, the Japanese Farmland Act regulates farmland purchase and sale, by allowing farmers to purchase only farmland that is for sale. Thus, there is no open market for farmland and the sale of unwanted farmland results in a decrease in farmland price. Because of the low price of rice, there has been considerable retirement of farmland tracts. Thus, capital gain from farmland is no longer expected in Japan.

A management analysis of dairy farming in New Zealand and Hokkaido is shown in Table 4. According to the Central Union of Agricultural Co-operatives (1994), the gross assets return ratio should be above the deposit interest rate for the enterprise to be profitable. The current deposit rate is about 6% per annum for a six-month period (“six month deposit rates”, Reserve Bank of New Zealand,

January, 2001), and about 0.2% per annum in Japan. New Zealand shows a low gross assets return ratio while Hokkaido shows a superior ratio. The gross-assets- return-ratio is strongly related to the turnover ratio of gross assets. If the gross assets of the enterprise are turned over frequently, the gross assets return ratio rises and this feeds back into the gross assets return ratio. The two turnover ratios are recommended to be over 150% (Central Union of Agricultural Co-operatives, 1994). The turnover ratios for these indexes in 12 prefectures in Japan range from 100% to 200%. However, the turnover ratio of gross assets remains below 100% in both countries. This indicates a poor utilisation of gross assets in dairy farming. The turnover ratio of livestock assets was nearer to the acceptable level for New Zealand, while Hokkaido farmers were higher than the desired level. By adopting a seasonal breeding system, which allows milk production only in certain seasons, New Zealand makes poorer utilisation of the milking cow asset. Some dairy farmers in New Zealand are trying to extend the lactation period by feeding supplements to allow the cow’s potential to be expressed more fully. This will have the effect of increasing the ratio of livestock assets. Although extending the lactation period increase milk production, the value of the extra milk must be greater than the costs of feeding extra supplements. The motivation for extending the lactation period by dairy farmers in New Zealand remains as a matter to be discussed further.

**TABLE 4:** Management analysis of dairy farming New Zealand<sup>1</sup> and Hokkaido<sup>2</sup> for the season 1998-99.

	New Zealand	Hokkaido	Desired Level (Range in Japan)
Gross income per cow (NZ\$)	1,070	10,981	
Expenditure per cow (NZ\$)	828	9,323	
Net income per cow (NZ\$)	241	1,659	
Income per cow <sup>3</sup> (NZ\$)	469	3,359	
Dairy produce income/gross farm income	98%	98%	
Net income/gross income	23%	15%	
Gross assets return ratio <sup>4</sup>	3%	14%	Over the deposit interest rate
Owner's equity return ratio <sup>5</sup>	5%	17%	
Turnover ratio of gross assets <sup>6</sup>	15%	67%	Over 150% (100-200%)
Turnover ratio of livestock asset <sup>7</sup>	115%	206%	Over 150% (100-200%)

<sup>1</sup>Livestock Improvement (1999b).

<sup>2</sup>MAFF(1999a) including only herds with 80 cows and over.

<sup>3</sup>In New Zealand, income per cow was calculated as net income + total farm manager wage. In Japan, income per cow was calculated as net income + family wage.

<sup>4</sup>Gross assets return ratio = net income / total assets.

<sup>5</sup>Owner's equity return ratio = net income / owner's equity.

<sup>6</sup>Turnover ratio of gross assets = total farm revenue / total assets.

<sup>7</sup>Turnover ratio of livestock assets = total farm revenue / livestock assets.

Notes: Exchange rate for 98/99 1NZ\$=65.8 Yen.

The readings in parenthesis are the range of readings in 12 prefectures in Japan.

## CONCLUSIONS

Considering the above, three major conclusions can be noted.

- 1) Production of milk solids per hectare in New Zealand is higher than in Hokkaido because New Zealand has a low cost production of milk based on a seasonal grazing system. This achievement is far beyond the level of performance even by the largest herd in Hokkaido.
- 2) Farmland utilisation in New Zealand is less intensive than that in Hokkaido. This is caused by farmland in New Zealand being mainly used for grazing, not for silage or haymaking as it is in Hokkaido. A poorer utilisation of farmland will always be the destiny of pasture grazing in economic terms. This statement is supported by the difference of the gross assets return ratio and turnover ratio of gross assets between the two countries.
- 3) In Hokkaido, there has been animated discussion suggesting that New Zealand-style grazing systems should be adopted by dairy farmers to reduce the costs. However, Hokkaido dairy farmers must recognise that there are differences in climate and topographic conditions in transferring New Zealand technology. Finally, it is important for dairy farmers in Hokkaido to be aware that grazing systems result in poor capital utilisation, especially when grazing is typically limited to just 6 months in Hokkaido.

## REFERENCES

- Central Union of Agricultural Co-operatives. 1994: Livestock Management Diagnosis (in Japanese). Tsukuba Shobou, Tokyo, Japan. Pp.68-76.
- Deane, T.H. 1993: The relationship between milkfat production and economic farm surplus on New Zealand Dairy farms. *Proceedings of the New Zealand Society of Animal Production* 53: 51-53.
- Holmes, C.W.; Wilson G.F. 1987: Milk production from pasture. Butterworths of New Zealand, Wellington, New Zealand.
- Holmes, C.W. 2000: Profitable milk at the commodity price (\$3.00Kg/milksolids). *Dairyfarming annual Massey University* 52: 109-132

Japan Livestock Industry Association. 2000: Livestock accounting for management diagnosis and standard system for management analysis (in Japanese). Japan Livestock Industry Association, Tokyo, Japan. Pp.35-145,

Livestock Improvement. 1999a: Dairy statistics 1998-1999. Livestock Improvement Corporation Ltd, Hamilton, New Zealand.

Livestock Improvement. 1999b: Economic survey of factory supply dairy farmers 1998-1999. Livestock Improvement Corporation Ltd, Hamilton, New Zealand.

MAFF.1998: Statistical Research on the Farm Economy by Type of Farming 1998. Tokyo, Japan.

MAFF1999a: Production Costs of Milk Farm Economy Survey 1999. Tokyo, Japan.

MAFF1999b: Milk and Milk Products Statistics 1999. Tokyo, Japan.

Makino, T.; Murakami, R. 1956: Primary Industry in New Zealand (in Japanese). Kouyou Shoin, Tokyo, Japan.Pp.73-100,

Murata, T. 1989: Low cost structure of New Zealand Dairy farming (in Japanese). *Proceeding of the 1989 annual conference of The Farm management Society of Japan (Handed materials)*.

Ozawa, T. 2000: Fluctuation of Japanese Dairy Structure. PhD Thesis, Tokyo University of Agriculture and Technology.