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International
Farm Comparison
Network IFCN

Predicted Impact of Liberalisation on Dairy Farm Incomes in Germany, Vietnam, Thailand and New Zealand

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A Living from Livestock

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PREFACE

This is the 42nd of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Livestock is vital to the economies of many developing countries. For low income producers, livestock can serve as a vital source of food, store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock products in developing countries is growing rapidly.

The study applies a method of economic analysis developed by the International Farm Comparison Network (IFCN) which is based on the concept of 'typical farms'. Ten farm types were selected to represent typical farms in Germany, Thailand, Vietnam and New Zealand. Economic evaluations and comparisons are carried out both within and across countries in order to assess impacts of dairy policies on different farm types. In addition, the study compares the Producer Support Estimate (PSE) as provided by the OECD to producer support estimated using the Policy Analysis Matrix methodology.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author(s), PPLPI and the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization (FAO).

Disclaimer

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Keywords

Milk production, dairy policy, policy analysis matrix, farm economics, dairy competitiveness, dairy comparative advantage, social profitability, open markets.

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1. EXECUTIVE SUMMARY

Introduction

The world-wide trend, underpinned by WTO and bilateral Free Trade Agreements (FTAs), is towards trade liberalisation. As a consequence, like for other sectors of their economy, countries should contemplate bringing the level of competitiveness of their dairy sector to international standards sooner rather than later. Raising farm competitiveness, however, is very likely to be easier for countries whose farmers receive little or no farm support and are efficient dairy producers. In other words, the ability of the bulk dairy farmers to cope with a more liberal trade environment is closely related to their current dependency on public support.

With this in mind, the main purposes of this study were (1) to analyse the farm economics of typical farms in Germany, chosen as a high support country, Vietnam and Thailand, representing countries providing intermediate levels of support, and New Zealand (no support) under their current policy framework; (2) to estimate the levels of support captured by typical dairy farms in these countries; and (3) to assess the farm economics of milk production once the policy distortions are eliminated.

More accurate estimations of public support to dairy farmers and the sources of this support would assist in identifying potential opportunities for dairy improvement, particularly through policy action, and in assessing the vulnerability of different farms to direct competition in a more closely interconnected world market. To this end, this study explores a PAM-based alternative to the OECD 'Producer Support Estimate'.

Methodology

The methodology applied for the economic analysis was developed by the International Farm Comparison Network (IFCN) and utilises the concept of 'typical' farms. IFCN identifies dominant farm 'types' through regional dairy experts taking into consideration (a) agro-ecology and location, (b) farm size in terms of herd size and (c) the production systems that make important contributions to milk production in the selected region/ country. For this study, the IFCN database for 2004 was utilized and farms from Germany, Vietnam, Thailand and New Zealand were selected (3, 2, 2, and 3 farms respectively) for comparison. More information about these farms is available in the 2004 IFCN dairy report.

The Policy Analysis Matrix (PAM) approach was used to evaluate the competitiveness of the selected dairy farms under their current policy framework and under an open market scenario for each country. Lastly, the PAM approach served to cross-check the 'producer support estimate' as monitored by the OECD.

Results

Comparison of Dairy Farm Economics

Comparison of the economic results at farm level, using private prices, shows that the Thai and Vietnamese dairy farmers achieve very lucrative levels of 'entrepreneurial profit' while the German dairy farmers make considerable losses and the New Zealand dairy farmers manage to almost break even.

The comparatively favourable situation in Thailand and Vietnam is mainly due to both countries' focus on promoting local milk production through setting high farm output prices and encouraging the use of local resources for food production. Closer scrutiny reveals that, for example, the Vietnamese dairy farmers have 1.15 to 1.25 times the production costs incurred by New Zealand dairy farmers, while these higher costs are more than counterbalanced on the return side, where they receive milk, beef and heifer prices that are 1.13, 1.55 and 2.15 times those obtained by their New Zealand counterparts. As a result, the 'cost of milk production only', which takes into account non-milk returns, of Vietnamese farmers is about 10 percent lower than that of New Zealand dairy farmers.

Despite the high profitability of Thai and Vietnamese dairy farms, their productivity levels are significantly lower than those achieved by dairy farmers in the other countries included in the study. Raising productivity may be discouraged by both the high profits these farmers are already making and the taxes on tradable inputs such as concentrate feeds, machinery, equipment, etc. (which are critical if productivity is to be improved). In contrast, for German and New Zealand farmers, finding feasible ways to raise productivity in order to increase farm-level profitability is by far more difficult.

For New Zealand dairy farmers, the entrepreneur's profits are slightly in the negative zone, with a tendency to worsen for larger farms. However, these farmers make a profit through the engagement of their cooperative further downstream in the dairy chain and abroad. This makes New Zealand dairy farmers very reliant on the world milk price. Therefore, for New Zealand the key question is: How well-positioned are New Zealand farmers to capitalize on rising world milk prices expected to result from the removal of market distortions?

Policy Analysis: PAM Methods and Results

Under the current national policy frameworks governing the dairy sectors, the farms studied can be grouped into: (1) high profit farms, in Thailand and Vietnam, (2) break-even farms, in New Zealand, and (3) high loss farms, represented by the German farms.

In order to arrive at these profitability levels, Germany, Vietnam and Thailand channel generous support to their dairy farmers. But exactly how much support reaches a typical dairy farm in these countries is difficult to quantify. Results from this study using the PAM concept show that while German farms receive a net support of around 12 US$ / 100 kg ECM produced, the Thai and Vietnamese farms receive about 6 US$ / 100 kg ECM. Interestingly, German and Thai dairy farmers receive support through high output prices while being taxed for imported farm inputs whereas Vietnamese dairy farmers enjoy both high output prices (though lower levels than in Thailand) and low farm input prices (through subsidised loans and labour). In this analysis, New Zealand is assumed to have an undistorted dairy sector, which means that no support or taxation applies to milk production at the farm level.

One frequently asked question is what would happen if the policies favouring high profits in Thailand and Vietnam and keeping German farmers from making even bigger losses would be eliminated. This study estimates that in the absence of the existing policies dairy farming in these countries would be unprofitable. The levels of loss would range from 0 to –30 US$ / 100 kg ECM for the larger Vietnamese and smaller German farms, respectively, while Thai farmers would make a loss of about 2 US$ / 100 kg ECM. As expected, given the assumption of no policy distortion, New Zealand farmers would not experience major changes, except those stemming from an increasing demand for imported dairy products in countries where dairy farmers may leave the sector due to the loss of their farm support.

Producer Support Estimates (PSE): OECD versus PAM Approach

OECD reports a PSE level of 51 percent for the EU dairy sector, which is being interpreted by the media as 51 percent of the returns of German dairy farms coming from policy support. However, an alternative PAM – PSE concept applied in this study produces different results suggesting that the OECD PSE provides potentially misleading information as it does not deduct 'non-visible' policy effects that negatively impact the balance sheet of German dairy farmers. Applying the PAM concept to the PSE this study finds that when these 'non-visible' policy effects are taken into account, the OECD's PSEs are 2.0, 2.15 and 1.4 times as high as the PAM-PSEs for the three German farms. This means that German dairy farmers typically have PSEs between 23 and 37 percent instead of PSEs between 50 and 55 percent as calculated by the OECD.

Conclusions

1. Under current domestic policy frameworks:
   a. In countries where production resources are becoming increasingly scarce and global competition is pressing, dairy farms must increase efficiency of resource use and competitiveness. To achieve this, they need to increase 'biological productivity' and find economy of scale effects (increase herd size).
   b. Increasing herd size, usually seen as the best strategy to reduce production cost, seems to have a positive effect in Germany and Vietnam while in Thailand and New Zealand the result is negative. It seems that, under prevailing conditions, the optimal herd size in Germany, New Zealand, Thailand and Vietnam is in the order of 650, 250, 20, and 5 dairy cows respectively (see IFCN Dairy Report 2004). More research on this topic is needed.
2. Under conditions of a global liberalised market:
   a. Once the existing policy effects are eliminated, all of the study farms, except those in New Zealand, are unprofitable and therefore very vulnerable to competition. Their costs of milk production become too high, resulting in economic losses.
   b. Considerable opportunities to improve farm competitiveness through cost reduction remain in Thailand and Vietnam. Although high producer prices in and taxation of farm inputs required for intensification discourage the pursuit of cost efficiency, at the end of the day, farmers will be pressed to reduce production costs to maintain their income levels.
   c. The small Vietnamese and Thai dairy farms currently have a profit margin, which is likely to fuel further growth of their dairy sector. Such growth may occur through increases in productivity, farm number or farm size. However, in each case, dairy sector expansion in Vietnam and Thailand faces several obstacles. Due to financial constraints, Asia's smallholder dairy farmers are often unable to increase their herd size or improve their technology levels without support. They will continue to raise local breeds using labour intensive technology. It would appear to be justifiable, both on social and efficiency grounds to provide adequate support to them so that they can increase herd size, adopt higher yielding breeds and technology, and thereby improve productivity and economic efficiency.
   d. Their undistorted dairy market and export focus places New Zealand dairy farmers in a strong position to capitalize on expanding market opportunities in those countries in which dairy farmers would be heavily challenged by a new global trade environment. One may thus expect that dairy imports into Vietnam and Thailand would increase during the adjustment phase of their dairy sector to an open global market.

e. In the absence of distorting policies, systems which are currently socially unprofitable may become socially profitable due to rising world milk prices resulting from increasing demand.

2. INTRODUCTION

Efforts to stimulate global economic growth have a strong focus on agricultural policy, aiming at reducing market distortions and liberalization of trade through a reduction of trade restrictions, import tariffs, and export subsidies. Despite the Doha round's recent failure to achieve agreement among major stakeholders, it is expected that in the long run world trade will liberalize further and that liberalization will have a strong influence on national dairy policies intended to stabilize dairy farm incomes.

A major challenge to the WTO-led efforts stems from the combination of the Doha round's objective of stimulating world economic growth with a strong focus on developing countries' economies on the one hand, while a number of developed countries provide heavy levels of support to agriculture in general and the dairy sector in particular.

This paper attempts to provide some insights into how and to what extent trade liberalization will affect dairy farmers in countries with different levels of policy support by posing the following questions: (a) what is the current economic situation of dairy farmers in different regions of the world? (b) how is their economic situation likely to change under a scenario of market liberalization?, and (d) how accurately is producer support to dairy farmers actually measured and monitored?

The paper is divided into the following sections:

1. **Selection and description of dairy farms**: Typical dairy farms from Germany, Vietnam and Thailand, and New Zealand are analysed to represent farmers from heavy, moderate and low supported dairy sectors.
2. **Farm economic comparison**: The IFCN methodology is used to analyse the current economics and competitiveness levels of the selected farm types.
3. **Policy analyses**: The IFCN methods are enhanced with the Policy Analysis Matrix (PAM) to quantify overall producer support and to assess the economic situation the selected farm types will face under market liberalization.
4. **Monitoring the Producer Support Estimates (PSE)**: The PSE concept applied by the OECD is compared with the support estimated through the PAM analysis.
5. **A concluding section** closes the paper.

3. SELECTION AND DESCRIPTION OF DAIRY FARMS

3.1 Rationale for Farm Selection for Comparison

Dairy farmers around the world operate under very different policy frameworks, which support milk production either directly or indirectly and to very different degrees. This study attempts to cover the wide range of policy packages affecting dairy farmers, from heavy to practically no support.

Using the IFCN database, the following countries were selected:

1. Germany: representing the EU countries providing strong support to their dairy industry, also being the biggest exporting block. Here the dairy sector is mature.
2. Vietnam and Thailand: representing main importer countries, where consumption and support for domestic production are increasing very rapidly. Here the dairy industry is young and rapidly expanding. Therefore, there is a strong need to identify those policies which will enable these countries to develop competitive, sustainable dairy sectors.
3. New Zealand: representing a dairy sector with no distortions. Here the dairy industry is mature, but aims at expanding along with the strong world demand for dairy products.

For more on the differences in dairy policy between these countries, see Annex 4: PAM Methodology.

3.2 Description of the Selected 'Typical Farms'

Germany

35-Cow farm (DE-35)

Location: Household farm located in the southern German state of Bavaria.

Activities: The farm keeps 35 Holstein Friesian cows and feeds home-grown crops (corn silage, grass silage, pastures, hay, winter wheat, etc.) and bought-in high-protein concentrates (balanced dairy feed, milk replacer, soya). Lactating cows are supplemented with a mineral mix. The milk used on the farm accounts for 7.5 percent of the total milk production. The farm receives incomes from dairy, forestry products and the sale of some surplus of crops.

80-Cow farm (DE-80)

Location: Household farm located in the northern German state of Schleswig-Holstein.

Activities: The farm keeps 80 Holstein Friesian cows and feeds home-grown crops (corn silage, grass silage, pastures, hay, winter rye, etc.) and bought-in high-protein concentrates (balanced dairy feed, cereals, soya, canola). Lactating cows are supplemented with a mineral mix. The milk used on the farm represents 2 percent of the total milk production. The farm obtains income from dairy, crops and fattened steers.

650-Cow farm (DE-650)

Location: Company farm located in the central-eastern German state of Sachsen-Anhalt.

Activities: The farm keeps 650 Holstein Friesian cows and feeds home-grown crops (corn silage, grass silage, pastures, winter wheat, rye and barley) and bought-in high-protein concentrates (balanced dairy feed and milk substitute). Lactating cows are supplemented with a mineral mix. The milk used on the farm represents a low 0.3 percent of total milk production. The farm earns income from dairy, crops and renting out barns and other facilities.

Vietnam

2-Cow farm (VN-2)

Location: Household located in a rural area near Hanoi renting 0.50 ha of government land.

Activities: The farm keeps 2 crossbred cows and feeds crop residues and high-protein concentrates. Lactating cows are supplemented with a mineral mixture. The family consumes 8 percent of the milk produced, the surplus is sold to the local milk collection centre. The farmer raises his own heifers as replacements. The main source of income is own-farm employment (dairy and cash crops).

4-Cow farm (VN-4)

Location: Household located in the rural area near Hanoi renting 0.47 ha of government land.

Activities: The farm keeps 4 crossbred cows and delivers 93 percent of the milk produced to the nearest milk collection point. The feed bases are crop residues and high-protein concentrates. Lactating cows are supplemented with a mineral mix. The farm raises its own replacement heifers. For this family, dairy farming and off-farm employment are the only sources of income.

Thailand

14-Cow farm (TH-14)

Location: Farm located in rural area near Chiang Mai with 2.1 ha of own land.

Activities: The farm keeps 14 crossbred cows and delivers 100 percent of its marketable milk to the local dairy co-operative. Lactating cows are supplemented with a mineral mix. The farm raises its own replacement heifers. Own-farm employment is practically the only source of income.

117-Cow farm (TH-117)

Location: Farm located in rural area near Chiang Mai with 3.0 ha of own land.

Activities: The farm keeps 117 crossbred cows and delivers 98 percent of its milk to the local dairy cooperative. The feed bases are crop residues and high-protein concentrates. Lactating cows are supplemented with a mineral mix. The farm raises its own replacement heifers. Sources of income are firstly dairy farming and secondly off-farm employment.

New Zealand

254-Cow farm (NZ-254)

Location: Household farm located in the Waikato region in the centre of North Island.

Activities: The farm keeps 254 Holstein Friesian cows and feeds home-grown forage (from pastureland and grass silage) and some bought-in high-protein concentrates (16 tons / year) and corn or grass silage or hay. The farmer pays a grazing fee for the young stock occasionally grazing on another farm. The milk used on the farm represents a low 2 percent of the total milk production. The farmer only derives income from the dairy enterprise.

447-Cow farm (NZ-447)

Location: Household farm located in the southern region of South Island.

Activities: The farm keeps 447 Holstein Friesian cows and feeds home-grown forage (from pastureland and grass silage) and some bought-in high-protein concentrates (8 tons / year) and corn or grass silage or hay. The farmer pays a grazing fee for the young stock occasionally grazing on another farm. The milk used on the farm represents a low 2 percent of the total milk production. The farm only obtains income from the dairy enterprise.

835-Cow farm (NZ-835)

Location: Partnership farm located in the central region of the South Island.

Activities: The farm keeps 835 Holstein Friesian cows and feeds home-grown forage (from pastureland and grass silage) and some bought-in high-protein concentrates (106 tons / year) and grass silage. The farmer pays a grazing fee for the young stock and wintering cows using land owned by another farmer. The milk used on the farm represents a low 2 percent of the total milk production. The farmer only derives income from the dairy enterprise.

Table 3.1 Description of the Selected 'Typical Farms'

Typical farm	DE-35	DE-80	DE-650		VN-2	VN-4
Region	Upper Bavaria / Bavaria	East Schleswig-Holstein	Floodplain of Elbe / Sachsen-Anhalt		Donganh / Hanoi	Donganh / Hanoi
Kind of Farm	Family Farm	Family Farm	GmbH (Ltd.)		Family Farm	Family Farm
No. of Cows	35	80	650		2	4
Farm description						
Total agricultural land [1] (ha)	32	80	1767		0.5	0.4
Land used for dairy enterprise [2] (% of total agr. land)	100%	87%	37%		93%	100%
Stocking rate [3] on total ha	1.09	1.00	0.37		3.97	9.26
Total labour input [4] (labour unit)	1.9	2.3	23.1		1.9	1.5
Family labour input (% of total labour)	100%	96%	0%		100%	100%
Other farm enterprises [5]	Forest	Cash crops, steers	Cash crops, barn for rent		Cash crops, heifer raising	None
Dairy specific data						
Milk yield (kg ECM [6] / cow)	6341	8003	8182		4083.2	3928
Milk production (t ECM [6])	222	640	5318		8	16
Replacement rate (%)	0.32	0.39	0.378		0.25	0.22
Age of first calving (months)	31	30	27		30	29

Typical farm	TH-14	TH-117		NZ-254	NZ-447	NZ-835
Region	Chiang Mai	Chiang Mai		Waikato	Southern South Island	Central South Island
Kind of Farm	Family Farm	Family Farm		Family Farm	Family Farm	Family Farm / equity partnership
No. of Cows	14	117		254	447	835
Farm description						
Total agricultural land [1] (ha)	2.1	3.0		106	160	270
Land used for dairy enterprise [2] (% of total agr. land)	100%	100%		100%	100%	100%
Stocking rate [3] on total ha	6.67	39.00		2.4	2.8	3.1
Total labour input [4] (labour unit)	2.3	12.7		2.3	4.3	6.8
Family labour input (% of total labour)	100%	18%		64%	33%	23%
Other farm enterprises [5]	Poultry and fruits	Sale of manure as fertilizer		None	None	None
Dairy specific data						
Milk yield (kg ECM [6] / cow)	3342	3155		4636	4670	4885
Milk production (t ECM [6])	47	369		1178	2087	4079
Replacement rate (%)	0.21	0.198		0.203	0.22	0.22
Age of first calving (months)	26	27		24	24	24

Legends:

1) without forest und other land
2) incl. setaside
3) No. of adult cows / total agricultural land
4) Hired and family labour input for the whole farm (1 unit = 2100 hours)
5) Other than crop and dairy
6) ECM = Energy corrected milk (4% fat, 3.3 % protein)

4. ECONOMIC FARM COMPARISONS

4.1 Whole Farm Comparison

Whole Farm Return Structure

All selected farms are specialized dairy farms receiving more than 60 percent of their total returns from the dairy enterprise.

Cash crops sold are wheat, barley and winter rape for DE-650, winter rye for DE-80, and maize for human consumption for VN-2.

The other farm activities providing returns are forestry (on DE-35), beef fattening (on DE-80), heifer raising (on VN-2), and producing mango fruits and poultry (on TH-14).

Whole Farm Capital Structure

The adjacent graph shows the share of liabilities in total assets, which ranges from 0 to 55 percent.

Three groups can be distinguished:

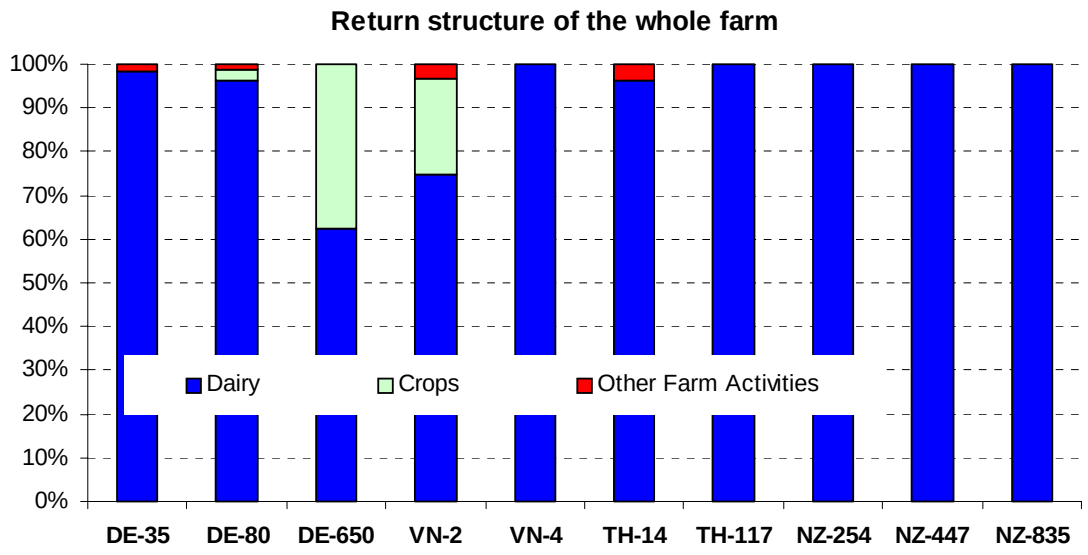
1. Farms with moderate liabilities (>30 percent of equity), namely the large German farm (DE-650) as well as the three New Zealand farms.
2. Farms with low liabilities (<20 percent of equity) represented by the two small German farms and the Vietnamese farms.
3. Farms without liabilities represented by the typical Thai farms.

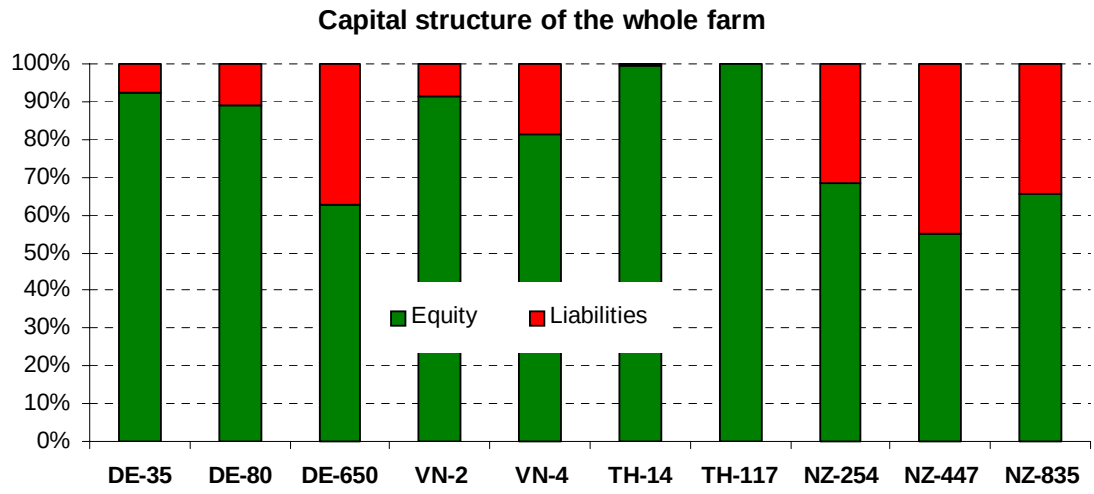
Whole Farm Profit Margin

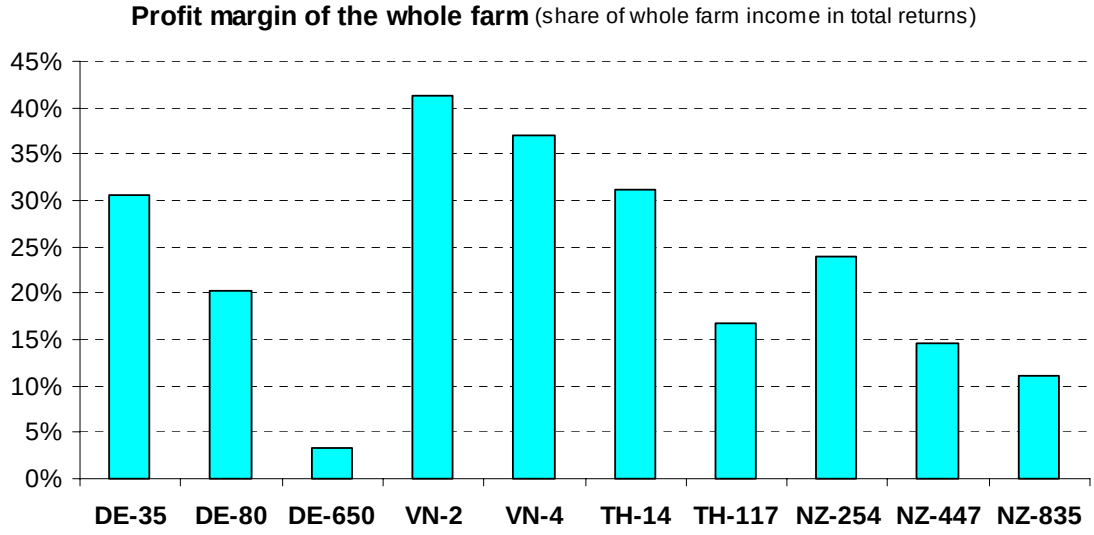
The profit margin ranges from a low 3 percent to a high of 40 percent. Except for the largest farm in Germany and New Zealand, all farms reach a profit margin of 15 percent or higher, which is excellent. For small family farms, this margin is generally high since they are usually managed without hired labour and have low liabilities.

Explanations of variables; year and sources of data:

- Farm codes: Example, DE-35 indicates a 35-cow farm in Germany; VN-2: a 2-cow farm in Vietnam; TH-14: 21- cow farm in Thailand; and NZ-254: a 254-cow farm in New Zealand.
- Profit margin: total farm income divided by total farm returns.
- For other methodological questions, refer to the Annexes 1 to 4 and the IFCN Dairy Report 2004.


Return structure of the whole farm
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Dairy
Crops
Other Farm Activities
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Capital structure of the whole farm
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Equity
Liabilities
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Profit margin of the whole farm (share of whole farm income in total returns)
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835

4.2 Dairy Farm/Enterprise Comparisons

Cost of Milk Production Only

Cost of milk production varies significantly from 35 to 53 US$ per 100 Kg ECM in Germany to 12 to 18 US$ per 100 Kg ECM in Vietnam and New Zealand, and between 20 and 25 US$ per 100 Kg ECM in Thailand.

Extreme cases are:

1. *DE-35 highest production costs*: driven by high opportunity costs for family labour, which represent 75 percent of all opportunity costs shown in this graph.
2. *VN-4 low production costs*: due to the sale of heifers and beef at high prices and sale of manure. (In the estimate of production costs for milk only, these non-milk (dairy) returns are subtracted from the total production costs of the dairy farm. For more see the IFCN methodology Annex 1 to 3.)

Vietnamese and New Zealand farms appear well positioned to produce milk and compete globally. Thai farmers seem to require minor adjustments to lower their production costs to the New Zealand level. German farmers, on the other hand, will need to make major changes to compete globally.

Return Structure

The returns between the farms range from 18 US$ per 100 kg ECM in New Zealand to about 40 US$ per 100 kg ECM in Germany. Differences in milk returns can largely be explained by differences in milk prices, which are 33 and 17 US$ per 100 kg ECM for NZ and Germany respectively. Regarding non-milk returns, beef and heifer prices are highest in Germany, but followed closely by those in Vietnam. Heifer prices in New Zealand are just slightly above half of those in Vietnam.

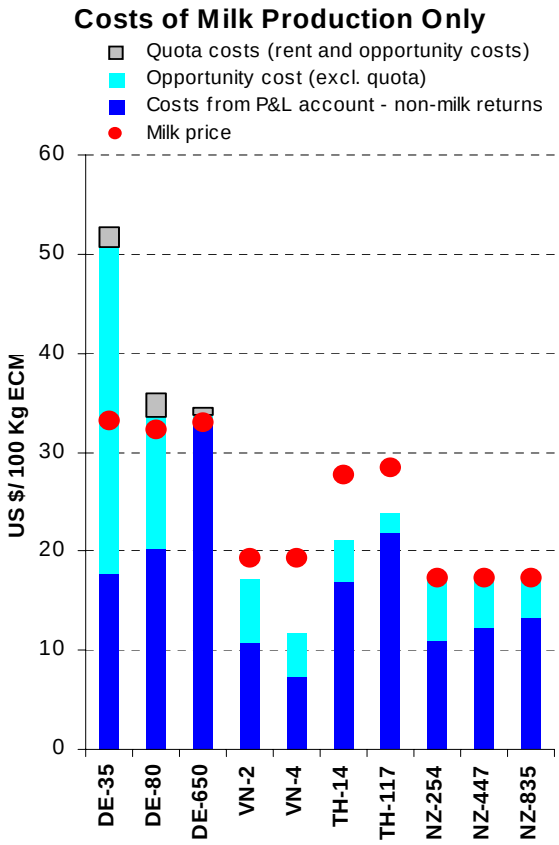
Cost Structure of the Dairy Enterprise

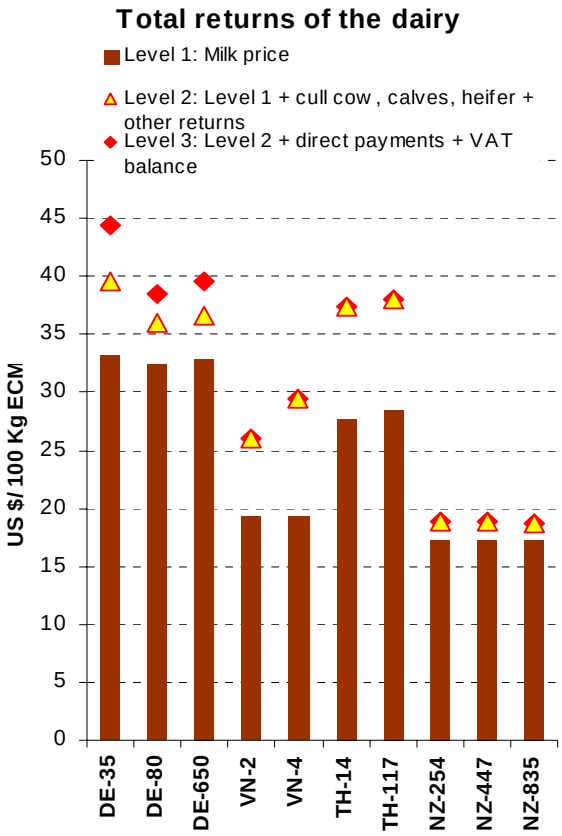
Costs structure of farms follows the trend of the returns. Note that labour costs are an important issue for German farms and the smaller Vietnamese farm.

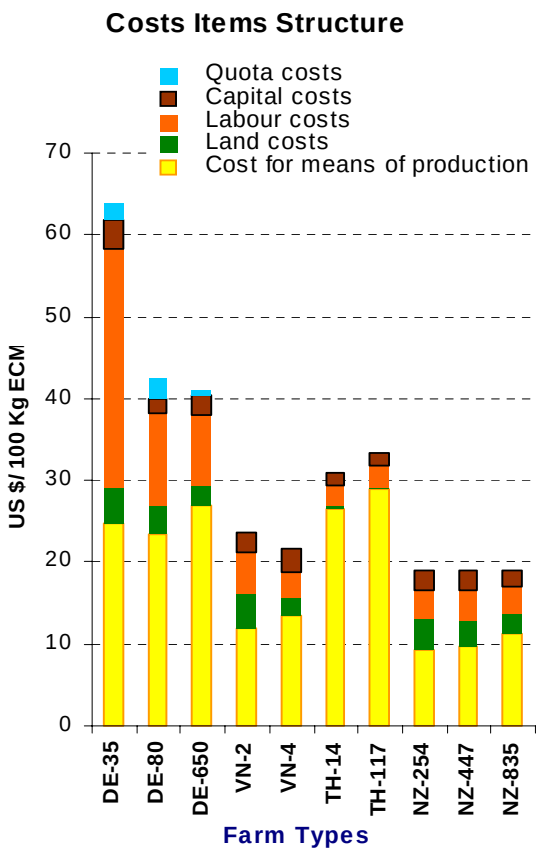
The highest cost item for all farm are the 'means of production', which includes cost of feed, machinery, buildings, veterinary and medicine, and others. Interestingly, although Thai farms exhibit the lowest labour costs, their costs for 'means of production' are not only the highest among all the farms analysed, but also there seems to be a negative economies of scale effect.

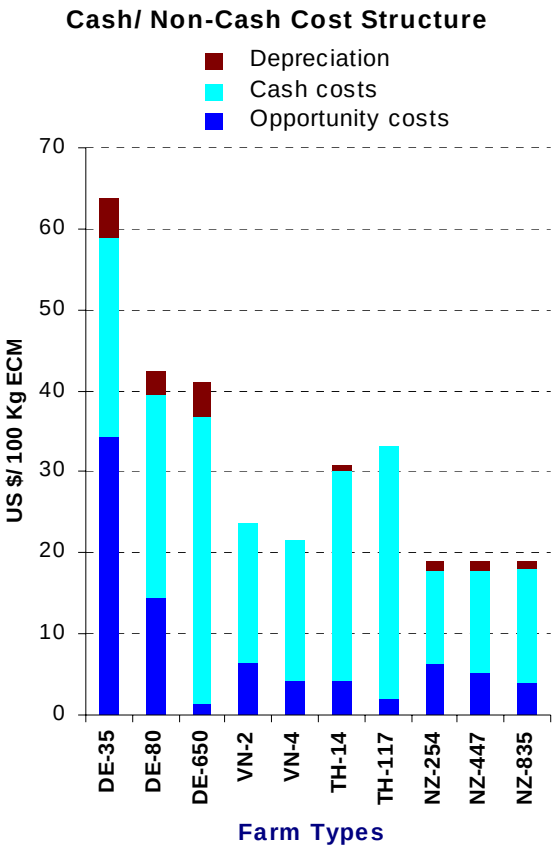
Explanations of variables; year and sources of data:

- Costs of milk production: See Annex 2.
- Return and costs structures: See Annex 3.


Costs of Milk Production Only
Quota costs (rent and opportunity costs)
Opportunity cost (excl. quota)
Costs from P&L account - non-milk returns
Milk price
US $/ 100 Kg ECM
0
10
20
30
40
50
60
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Total returns of the dairy
Level 1: Milk price
Level 2: Level 1 + cull cow , calves, heifer + other returns
Level 3: Level 2 + direct payments + VAT balance
US $/ 100 Kg ECM
0
5
10
15
20
25
30
35
40
45
50
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Costs Items Structure
Quota costs
Capital costs
Labour costs
Land costs
Cost for means of production
US $/ 100 Kg ECM
0
10
20
30
40
50
60
70
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types


Cash/ Non-Cash Cost Structure
Depreciation
Cash costs
Opportunity costs
US $/ 100 Kg ECM
0
10
20
30
40
50
60
70
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types

Dairy Farm Income

Dairy farm income refers to the income coming from the profit and loss account for the dairy enterprise of these farms only.

For the selected farms, the dairy farm income surpasses the 4 US$ per 100 kg ECM, with the exception of the large farm in Germany which makes a slight loss. In Germany, Vietnam and Thailand, the smallest farms achieve dairy farm incomes above 9 US$ per 100 kg ECM while the large farm in Thailand as well as all New Zealand farms achieve dairy farm incomes between 4 and 7 US$ per 100 kg ECM.

Dairy farm families generally use their dairy farm income to cover their living expenses and equity growth.

Dairy Profit Margin

All dairy enterprises, except in the large farm in Germany, achieve a dairy profit margin above 20 percent, which is excellent. Only the large farm in Germany has a negative profit margin.

Entrepreneurial Profit

The entrepreneurial profit indicates whether a farm is able to cover its full economic cost (including family labour, land, and capital) and shows whether a farming system is sustainable in the economic sense.

For the farms in this study, the entrepreneurial profit ranges from a –20 to + 8 US$ per 100 kg ECM produced. Only the farms in Vietnam and Thailand achieve a positive entrepreneurial profit; followed by New Zealand farms which make a small entrepreneurial loss while the farms in Germany make significant entrepreneurial losses.

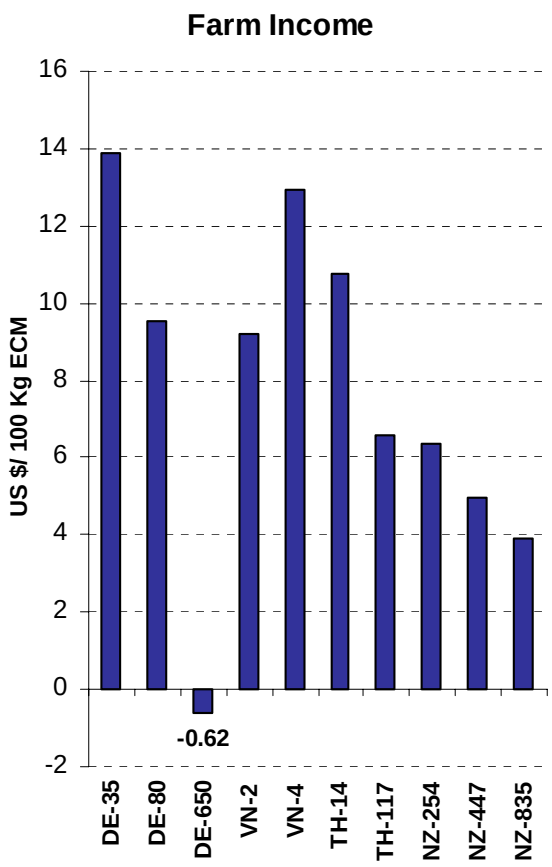
Return to Labour

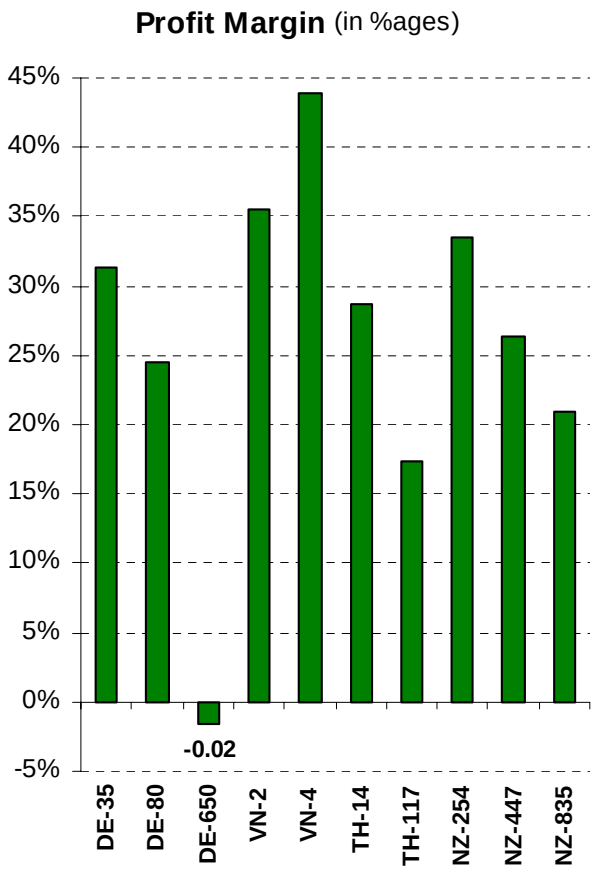
The return to labour varies tremendously across farms, from a high 11 US$ / hr in the German farms to a low 0.23 US$ / hr in its Vietnamese counterparts. Likewise, the local wages around the farms vary by a factor of 100 between 16 and to 0.16 US$/ hr.

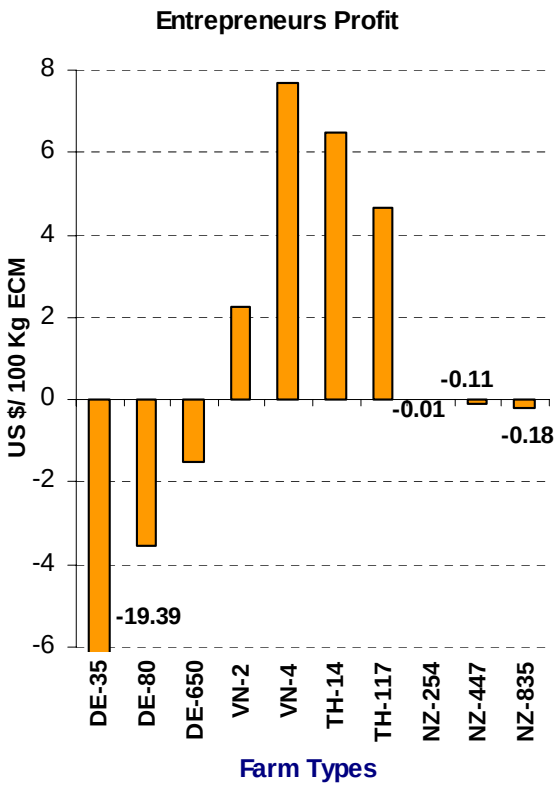
Considering these two parameters (dairy return to labour and local wages) together, the adjacent graph shows whether these dairy farms could compete in the local labour markets and cover their full economic costs. The German and New Zealand farmers achieve a return to their labour input equivalent to 70 to 100 percent of the local wages. However, when Vietnamese and Thai farmers invest one hour of their labour in their dairy farms, they earn 1.5 to 3.5 times the average wage paid nearby.

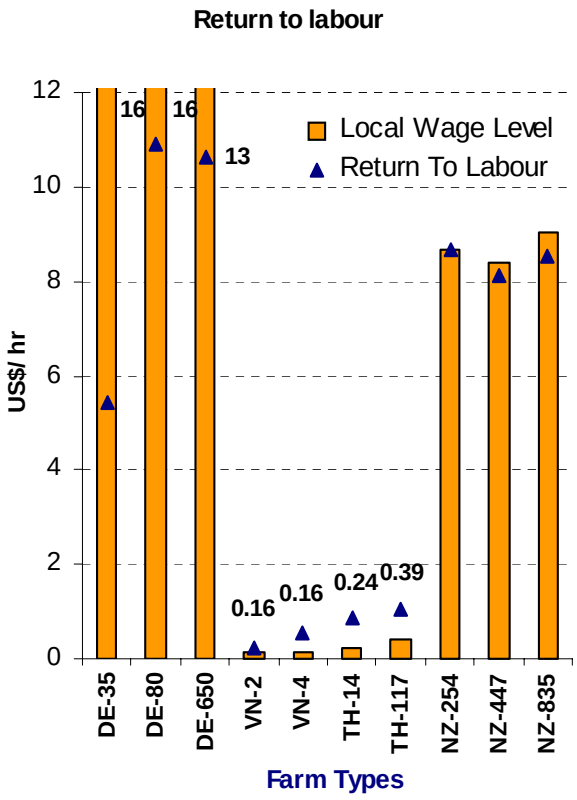
Explanations of variables; year and sources of data:

- IFCN methods: See Annex 1 to 3.
- Sources of Data: IFCN database, expert estimations, and statistics for the year 2003 and season 2002/2003 for New Zealand.


Farm Income
US $/ 100 Kg ECM
16
14
12
10
8
6
4
2
0
-2
-0.62
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Profit Margin (in %ages)
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
-5%
-0.02
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Entrepreneurs Profit
US $/ 100 Kg ECM
8
6
4
2
0
-2
-4
-6
-19.39
-0.01
-0.11
-0.18
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types


Return to labour
US$/ hr
12
10
8
6
4
2
0
16
16
13
0.16
0.16
0.24
0.39
Local Wage Level
Return To Labour
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types

Labour Costs

Total labour costs range from 29 to 2.5 US$ per 100 kg ECM. A reference line at the 4 US$ would show that the German farms and the smaller Vietnamese farm have labour costs above it while the remaining farms have labour costs below 4 US$ per 100 kg ECM. The differences can mainly due to differences in wages and / or labour productivity.

Analysis of labour productivity shows that farms produce from a low of 3 to a high of 300 kg ECM per hour of labour input. This variation is due to the combination of low wages and poor access to capital to intensify production as is for example the case in Vietnam and Thailand on one side while on the other, in Germany and New Zealand, mechanization is combined with labour saving devices / practices and with economies of scale (which results in high output/ hr labour).

Dividing labour costs into paid wages and the opportunity cost of family labour, we see that family labour dominates, except for the larger farms and the middle farm in New Zealand.

Land Costs

Land costs vary from 4.5 to 0.06 US$ per 100 kg ECM. The difference can be explained by land rent values, land productivity, and land area used for dairying.

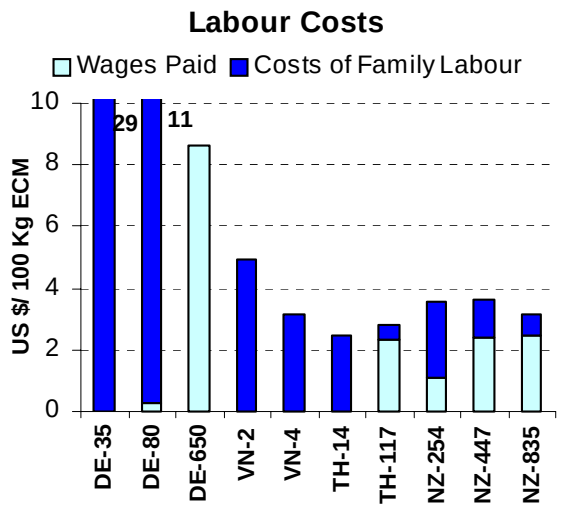
While the farms in Thailand and New Zealand do not have to pay land rents, but are owned by the family (expect for the small New Zealand farm), farmers in Vietnam and Germany usually rent land. In Vietnam, land is not privately owned.

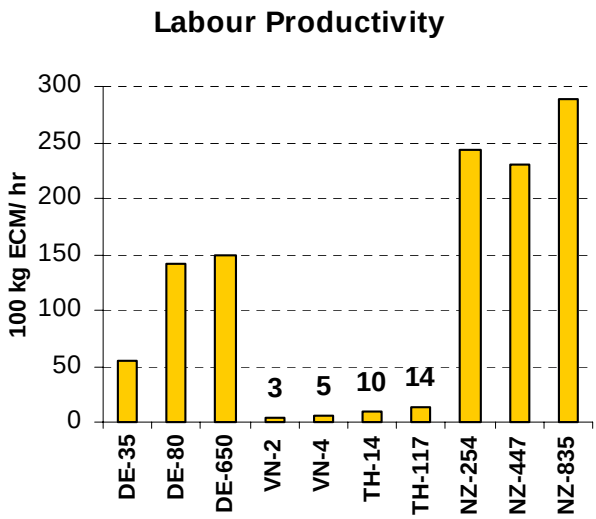
Capital Costs

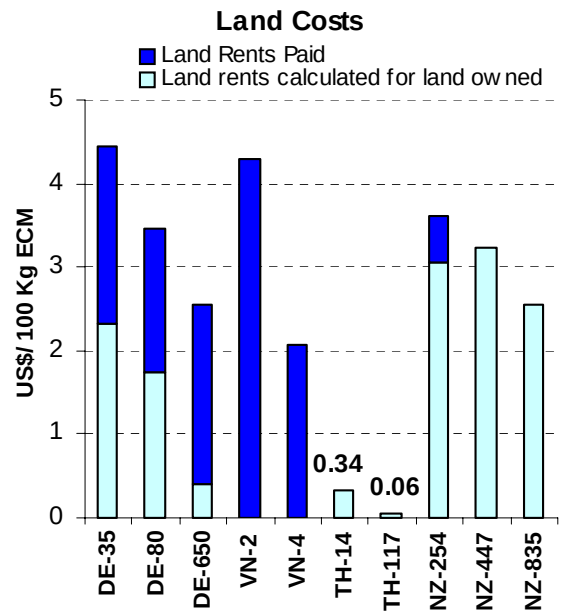
Capital costs are estimated to range from 1.5 to 3.5 US$ per 100 kg of ECM. The lowest capital costs are seen in Thailand while Vietnam and New Zealand appear to have the highest capital costs.

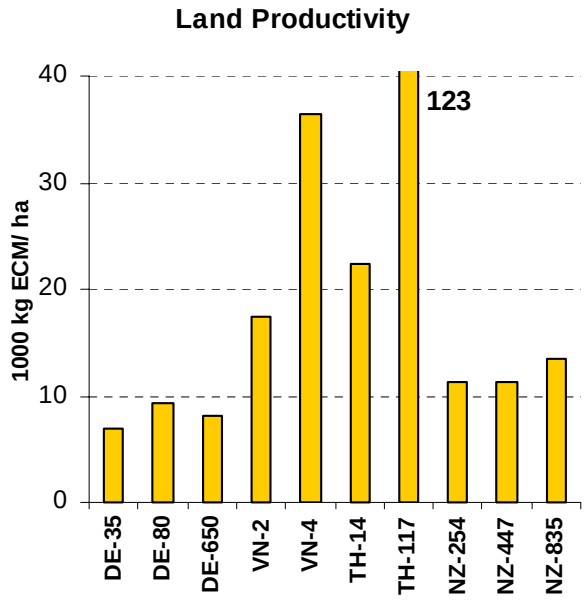
Explanations of variables; year and sources of data:

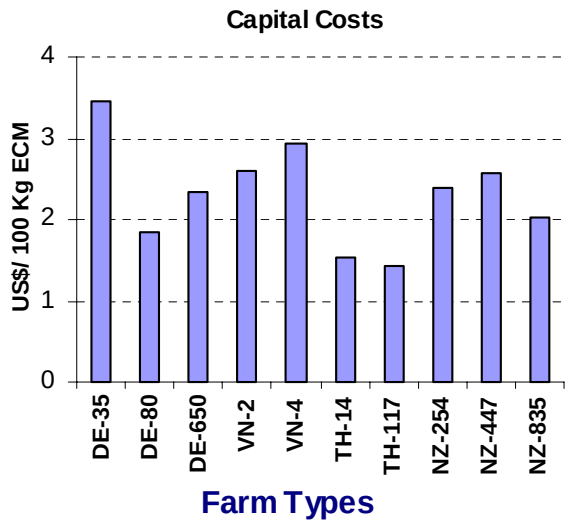
- IFCN methods: See Annex 1 to 3.
- Sources of Data: IFCN database, expert estimations, and statistics for the year 2003 and season 2002/2003 for New Zealand.

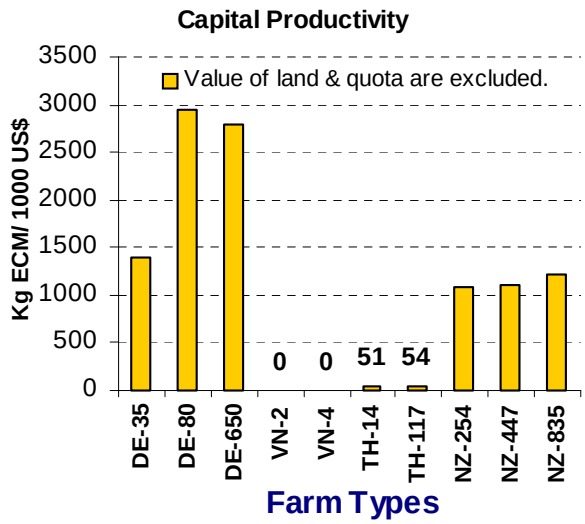

Labour Costs
Wages Paid
Costs of Family Labour
US $/ 100 Kg ECM
29
11
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Labour Productivity
100 kg ECM/ hr
3
5
10
14
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Land Costs
Land Rents Paid
Land rents calculated for land owned
US$/ 100 Kg ECM
0.34
0.06
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Land Productivity
1000 kg ECM/ ha
123
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Capital Costs
US$/ 100 Kg ECM
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types


Capital Productivity
Value of land & quota are excluded.
Kg ECM/ 1000 US$
0
0
51
54
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835
Farm Types

5. POLICY ANALYSIS OF THE DAIRY FARMS: PAM RESULTS

5.1 Competitiveness Analysis at Market Prices

Considering the cost of all family resources at market prices, the farms analysed can be grouped into those making a profit, those breaking even, and those making an economic loss.

Profitability German Dairy Farms

The German dairy farms enjoy the highest dairy returns at about 40 US$ / 100 kg ECM. These returns include high beef prices and generous direct payments. This high level of return, however, cannot fully cover the high production costs, which range from 41 to 64 US$ / 100 kg ECM. This leaves farmers with a loss of about 20 US$/ 100 kg ECM for the small farm and a loss of about 2 US$/ 100 kg ECM for the large farms. There are strong indications of economies of scale.

Profitability of Vietnamese Dairy Farms

The Vietnamese dairy farms achieve returns of 25 to 30 US$ / 100 kg ECM while their production costs are between 20 and 24 US$ for 100 kg ECM. Thus, these farmers make excellent profits ranging from 2 to 8 US$/ 100 kg ECM. High beef and heifer prices play a key role in determining these profitability levels.

Profitability of Thai Dairy Farms

As in Vietnam, milk production in Thailand is lucrative. Thai farmers achieve returns of over 37 US$ / 100 kg ECM while their production costs fall below 33 US$ per 100 kg ECM. Both farms analysed make profits of at least 5 US$ / 100 kg ECM. Again, high beef and heifer prices play a key role in these profitability levels.

Profitability of New Zealand Dairy Farms

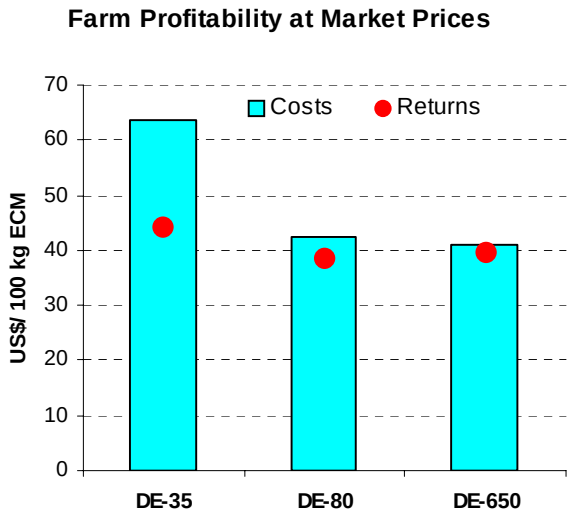
Dairy farmers in New Zealand are merely breaking even since their returns and costs of production are practically identical. The reasons for which these farmers keep dairy farming are numerous, but economically speaking their profits typically come from asset appreciation (land) and cooperative dividends paid at year end.

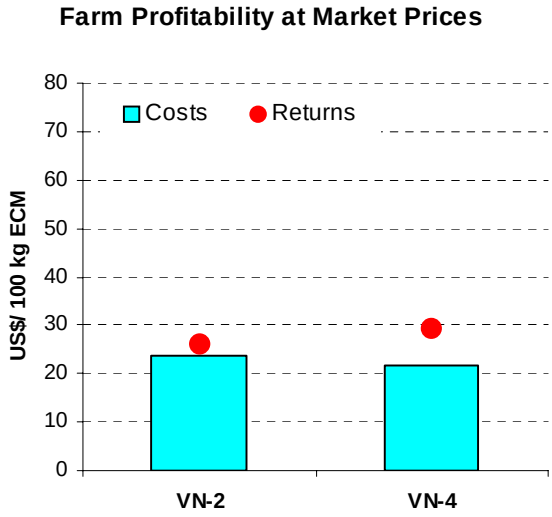
Cross-country Dairy Competitiveness

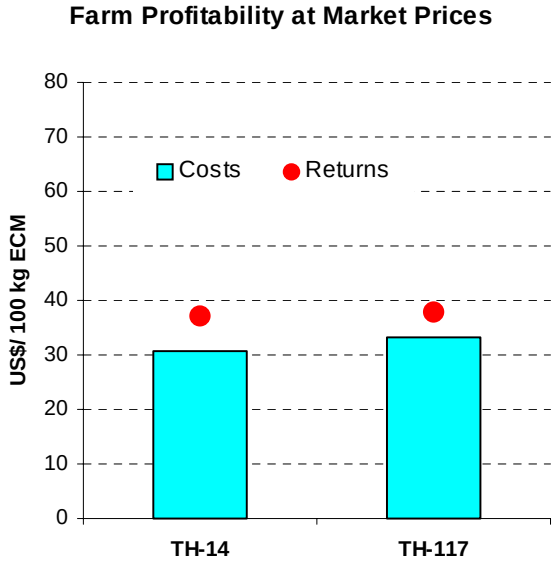
Based on the profitability of the dairy farms in this comparison, it seems that public policy and market conditions provide incentives for expanding milk production in Vietnam and Thailand, and to some extent in New Zealand, while in Germany, milk producers incur a significant economic loss and would need major adjustments to the industry.

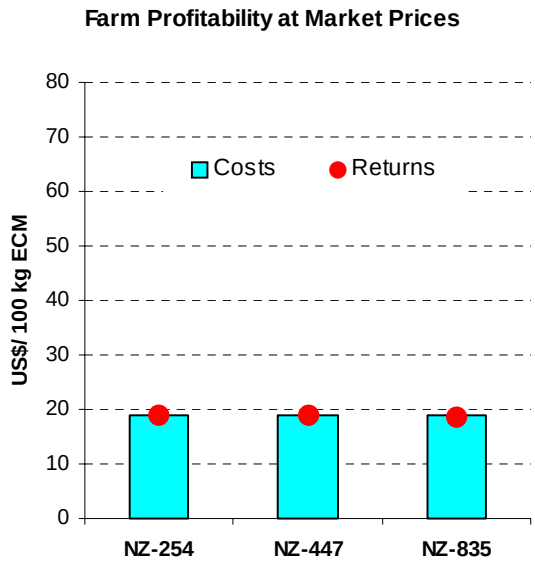
Explanations of variables; year and sources of data:

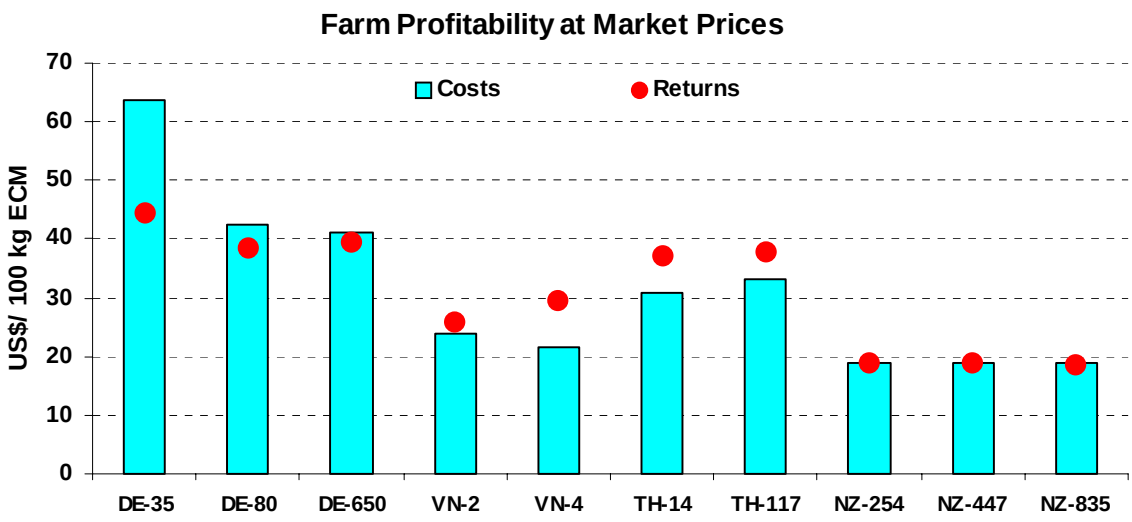
- PAM methods: See Annex 4 and 5.
- Sources of Data: IFCN database, expert estimations, and statistics for the year 2003 and season 2002/2003 for New Zealand.


Farm Profitability at Market Prices
Costs
Returns
US$/ 100 kg ECM
70
60
50
40
30
20
10
0
DE-35
DE-80
DE-650


Farm Profitability at Market Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
VN-2
VN-4


Farm Profitability at Market Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
TH-14
TH-117


Farm Profitability at Market Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
NZ-254
NZ-447
NZ-835


Farm Profitability at Market Prices
Costs
Returns
US$/ 100 kg ECM
70
60
50
40
30
20
10
0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835

5.2 Competitiveness Analysis at Social Prices

Market prices are frequently distorted by policy measures providing support or adding taxes. In this section, the main policies causing prices distortions are identified and these distortions are 'neutralised' so as to define the 'social price' of the inputs and outputs of the selected dairy farm types. (For more information, see Annex 4 and 5 and the references section.)

When price-distorting policies are accounted for, the profitability of all dairy farms in this comparison significantly diminishes, with the exception of the New Zealand farms.

Profitability of German Dairy Farms

With 'social prices', German farms still enjoy the highest dairy returns oft about 22 US$ / 100 kg ECM. This high level of returns, however, still falls short from covering their high production costs, which range from 35 to 56 US$ / 100 kg ECM. This would leave medium and large German dairy farmers with a loss of about 10 to 30 US$/ 100 kg ECM. Under social prices, there is little evidence of the apparent economies of scale effect seen under prevailing market conditions.

Profitability of Vietnamese Dairy Farms

Under 'social pricing', Vietnamese dairy farms would achieve returns of 23 US$ / 100 kg ECM while their production costs lie at about 24 US$ / 100 kg ECM. Overall, the Vietnamese society losses between 0 to 3 US$/ 100 kg ECM produced by VN-2. In the case of more productive, larger farms, the loss to the nation at social prices would be zero (VN-4's case).

Profitability of Thai Dairy Farms

Without distorted prices, Thai farmers would achieve returns of over 28 US$ / 100 kg ECM while their production costs would be expected to fall below 30 US$ / 100 kg ECM. At social prices, Thai farmers would thus make losses of less than 2 US$ / 100 kg ECM, which is lower than the estimate for Vietnam.

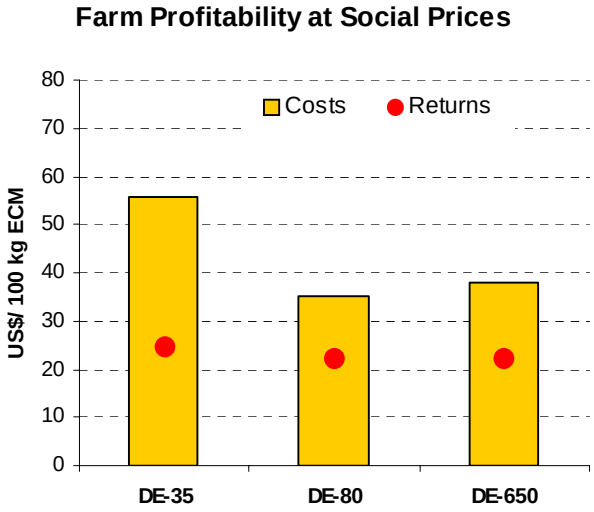
Profitability of New Zealand Dairy Farms

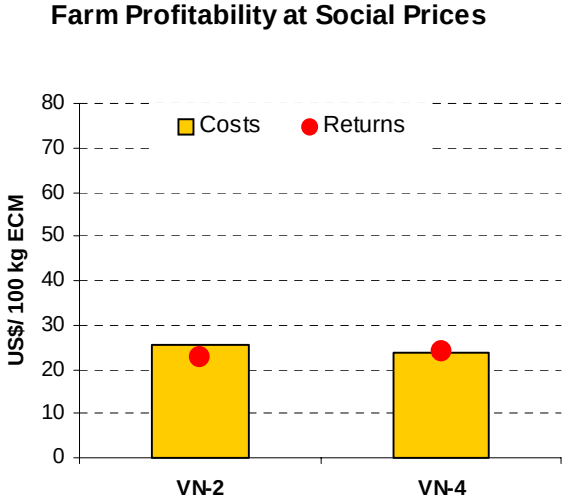
Dairy farms in New Zealand are assumed to be operating under undistorted market conditions, which in turn required no adjustment of market to social prices. Therefore, these farms continue to just break even as their returns to and costs of production are almost identical. Actual real profits come from asset appreciation (land) and cooperative dividends paid at year end.

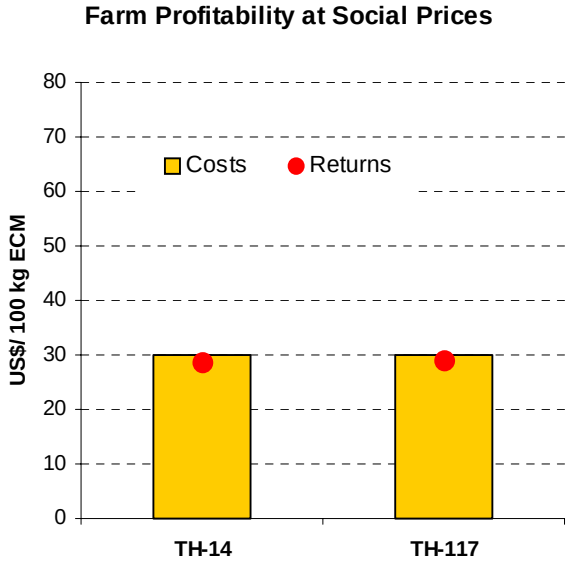
Cross-country Dairy Competitiveness

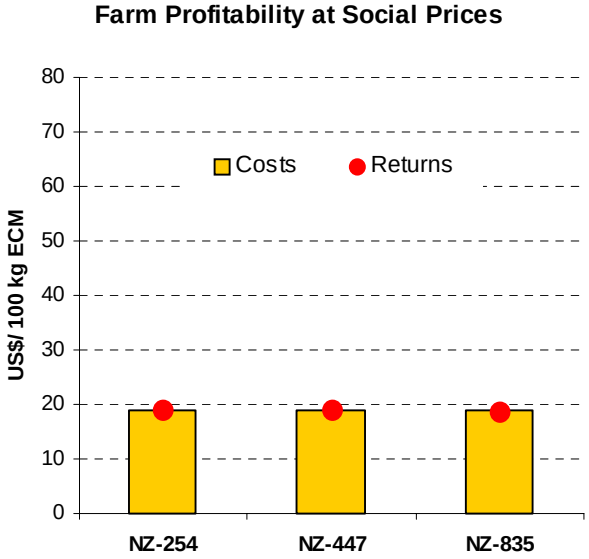
Based on the expected profitability of the selected dairy farm types under a non-distorting policy scenario, farms in Germany, Vietnam and Thailand are unprofitable while those in New Zealand just break even.

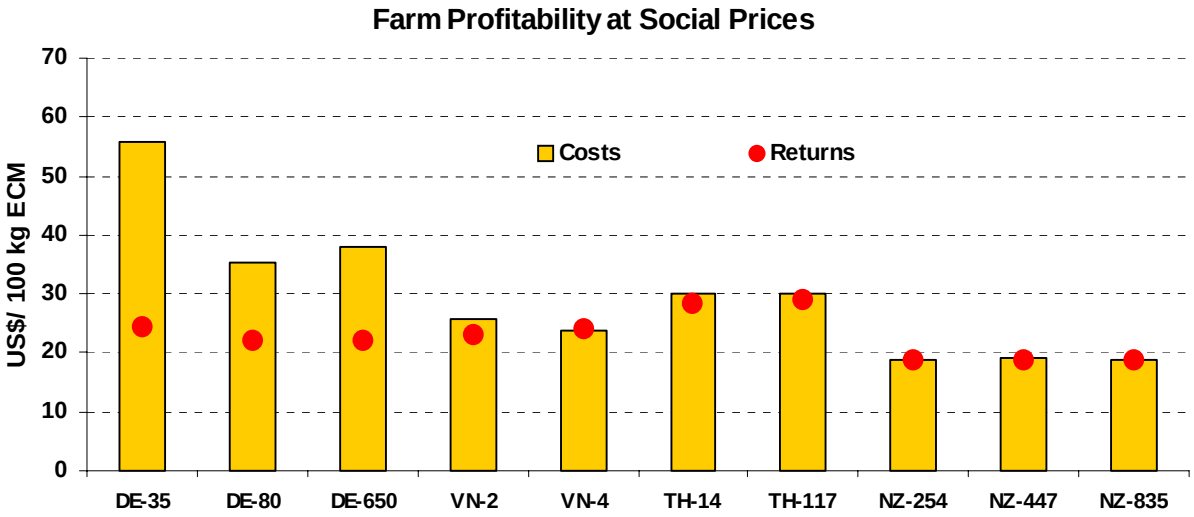
Eliminating existing policy distortions would seriously hurt German farmers while New Zealand farmers would not be affected. This analysis, however, ignores potential effects of having a truly liberalized world market on countries which are net exporters (New Zealand and Germany) and importers (Thailand and Vietnam).


Farm Profitability at Social Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
DE-35
DE-80
DE-650


Farm Profitability at Social Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
VN-2
VN-4


Farm Profitability at Social Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
TH-14
TH-117


Farm Profitability at Social Prices
Costs
Returns
US$/ 100 kg ECM
80
70
60
50
40
30
20
10
0
NZ-254
NZ-447
NZ-835


Farm Profitability at Social Prices
Costs
Returns
US$/ 100 kg ECM
70
60
50
40
30
20
10
0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835

5.3 Level of Support Captured by the Dairy Farms

Net Transfers Received per 100 kg ECM

Transfers to the dairy farms are mediated through price protection of the outputs in all three countries analysed. In practice this means that farmers receive a higher price for their milk, beef and live animals than they would in the case of a free world market. Three levels of transfers to dairy farms through output prices can be differentiated: between 15 and 20 US$ / 100 kg ECM in the case of Germany, between 5 and 10 US$/ 100 kg ECM in Vietnam and Thailand, and none in New Zealand.

On the other side, domestic policies tend to tax farm inputs, such as feed, machinery, drugs, animal genetic material, etc. This is the case for the German and Thai farmers. Interestingly, Vietnamese dairy farmers rely on few inputs which are both of domestic origin and under-priced, namely capital and labour. Therefore, farmers in Vietnam are the only ones who receive positive net transfers through both the outputs and inputs policies. Farmers in New Zealand are neither supported nor taxed for producing milk.

Origins of Transfers to the Dairy Farms

On a per 100 kg ECM basis, the study farms can be divided into three groups: (1) those receiving between 9 and 15 US$ / 100 kg ECM (German farmers); (2) those receiving between 4 and 8 US$ / 100 kg ECM (Thailand and Vietnam); and (3) those not receiving any transfers, the New Zealand farmers.

Net Transfers Received per Farm per Year

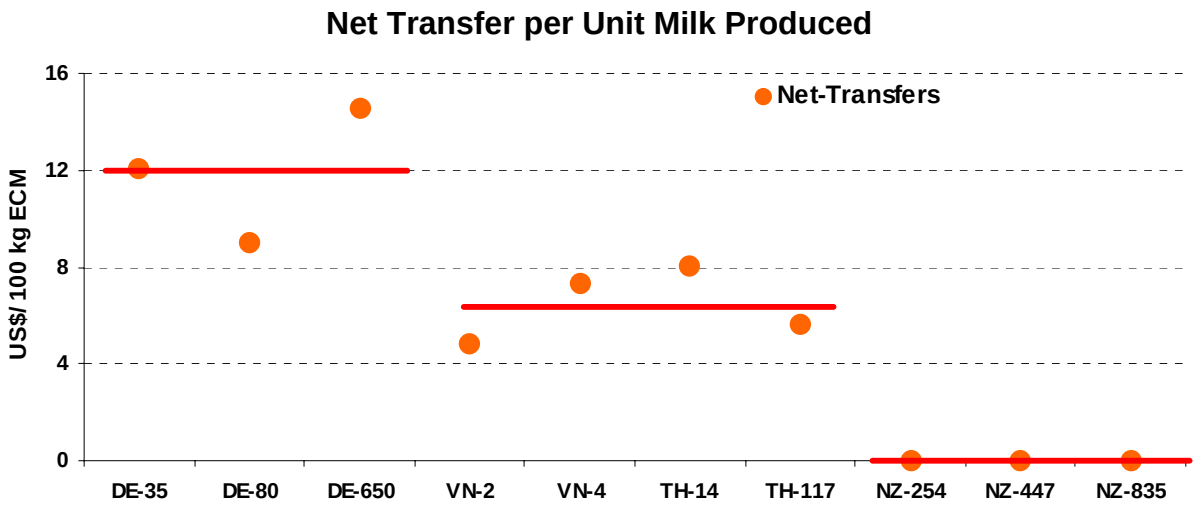
The German dairy farmers captured transfers ranging from 26,000 to 775,000 US$ per year. This is due to both a high transfer per unit ECM and relatively large farm output volumes.

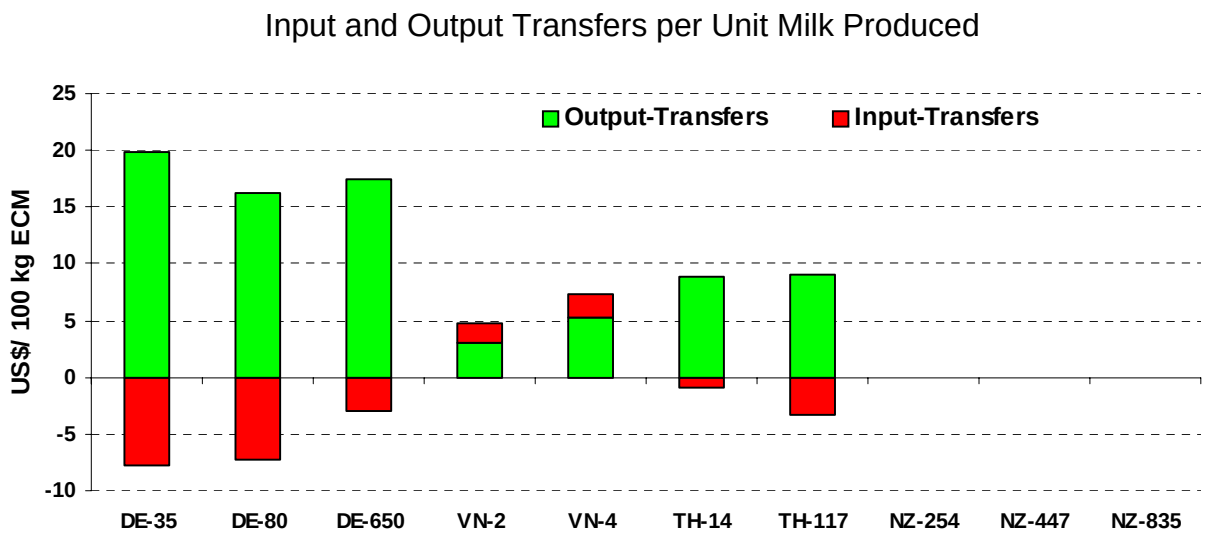
Although Vietnam and Thailand provide similar net-transfers per 100 kg ECM, their higher farm output volumes allow the Thai farmers capture 8 to 14 times the aggregate transfers secured by their Vietnamese counterparts.

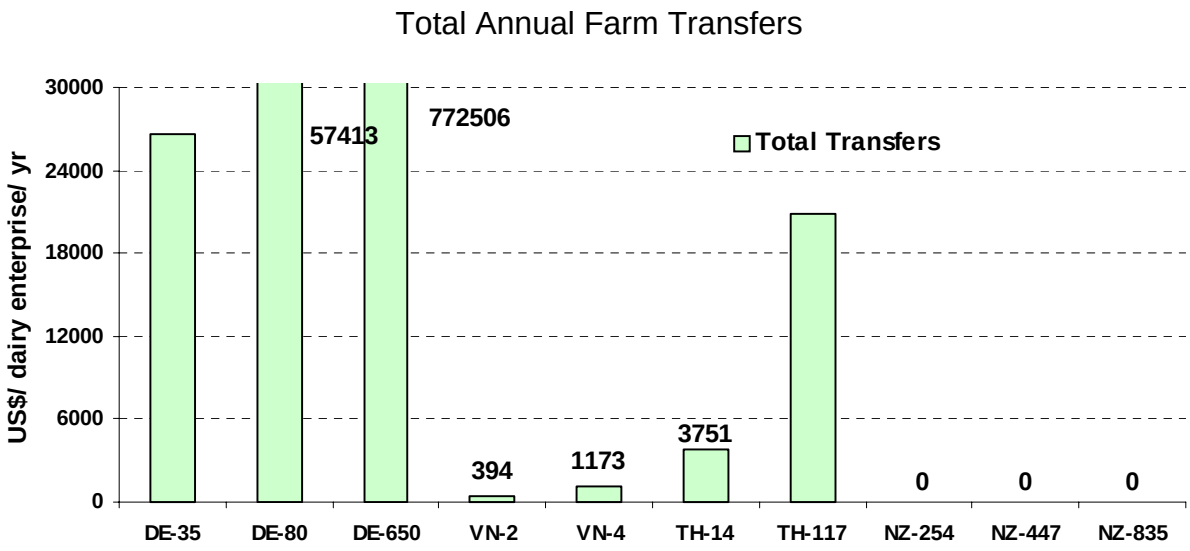
In conclusion, maximizing farm output volumes is a sound strategy to capture more net transfers.

Explanations of variables; year and sources of data:

- PAM methods: See Annex 4 and 5.
- Sources of Data: IFCN database, expert estimations, and statistics for the year 2003 and season 2002/2003 for New Zealand.


Net Transfer per Unit Milk Produced
Net-Transfers
US$/ 100 kg ECM
16
12
8
4
0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Input and Output Transfers per Unit Milk Produced
Output-Transfers
Input-Transfers
US$/ 100 kg ECM
25
20
15
10
5
0
-5
-10
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Total Annual Farm Transfers
Total Transfers
US$/ dairy enterprise/ yr
30000
24000
18000
12000
6000
0
57413
772506
394
1173
3751
0
0
0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835

5.4 Cross-country 'Comparative Advantage': PAM Analysis

In order to neutralize likely distortions in the monetary exchange rate policies in these four countries with respect to the US Dollar, the PAM offers several ratios (See Annex 4 on how these ratios are derived). The following key ratios are selected to assess the 'comparative advantage' of the farms studied:

Private Cost Ratio (PCR): The PCR is the ratio of the cost of domestic factors of production to the value-added at private prices. The value-added is the difference between the value of the outputs (returns) and the costs of tradable inputs. This value-added figure shows how much the farmer pay for the domestic factors of production and still break-even. For example, VN-2 generates a value-added of VND 259,820 per 100 kg milk while the value of domestic factors of production used per 100 kg milk in private prices is only 223,345. This results in a PCR of 0.86, which means that 14 percent of the value-added are profit. On the other hand, a PCR >1, as is the case for the German farms, means that after covering the cost of the tradable inputs, there are no returns left to cover the cost of domestic resources.

Domestic Resource Cost Ratio (DRC): The DRC is analogous to the PCR, however it is calculated at social prices (which are prices expected without the policy distortions). All the DRCs, except for VN-4, are above 1. Thus, with the exception of VN-4, all farms in this study operate at a 'social loss', which means that after covering the tradable inputs, farm returns are not sufficient to cover the full value of domestic factors at their social prices.

Nominal Protection Coefficients for Outputs and Inputs (NPCO and NPCI): The coefficients show that, except for New Zealand, dairy farms receive protection for their outputs (NPCO>1), while they are supported (NPCI<1) for some factors and taxed for some tradable inputs (NPCI>1), resulting in a net 'taxation' of inputs. In general, policy distortions and market conditions result in the private prices of outputs and inputs respectively being 10 to 80 percent and 7 to 40 percent higher than they would be otherwise.

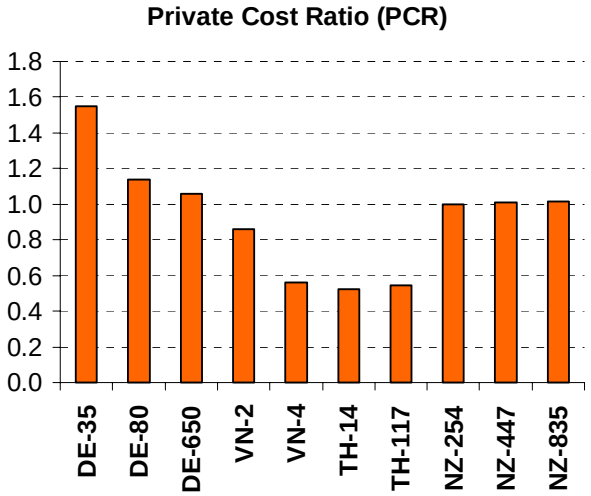
Effective Protection Coefficients (EPC): The EPCs range from 1.1 to 2.5 for Vietnamese, Thai and German dairy farmers indicating that overall these producers benefit from current market conditions and policies as the benefits of protecting output prices are greater than the dis-benefits of taxing their tradable inputs.

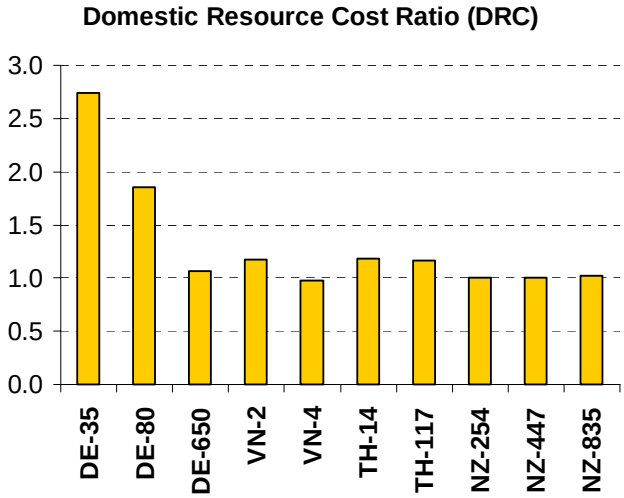
Producer Support Estimate (PSE): The PSE is an estimate of the financial transfers farms receive as a percentage of their total returns, measured at farm-gate. The German farms have the highest PSEs of 23 to 37 percent whereas New Zealand farms do not receive any producer support (more details in the next section). The farms in Vietnam and Thailand receive similar levels of support coming mainly from artificially low capital and labour costs.

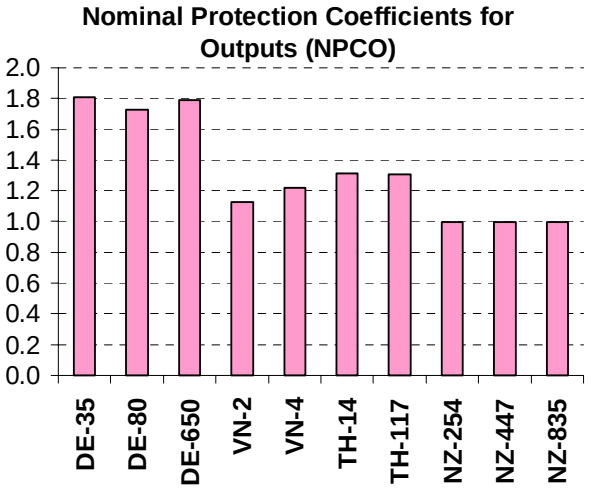
Interestingly, DE-80 and VN-4 display very similar PSE levels despite different policy environments. The explanation seems to be, that for DE-80 the high use of taxed items such as land, feed, and labour drive the PSE down, while for VN-4 the high use of subsidised agricultural loans to raise heifers, which can be sold at artificially high prices, drives PSE up. DE-650's high PSE is due to its high use of borrowed capital, estimated to be made available at a cost 10 percent below the costs if no policy interventions were in place.

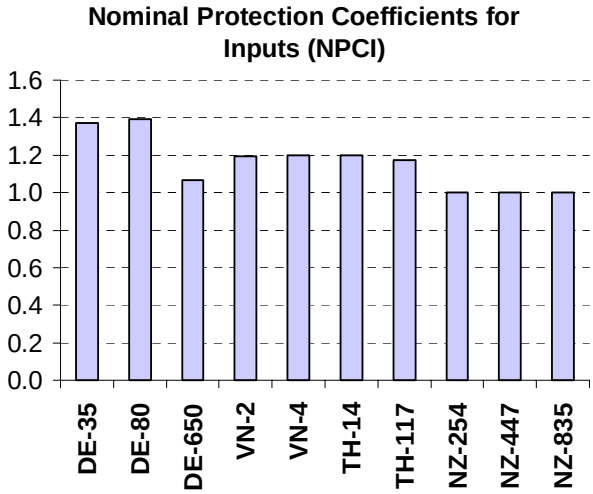
Explanations of variables; year and sources of data:

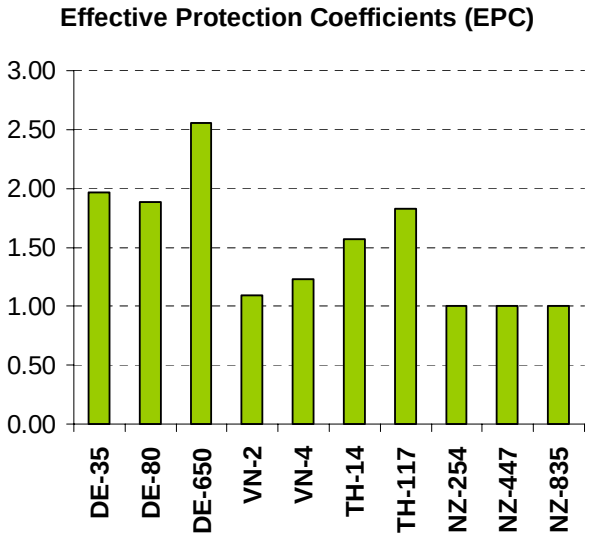
- Social prices estimations: See Annex 4.
- PAM methods: See Annex 4 and 5.

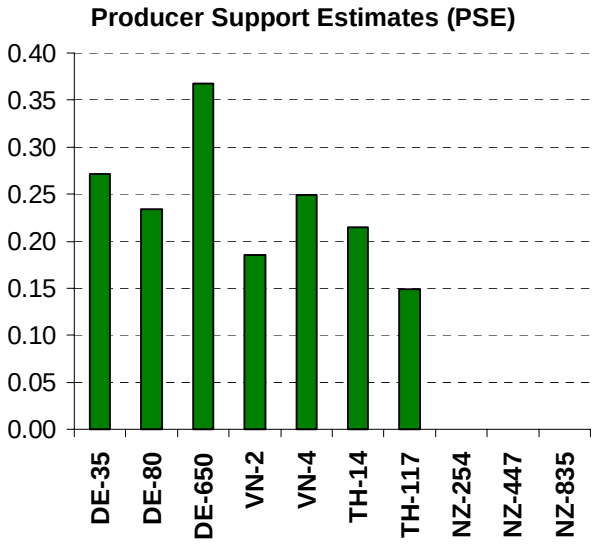

Private Cost Ratio (PCR)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Domestic Resource Cost Ratio (DRC)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Nominal Protection Coefficients for Outputs (NPCO)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Nominal Protection Coefficients for Inputs (NPCI)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Effective Protection Coefficients (EPC)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835


Producer Support Estimates (PSE)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
DE-35
DE-80
DE-650
VN-2
VN-4
TH-14
TH-117
NZ-254
NZ-447
NZ-835

6. PRODUCER SUPPORT ESTIMATES: OECD AND PAM RESULTS

The **Producer Support Estimate (PSE)** is an indicator of the monetary value of the gross transfers from consumers and taxpayers to agricultural producers, measured at farm-gate prices, arising from policy measures in support of agriculture relative to a situation without these measures.

The PSE is the only available and internationally comparable indicator on support levels in agriculture in OECD countries, and it attracts much attention by those interested in agricultural policy impacts. The PSE approach as used by OECD has been criticized as providing potentially misleading information. One source of criticism is that the use of the PSE concept by the OECD focuses mainly on the 'visible' part of policy effects (price supports, taxes, subsidies, and direct payments), while it omits less 'visible' factors. An alternative PSE-concept, which also deducts 'non-visible' policy impacts (e.g. distortion on land, labour and quota prices), following the PAM methodology, is being developed by one of the authors of this paper *(Ongoing PhD Dissertation work by Juliane Stoll and IFCN)*. This section compares the PSE concepts as calculated by OECD and the PAM methodology as for these German dairy farms.

OECD's PSE at Sector and Farm Levels

For the dairy sector of the EU, the OECD-PSE is 51 percent, which means that 51 percent of the dairy returns in the EU are a result of various policy interventions.

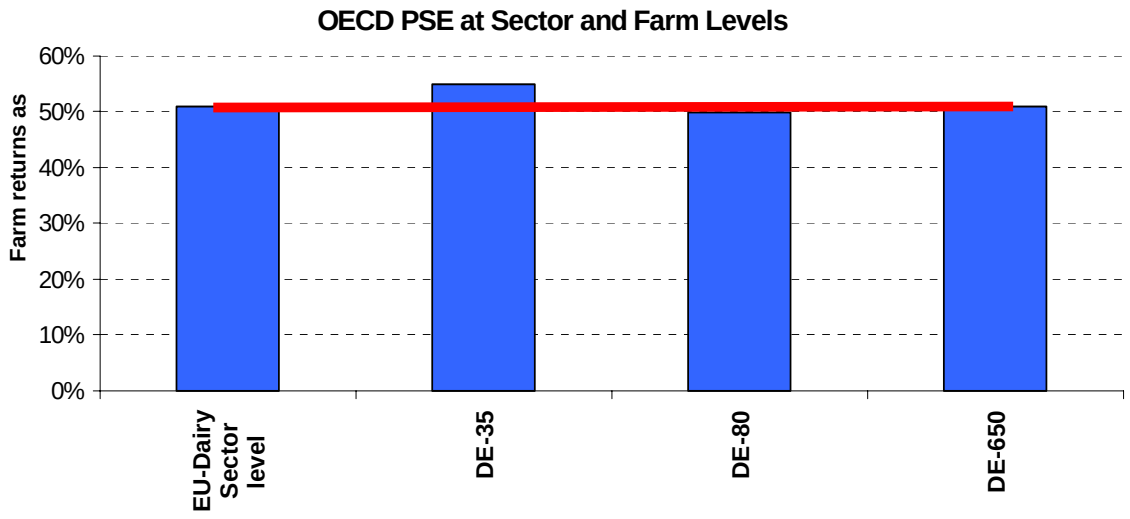
The calculation of the OECD-PSE at the farm level strictly follows the OECD rules of calculation, available on the OECD homepage (http://www.oecd.org) and Annex 6 of this report). By applying this sector-based-OECD concept at farm level, the German farms have PSEs varying from 50 to 55 percent, which are at the level of the OECD dairy sector PSE of 51 percent. DE-35 has a slightly higher PSE of 55 percent, mainly resulting from higher direct payments due to regional and environmental issues. Notice that this concept doesn't deduct distortions from less 'visible' farm production factors.

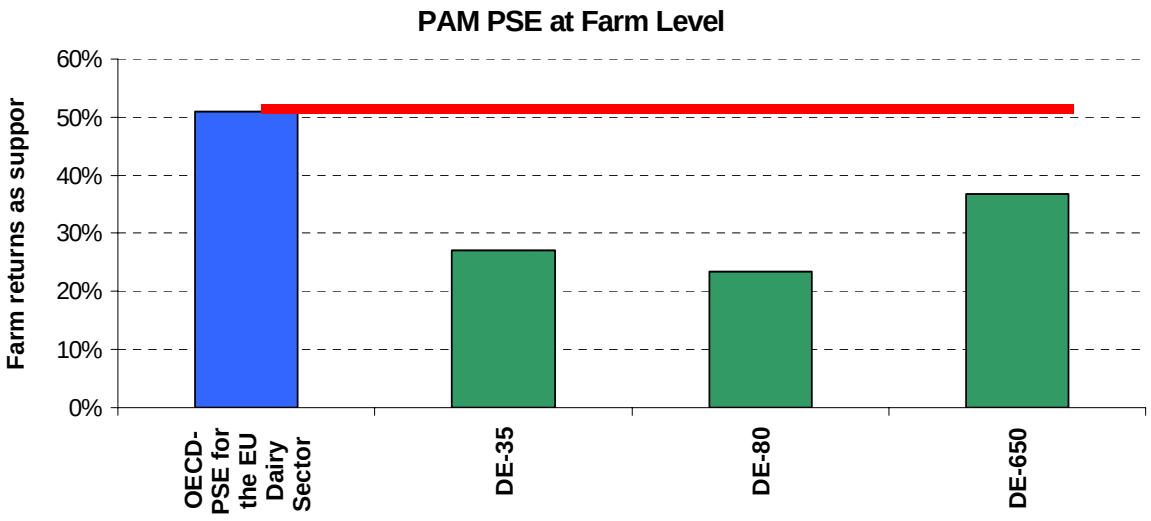
PAM-PSE at Farm Level

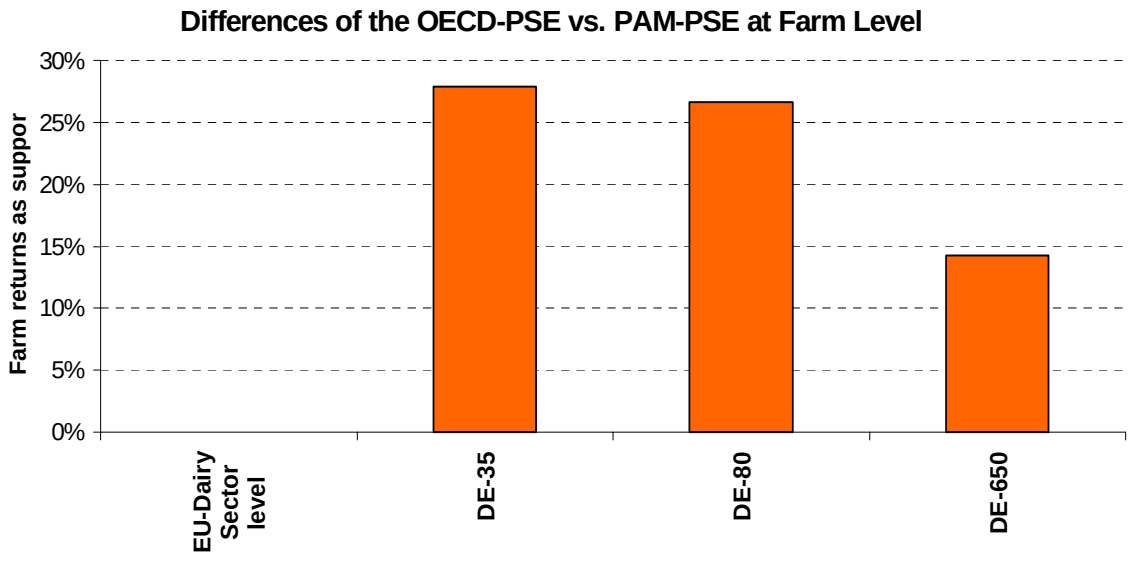
Unlike the OECD-PSE approach, the PAM approach deducts the distorting policy effects on land, labour and quota prices, as they apply to the selected typical dairy farms. The PAM-PSE levels are in the order of 27, 23 and 37 percent for DE-35, DE-80, and DE-650 respectively. This means that by focussing on the 'visible' part of policy impacts as is the case with the OECD-PSE calculation, the farm-level effects are overestimated. DE-80's low PAM-PSE is mainly due to its relatively high use of taxed items such as land, feed, and labour, driving the overall PSE down.

Differences Between the OECD and PAM PSEs

For the selected German farm types, OECD's PSEs are 2.0, 2.2, and 1.4 times higher than the PAM PSE levels. Particularly in the case of DE-35 a more accurate PSE would be closer to 25% than to 51% as resulting from the OECD concept. Many of the financial transfers provided by policy support are counterbalanced by 'inflated' costs of production factors such as land, quota, labour, feed, etc., costs which are not included in the OECD estimates.


OECD PSE at Sector and Farm Levels
Farm returns as
60%
50%
40%
30%
20%
10%
0%
EU-Dairy Sector level
DE-35
DE-80
DE-650


PAM PSE at Farm Level
Farm returns as suppor
60%
50%
40%
30%
20%
10%
0%
OECD-PSE for the EU Dairy Sector
DE-35
DE-80
DE-650


Differences of the OECD-PSE vs. PAM-PSE at Farm Level
Farm returns as suppor
30%
25%
20%
15%
10%
5%
0%
EU-Dairy Sector level
DE-35
DE-80
DE-650

7. SUMMARY & CONCLUSIONS

Given that the Pro-Poor Livestock Project Initiative (PPLPI) has a special interest in identifying and informing dairy development policies for developing countries, the following summary and concluding remarks refer mainly to milk production in Vietnam and Thailand to a much lesser extent to the situation in New Zealand and Germany.

7.1 Comparison of Dairy Farm Economics

Comparison of the economic results at farm level, using private prices, shows that the Thai and Vietnamese dairy farmers achieve very lucrative levels of 'entrepreneurial profit' while the German dairy farmers make considerable losses and the New Zealand dairy farmers manage to almost break even.

The comparatively favourable situation in Thailand and Vietnam is mainly due to both countries' focus on promoting local milk production through setting high farm output prices and encouraging the use of local resources for food production. Closer scrutiny reveals that, for example, the Vietnamese dairy farmers have 1.15 to 1.25 times the production costs incurred by New Zealand dairy farmers, while these higher costs are more than counterbalanced on the return side, where they receive milk, beef and heifer prices that are 1.13, 1.55 and 2.15 times those obtained by their New Zealand counterparts. As a result, the 'cost of milk production only', which takes into account non-milk returns, of Vietnamese farmers is about 10 percent lower than that of New Zealand dairy farmers.

Despite the high profitability of Thai and Vietnamese dairy farms, this study finds their productivity levels to be significantly lower than those achieved in the other countries included in the study. Raising productivity may be discouraged by both the high profits these farmers are already making and the taxes on tradable inputs such as concentrate feeds, machinery, equipment, etc. (which are critical if productivity is to be improved). In contrast, for German and New Zealand farmers, finding feasible ways to raise productivity in order to increase farm-level profitability is by far a more urgent matter.

For New Zealand dairy farmers, the entrepreneur's profits are slightly in the negative zone, with the tendency to worsen for larger farms. However, New Zealand farmers make a profit through the engagement of their cooperative further downstream in the dairy chain as well as abroad.

IFCN comparisons have repeatedly shown that smaller dairy farms usually achieve higher farm income and profit margins per 100 kg ECM milk. This is also the case for the farms in this study, with the exception of Vietnam. In 2003 and around Hanoi, VN-4 type farmers were 'clever' at obtaining subsidized agricultural loans to purchase female dairy calves and raise their own calves to profit from the prevailing high livestock prices. In 2004, prices for dairy stock were expected to fall dramatically, however, due to the crisis in the Vietnamese poultry sector caused by highly pathogenic avian influenza, small-scale poultry producers saw ruminant livestock as an alternative investment and heifer prices fell by a mere 8 percent relative to those in the previous year.

7.2 Policy Analysis: PAM Methods and Results

Under the current national policy frameworks governing the dairy sectors, the farms studied can be grouped into: (1) high profit farms, in Thailand and Vietnam, (2) break-

even farms, in New Zealand, and (3) high loss farms, represented by the German farms.

In order to arrive at these profitability levels, Germany, Vietnam and Thailand channel generous support to their dairy farmers. But exactly how much support reaches a typical dairy farm in these countries is difficult to quantify. Results from this study using the PAM concept show that while German farms receive a net support of around 12 US$ / 100 kg ECM produced, the Thai and Vietnamese farms receive about 6 US$ / 100 kg ECM. Interestingly, German and Thai dairy farmers receive support through high output prices while being taxed for imported farm inputs whereas Vietnamese dairy farmers enjoy both high output prices (though lower levels than in Thailand) and low farm input prices (through subsidised loans and labour). In this analysis, New Zealand is assumed to have an undistorted dairy sector, which means that no support or taxation applies to milk production at the farm level.

One often posed question is, what would happen if the policies favouring high profits in Thailand and Vietnam and keeping German farmers from making even bigger losses would be eliminated. This study estimates that in the absence of the existing policies dairy farming in these countries would be unprofitable. The levels of loss would range from 0 to –30 US$ / 100 kg ECM for the larger Vietnamese and smaller German farms, respectively, while Thai farmers would make a loss of about 2 US$ / 100 kg ECM. As expected, given the assumption of no policy distortion, New Zealand farmers would not experience major changes, except those stemming from an increasing demand for imported dairy products in countries where dairy farmers may leave the sector due to the loss of their farm support.

7.3 Producer Support Estimates (PSE): OECD versus PAM Approach

OECD reports a PSE level of 51 percent for the EU dairy sector, which is being interpreted by the media as 51 percent of the returns of German dairy farms coming from policy support. However, the alternative PAM – PSE concept applied in this study produces different results suggesting that the OECD PSE provides potentially misleading information as it does not deduct 'non-visible' policy effects that negatively impact the balance sheet of German dairy farmers. Applying the PAM concept to the PSE this study finds that when these 'non-visible' policy effects are taken into account, the OECD's PSEs are 2.0, 2.15 and 1.4 times as high as the PAM-PSEs for the three German farms. This means that German dairy farmers typically have PSEs between 23 and 37 percent instead of PSEs between 50 and 55 percent as calculated by the OECD.

7.4 Conclusions

Under current domestic policy frameworks:

- In countries where production resources are becoming increasingly scarce and global competition is pressing, dairy farms must increase efficiency of resource use and competitiveness. To achieve this, they need to increase 'biological productivity' and find economy of scale effects (increase herd size).
- Increasing herd size, usually seen as the best strategy to reduce production cost, seems to have a positive effect in Germany and Vietnam while in Thailand and New Zealand the result is negative. It seems that, under prevailing conditions, the optimal herd size in Germany, New Zealand, Thailand and Vietnam is in the order of 650, 250, 20, and 5 dairy cows respectively (see IFCN Dairy Report 2004). More research on this topic is needed.

Under conditions of a global liberalised market:

- Once the existing policy effects are eliminated, all of the study farms, except those in New Zealand, are unprofitable and therefore very vulnerable to competition. Their costs of milk production become too high, resulting in economic losses.
- Considerable opportunities to improve farm competitiveness through cost reduction remain in Thailand and Vietnam. Although high producer prices in and taxation of farm inputs required for intensification discourage the pursuit of cost efficiency, at the end of the day, farmers will be pressed to reduce production costs to maintain their income levels.
- At current market prices, Vietnamese and Thai dairy farms are profitable, which may promote expansion of the respective dairy sectors. However, due to financial constraints, these smallholder dairy farmers are often unable to increase their herd size or improve their technology levels without external support. They will continue to raise local breeds using labour intensive technology. It would appear to be justifiable, both on social and efficiency grounds to provide adequate support to them so that they can increase herd size, adopt higher yielding breeds and technology, and thereby improve productivity and economic efficiency.
- Their undistorted dairy market and export focus places New Zealand dairy farmers in a strong position to capitalize on expanding market opportunities in those countries in which dairy farmers would be heavily challenged by a new global trade environment. One may thus expect that dairy imports into Vietnam and Thailand would increase during the adjustment phase of their dairy sector to an open global market.
- Domestic (and international) demand of dairy products is likely to keep rising due to increasing income and urbanization, particularly in Asia. Under this scenario, the Asian dairy farmers found to be socially unprofitable in this study could very well become socially profitable. With higher international milk prices, growing local demand for dairy products and poor alternative use of the domestic factors of production, the Vietnamese and Thai dairy farms could become both privately and socially profitable. Reaching this dual profitability seems a matter of implementing the right public policies to promote local entrepreneurship and mobilize private investment.

A1: METHODOLOGICAL BACKGROUND

In this chapter, we will present the methods and sources of information used to collect data about the dairy farms analysed and how the costs of production for the selected typical production systems are calculated.

This project has followed the framework used by the International Farm Comparison Network (IFCN). IFCN is a world-wide association of agricultural researchers, advisors and farmers. These participants select typical agricultural systems in key production regions in their individual countries. In 2005, the number of participating countries extended to 33 countries with 102 farm types that represent more than 70 percent of the world milk production.

The Central Objectives of IFCN are:

1. To create and maintain a standardised infrastructure through which production data of the major agricultural products (milk, beef, wheat, sugar, etc.) and from major producing regions of the world can be effectively compared and discussed.

2. To analyse the impact of the structure of production, technology applied and country-specific policies on the economic performance of agribusinesses, their costs of production and global competitiveness.

In order to achieve these objectives, IFCN employs the following methods and principles:

Direct contact with the production protagonists. A team of advisors and farmers is assembled to set up the typical production models and to revise the final results. This approach brings the results closest to reality.

The principle of 'Total Costs'. IFCN considers both direct costs and margins, and the indirect (fixed) costs (i.e. depreciation and interests of the infrastructure used) and the opportunity costs for owned assets and production factors (i.e. family labour, land, capital).

A single and homogeneous method is utilised to calculate the costs of production for all participating countries. The IFCN standard is not the only truth, but a) it is scientifically sound, b) it includes all the existing production costs, and c) it creates transparency and international comparability in the arena of costs of agricultural production. Each IFCN member and client can reorganise the costs at his convenience and present them in the particular format of his country while he maintains an internationally comparable set of results.

The concept of setting (regional) typical agricultural models. A team of country experts, advisors and producers is formed to identify and set up the typical regional production models for each agricultural product. Typical production models must represent the common production structures in the region or country.

In the case of dairy production, for example, a working team composed of advisors, consultants and producers is formed as a panel. The first working step is to define the typical milk production systems of the major dairy regions in country. This model may be a 4-cow farm, feeding mostly cut grasses to fully confined animals, combine milk production with some other agricultural activities such as wheat and rice production in 3 ha of irrigated owned land, and milking is done by hand twice a day.

The second working step is to collect all the needed information from these typical models. For this, IFCN has developed a standard questionnaire. It is crucial that these data collected should neither reflect an individual farm (too many particularities may hurt the ability to generalise the results) nor be an arithmetic average (an average does not show much about the technology and the economics involved). The typical

model should rather represent real and common situations of the region and show clearly the predominant technology and infrastructure. Such models will be preferred by analysts. The model TIPI-CAL (Technology Impact and Policy Impact Calculations) is utilised for the simulations of these typical models and the calculations of their costs of production. TIPI-CAL can be easily shared with all IFCN members since it is a spreadsheet in MS-Excel. This model is a combination of production (physical data) and accounting (economic data). TIPI-CAL also consists of both a structure of costs of production and a simulation component (without optimisation). The simulations can be done for a period of up to 10 years in order to evaluate the growth, investments, policies or market conditions. For each year, TIPI-CAL produces a 'Profit and Loss Account', a balance and cash flow statement.

Allocation of costs of production. When the typical milk production systems have several agricultural activities besides dairy, fixed costs and expenses (i.e. depreciation) are distributed to each activity according to their use. For example, the depreciation of the machinery, which is used, for the dairy and the crop enterprises is allocated according to the hours worked in each.

Data about farm and off-farm household economics. IFCN takes into account all activities of the typical production systems, plus all the off-farm incomes and expenses realised by the owner and his family. This more complete picture of the typical model is necessary to obtain reliable information about the current economic situation of the model (and the household) and about the future of the farm (simulations).

All the methods and principles above have been applied in this project. The IFCN fieldwork experience supports that the analysis of costs of production shows no significant difference between the participation of one advisor and a 'full panel'. Therefore, it was decided that an IFCN scientist first visit each and every model, talk with the owners to collect project-specific information, analyse the data and then have the results cross-checked by local experts and farmers.

The analysis of costs of production and the competitiveness of the typical farm models follow the same structure as those in the 'IFCN Annual Dairy Report'. The main objectives of this report are a) to analyse the main typical milk production systems in Germany, Vietnam, Thailand and New Zealand; b) to apply the Policy Analysis Matrix methodology at the dairy farm levels using IFCN as a platform; and c) to compare the Producer Support Estimates from the OECD and PAM approaches for the German only.

For more information about IFCN, visit http://www.ifcnnetwork.org and http://www.ifcndairy.org

A2: IFCN METHOD: COST OF PRODUCTION CALCULATIONS

Cost Calculation

The cost calculations are based on dairy enterprises that consist of the following elements: Milk production, raising of replacement heifers and forage production and / or feed purchased for dairy cows and replacements.

The analysis results in a comparison of returns and total costs per kilogram of milk. Total costs consist of expenses from the profit and loss account (cash costs, depreciation, etc.), and opportunity costs for farm-owned factors of production (family labour, own land, own capital). The estimation of these opportunity costs must be considered carefully because the potential income of farm owned factors of production in alternative uses is difficult to determine. In the short run, the use of own production factors on a family farm can provide flexibility in the case of low returns when the family can choose to forgo income. However, in the long run opportunity costs must be considered because the potential successors of the farmer will, in most cases, make a decision on the alternative use of own production factors, in particular their own labour input, before taking over the farm. To indicate the effects of opportunity costs we have them separated from the other costs in most of the figures.

For the estimations and calculations the following assumptions were made:

Labour costs

For hired labour, cash labour costs currently incurred was used. For unpaid family labour, the average wage rate per hour for a qualified full-time worker in the respective region was used.

Land costs

For rented land, rents currently paid by the farmers were used. Regional rent prices provided by the farmers were used for owned land. In those countries with limited rental markets (like NZ), the land market value was capitalised at 4 per cent annual interest to obtain a theoretical rent price.

Capital costs

Own capital is defined as assets, without land and quota, plus circulating capital. For borrowed funds, a real interest rate of 6 per cent was used in all countries; for owner's capital, the real interest rate was assumed to be 3 percent.

Quota costs

Rent values were used for rented or leased quota. Purchased quota values were taken as being the annual depreciation of values from the profit and loss accounts.

Depreciation

Machinery and buildings were depreciated using a straight-line schedule on purchase prices with a residual value of zero.

Adjustments of fat content

All cost components and forage requirements are established to produce ECM (Energy Corrected Milk with 4.0 percent fat and 3.3 percent protein)

Adjustment of VAT

All cost components and returns are stated without value added tax (VAT).

Adjustment of milk ECM (4 and 3.3 percent fat and protein)

The milk output per farm is adjusted to 4 percent fat. Formula: ECM milk = ((milk production * 0.383 * fat in percent) + (milk production * 0.242 * protein in percent) + (total marketable milk output * 0.7832))/3.1138

Farm Economic Indicators (IFCN method)

+ Total receipts =

+ Crop (wheat, barley, etc.)
+ Dairy (milk, cull cows, calves, etc.)
+ Government payments

- Total expenses =

+ Variable costs crop
+ Variable costs dairy
+ Fixed cash cost
+ Paid wages
+ Paid land rent
+ Paid interest on liabilities

= Net cash farm income

+ Non cash adjustments =

- Depreciation
+/- Change in inventory
+/- Capital gains / losses

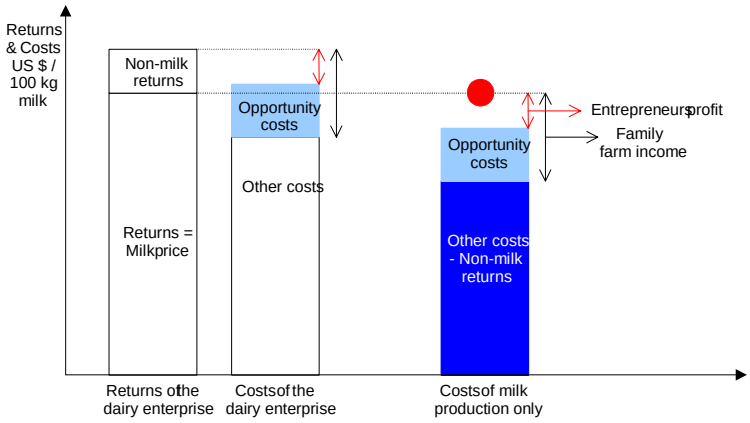
= Farm income (Family farm income in Dairy Report 2001)

- Opportunity costs =

+ Calc. interest on own capital
+ Calc. rent on land
+ Calc. cost for own labour

= Entrepreneurs profit

Cost of Milk Production Only



Method

The total costs of the dairy enterprise are related to the total returns of the dairy enterprise including milk and non-milk returns (cattle returns and direct payments). Therefore the non-milk returns have been subtracted from the total costs to show a cost bar that can be compared with the milk price. The above figure explains the method.

Other costs: Costs from the P&L account minus non-milk returns (cattle returns and direct payments, excl. VAT).

Opportunity costs: Costs for using own production factors inside the enterprise (land * regional land rents, family working hours * wage for qualified workers, capital: Own capital * 3 percent).

Returns of the Dairy Enterprise

Milk price: Average milk prices adjusted to fat corrected milk (4 percent excl. VAT).

Cattle returns: Returns selling cull cows, male calves and surplus heifers + /- livestock inventory (excl. VAT).

Other Returns: Selling/home use of manure

Costs by Cost Items

Costs for means of production: All cash costs like fuel, fertiliser, concentrate, insurance, maintenance plus non-cash costs like depreciation for machinery and buildings (excl. VAT).

Labour costs: Costs for hired labour + opportunity costs for family labour.

Land costs: Land rents paid + calculated land rents for owned land.

Capital costs: Non-land assets * interest rate (equity * 3 percent, liabilities * 6 percent).

Quota costs: Payments for rented quota and depreciation for quota bought.

Cash and Non-cash Costs

Cash costs: Cash costs for purchase feed, fertiliser, seeds, fuel, maintenance, land rents, interest on liabilities, wages paid, vet + medicine, water, insurance, accounting, etc (excl. VAT).

Depreciation: Depreciation of purchase prices for buildings, machinery and quotas (excl. VAT).

Opportunity costs: Costs for using own production factors (land owned, family labour input, and equity).

Economic Results of the Dairy Enterprise

Farm income per farm: Returns minus costs from P&L account of the dairy enterprise.

Farm income per kg milk: Farm income per farm (dairy enterprise) / milk production

Profit margin: Share of farm income on the total returns: Farm income divided by the total returns.

Entrepreneurs profit: Returns minus costs from P&L account of the dairy enterprise – opportunity cost allocated to the dairy enterprise.

Net cash farm income: Cash receipts minus cash costs of the dairy enterprise or: Farm income + depreciation

Return to labour: Entrepreneurs profit plus labour costs (wages paid plus opportunity costs) divided by total labour input.

Average wages on the farm: This figure represents the gross salary + social fees (insurance, taxes, etc.) the employer has to cover. Calculation: Total labour costs (wages paid plus opportunity costs) divided by the total hours worked. To calculate this, the number of hours worked by the employees and the family has been estimated by experts.

Labour input: The estimation of hours worked and the valuation of these hours is extremely difficult especially in family farms. In the IFCN network this method will be intensively discussed and improved during the next workshops.

Labour costs: Paid wages and opportunity costs for own labour of the dairy enterprise.

Labour productivity: 100 kg ECM produced per hour of labour input on the farm

Land costs: Paid land rents and opportunity costs for own land (calculated rent) of the dairy enterprise.

Land productivity: 100 kg ECM produced per ha of land allocated to the dairy enterprise in a typical year.

Stocking rate: Number of cows / ha land.

Capital costs: Paid interests and opportunity costs for own capital (excluding land capital and quota capital). For equity 3 percent and for liabilities 6 percent interest rate is used in all countries. This reflects the method of “capital using costs” developed by Isermeyer 1989.

Capital input: Total Assets (land, buildings, machinery, cattle)/ number cows.

Capital productivity: 100 kg ECM produced divided by capital input (excluding land and quota)

A4: PAM METHODOLOGY

The Policy Analysis Matrix, as developed by Monke and Pearson (1989), evaluates the competitiveness of commodities concerned by comparing data from the private and social budgets. While private profits are estimated based on market prices, social profits are estimated on the basis of social prices. (See Table 1)

In theory, social prices are those that would exist in a perfect market situation. In practice, such prices are estimated using different methods such as identification of quantifiable market interventions that make the difference between the observed and free market prices, calculation of border equivalent or parity prices and estimation of shadow prices (Gittinger, 1982 and Yao, 1997).

Social Prices: Primary Data and Collection Methods

For this study, we followed the PAM methodology to first identify the policy effects concerning input and outputs of these dairy farms; and secondly, we combined information on tariffs, taxes and farm supports with country experts to estimate the social prices in terms of the existing market prices.

For Germany the social prices, as percentage of the market prices, are: Milk price: 60%; Beef prices: 75%; Land prices: 70%; Labour prices: 90%; Quota prices: 0%; Capital prices: 110%; Feed prices: 90%; Fuel prices: 50%; Machinery prices: 90%; Prices for seeds, fertilizer, pesticides, livestock, electricity and veterinary and medicine 100%.

For Vietnam, the social prices, as percentage of the market prices, are: Milk price: 80%; Beef prices: 80%; Land prices: 50% (for land rents only); Labour prices: 150%; Quota prices: 0%; Capital prices: 200%; Feed prices: 82%; Fuel prices: 90%; Machinery prices: 80%; Seeds 100%; Fertilizer 95%; Pesticides 89%; Livestock 95%; Electricity 93%; and Veterinary and Medicine 89%.

For Thailand, the social prices, as percentage of the market prices, are: Milk price: 73%; Beef prices: 88%; Land prices: 150%; Labour prices: 150%; Quota prices: 0%; Capital prices: 150%; Feed prices: 83%; Fuel prices: 83%; Machinery prices: 100%; Seeds 100%; Fertilizer 88%; Pesticides 100%; Livestock 93%; Electricity 93%; and Veterinary and Medicine 63%.

For New Zealand, we have assumed no market distortions. Therefore, market prices are equal to social prices.

PAM Structure and Ratio Indicators

The following tables intend to briefly arm the reader with the concepts and formulas used for PAM and applied in this paper.

Table 1: The Policy Analysis Matrix (PAM)

		Costs		
	Returns	**Tradables**	**Factors**	**Profits**
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Divergences	I	J	K	L
Where:	D = A - B - C I = A - E K = C - G	H = E - F - G J = B - F L = D - H = I - J - K		

Table 2: PAM indicators to compare unlike output bundles

Ratios	Formula from PAM	Description
PCR	C/(A-B)	Private Cost Ratio
DRC	G/(E-F)	Domestic Resource Cost
NPCO	A/ E	Nominal Protection Coefficient on tradable Outputs
NPCI	B/ F	Nominal Protection Coefficient on tradable Inputs
EPC	(A-B)/(E-F)	Effective Protection Coefficient
PSE	(D-H)/ A	Producer Support Estimate

For more details on IFCN application of the PAM methodology, please see the IFCN Dairy Report 2005 and Garcia, O. (2005; 2006).

A5: PAM CALCULATIONS AND RESULTS

Farm Types	Accounts		Private Prices	Social Prices	Divergences
DE-35	Returns		44.36	24.52	19.84
	Costs	Tradables	8.91	6.50	2.41
		Factors	54.84	49.44	5.41
	Profits		-19.39	-31.41	12.02
DE-80	Returns		38.41	22.22	16.19
	Costs	Tradables	9.77	7.01	2.76
		Factors	32.65	28.19	4.46
	Profits		-4.01	-12.98	8.97
DE-650	Returns		39.51	22.09	17.41
	Costs	Tradables	12.20	11.41	0.79
		Factors	28.81	26.72	2.10
	Profits		-1.51	-16.04	14.53
VN-2	Returns		25.97	23.01	2.95
	Costs	Tradables	9.8	8.2	1.60
		Factors	13.9	17.4	-3.50
	Profits		2.23	-2.59	4.82
VN-4	Returns		29.43	24.17	5.26
	Costs	Tradables	12.1	10.1	2.00
		Factors	9.7	13.7	-4.00
	Profits		7.70	0.37	7.33
TH-14	Returns		37.31	28.47	8.84
	Costs	Tradables	24.00	20.00	4.00
		Factors	7.00	10.00	-3.00
	Profits		6.49	-1.53	8.02
TH-117	Returns		37.97	29.01	8.96
	Costs	Tradables	27.00	23.00	4.00
		Factors	6.00	7.00	-1.00
	Profits		4.65	-0.99	5.65
NZ-254	Returns		18.87	18.87	0.00
	Costs	Tradables	4.49	4.49	0.00
		Factors	14.39	14.39	0.00
	Profits		-0.01	-0.01	0.00
NZ-447	Returns		18.90	18.90	0.00
	Costs	Tradables	3.82	3.82	0.00
		Factors	15.19	15.19	0.00
	Profits		-0.10	-0.10	0.00
NZ-835	Returns		18.70	18.70	0.00
	Costs	Tradables	6.50	6.50	0.00
		Factors	12.40	12.40	0.00
	Profits		-0.20	-0.20	0.00

Note:
Figures given as US$/ 100 kg ECM.

A6: OECD PSE CALCULATIONS

			DE 80	DE-35	DE-650	Formulas
A	Milk Price	US-$/ 100 kg ECM	32	33	32	
B	NZ Milk Price	US-$/ 100 kg ECM	17	18	18	
C	Diff. EU vs WM	US-$/ 100 kg ECM	15	16	14	(A-B)
D	Payments	US-$/ 100 kg ECM	2	6	4	
E	PSE	US-$/ 100 kg ECM	17	22	19	(C+D)
F	Total Returns	US-$/ 100 kg ECM	35	39	36	(A+D)
	PSE	**%**	**50**	**55**	**51**	(E/F)

Notes:
1- NZ = New Zealand
2- WM= World Market
Data from year 2005

Application of the OECD PSE to the Selected German Farms

The calculation of the OECD-PSE at farm level was done by strictly following the OECD rules of calculation, which are available on the OECD homepage.

Firstly, the farm milk price (component A in the table above) is taken from the IFCN database and compared to the New Zealand milk price (component B). The NZ milk price serves as a proxy to the world market price of milk and was also taken from IFCN Data 2005. The difference between the farm gate price and the used reference price (component C) is the so called market price support expressed in US-$ per 100 kg ECM. Furthermore, the PSE also contains policy measures that provide payments (component D) to farmers based on criteria such as the quantity of a commodity produced, the amount of inputs used, the number of animals kept, the area farmed, or the revenue or income received by farmers (budgetary payments). The farm level information about these budgetary payments can be obtained from the IFCN data. The farm data includes information about the received (and spent) payments from (to) the state. This amount of payments expressed in US-$ per 100 kg ECM are the budgetary payments considered in this calculation.

Then, the market price support and the budgetary payments in 100 kg ECM on farm level are summed up (component E) and put into relation with the total returns (component F), which is the farm gate milk price plus the received budgetary payments. Finally, the PSE can be and is expressed in percentage.

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Other references appear at the bottom of the pages where tables and graphs are shown.