IFCN DAIRY REPORT 2001
COSTS OF MILK PRODUCTION - A WORLD WIDE STUDY

Torsten Hemme, Johannes Holzner
IFCN Coordination Center
Institute of Farm Economics and Rural Studies,
Federal Agricultural Research Center (FAL)
Bundesallee 50, D-38116 Braunschweig, Germany
E-mail: Torsten.Hemme@fal.de, Tel. +49-531-596-5117
www.ifcnnetwork.org

Abstract

IFCN stands for International Farm Comparison Network. Within this network agricultural farms and production systems are defined that are typical for their region. Their economic situation is analysed and the farms are projected into the future.

The IFCN, using the concept of typical farms is producing each year a world wide dairy farm comparison. The results are documented in the annual IFCN Dairy Report. In 2001 dairy farms from 20 countries representing ca. 70% of world milk production have be analysed.

Milk prices

Milk prices range from **13 - 30 US $** / 100 kg milk FCM and can be grouped into 2 categories:

- **25-30 $:** Germany (EU), USA
- **13-20 $:** Poland, Argentina, India and New Zealand

Costs of production

For simplicity, 3 cost levels (measured in US $ / 100 kg milk) can be described:

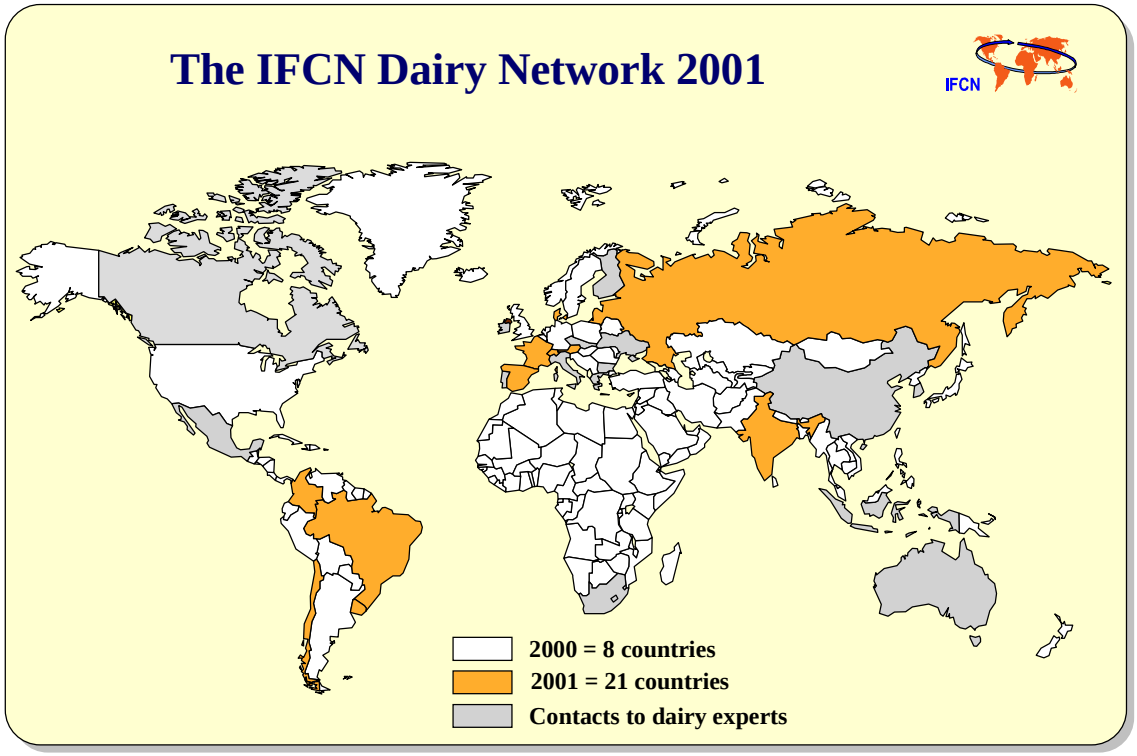
- **> 30 $** on the average size EU farms, small Polish farms and Brazilian farms all Swedish farms.
- **20-30 $** on the larger size EU and US and all Brazilian farms. Most to the farms are in the $25-30 range, although the Idaho farm with 2100 cows is at $22, close to the low cost category.
- **< 20 $** in most CEEC countries, Argentina, Chile, Uruguay, New Zealand and the bigger farms from India.

This paper is presenting a selection of countries representing the main world production regions (Germany, USA, Poland, Argentina, India, New Zealand). If you are interested in the IFCN results of the other countries you are invited to join the IFCN as scientist or supporting partner. Please contact the IFCN authors.

1. INTRODUCTION

In order to assess the competitiveness of farming systems world-wide, the IFCN concept has been developed. IFCN stands for International Farm Comparison Network, and it is a cooperation of agricultural scientists, advisors and farmers. Every year, the IFCN Dairy branch creates a unique annual updated database of typical farms. The results of the farm comparison are published in the IFCN Dairy Report.

Figure 1: Countries/scientists in the IFCN Dairy Network



For more details please have a look at: www.ifcnnetwork.org

This paper is presenting a selection of countries representing the main world production regions (Germany, USA, Poland, Argentina, India, New Zealand). Base for this publication is the IFCN Dairy Report 2001. Following the structure of the Dairy Report, the paper focuses mainly on the description of facts. In the appendix additional information about the IFCN concept and the related methodological issues can be found.

2. FARM COMPARISON 2000 DATA

Description of the typical farms

The work in the IFCN is based on the concept of typical farms. The selection of typical farms in a country goes along with the following scheme: The first (smallest) farm of every country is developed to represent the size that is close to the statistical average. The other typical farms represent larger farms and show the economies of scale in the countries. The farms represent an 'average to slightly above average' managed type of farm.

Farm sizes ranges from 3-4 cows (Poland, India) – 2100 cows (USA) and can be grouped in 3 categories:

< 50 cows:	India, the average farm in Germany and Poland.
50 - 100 cows:	Larger family farms Germany and average farm in USA
>150 cows:	Former cooperative type of farms in Eastern Germany and Poland, the larger farms in USA and all farms in Argentina and New Zealand

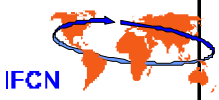
Most of the farms analysed are **specialised dairy farms** and obtain more than 65 % of their total returns from selling milk, cull cows, calves, and heifers. The most specialisation in dairying is found in USA, and New Zealand.

Most of the dairy farms have a **crop enterprise,** selling mainly cash crops. Other typical **non-dairy activities** are beef cattle (D-68) and hogs (PL-3). In Brazil, more than 30% of the domestic milk production comes from farms (with beef and/or grain) where dairying is not the major activity.

Figure 2: The typical dairy farms analysed

Country	Region	The Dairy Enterprise				Acerage*	
		Cows	Milk yield	Produc-tion	Returns from dairy	total	Grassland
		no.	t/cow	t/farm	%	ha	%
EU-countries							
Germany	Bayern	35	6405	224	97%	35	66%
Germany	Niedersachsen	68	7730	526	86%	90	40%
Germany	Sachsen Anhalt	650	7982	5,188	65%	1,700	33%
USA							
USA	Wisconsin	70	9755	683	99%	95	0%
USA	Wisconsin	600	9346	5,608	100%	405	0%
USA	Idaho	2100	9747	20,468	100%	249	0%
Central-Europe							
Poland	North West	3	2951	9	23%	10	45%
Poland	North West	20	4482	90	79%	41	62%
Poland	North West	180	4821	868	45%	1,000	31%
South America							
Argentina	Cordoba	150	3758	564	97%	250	92%
Argentina	Buenos Aires	600	6962	4,177	100%	650	72%
Asia							
India	Haryana	4	2095	8	36%	4	0%
India	Haryana	22	5511	121	78%	7	0%
Ozeania							
New Zealand	North Island	222	3967	881	100%	124	100%
New Zealand	South Island	478	4159	1,988	100%	267	78%

* Acerage: Land used for the dairy enterprise
Grassland: Land used for grazing, grassilage or hay
Source: IFCN Dairy Report 2001



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Milk yields

Milk yields per cow range from 2000 – 10 000 kg / cow. These differences may be due to either the dairy production system or to the genetic and management potential of the farms.

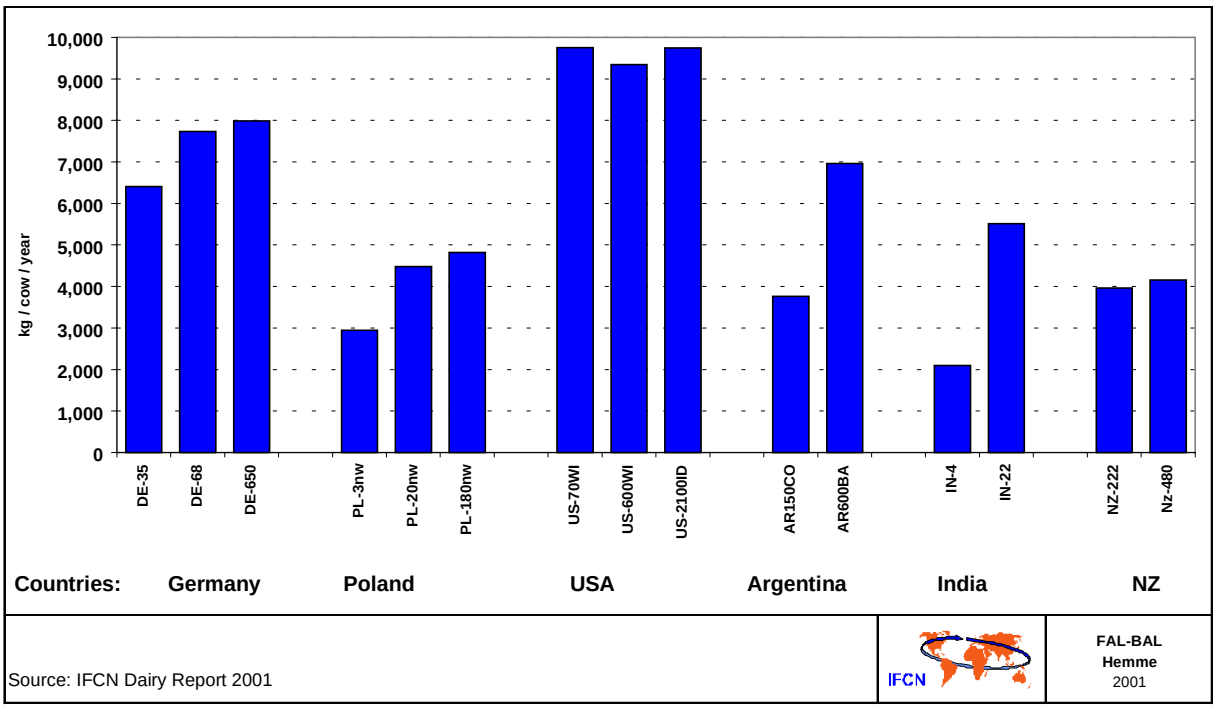
Very low yields (2000 kg) are observed on the small farm India. The larger farm has significant higher yields due to a higher share of buffaloes (higher yields than cows) better genetic for the black and white cattle.

The low yields (3000 - 5000 kg) observed on all Polish farms might be caused by the lower genetic potential of the cows and also the lack of management skills of the farmers.

Grazing dairy systems (**AR, NZ**) present relatively low yields (4000 - 6000 kg). These farms base their milk production mainly on grass and grass silage / hay with a small amount of concentrates.

On the other hand, **German and the US farms** are characterised by high yields (7000 - 10000 kg). These farms feed a much higher amount of concentrates / cereals and use also corn silage in the rations.

Figure 3: Milk yield of the typical dairy farms



Source: IFCN Dairy Report 2001

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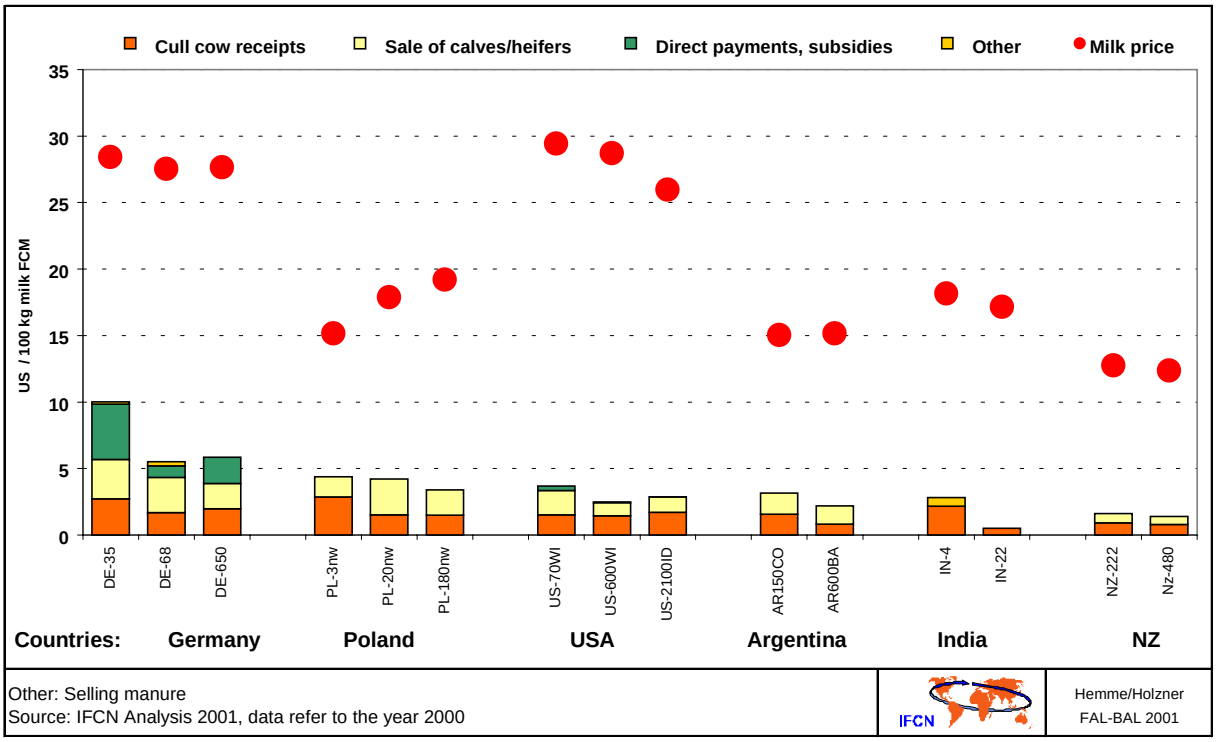
Returns of the dairy enterprise

Figure 4: Returns of the dairy enterprise



Milk prices range from 15 - 30 US $ / 100 kg milk, receiving the European and US farms the highest prices (27 - 30 US $). The difference in prices between countries can be explained by trade barriers (import quotas, tariffs, etc) as well as, in the EU, by the quota system. Farms in the CEEC countries, India and the Southern hemisphere receive prices of 15 - 20 US $, which is about 50 % below the EU / US level. The differing milk prices in Poland are caused by differences in milk quality in the typical farms.

Non-milk returns: Besides milk, dairy farms receive returns from selling cull cows, calves, heifers and from direct payments. These non-milk returns range from 10 to less than 2 US $ / 100 kg milk and contribute to about 10 - 20 % of the total returns of the dairy farms.

Cattle returns: Differences in cattle returns per 100 kg milk are explained by differences in cattle price, culling rate of cows and different heifer management systems. Furthermore, cattle breed (Holstein vs. dual-purpose breed) and milk yield are the most important variables to consider.

High cattle returns in **Germany** are justified by high cull cow and male calf prices. Furthermore, it is typical to sell a reasonable number of surplus heifers each year.

Cattle returns in **New Zealand and Argentina** are the lowest due to the very low cull cow, calf and heifer prices in these countries.

Significant higher beef prices in the **USA** than in New Zealand/Argentina does not lead to higher beef returns because milk yields are very high.

In **India** Cattle returns result from slaughtering buffaloes and selling calves. Moreover the farms gain receipts from selling manure for heating.

Direct payments:

Direct payments range from 0–4 US$/kg milk. Payments for dairy farms in EU countries are mainly derived from acreage payments for grain and corn silage (200-300$/ha). Some farms receive payments from special national or regional programs (less favoured area payments, environmental programs, etc.). Farms in the USA receive market loss payments per kg milk. Crop payments are per unit of production are based on payment history and also per ha.

Costs of milk production

Method: In this section, the cost for “milk production only” are considered. This cost is calculated as the costs of the dairy enterprise minus the non-milk returns. More methodological details can be found in the Appendix.

The graph shows the milk price level these farms required to cover their full economic costs in 2000.

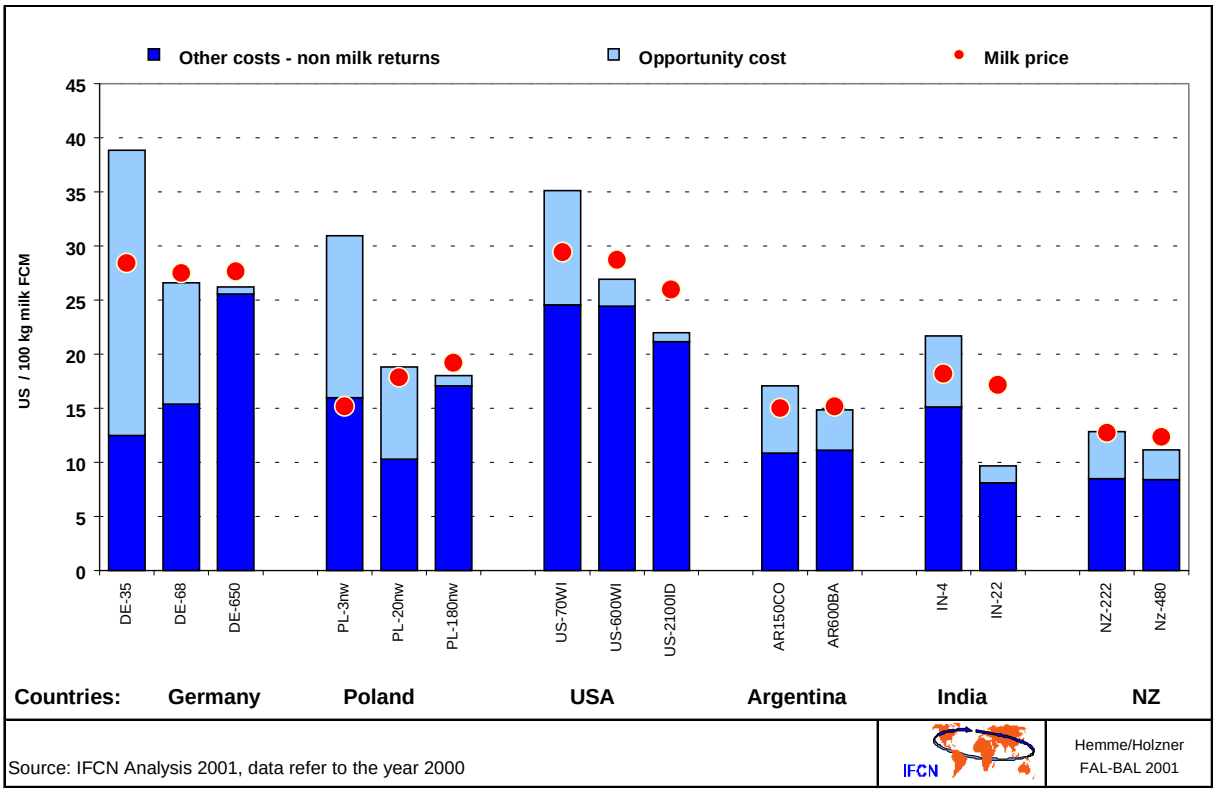
To simplify, 3 cost categories measured in US $ / 100 kg milk can be described:

30 - 40 $: Average size farms in Germany, USA and Poland

20-30 $: Larger size farms in Germany and USA. Most to the farms are in the $25-30 range, although the US-Idaho farm is at $22, close to the 20$ category.

< 20 $: Larger polish farms (20, 180 cows), the farms from Argentina, India and New Zealand. The lowest costs with ca. 10$ / 100 kg milk are the large farm from India and New Zealand.

Figure 5: Costs of milk production



Costs and milk price:

All farms except the Polish 3 cow farm cover their costs from the profit and loss account (section other costs – non milk returns), creating therefore a positive family farm income. The farms De-650; US-600/2100, India-22 and the large New Zealand farm are covering the opportunity costs for family owned production factors. Most average sized family farms do not cover the full economic costs but stay in business as long as the family farm income meets their requirements.

Low cost milk producers (<20 $):

These countries have a cost advantage of about 50 % compare to the larger EU farms. Their privileged cost levels result from a) the Southern hemisphere production systems without barns (NZ, AR) and b) the very low labour prices (Poland and India).

Economies of scale / structural changes in the future?

In all countries significant cost differences between the average and larger farms are found. Large farms tend to have lower costs and higher profits. This is a clear indicator for structural change in the future.

Cost potential in the EU and USA:

The most competitive farms in the EU are producing milk for ca. 25 US$/100kg (DE-68, DE-650). The typical 600 cow farm in Wisconsin is producing milk for is 27 US$ while the cost potential is better shown on the Idaho farm (US-2100) with 22 US$ per kg milk.

Optimum farm size - where does growth stop?

In the USA, larger farms (>500 cows) show a clear cost advantage against the smaller family type of farms (70-105 cows). In Europe, this picture is not as clear (DE-68 vs. DE-650; E-74 vs. E-1050). With the current picture of dairy production costs, no clear answer can be given regarding a possible “optimum farm size”.

Reason for differences in cost of production

The reason for cost differences can be either as reason of input prices or productivity differences. In Appendix 3 labour costs, labour prices and productivity are shown for the farms analysed.

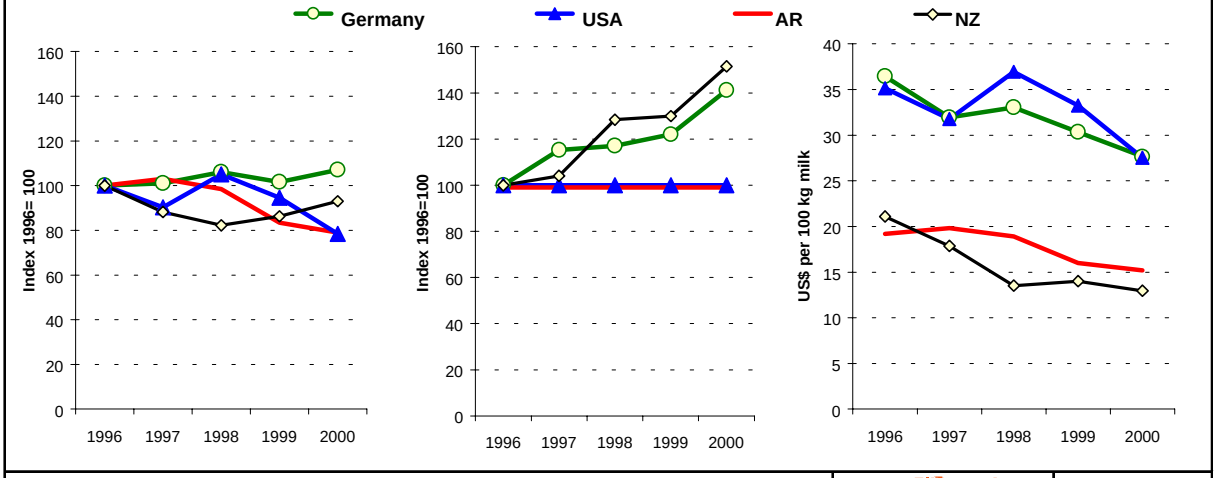
3. DEVELOPMENTS 1996 – 2000

The economics of dairy farming and its competitiveness can not be answered by just analysing one year. Therefore this part shows the development of milk prices and costs of production for the period 1996 - 2000.

Milk prices 1996 - 2000

In US$ terms in all countries milk prices have decreased 8 US$ per 100 kg milk (Argentina –4 US$). The reasons for this are different.

Figure 6: Milk prices 1996 – 2000



*US$ to nat. currency
Source: Various national statictics , IFCN 2001

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In **Germany and New Zealand**, the main reasons for the price reduction was devaluation of the own currency against the US $. Milk prices in national currency remained more or less stable.

In **USA and Argentina** the main reason for prices changes was caused be significant reduction in milk prices for the farmers.

Comparing USA and Germany milk prices where slightly higher in the US than in Germany (EU). Looking at New Zealand and Argentina, milk prices have decreased stronger than in Argentina. In 2000 the price in New Zealand was 2 US$ per 100 kg milk lower than in Argentina.

Costs of milk production 1996 – 2000

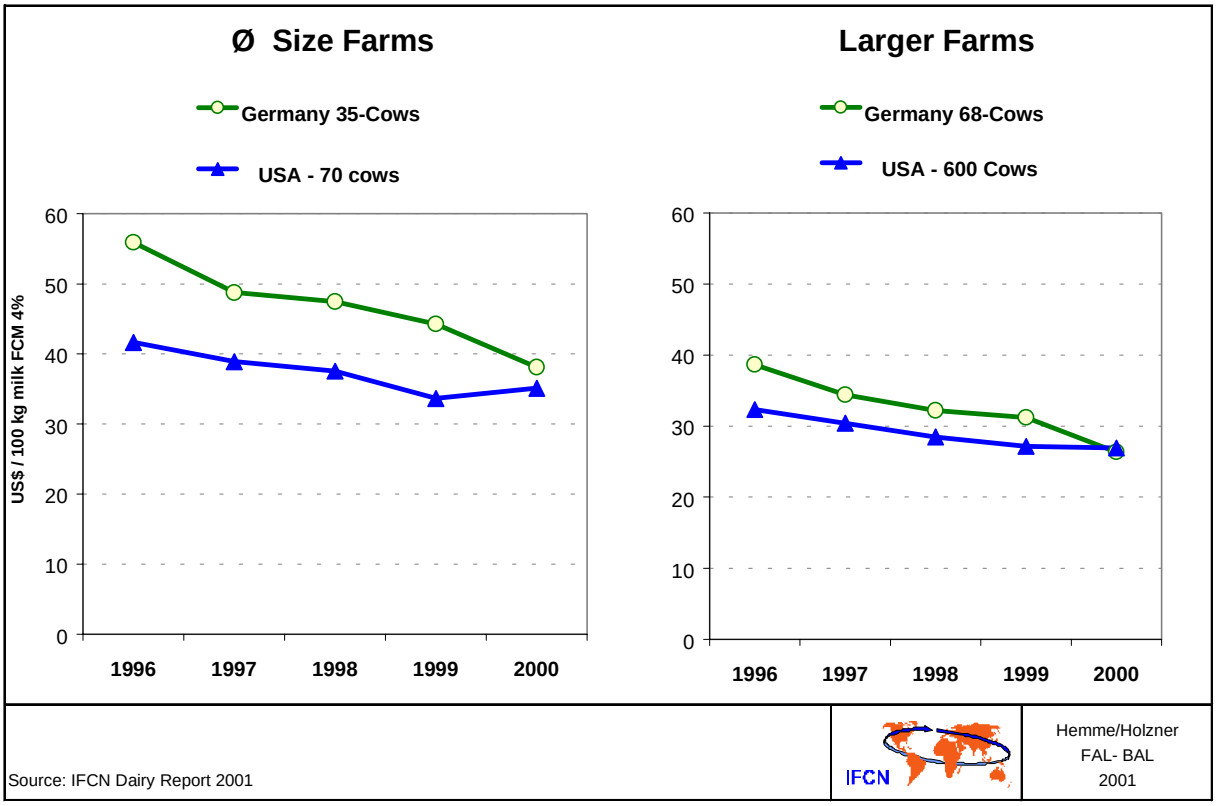
Changes in costs of production in US $ terms were caused by changes in the exchange rate with the US $. Additionally, changes in input prices like feed, the level of non-milk returns, the general inflation, and the productivity changes (milk yields) in each country play a major role.

In the **USA**, costs diminished by 20 % mainly due to the decrease in feed prices by around 40 %.

In **Germany,** costs were reduced by around 20 %. This is mainly caused by the devaluation of the Euro against the US $. Minor cost reductions (feed) were compensated by inflation driven increase of other costs.

It should be mentioned that the **feed price** reduction in national currency was a lot higher in US $ countries (USA, Argentina) than in the Euro zone. Moreover the EU does not allow to import cheap feed grains (corn, barley), so the dairy farmers in the EU do not benefit as much as the US farmers from declining world grain prices.

Figure 7: Costs of milk production 1996 – 2000



USA vs. Germany: The strong US $ 2000 reduced the cost advantage of US farms in comparison to the EU farms. In 2000 a typical German 68 cow operation has similar costs than a 600 cow farm in the USA.

Appendix

1. Participating Scientists in the IFCN Dairy Report 2000
2. IFCN Dairy Report 2001 – Table of contents
3. Labour Costs, Prices and Productivity's
4. Farm economic indicators used
5. Assumptions for the cost calculations
6. Questions about the typical farms

Appendix 1: Participating Scientists in the IFCN Dairy Report 2001

Editors and IFCN co-ordination center

Torsten Hemme, Johannes Holzner

Western Europe

Christian Gazzarin	Swiss Federal Research Station, for Agricultural Economics and Engineering, Taenikon, *Switzerland*
Leopold Kirner	Bundesanstalt für Agrarwirtschaft Wien, *Austria*
Eva Deeken, Elgin Giffhorn	FAL Bundesforschungsanstalt für Landwirtschaft *Germany*
Christophe Perrot	Département Systèmes d´exploitation d´élévage, Institut de l´Élevage Paris, *France*
Nemesio Fernández	ETSIA Universidad Politecnica de Valencia, *Spain*
Cláudio Lopez Garrido	Centro de Investigacion Agrarias de Mabegondo (CIAM) La Coruna, *Spain*
Alan Hopps	Greenmount College, *UK - Northern Ireland*
Alun Davies, Tim Jenkins	Welsh Institute of Rural Studies, *UK - Wales*
Susanne Clausen	The Danish Agricultural Advisory Centre, Aarhus, *Denmark*
Patrik Nordgren	Swedish Dairy Association Eskilstuna, *Sweden*
Bram Prins	European Dairy Farmers , Lellens, *The Netherlands*

Central and Eastern Europe

Csaba Borbély Bernadett Kovacs	University of Kaposvàr, *Hungary*
Michael Switlyk, Tomasz Sobczak, Ewa Kaczocha	University of Szczecin, *Poland*
Janis Zeberlins	Swede-AgriSt. Petersburg, *Russia*
Katri Lahesoo	Estonian Agricultural University,Insitute of Agricultural Economics and Marketing, *Estonia*

North and South America

Ronald D.Knutson, Rene Ochoa	Texas A&M University, Agricultural Food Policy Centre, Department of Agricultural Economics College Station, Texas, *USA*
Steven Harsh Christopher Wulf	University of Michigan, *USA (Participation with data only)*
Bernardo Ostrowski	Cátedra de Administración Rural, Facultad de Agronomia, Universidad Buenos Aires (UBA), *Argentina*
Lorildo Stock	Embrapa Gado de Leite (*Embrapa Dairy Cattle*), Juiz de Fora, MG, *Brazil*
Eduardo Fynn	CREA Asesor, Paysandu, *Uruguay (Participation with data only)*
Ernesto Reyes	Universidad Autónoma de Barcelona, Animal Production and Economics Department (Spain) – Representing *Colombia*

Asia Oceania

Amit Kumar Saha	National Dairy Research Institute, Department of Dairy Economics Karnal, *India*
Nicola Shadbolt	Massey University, College of Sciences Palmerston North, *New Zealand*

Appendix 2: IFCN Dairy Report 2001 – Table of contents

1. Comparison of the typical farms 2000 in US $

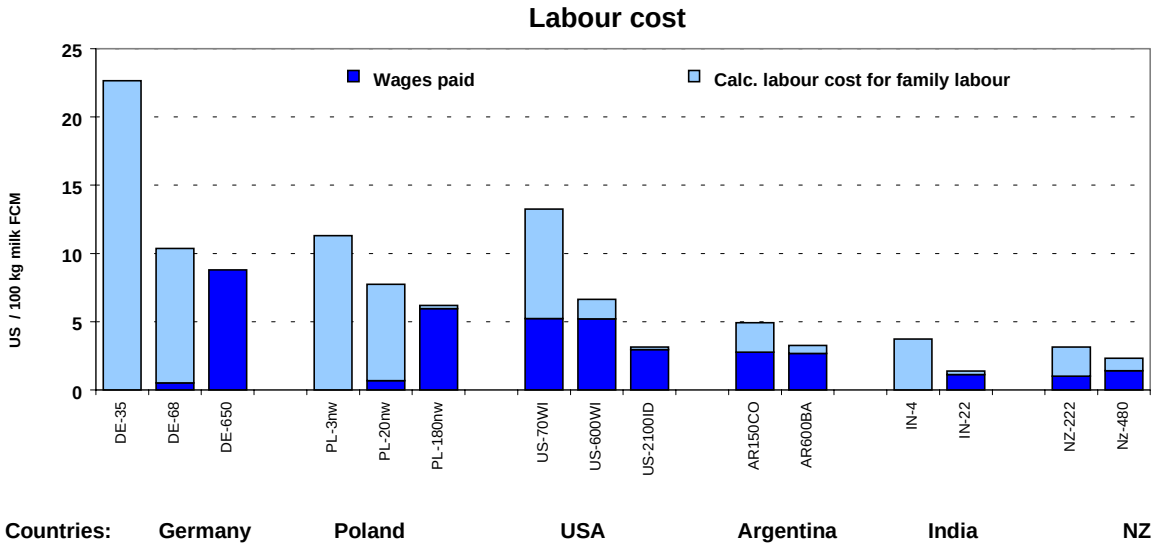
2. Dynamic comparison of the farms 1997 - 2000 in US $

3. Country reports 1997 - 2000 in national currency

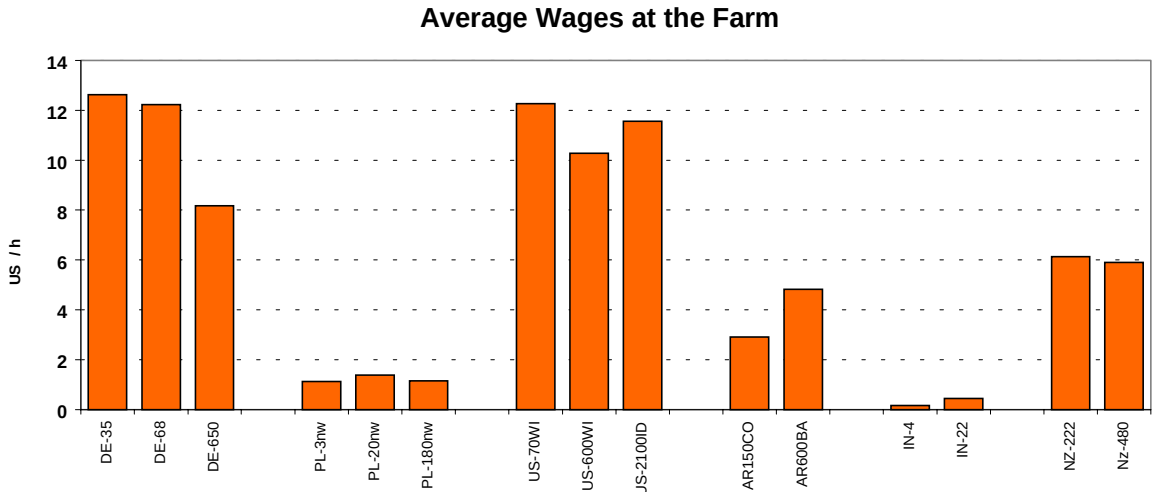
4. Special studies

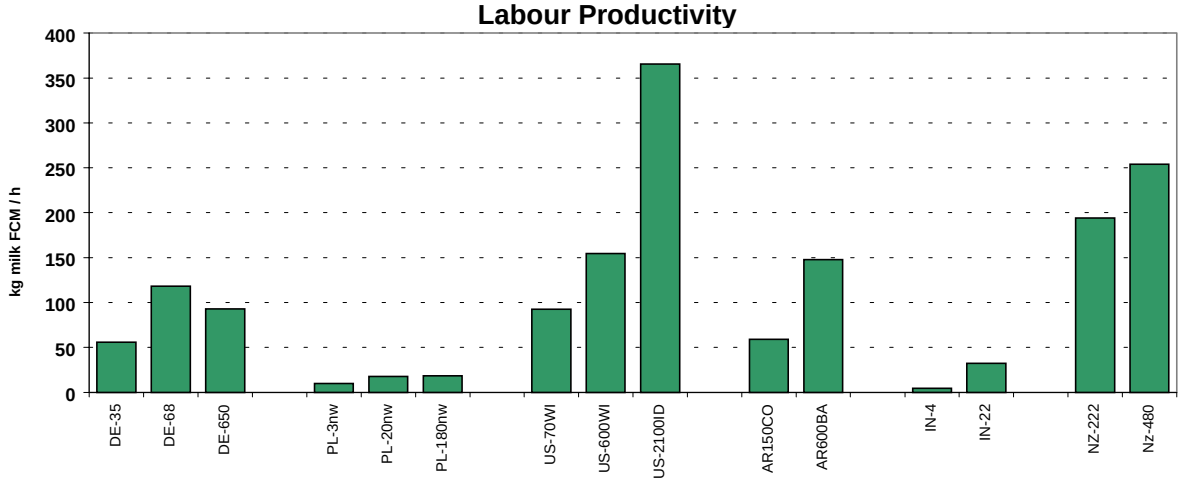
Appendices: Background data and information

Appendix 3. Labour Costs, Prices and Productivity's



Countries: **Germany** **Poland** **USA** **Argentina** **India** **NZ**





Source: IFCN Dairy Report 2001

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Appendix 4. Assumptions for the calculations

Cost calculation

The cost calculations are based on dairy enterprises that consist of the following elements:

- milk production
- raising of replacement heifers
- 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 are 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 FCM (fat corrected milk with 4.0 % fat).

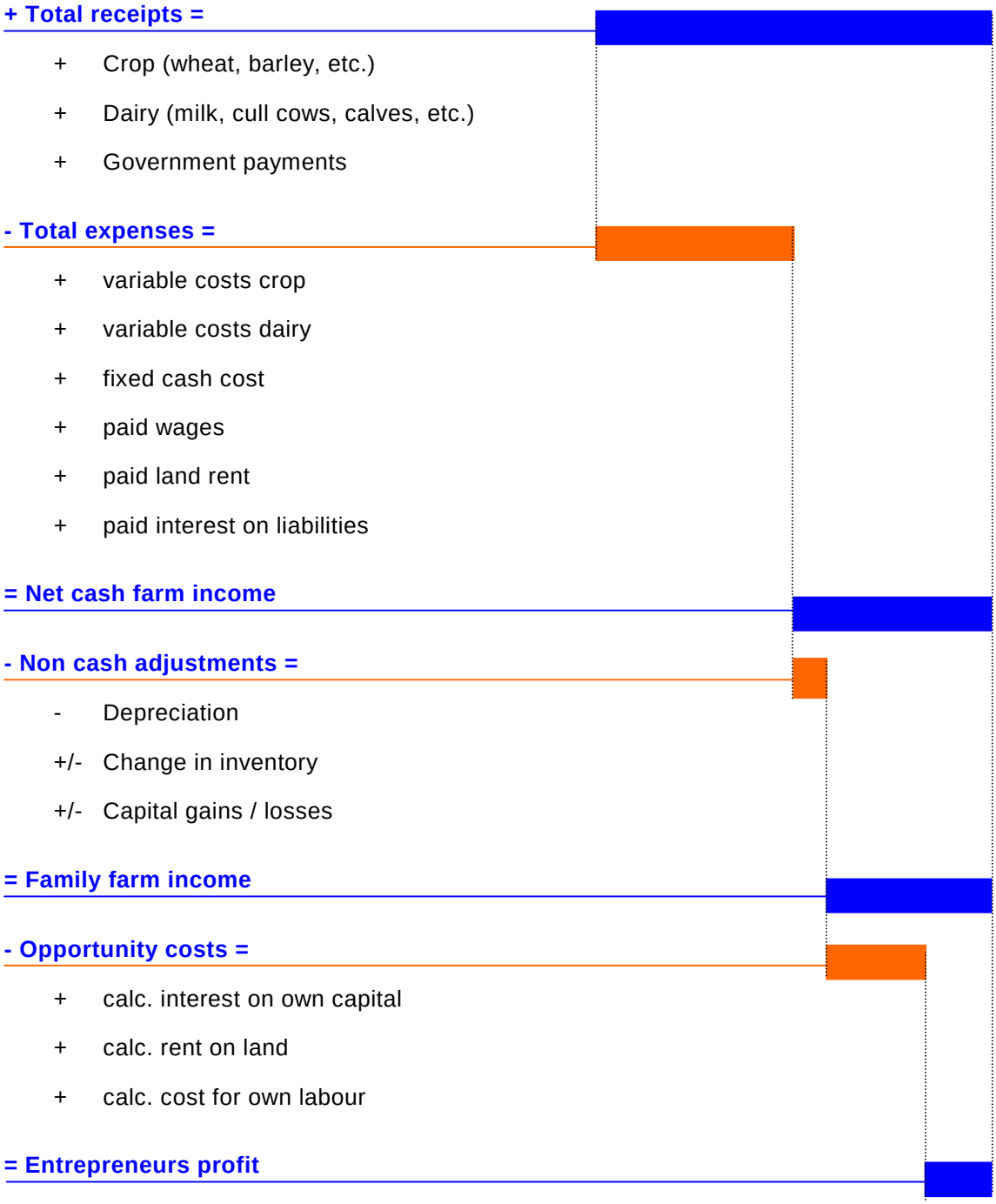
Adjustment of VAT

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

Adjustment of milk FCM 4%

The milk output per farm is adjusted to 4% fat. Formula: FCM milk = (milk production * fat in %*0.15) + (milk production*0.4)

Appendix 5. Farm economic indicators



Appendix 6 Questions about the typical farms

How exactly does the selection of typical farms work?

In the first step, the regions which are most important for the product considered (e.g., beef) are identified. As a rule these will be the main areas of production, but in some cases they may be the regions with a particularly high potential for the expansion of production.

In the second step, experts are contacted with a sound knowledge of the local conditions, with access to regional accounting statistics and with good contacts to practical farming (e.g.,

technical advisors). With these experts the main structural characteristics of the typical farms to be established are discussed (e.g. type of farm, size of farm). It is aimed to establish both a moderate and a large farm for each region.

The third step starts with the search for farmers managing farms that are similar to the typical farm to be established. Once they have been identified, the farmers, the regional expert and the national IFCN-coordinator form the so-called 'panel'. The task of the panel is to establish the data base for the typical farm and to discuss farm level strategies for the projection of the farms (e.g. introduction of new technologies, adoption of policy changes).

How many farmers participate in a panel?

The concept of panels has proven successful in policy advice since the early 1980s in the USA. There, usually five farmers participate in a panel. In the early phase of IFCN, starting in 1995, this concept had been taken over exactly in order to use identical methods.

In the meantime, experience has shown that depending on the task of the analysis, panels of different sizes are more appropriate.

In most cases a 'pre-panel' is formed in the first step where the national coordinator, the regional expert and one farmer participate. The bases for the typical farm are the single farm data provided by the farmer and the advisor. These data are 'corrected' by particularities of individual years and other single- farm specific issues. The expert knowledge of the participants plays an important role in this procedure. This quick and low-cost approach is appropriate when a speedy collection of internationally harmonised data for many farms in many countries is in the focus of attention.

For in-depth analysis of typical farm adjustments to technological and political conditions, a full panel is formed in the second step, with participation by approximately five farmers. The full panel has the advantage that the data, the options of farm level adjustments and the results of the scientific analysis can be discussed to a broad extent.

Which is the data base for a typical farm?

The aim is to establish the data for the typical farm in as detailed a manner and as close to reality as possible. The data shall cover all relevant aspects from production technology to taxation of the profit. Statistical averages derived from farm groups shall be avoided due to their lack of accuracy. The basis for the typical farm data base consists of:

- The internationally harmonised data collection system of IFCN
- The enterprise budgets and the accounting data of the participating farmers
- Additional data and information provided by the regional experts (e.g. accounting statistics, farm and enterprise comparisons)
- The expert knowledge of the panel members

That means that the typical farms do not really exist?

Right! It is not foreseen in the IFCN to make '1:1 use' of data sets from existing

farms. Some reasons for that have already been mentioned. Moreover, averages of farms, remote from reality, are not foreseen in the IFCN but the typical farms should to some extent be representative of the farms in the region.

Finally, there is another, organisational aspect speaking against the use of real farm data. The use of these data in the IFCN might in some countries lead to problems with regard to confidentiality and property rights once it comes to scientific analysis and publication of the data. This would certainly reduce the flexibility and the speed of the whole system.

Would it not just be interesting for individual farmers to compare their farm data with typical IFCN-farms around the world?

This is certainly an interesting option that should be further evaluated. For example, a direct comparison of the individual farm with foreign competitors could provide a basis for the analysis of strengths and weaknesses of the farm as well as for investment decisions.

As a consequence, a pilot project within the framework of the European Dairy Farmers (EDF) network was launched to give participating dairy farmers the opportunity a) to provide their data for the annual cost comparison and b) to make a connection to the world-wide data base of IFCN. The accounting and data systems of both networks are unrestrictedly compatible.

Whether this service can be extended to further farm types in the following years depends mainly on the availability of sufficient funds for financing further IFCN-Teams (Arable, Hogs, Beef).

Given the availability of accounting data bases in most regions, why does IFCN create a new data base?

Considering the issue from a world-wide perspective, one can conclude that the existing data sets show significant differences in methodology. These differences affect for example depreciation methods, the recording and valuation of labour input and the separate recording and valuation of volumes and prices of means of production. Moreover, important data are often missing so that only a partial cost analysis is possible.

Ex-post correcting or amending the data sets is very often impossible or requires a very high input; moreover, it is a potential source for errors. As a consequence, the IFCN-strategy - creating a consistent data set for every typical farm by using the information of existing data sets - is time saving and more appropriate with respect to comparability of results on an international scale.

Couldn't we use at least in the EU the harmonised data of the Farm Accountancy Data Network (FADN)?

The FAL uses this very valuable data set for various types of economic analysis. However, for a world-wide oriented analysis of international competitiveness and its causes, the FADN is not suitable for the following reasons:

- The FADN only exists in the EU. A comparable data base for overseas locations is not available.
- The data of the FADN are not broken down to enterprise level; as a consequence, production cost can only be very vaguely estimated.
- The FADN data set does not provide the depth of data which is required for cost analysis and future-oriented modelling (e.g. separation of volumes and prices).
- The farms represented by the data are not known so that feedback to the farmers is not possible.
- The data of the FADN is at least three years old.

It is not the question what system is right or wrong but how both systems can best complement each other. Ranking of typical farms using economic performance accounting statistics like FADN or other sources is one example of a valuable interaction.