Pro-Poor Livestock Policy Initiative

International Farm Comparison Network (IFCN)

The Economics of Milk Production in Hanoi, Vietnam, with Particular Emphasis on Small-scale Producers

Otto Garcia, Torsten Hemme, Luong Tat Nho and Hoang Thi Huong Tra

A Living from **Livestock**

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This is the 33rd 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 and livestock products in developing countries, though starting from a low base, is growing rapidly.

This study applies a method of economic analysis developed by the International Farm Comparison Network (IFCN) which is based on the concept of 'typical farms'. Three farm types were selected to represent typical farms in the region of Hanoi, Vietnam. The farms were located in two villages near Hanoi (10 to 15 km away), benefiting from good market access. The farms kept two, four and five crossbred dairy cows and practiced stall-feeding. Each farm was analyzed in detail and assets, production costs, profits and other economic information are presented graphically and are described in the text. A policy analysis using the PAM methodology is carried out for each of the typical farms. Furthermore, a preliminary analysis of the dairy chain in Hanoi was conducted.

We hope this paper will provide useful information to its readers and any feedback is welcome by the authors, 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, Vietnam, Hanoi, Poverty Reduction, Dairy, Farm Economics, Policy.

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1. EXECUTIVE SUMMARY

Introduction

The main purpose of this study was to gain insight into the household and farm economics of small-scale dairy farms in Hanoi, and to obtain estimates of the costs of milk production so as to gauge their potential for improvement, particularly through policy action, and vulnerability to international competition in a more closely interconnected world market. In order to ascertain possible developments in the dairy sector and to broadly identify areas of intervention that favour small-scale dairy producers, the study examines the potential to improve milk production of different farm types. A case study approach is used, the aim being to obtain qualitative insights rather than quantitative extrapolation.

Methodology

The methodology applied for the economic analysis was developed by the International Farm Comparison Network (IFCN) and utilises the concept of typical farms. Farm types are determined by regional dairy experts which take into consideration (a) location of the farm, (b) farm size in terms of dairy herd size and (c) the production systems that make important contributions to milk production in the study region. Three farm types were selected for this study. The first type represents the common small-size farms (2 cows); the second category (4 cows) was chosen to represent the farm size that is closest to the statistical average, and finally, a third farm type was defined to represent larger and more progressive dairy farms (5 cows), allowing further exploration of potentials for economies of size in the region. Management levels on the typical farms are average to slightly above average compared to other farms of the same type. Data was collected using a standard questionnaire and a computer simulation model, TIPI-CAL (Technology Impact and Policy Impact Calculations), was used for biological and economic assessments. Furthermore, method testing exercises regarding the dairy chain and policies affecting the typical dairy farms were conducted. The methods tested are further explained in their corresponding sections and/or the annexes.

Results

Milk production in Vietnam

Vietnam has a relatively short tradition both in milk production and consumption of dairy products. However, from 1996 to 2002, milk production increased three-fold to reach 78,450 tons. This growth over just six years is mainly attributed to a strong increase in the domestic demand of dairy products coupled with very supportive policies directed at the development of the domestic dairy sector.

The average milk yield per dairy animal increased by 35 percent over the last six years, but the largest relative increase was recorded for the number of dairy animals, which grew by 360 percent. Over 60 percent of the dairy animals are found in the North-East-South region (see the map in Annex A4), which includes Ho Chi Minh City, while the area around Hanoi accounts for about 3.5 percent of the dairy herd.

Vietnam contributes barely 0.01 percent to total world milk production although the national herd (cattle and buffaloes) amounts to nearly 75 percent of the total number of cattle in New Zealand. The average dairy cow in Vietnam yields as much milk as four cows in India, mainly due to better dairy genetics and management. Milk prices are 20 percent higher than in New Zealand and just over half of those in Germany.

Analysis of 'typical farms' in the area of Hanoi, Vietnam

Based on the IFCN methodology, three farm types were identified as 'typical' and were subjected to detailed analyses. A small dairy farm, VN-2 (2 crossbred cows and 0.47 ha of land, planting Maize as cash crop), a medium-size farm, VN-4 (4 crossbred cows and 0.43 ha land with no cash crops), and a 'progressive' farm, VN-5 (5 crossbred cows and 0.36 ha land with no cash crops), which represents the more commercially-managed dairy systems in the area. The selected farm types closely match the 2001 national statistics on farm structures, which show that about 98 percent of the dairy farms held 5 or less cows.

Dairy production systems

Despite the importations of purebred dairy animals, crossbred dairy animals represent the vast majority of the dairy cows. The popular breeds for crossing are Holstein Frisian, Red Sindhi and the Yellow Cattle.

The farms are managed by the farm family. Feeding practices are very diverse. However, the farms usually use public land (1) to cut-and-carry grass to the stall-tied animals, (2) to graze cattle in the (peak natural grasses) growing season, and (3) to tie animals under trees along the Red River during the hottest hours of the summer days. Farms VN-2 and VN-4 grow Elephant grass on rented land while VN-5 relies on natural grasses. Feed rations are primarily based on agricultural by-products such as rice bran, broken rice, grasses, rice straw, and maize leaves.

Protein and commercial mix feeds are also used differently among the farm types. While the two smaller farms use a commercial feed mix, the larger farm relies on soybean and by-products from the beer industry. All farms feed mineral mixes and pulse meals when available.

Household comparison

Farm families have between 4 and 6 members, which is typical in the region. Family labour utilisation in off-farm activities increases with farm size.

Total annual household incomes range from 1,570 to 5,350 US$. Non-cash benefits are more relevant for the smaller farms (over 13 percent of VN-2 total income). Net cash farm incomes account for 83 to 58 percent of the household incomes for farms VN-2 and VN-5 respectively. All farms are able to cover the family living expenses and make a profit.

Whole farm comparison

Farm returns range from 2,700 to 7,200 US$ per year. Interestingly, the small farm is the only one having cash crops. The net cash farm income closely follows the farm returns and varies from 1,135 to 2,785 US$/year. All farms have high profit margins of 38 to 42 percent.

Comparison of the dairy enterprise - Costs of milk production

Cost of milk production varies from 11.5 to 17.0 US$ per 100 kg ECM. The average-size farm, VN-4, has the lowest costs (11.5 US$), which is mainly due to lower labour costs for family labour and lower costs for means of production.

The returns per 100 kg milk range from 27 to 39 US$. Differences in milk returns can be explained by price differences with the large farm selling directly to a milk processing company.

The results indicate that expanding VN-2 to VN-4 may decrease milk production costs by 2 US$/100 kg ECM, if conditions do not change. The potential effects of economies of scale seem to be determined by land and labour cost components.

Dairy chain in Hanoi

Between 90 and 95 percent of the milk marketed in the region of Hanoi is captured by the formal sector, which basically consists of two large processors, *Vinamilk* and Hanoi Milk. Despite the dominance of the formal sector, an informal sector, which consists of small milk shops, does exist. These shops market 5 to 10 percent of the region's fresh milk volume and sell either directly to consumers or to retailers, both within the city of Hanoi.

Producer milk prices are similar in both sectors (0.197 US$/kg). However, the consumer price is almost 1.5 times higher in the formal sector, which pasteurises, adds sugar, packs and distributes its fluid milk products. The margins in processing and retailing are 0.43 and 0.24 US$/kg milk for the formal and informal channels respectively.

PAM results for the three dairy farm types

The PAM results show that at market prices the studied farm types are highly profitable for their owners (3.0 to 9.5 US$/100 kg milk), while applying social prices they barely break even, with the small farm even operating at a social loss. The larger farms make the biggest private profit, do not incur a social loss, and capture the highest level of public support. On the other hand, the larger farms' profits are reduced by taxes on inputs (feeds).

A set of PAM ratios shows that farm outputs are supported and inputs are taxed by 21.5 and 20.0 percent respectively. The net result is that all farms benefit significantly from current policies and market conditions and about 24 percent of the private returns of the farms come from external support. Public support (private profits minus social profits) for the farms ranges from 6.0 US$/100 kg milk for the smallest to 9.5 US$/100 kg milk to the largest farm.

The high level of support is a clear indicator of a high degree of imperfection in the Vietnamese dairy market. Consequently, there should be potential for increasing production and competitiveness through policy measures.

Conclusions

Several key conclusions can be drawn from this study:

1- In the last decade, the Vietnamese economy has achieved remarkable growth. The dairy sector tripled its output in the period between 1996 and 2002. Driving the growth of the dairy sector are an increasingly strong demand for dairy products (from a growing population and increasing per capita purchasing power) and a very supportive set of development policies affecting stakeholders throughout the dairy chain (producer-consumer).

2- This study identifies substantial potential on both the demand and production side for the sector to continue its fast development. On the demand side, Vietnamese consumers pay as high prices (0.63 US$/lt.) for fluid milk as European consumers pay for similar products. More affordable dairy products in Viet Nam are very likely to further boost per capita consumption, contributing to a healthier workforce. On the production side, the government, through its diversification strategy, has supported dairy farming to great extent. This study finds that Vietnamese dairy farms belong to both (a) the world's low cost milk producers (<18 US$/100kg ECM) and (b) and to the world's most profitable dairy farms (2 to 9 US$/100kg ECM entrepreneurial profits) (See, IFCN Dairy Report 2004).

3- The strong profitability of Vietnamese dairy farms however relies heavily on national public support. This study's preliminary PAM results show that for the 2 to 9 US$ entrepreneurial profits, these dairy farms receive public support of 6 to 9

US$/100 kg ECM milk produced. This support reaches the farms through two main channels: (a) farm output prices (e.g. milk and beef) are kept above world market prices and (b) domestic farm inputs (e.g. capital and labour) are purposely kept low.

4- The study identifies the need of policies to create conditions, which promote farm productivity and dairy chain efficiency, to allow the dairy sector to become nationally and internationally competitive. As starting points, policymakers should look at issues such as land ownership and import tariffs with an emphasis on farm inputs such as machinery, veterinary medicine and feedstuffs, which may boost farm productivity through intensification.

Vietnam - Dairy in the Global Context

World milk production

In 2002 Vietnam produced 78,600 tons, which represented 0.01 percent of total world milk production. Viewed from another perspective, Vietnam reached about 0.07, 0.09 and 0.10 percent of European Union, India and USA milk production, respectively.

National herd and dairy animals

For 2003, FAO reports that Vietnam counts with about 4.4 million cattle and 2.8 million buffaloes. This total herd size represents around 50 and 77 percent of the respective herds of Germany and New Zealand. However, with 79,225 head, the share of dairy animals in the Vietnamese herd is estimated at only 1 percent (MARD, 2003).

Dairy herd structures

The average herd size is estimated at 3 dairy animals per farm. Nearly 95 percent of the farms have less than 9 dairy animals.

Milk yields

A comparison of average milk yields in 1997 shows that a Vietnamese dairy animal produces as much milk as four "dairy animals" in India. This large difference seems to be due mainly to better dairy genetics and a more intensive production management. On the other hand, one dairy cow in the USA produces as much as three dairy cattle in Vietnam.

Milk prices

Vietnamese farmers receive a 20 percent higher milk price than farmers in New Zealand, but only 60 percent of what German milk producers receive.

Milk production per capita

Despite the recent fast growth of the Vietnamese dairy industry, national figures reveal a low per capita milk production of about 1 kg/year. Experts consider Vietnam's short history in milk production and consumption as major factors.

Explanations of variables; year and sources of data:

- World Milk Production: FAO (2004) at http://www.fao.org; Report from the Agricultural Department, MARD (2003).
- Dairy Animals: FAO (2004) at http://www.fao.org.
- Dairy Farm Structures: IFCN Dairy Report 2004; and Report of Agricultural Department & Results of the Rural, Agricultural and Fishery Census – GSO (2003).
- Milk Yields per Dairy Animal (2002): Hemme et al. (2003); Personal communications with dairy farming experts in Hanoi.
- Farm Gate Milk Prices (2002): IFCN Dairy Report 2004.
- Milk Production per Capita (2002): Hemme et al. (2003)

World Milk Production

Dairy Farm Sizes

Milk Yields (1997)

Number of Live Animals

Farm Gate Milk Prices

Milk Production per Capita
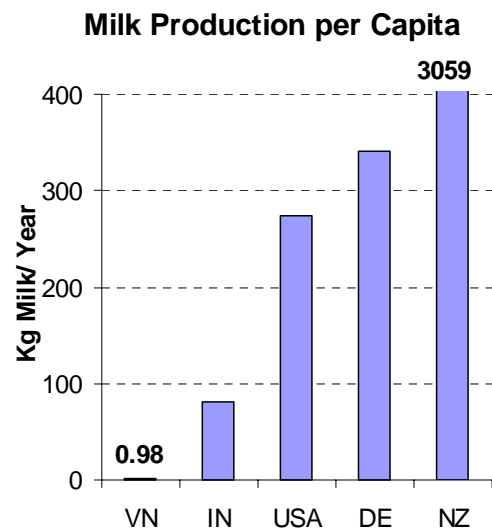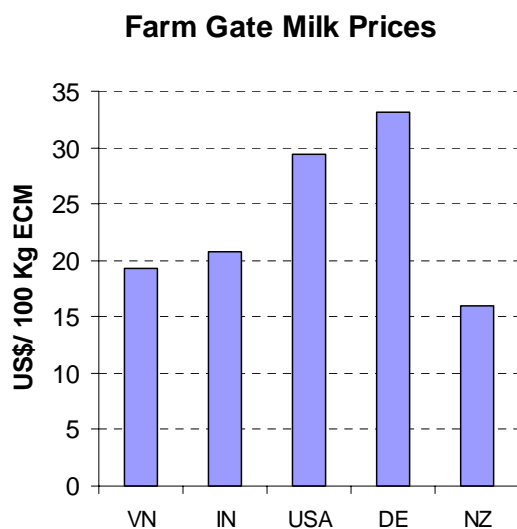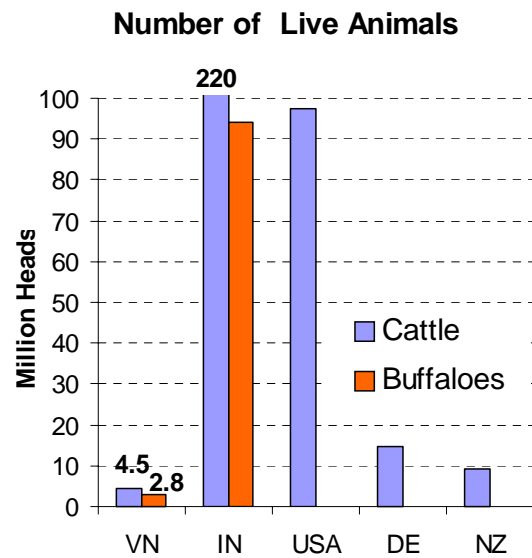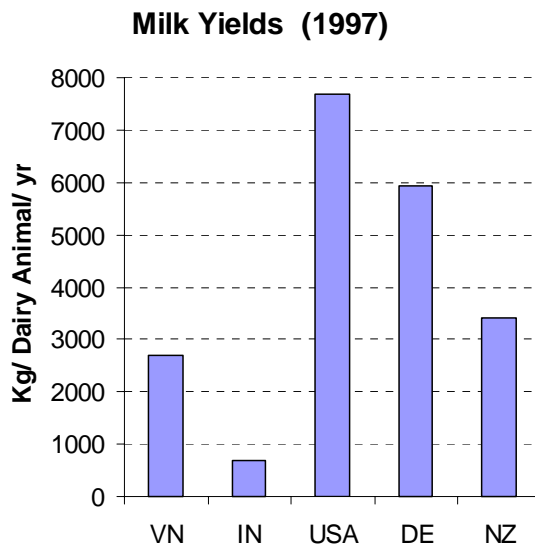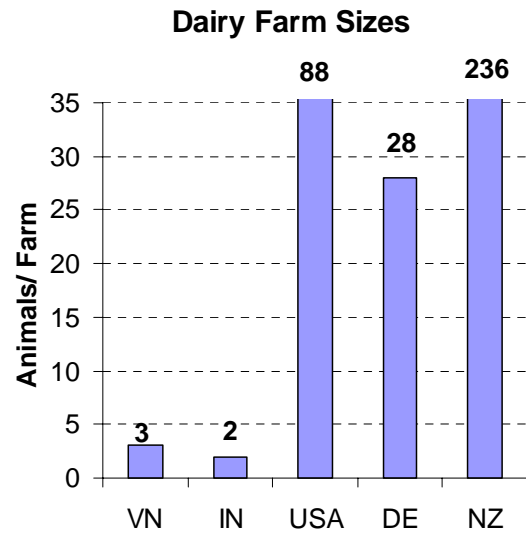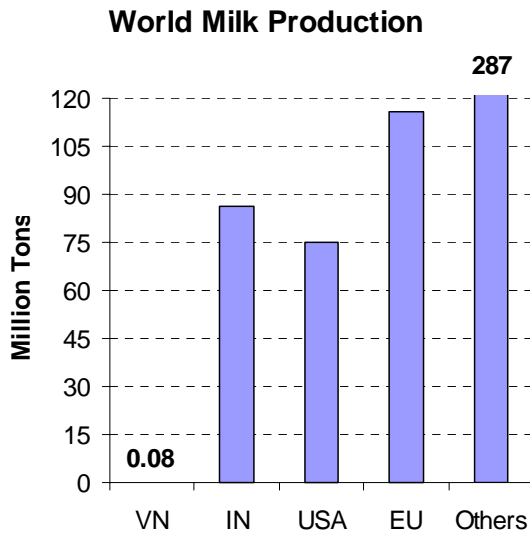
Recent Dairy Developments in Vietnam

Milk production

From 1996 to 2002 Vietnam's milk production tripled and between 1996 and 1999 national milk production grew by slightly over 10 percent per year. This growth was driven by an increase in milk demand and the government's dairy promotion efforts consisting of stabilising milk price, supporting the creation of collection centres and marketing channels, and the importation of highly productive dairy animals for breeding purposes. In addition, farm families dispose of labour and feed resources for dairy farming and have a strong need for a regular cash income as provided by milk operations. The combination of these factors accelerated dairy sector output growth up to an average of 25 percent per year between 2000 and 2002.

Development of daily milk yield

From 1996 to 2003, average daily milk yield grew by 34 percent. Averaged per year, Vietnam has seen an annual increment in milk yields of a little over 5 percent. This increase in milk yield has been significantly driven by genetic improvements through crossbreeding with imported dairy animals and better animal selection.

Number of dairy animals

In 2003, Vietnam had 3.6 times as many dairy animals as in 1996. The detailed figures show that the growth in number of dairy animal was slightly above 10 percent until 1998, accelerated to over 17 percent until 2000, and finally to over 35 percent from 2001 to end 2003.

Milk prices

Vietnam milk prices, in national currency, stayed constant from 1996 to 2002. This is due to smallholder production mostly being sold to milk processing companies. The milk price decrease of about 3 percent in 2003 is due to a difference in data source. The 2003 milk price comes from a large-scale national survey while previous years' data include the major dairy regions of Hanoi and Ho Chi Minh City only.

Finally, although the national milk price has remained constant in VND, when inflation is considered, converting prices into US dollar terms, milk prices for the same period went down by 32 percent.

Explanations of variables; year and sources of data:

- Milk Production: Report from MARD for 2003; and Sullivan et al (2002).
- Development of Milk Yield: Personal communications.
- Number of Dairy Animals: Report from MARD for 2003.
- Milk Prices: IFCN Dairy Report 2004.

Milk Production

Daily Milk Yields

Number of Dairy Animals

**Milk Prices Developments
(in VND)**

**Milk Prices Developments
(in US$)**
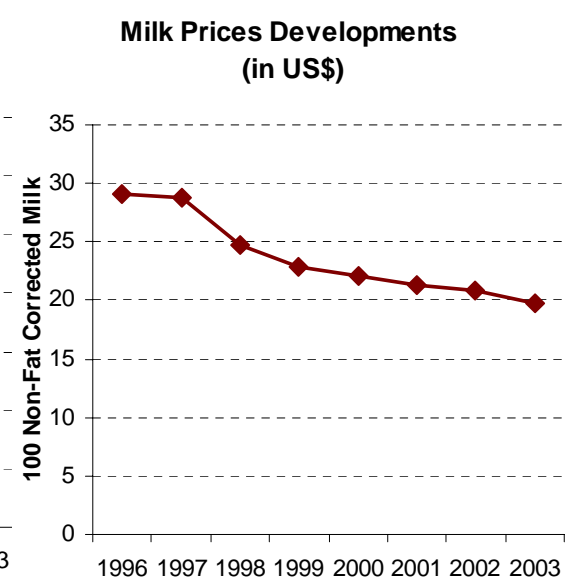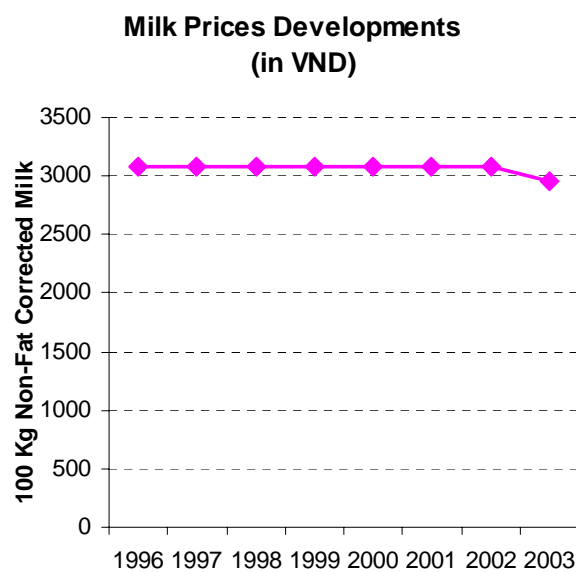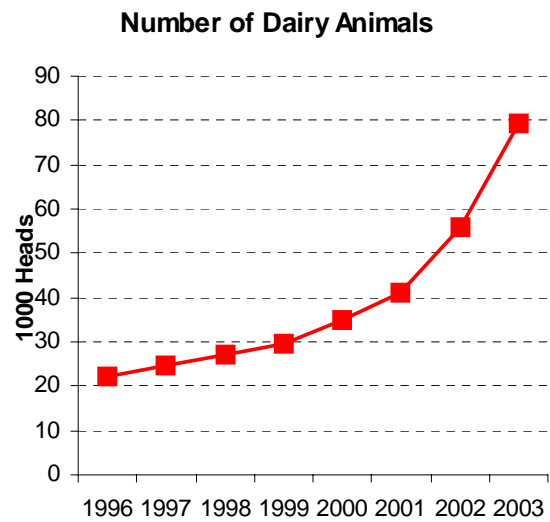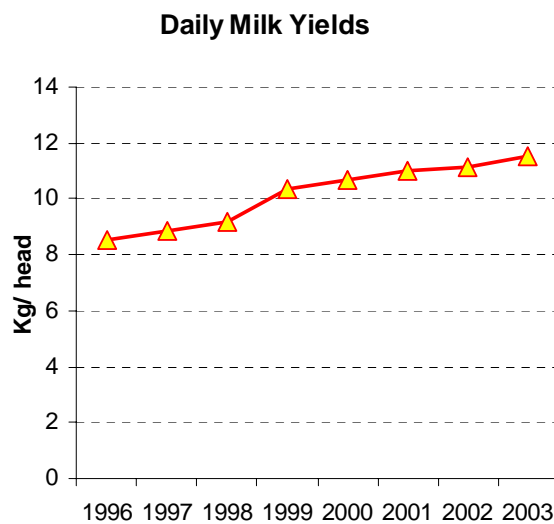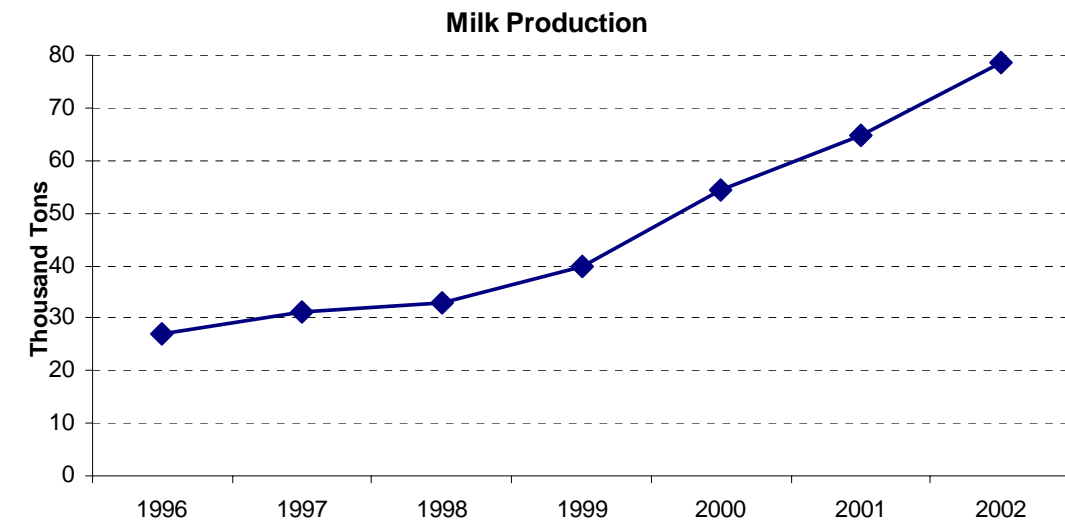
Recent Dairy Developments in Hanoi

Milk production

From 1998 to 2003, milk production in the Hanoi region increased by a factor of 2.35, which is considerably lower than the factor 3.0 recorded for the country as a whole. Before 2001, growth in milk production varied between 15 and 45 percent per year while thereafter it has been below 10 percent per year. This slowdown in the Hanoi region may be partially explained by more rapid growth in areas with a higher share of the dairy animals. (Hanoi counts with roughly 3 percent of the dairy animals in the country, while the North-East-South region, where Ho Chi Minh City is located, counts with 65 percent of the country's dairy animals.)

Although it was not possible to find reliable data for milk production per district in Hanoi, the district of Gia Lam seemed to have produced over 40 percent of the Hanoi milk in 2001.

Number of dairy animals

Between 1997 and 2003, Hanoi's dairy herd tripled (the country's dairy herd grew by a factor of 3.25 over the same period). In terms of genetic composition, the number of F1 crosses tripled, the number of F2 animals hardly doubled while the number of F3 increased by a factor 5.65 in the above period. This trend indicates that in spite of the slightly lower milk yield potential of F3 crosses, farmers prefer the latter due to their suitability to the local climatic conditions and their own skills. The adaptability of these crosses is mainly due to the Red Sindhi and Yellow Cattle, which are most commonly used for crossbreeding.

Development of daily milk yield

From 1996 to 2003, the daily milk yield grew by 20 percent (34 percent for the country). If averaged per year, the region has seen only a slight increment in daily milk yield of a little over 2.8 percent.

Explanations of variables; year and sources of data:

- Milk Production: Pham Thi Minh Nguyet, Ph.D thesis, Hanoi Agricultural University.
- Number of Dairy Animals and Development of Milk Yields: Bui Tuan Khai, Report from Dairy cattle production in Hanoi; and personal communication.

Hanoi Milk Production
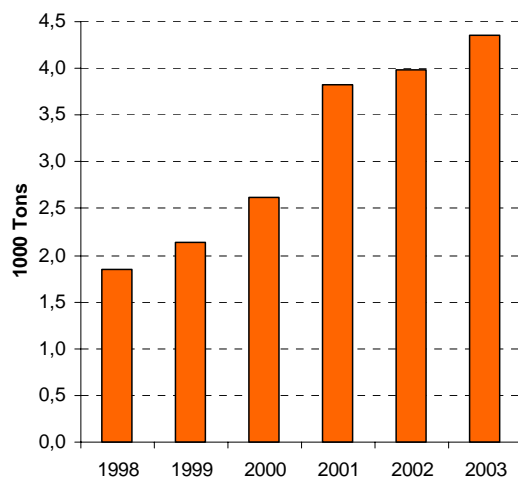
Hanoi Milk Production- Main Districts
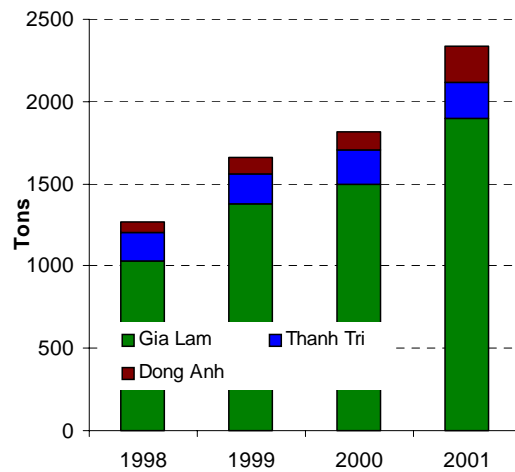
Composition of the Dairy Herd (in heads)
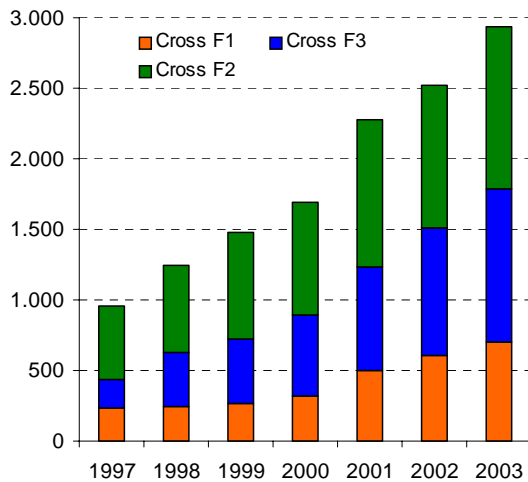
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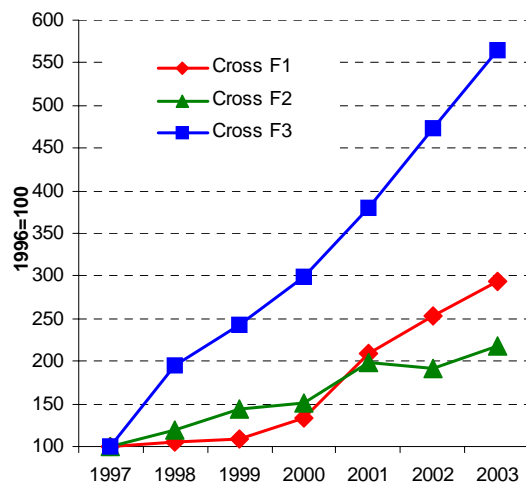
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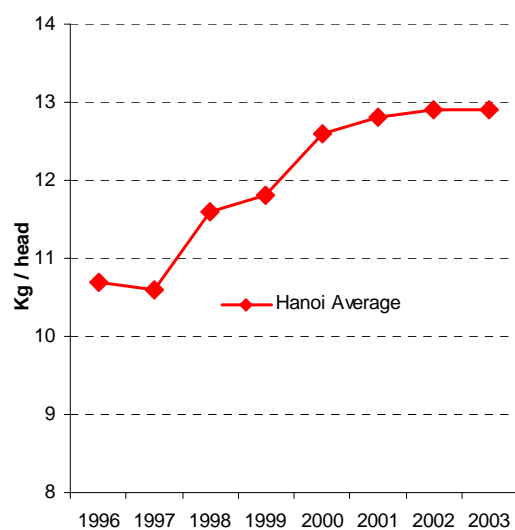
Growth of Milk Yield
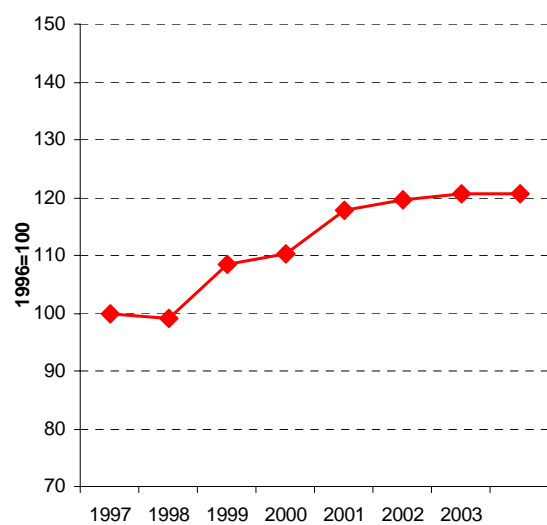
Natural Conditions and Herd Structure in Hanoi

Natural conditions (rainfall and temperatures)

Hanoi, as the rest of Vietnam, has a tropical monsoon climate with wet and dry seasons, along with higher and lower temperatures. The dry season extends from November to April, during which temperature remains under 25 degrees Celsius. For about three months per year, December to February, Hanoi has an average temperature below 20 degrees Celsius. During the rainy season (May to September), the average temperature stays over 27 degrees Celsius.

The region has excellent water resources and agriculture relies heavily on irrigation, for which pumping stations have been established in strategic locations.

Herd structure in Hanoi

Studies carried out in the four main dairy districts of the region of Hanoi show that about 75 percent of the households keeping dairy animals are found in Gia Lam district and 15 percent in Dong Anh. These two districts also keep 76 and 9 percent of the surveyed dairy animals, respectively.

Both districts are located along the Red River banks. Every rainy season, the soil is flooded and sediments improve soil quality, which in turn allows good growth of natural and planted grasses. These grasses are both cut-and-carried to the animals or animals are grazed along the river banks.

Households in Gia Lam and Dong Anh keep an average of 3 and 2 dairy animals each. Although the district of Thanh Tri, also along the Red River bank, has less households and dairy animals, its dairy herds, 4 to 5 dairy animals per household, are significantly larger.

Explanations of variables; year and sources of data:

- Temperature and Rainfall: Discover Vietnam (August 2004); at http://www.discover-vietnam.com
- Farm Structure in Hanoi: Pham Thi Minh Nguyet (2001)

Average Temperatures in Hanoi (°C)

Average Rainfall in Hanoi (mm)
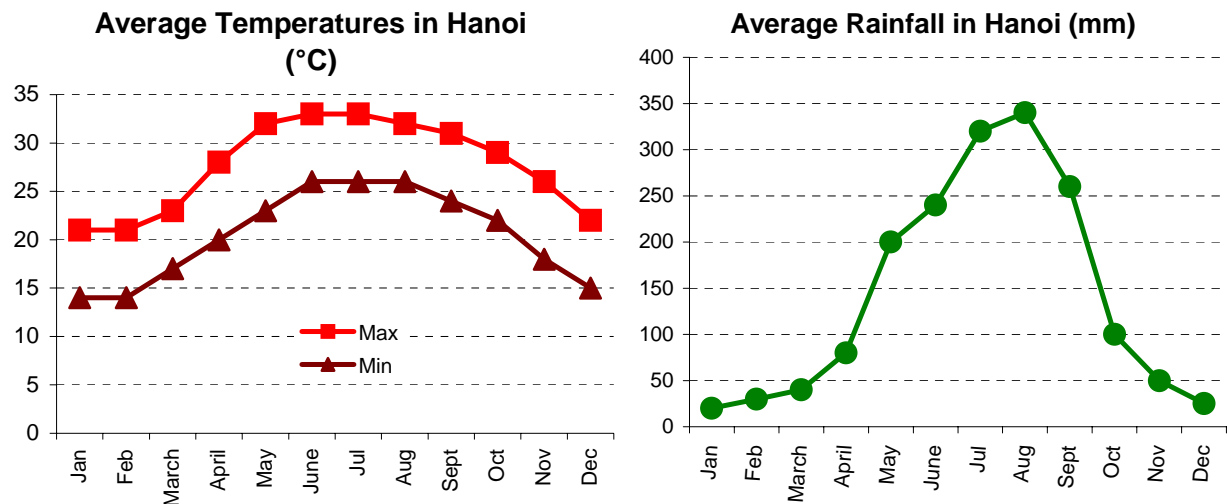
Number of Households keeping Dairy Animals in these Regions of Hanoi
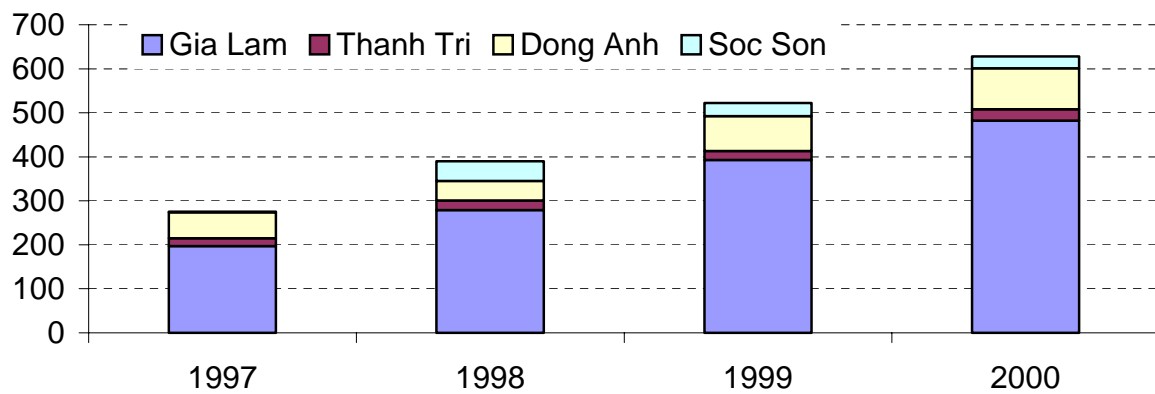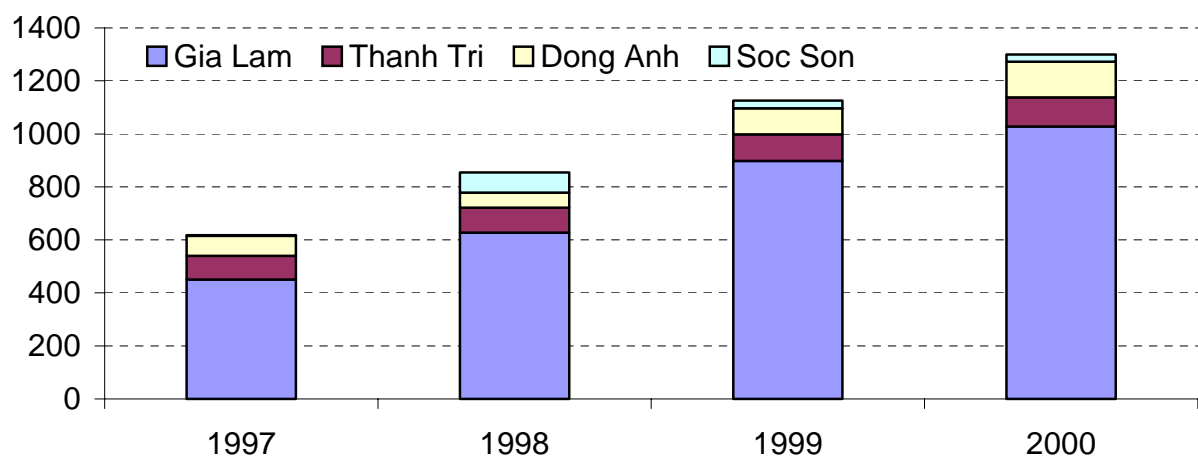
Number of Dairy Animals in these Regions of Hanoi

Description of the 'Typical' Farms in Hanoi

Although dairy farmers in Hanoi done operate the same production system, dairy herds vary in size. Using the IFCN methodology and the herd size distribution in the region, three dairy farm types were identified. One farm from each category has been analysed. Each farm is briefly described and details about the selected dairy farms can be found in the table on the next page.

2-Cow farm (VN-2)

Location: Household located in the rural area 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. It raises its own heifers as replacement. 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 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 basis are crop residues and high-protein concentrates. Lactating cows are supplemented with a mineral mixture. The farm raises its own replacement heifers. For this family, dairy farming and off-farm employment are the only sources of income.

5-Cow farm (VN-5)

Location: Household located in the rural area renting 0.46 ha of government land.

Activities: The farm keeps 5 crossbred cows and delivers 93 percent of the milk produced to a milk plant in Hanoi. The feed basis are crop residues and soybean as supplemental high protein feed. Lactating cows are supplemented with a mineral mixture. The farm raises its own replacement heifers. Sources of income are dairy farming and off-farm employment.

Farm	Units	VN-2	VN-4	VN-5
Land Owned	ha	0 *	0 *	0 *
Land Rented		0.504 **	0.468 **	0.464 **
Dairy Enterprise				
Milk Animals	no.	2	4	5
Breed	description	HF crossbred	HF crossbred	HF crossbred
Liveweight	kg	420	420	420
Milk yield	kg ECM/cow	4083	3928	3838
Fat and protein content	%	3.7% / 3.3%	3.7% / 3.3%	3.7% / 3.3%
% milk sold	%	92	93	93
Land use Dairy enterprise				
Land use for dairy	ha	0.468	0.432	0.3588
Milk produced per ha	Kg ECM/ ha	16203	33577	41355
Stocking rate ***	Cows / ha	5	10	14
Labour				
Full time employees	persons	0	0	0
Share of family labour	% of total	100	100	100
Hours per milking cow	h / cow/ yr	1300	630	575
Buildings				
Housing type	description	Three-wall bricked house + tiled roof.	Three-wall bricked house + tiled roof.	Three-wall bricked house + tiled roof.
Building Built	year	2001	1993	2002
Milking				
Milking system	description	hand	hand	hand
Calves/ Animal/ Year	head	0.92	0.92	0.87
Length of lactation	days	305	305	300
Collection Centre	km (far)	0.2	0.2	10
Herd management				
Seasonality	yes/ no	no	no	no
Age of first calving	months	29	27	27
Intercalving period	days	365	360	360
Dry period	months	2	2	2
Breeding	Method	Artificial	Artificial	Artificial
Feeding times	per day	3	3	2
Death rate	% cows	5	5	5
Cow Culling rate	% / year	20	17	12
Feeding				
Feeding systems	description	Stall fed + Seasonal grazing	Stall fed	Stall fed + Seasonal grazing
Roughage feed source	description	Grass + maize stem + rice straw	Grass + maize stem	Grass + maize stem
Concentrates fed	description	Maize + Commercial feed mix + molasses+ rice bran + mineral	Maize + Commercial feed mix + molasses+ rice bran + mineral	Soybean+ beer by-product+ rice bran + mineral
Concentrate input	g / kg ECM	453	350	792
Calf rearing				
Death rate of calves	% calves	20	15	15
Weaning period	months	4	3	3

Notes:

* In Vietnam, land is not privately owned.

** Land rented from the state for agricultural and family housing purposes.

*** Stocking rates include only the dairy cows divided by the land used for the dairy enterprise.

Farm Comparison: Household Approach

Size of the household - Labour utilisation

The farm families have between 4 and 6 members, which is typical for the region. All three families utilise their labour in off-farm activities, but the share of off-farm labour use increases with farm size. Since the husbands in farm households VN-2 and VN-5, who both work off-farm, only find short-term employment, they also work in the dairy enterprise. However, VN-4 represents the typical case, in which one family member has a full-time off-farm job and the family must manage the dairy with less labour input.

Household income levels

The household income shown overleaf includes the net cash farm income, the off-farm salary and the value of manure (for fuel) and milk used in the household. Annual incomes range between 1,570 and 5,350 US$.

For VN-5 the off-farm activity of milk collection has a big impact on household income. Although compared to VN-2 and VN-4, VN-5 allocates 1.4 and 0.6 times the amount of family labour to off-farm activities, its off-farm income is 10 and 5 times higher. VN-5's higher non-cash benefits are explained by its slightly higher milk consumption and price.

Household income structure

Non-cash benefits are more relevant for the small farms (over 13 percent of VN-2 total income). When non-cash benefits are included in household income, the net cash farm income accounts for 58 to 83 percent of household incomes.

Household living expenses

All farms are able to cover the family living expenses. The data on living expenses proved difficult to collect. For example, on VN-2, the family allegedly lives on 454 US$/year (91 US$/person/year), which seems very low.

Household Equity Growth

When living expenses are subtracted from total household incomes, all families make a surplus ranging from 1,100 to 4,200 US$/year.

*** When the farmers were asked to explain the low household living expenses and relatively high equity growth, they explained that if they had any surplus income they certainly would use it for daily living expenses.

Explanations of variables; year and sources of data:

- Size of the household: People living together in one house as a family
- Labour utilisation: Total family labour used to generate income
- Household income: Includes cash and non-cash incomes from farm and off-farm activities
- Off-farm incomes: Includes all salaries for all family members
- Non-Cash Benefits: Value of cow manure used as fuel and fertiliser, draught power & milk used by family
- Household living expenses: Minimum annual cash expenses for the family to maintain the current living conditions.
- Sources of Data: IFCN database, expert estimates, and statistics, year 2003.

Size of Household

Labour Utilization

Household Income

Income Structure

Non-Cash Benefits

Household Living Expenses
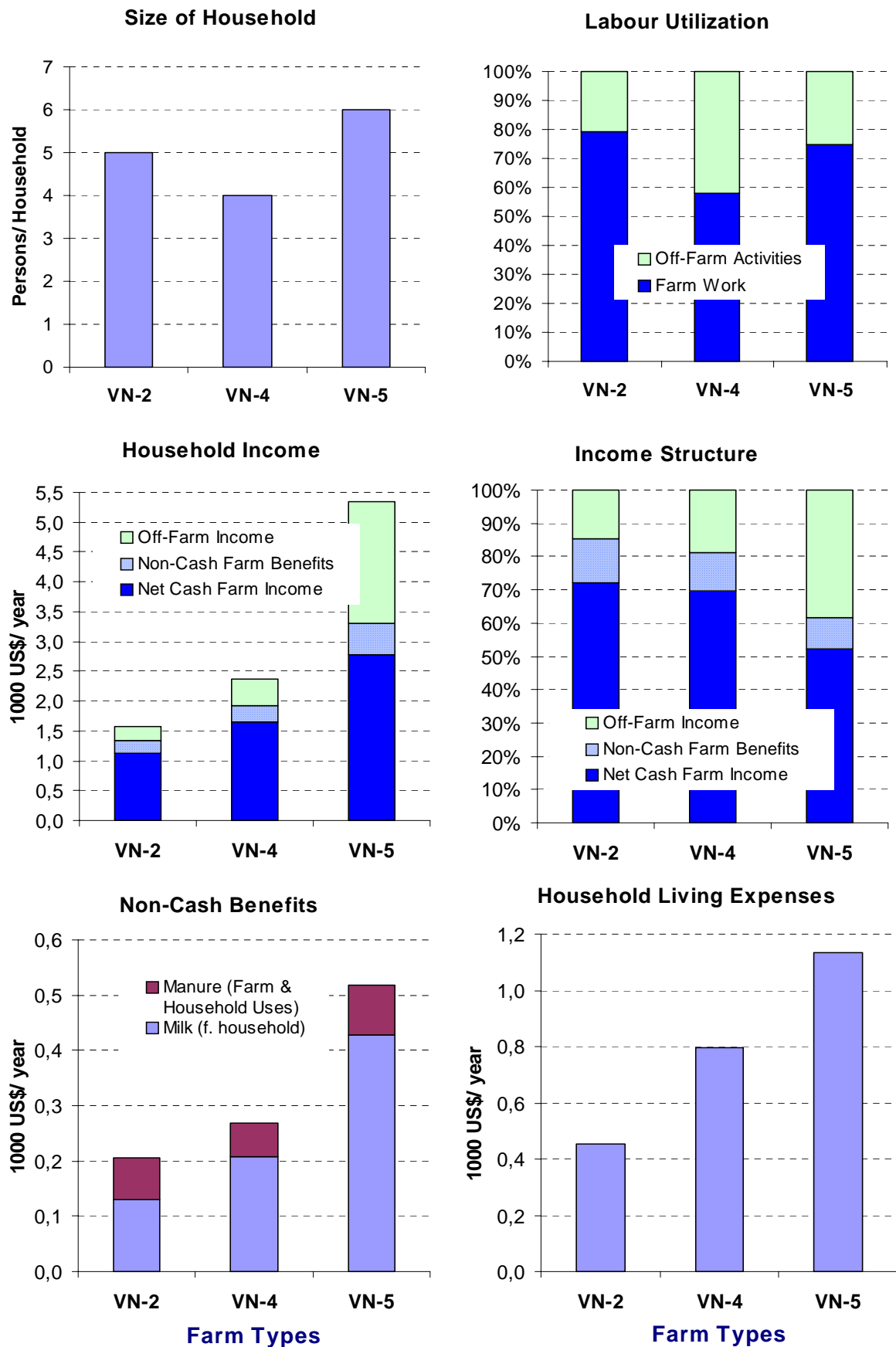
Farm Comparison: Whole Farm Approach

Farm returns

The farm returns are 2,700, 4,500 and 7,200 US$ per year for VN-2, VN-4 and VN-5 respectively. Interestingly, the small farm VN-2 is the only one having cash crops while the returns of the larger farms almost entirely stem from the dairy business (>97%).

Other farm activities refer to returns from selling/using cow manure and heifer raising in the case of VN-2.

Net cash farm income (NCFI)

The net cash farm income mainly follows farm returns and ranges from 1,135 to 2,785 US$/year.

With 42 percent the profit margin of the smaller farm is slightly higher than that of other two farms where it lies around 38 percent.

Farm assets

Asset values range from 5,000 to 15,000 US$. On the whole farm basis, the dairy animals are the most important assets representing between 75 to 85 percent of the farms' asset pool. Others assets refer to machinery, buildings and cash-in-hand.

Explanations of variables; year and sources of data:

- Total returns: All cash receipts minus the balance of inventory (for example livestock).
- Returns to dairy: Milk, cull cows, heifers, calves, sale and use of manure, draught power, etc.
- Cash crops: Sale of surplus crops like rice, wheat, etc.
- Net cash farm income (NCFI): Cash receipts minus cash expenses of the farm.
- Profit margin: Net cash farm income divided by total farm returns.
- Farm assets: All assets related to the farm (land, cattle, machinery, buildings, etc.)
- Sources of Data: IFCN database, expert estimations, and statistics, year 2003.

Total Returns of the Farm

Return Structure

Net Cash Farm Income (NCFI)

Profit Margin

Farm Assets

Asset Structure
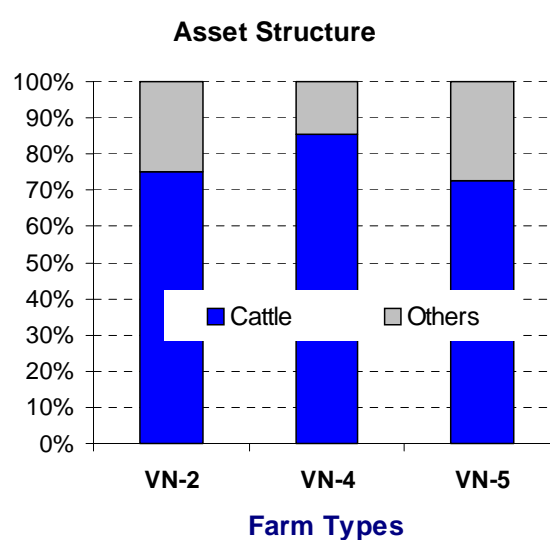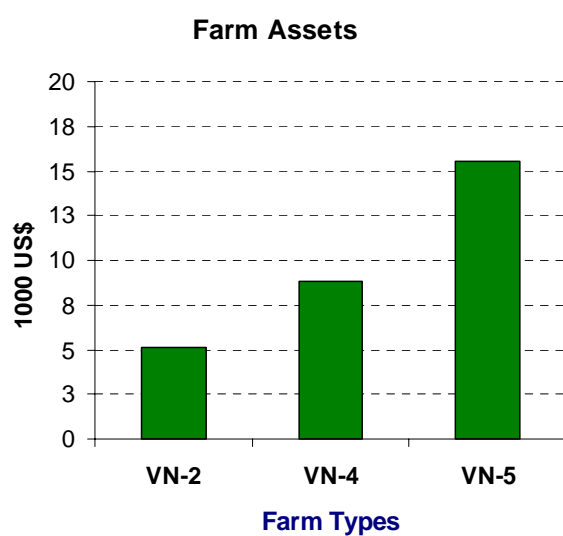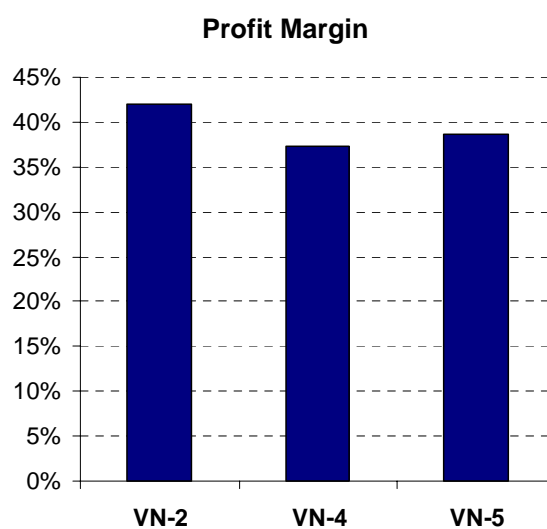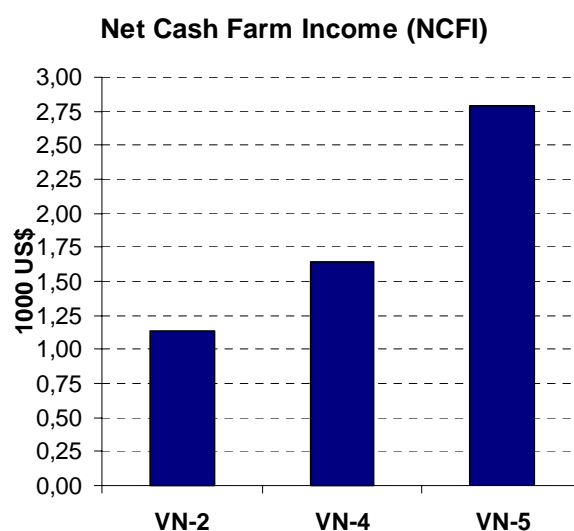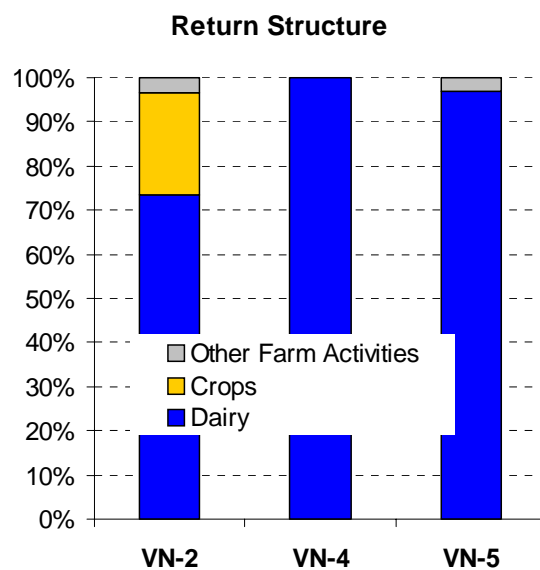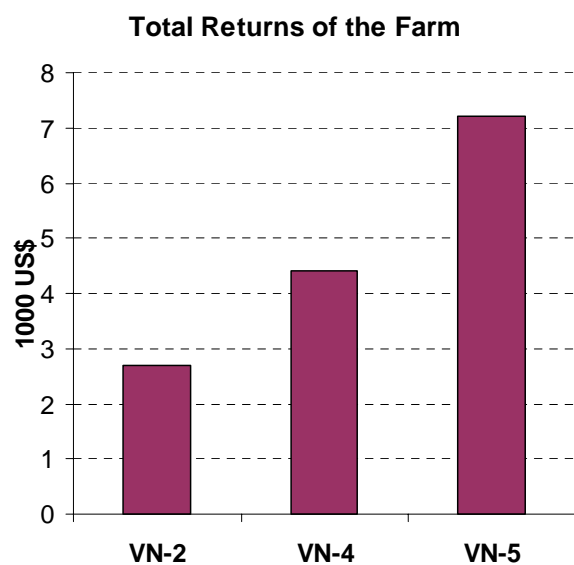
Farm Comparison: Dairy Enterprise Approach

Cost of milk production

The cost of milk production ranges from 11.5 to 17.0 US$ per 100 Kg ECM. VN-4's low cost (11.5 US$) is due to both low labour cost of family labour and low costs of means of production.

Return structure

The returns are 27, 29.5 and 39 US$ per 100 kg milk for VN-2, VN-4 and VN-5 respectively. Differences in milk returns can be explained by differences in the price of milk due to VN-5 selling directly to a milk processing company, the farmer being a milk intermediary himself. Non-milk returns result from selling livestock and/or using manure for bio-gas and as fertiliser (shown here as Other Returns).

Cost structure of the dairy enterprise

In the small farm type the land costs are 2 to 4 times those of the larger farms while its labour costs are almost at the level of the largest farm. These cost items largely explain VN-2 having higher costs than VN-4 (23.5 and 21.5 US$/100 kg ECM) while they both have similar cash costs.

The larger farm costs reach 29 US$/100 kg ECM as its feed costs are significantly higher than those of the other two farms.

The observed land and labour economies indicate that expanding VN-2 into VN-4 may decrease milk production costs by 2 US$/100 kg ECM, provided other conditions remain unchanged.

Explanations of variables; year and sources of data:

- Costs of milk production : see Annex A2
- Return structure and cost structure: see Annex A3
- Sources of data: IFCN database, expert estimates, and statistics, year 2003.

Costs of Milk Production Only

- ■ Opportunity Cost
- ■ Other Costs- Non Milk Returns
- ● Milk Price

Return Structure

- ■ Cattle Sales
- ■ Other Returns
- ■ Milk Returns

Costs Items Structure

- ■ Other Means of Production
- ■ Land Costs
- ■ Capital Costs
- ■ Labour Costs
- ■ Purchased Feed

Farm Types

Cash/ Non-Cash Cost Structure

- ■ Opportunity Costs
- ■ Depreciation
- ■ Cash Costs
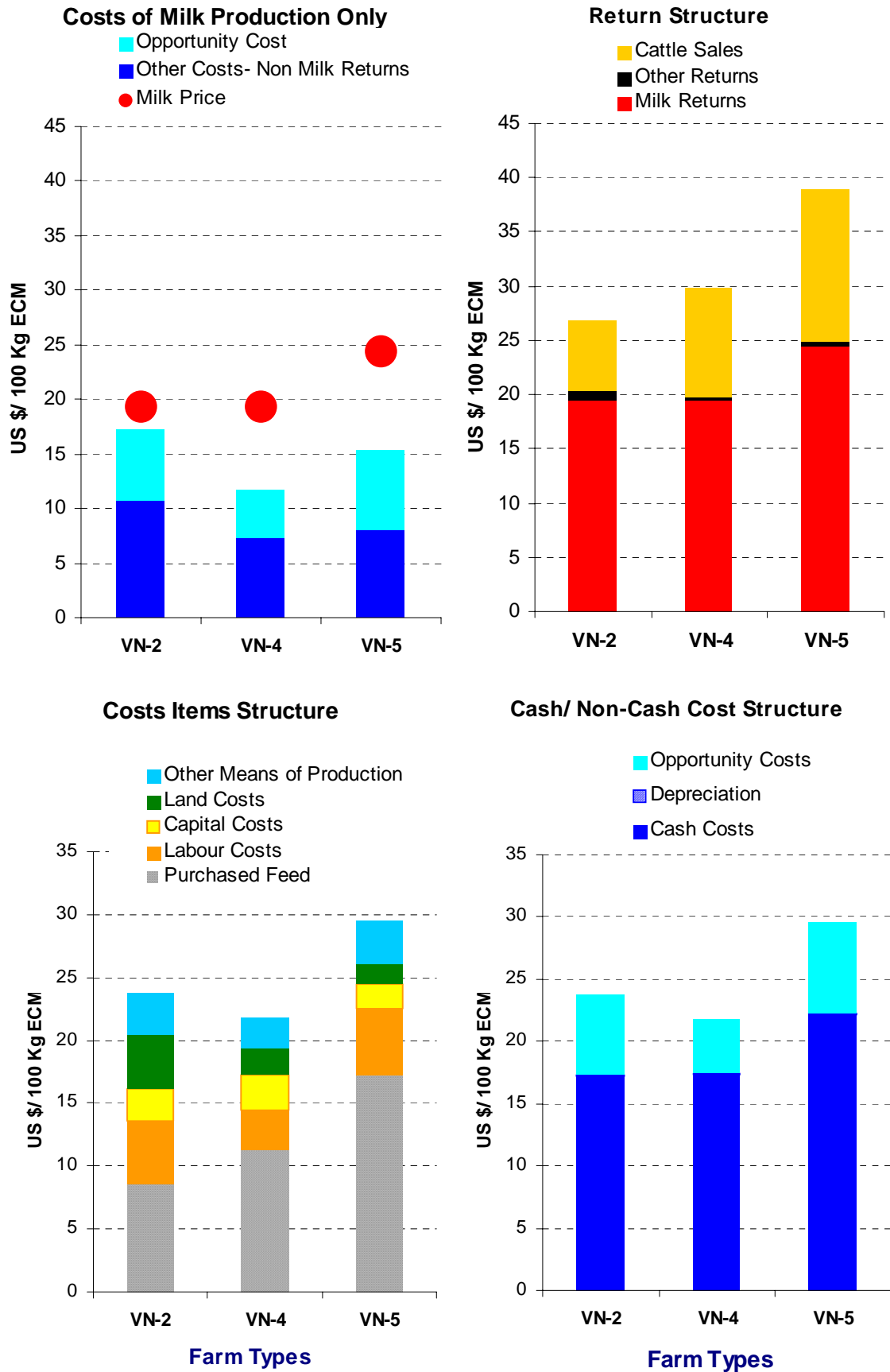
Farm Types

Dairy farm income

All four farm types cover their costs from the profit and loss account and generate a positive farm income. The income ranges from about 8.5 (for VN-2) to 16 US$/100 kg milk (VN-5).

Dairy profit margin

All farms have positive and relative high dairy profit margins, which lie between 46 and 59 percent. Interestingly, VN-2 and VN-5 have similar profit margins. These are due to lower costs for VN-2 and high milk prices for VN-5.

The high profit margin for VN-4 is mainly due to the low input of family labour and its relatively lower costs of means of production.

Entrepreneurial profit

All the farms cover their full economic costs and generate an entrepreneurial profit of 2.25 to 9.0 US$/100 kg ECM.

While an entrepreneurial profit of 2.25 US$ per 100 kg ECM is consider excellent by international comparison, the profits of 7.5 and 9.0 US$ per 100 kg ECM the two larger farms are exceptionally high.

Return to labour

All farms have higher returns to labour (wage level earned by working on the dairy farm) than the local wage level and these follow the same trend as the entrepreneur's profits. Thus household members would obtain higher returns by increasing dairy farm output than by taking up off-farm employment in the area.

The wage level around VN-5 (Thanh Tri District) is significantly higher than in the villages of VN-2 and VN-4 due to higher demand for labour, which increases the opportunity costs of family labour used for dairy farming.

Explanations of variables; year and sources of data:

- Explanations variables and IFCN method: see Annex A2 and A3
- Other returns: Value of manure (sold, home use); draught power use
- Sources of data: IFCN database, expert estimations, and statistics, year 2003.

Farm Income

Profit Margin

Entrepreneurs Profit

Return to labour
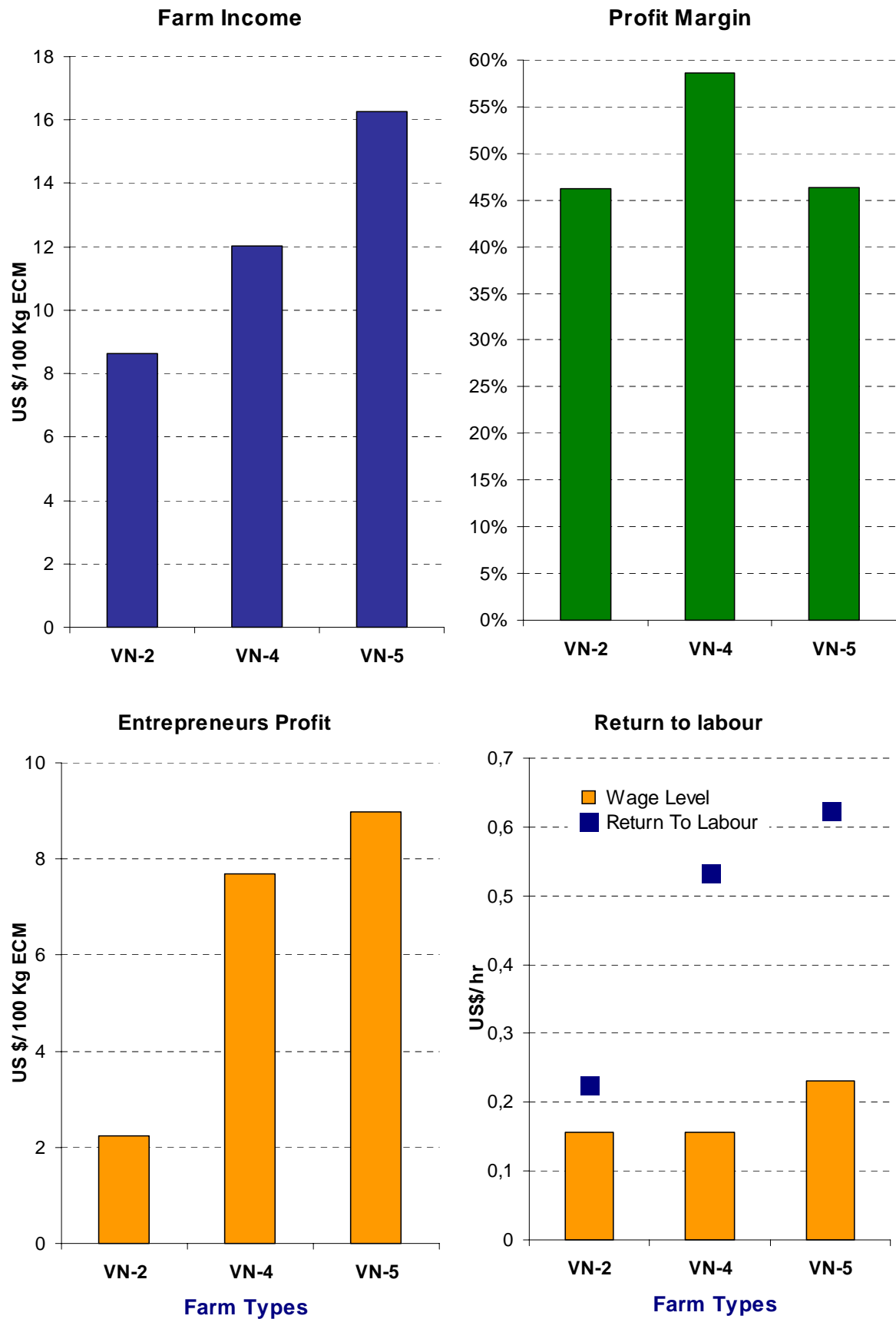
Labour costs

VN-2 requires 1.6 times the (family) labour input per dairy animal as VN-4 and labour costs per 100 kg ECM maintain the same relation of 1.6 to 1 between VN-2 and VN-4. With respect to VN-5, VN-2 uses about 1.5 times the labour input per animal, but due differences in the local wages, VN-2 labour costs are only 0.95 those of VN-5.

During the grazing season, a person can easily care for more than 2 dairy animals without requiring extra time input. Therefore, VN-2's high labour input could be dramatically lowered by increasing herd size or joining into a cooperative grazing arrangement with similar small farmers, sharing the time used for grazing supervision.

Capital costs

The capital costs per dairy animal are highest in the largest farm, whereas in terms of capital costs per 100 kg ECM produced, capital input is highest in the medium-sized farm. This is the case because VN-4 has a loan double to that of VN-2; while VN-5 has no loan to repay.

Land costs and 'stocking rates'

Land costs for VN-2 to produce 100 kg ECM are 2 and almost 3 times the costs incurred by VN-4 and VN-5 to produce the same amount of milk output. Furthermore, VN-4 land costs are 1.35 times those of VN-5, which further indicates that economies of scale might operate in the reduction of land costs for these farms.

Notice that land costs per 100 kg ECM are inversely related to stocking rates and that even VN-4 only has two-thirds the stocking rate of VN-5. VN-2 has the lowest stocking rate with only half and one-third of the number of dairy animals per ha compared to VN-4 and VN-5.

Explanations of variables; year and sources of data:

- Explanations variables and IFCN method: see Annex A2 and A3
- Stocking rates: the number of dairy (adult) cows/land (ha) allocated to the dairy enterprise only.

Labour Input per Dairy Animal
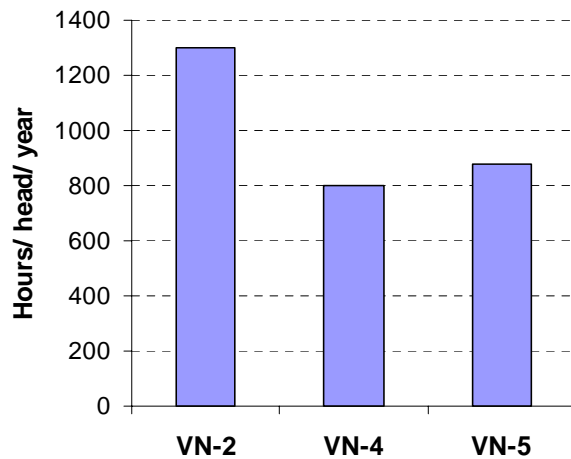
Labour Costs
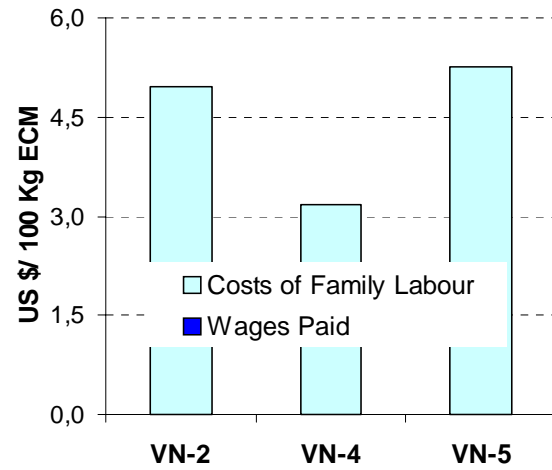
Capital Input per Dairy Animal
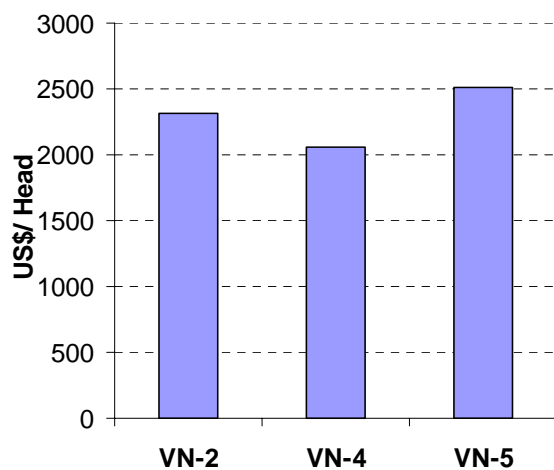
Capital Costs
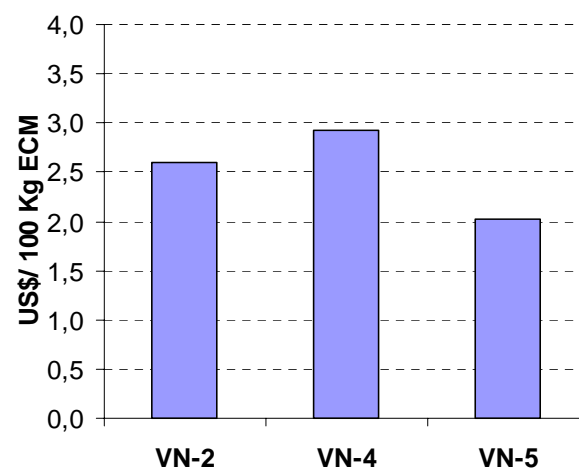
Land Costs
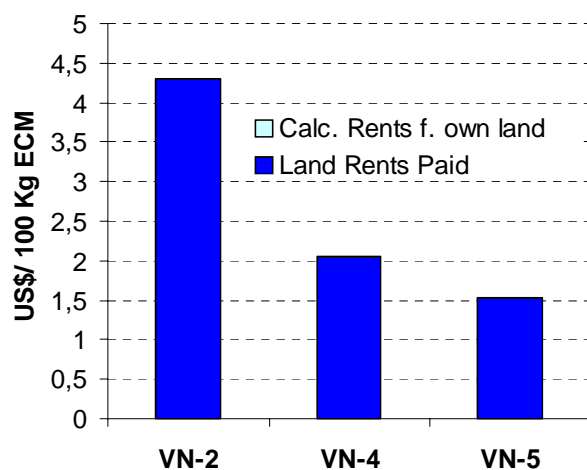
Stocking Rate
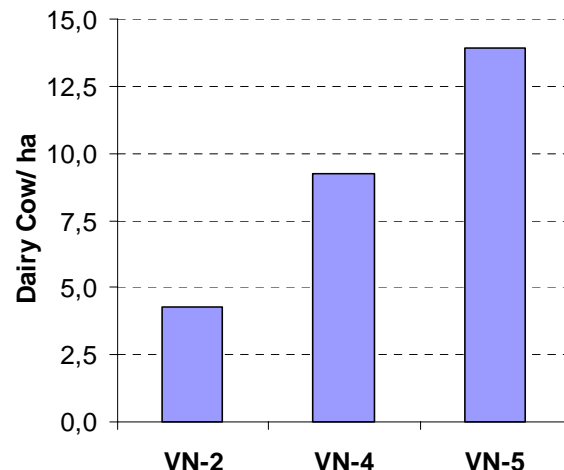
Farm Types

Farm Types

Sensitivity to Variation in Livestock and Heifer Prices

Heifer prices were a record high during 2003 and showed a decreasing trend by the time this report was being finalized. Therefore, this section aims at assessing the impact of declining beef and heifer prices on the farm returns, costs of milk production, and return to labour of the dairy enterprise. In order to simplify the exercise, we chose one farm, VN-4, and three scenarios.

(See abbreviations and scenario descriptions in the box below)

Dairy farm returns

A decline of beef and heifer prices by 20 percent lowers the dairy farm returns for VN-4 by 7 percent. This relatively low impact can be explained by the fact that VN-4 only made 34 percent of its dairy returns from cattle (beef and heifer) sales. Furthermore, of this 7 percent decrease, 5 percent (or 70% of the total variation) are due to changes in the heifer price only.

In 2004, heifer prices decreased by 8 percent. Applying this more moderate price decrease, dairy farm returns decrease by only 2 percent (from 29.5 to 28.9 US$ / 100 kg ECM).

Cost of milk production only

Lowering beef and heifer prices by 20 percent increases the costs of milk production by 15 percent. This can be explained by the IFCN methodology, which benchmarks costs of milk production ONLY. For this, all non-milk returns are deducted from the total (cash) costs of producing milk. Note that VN-4 has returns from manure used / sold as fertilizer. Applying the 2004-heifer prices, the 'cost milk production only' increases by merely 5 percent.

Return to labour (in the dairy enterprise only)

A decline in beef and heifer prices by 20 percent has a reduces the return to labour imputed for the dairy farm by 17 percent. With 2004-heifer prices, the return to labour in VN-4 decreases by 5 percent.

Conclusion: The 8 percent decrease in heifer prices from 2003 to 2004 only has a minor impact on farm returns (-2%), costs of milk production (+5%) and return to labour (-5%). Furthermore, heifer prices can be expected to remain high given a strong demand from (a) herd size expansion of current dairy farms, and (b) poultry producers switching to dairy production as a reaction to the current avian influenza epidemic.

Explanations of variables; year and sources of data:

- **VN-4 SQ**: VN-4 Status Quo.
- **BH -20**: Beef & heifer prices decreased by 20 percent.
- **H -20**: Only heifer prices (only) decreased by 20 percent. Beef prices and livestock asset valuation kept as in status quo.
- **H –8**: Only heifer prices decreased by 8%, which corresponds to the estimated 2004-heifer-price level. Beef prices and livestock asset valuation kept as in status quo.

Costs & Returns of the Dairy Farm

- Dairy Farm Costs
- ◆ Dairy Farm Returns

Variation from the Status Quo level

- Dairy Farm Returns

Costs of Milk Production (Only)

- □ Opportunity costs
- ■ Total costs from P&L account - non milk returns
- ● Milk price

Variation from the Status Quo level

- Costs of Milk Prod (Only)

Return to Labour

- Return on labour input (per h)
- Local farm wage

Variation from the Status Quo level

- Return to Labour
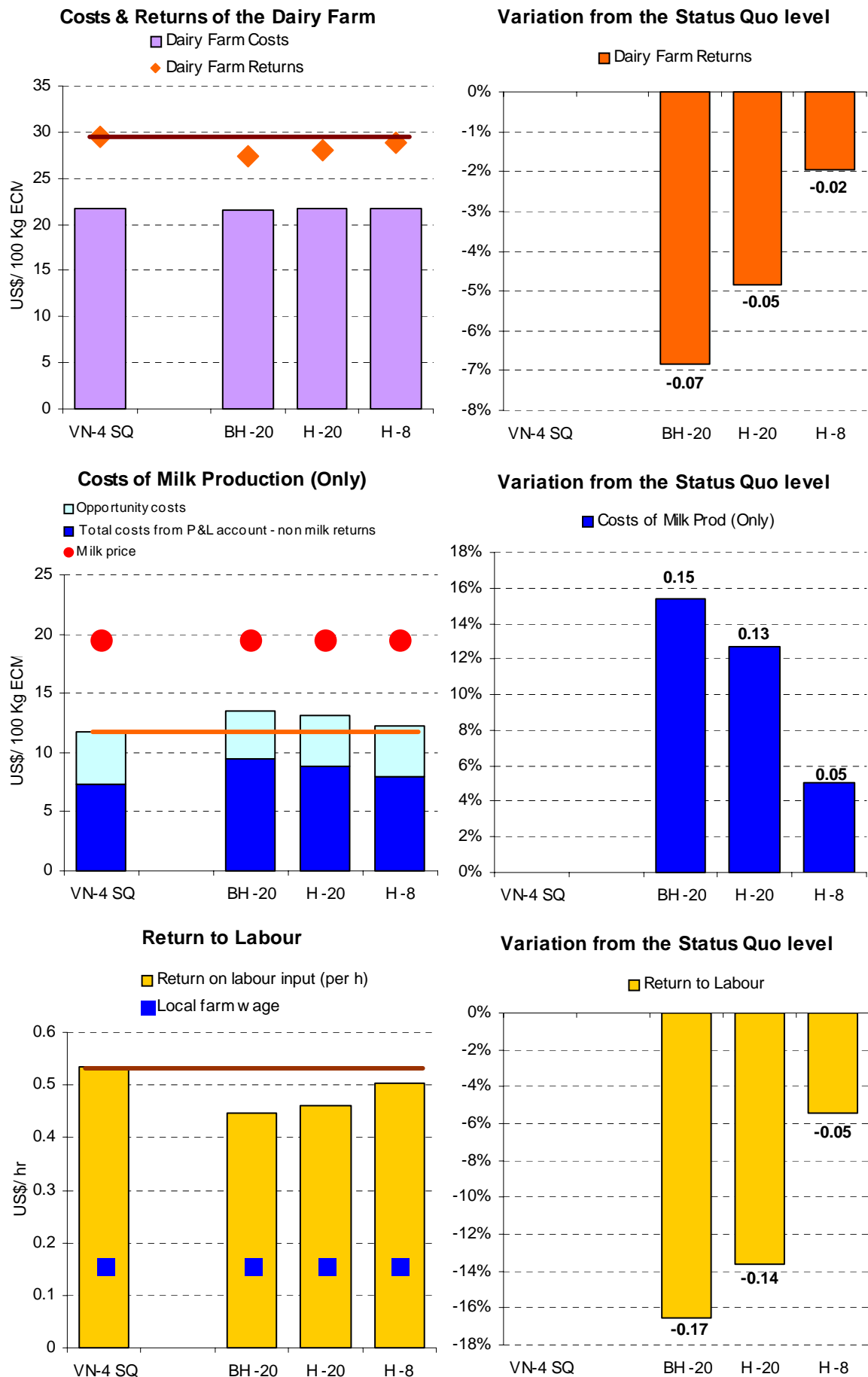
Main Distribution Channels for Dairy Products in Hanoi

While in India and Pakistan's urban centres, the formal sector only handles a small share of the domestic milk production, the formal processors around Hanoi handle the bulk of the local production. This dominance of the formal sector in Hanoi can be explained to a large extent by the following characteristics of dairy development in the area:

1- From very early on, the formal dairy processing sector has been a driving force in the promotion of dairy farming in the region.

2- The major dairy processors have established numerous milk collection centres, reaching most, if not all, small producers in the region.

3- Small dairy farmers normally produce milk for the (cash) market since they consume very little of their own milk. This makes them very market-oriented (unlike dairy farmers in India and Pakistan who produce mainly for self-consumption and only in the second instance for the market)

The diagram on the next page depicts a simplified version of the main milk marketing channels in the formal and informal sectors in Hanoi.

It is estimated that 90 to 95 percent of the milk produced in and around Hanoi is captured by the formal sector, which consists of two major dairy processors, Vinamilk and Hanoi Milk. These processors partner with local co-operatives and/or individuals, both of which act as milk collection centres. Despite the large share of the formal sector, an informal sector, which consists of small milk shops, does exist. These shops handle 5 to 10 percent of the region's fresh milk volume and sell either directly to consumers or to retailers, both within the city of Hanoi.

The formal sector uses the bulk of the milk to produce various types of liquid milks, which are pasteurised and packed in plastic or tetra pack containers. The formal sector also produces condensed milks, yoghurts, UHT and powder milk. It is estimated that about 84 percent of the formal sector's dairy products are made from imported milk.

Regarding packaging of the formal sector's products, retail shops normally offer most liquid milks in 200 to 300 ml plastic or tetra-pack containers. Larger food stores, which are significantly fewer, hold milk in larger containers of up to 1 litre.

The informal sector normally sells fresh milk and yoghurt. These products compete well in price since they are produced from local milk using household labour and simple packaging. It is estimated that with increases in income, consumers will prefer higher quality dairy products, which will pose a major challenge to the informal sector.

Simplified Diagram of the Distribution Channels for the Domestic Milk in Hanoi

Formal sector 90 - 95% share		Informal sector 5-10% share
Milk from dairy farmers		
Collecting centres 80% share	1% share	Retailers 4% share
	Middlemen 15% share	
Milk companies		
	Retailers/distributors	
	Consumers	
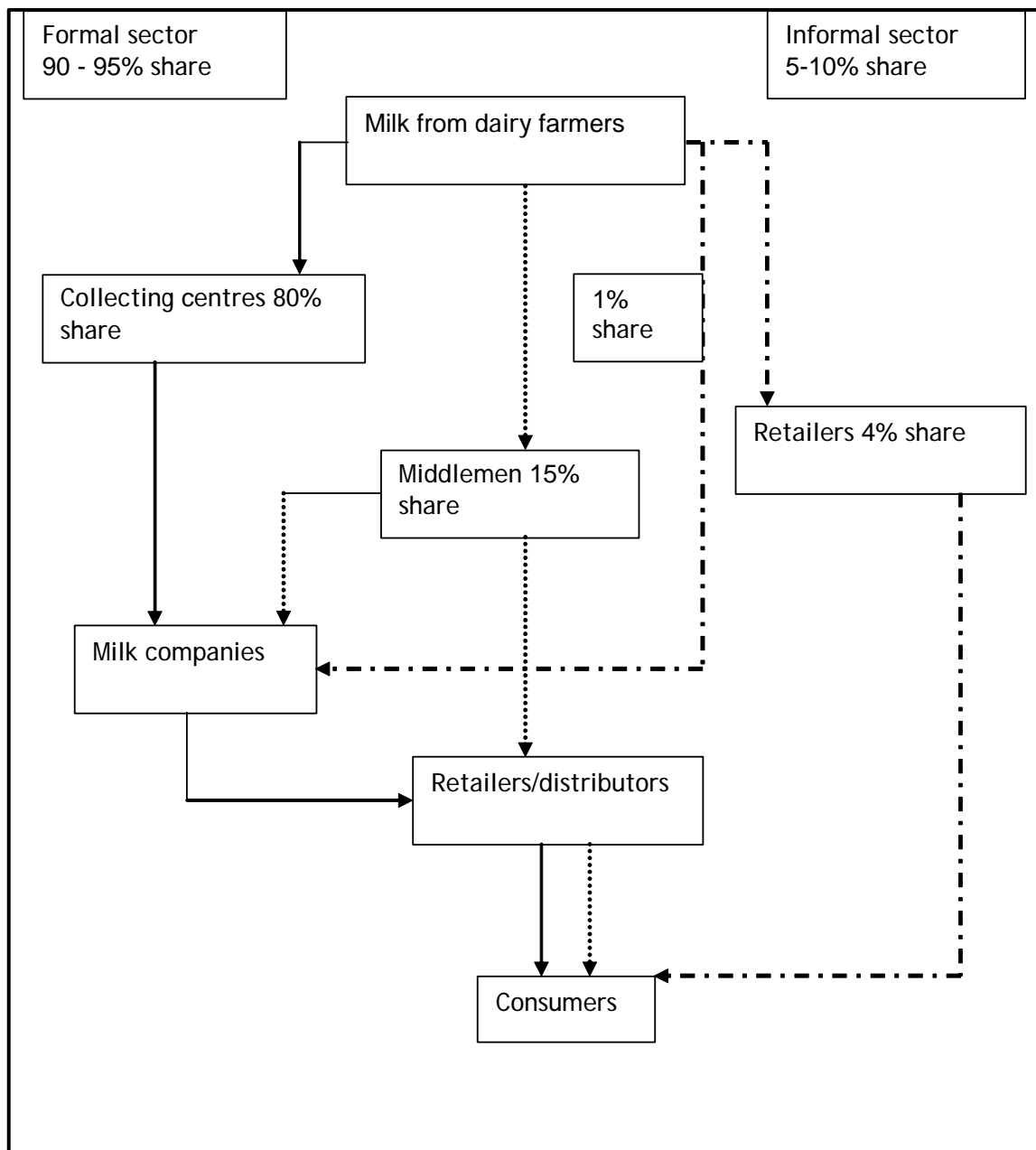
Source: Personal communication Mr. Bui Tuan Khai - Director of the Dairy Milk Production Project in Hanoi, February, 2004.

Margins in the Dairy Chains: Farmer to Consumer

In this section, the margins in the dairy chains around the city of Hanoi are analysed. For the sake of practicality and comparability between dairy chains, calculations are based on the assumption of the various dairy chains purchasing one kg of non-corrected milk, processing it into their most popular (fluid) milk product, and selling it to the end-consumer. Although prices were available, details about processing were impossible to obtain. Therefore the calculations are based on assumptions derived from the authors' knowledge of dairy processing for similar products (details in Annex A6). Consequently, the calculations should be regarded merely as an exploratory exercise intended to support other sections of this study rather than as a definitive assessment.

The dairy chains

Fresh Milk (8.3 % Sugar): Processors buy milk at 3.7 percent fat and sell it pasteurized, sweetened and packed at 3.45 percent fat.

Fresh Milk (whole): Dairy farmers boil their fresh milk and deliver it directly to consumers' homes at 3.7 percent fat.

Input costs of the dairy chains

Each chain buys 1 kg fresh milk at 3.7 percent fat. The farmer milk prices are centrally fixed at 0.197 US$/kg of milk with 3.7 percent fat for both sectors. Only the formal sector adds sugar (8.3% on volume basis), at the current cost of 0.036 US$/kg.

Returns of the dairy chains

The returns per kg of milk are 0.63 and 0.44 US$ for the formal and informal chains respectively. While the formal chain makes a 43 percent higher return than the informal chain, the average consumer price is 30 percent higher for the milk product in the formal sector (0.60 and 0.46 US$/kg milk for the formal and informal sectors). This difference in returns is largely attributable to the formal sector's higher consumer prices due to better milk quality through pasteurisation, sweetening and packaging, leading to longer product shelf life.

## Margins in processing and retailing (returns minus cost of inputs)

The margins attained from processing and retailing are 0.43 and 0.24 US$/kg milk for the formal and informal chains respectively. Thus, the formal chain has a margin 1.8 times that of the informal chain. Although the informal chain in Vietnam has the relatively lower margin of 0.24 US$/kg milk, this still is 2 and 1.5 times the margin obtained by milkmen in Punjab, Pakistan and the sweet shops in Sirajganj, Bangladesh. Vietnamese dairy companies' margins of 0.43 are within the levels obtained by European dairy chains (0.30 – 0.50 US$/kg).

Farmers' shares

Farmers' shares in end consumer prices are 31 and 45 percent in the formal and informal chains. These values are similar to those found in other countries and highlight the capacity of the formal sector to add value to milk, which, in turn, tends to decrease farmers' shares in consumer prices when compared to the informal sector.

Explanations of variables; year and sources of data:

• For more details on the diary chain calculations, see Annex A6.

Input costs of the Dairy Chain
Basis 1 kg milk from the farmer

Returns of the Dairy Chain
Basis 1 kg milk from the farmer

Margins for Processing and Retailing

Margins and Farmers Shares
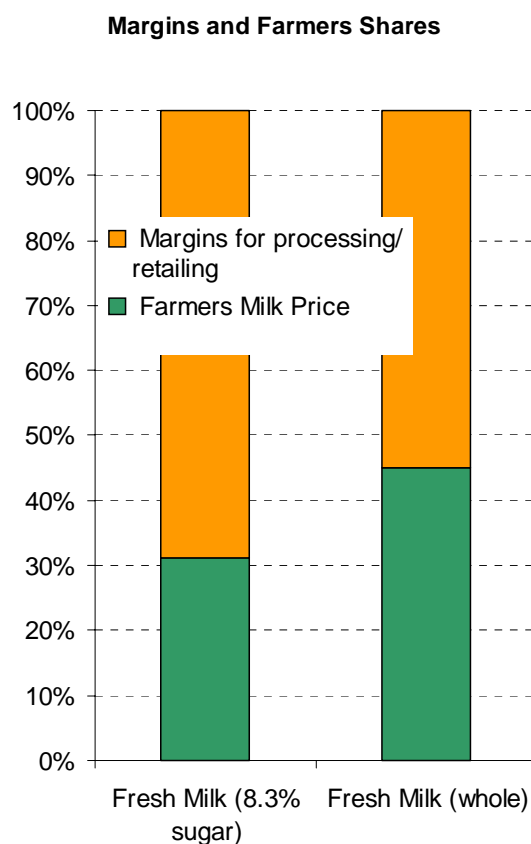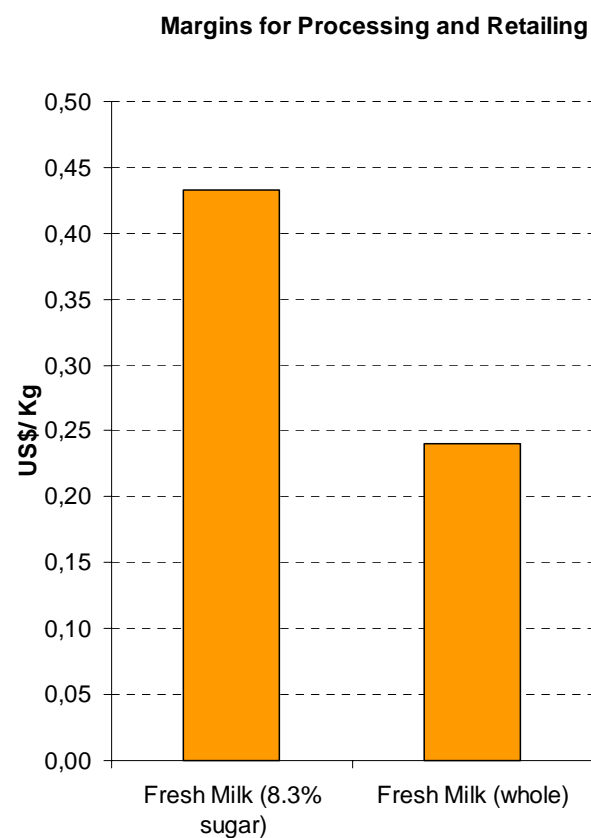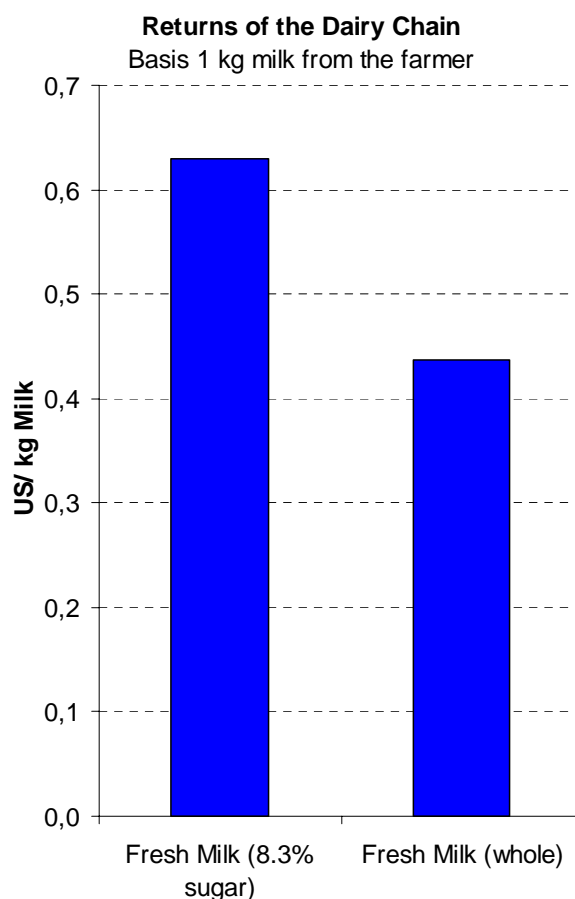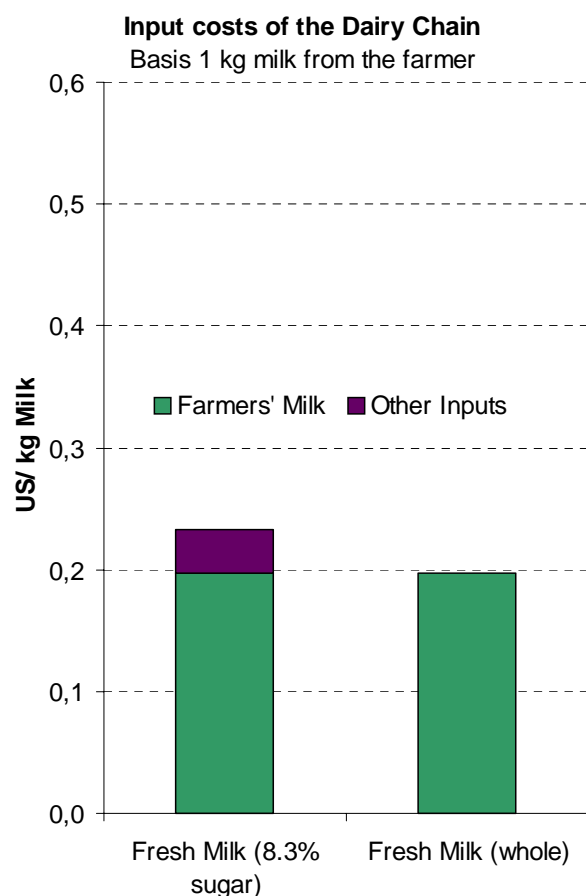
The policy analysis matrix (PAM), developed by Monke & Pearson (1989), was used as an instrument for empirical analysis of the impact of Vietnam's agricultural policy on typical farms and the dairy sector. Through the use of the PAM, it is possible to quantify the impacts of applied policy measures and market structures on commodity systems. This quantification is based on the comparison of 'private prices', which are the actual farm gate prices, with 'social prices', which can be understood as those prices that would prevail if markets were not influenced by policy measures and other distorting market structures.

The PAM approach is employed because of its simple and understandable nature, particularly for policy makers. The following results were produced with a policy tool, within the IFCN model, whose development is part of an ongoing PhD project[*]. For more details on the methodology and data, please refer to Annex A5.

Competitiveness Analysis

Considering the costs of all family resources at market prices, all of the dairy farms are highly profitable since they make entrepreneurial profits ranging from 3 to 9 US$/ 100 kg milk for the smallest and largest farms respectively.

Applying social prices, the smallest farm makes a loss of 2.8 US$/ 100 kg milk, which is attributable to the high input of labour and borrowed capital, both heavily subsidized, as compared to the other farms. VN-4's low labour and capital use result in the highest profit at social prices.

The combination of high private profits (largely effected by current policies) with either social losses or low profits after accounting for the effects of current policies) indicate that these farming systems are greatly benefiting from existing protective policies and market distortions. The divergence between private and social profits results from the 'transfers' to these farms to keep them operating at the current levels of private profit. The support received ranges from 5.7 to 9.4 US$/100 kg milk for the smallest to the largest farm respectively.

Support is provided through output prices that are higher than world market levels as well as through artificially lowered prices for labour and capital. For VN-2, for example, gross support amounts to 7.3 US$/ 100 kg milk. However, as the government taxes tradable inputs, net support is reduced to 5.7 US$/ 100 kg milk. The 'high' prices for tradable inputs are mostly a result of import duties on feed. Note that the support through output prices is highest for the larger farm due to the higher milk price.

The larger the farm, the more benefits it captures from output price protection and subsidization of the use of labour and capital. It is also true that the larger farms pay more taxes on inputs (3.2 US$ for VN-5), but overall the net result is that larger farms benefit more the existing policies than smaller farms.

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[*] Stoll, J. (2005). Development and Application of Methods to Measure the Influence of Agricultural Policy on Farms – An Extension of the IFCN-Model. Discussion Paper N° 19, Institute of Agribusiness, Giessen.

Table 5.1 *Competitiveness analysis of typical dairy farms (US$[1]/100 kg ECM)*

| Farm type | Prices | Returns | Costs | | Profit |
			Tradables	Factors	
VN-2	Private	26.9	9.8	13.9	3.2
	Social	23.0	8.2	17.4	-2.8
	Divergence	3.9	1.6	-3.4	5.7
VN-4	Private	29.8	12.1	9.7	8.1
	Social	24.2	10.1	13.7	0.4
	Divergence	5.6	1.9	-4.0	7.7
VN-5	Private	39.0	18.1	11.4	9.5
	Social	31.4	15.0	16.4	0.0
	Divergence	7.6	3.2	-5.0	9.4

[1] Exchange rate: 1 US$ = 16,607 VN Dong

Analysis of Comparative Advantage

An important application of the PAM is the possibility to compare different production systems nationally and internationally. The necessary information is derived by taking the ratios of several result-identities of the PAM. These ratios provide information about the comparative advantage and the level of protection of the different production systems. The following ratios were selected to assess the comparative advantage of the Vietnamese dairy farms:

The **Private Cost Ratio (PCR)** is an indicator for comparative competitiveness. The ratio indicates how much the production system of interest can afford to pay for the domestic factors of production and still remain competitive. The results for this ratio show that dairy farming is profitable for the farmers as they produce more value-added than their domestic resources cost. In other words, from the milk returns the farmers can pay for all tradable inputs and are still left with 54 to 82 percent of the returns to pay for the domestic resources used (which leaves high profits).

The **Domestic Resource Cost Ratio (DRC)** is like the PCR but calculated at social prices. Because the DRC considers the true cost of domestic factors (after eliminating the effects of policies), it is an excellent indicator of the efficiency with which domestic resources are utilized by a system to produce value-added. DRCs below 1 indicate a comparative advantage of a system. Of the farms studied, only the two larger ones have high enough returns to pay the tradable inputs and the full value of domestic factors. VN-2's high DRC is mainly due to the relatively high use of subsidized capital (loan), which ultimately means that without external support this farm would have great difficulties to survive.

The **Nominal Protection Coefficients for Outputs and Inputs (NPCO and NPCI)**. These coefficients show that the producers are protected with respect to their outputs (NPCO>1) while they are paying taxes for the inputs (NPCI>1). Policy distortions and market conditions result in the market prices of outputs and inputs to be respectively around 21.5 and 20.0 percent higher than they would be under free market conditions.

The **Effective Protection Coefficient (EPC)**. The EPCs for all three farm types are well above 1, which indicates that the effect of protecting output prices is greater than that of taxing tradable inputs. (Note that the EPC does not consider the cost of domestic factors.)

The **Producer Support Estimate (PSE) indicates** the proportion of the private farm returns that are due to policy interventions. For instance, a PSE of 0.24 for VN-5 indicates that for each US$ of farm returns, 24 cents are provided by farm support policies.

Table 5.2 *Summary of PAM ratios for typical farms in Vietnam*

PAM Ratio/Indicator[1]	Farm type		
	VN-2	VN-4	VN-5
PCR	0.82	0.54	0.55
DRC	1.17	0.97	1.00
NPCO	1.17	1.23	1.24
NPCI	1.19	1.20	1.21
EPC	1.16	1.26	1.27
PSE	0.21	0.26	0.24

[1] See Annex A5 for the explanations of indicators

6. CONCLUSIONS

Dairy Development in Vietnam

Between 1996 and 2002, milk production in Vietnam tripled, reaching a volume of 78,450 tons in 2002. This development, over just six years, is mainly attributable to a strong increase in the domestic demand for dairy products coupled with very supportive policies directed at the development of the domestic dairy sector.

The average milk yield per dairy animal also increased by 35 percent over the last six years, but it is the number of dairy animals, which has made the biggest increase, rising by 360 percent. Over 60 percent of these dairy animals are found in the North East South region, which includes Ho Chi Minh City, while Hanoi accounts for about 3.5 percent only.

Dairy Farming in Hanoi

Total annual household incomes range from 1,570 to 5,350 US$. Non-cash benefits are more relevant for the smaller farms (over 13 percent of VN-2's total income) When non-cash benefits are included, the net cash farm incomes account for 83 to 58 percent of the household incomes for farms VN-2 and VN-5 respectively.

Total annual farm returns range from 2,700 to 7,200 US$ and the net cash farm income follows a similar trend, ranging from 1,135 to 2,785 US$. All farms have excellent profit margins of around 40 percent.

The cost of milk production varies between 11.5 and 17.0 US$ per 100 kg ECM. The average-sized farm, VN-4, has the lowest costs (11.5 US$), which is mainly due to its low labour costs for family labour and low costs for means of production.

The returns per 100 kg milk vary between 27 and 39 US$. The differences in milk returns are due to price differences with the large farm selling directly to milk retail shops in Hanoi and the milk processing company.

The results seem to indicate that expanding VN-2 into VN-4 may reduce production costs of milk production by 2 US$/ 100 kg ECM, provided other factors remain equal. These potential effects of economies of scale appear to be driven by the land and labour cost components.

Dairy Chain in Hanoi

Between 90 and 95 percent of the milk marketed in the region of Hanoi is captured by the formal sector, which mean basically by the two largest processors, Vinamilk and Hanoi Milk. Despite the large share of the formal sector, an informal sector, which consists of small milk shops, does exist. These shops deal with 5 to 10 percent of the region's fresh milk (in volume terms) and sell either directly to the end-consumer or to other retailers, both within the city of Hanoi.

Producer milk prices are similar in both sectors (0.197 US$/ kg). However, the consumer price is 1.44 times greater in the formal sector, which pasteurises, adds sugar, packs and distributes its most popular fluid milk product. The margins attained from processing and retailing are 0.43 and 0.24 US$/kg milk in the formal and informal sectors.

As a result of the 'value-adding', farmers' shares in the final consumer prices are 31 and 45 percent in the formal and informal sectors. These findings are consistent with previous results from similar exercises, which highlight the formal sector's high

capability to add value to milk, which, in turn, tends to decrease farmers' shares in the consumer prices when compared to the informal sector.

PAM Analysis for Typical Dairy Farms

The PAM results show that at prevailing market prices Vietnamese dairy farms are to be highly profitable for their owners (3.0 to 9.5 US$/100 kg milk), while, using 'social' prices they would barely break even. The smaller farm type would even make a loss. All three farm types analyzed receive public support, ranging from 6.0 to 9.5 US$/100 kg milk for the smallest to the largest farm respectively. Hence larger farms make bigger private profits and capture higher levels of support. On the other hand, the larger farms' private profits are reduced by paying more taxes on tradable inputs (feeds). A set of PAM ratios shows that farm outputs are supported and tradable inputs are taxed by 21.5 and 20.0 percent respectively. The net result is that farms benefit significantly from current policies and market conditions and about 24 percent of the private returns result from external support.

These high support levels (private profits minus social profits) clearly demonstrate a high degree of imperfection in the Vietnamese dairy market, and consequently there should be significant potential for increasing production and competitiveness through policy measures.

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Other sources used appear at the page bottom where the data is presented

This chapter presents the methods and sources of information used to collect data about the dairy sector in Hanoi 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 2004, the number of participating countries extended to 31 countries with 86 farm types that represent more than 70 percent of the world milk production.

Within this scientific Network, FAL-Federal Agricultural Research Centre (Germany) through its Institute of Farm Economics is acting as the co-ordination centre for scientific issues.

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 put together 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 correct, 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 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 the region of Hanoi, b) the describe and briefly evaluate the economics of the most typical channels for milk and dairy product distribution around these farms, and c) to get insights, through a PAM analysis, about the effect of policies and market factors on the economics of these farms.

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 chose 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 were 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 per cent.

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
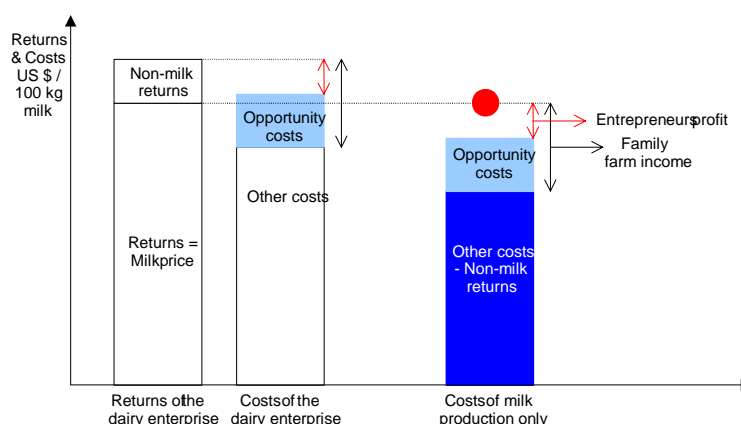
Method

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 figure beside 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 costs 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, 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.

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

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

2,650 head
3,3%
Study Area

2,910 head
3.7%

4,044 head
5.1%

9,033 head
11.4%

1,898 head
2.4%

3,532 head
4.4%

1,732 head
2.2%

51,080 head
64.5%

4,996 head
6.3%

44,670 head
56.4%
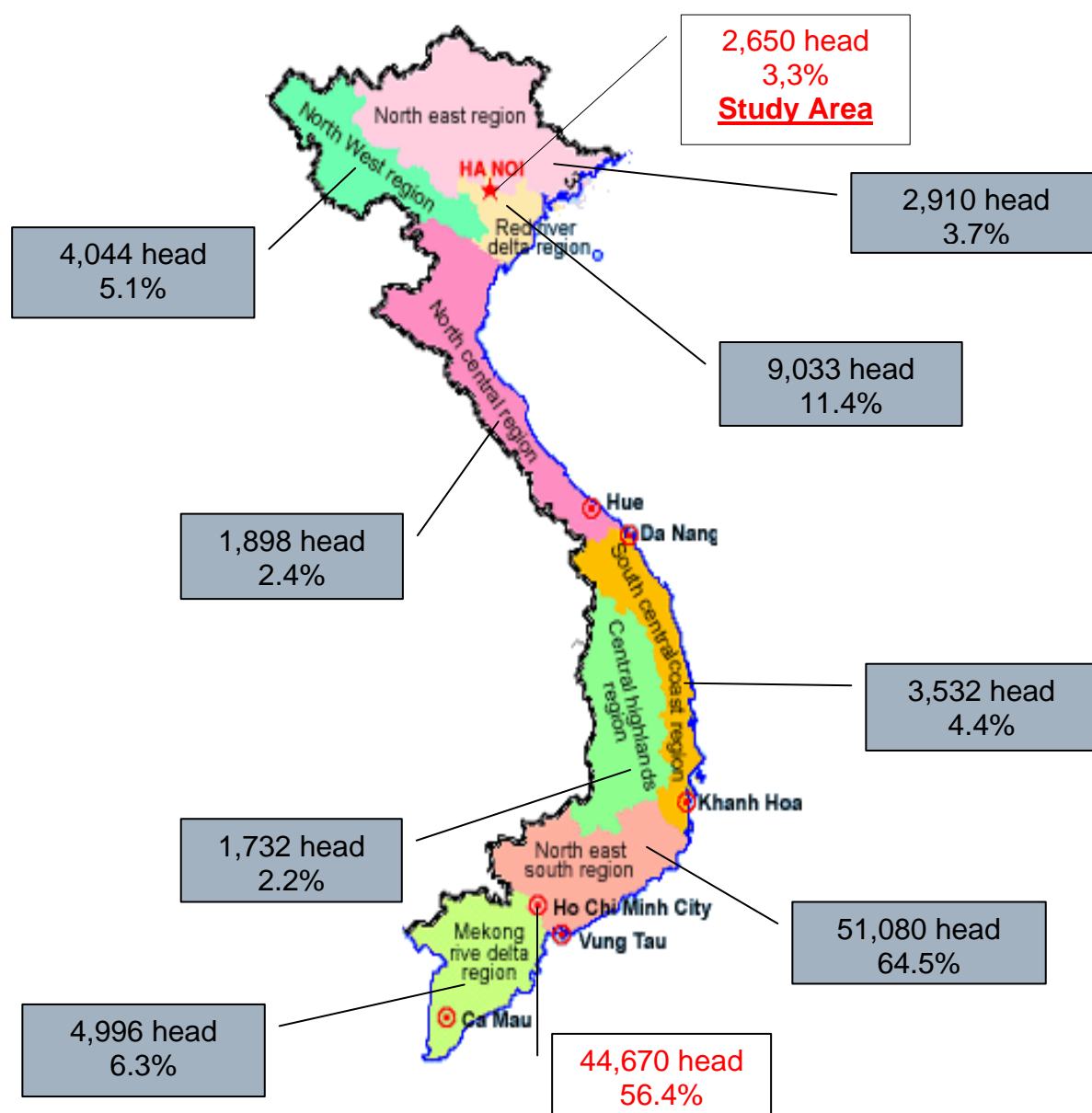
Source: Department of Agriculture-MARD, 2003.

Tradable Inputs

Farm Outputs	Trade Status (Imported or Exported)	Tariffs (for Imports & Exports)	VAT * (Value Added Tax)
Milk Powder	Imp	10-30% (1.5% fat content, no additives)	10%
Livestock	Imp	5% for crossbred bovines and buffaloes, but 0% for purebred bovines	Exempt
Culled Animals	Imp	10%	10%
Farm Inputs			
Feed Ingredients			
Maize (for feeds)	Imp	5%	10%
Soybean (for feeds)	Imp	10%	10%
Most other cakes and residues for feed	Imp	10%	10%
Commercial Feed-Mixed Domestically	Imp. Ingredients & mixed locally	8% Estimated	10%
Agricultural Pesticides	Imp	1%	10%
Semen		0%	10%
Veterinary Medicine	Imp	0%	10%
Maize (seed)	Imp	0%	10%
Fertilizer (NPK; Urea)	Imp	0%	5%
Machinery	Imp	10% (pump 10%, and fans 20%)	10%
Electricity	Imp	1%	10%
Gasoline and Diesel	Imp	0%	10%

Main source: The US-ASEAN Business Council; from http://www.us-asean.org/aftatariffs.asp, accessed on December 05, 2004.

* We chose 10% VAT for all items (except fertilisers) because of the following: In Vietnam, VAT has four different rates - 0%, 5%, 10% and 20% - and many businesses have found that clear distinctions are very difficult to make. Therefore, dealing with four tax rates or exemptions, it's not just four times harder, but at least ten times more difficult. The response has been that firms, some of them totally outside the purview of the tax, have increased prices using VAT as a pretext; others say it has enabled them to lower their rates. Stuck in the middle, the General Department of Taxation (GDT) seems to have decided to leave it up to businesses to interpret the tax and then make its judgement on what they decide.

These tariffs and VATs are mainly used to estimate the direction of the effect of policies for tradable goods for these farms. However, since tariffs and VATs are not the only factors distorting the national dairy sector, the PAM results exclude effects of other policy tools and market factors that may also be intervening. A more complete assessment will require a closer

look at services (such as transportation, insurance, etc.) and programs in order to identify further distortions and their effects on these farms.

Other sources consulted: http://mkaccdb.eu.int/cgi-bin/wtdtar/wtdsearch.pl ,
http://www.sice.oas.org/Trade/usviet/USViet1.asp#TAP , and
http://r0.unctad.org/trains/2001%20Vietnam.htm

Domestic (Production) Factors

Domestic Factors	Policies & their Effects on Prices	Adjustment Factor for Social Prices
Labour	Under the 1994 Labor Code and subsequent decrees, the government maintains a minimum wage which is currently set at 310,000 dong (or 19.30 US$) per month for domestic enterprises and between 626,000 to 487,000 dong (or 39 to 30 US$) for foreign enterprises, depending on geographic location. These figures show that the domestic sector pays about one-third of what the foreign invested sector pays for the use of the country's labour resources. The unattractive wages help to explain why wage employment in Vietnam accounts for only about 15 to 20 percent of total employment; and why even in some rural areas, it is hard for many foreign enterprises to find enough labourers. But more relevant here is that the Viet Nam Confederation of Labour recently asked the Prime Minister to increase the minimum wage for foreign invested enterprises to US$45 per month (or 723,000 dong/ month). The Confederation argued that it is necessary to increase the minimum wage immediately to help workers cover living costs and enterprises to stabilise production. Another distorting policy is that foreign invested enterprises previously paid wages in US dollars. However, they switched to Vietnamese Dong in 1999, as mandated by the Ministry of Labour, Invalids and Social Affairs. Under the ministry's decision, the exchange rate is fixed at 13.910 Dong/ US$1 (the current exchange rate is actually 16,067 Dong; or 1.15 times higher). Therefore, even though labourers working at some enterprises in HCM City technically earn US$ 45, they only receive 626,000 Dong.	If hiring labour, these typical dairy farms would have to pay 500,000 Dong/month as they are nearest to the city of Hanoi. Notice that although foreign enterprises already pay over 1.57 times higher wages than the domestic private sector, they are paying from –3 up to roughly 20 percent higher wages than those reported by these typical dairy farms as local wages they would have to pay. If, as proposed by the Viet Nam Confederation of Labour, we take 45 US$ (or 723,000 Dong/ month) as a more adequate indicator of minimum cost of labour in the region, this would mean that the Vietnamese minimum wage for foreign invested enterprises would increase by 48 percent (723,000/ 487,000). For the domestic private sector increasing minimum wages to 45 US$/ month means a 2.33 times greater labour cost. However, for this exercise, an increase of 48 percent (just like for the foreign enterprises) over the current level of 310,000 Dong/ month will make minimum wages of the private sector 459,000 Dong. Although this increase is relatively close to the current wages around these typical dairy farms, it may not attract much of the 85 to 90 percent or more of the active labor force, which is-self-employed, not subject to any government wage control, and of whom over 60 percent work on the farms.

	Source: 1- http://www.asianlabour.org/archives/002641.php (Seen on December 2004).	**Conclusion**: there is an 'unorganised' labour market where wages are 80 and 160 percent of the legally imposed minimum wages for the foreign enterprises and the private domestic sector respectively. Without these minimum wages policies and the exchange rate distortion to salaries, we expect that the national wage would reach 45 US$/month, which means an <u>increase by 48%</u> in both the foreign and domestic sectors.
Land	The Doi Moi (Renovation) policy, in 1986, abandoned the previous framework of collective farming by recognising the household as an economic agent and by instituting several measures of liberalisation that had allowed the Vietnamese economy to make significant growth. Resolution 5, approved in 1993, instituted long-term land use rights to farming households, including the right to exchange, transfer, lease, inherit and mortgage in specific circumstances. Like other social policies, the central purpose of the right of use of the land is to ensure equal access of the land to the farmers so they can provide for their livelihood and to serve the national goal of the supply of targeted agricultural products. The ownership of land remains however the property of the state and the ability to transfer land use rights is subject to significant government review and varies between different categories of land, landholder and interests in lands, effectively negating a true free-market in land use rights. Land prices set by the State now don't match at all the price of transferring land as set by the market. Some state that the State's prices can be up to 300 percent higher. Therefore, the Land Law draft committee members have agreed that the prices set by the State have to be closer to the price of transferring land-use certificates on the market. This gave place to the Decree 188 which regulates land price frames for urban and rural areas in the country. *It generally states that* one square metre of land in urban Vietnam can reach a maximum value of VND67.5mil, while	For our calculations, we shall consider the State land price of 1,250,000 Dong / sq. Meter of agricultural land on one side and the true agricultural land price where these dairy farms are, which is 1,000,000 Dong / sq. Meter. This means that the market price is only 0.80 percent of the State price for such land, which is the maximum variation allowed from the government price, based on the Decree 188. We would expect, however, that if Decree 188 rather than limiting price adjustment by a variation of plus/minus 20 percent, it would allow for a free land market, a square meter of this type of land could be "acquired" for half of the price, and in many instances for even one-third the government price. Lastly, let us take into account the current 2 percent land use right transfer tax applied to agricultural land. Again, in a free market, we then assume no land transfer tax. **Conclusion**: by looking at land prices in other countries in the region and assuming a truly free Vietnamese land market, we expect that (agricultural) land prices <u>would decrease by 50%</u> of its current Government prices.

	rural areas stay at VND1,250,000. Most importantly to this study is that, according to the decree, local authorities are allowed to define pricing. However, the prices cannot vary more than 20 percent compared from the Government land price frame system. One expects that official prices will come down by 20 percent, but still they remain too high when compared to the 'true' market levels.

Sources:

1- Marsh, Sally P., & MacAulay, Gordon T., Land reform and the development of commercial agriculture in Vietnam: policy and issues, Agribusiness Review - Vol.10 - 2002, Section 2.1 (2002), citing Decree No.17/1999/ND-CP (1999), p 15.

2-http://www.dbav.org

3-http://english.vietnamnet.vn | |
| Capital (Interest Rates) | Recent studies have revealed that the informal sector provides the bulk of financial intermediation (between 60 and 75 % of those households surveyed).

The literature claims that due to lack of collateral, lack of knowledge and understanding of policies of the Vietnam Bank of Agriculture (VBA), poor households have to seek their credit from informal sources. Since the formal market is characterised by low nominal interest rates and high transactions costs, while the inverse is true for the informal market, those who require small loans even for production efficiently borrow from the informal markets.

Furthermore, one has to differentiate between small and medium and large loans. If a farmer needs to borrow less than 2,500,00 Dong s/he should approach an informal source since the final interest rate of 4.5 percent on average per month will be lower than in the formal sector once opportunity costs and briberies are included (which may easily mean about 6 Percent interest rate). For loans above that level, the VBA's average rate of 1.75 percent per month becomes the best alternative for the small-scale farmer, provided opportunity costs and bribes are | It is clear here that the formal credit sector in Vietnam can not effectively serve the needs of the majority. On one side, the VBA often charges similar interest rates as moneylenders and still barely covers its administration costs. Now, add any default (unfortunately, this often happens in rural areas in the case of natural disasters), the banks, of course, need subsidies. Despite this VBA need for subsidies, these typical dairy farms benefit from even cheaper loans for an interest rate of 1 percent per month.

Clearly banks, like VBA, have no incentives to expand their loan portfolio in favour of small-scale farmers and the poor. Therefore in a free capital market, VBA would have more freedom to open up interest ceilings. Higher interest rates would help VBA increase the number of units at commune level and so its outreach to the rural population.

The question is: In this free market, how much higher the interest rates |

kept low.

Studies of mainstream rural credit institutions in Vietnam have proved that they cannot easily serve the credit service requirements of small-scale farmers and the poor. In response, a number of credit schemes of domestic credit institutions and some donor-funded programmes targeting credit to the small-scale borrowers are being implemented. Such institutions organise groups and provide cheap loans (only to project members) at an interest rate of 2 percent per month and one year maturity. Interest and loan principal are paid monthly. The projects usually require compulsory savings of about 3,000 to 5,000 Dong/ month from the member borrowers, which often is difficult for the poor. Interest income from loans is used to pay project management costs.

Sources:

http://vsed.onestop.net/

would go?

If the formal sector simplifies its borrowing procedures and increases its interest rate up to 2 percent per month (as that of several development organisations), one would expect that most small-scale farmers and the poor would borrow from it rather than from the informal sector. This would significantly increase the VBA business volume, which in turn would bring opportunities to increase efficiency and decrease or eliminate its need for government subsidies.

All in all, the formal sector would need to increase its interest rates for small loans, but significant gains can be made through efficiency gains regarding VBA services.

This means that in a free market: (1) the formal sector would double its interest rate and significantly increase its volume of business, or (2) banks like the VBA would stop serving small-scale borrowers. In the latter case, borrowers would have to borrow from development organisations (at 2 % rates and only if they meet membership requirements) or from moneylenders charging 4 times higher rates. In both options, small-scale farmers are left with loans at 2% interest rates as bottom line.

This means an increase of 100% for borrowed money. However, in a free market where land prices (and land use rights in this case) go down by 50%, there will be an effect on capital markets. Under these circumstances, in fact, the collateral value of the land is reduced by half and, in a free capital market, the formal sector will not "dramatically increase its volume of business", as transaction costs will be go up exactly by 50% (if we consider that transaction costs are independent of the amount lent/borrowed). In other words, interest rates per unit of loan could go up by 300 to 400

| | percent, or even more.

Conclusion: in this study, an increase for the interest rate from 1 to 2 is found to be not only realistic, but conservative. Therefore, in a free capital market, we assume that interest rates for loans given to small-scale dairy farmers around Hanoi <u>would increase by 100% of what they pay now</u>. |

These policies and their effects come from literature reviews, experts' contributions, and researchers' estimations. These 'Adjustment Factor' were inserted in the IFCN PAM model to produce the (Social) economic results for these dairy typical farms under liberalised market conditions.

Variables	Units	Formal Milk Channel Fresh Milk (8.3% sugar)	Informal Milk Channel Fresh Milk (whole)
Dairy Processing activities based on 1 kg milk bought from the farmer			
INPUTS			
1- Milk from the farmer			
Quantity	Kg	1.0	1.0
Fat Content	% estimation	3.7	3.7
Protein Content	% estimation	3.3	3.3
FARMERS MILK PRICES	US$	0.197	0.197
2- Other Inputs			
Input type	Name	**Sugar**	**None**
Quantity added	Kg	0.083	0
Input price	US$/ Kg	0.436	0
Costs of added Input	US$	0.036	0
OUTPUTS			
Main Product	Description	**Fresh Milk (8.3% sugar)**	**Fresh Milk (whole)**
Quantity	Kg	1.05	0.95
Fat Content	%	3.45	3.7
Protein Content	% estimation	3.28	3.3
Retail Price	US$/ Kg	0.6	0.46
TOTAL CONSUMER PRICES	US$	0.63	0.437
MARGINS			
Sum of all Returns	US$	0.63	0.437
-Farmers Milk Price	US$	0.197	0.197
FINAL MARGINS	US$	**0.43**	**0.24**
Exchange Rate used: 1 US$ = 16067 VND			

Notes and Assumptions:

* For these calculations, we bought 1 kg milk at farmer's price; pasteurized it and added sugar in the formal sector; boiled it for the informal sector.

** The two final milk products chosen here are the most popular fluid milks retailed by both sectors.