PACIOLI 9
Innovations in the FADN

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The Pacioli network explores the needs for and feasibility of innovation in farm accounting and its consequences for data gathering for policy analysis in Farm Accountancy Data Networks (FADNs). PACIOLI 9 was held in Braunschweig, Germany, in November 2001. This workshop report presents the papers. In addition results of the workgroup sessions on the creation of a website are reported. These sessions were the input for www.pacioli.org.

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Preface

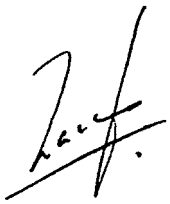
Innovative ideas face many hurdles to become successful implementations. This is also true in farm accounting and in Farm Accountancy Data Networks (FADNs). Therefore it makes sense to bring together the 'change agents', the persons that have a personal drive to change the context of their work and their organisations, to adapt them to new circumstances. For farm accountancy and policy-supporting FADNs it is appropriate to do this in a European context: this creates possibilities to learn from each other.

It is with this background that the PACIOLI-network organises a workshop every year. This small but open network has become a breeding place for ideas on innovations and projects.

This report is one of the more lasting results from the 9th Pacioli workshop, held in November 2001 in Braunschweig, Germany. We are indebted to our German colleagues for the local organisation. The dedicated support of mr. Werner Kleinhanß of the Federal Agricultural Research Center FAL in Braunschweig and mr. Hans-Hennig Sundermeier of the Landwirschaftlicher Buchführungsverband in Kiel resulted in a very pleasant seminar. Their local ties lead to a very interesting excursion. We are indebted to prof. dr. F. Isermeier (FAL) for making the facilities and some logistics available. Helga van der Kooij managed to get the papers and the results from the work group sessions in a readable workshop report.

There were more participants in PACIOLI 9 than expected. This resulted in a small positive financial result that has been invested in a dedicated website: www.pacioli.org. We hope that this website becomes a useful tool to keep the information flow at a high level between the workshops and that it helps to prepare next workshops more efficiently. PACIOLI X is scheduled for December 2002. We hope that this workshop report gives the readers the incentive to take part in that event.

The managing director,



Prof. Dr. L.C. Zachariasse

1. Introduction

1.1 The PACIOLI network

Decision making by farmers becomes more complex as economics, new agricultural policies and environmental aspects demand integration. Information systems require adaptation and there is a special need for innovation in farm accounting.

The objective of the PACIOLI network is to assess the need for and feasibility of projects on the innovation in farm accounting and its consequences for data-gathering on a European level through the *Farm Accountancy Data Network* (FADN / RICA).

PACIOLI was originally a Concerted Action funded by the EC under the AIR specific programme of the Community's Third Framework Programme for Research and Technological Development and managed by DGVI.FII.3 (AIR3-CT94-2456). After completion of the contract the partners decided to keep the network alive at their own costs.

1.2 Programme PACIOLI 9

Sunday, 11 November 2001

Travel from Hannover airport to Braunschweig (by request).

16:00 Arrival and registration at Hotel Mövenpick (until 19.30)

19:30 Welcome drink with a light dinner (Hotel Mövenpick)

Monday, 12 November 2001

7:45 Breakfast

8.25 Travel to FAL (Forum) with FAL minivans

9:00 Welcome and introduction
Prof. F. Isermeier, Head of FAL

'German FADN/use for policy assessment'
Dr. Hauser, BMVEL

Plenary Session 1

9.45 *'A Comparison of Swiss and EU Farm Accountancy Data (FADN)-Methods and selected results'*
Beat Meier, FAT, Switzerland

10.15 *'Net present value and valuation of assets'*
Koen Boone, Agricultural Economics Research Institute (LEI), Netherlands

10.45 Break

11.15 Workgroup Session 1
What do the differents clients expect from FADNs?

12.15 Lunch (FAL Canteen)

Plenary Session II

13.30 *'Modernisation projects of FADN at EU level'*
Yves Plees, EC, DG Agriculture, Brussels

14.00 *'PO, verification tests of EU-FADN data haven't to be checked'*
Susanna Perachino, Penguin Consulting, Italy

14.30 *'Treatment of quality and certification in the FADN to evaluate the agricultural policy'*
Stefano Trione, I.N.E.A., Italy

15.00 Break

15.30 Workgroup session II
Realise a FADN web site for clients

Plenary Session III

16.30 *'FADN at national and European level: Improvement with a new information technology: Czech Republic example'*
Bernard Del'homme, ENITA Bordeaux, France

17.00 *'Agricultural Accounting System in Romania'*
Sorana Cernea, University Hohenheim, Germany

17.30 Snack

18.00 Plenary Session IV
'Exchange network for the setting up of FADN in Central and Eastern European Countries (CEEC)'
Bernard Del'homme, ENITA Bordeaux, France

19.30 Dinner (FAL Forum, 6-8 scientist from FAL are invited)

22.30 Travel to the Hotel (FAL minivans)

Tuesday, 13 November 2001

7.30 Breakfast

8.00 Travel to FAL (FAL minivans)

Plenary Session V

8.30 *'Phasing out of milk quotas - Impacts on German Agriculture'*
Werner Kleinhanss, FAL, Germany

9.00 *'Accounting data as an aid for decision making of Belgian Glasshouse managers'*
Nicole Taragola, Ministry of SME, Trade & Agriculture, Belgium

9.30 *'Estimation of Feed Utilisation Matrices and Demand for Feed Using Farm Data'*
Andrzej Tabeau, Agricultural Economics Research Institute (LEI), Netherlands

10.00 Break

10.30 Workgroup Session III
'Discussing Bottlenecks and wildcards'

12.00 Excursion

12.00-
12.45 Travel to Haldensleben

12.45-
15.00 Visit of Gut Glüsig including lunch

15.00-
15.45 Travel to Klein Wanzleben

16.00-
17.30 Visit of Sugar factory of Nordzucker

17.30-
18.30 Travel to Quedlinburg

18.45-
20.30 Guided visit of the historical town

20.45-
22.30 Dinner in the historical cellar of the Ringhotel

22.30 Travel to Braunschweig

Wednesday, 14 November 2001

7.30 Breakfast

8.00 Travel to FAL (FAL minivans)

Plenary Session VI

8.30 *'A new methodology for stratification and weighting of the Belgian FADN'*
Dirk van Lierde, Ministry of SME, Trades & Agriculture, Belgium

9.00 *'Working procedures for the Selection of Farms in the FADN'*
Hans Vrolijk, Agricultural Economics Research Institute (LEI), Netherlands

9.30 *FADN as a part of the Agricultural Statistical System*
Ann-Marie Karlsson and Gunnar Larsson, Statistics Sweden, Sweden

10.00 Break

10.30 Workgroup Session IV
Making an actionplan on the FADN web site

11.30 Questions and answers session

12.00 Lunch (FAL Canteen)

13.00 Information on PACIOLI 10

13.30 Closing/follow-up

15.00 Travel to the station or airport (by request)

How to serve FADN users needs - aspects from the German view

Josef Hauser [1]

Objectives and importance of FADN in the new agricultural policy

If you have a look at the starting Agriculture Web site of the EU Commission, you will find the current big issues: sustainability, food quality, food safety, animal welfare, control mechanisms.

There is nothing, which is related the objectives of agricultural policy in article 33 of the EC foundation treaty: increasing agricultural productivity, increasing earnings of farmers, competition ...

We have a new agricultural policy, a change of agricultural policy ('Agrarwende'). This change is perhaps stronger in Germany than in other Member states. Our ministry has taken on a new name and new tasks. Organisation has been changed. But there is no more money and staff. Resources in less important old tasks must be reduced, so in FADN. Even other federal agricultural institutions and FADN offices of the German regional States (Länder) are affected.

Our national FADN is based on the Agricultural Law from 1955. This law defines the objectives of agricultural policy and the foundation of FADN. FADN was so important that it was established in the ministry:

- the Ministry of Agriculture studies each year the profits and the expenditures of holdings by economic size, by type of farming and by region. This survey is based on the operating results of holdings. The participation of the farmers is voluntary;
- the Federal Government annually submits the results of this survey in Agriculture Report (Agrarbericht) to the Bundestag (parliament).

This law was never changed. But in October the German Bundesrat has started a discussion to change the law concerning the objectives of agricultural policy and the necessity of FADN. Some of the members recommend to change even Article 33 of the EC Treaty.

Last year our system has been examined by the Federal Audit Board. It is asked why there is still such an expensive state-financed network for the small agricultural sector in Germany, which other sectors do not need. The network should be done by private institutions, by our Farmers Union.

The EC-FADN has been established in 1965 basing on the objectives in Article 33 of the EC foundation treaty. Objectives and construction of the FADN then were in accordance with the spirit of the age.

[1] Federal Ministry of Consumer Protection, Food and Agriculture, Bonn.

Probably the EC Council would not decide today the same FADN-regulation as in 1965 or any regulation.

We are in a defensive position and have to demonstrate and justify the benefits of our FADN for the changed agricultural policy, especially for environmental requirements.

In November 1999 the Agriculture Council adopted a strategy to address the integration of environmental requirements into the Common Agricultural Policy through the reforms adopted under Agenda 2000.

EC Commission presented an initial set of 'Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy', and areas where indicators are needed. These are:

- organic farming;
- quantities of the use of water, energy and fertilizers;
- soil surface nutrient balance;
- intensification/ extensification, specialisation.

FADN can collect economic accounting data for organic farms. We do this. But should we extend FADN to an environmental and ecological data system, because policy has changed ?

Restrictions for further development of FADN in Germany

a) There are no special accounts for FADN
The German network is based on annual accounts, which are primarily used for other purposes than economic statistics. The majority of the farmers must already prepare accountancy documents (balance sheets, profit and loss accounts) on the basis of legal obligations (income tax law, accounting procedures of the commercial law, bookkeeping obligation within the framework of support measures). Therefore we have to use these accounts and not to collect special accounts for the national and Community accountancy network.

b) Staff qualification
The annual accounts (farm returns) for the accountancy network and other purposes are usually prepared by private accounting services (service enterprises for book-keeping and tax counselling). The employees in these enterprises are usually experts in tax regulations and finical book-keeping, but not experts in agricultural production, in good agricultural practice and in agricultural economics. We finance training workshops for these services, however it seems impossible for the staff, for instance to collect detailed data of fertilizers use or nutrient balances.

c) Costs
Farmers and the FADN have to pay for these services. Additional data collection requires additional payments. Actually we pay approximately 245 to 660 € per data set to the Accounting services. (The reimbursement of the EC-Commission is only 132 €.) The annual costs for the national network are currently approximately 5 million €.

These costs are regarded as too high. The funds were substantially reduced in the last years.

d) Quality control
The financial accounts can be examined by tax administration. Therefore the quality of the main positions in our system is good. The correct booking of detailed information depends on the subdivision of receipts and bills related to the single business and banking transaction.
Our experience is: Data, which cannot be checked by control programs, give no reliable results.

These aspects should be considered by changing farm return. Not all needs on new data, indicators and information can be answered by FADN. We should not change a network of accountancies to a general farm data collecting system. Let us remain in the spirit of Luca Pacioli in 1494: 'recordation of business transactions, debits on the left side credits on the right'.

There are other data-sources and systems, which may be more suitable for certain questions:

FSS (Farm Structure Surveys)
IACS (Integrated Administrative and Control System) ➔ detailed information about CAP direct-payments
other administration data

IFCN (International Farm Comparison Network)

Use of FADN for policy management

In my opinion a lot of decision support can be done with the current FADN system. With this support we can justify the costs of the network and demonstrate its use. To do more is mainly restricted by the availability of staff , educated in economics , not by an insufficient content of the accounts or data sets. In our ministry we use the FADN Data:
- for the annual presentation of actual results in the agricultural report; and
- more over for a lot of internal analyses of different politic questions.

We are a service unit for all departments of the ministry. Actually we have made analyses for:
- modulation of CAP- direct payments;
- objective criteria changing the headage limit of 90 animals for the male bovine premium;
- impacts of stronger linking animal production to farm areas (stocking density, livestock units per ha) in different national regulations;
- costs of milk production in different types of milk farms;
- energy costs in horticulture.

Every year we have to make calculations for our agricultural social insurance. This calculation is ordered by law, which explicitly prescribes, that the calculation must be done by using the FADN-data. The highest German social court has confirmed that the calculations are legal and accurate.

In the ministry we can not make complex, scientific analyses and researches, which could be published in economic research journals. We have to produce simple answers and figures in the shortest time.

Complex researches by using FADN data are done by the Modelling Team of the FAL. A strong sense of collaboration has evolved between the FAL and the various departments of the BMVEL.

For reasons of data protection only my unit and the FAL-Institute of Farm Economics have access to the single farm data of our national network (the Länder have own regional networks.).

We also use the standard results by type of farm and economic size of the EC-FADN for analyses.

Comparability restrictions and methodical problems

The use of these data in Germany is restricted by some methodical problems:

a. Structure of accounts

The German FADN annual account differs substantially from the EU farm return. The structure of our account for agricultural enterprises is the same as the account for commercial (trade and industry) enterprises. The agricultural legal entities are obligated to make their accounts according to the rules of our commercial law, which is based on the Council Directive on the annual accounts of joint stock companies. We use this account for all legal forms. Therefore farmers, accounting offices and other national institutions do not know the EC-FADN farm return.

The principle structure of the EC-return was constructed in the Seventies for family holdings and does not correspond to the general commercial accounting rules for modern enterprises of different legal form with different business, even non agricultural business and financial activities.

b. Definition of professional (commercial) farms
c. Classification by type and size
d. Weighting system
e. Depreciation method
f. Definition of variables

Next year all FADN monetary figures at national and EC-level are presented in €. But the figures are not comparable. In my opinion the missing comparability of results at international level is the main reason for insufficient use of the data and for insufficiently serving the needs of the users.

We will do a step towards better comparability by applying the EC Typology in the national FADN and in other statistics next year.

The topic of this workshop is 'How to serve users needs'. My opinion is:

not by

enlargement of the EC- farm accountancy return to a more ecological but less economic farm questionnaire

but by

modernisation of the current EC system, which is:

adaptation of the farm account to international standards for commercial accounts

and

methodical harmonisation of national networks to improve comparability.

2. A Comparison of Swiss and EU Farm Accountancy Data (FADN) - Methods and selected results

Beat Meier [1]

Abstract

Improving the competitiveness of Swiss agriculture is a priority objective of agricultural policy. International comparisons play an important role in analysing competitiveness. However, such comparisons are only possible and meaningful with a suitable data base. In conjunction with all the EU Member States the EU Commission operates a Farm Accountancy Data Network (EU FADN), based on standard methodology. The conversion of Swiss data in accordance with EU FADN methodology carried out by the FAT has now made comparable results available. This paper explains the methodology and presents an initial analysis.

First results show that on Swiss farms the income per family labour unit is significantly higher than that of neighbouring countries and the EU average. This makes no allowance for the fact that in Switzerland the purchasing power of an ECU is approximately 20-30% less than in the countries compared. In order to rule out the effects of different farm structures, dairy farms (EU typology TF41) with an area of between 30 and 50 ha are investigated in greater detail. Total costs in the compared French, German and Austrian dairy farms account for only 40 to 60% of the costs on Swiss valley and hill farms.

2.1 What is EU FADN?

The Farm Accountancy Data Network of the European Union (EU FADN) was set up in 1965. Its aim is to gather accountancy data from agricultural holdings in order to determine their incomes and to analyse their business conditions.

The annual sample currently encompasses approximately 60,000 farms, covering over 90% of the total utilised agricultural area (UAA) and over 90% of the total agricultural production in the EU.

Most EU countries also operate national accountancy networks from which FADN data can be extracted for the EU commission. EU FADN is the only data source with EU-wide comparable economic data on agricultural holdings (cf. also bibliographical references relative to EU FADN purpose and organisation).

[1] Swiss Federal Research Station for Agricultural Economics and Engineering (FAT), CH-8356 Tänikon, Switzerland; Email: Beat.Meier@fat.admin.ch; FAX: ++41 52 365 11 90; Phone: ++41 52 368 31 31.

2.2 Implementing EU FADN methodology

Data collection and evaluation in EU FADN differs in several respects from the methodology of the Swiss Farm Accountancy Data Network (cf. figure 2.1). *In order to draw a comparison between EU FADN and Swiss accountancy data, the FAT carries out the conversion of Swiss data on various levels.* This means that results of Swiss farms given here are not comparable with the evaluations of the reference farms (cf. for example annual main report).

	Farm Accountancy Data Network of the EU (EU FADN)	Swiss Farm Accountancy Data Network Reference Farms
Farm definition		
	Agricultural holding excluding dwelling house.	Dwelling house belongs to the farm; imputed lease to farm manager's family.
Valuation and depreciation		
	Land, livestock, inventory and supplies in kind valued at market prices, fixed assets at replacement value.	Valuation according to the cost price principle, i.e. land generally at earning capacity value, reference values for livestock, inventory and supplies in kind.
	Depreciation based on replacement values; no balance sheet continuity.	Depreciation of historical net cost of acquisition; balance sheet continuity
Profit and loss account		
	Total output and inputs incl. internal supplies (farm use); value changes in breeding livestock only affect current operating result in case of quantitative change.	Gross profit-external cost calculation excludes internal supplies (farm use). Each valuation change in livestock affects current operating result.
Farm typology		
	EU farm typology: each production branch (ha or number of livestock) is multiplied by a standard gross margin (SGM). The composition of the overall farm standard gross margin gives the type of farming (TF). The sum of standard gross margin determines the economic farm size in European size units (ESU; 1 ESU= 1200 ECU SGM).	FAT99 farm typology: farm type is determined on the basis of physical criteria (land use and livestock composition). Unlike EU typology, where SGM varies annually, FAT99 typology gives a more stable classification over time. The utilised agricultural area is generally used as the measurement of farm size.
Universe and sample		
	FADN covers full time farms. Full time farms must exceed an economic minimum size (in ESU). These thresholds are set differently, depending on the country. Switzerland‘s neighbours generally have a recording threshold of 8 ESU, Italy has 2 ESU.	The univers of the reference farms is delimited by minimum physical thresholds. In the univers of around 55,000 farms many part-time farms are included.
Weighting of results		
	Based on stratification of farms by farm type (TF), economic farm size (in ESU) and FADN regions (e.g. the Federal States in Germany).	Based on stratification of farms by type (FAT99), size class (UAA) and region (valley, hill and mountain farms, derived from production zones).

Figure 2.1 Methodological differences between EU FADN and the evaluation of reference farms by FAT (Swiss FADN)

The dwelling house exclusion requires adjustments in building costs including depreciation, income from building rental, a proportionate reduction of debt interest, of rent in the case of purely tenant farms, of assets and liabilities.

Book values and depreciation are corrected to replacement value: machinery +5%, buildings +20%. Swiss FADN values are adopted for land and other assets (Germany and Ireland also make an exception from the valuation at market prices). EU FADN standard variables are calculated for the profit and loss account including adjustment of livestock valuation, balance sheet representation and financing indicators. The recording threshold for Switzerland is fixed at 16 European size units (cf. table 2.1). When EU farm typology and analogous weighting are implemented, just under 50,000 farms with over 90% of the area and production are covered. EU FADN methodology was first implemented for Switzerland in 1996 and was documented in detail (Meier 1996, cf. also bibliographical references relative to EU FADN methodology).

2.3 Important variables in EU FADN

EU FADN calculates and publishes so-called standard results for different farm groups and regions. The detailed results (called Level 1) include over 120 such standard variables, the summary report (Level 2) approx. 30 variables. The standard results are given a continuous code (SExxx, cf. also bibliographical references on standard results), making it easier to navigate charts and tables.

The profit and loss account is split up as follows (with the codes for standard variables):

+ Total output crops and products (SE135)
+ Total output livestock and products (SE206)
+ Other output (SE256)
= Total output (SE131)

+ Total output (SE131)
+ Balance current subsidies and taxes (*esp. direct payments*) (SE600)
- Total intermediate consumption (SE275)
= Gross farm income (SE410)

+ Gross farm income (SE410)
- Depreciation (SE360)
= Farm Net Value Added (SE415)

+ Farm Net Value Added (SE415)
- Total external factors (*wages, rent, interest*) (SE365)
+ Balance subsidies and taxes on investments (SE405)
= Family Farm Income (SE420)

Family Farm Income (SE420) /
Unpaid labour input (SE015)
= Family Farm Income per Family Working Unit (SE430)

Family farm income compensates unpaid family labour and family capital used in the farm, i.e. is equivalent in concept to agricultural income in Swiss FADN. Total output also includes products consumed on the farm, e.g. home-produced feed. The standard variable 'Balance current subsidies and taxes' (SE600) basically corresponds to direct payments from the public purse. In the charts below these are combined as 'subsidies and taxes' together with the subsidies and taxes on investments which flow directly into the profit and loss account.

2.4 A comparison of farms in Switzerland and neighbouring countries

Because of the availability of data, the analysis below is restricted to the years between 1996 and 1998. More up-to-date EU data is continously made available on the Internet. When comparing Swiss results with those from France, Germany and Austria, the major points are as follows:

- in Switzerland the average area is significantly less than in neighbouring countries and the EU (15) (average of all 15 EU Member States). Animal stocks and labour input are on a level comparable with Austria and the EU average (cf. table 2.1);
- although holdings are smaller, the sum of total output, current and investment subsidies (SE131+SE600+SE405) on the Swiss farms is similar to Germany and France (figure 1.3);
- livestock and products (SE206) and direct payments (SE600) are of primary importance in Switzerland (figure 2.4);
- in Austria the proportion of 'Subsidies and taxes' ((SE600+SE405) / (SE131+SE600+SE405)) is 22%, in Switzerland 20%, in Germany and France and in the EU countries on average it is between 13 and 14%.

Table 2.1 Average farm structures in selected European countries 1996-1998

	Switzerland	Germany	France	Austria	EU 15
Total labour input AWU (SE010)	1.86	1.99	1.79	1.91	1.50
Unpaid labour input FWU (SE015)	1.38	1.47	1.44	1.81	1.23
Total Utilised Agricultural Area ha (SE025)	19.7	53.1	63.9	24.8	31.3
Total livestock units LU (SE080)	28.9	57.6	52.2	25.3	27.3

Sources: EU Commission, FADN; Swiss FADN, FAT.

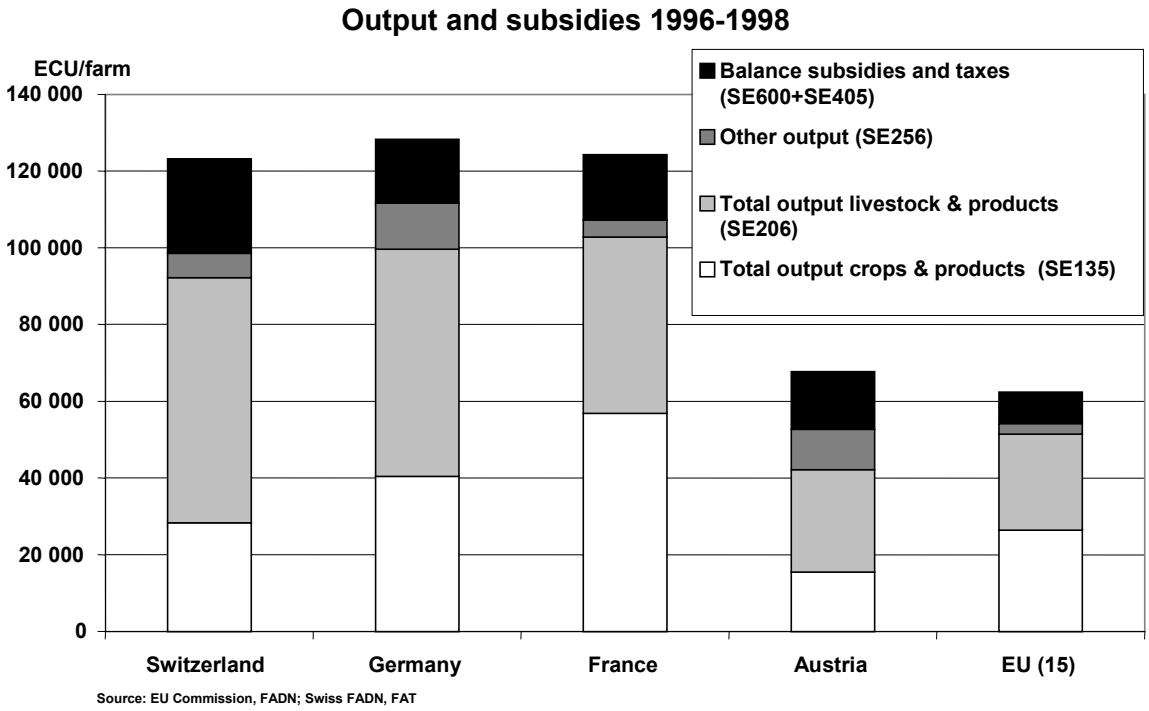


Figure 2.2 Gross output, operating and investment subsidies in selected countries

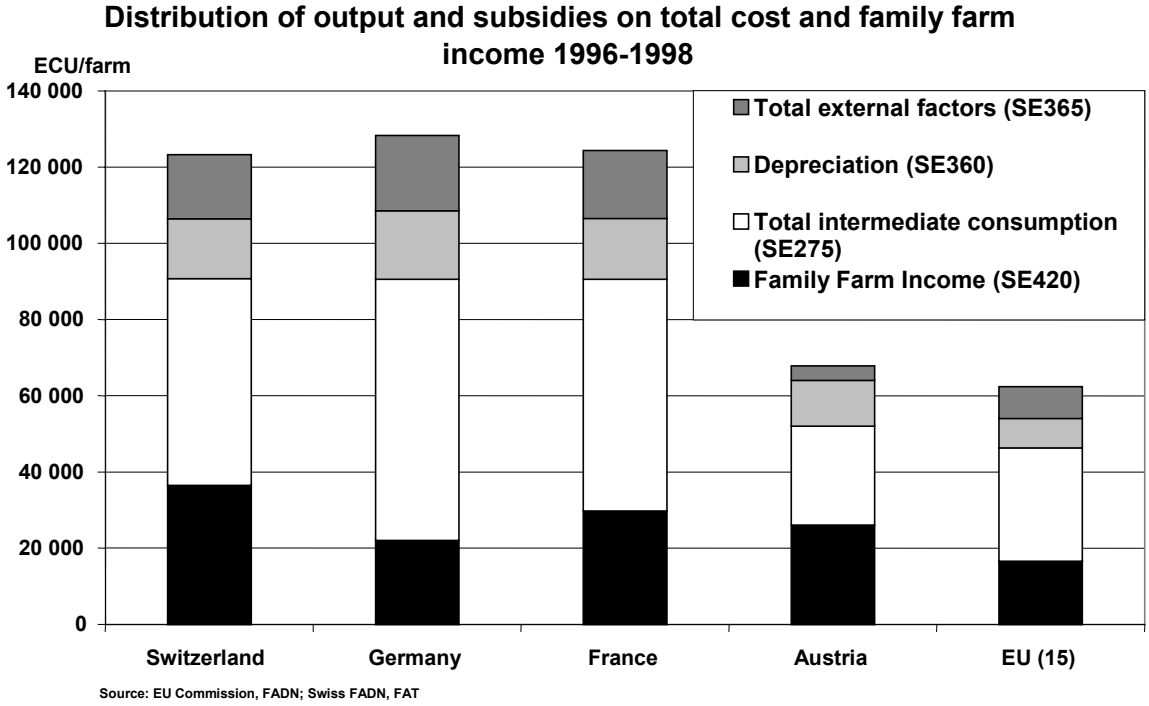


Figure 2.3 Expenditure and family farm income in selected countries

Swiss farms come off relatively well on the expenditure side, bringing in a family farm income significantly above that of the countries used for comparison. The column heights in figure 2.1 thus correspond exactly to the sum of output and subsidies in figure 2.3. When interpreting this data it should be borne in mind that the Swiss farms are substantially smaller than the German and French farms in terms of quantity product volume.

2.5 Dairy farms in selected European regions

Analysis so far has shown that, thanks to high producer prices and high direct payments per farm, Swiss farms enjoy incomes which exceed the comparable European average even though structures are significantly smaller. The question is how farms with similar structural preconditions stand up to international comparison. *Dairy farms* (to EU typology TF41) are therefore investigated in greater detail below. Only *farms with an area of between 30 and 50 ha* are considered, both type of farming and size of farm being similar.

In order to rule out the effect of difficult production conditions in mountain areas, valley and hill farms are also shown separately for Switzerland. A comparison is made with FADN regions in which milk production plays a major role. In addition to Bavaria and Schleswig-Holstein consideration is also given to the French region of Rhônes-Alpes, which includes parts of the Rhone valley as well as the alpine area. Data for Austria is available only on a national level (cf. bibliographical references relating to FADN regions).

Farm structure

Table 2.2 shows that the high labour input of over two workers in Switzerland is just reached by Austrian farms. There are hardly any salaried employees on the farms of the EU

Table 2.2 Farm structures of specialist dairy farms with 30-50 ha utilised agricultural area, 1996-1998 average

	Switzerland		Bavaria Holstein	Schleswig-	Rhônes-Alpes	Austria
	All regions	Valley and hill region				
Farms represented	2,747	1,437	12,072	1,656	3,125	3,282
Total labour input AWU (SE010)	2.3	2.5	1.6	1.5	1.5	2.4
Unpaid labour input FWU (SE015)	1.6	1.6	1.6	1.3	1.5	2.3
Total Utilised Agricultural Area ha (SE025)	36.5	36.1	37.1	41.0	39.3	35.8
Total livestock units LU (SE080)	42.9	51.7	56.8	72.4	39.4	38.0
Dairy cows (SE085)	23.6	28.0	31.4	36.2	26.5	22.3
Milk yield kg/cow (SE125)	5,905	6,120	5,500	5,879	5,357	5,269
Milk production kg (SE085*SE125)	139,600	171,500	172,900	212,500	142,000	117,400

Sources: EU Commission, FADN, Swiss FADN, FAT.

regions compared, but they account for 0.7 to 0.9 of the workforce on Swiss farms. The milk yield per cow tends to be above average in Switzerland. With the very restrictive selection of the compared farms it should be borne in mind that those in Switzerland and Austria are of above average size by comparison with all the dairy farms in the country, whereas in Germany they correspond roughly to the national average. The farms in the Rhônes-Alpes region are considerably smaller than the average French dairy farm.

Output and subsidies

While farm structure is similar, the output obtained by Swiss farms from agricultural production is 1.5 to 2 times that of comparable EU farms (cf. figure 2.5). On top of that there are direct payments (SE600+SE405) of around 40,000 ECU, a level not even approached by Austria with 21,000 ECU. The German and French farms analysed receive direct payments of between 6,000 and 13,000 ECU.

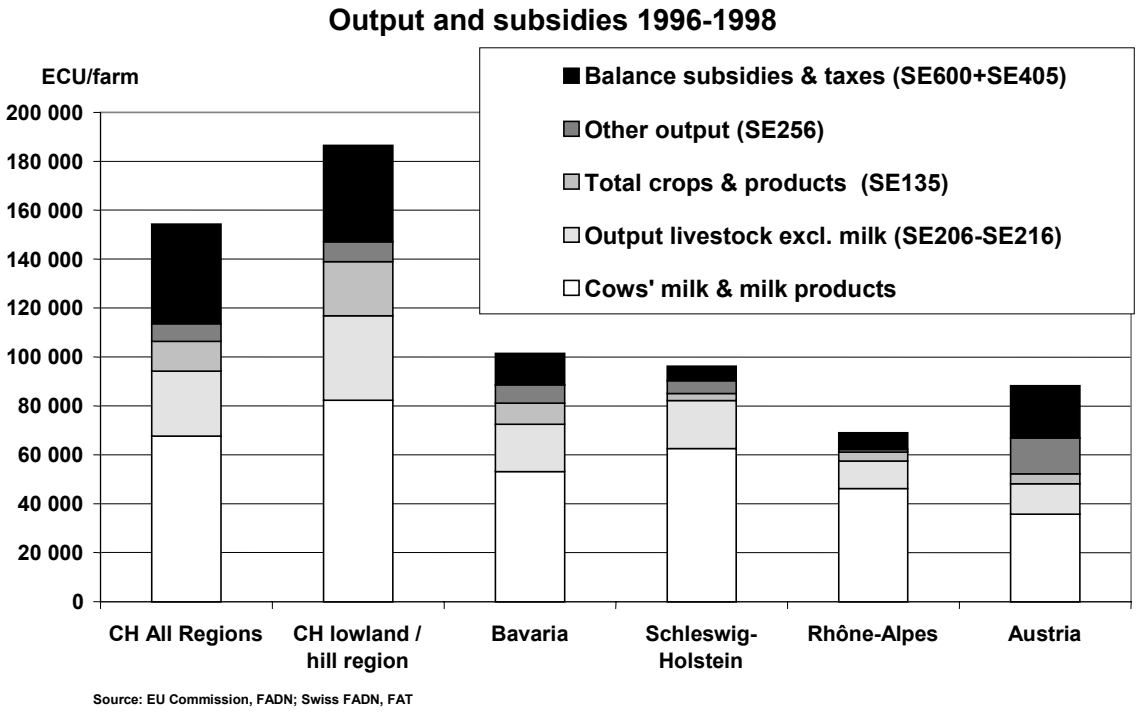


Figure 2.4 Output, current and investment subsidies in dairy farms of 30 to 50 ha

Costs and income

The costs of Swiss farms also differ considerably from that of their neighbours. Figure 2.5 shows total costs and family farm income received. The total column height corresponds to the sum of output and subsidies in figure 2.4.

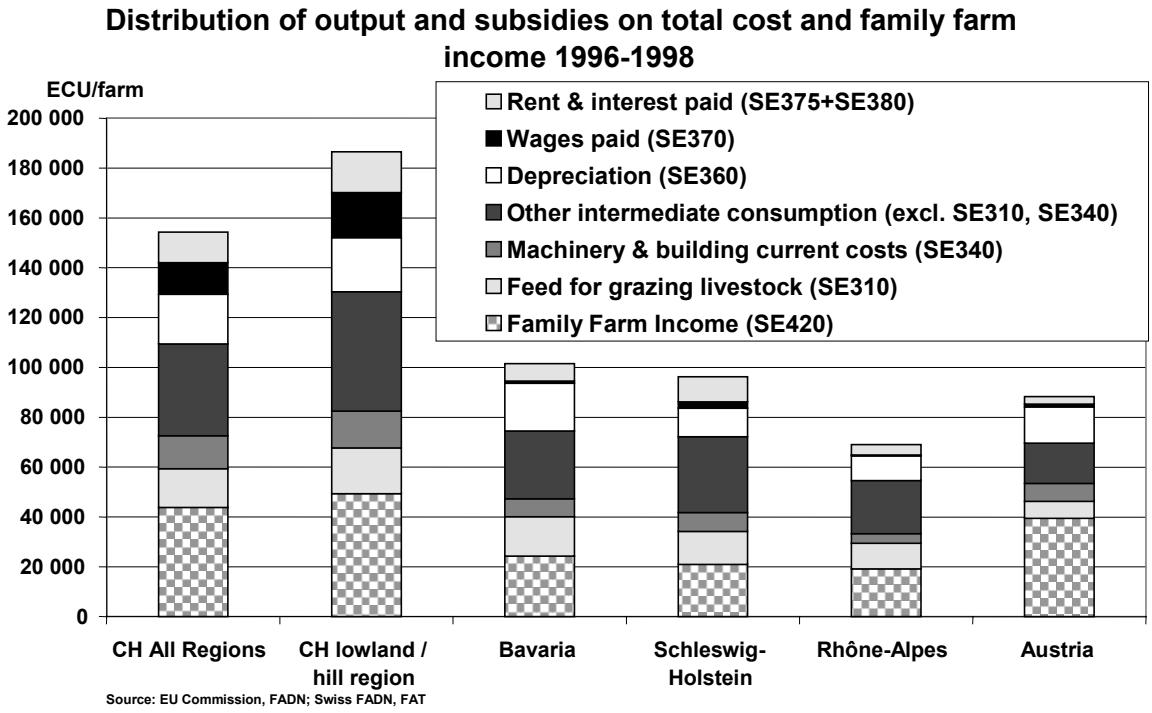


Figure 2.5 Costs and family farm income in dairy farms of 30 to 50 ha

In all the cost items shown the two groups in Swiss farms are substantially above those of the comparable EU groups. The most striking difference is wage costs, which are barely significant in EU farms of this size. The costs of rent and debt interest are also above average in Switzerland. Rented area accounts for approx. 60% in Swiss farms, surpassed only by farms in the Rhônes-Alpes region, rent payments being comparatively low on French farms. Between 40 and 50% of the area in German farms and approx. one third in Austrian farms are rented. The cost of building maintenance and repairs on the Swiss farms investigated is at least double that of their German and Austrian neighbours, and up to quadruple that of the French region.

Depreciation on the Bavarian farms is almost as high as in Switzerland, whereas in the other regions it is considerably lower.

Total costs on the French and Austrian farms is only 40% of the total costs on Swiss valley and hill farms. The figure for German farms is approximately 60% of the Swiss.

Reasons for cost variations

These huge variations in expenditure cannot be explained by the size of the farm, as farms of similar size were compared. Higher prices, of feed products for example, are in part responsible for the additional costs on Swiss farms. In the case of other expenditure items, however, higher inputs are probably crucial. This is particularly noticeable with reference to labour, the use of external capital (cf. figure 2.6) and the maintenance of buildings and

machinery. Certainly topographical and climatic conditions are also responsible for the higher cost of production in Switzerland, as are environmental and animal protection requirements. But this cannot fully explain the major differences, for example in relation to Austria.

Income

The difference between total output including subsidies and total expenditure gives family farm income. On Swiss farms this is 44,000 or almost 50,000 ECU, while thanks to comparatively low costs Austrian farms still make 40,000 ECU and the other groups take between 19,000 and 24,000 ECU. When making cross-comparisons it should be borne in mind that the Austrian farms have around 2.3 unpaid employees, whereas in all the other holding groups family farm income covers between 1.3 and 1.6 unpaid hands.

Assets and financing

The first thing shown by a balance sheet analysis (figure 2.6) is the great variation in land valuation. In Switzerland building assets are four times that of the regions compared. Surprisingly enough the value of machinery and equipment is even higher on Bavarian farms, but in the other regions is lower than the Swiss figures. The liabilities of the Swiss farms are up to five times as high. As the average interest paid on external capital in all the regions is between 3 and 5%, this also explains why the debt interest of the Swiss farms is significantly higher.

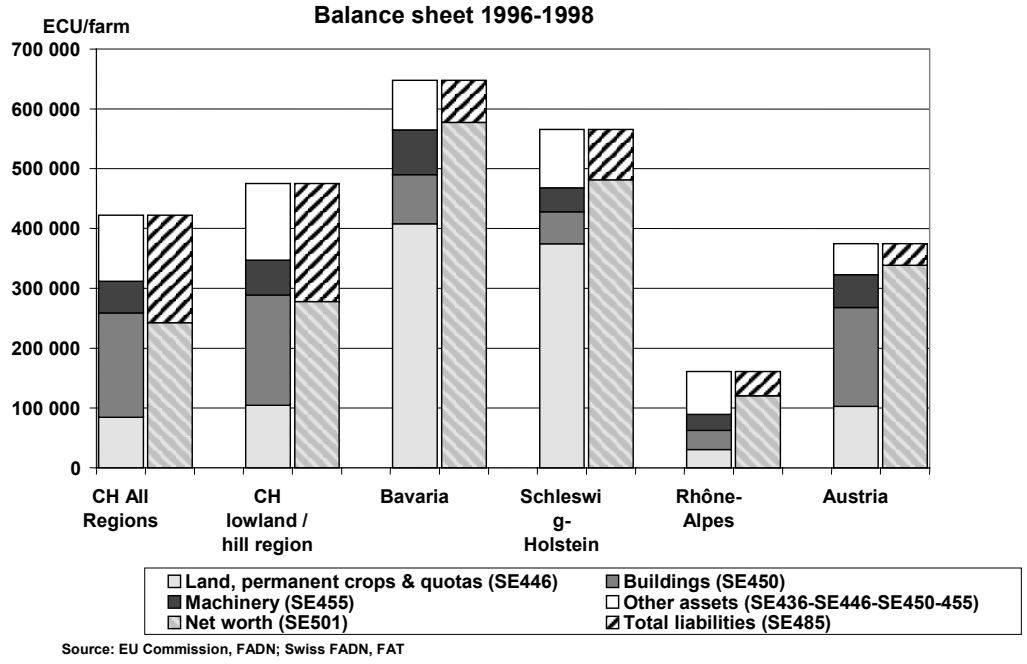


Figure 2.6 Balance sheet of dairy farms of 30 to 50 ha

The very low balance sheet total of the farms in the Rhônes-Alpes region on cross comparison could be linked to the high percentage of rent. However, this was not investigated further. Figure 2.6 also shows the possibilities and limits of international accounting comparisons: the degree of external and internal financing is an extremely problematical index which is fairly meaningless for international comparisons, partly because of land valuation and the different forms of ownership. On the other hand, analysis relating to the absolute use of external capital and interest load is meaningful.

Bibliography and Data Sources

Meier, Beat, 1996. Vergleich landwirtschaftlicher Buchhaltungsdaten der Schweiz und der EU - Methodische Grundlagen. Schriftenreihe der FAT Nr. 41. Tänikon. Schweiz.

FADN on the Internet

Purpose and organisation of FADN:
http://europa.eu.int/comm/agriculture/rica/concept_en.cfm

Methodology of FADN:
http://europa.eu.int/comm/agriculture/rica/methodology_en.cfm

Definition of FADN standard results and standard groupings:
http://europa.eu.int/comm/agriculture/rica/diffusion_en.cfm

FADN regions:
http://europa.eu.int/comm/agriculture/rica/regioncodes_en.cfm

Database with own access facilities:
http://europa.eu.int/comm/agriculture/rica/dwh/index_en.cfm

Static result tables:
http://forum.europa.eu.int/irc/agri/rica/info/data/tabstd.htm

Workgroup session 1: What do the different clients expect from FADNs?

Introduction to the workshop's theme

The PACIOLI workshops are designed to work together: this leads to new common ideas and is a good method to learn to understand each other better. In PACIOLI 8 several participants showed an interest in creating together an common web site on FADNs and PACIOLI in the form of a Portal (or Vortal). INEA and DG-Agri even suggested that they would be able to upload material. Notwithstanding these good intentions, not much has materialised. We therefor selected this theme as the issue for the workgroup sessions of PACIOLI 9. In the workgroups we hope to work a litte bit more on the potential content of such a we site, and we use some formats for group work that might provide energy. We will also discuss the formats themselves, to learn their advantages and disadvantages for use in other situations.

Theme of session 1

In the best tradition of the stakeholder orientation that we often use in PACIOLI, we start with a classical brainstorm on the needs of clients. Using a flip over each group is asked to brainstorm ideas for the question: 'What do the different clients expect from FADNs?' Each group concentrates on one category of clients:
Group A: farmers;
Group B: accounting offices;
Group C: policy makers;
Group D: the press and the general public;
Group E: researchers.

Each group is asked to brainstorm for 10 minutes and then (if needed) clarify the suggestions that have been made in the next 10 minutes. Remind that in a brainstorm you are not allowed to put questions and certainly not to criticise ideas that are put forward. Quick suggestions are important, to invoke additional ideas from others. Questions and comments are given afterwards.

Groups for the workgroup session

Group 1 - Farmers

N. Taragola (chairperson)
J. Aamisepp
S.C. Cernea
E. Øvren
A-M. Karlsson

Group 2 - Accounting offices

H.H. Sundermeier (chairperson)
A. DeCicco
J. Jalast
A. Latukka
S. Parachino
S. Trione
Z. Kubikova

Group 3 - Policy makers

J. Boone (chairperson)
J. Bjarnason
Y. Plees
Z. Jurisic
M. Njavro
S. Trione

Group 4 - Press and general public

B. Meier (chairperson)
V. Bratka
B. Del'homme
G. Larsson
D. Osuch

Group 5 - Researchers

H. Vrolijk (chairperson)
W. Kleinhanss
D. van Lierde
A. Tabeau
K. Grabowska
M. Lekesova

Results

Worksession-Group 1-Farmers

Comparison with others (same type)
- same region
- other regions (EU)

to learn from others
to know about distorsions (subsidies)
reasonable input for data collection delivery
confidentiality
desicion help for farm design
recognize their own farms
additional benefits (professional bookkeeping and advisory services)
easy-to-understand bookkeeping results
differences between EU-regions (climate, altitude, policies...)
get advice for long-term strategy
easy access to FADN results (internet)
FADN should improve dissemination of results
farmers' unions should use FADN results too

Workgroup session 1 - Group 2 Accounting offices

What is an accounting office ?
- depends on country

* ' don't bother as with FADN-data requirements... '
* clear instructions
* functioning IT and accounting software
* information about later use of the data (the role of accounting office in the whole system)
* money and other incentives
  ↓ ↓
  earn living motivation

* concurrence of other tasks (→ more time available)
* instruction → compatible with national rules/laws
* minimum number of FADN-farms
  → to justify the investment in education
* FADN adds to normal workload
  ↓
  specialisation needed
* a) software → plausibility checks / quality
  b) weak thresholds

Workgroup Session 1 Group 3 Policy makers

1. Relevant for policy making and evaluation
2. Understandable
   Simple/one total
3. Recent data
4. * value for money
5. Comparable < countries, other databases, sectors

Other:* comparable over time
* capable to answer detailed concrete questions
* representative data
* validated data
* not only per farm but also per sector
* tourism, forestry, off farm income
* environment
* foord safety and food quality

Observation:
→ policymakers ask too much of FADN (things which FADN is not suitable for)

Workgroup Session 1/Group 4

Press and general public expect:

* info on income
* profitability in production lines
* development over years
* effects agric.→ environement
* efficiency of public support
* regional data
* labour input & employment in rural areas
* tendencies incomes/-development
* non farm income/total income
* forecasts
* food safety, product quality
* animal welfare
* comparability - other memberstates
  ↓
  different farm types
* comparison with non-agric. sector
* interpretations not figures
* facts for predefined hypothesis
* data on typical farms

* living standard farmers - other groups
* how is FADN need in policy making

Conclusion:
Presenting vs. analysing
contents vs. methods
classical economic data vs. new fields

Workgroup Session 1-Group 5 Researchers

Availability - access
- actuality
Consistency - across countries
Splitting costs / differentiation inputs
Definition of variables
Data on subsequent years
Regional data / indicators
Representativity
Access to standard results
Broadness available data
- non agricultural
- environmental
- qualitative

Large N
Links with other data
Flexible system

Demands (additional) from the view points of politicans and researchers:
1. More regional differentiation, especially for problems which refer to problems in smaller regions:
    a. environmental, due to intensity and stocking density
    b. social aspects in regions (subregions) with dominating production lines
2. a great proportion of 'identical farms' (farms staying in the panel for 3-5 years) not so much for time-series analysis but in order to get more reliable averages
    a. reduce the effects of opening and closing values
    b. reduce the effects of extra-ordinary weather and / or market conditions
3. improve harmonisation and realization of FADN standards in all countries.

3. Asset valuation based on fair value using the NPV method

Koen Boone (LEI)

3.1 Introduction

In the last several years, more and more papers have been appearing which argue for a fundamental revision of the annual balance sheet (Lev, 2000; Vergauwen and Vandemaele, 2001). One of the most important reasons for this is the steadily increasing gap between the balance sheet or book value of the net worth on the one hand and the market value of the net worth on the stock exchange (Hoogendoorn, 2000) on the other. In addition, the relation between the financial results of a company according to the books and the price of the company's stock is becoming weaker and weaker (Lev and Zarowin, 1999). For some 'new economy' sectors, it has even been shown that financial results are not relevant for the valuation of the companies on the stock market (Amir and Lev, 1996).

The above is, in the first place, due to the fact that the balance sheet focuses only on the tangible assets, whereas intangible assets such as information and intellectual capital are increasingly determining the worth of a company. In addition, the valuation of tangible assets sometimes has only a limited relation to their market value. The valuation is often determined on the basis of historic costs. The expected profit that one desires to realise through a particular production process is not included in the valuation1 and only those contracts and transactions that can be legally verified are included.

The issues mentioned above are viewed as a growing problem not only in the academic world but also in the accounting sector. The International Accounting Standard Committee (IASC), which attempts to harmonise reporting guidelines in an international framework, as well as the Financial Accounting Standards Board (FASB), which formulates the reporting guidelines in the USA, recognise the problem. The FASB has formed several working groups to look for alternative reporting guidelines that have a stronger relation to market values and has, in some Exposure Drafts, proposed a valuation based on fair value. For some sectors where one considers reliable fair values to be available and where the present valuation leads to an incorrect description of company performance, the IASC has also proposed a valuation based on fair value. In 1999, the IASC already presented a standard (IAS 39) which proposed a valuation of financial instruments on the basis of fair value. In 2001, this was followed by IAS 41 (agriculture), which proposed the valuation of biological (meaning live) assets on the basis of fair value. The above standards are the first steps on the road to a financial reporting that is in better agreement with the market value of a company.

[1] The expected losses, however, are included. This results in an even greater discrepancy compared to the market value, as these losses are often not certain to occur but are often included for the full amount on the balance sheet.

However, there is still a long way to go before this final goal will be reached. In the meantime, the annual report will consist of a combination of retrospective (historic costs) valuation and prospective (fair value) valuation. Many authors (for an overview, see Brief, (1986) and Feenstra and Wang (2000)) have already demonstrated that the combined use of both concepts for matters such as performance measurement and investment selection leads to incorrect decisions. In this article, I will argue that a present value calculation on the basis of information from the current (retrospective) annual report, leads to an incorrect valuation and determination of financial results. The information needed to implement this method properly will often not be available. A greatly modified variant of this prospective valuation method can only be used if several assumptions are satisfied.

I will demonstrate the above by applying the concept of fair value in the agricultural sector. That is why paragraph 3.2 begins with a discussion of IAS 41 and the concept of fair value. Then, an example of the fair value calculation is used to show what mistakes the calculation of Net Present Value can lead to. In paragraph 3.4, the reasons for this incorrect calculation are explained, and in paragraph 3.5 an alternative method of calculation is proposed.

3.2 IAS 41 and fair value

Prior to the publication of IAS 41, no international guideline existed for the valuation and processing of biological assets. Biological assets refer to all living assets, meaning all plants and animals that have not yet been harvested or slaughtered. Although there was agreement on the specific character of the agricultural sector (managing biological assets), little attention was paid to the standardisation of financial reporting, both on an international and national level. This was, in the first place, due to the fact that most agricultural businesses were of limited size. In addition, most farmers and market gardeners, often having limited financial training, did not recognise the importance of financial reporting. During the last few decades, the scale on which business is conducted in the agricultural sector has increased dramatically. As a result, the importance of reliable external reports for third parties such as banks or providers of subsidies has also increased.

As the level of training of people engaged in agriculture increases and the activities they engage in become increasingly complex, the need for financial management information for smaller businesses also increases. Maintaining separate reporting systems for internal and external use is not financially feasible for smaller businesses, and doing so would also lead to confusion among agricultural managers, who often have limited accounting expertise. As a result, the points of departure for the internal and external systems are often the same.

The most important guideline in IAS 41 is that biological assets must be valued on the basis of their fair value, unless it can be demonstrated that the fair value of the asset concerned cannot be reliably determined. The fair value is defined as 'the amount for which an asset could be exchanged or a liability settled, between knowledgeable, willing parties in an arm's length transaction' (IAS 41, section 8). To determine the fair value, the following steps must be worked through (IAS 41, sections 18 and 20):

- market price at an active market at the time of valuation;
- market price at an active market shortly before the time of valuation;
- market price at an active market for similar products;
- sector benchmarks;
- present value of future cash flows

For a large number of biological assets, the market price or reliable sector benchmarks are not available on the balance sheet date. This is primarily because the asset concerned is not traded in the state in which it is then found. Examples are an orchard bearing fruit or a pig that has not yet reached market weight. For these products, the fair value must be determined via the present value of future cash flows. This present value is calculated by determining the Net Present Value (NPV) of all the projected cash flows. The NPV is an indication of the amount that can be earned with the asset concerned. The assumption is that the present value of the asset is equal to the amount that can be earned with it in future (including a reasonable compensation for the capital invested). In this situation, it is not possible to realise 'supernormal profits', that is to say returns that are higher than normal. After all, if it were possible to realise 'supernormal profits', more participants would be attracted, which would cause the price of the asset to rise to a level at which supernormal profits could no longer be realised.

The above line of reasoning applies only to efficient markets. Agricultural markets, which often have many parties offering goods and many parties purchasing them, could be considered, as an approximation, to be efficient markets. However, a pre-condition for applying the NPV method to the valuation of an individual production factor is that the opportunity costs for all the other production factors needed for the production process are also known. For several production factors, these are very difficult to determine. This issue manifests itself to an even greater extent in the agricultural sector. Agricultural markets are characterised by a low elasticity on the demand side, a low short-term elasticity on the supply side, and production volumes that are strongly influenced by external conditions (weather, disease etc.). As a result, the prices of the products, and therefore of the opportunity costs of the production factors, can fluctuate widely. In this sector, it will therefore be especially difficult to determine the opportunity costs of the individual production factors. I will explain the empirical consequences of these problems in more detail in paragraph 3.3 using an example from the agricultural sector. Paragraph 3.4 contains a more detailed theoretical explanation for the problems encountered with the NPV calculation.

3.3 NPV of a pig

I will illustrate the NPV calculation using the valuation of a pig. A pig has been chosen as an example because pig meat is traded on the futures market. This means that one knows what meat price the market expects for the coming months. Another advantage of using pigs is that trade takes place during the entire year between hundreds of parties on both the demand and supply side. The probability that prices are determined efficiently in this market is therefore high.

Our point of departure is a pig that is purchased as a piglet one day before the balance sheet date (Dec. 30). The piglet is born on a pig-breeding farm and when it weighs 25 kg, it is sold to a pig-fattening farm, which holds the pig until it is ready for slaughter.

It takes a little more than 3 months to turn a piglet weighing 25 kg into a pig ready for slaughter. In the weight category from 25 kg to the category ready for slaughter (about 112 kg), there is almost no trade taking place and there is therefore also no market price available. In view of the short time period between purchase and sale and therefore the minimal effect of discounting future cash flows, the values in the example are not discounted. A calculation which discounts future values would not change the conclusions but would make the calculations more complex.

In order to demonstrate that the NPV method can result in an over-valuation as well as an under-valuation, the valuation is calculated for two points in time: 31 December 1998 and 31 December 2000. In table 3.1, the prices and quantities used are presented. These correspond to the actual situation in the Netherlands at the times mentioned.

The expected cash inflows are estimated by multiplying the physical yields expected (kg) by the expected price per kg. The expected price used is the average of the futures market prices for contracts with a remaining duration of 2.5 (March) and 3.5 (April) months respectively. The pig will actually be sold in the middle of these two time periods.

For calculating the outgoing cash flows, the feed costs are the first factor of importance. Practically all the feed is purchased from an external source. The outgoing cash flows are approximated by multiplying the quantity of feed needed by the price level at the moment of valuation. The amount of feed needed is determined with the help of the Farm Accountancy Data Network (FADN) of the LEI (Agricultural Economic Research Institute) [1].

Estimates of the outgoing cash flows for several other smaller cost factors such as medical care (veterinary surgeon, vaccinations), insurance, water, and electricity are based on the average amounts spent per pig in the previous year.

The cash flows for buildings and inventory (sties etc.) can be divided into maintenance and investment. The first item, which actually results in payments during the period concerned, is estimated on the basis of the average maintenance during previous years at an average company. It is more difficult to estimate the cash outflow for the purchase of the sties. The sties last for a longer period than is involved in fattening this group of pigs. Only that fraction of the costs should be included that applies to the period/pigs involved. This can be calculated by including the depreciation of the sties during the fattening period for this group of pigs as a negative cash flow. If a decision is made not to sell the sties at the beginning of the period, but (perhaps) at the end of the period, then the expected difference in cash flow is equal to the depreciation during that period. The depreciation is estimated on the basis of the depreciation per pig on an average pig farm. This depreciation is calculated on the basis of the actual value of the sties on the balance sheet date, which means that changes in the value of the sties since purchase are taken into account. The actual value is determined by correcting the historic payments for the increase in building

[1] This database contains the financial data for about 100 pig farms. These businesses form a representative sample of all the commercial pig farms in the Netherlands. Unless indicated otherwise, all the cash flows mentioned are based on this database.

costs during the interim period. Interest costs are also calculated for the capital invested in the sties.

Finally, the outgoing cash flows for labour must be taken into account. The average number of hours needed is based on the FADN referred to earlier. The level of wages is the most complex item for agricultural businesses, as almost all the labour is carried out by the entrepreneur and his/her family, and therefore does not result in an outgoing cash flow (Boone, 1998). On the other hand, the labour involved brings opportunity costs with it, as it could have been invested elsewhere if it were not invested in the pig farm. In the example, I will use 2 extreme variants to approximate the opportunity costs:

A: The labour costs are determined by calculating a gross CLA (collective labour agreement) wage to be paid to a manager.

B: No costs calculated for work done by entrepreneur and family.

Table 3.1 Points of departure for the NPV calculation for fattening pigs

Weight on 31 December	25.3 kg
Slaughtered weight	88 kg
Expected porkprice per kg 1998/99 (futures market)	1.75 guilders
Expected porkprice per kg 2000/01 (futures market)	3.59 guilders
Outgoing cash flow 1998/99 per pig (excl. labour)	147.8 guilders
Labour (Collective agreement wage) per pig 1998/99	26.6 guilders
Outgoing cash flow 2000/01 per pig (excl. labour)	145.6 guilders
Labour (Collective agreement wage) 2000/01 per pig	24.4 guilders
NPV 1998 (excl. labour costs) per pig	6.2 guilders
NPV 1998 (incl. labour costs) per pig	- 20.4 guilders
NPV 2000 (excl. labour costs) per pig	170.3 guilders
NPV 2000 (incl. labour costs) per pig	145.9 guilders
Actual price of piglet 30 December 1998	57 guilders
Actual price of piglet 30 December 2000	114 guilders

The calculation of the NPV for 2000/01, assuming a CLA wage for the hours worked, is done as follows:

Expected incoming cash flows - Expected outgoing cash flows
= 88*3.59 - 145.6 - 24.4 = 145.9 guilders

From table 3.1, it appears that for 31 December 2000 one would expect a price for the pig of between 146 and 170 guilders. In reality, the market price was 114 guilders. For 1998, one would expect a market price between -20 and 6 guilders. The actual value was 57 guilders. The example makes it clear that this NPV calculation does not result in the market value. For the year-end balance of 2000, the calculation results in a serious overestimation of the price, and for the year-end balance of 1998, the result is a serious underestimation.

3.4 NPV and valuation of individual assets on the balance sheet

The NPV calculation in paragraph 3.3 assumes that if the expected price for pigs rises, the demand for piglets will increase immediately. The calculation also assumes that the price of the other production factors remains constant, so that the higher price of pigs influences only the price of piglets. This price will increase to the level at which the NPV for the purchase of a piglet would be about 0. This means that the value of a piglet would lie between 145 and 170 guilders. In this situation, the expected return realised by pig farms would constitute a reasonable compensation for the capital invested, and the supernormal profit expected would therefore be 0.

In reality, the piglets are not the only limiting production factor. For example, in addition to the piglets, labour and capacity in the form of pigsties are needed. Not only will the price of piglets increase, the price of sties and labour can also be expected to increase. In the first place, the incorrect valuation with the help of the NPV method is therefore caused by the incorrect estimation of the outgoing cash flows involved, for example for sties and labour. The outgoing cash flows are estimated on the basis of historic values, which are adjusted, if necessary, for changes in building costs or average wage costs, but not on the basis of the opportunity costs at the time of valuation.

In addition, there are two other causes for the incorrect NPV valuation. Several items owned by the company but not included in the balance sheet have not been included in the calculation. Examples of these are the manure production rights and other (environmental) permit-related items. It is not a simple matter to estimate the opportunity costs for these items. Prices do exist for manure production rights, but that is not the case for most of the other permits.

A final reason for the fact that the NPV value is not equal to 0 is that the sum of the values of the individual production factors is often more than the value of the business as a whole. This difference in value is often described as the synergistic effect of goodwill. If one purchases sties, piglets, manure production rights etc., one does not automatically possess a properly functioning business. This explanation comes down to the same basic factor as the previous one: the fact that certain assets, such as intellectual capital, are not included in the NPV calculation [1].

In summary, the following modifications need to be implemented in order to arrive at a correct NPV calculation:

- the existing assets and liabilities must be valued on the basis of fair value;
- items that are not yet included in the company accounts (such as production rights acquired for free, environmental permits, etc.) should be included on the basis of fair value;
- a separate item should be included that represents the extra value of the assets taken as a whole compared to the sum of the values of the separate parts.

[1] Vergauwen et al. (2001) define intellectual capital as including human capital, structural capital, and relational capital.

All the differences between the values used in the example and the fair value were attributed, in the example, to the value of the piglet. As a result, it was possible for large discrepancies to arise compared to the real market value.

3.5 An alternative method of using the NPV for valuation purposes

In the previous chapter, it was shown that the NPV calculation was not based on correct input values. What options are left for properly estimating the opportunity costs?

The fair value of the non-biological assets could, as is the case for the biological assets, be determined with the help of a market price or by discounting future cash flows (NPV). Generally speaking, it should be possible to determine a market price for manure production rights and similar items. This will be much more difficult for pigsties, as there is hardly a market in such items. Even when a pigsty is sold, this will often be in combination with a complete farm, making it difficult to determine the separate price of the sty. In addition, the location of the sty also plays an important role in determining the price (whether or not one has the possibility of selling the manure, and whether or not one has the possibility of expanding in the municipality concerned).

Often it will also be difficult to determine the fair value of the labour involved. Although efficient pricing does not exist due to interference by the government in this area (collective labour agreements, minimum wage, job protection), one could use the wages paid out as the value of the labour component. However, almost all the work on agricultural enterprises is done by non-paid workers. For labour carried out by the entrepreneur and his/her family, it is not always possible to simply use the wages paid out (see Boone, (1998)). One of the reasons is that the entrepreneur views work done by him/herself at his/her own farm as a very different sort of labour than labour done within the framework of an employment contract. If a market price is not available, then the NPV calculation is the only option that remains.

The final element in play is the issue of the valuation of the synergistic effects and the assets not included on the balance sheet such as permits. The only way to reliably estimate these items is to compare the NPV value of the entire business with the present valuation of the other assets and liabilities.

In conclusion, we can say that the NPV method can be used for the valuation of the individual assets only if reliable estimates are available for the fair value of all the other assets. For several items, such as the synergistic effects, the entrepreneur's own labour, permits etc., this will seldom be the case. However, as soon as a market value is not available for one of these items, we end up 'chasing our own tail'. To determine the value of the piglets as well as the other assets for which no market value is available, values must first be filled in for all the other assets in the NPV calculation.

The above argument leads to the conclusion that the standard NPV method can seldom be used to determine a reliable fair value. However, if several assumptions can be satisfied, the modified NPV calculation presented below can be used to calculate a reasonable approximation of the fair value.

In the example presented previously, 2 market prices are known: the price of a 25-kg piglet and the price of a pig fattened to a weight of 110 kg. If we take the historic costs of

production factors as our point of departure, then in the example with a high futures market price for pig meat, supernormal profits are realised during the entire production period. If we assume that the ratio of the 'expected production costs' based on realistic prices to the historic cost price of production factors used in the calculation is stable during the production period, then the 'supernormal profits' will be realised in proportion to the utilisation of the production factors.

The above assumption can be broken down into two separate assumptions:

1. The profit to be expected from utilising a production factor is fairly stable over the period that the factor is utilised.
2. The profitability of the individual production factors will be proportional to their historic production costs

or

During the entire production period, the ratios between the production factors utilised remain fairly stable. For example, during the entire production period, 1 sty, 3 kg of feed and 1 hour of labour are needed per day. If however, more labour hours are used in the beginning of the period and much fewer towards the end, this assumption is no longer valid.

Assumption 1 would seem to be realistic since if there were differences in profitability during the production period, the production factors would tend to be utilised in the most profitable part of the production period, which would cause the profitability in that sector to decrease and lead to a greater balance.

The first part of the second assumption will probably not be realistic. Some production factors will be more profitable than others. However, the second part would seem to be a realistic approximation for a product such as pigs - during the entire production period, the ratios between the various production factors utilised remain fairly stable. In that case, the following formula can be used to determine a realistic valuation for the pigs:

$$PVb = Pb + Kb + (PVa-Pb-K) * (Kb/K) \quad (1)$$

PVb = Price of pig on balance sheet date
Pb = Price of piglet on balance sheet date
Kb = Costs until balance sheet date
PVa = Expected price of pig on delivery
K = Expected costs during entire production period

3.6 Conclusion

This article argues that a combination of retrospective valuation and prospective valuation when using the NPV method leads to methodological and practical problems. For a correct application of the NPV method, one must not use the present balance sheet valuation of production factors but fair values. As no market prices are available for various production factors (such as entrepreneur's own labour, permits and goodwill), the NPV method cannot be used or it will be necessary to use retrospective information for the valuation of individ-

ual assets. In the latter case however, the NPV method will result in valuations that can differ greatly from the market value.

For those assets for which it can be assumed that the 'supernormal profit' to be expected will be proportional to the historic production costs, an alternative method of calculation is presented which does result in a correct and realistic valuation. For those products for which the above assumption does not apply and for which there is also no market price available relative to the state of the asset on the balance sheet date, it will not be possible to calculate a fair value.

It is therefore to be recommended that the IASC includes formula (1) and an explanation as to when the formula can be applied in (the explanatory notes to) IAS 41. If one is of the opinion that it is not possible to reliably determine whether formula (1) can be used for a particular asset, then the use of the NPV method as an alternative to determine the fair value should be re-evaluated. As the example with pigs makes clear, the NPV calculation can result in large discrepancies compared to the market value. This fact, combined with the impossibility of determining when such discrepancies will occur, makes this method of calculation unacceptable.

The above issues have been illustrated with an example for the valuation of a biological asset. Such issues, however, are not confined exclusively to the agricultural sector. A part of the problem, namely sharply fluctuating prices of products and therefore of production factors, will have a greater impact in the agricultural sector than in some other sectors. This is because the agricultural sector is characterised by little elasticity on the demand side, little short-term elasticity on the supply side, and a production that is strongly influenced by external conditions.

However, issues that involve using the NPV to simultaneously determine the value of more than one production factor are not confined to the agricultural sector.

The above issues will present less of a problem for the valuation of financial instruments for which a realistic valuation has to be determined according to IAS 39. In those markets, increased demand can be dealt with relatively easily through an increased utilisation of one production factor (labour). However, it is to be recommended that an investigation be carried out to determine whether this is true for all financial instruments.

The importance of realistic valuation can be expected to increase within the framework of financial reporting. In that context, it is important that the use of the NPV method for the reliable determination of the fair value of individual assets be critically evaluated.

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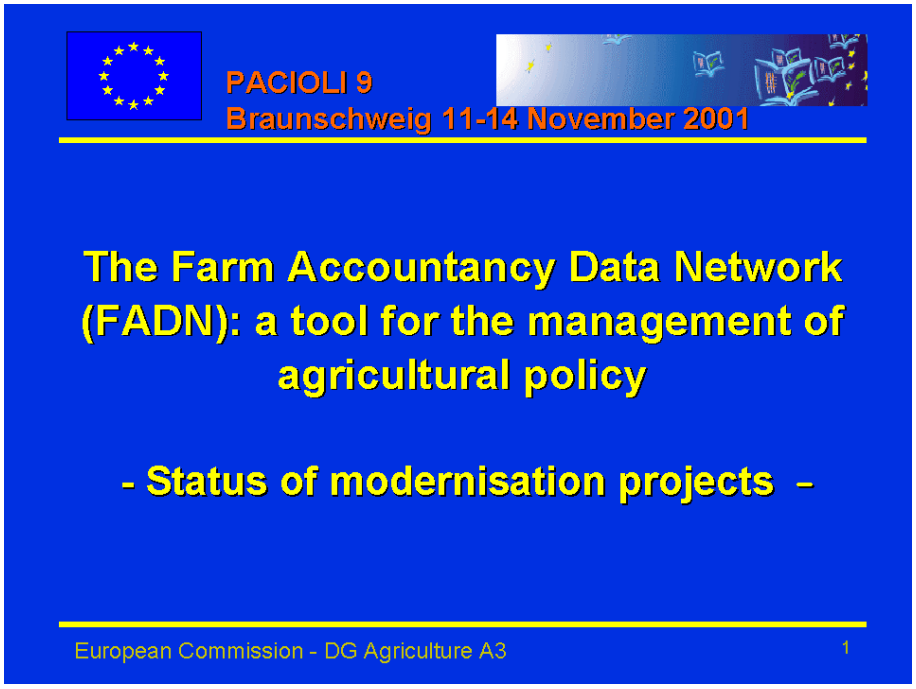
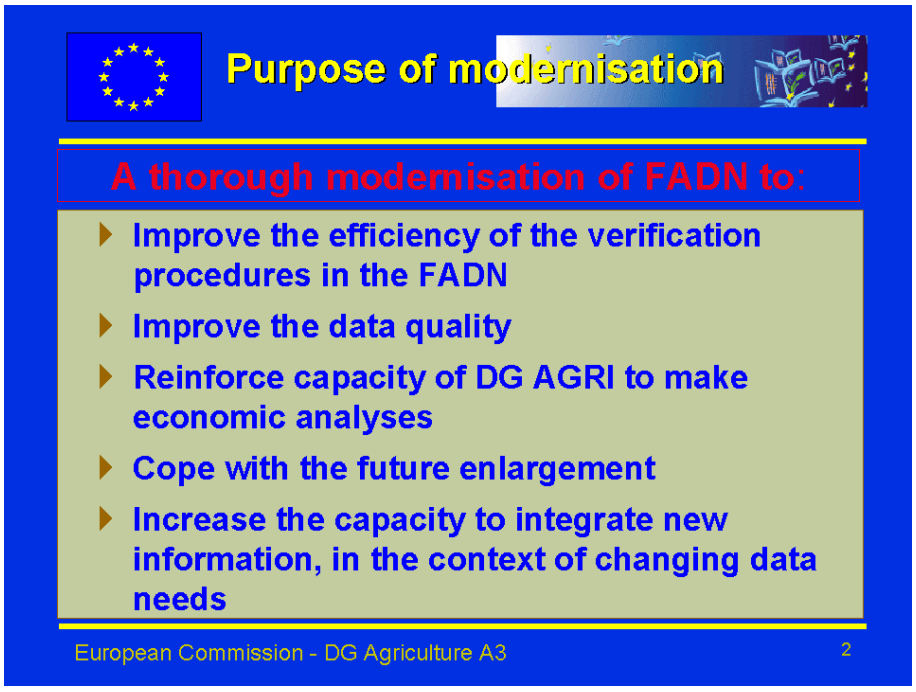
Presentation 'Modernisation projects of FADN at EU level'

Yves Plees (DG-Agri)





Modernisation program

... Turning ideas to actions

- Data collection, control and preparation system
- Database and analysis system
- Information diffusion system

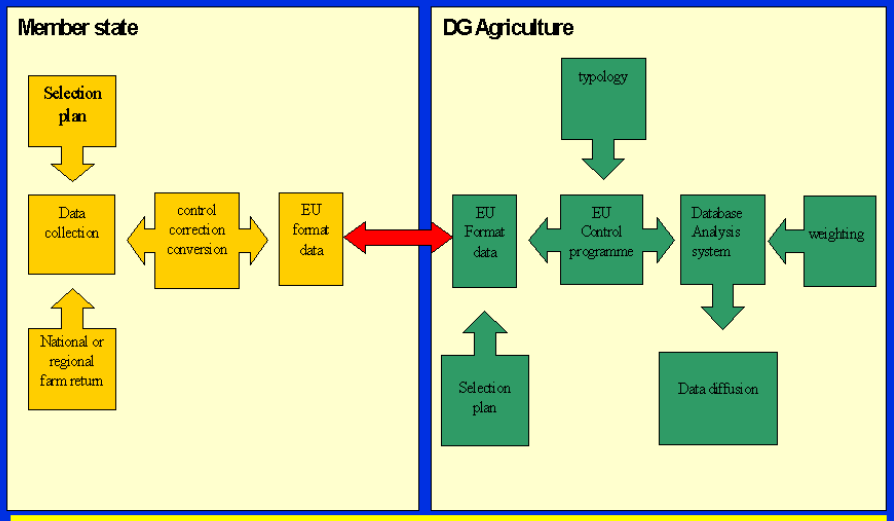
RICA 1 2nd phase

RICA 2 1st phase

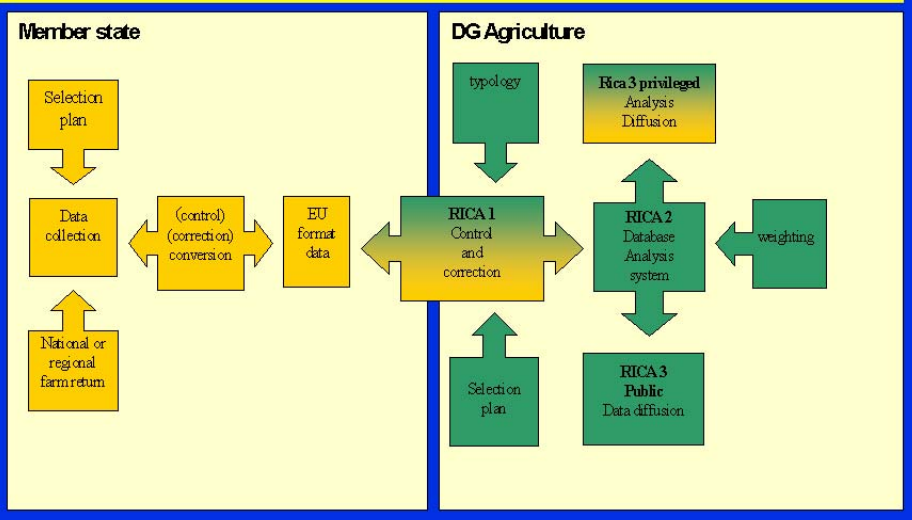
RICA 3 2nd phase

- RICA web site: information about FADN, link to RICA-1 and RICA-3
- RICA assist

Current data flow



Future data flow



RICA 1

RICA 1: Data collection, control and preparation system

- Complete redesign and development of the collection, control and preparation processes ("control program" included)
- High flexibility to cope with changes in the Farm Return and accession of new member states
- Internet technologies, integration with RICA-2 and RICA-3
- Security for data transmission and confidentiality
- Multilingual interface: currently 5 languages (data items and tests)

RICA 1: Objectives

Controls of data are carried out in the Member States using the RICA 1 tool....

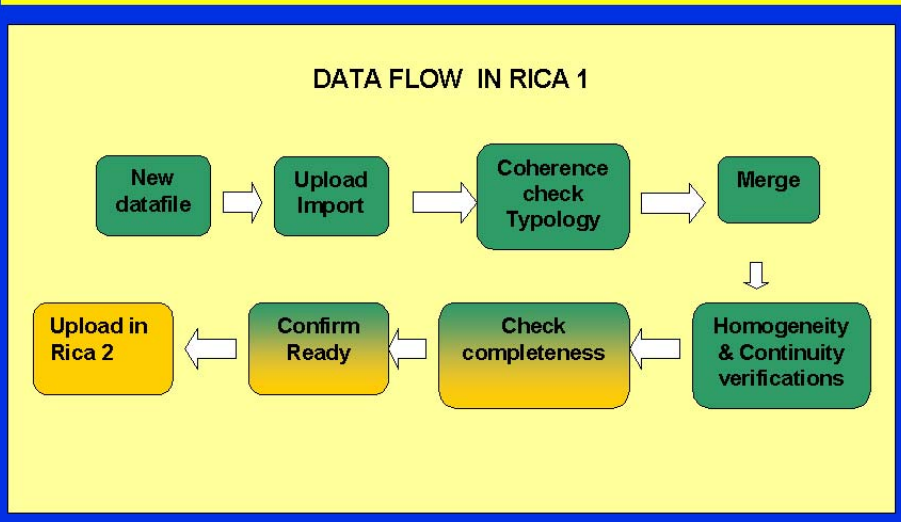
- Shorten the overall process of data verification and therefore permit earlier availability of data
- A more transparent process of data treatment
- Improve quality of data

RICA 1: Approach

How does it work ?

- **Member states can upload and verify their own data using a control program residing on the EU server**
- **Flexible reporting and on-line corrections**
- **Partial files per country can be uploaded and downloaded**
- **Test results and reference data can be downloaded for further electronic transmission by Member States**
- **Help desk facility provided by AGRI A3**
- **Constant monitoring of the process**

Data flow in RICA 1



RICA 1: Types of verification

Data control procedures

- ✓ Coherence and plausibility tests (XML) → "Agronomic" and economic data coherent
- ✓ Homogeneity tests (SAS-based) → compare individual farm with a group
- ✓ Continuity tests (SAS-based) → compare groups of farms over time
- ✓ Comparison with selection plan → survey representativity

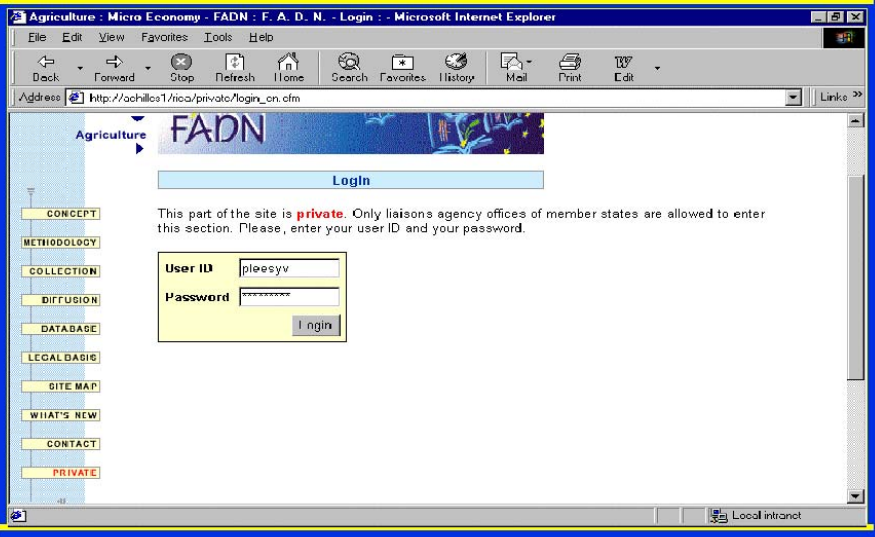
detect outliers

Coherence & plausibility tests

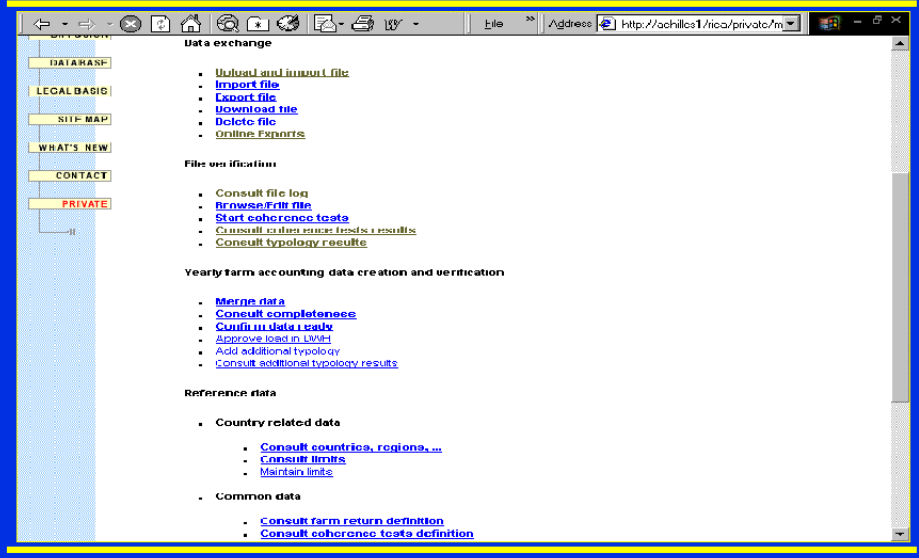
Different error levels:

- **system errors :** data could not be read by RICA 1 (eg. because of wrong format)
- **critical error:** correction obligatory
- **severe error:** correction necessary unless otherwise agreed
- **anomaly :** justification necessary
- **warning :** justification possible

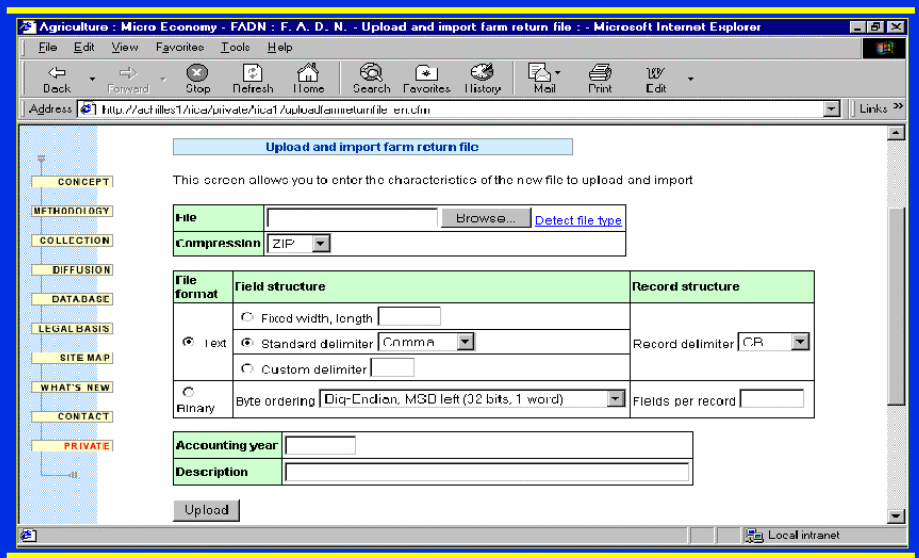
FADN-login via website



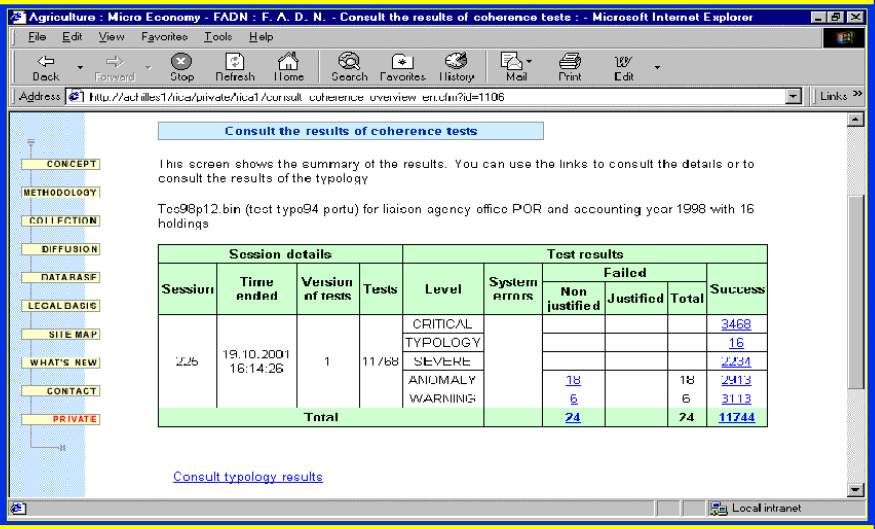
Main menu



Upload and import of data

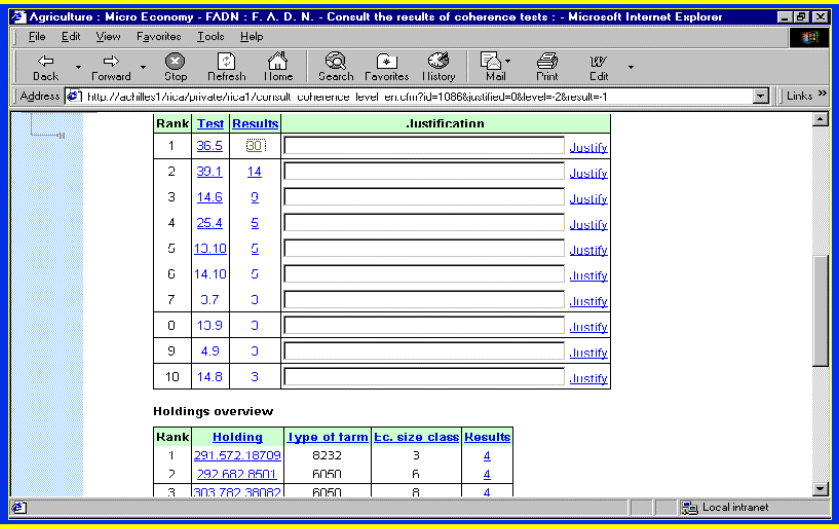


Example coherence tests



Session details				Test results					
Session	Time ended	Version of tests	Tests	Level	System errors	Failed: Non justified	Failed: Justified	Failed: Total	Success
226	19.10.2001 16:14:26	1	11768	CRITICAL					3468
				TYPOLOGY					16
				SEVERE					2284
				ANOMALY		18		18	2913
				WARNING		6		6	3113
Total						24		24	11744

Example of test results

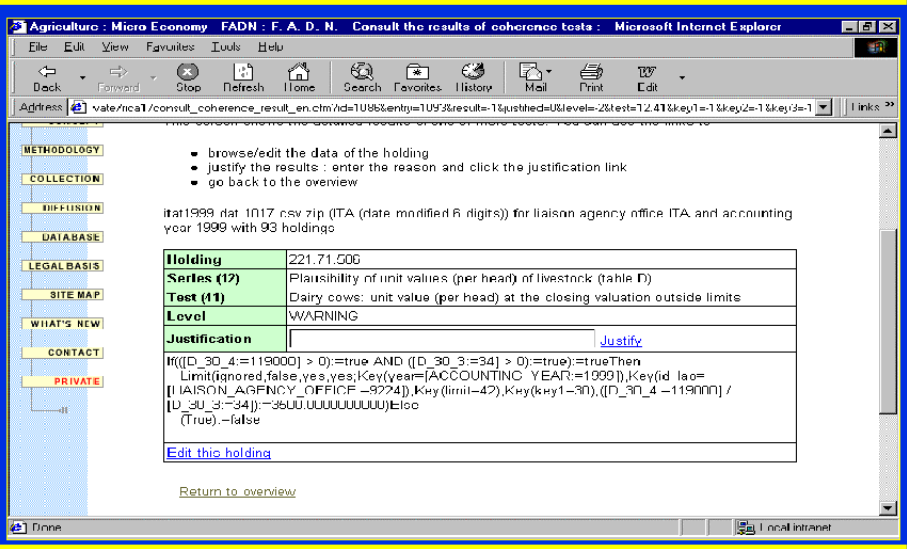


Rank	Test	Results	Justification
1	36.5	30	Justify
2	39.1	14	Justify
3	14.6	9	Justify
4	25.4	5	Justify
5	13.10	5	Justify
6	14.10	5	Justify
7	3.7	3	Justify
8	13.9	3	Justify
9	4.9	3	Justify
10	14.8	3	Justify

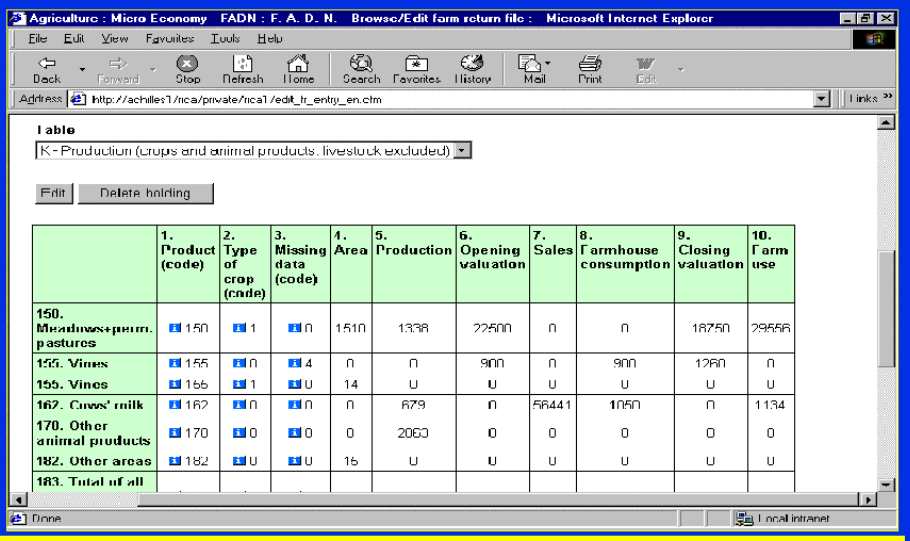
Holdings overview

Rank	Holding	Type of farm	E.c. size class	Results
1	291.572.18709	8232	3	4
2	292.682.8501	6050	6	4
3	303.782.38082	6050	8	4

Example warning : farm level

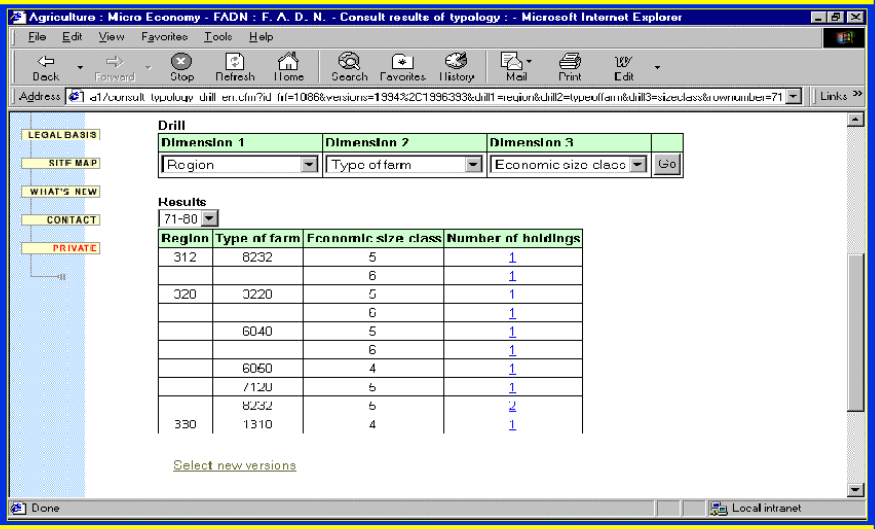


farm return data

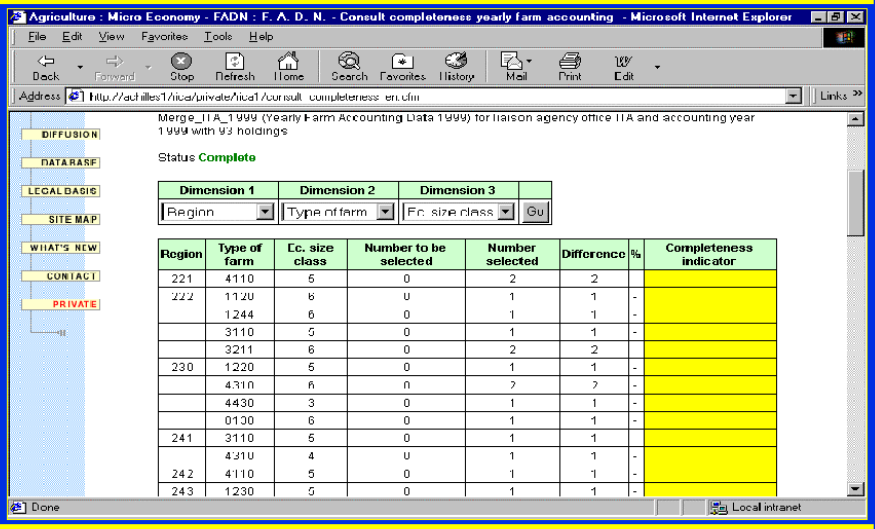


	1. Product (code)	2. Type of crop (code)	3. Missing data (code)	4. Area	5. Production	6. Opening valuation	7. Sales	8. Farmhouse consumption	9. Closing valuation	10. Farm use
150. Meadows+perm. pastures	150	1	0	1510	1338	22500	0	0	18750	29556
155. Vines	155	0	4	0	0	900	0	900	1260	0
156. Vines	156	1	U	14	U	U	U	U	U	U
162. Cows' milk	162	0	0	0	679	0	56441	1050	0	1134
170. Other animal products	170	0	0	0	2060	0	0	0	0	0
182. Other areas	182	U	U	16	U	U	U	U	U	U
183. Total of all										

Consult Typology



Comparison with selection plan



RICA 1: Status and timing (I)

Acceptance of tests of basic system	➡ Autumn 2001
Access to Member States	➡ After New Year

Basic system ready to be used from accounting year 2000 data onwards

Rica 1 : implementation

- **Autumn:** migration to data center & testing of the application on the server in Luxembourg
- Implementation for year 2000 data:
  - FADN unit makes a first evaluation of the data with the new system (verification of readability)
  - FADN unit will provide training for users, using the data from MS
  - FADN unit provides helpdesk
  - Evaluation of first experiences with system

Rica 1: future developments

- Introduction of homogeneity checks
- Introduction of continuity checks
- Improve performance

In collaboration with member states (based on experiences with year 2000 data):

- Improve user friendliness

➡ Starting autumn 2001

RICA 1: future developments

Evaluation, revision and development of the test procedures of EU FADN was not awarded, a new call for tender will be launched

➡ launch winter 2001/2002
(pre-info already published)

RICA 2: database and analysis system

✓ Already operational (SAS application)

DATA WAREHOUSE	✓ more than 50.000 sample farms per year (since 1989) ✓ several weighting schemes
FUNCTIONALITIES	✓ Classification variables out of 8 dimensions ✓ Create new analysis variables ✓ Create new classification variables ✓ Define a subset ✓ Define a constant sample

Rica 2 : future developments

- adaptation to year 2000 data
  - integration new information
  - calculation of standard results
- evaluation of RICA 2 :
  - software platform
  - functionalities
- time series will remain intact

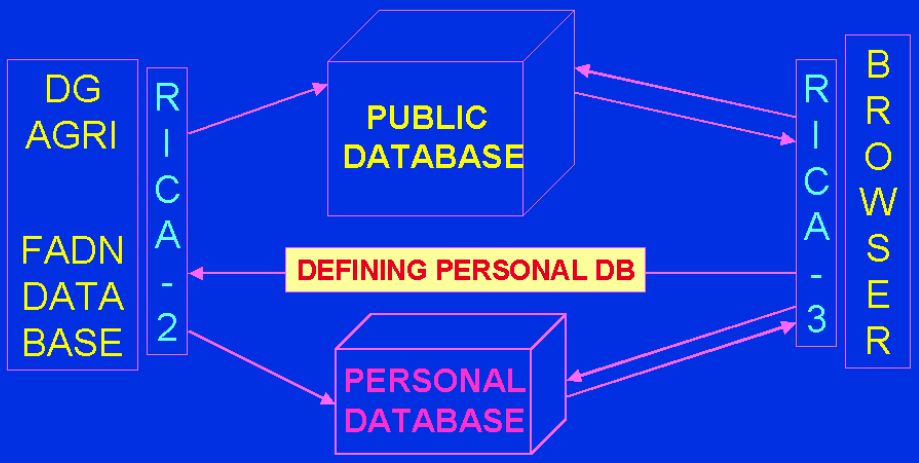
RICA 3: data diffusion system

- Diffusion of EU-FADN aggregated results for two types of users: 'Public' and 'Privileged' (Liaison Agencies)
- Internet technologies
- Integrated with RICA-1 and RICA-2

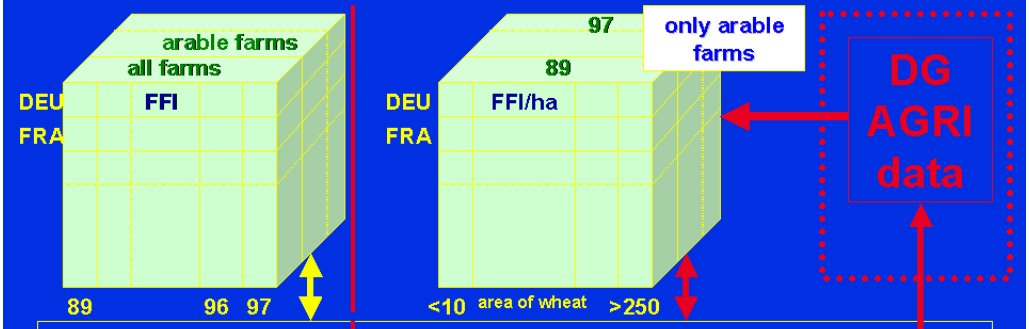
PUBLIC — http://europa.eu.int/comm/agriculture/rica/dwh since February 2001: used by students, researchers (50 requests/day)

PRIVILEGED — under evaluation by DG Agri

RICA 3 : architecture (1)



RICA 3 : architecture (2)



STANDARD RESULTS

- consult the data
- export the data

MEMBERS ONLY

- define new data
- consult the data
- export the data

RICA 3 : public database

↳ Aggregate (confidentiality) / average data can be consulted and downloaded

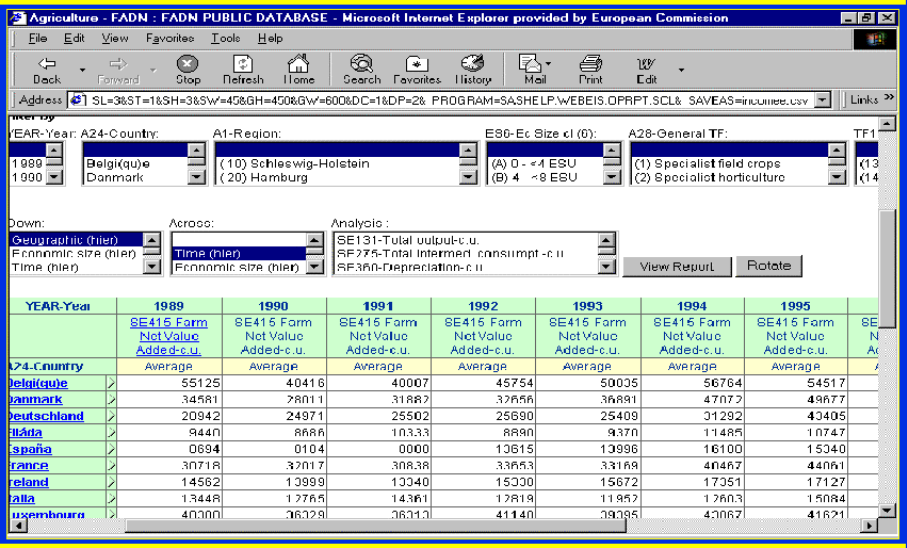
146 Standard results variables

- ✓ physical and structural data: crop areas, livestock, labour force...
- ✓ economic and financial data (in : value of production, production costs, assets, subsidies

4 DIMENSIONS

- ❶ year (data from 1989)
- ❷ location (country / region)
- ❸ type of farm (14 principal TF)
- ❹ economic size (6 to 10 classes)

Rica 3 public database



RICA 3 : privileged database

- Aggregate (confidentiality) / average data can be consulted and downloaded

FUNCTIONALITIES

- ✓ Select out of 2.500 variables of the FADN database
- ✓ Classification variables out of 8 dimensions
- ✓ Create new analysis variables
- ✓ Create new classification variables
- ✓ Define a subset
- ✓ Define a constant sample

RICA 3 : confidentiality

To guarantee confidentiality

① To hide results if the sample < 15 farms

② To give the sample size only by ranges,

③ To round the number of represented farms to the tens,

④ To sign a confidentiality agreement with Privileged users.

RICA-Website

http://europa.eu.int/comm/agriculture/rica

Multilingual information on the FADN such as :

- Methodology
- Legislation
- Definition of variables
- Description of SR
- Access to public database

links to RICA 1 and RICA 3 privileged (only for liaison agencies)

Links to the web sites of liaison agencies of Member States

...thanks for your attention

4. PO, verification tests of EU-FADN [1] Farm Return haven't to be checked

Susanna Perachino [2]

Abstract

PO, that means Provocative Operation, is a definition introduced by De Bono [3] to describe a lateral thinking [4] method which allows the creation of new ideas starting from explicit paradox.

Since a while members of FADN Committee, European Commission included, have been asking for the development and implementation of a new control program for EU Farm Return in order to perform and up-date checks which should guarantee the total quality of the database.

Then the application of alternative approach based on nonsense sounds to be innovative to look at the global system from an unusual point of view while the field looks rather complex and the data utilization is kindly requested.

The creative [4] session takes into account some advices provided in general terms by De Bono and certain elements directly connected to EU Farm Return.

The final output shows that the verification tests of EU-FADN data could be replaced.

Keywords: Lateral thinking, provocative operation, control program, EU-FADN, tests

4.1 Introduction

The tendency to see a new thing as an already known one shows lack of imagination and reflects such recycled ideas.

Learning from last ten years management, facile tools such as problem-solving and analysis of data no longer suffice to achieve a goal. It's clear that the combination of human resourses, flexibility, transparency, total quality requires a reengineering of the working approach. PO is a specific method of lateral thinking deliberately used in order to generate new hypotheses starting from a concept which doesn't seem to make sense.

The title of this paper just means a provocation from which the working session moves to find out a wide range of alternatives or solutions. It's obvious that verification tests actually have to be checked because this is related to the main meaning of their rule

[1] Farm Accountancy Data Network of the European Union.
[2] Penguin Consulting, Via Sormano 4/16, 17100 Savona, Italy, e-mail: susanna.perachino@tin.it
[3] See reference list.
[4] See appendices.

but the sense of the paradox drives on the other way around in order to justify only ex-post the preliminary PO.

Brain works with pre-ordered links and directions because of his efficient self-organizing model: in that context a new route will be found only starting suddenly from a deviation.

4.2 Issue

The development and implementation of the control program for EU-FADN Farm Return has to be undertaken because of the following reasons:

- to date Tables A, J, K, M, N of the Farm Return have been modified in order to include certain data related to Agenda 2000 and Rural Development Plans;
- some verification tests (in particular for COP area payments) aren't included in the control program;
- the level of severity for each test is partly appropriate: so called 'warning' test isn't significant while the rest isn't strictly suitable;
- the checks are intended to verify only a formal coherence in the Tables while the range of limit values isn't plausible for all Member States;
- lack of flexibility is partly explained by Farm Return itself;
- Information Technology is not enough performed.

The task is critical but the context requires the effort even for other explanations:

- dichotomy between tests at national and european level: they often don't fit each other (further justification isn't acceptable for Member State and/or for European Commission);
- starting from conversion program and ending with verification tests the complete procedure is complex and rather long: FADN can't serve the users' needs if data aren't correct and available in short term.

4.3 Aim

The aim of a creativity session seems to be reasonable in order to:

- introduce an alternative approach;
- attempt a variant;
- supply different working hypotheses for the development of the control program;
- underline multi-task tools;
- stimulate other working sessions.

4.4 Method

The title of this paper is the forceful argument for the beginning of creative session:

PO, verification tests of EU-FADN Farm Return haven't to be checked

As far as lateral thinking is concerned, Provocative Operation has always an origin. In this circumstance that is called *'escape'* method because it's obvious that verification tests actually have to be checked but the sense of the paradox deliberately gets in the opposite side.

Once here, the main step is the *operation of movement* [1]*:* the session starts with the provocation and moves to the new track in order to check if the idea is valuable even if it doesn't matter the way of proceeding.

Learning from De Bono's suggestions, so called *'positive aspects'* is the suitable system to carry on an operation of movement as below:

If verification tests of EU-FADN data hadn't to be checked,

- Farm Return would be already correct,
- Database would be available in short term,
- No mandatory justification and correction would be requested,
- No up-dating would be necessary,
- Each Liaison Agency would exclusively provide his own verification tests.

Tellingly, the most important concept seems to mention a preliminary arrangement.

4.5 Results

Then the idea is to focus on the procedure of conversion program because that is actually the main step from which time and efficiency are missing.

- considered that each Liaison Agency [2] manages under his own responsibility the accounting program, the control program, the plausibility of the tests at national level, the database;
- considered that each Liaison Agengy is responsible even for the conversion program;
- considered that each Liaison Agency up-dates the accounting program according to relevant exigencies like Rural Development Plans in order to supply data for regional, national and european decision makers, researchers, etcetera;
- having regard to the differences between national procedures in the FADN network;
- considered that at least 4 months are necessary to end the session of conversion program and verification tests of EU-FADN data;
- having regard to the effort in terms of time, technical competence and money largely required in order to introduce or modify any data in the Farm Return.

The suggestions could be listed as following:

- remove the conversion program and the verification tests of EU-FADN Farm Return;
- create some standard Tables (Excel, Access, etcetera) including all useful data for users' needs (total per heading, optional sub-total, data per farm, etcetera);
- strictly verify and analyse the procedures, the range of limit values, the control program per each Liaison Agency.

[1] See appendices.

[2] Candidate Countries have their own accounting program as well.

4.6 Conclusions

To conclude and summarize, the creative session introduces a simplification of the global system. From european side, standard Tables should be implemented while, from Liaison Agencies side, these Tables should be filled in using national database. Moreover, national procedures of control program (tests, limit values, etcetera) should be examinated and improved in detail in order to achieve an acceptable and reliable common range of checks which is able to substitute the old system efficiently.

According to De Bono's advice, here below the checklist of the new idea is:

- bond: availability of time and financial means;
- improvement on the suggestions (Gentlement Agreement, etcetera);
- acceptability;
- comparison between old system and new idea;
- defects;
- considerations in the long term;
- empowerment (FADN Committee, European Commission, etcetera).

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Appendices

The method of lateral thinking may seem extremely bizarre, nevertheless it does work because it considers such a wide range of elements as following:

- self-organizing model (brain's model);
- perception;
- *movement* (it's distinct from judgement because it uses an idea to move forward instead of comparing and criticizing);
- simple mechanism which is able of behaving in complex ways;
- from passive information system to active one;
- creative tools (Provocative Operation, casual entrance, etcetera);
- deliberate creative effort;
- switching thinking;
- focusing on separately (Six thinking hats);

- different circumstances;
- description of possible hypotheses;
- *water logic:* skills of adaptation (the contrary of *rock logic*).

5. Treatment of quality and certification in the FADN to evaluate the agricultural policy

Giorgio Seroglia and Stefano Trione [1]

Abstract

In Italy, a specific project meant to valorize the FADN and its Regional networks as an Informative System supporting Common Agriculture Policy is in progress; this project aims at using FADN to evaluate Rural Development Programs. In this regard, it is necessary to collect some information - useful to the measurement of economical indicators required for evaluation - that is not part of the data set traditionally collected via FADN.

In this paper we first define which are the quality and certification requirements typical of agricultural produce to be collect by FADN, according to Communitary, National and Regional regulations.

Afterwards we analyse the logical scheme represented according to the Entity - Relationship Model that describes the changes we have implemented in Italian FADN data organisation in order to register new information on agri-products quality and, in particular, we illustrate the improvements introduced into PEGASO-CONTINEA, the software by which farm accountancy data are collected.

Keywords: Agri-products quality, process certification, Italian FADN, Agricultural policy evaluation

5.1 Introduction

EU Regulations issued in 1999 have introduced important changes in respect of monitoring and evaluating rural development policies, with the main aim of guaranteeing a more effective use of Structural Funds.

In particular, Regulations on structural actions for the period 2000-2006 has ascribed to evaluation a much more important role than in the past.

During the phase of planning of the national and local interventions, a much more rigorous - than in the past - ex ante evaluation has yield a better identification and analysis of the problems to be tackled. Moreover, intermediate evaluation (scheduled for 2003) and ex post evaluation (to do done by 2008) will allow to assess the performances of Programmes prepared by Member States and Regions.

In this regard, it is to be recalled that Member States and Regions are responsible of intermediate evaluation, while the responsibility of ex post evaluation rests on to the European Commission in collaboration with Member States and Regions.

[1] National Institute for Agricultural Economics, Italy.

In this perspective, a statistical economic documentation supporting planning in the rural sector assumes great importance. Farm Accountancy Data Network can efficiently meet Public Administrations needs for planning and evaluation at EU, national and local level.

5.2 The Project 'RICA for Evaluation'

In Italy, a specific project meant to valorize the National FADN and its Regional networks as an Informative System supporting Common Agriculture Policy is in progress; in particular, this project aims at using FADN to evaluate Rural Development Programs.

It is important to underline that FADN - together with EUROFARM, EUROSTAT and National Statistics - is indicated as a possible source of information in the document VI/8865/99 'Guidelines for evaluation of rural development programmes 2000-2006 supported from the European Agricultural Guidance and Guarantee Fund'. According to it, FADN could especially be a precious source of the so called 'secondary data', i.e. it could be more relevant for context indicators than for programme indicators.

Moreover, FADN is suggested as an effective source of data to answer to the 'Common Evaluation Questions' listed in the Document STAR VI/12004/00 'Working documents on common evaluation questions, criteria and indicators for the rural development programmes 2000-2006'. According to this document, the use of a common set of evaluation questions, criteria, indicators and target levels across all evaluations will produce information that can be aggregated so that the Commission can establish the Community-level synthesis required in the implementing regulation.

Therefore, in Italy, the National Institute for Agricultural Economics realized a project to check how FADN could answer to questions like this: 'To what extent have supported investments improved the income of beneficiary farmers?'. More in general it is necessary to know which is the contribution of FADN to the measurement of economical indicators required for evaluation.

Many recommended indicators described in the Document STAR VI/12004/00 can be usefully obtained from Accountancy Data today collected via FADN (figure 5.1). On the contrary, other requested information is not part of the data set traditionally collected via FADN.

Until now the missing information is the following:

- data concerning rural family income, not produced by means of farming activity;
- data concerning quality of agri-products.

Recently, the software PEGASO - CONTINEA - by which technical and economical information of Italian farms are collected - has properly been modified in order to gather information about quality of agricultural products. So, those data will be available in the Italian FADN data bank since 2001.

5.3 The FADN modification process to obtain information on agri-products quality

It is essential to identify which are the quality requirements of agricultural produce in FADN farms; this is essential in order to answer to some specific 'common evaluation questions', like the following:

- to what extent have the supported investments contributed to increase the competitiveness of agricultural products through improved and rationalised processing and marketing of agricultural products?;
- to what extent have the supported investments helped to increase the added value and competitiveness of agricultural products by improving their quality?

The suggested indicators are the following:

- ratio of (share of beneficiaries having ISO 9000 certification two years after assistance) to (share of all firms in sector having ISO 9000 certification);
- share of marketed products from assisted processing/marketing lines sold with quality label (number of products and %);
  - of which under EU labelling schemes (%);
  - of which under national-level labelling schemes (%);
  - of which under other labelling schemes (%).

The additional information now collected in farms concerns data both on the quality of agricultural products and on the certification of production processes.

Actually, the subject 'quality of agri-products' is strictly linked to the subject 'certification of the production processes': the last one, in fact, is often (but not always) the instrument by which quality is guaranteed - for example, in case of the so-called 'traditional agri-products'.

As a first step, we have surveyed Communitary, National and Regional regulations in order to define which are the quality and certification requirements typical of agricultural produce to be collect by FADN.

First, the elements characteristic of process certification, and their codification in Italian FADN are described in figure 5.2.

We talk about 'origin or collective certification' with regard to the inspections made by Regional Services or Private Organisations in order to guarantee the respect of certain specific product specifications.

Communitary Regulations that rule this type of certification are:

- Council Regulation (EEC) number (No) 2081/92 on the protection of geographical indications and designations of origin for agricultural products and foodstuffs (PDO and PGI);
- Council Regulation (EEC) number (No) 2082/92 that establishes rules on certificates of specific character for agricultural products and foodstuffs (TSG);
- Council Regulation (EC) number (No) 40/94 on the Community trade mark.

In addition, there is the Italian National Law number 164/92 concerning regulation of DOC and DOCG in the wine sector.

Another type of process certification that we can encounter in Italian farms is HACCP (Hazard Analysis Critical Control Point), pertaining usually to raw material processing stage. Communitary rules concerning HACCP are in Council Directive 93/43/EEC on the hygiene of foodstuffs, and also the national legislation that enforces these measures (Decree Law number 155/97).

Moreover, ISO (International Standard Organisation) 9000 and ISO 14000 certification could be implemented in Italian farms. Finally, also in case of organic farming we are in presence of a process certification. The subject 'quality of agri-products' is strictly related to the subject 'certification of the production processes': between these subjects, indeed, exist logical relationships properly considered by FADN methodology.

In figure 5.3 the adopted definitions for agri-products quality and their codification in Italian FADN are displayed. First, we consider the so called 'traditional foodstuffs' (legally valid only at the National level): i.e. those foodstuffs whose processing techniques are well established since at least 25 years and whose production and/or processing techniques do not need to respect any specifications.

The subject concerning brands is quite complicated. We can find registered trade marks that identify the characteristics of agriproducts or foodstuffs with the producer, private labels that highlight the name of the distributor, and generic labels.

We can also find collective brands, whose proprietors often are producers associations and voluntarily associated farmers. A collective brand is characterised by the separation between property and use. In Italy we have:

- identification marks, registered by private (individuals) or private corporations, very often in order to increase the value of vegetable and livestock production obtained adopting integrated pest management;
- regional marks, established by a Regional Law, belong to private and public corporations in order to identify local agricultural produce;
- the Community trade mark - registered according to the rules of Council Regulation EC number 40/94 - that protects brands at the Communitary level.

Finally, Italian farms can market agricultural products referring to organic production methods. 'Organic product' is a definition valid for agricultural crop and livestock productions obtained in compliance with Council Regulation EEC No 2092/91 - on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs - and its corrigenda and supplementing.

By the way, it’s necessary to underline that in the most recent years in Italy the number of farmers participating in agro-environmental programmes has increased, as well as the number of those who has chosen organic production methods.

At the beginning of 2000 in Italy about 200,000 farms - equivalent to the 12% of the national total number of farms with more than one hectare of land - benefited from agro-environmental programmes, interesting about 2.7 million hectares of utilised agricultural land and nearly 50,000 adult bovine units.

At the same time, there were over 50,000 organic farms in Italy with almost 1,000,000 ha of utilised agricultural land (already organic and under conversion). In this sector, both the number of farms and the area cultivated are growing fast.

5.4 Structure of agri-product quality and process certification information in FADN

It is advisable to explain the changes we have implemented in Italian FADN data organisation in order to register new information on agri-products quality. In particular, we briefly describe the improvements introduced into PEGASO-CONTINEA, the software by which farm accountancy data are collected.

Diagram 5.1 shows the logical scheme of the software INEA-Italian FADN, in respect of information strictly necessaries to present the subject 'agricultural produce quality and certification'.

The upper part of the chart pertains to the part of software existing before we made any changes; the lower part of the scheme describes changes implemented to the software in order to manage information on quality and certification.

The logical scheme has been represented according to the Entity - Relationship Model. Besides the farm, we have four entities involved in this scheme: production processes, agri-products, processes certification, agri-products quality.

Productive processes and agri-products are already considered by INEA-FADN methodology of accountancy data collection. On the contrary, the remaining two entities must be defined ex novo.

We analyze first the two Entities historically present in Italian FADN.

The Entity (1. Productive Process) is weak [1] respect to the Entity (0. Farm); the first one is linked to the second one by a relationship of Existence and Identification: this means that each productive process includes the complete identifier of the farm which it depends on.

Moreover, the process specific identifier is different in case of crops and livestock productions. In fact, crops are defined in a different way than livestock productions. Primary key - i.e. the primary entity identifier - for crops is each single species, farming method (open air cultivation, specialised fresh vegetable cultivation, under glass cultivation) and cultivar.

On the contrary, primary key for livestock productions is only species, often, differentiated on the basis of production specialisation (milk, meat, etcetera).

It also includes specific information pertaining to process (total utilised land, irrigated land, costs, etc.) collected as simple attributes.

Entity (2. Products) is also weak respect to the Entity (1. (Kind of) Productive process). The first is hooked to the second one by a Relationship of Existence and Identification. Therefore each product contains - in addition to the farm identifier - the specific identifier of the productive process from which it derives (for example: bread wheat of a certain cultivar). As a further specification, the identifier of the kind of product (for example: grain, straw, sowing seed, etcetera) is added to the identifier of process.

Entity (2. Products) also contains specific information pertaining to agri-product (quantity, volume of sales, etcetera) collected as simple attributes.

[1] An Entity is weak if it can be defined only in function of another entity (strong) which it depends on. In this case productive process doesn't exists if there isn't a farm that manages it.

Now we consider the two new Entities added in order to collect new information described in the lower part of Diagram 5.1.

We just added to the pre-existing scheme the two new entities (3. Agri-product quality) and (4. Process certification) without modify the logical structure represented in diagram 5.1. The two new Entities are just the translation in table form of the certification typologies previously described.

Relationships 'Process - is subjected to - process certification' and 'Agri-products - distinguished for - Product qualities' are of type n : m (many to many). In fact, each productive process may be at the same time involved in many certifications, just as each kind of certification may interest more than one productive process.

The relationship - matches up - is not part sensu strictu of the data base; it just answers the purpose to establish a priori all possible combinations linking quality and certification when data are entered into data base or when information is tested.

Therefore, the adopted solution allows us to achieve the goal to collect all information useful to characterise agri-produce quality and possible certification of productive process.

As we keep the same definitions of productive process and agri-product used previously, we can't perfectly analyse the presence in the same farm of many certification types (or combinations of them) regarding a certain productive process.

Similarly, we can't recognise many qualities (or combinations of them) regarding the same agri-product.

In all these cases - in reality, a small number of cases - Italian FADN data base will register the combination of different types of certification and qualities (present in farm) only in terms of preponderance, but it won't allow us to determine technical-economical information pertaining each of them.

An alternative solution more satisfying under a cognitive aspect - but, of course, much more difficult to act and manage - would have required the redefinition of primary keys of the Entities (1. Productive process) and (2. Agri-product) in order to make univocal all instances of the certification process and agri-product quality attributes.

We've preferred the first solution, as we suppose the second one is not practicable at this moment. It also allows us to keep a better continuity with the previous Italian FADN data base structure. Finally, it avoids to make heavier the accounting record phase; the overload of the collecting stage would be unacceptable given the essentially accounting nature of the informative source.

Figure 5.1 Information about revenues, costs and income of holdings, rural families and productive processes in Document STAR VI/12004/00 and their compatibility with Italian FADN methodology

(*)	COMMON EVALUATION QUESTIONS	RECOMMENDED INDICATORS	COMPATIBILITY WITH ITALIAN FADN METHODOLOGY
	Cross-cutting common evaluation questions - Title II, Chapters from I to IX of Regulation (EEC) No 1257/99		
3.	To what extent has the programme been conducive to maintaining or improving the income level of the rural community?	Income of directly/indirectly assisted farming population (Euro/person, number concerned)	See partial indicators
		Of which:	Total
		- 'family farm income' (%)	
		- income of non-family workforce on holdings (%)	Total
		- relating to pluryactivity of part-time farmers (%)	It needs to collect informations about personal income of all members of rural family
		- relating to gainful activities on holdings other than the production of basic agricultural/forestry products (%)	Total
		- indirectly as a result of supplier and multiplier effects (%)	It needs to collect informations about personal income of all members of rural family
	Chapter-specific common evaluation questions - Title II, Chapters from I to IX of Regulation (EEC) No 1257/99		
	Chapter I. Investments in agricultural holdings		
I.1.	To what extent have supported investments improved the income of beneficiary farmers?	'Gross farm income' of assisted holdings (Euro)	Total
I.2	To what extent have supported investments contributed to a better use of production factors on holdings?	Ratio of {outputs} to {'all inputs'} on assisted holdings	Total
		Output per hour of labour on assisted holdings (Euro/h)	Total
		Cost per unit of basic products sold (e.g. Euro/ton, Euro/m³, etcetera) on assisted holdings	It needs to collect analytical informations concerning each productive process
		Ratio of {cost} to {turnover} on assisted holdings	Total

(*) With reference to Document STAR VI/12004/00.

(*)	COMMON EVALUATION QUESTIONS	RECOMMENDED INDICATORS	COMPATABILITY WITH ITALIAN FADN METHODOLOGY
I.3.	To what extent have supported investments contributed to the reorientation of farming activities?	'Net change' in 'surplus product' activity after the investment	It needs to describe agri-products quality
		Number of assisted holdings introducing alternative activities	It needs to describe agri-products quality
		Share of assisted holdings with a significant part of their turnover (> or =10%) from alternative activities (%)	It needs to describe agri-products quality
		Share of working time spent on alternative activities on the holding (%)	It needs to collect analytical informations concerning each productive process and to describe agri-products quality
I.4.	To what extent have supported investments improved the quality of farm products?	Ratio of {price of assisted quality-improved basic products} to {average price for the commodity concerned}	It needs to describe agri-products quality
		Gross sales of assisted quality-improved basic products (Euro)	It needs to describe agri-products quality
		Share of assisted products sold with quality label (%) (a) of which EU-level labelling schemes (%) (b) of which national level labelling schemes (%) (c) of which other labelling schemes (%)	It needs to describe agri-products quality
I.5.	To what extent has the diversification of on-farm activities originating from supported alternative activities helped maintain employment?	Number of full-time equivalent jobs (FTEs) maintained or created thanks to the assistance for alternative activities	It needs to describe agri-products quality
	Chapter IV. Early retirement		
IV. 2.	To what extent has the economic viability of the remaining agricultural holdings improved?	Ratio of {Outputs} to {'all inputs'} on assisted holdings (a) description of the indicator's relationship to the conditions mentioned in Article 11(2) 1st indent: skill/competence, surface area, volume of work or income	Total

(*) With reference to Document STAR VI/12004/00.

(*)	COMMON EVALUATION QUESTIONS	RECOMMENDED INDICATORS	COMPATABILITY WITH ITALIAN FADN METHODOLOGY
	Chapter V. Less-favoured areas and areas with environmental restrictions		
V. 1.	To what extent has the scheme contributed to:	Ratio of {premium} to {higher production costs + reduction in value of farm output	Total
	(i) offsetting the natural handicaps in LFAs in terms of high production costs and low production potential, and:	Share (%) of compensated holdings with a premium of (i) < 50% of IID, (ii) 50% of IID < premium < 100% of IID, (iii) premium > 100% of IID	Total
	(ii) compensating for costs incurred and income foregone in areas with environmental restrictions?	where 'IID' represents the 'Individual income deficit' = {higher production costs + reduction in value of farm output} for individual holdings	
V. 3.	To what extent have compensatory allowances contributed to the maintenance of a viable rural community?	Ratio of {'family farm income' + off-farm income of holder and/or spouse} to {average family income in NUTS 2}	It needs to collect informations about personal income of all members of rural family

(*) With reference to Document STAR VI/12004/00.

Figure 5.2 Productive Process Certification

Code	Description	Legal References	Notes
0	No Process Controls		
1	Origin or Collective Certification	Regulation (EEC) No 2081/92 (PDO and PGI); Regulation (EEC) No 2082/92 (TSG); Regulation (EC) No 40/94 (Community Trade Mark) Law No 164/92 (DOC and DOCG).	Certification is consequent to controls ran by public or private corporations in order to guarantee the respect of specific product specifications.
2	HACCP	Directive 93/43EEC on the hygiene of foodstuffs; Directive 96/3/EC granting a derogation from certain provisions of Directive 93/43/EEC; Law Decree No 155/97 (Implementation of Directives 93/43/EEC and 96/3/EC)	Farm self control, generally limited to agri-products processing.
3	ISO	Regulations UNI EN ISO 9000 and ISO 14000	Certification is consequent to process control based on ISO Regulations.
4	Organic Farming EC	Regulation (EEC) No 2092/91; Law Decree No 220/95; Several Regional Laws.	Certification is consequent to controls checked by an external auditor according to Regulation (EEC) No 2092/91.
9	Other		

Figure 5.3 Agri-products Quality

Code	Description	Legal References	Notes
0	Normal agri-product		
1	Traditional agri-product	Law Decree No 173/98; Decree of Minister of Agricultural and Forestal Policies dated 7/18/00.	'Traditional agri-products' are those agri-products and foodstuffs whose processing techniques are well established since at least 25 years and whose production and/or processing techniques don't need to observe specific product specifications.
2	Brand		It identifies the characteristics of agri-products or foodstuffs with the producer (brand, private label, generic).
3	Collective Marks	Regulation (EC) No 40/94 (Community Trade Mark)	CTM (Community Trade Mark); Regional Marks; Identification Marks.
4	Origin Marks	Regulation (EEC) No 2081/92 (PDO and PGI); Regulation (EEC) No 2082/92 (TSG); Law No 164/92 (DOC and DOCG).	Protected Designation of Origin (PDO); Protected Geographical Indication (IGP); Traditional Speciality Guaranteed (TSG); DOC and DOCG (in the wine sector).
5	Organic agri-product	Regulation (EEC) No 2092/91; Regulation (EC) No 1804/99; Regulation (EC) No 31/00.	It identifies all crops and livestock productions obtained by organic methods.

Diagram 5.1 Entity - Relationship Scheme of Information about Productive Processes and Agri-products in Italian FADN

Workgroup session 2: Realise a FADN web site for clients

Theme

In this workgroup session we ask ourselves 'How we are going to realise a FADN web site for clients'. The How-questions can include nearly everything which lay-out, which content, include discussion forums or not, in Java or HTML, at DG-Agri or elsewhere, who pays?, etcetera.

Method

To answer this question we introduce the method of the Lotus Flower. Every participant gets a paper on A3 format with a central question: 'How to realise FADN web site for clients'. Around this question you find 8 boxes to note down ideas, suggestions or new questions that come to your mind when you think about the central question. After noting down these 8 (or a bit less), you choose the 3 or 4 most interesting or important ones. Copy them to the square 'behind' the box they are in.

Then you start again: in this part of the Lotus Flower you have a new question or idea, and you try to find 8 related ideas or questions, etcetera.

After 20 minutes of hard work you spent 10 minutes in your group to present your Lotus Flower and the 2 most interesting ideas you have gained from it.

Groups for the workgroup session 'Realise a FADN web site for clients

Group 1

Y. Plees (chairperson)
J. Aamisepp
N. Taragola
M. Njavro
H.H. Sundermeier
Z. Kubikova

Group 2

S. Perachino (chairperson)
J. Bjarnason
J. Boone
W. Kleinhanss
D. van Lierde
S. Trione

Group 3

A. Latukka (chairperson)
J. Jalast
G. Larsson
H. Vrolijk
S. Trione

Group 4

B. Del'homme (chairperson)
V. Bratka
B. Meier
Z. Jurisic
A. DeCicco
M. Lekesova

Group 5

E. Øvren (chairperson)
S.C.Cernea
A. Tabeau
A-M. Karlsson
D. Osuch
K. Grabowska

Workgroup 2 - Group 1

Who are the clients?
- details/aggregate?
- attract potential clients
- co-operate with other
  - → links
  - → integration
- attraction points:
  - efficiency indicators
  - comparison

How to find?
- commercial/free info
- advertisements 'commercials'
- subscription/admittance fee
- exchange information

Who build it?
- give it to a class → technical / visual aspects
- competition

Workgroup 2 - Group 2

Farm managenent support	figures, results charts	comparable data x farmers (typing, size)

organic farm subsidies market

data accounting offices → interactive info comparison database

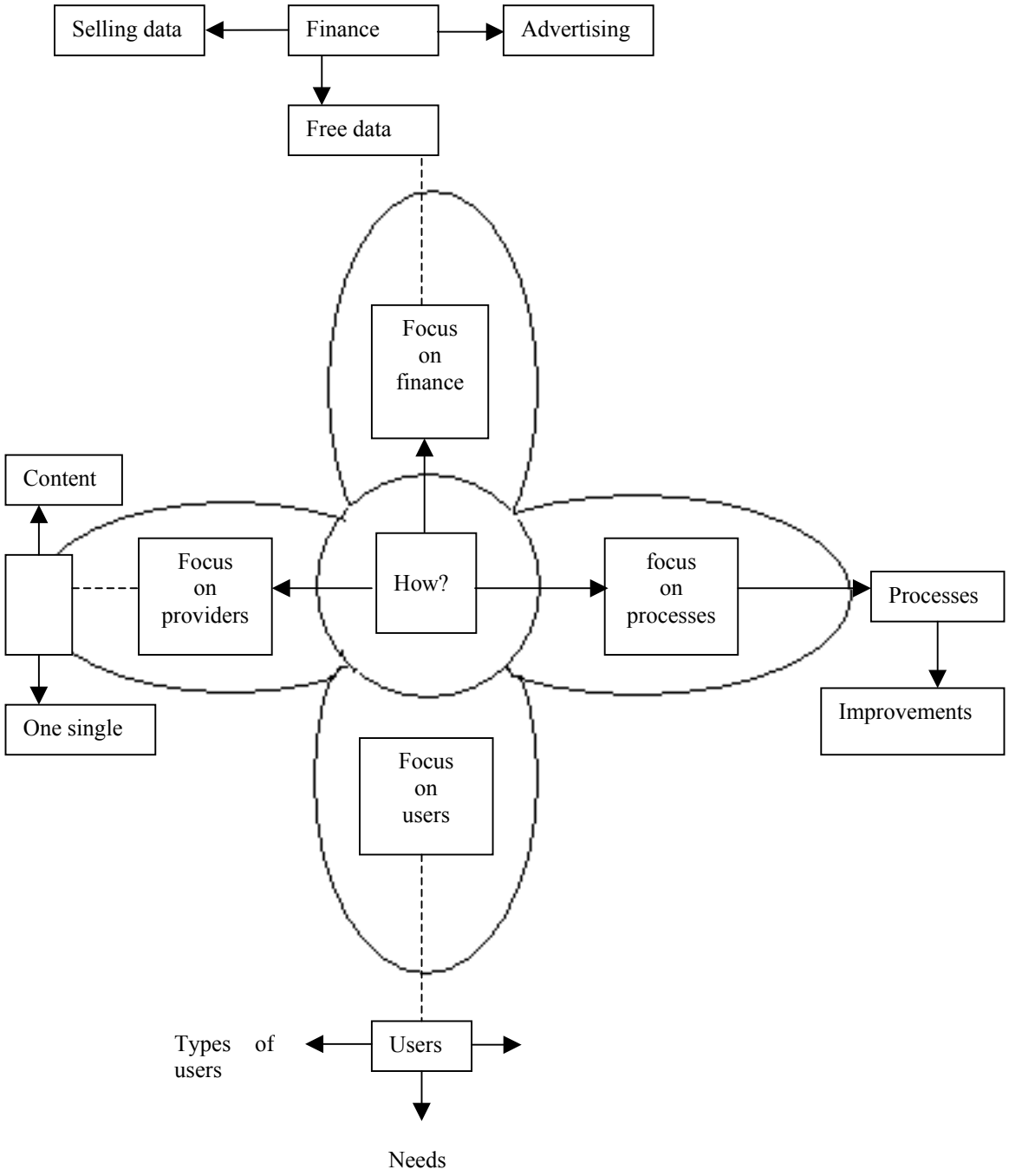
aggregated date x politicians	dynamic responses (interview) FORUM discuss.	identification of clients

Search engine	benchmark	links others countries
FR: automatic replies		commercials maintenance (web farmer's site)
farmers connected each others		Institutes research: info commercials

Workgroup 2 - Group 3

- Dynamic web site
- Platform for FADN use
- Questions and answers
- Presentation of reports based on FADN-data
- Registration on use
- Links from other websites
- Graphics/maps
- Time series
- Export to excel

Workgroup 2 - Group 4



Workgroup 2 - Group 5

FAQ
- discussion list
- FAQ itself
- question box
- tips and solutions
- searchable data-base with answers and tips

What's new
- papers (downloadable)
- calls for projects
- new documents
- conferences and workshops

Documents and data
Standard programs
Links and contacts

EU-level and country level
Expert level and public level
Find and copy solutions from other sites (that is working)

6. FADN at national and European level: improvement with a new information technology - Czech Republic example

Bernard Del'homme [1], Jerôme Steffe [1]

Abstract

European enlargement means for Eastern countries a lot of changes in their agriculture. At political, economical and technical level. This means that their information systems on agriculture have to move with those changes. It is mainly obvious for national Farm and accountancy data networks (FADN). They have either to be created, developed and renewed, and must integrate European requirements in order to be included in the European RICA Database.

Hopefully, we can use new information technology to lead such evolutions. With the example of Czech Republic, we will see that it is possible to renew the FADN with a new information approach, based on relational database managed with Internet technology and including national and European purposes. This system should be efficient in the second half of 2001.

6.1 Introduction

The Czech republic is one of the potential new members of the European Union in the next years. Therefore, work has begun since a few years in order to prepare it's integration (with European support in the Phare program). In the agricultural field, this means a lot of changes. The national FADN is concerned by this. It has to be harmonised with the European one, and by the way, be managed by a new system more efficient.

After making a presentation of the actual situation about FADN in Czech Republic, we will see which methodology and which changes have been chosen for upgrading a new FADN.

6.1.1 FADN in Czech Republic: state of the art and new needs

6.1.1.1 State of the art

Since 1996, 2 databases gather data from 2 main types of farms: one type called legal entities, corresponding mostly in firms using double entry bookkeeping (including cooperatives and diversified companies, but also big farms, 3,000 entities whose 1,500 co-

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operatives. The last census in C.R. was 1995, a new one is arriving.), and another type called individual (or personal) entities corresponding in small farms using simple entry bookkeeping(between 30,000 and 100,000 entities depending on sources).

The database for legal entities is now quite old. It has been developed under Paradox with MS-DOS environment, and has to be renewed.

The database for individual entities is more recent. It has been developed with FOXPRO under Windows environment.

The first Database is managed by an external software company, Umbriel. The second one is managed in the VUZE by 2 persons. VUZE is a Research Institute for Agricultural Economics in charge of the national FADN.

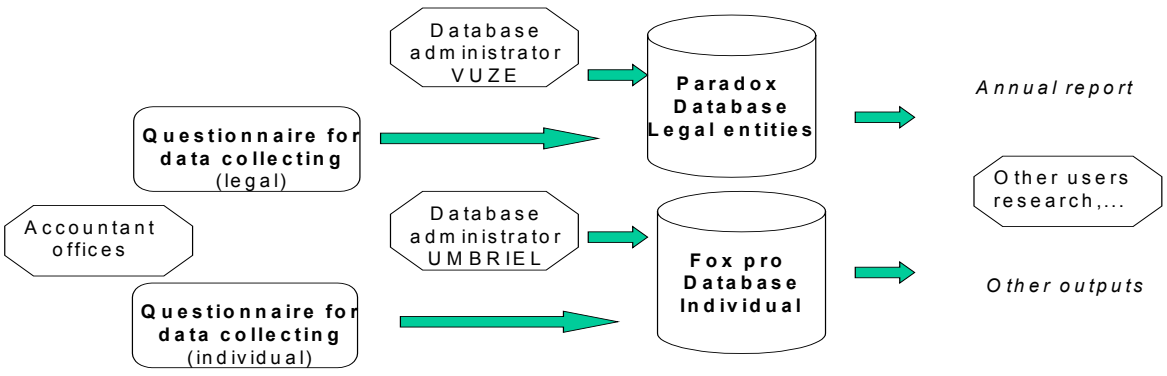
The 2 databases gather data from 1,200 entities (half for each type of farm). Data are collected from a questionnaire provided by around 10 accountant offices in the country. The questionnaire collect data from 18 pages and 250 variables.

Several reports are made from those databases, mostly the annual report on agriculture (green report), the detailed report on agriculture and specific surveys on production costs.

After this overview, main points must be underlined:

- two databases are not needed in the future, it will be relevant to build a new one gathering the two types of entities;
- we have to produce a new return fiche for the European Commission and must combine this new goal with the national purposes on the FADN;
- it would be relevant to use new technologies to implement a new system, with Internet support;
- we need to prepare our work with two main tasks: reflection on data contents, reflection on computer technology and work organisation.

GLOBAL OVERVIEW OF THE ACTUAL CZ FADN (2000)



02/04/01

6.1.1.2 Problems and New needs

Implementation of a new return fiche based on European requirements for the future adhesion of Czech Republic to the Union is a good occasion to renew the Fadn in Czech Republic. So it was clear that we had several steps in our project:

6.2 Conversion tables, questionnaire adjustment

Activities

Conversion tables are prepared with inventory of data available in CZ FADN. New structure of new questionnaires should be prepared as soon as possible. A new software development should start as soon as possible.

Problems and needs

Different situation for legal and physical persons. Separation of agricultural and non-agricultural activities in lot of data items. Different structure of animals. Different accounting procedures in CZ - value of own products on stock or home and farm consumption is on cost level not in market prices, animals in fixed and circulation capital, depreciation of animals. Different structure of labour in legal persons. The data structure of EU FADN data set (send to Brussels) is needed, etcetera.

6.3 Data processing - software

6.3.1 Software for data collection

Activities

New software should be prepared - two versions for legal and physical entities.
New software should be verified on a pilot survey.
Distribution of software and training of data collectors.

Problems and needs

Procedural issues.
New structure of data and questionnaires - conversion tables.
The data structure of EU FADN data set (sent to Brussels) is needed.
Checking procedures -procedures used on EU FADN data set are needed.
Supply of equipment cancelled by EU (hardware and system software for accountancy offices).

6.3.2 Central database data processing

Activities

Creation of central database (SQL).
Creation of data file for transmission to Brussels.
Application of EU FADN checking procedures.
Verifying of data transmission.
Calculation of EU Standard Results tables.
Data analyses on central level.

Problems and needs

The data structure of EU FADN data set (sent to Brussels) is needed.
Checking procedures -procedures used on EU FADN data set are needed.
Procedures used on EU FADN standard results calculation are needed.
Supply of equipment cancelled (hardware and system software SQL server for VUZE).
Methodology of data analysis in EU countries should be envisaged.

6.3.3 Software for typology

Activities

New software for typology should be prepared.
Verification of software on CZ FADN data.

Problems and needs

New calculated SGMs are needed.
Software on typology of Eurostat is available?

6.4 Typology

Activities

Calculation of SGM.
Preparing procedures for software development.

Problems and needs
Data for calculation of SGMs of some categories of products.
Segmentation of SGMs according to the regions.
Methodology of calculation in EU countries should be envisaged.

6.5 Selection plan

Activities

Setting of the stratification criteria.
Stratification of farms involved in Agrocenzus 95.
Setting of a selection threshold and schema.
Preparing of a variants o selection plan.

Problems and needs

Methodology of a selection plan in EU countries should be envisaged.

6.6 Institutional building

Activities

Establishment of CZ FADN management committee.
Proposal of legislative background.
Establishment of VUZE team.
Proposal on financing and organisation of FADN CZ.

In order to solve those problems and taking into account the new needs, a methodology has been used, based on the Information approach.

6.6.1 Using an information approach to renew the system

6.6.1.1 A new modelling combining national and European goals

The project is to create an information system which enables to follow the CZ FADN network and allows the producing of results based on the EU requirements.

This information system will be based on a P.C. software application, installed on a server and linked with Internet access.

Therefore, it has been planed to set up a software (or a group of software) with four main steps (see following diagram):

6.6.1.1.1 Input of data

- The software will have to collect data on the 2 main types of farms in CZ (legal entities and individual entities). This collecting of data should be organised from several different types of data (conversion from bookkeeping or manual forms);
- the software will allow control procedures on data entry with CZ and E.U. rules;
- the software will allow the producing of reports at farm level (farm analysis, report on levels of costs, …);

- the software should be able to send with different procedures those data to the central data base in the VUZE.

6.6.1.1.2 Typology

The software will authorize:
- calculation of standard gross margin (sgm);
- implementation of groups of farms according to a typology requested. different keys should be used for creating different typologies;
- the processing of different sources of data (agro census, surveys);
- outputs on farm level.

6.6.1.1.3 Central database

A central database will be created on the VUZE server, based on a relational information model (process model, entity relationship diagram, data dictionary). This database will be developed with the software SQL SERVER (at least version 7), already used in the VUZE.

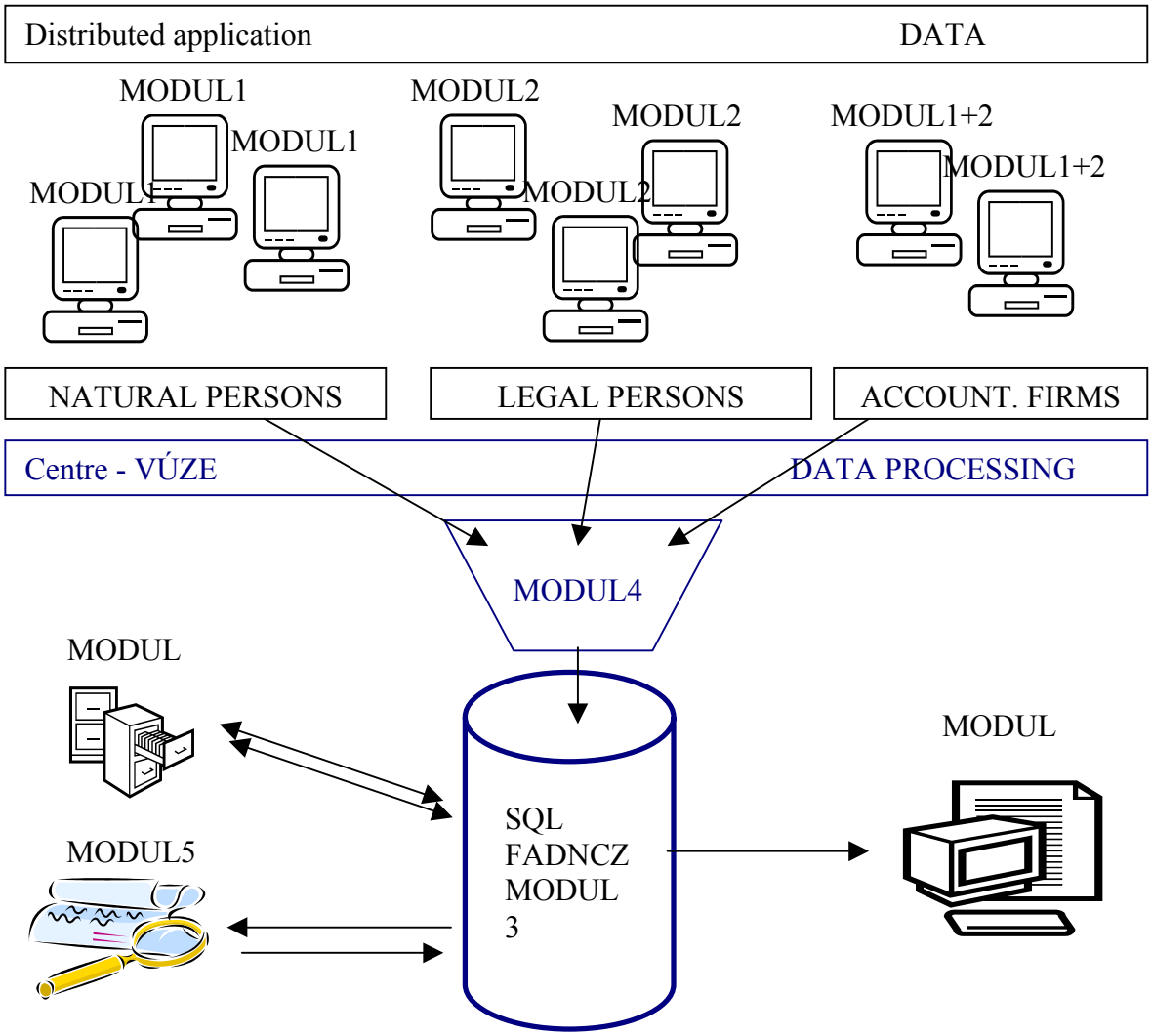
This database will allow:
- to aggregate data from the VUZE samples,
- to realise several control procedures on the data collected,
- to stock and secure data,
- to process data with different rules according to the relational model implemented,
- to produce results in different types (screens, tables and graphs, files, reports on paper, …).

6.6.1.1.4 Outputs

The Database will produce several types of outputs:
- outputs for the C.Z. green annual report (according to the C.Z. methodology);
- outputs for the standard report of the E.U. FADN;
- outputs for other surveys.

6.6.1.2 A technology based on Internet links

The software activities are based on different modules to be developed:



Each individual model will be developed as a separate sub-project with its own life cycle of the project.

Analysis of these projects has been made by standard processes of analysis, modelling, abstraction and synthesis. Common Microsoft applications have been used as tools, the data analysis has been made directly in the database application itself.

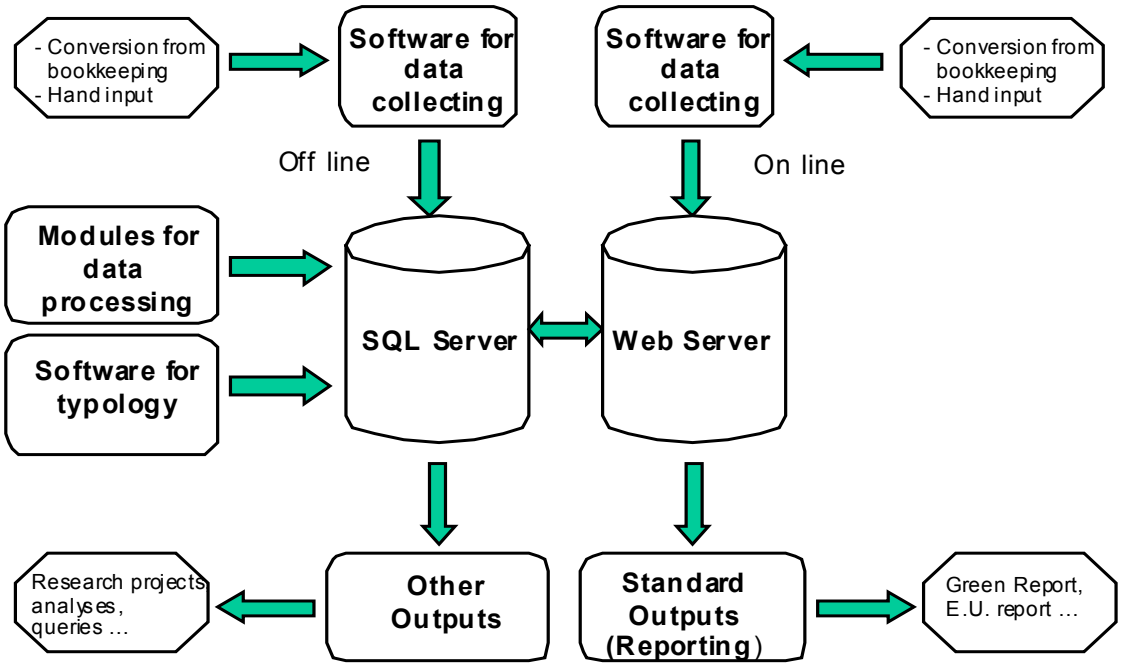
Implementation (programming) came from the standard procedures based on the creation of general libraries and procedures. The code have been described and documented. Microsoft development tools have been used as other development instruments, based in particular on the MS Visual Basic language.

- minimum requirements of the applications on HW are derived from the real possibilities of the clients of these applications in the year 2001;

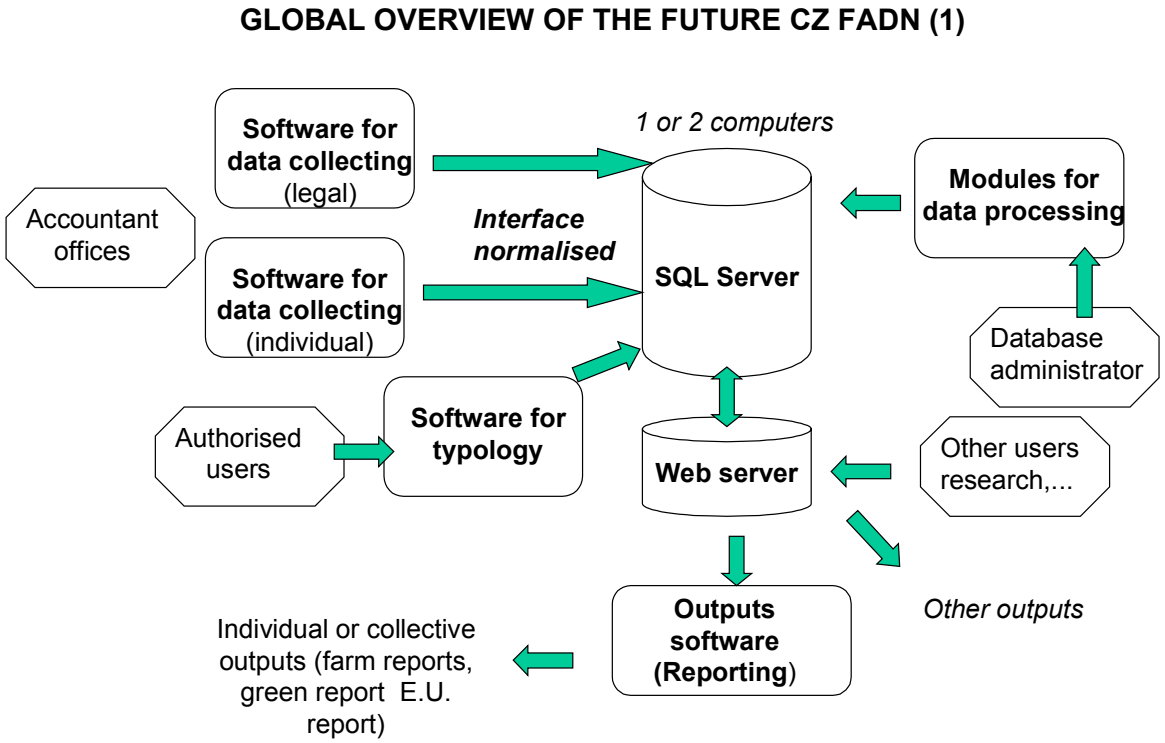
- the SQL server is the MS SQL server, at least version 7.xx;
- Data outputs have to be processable in common office applications;
- extent of the data presentation on the Internet is limited by the technological possibilities of the VUZE connection;
- web applications are programmed as HTML.

As Internet technology is not as much used in Czech republic, the new system has been created with a possibility for non connected offices. Such a new system can be represented like this figure:

NEW FADN CZ SOFTWARE MODEL



Once it will be installed, it will evolve to this final state:



6.7 Conclusion

This project is now quite realised. It has to be tested and implemented in the country since the end of the year 2001. It shows clearly that for developing new FADN, new information technologies in agriculture are helpful. When they are well managed, they can give results which authorise a better use of information, and hopefully, a better agricultural policy. All rely now on the way those information will be managed, because such technologies require people trained to such information management, and of course on the way those information will be used by the different stkeholders.

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7. Agricultural Accounting System in Romania

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Abstract

The Romanian agriculture has as starting base the family farm, which administers small areas (an average of 2.47 ha). The accounting system applied in agriculture should consider these particularities but unfortunately this is not the case. According to the Accounting Law all commercial and agricultural companies have to present a double-entry accounting. Authorised physical persons and family associations can have a single-entry accounting. Family farms and associations of families, which represent 99% of the total private agricultural enterprises and own almost 75% of the total agricultural area of Romania, are not obligate to have any accounting.

Keywords: legal forms, double-entry accounting, Fourth Council Directive EEC, International Accounting Standards, yearly financial report.

7.1 The Romanian Economy in its Way to the Market Economy

Since December 1989, after the fall of the socialist system, Romania has been passing through a fundamental change process. The transition process from the central planned economy to the market economy, which first of all includes all institutional and microeconomic reforms, is far from being finished.

On national level Romania wishes to *integrate into the European Union* and therefore officially requested the accession in 1995. The European Union took in consideration this request, but also established a set of conditions that candidate countries have to fulfil before joining EU. Acquiring the EU member status in a shortest possible amount of time constitutes an absolute priority for the Romanian policy. One of the most important objectives regarding Romanian integration in the EU is the harmonisation of the legal system, namely acquisition and implementation of the 'acquis communautaire'.

Economical situation of Romania in 1999, overview see table 7.1.

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Table 7.1 The Economic and Agricultural Situation in Romania, 1999

	Unit	Value
Total area	millions hectares	23.8
- agricultural area of which	millions hectares	14.8
- arable land	millions hectares	9.3
Population (total)	('000)	22,458.0
National accounts		
GDP a) per capita at current prices	PPS b) - €	5,682.0
	% of EU average	27.0
GDP at current prices	billion ROL	521,736.0
	millions €	31.9
Structure of production:	% of GVA c)	
- agriculture		15.5
- industry		30.9
-construction		5.4
- services		30.9
Gross fixed capital formation	% of GDP	18.5
Agricultural investments	% of total investment	11.3
Stock of foreign direct investment (data are estimated)	millions €	5,496.0
	€ per head	245.0
External trade		
Exports	millions €	8,081.0
Imports	millions €	9,875.0
Financial indicators		
Inflation rate (annual average)	%	45.8
Euro exchange rate (end of period)	(1 € = ... ROL)	18,345.0
Gross foreign debt of the whole economy (data are estimated)	% of GDP	23.7
Labour market (ILO methodology)		
Economic activity rate	% of labour force	63.4
Unemployment rate	% of labour force	6.8
Average employment by NACE branches:		
- agriculture and forestry	% of total	41.7
- industry (excluding construction)	% of total	23.9

a) Gross domestic product; b) Purchasing Power Standards; c) Gross Value Added.
Sources: Regular Report from the Commission on Romania's Progress Towards Accession, 2000; National Institute of Statistic, Romanian Statistical Yearbook, Edition 1999.

The Romanian Economy, since December 1989 regime change, has been characterised by a dramatic decrease of the industrial and agricultural production, negative trade balance, growth of the unemployment rate, alarming increase of the inflation rate (a peak of 256% was reached in 1993), a general government budget deficit, antiquated and deserted production capacities, continuing presence of the industrial giants built on the former communist regime that have been producing constant losses, the delay of state companies privatisation, relatively low foreign investments - especially due to the often changes in the legal system and corruption - etcetera.

7.2 The last decade evolution of the Romanian Agriculture

The economic and politic evolution of Romania beginning with 1990, particularly in the restoration of the agricultural property and the privatisation of the large state companies in agricultural sector, has as a result an impressive number of agricultural enterprises, especially family farms of small and very small size.

Table 7.2 Distribution of land by size of holdings in year 1999

Size of Land	Number	%
< 0.5 ha	504,353	12.2
0.5 - 1 ha	1,115,119	27.0
1 - 3 ha	1,350,775	32.7
3 - 5 ha	686,696	16.6
5 - 10 ha	448,047	10.9
> 10 ha	14,621	0.4
Soc of Private Assoc.	9,837	0.2
TOTAL	4,129,448	100.0

Source: Ministry of Agriculture and Food, Strategy of Romanian Agriculture, 2000-2012, Bucharest, 2000, p. 43.

Although the agriculture is formally 'the champion' of the privatisation, with 86.4% of the agricultural area and almost 100% of the livestock, there is no efficiency improvement comparing to the former times. This is mainly attributable to the following facts that are actually defining *the Romanian agriculture* since December 1989:

- excessive fragmentation of the land property (three quarters of the agricultural exploitations have less then 3 ha of agricultural area): the lots of property where already very small before the Second World War and those were split further to the heirs of the former owners;
- the high percentage of the population working in the agricultural field (41.7% compared to the 1998 EU average of 4.7%) and the high number of elderly (more than 50% are 50 years old or older);
- the laws concerning property rights over land and forest are very ambiguous;
- a subsistence agriculture instead of a competitive one able to face market economy: farmers do not have access to the necessary market information concerning the demand, or the market price, do not keep a basic evidence of their expenses and therefore they sale for an arbitrary price;
- physical production level decreased both in animal and crop production;
- livestock reduced to almost 50%;
- antiquated and deficient production capacities: statistically the charging rate for a Romanian tractor is 69 ha (compare to the EU average of 13 ha) and 149 ha for a combine (compare to 79) but practically the charging-covering rate of the in-service machinery is doubled;

- the chaotic and unfounded subsidising system in agriculture: the agricultural data available to the decision makers refer to the area in property and cultivated area, livestock, productions achieved, sale prices and do not refer at all to the production costs, profit etc. Even these data are usually obtained to late to be helpful in a scientifically based decision-making;
- difficulties on credit (loans) contracting: lacking material guaranties and a very complicated procedure imposed by the banks;
- difficult access to information for the farmers: regardless their legal status of activity, most of the times, farmers are insufficient informed about their rights and obligations. And concerning agricultural extension services, there is still a long way to go;
- frequent changes in legal system and regulations and the multitude of legal documents: the legal system is much to complicated not only for a farmer but also for a specialist, and to be up to date with all changes it is practically impossible;
- the sector's structures from don- and upstream agriculture were not consequently stimulated;
- very low foreign investments in the sector.

7.3 Agricultural Accounting System in Romania

The Legal Forms of private agricultural enterprises in Romania are:

- with legal status:
  (1) Commercial companies: Limited Liability Companies, Joint Stock Companies, Limited Partnership Companies (Simple and Stock Holding), Collective Liability Companies (Law no. 31/1990),
  (2) Agricultural companies (Law no. 36/1991).
- without legal status:
  (3) Authorised physical persons according to the free incentive activity1 (Decree--law no. 54/1990),
  (4) Authorised family associations according to the free incentive activity4 (Decree-Law no. 54/1990),
  (5) Associations of families based on written or verbal agreement (simple associative forms) (Law no. 36/1991),
  (6) Family farms.

The Romanian agriculture has as starting base the family farm, which administers small areas (an average of 2.47 ha). The accounting system applied in agriculture should consider these particularities but unfortunately this is not the case. Actually even the title for this paper, 'Agricultural Accounting System in Romania', is partially improper considering the fact that there are no special accounting regulations for the agriculture, therefore the general accountancy regulations have to be applied.

[1] This legal form is very rare used in practice.

Table 7.3 Organisational Structure of Private Agricultural Exploitations

Item	Unit	30.06.2001
Agricultural area under private exploitation	1,000 ha	12,786
	% of total agricultural area	86.40
A. Agricultural companies with legal statute (1+2)		
Total number		4,376
Agricultural area	1,000 ha	1,685
Average area	ha/exploitation	385
B. Family associations without legal statute (4+5)		
Total number		6,494
Agricultural area	1,000 ha	790
Average area	ha/exploitation	122
C. Private households (3+6)		
Total number		4,170,279
Agricultural area	1,000 ha	10,311
Average area	ha/exploitation	2.47

Source: Ministry of Agriculture, Food and Forests, News Bulletin, Number 7 - 2001, Bucharest, p. 9.

We are concluding now seven years since Romania has been applying a new accounting system that represented a *radical reform in the Romanian accountancy*. The Romanian Norms and Regulators have conceived an accounting system according to the market economy exigencies and has been generalised and applied since 1994. This system is based on the actual tendencies of internationalism and general harmonisation of the accounting systems and takes into account the practices of several representative countries concerning the accounting theories and doctrines.

The fundamental law that statutes and regulates the accounting system in Romania is represented by *the Accountancy Law* no. 82/1992. All forms of agricultural enterprises except for the family farms (6) and simple associative farms (5) are under the incidence of this law. According to this law it is mandatory for the commercial companies (1) and agricultural companies (2) to have *double-entry accounting*. Authorised physical persons (3) and authorised family associations (4) can present a *single-entry accounting*.

The Accountancy Law defines the accounting as being the specialised activity in measuring, evaluating, comprehending, administering and controlling the actives, debts and equity as well as the results. It has to assure the chronological and systematic registering, processing, publication and conservation of the information concerning the financial position, financial performance and cash-flows, as well as the internal needs for present and potential investors, financial and commercial creditors, customers, governmental institutions and other users.

Among *the rules of the double-entry accounting* we can enumerate:

- accountancy has to be kept in Romanian language and official currency. For internal informing needs operators can draw financial reports in a foreign stable currency (Euro, USD etcetera);
- foreign currency has to be recorded in that specific currency as well as in ROL;

- general system of accounts is structured into nine classes, which are splitting in groups and then into synthetic accounts of first degree and finally into synthetic accounts of second degree;
- financial year coincides with the calendar year;
- accounting principles explicitly formulated by the Law are: prudence principle, principle of permanency of the methods, continuous activity principle, principle of the independent financial year, principle of opening balance intangibility and non-compensating principle;
- the methods employed in assessing the patrimony have to be the same during the whole accounting financial year, as well as from one financial year to another. These can be changed only in justified instances and under the reserve of mentioning the change in the appendixes to the yearly financial reports;
- the elements of the assets are recorded in accountancy at their input prices, production cost or the 'right value' (the market price) for other inputs than those bought or produced;
- claims and debts are recorded in accountancy at their nominal value;
- the inventory of assets and liabilities elements is compulsory at the start of the activity and at least once a year during the functioning period and in case of fusion or cancelling the activity;
- the immobility's accountancy is held by categories and on every inventory element;
- the stock accountancy is kept quantitatively and appraise or appraising only, according to the conditions stipulated by the regulations;
- the disbursement accountancy is held on disbursement types, nature or destination;
- the receipts accountancy is realised on receipts types, nature or source;
- the value of the stocks emitted or of other titles as well as subscriptions of assets are distinctly reflected in accountancy;
- the customers and suppliers accountancy and of all other claims and debts is held by categories and every commercial partner whether or not with legal status;
- the profit and loss account is established monthly and cumulated from the beginning of the year;
- the official document for presenting the economic-financial situation is the Yearly Financial Report, which has to offer a very accurate picture of the financial position, financial performance, cash flows and all other information referring to the developed activity. This document is prepared annually and also in the case of fusion, separation or cancelling of activities;
- for verifying the correct recording of all operations in accountancy, the check-balance is realised monthly;
- the compulsory Accounting Registers are: daybook, general ledger, and inventory book. All these together with the justifying documents serving for recording the financial accountancy are conserved in archive for ten years starting from the end of the accounting financial year in which they have been produced, except for the yearly financial reports and wage sheets which are conserved for 50 years.

The equity is represented by: share capital, bonuses related to the capital, differences from the re-evaluations, reserves (e.g. legal reserves that are stored in capital companies,

from at least 5% of the gross profit until they reach a minimum of 20% of the capital stock), own funds (development fund, profit participation fund, other funds), results reported from precedent years, result of the current financial year, investment subsidies (e.g. subsidies received for acquiring fixed assets, fixed assets received off charges) and regulated provisions (e.g. accelerated depreciation).

Fixed assets are objects or a complex of objects fulfilling *both of the following conditions*:

- value higher than the limit established by the governmental decision (which is in this moment 8 Mio. ROL - approximately 285 Euro),
- normal period of use more than one year.

The total depreciation value is equal to the entering value of the fixed asset. The normal usage periods for each category of fixed assets are mandatory taken from the Catalogue appended to the Law no. 15/1994. Only the following depreciation methods are recognised by the regulations in Romania:

- linear depreciation: consisting of uniform repartition of the entering value of the fixed asset for the whole normal usage period;
- degressive depreciation: suppose the multiplication of the linear depreciation ratio with particular coefficient (1.5, 2.0 and 2.5);
- accelerated depreciation: consisting of including up to 50% of the inventory value of the fixed assets in the first year of service into the exploiting charges and for the following years the depreciation would go linear. The Financial Administration approval is needed in order to apply this method.

When entering the patrimony *the stocks* are recorded in the accountancy at their acquisition costs, production costs or standard costs (pre-established), this last one under the condition of displaying clearly the price differences against the acquisition or production costs. When leaving the patrimony, the stocks are evaluated and recorded in accountancy by using one of the following methods: pondered average cost, FIFO or LIFO.

In September this year (2001) the Romanian Government emitted the Order no. 94/2001 for approving *The Accounting Regulations complied with the Fourth Council Directive of the EEC and with International Accounting Standards*. These regulations apply starting with the year 2000 financial reports for the companies represented on Bucharest Stock Exchange, several state owned companies, companies and national societies, other

End of the financial fiscal year	Turnover for the previous financial year (Euro)	Total assets for the previous financial year (Euro)	Average employees for the previous financial year
31-st December 2001	over 9 millions	over 4.5 millions	250
31-st December 2002	over 8 millions	over 4.0 millions	200
31-st December 2003	over 7 millions	over 3.5 millions	150
31-st December 2004	over 6 millions	over 3.0 millions	100
31-st December 2005	over 5 millions	over 2.5 millions	50

national interest companies, and certain specific categories of companies which are operating on capital market, according to an explicit list appended to the Order.

For the period *2001-2005* the implementing program for the regulations is presented below. In this respect, the regulations are applicable for the legal companies who can satisfy two of the three criteria presented.

Starting with the *2006* financial year only the SME (Small and Medium Size Enterprises) companies will be remaining outside the regulations.

For the companies applying The Accounting Regulations complied with the Fourth Council Directive of the EEC and with International Accounting Standards, *the yearly financial reports* are composed by balance sheet, profit and loss account, equity changes report, cash flow report, accounting policies and explanatory notes. One copy of the yearly financial report is sent to the General Direction for Public Finance within 120 days from the end of the financial year and then to the County Chamber of Commerce and Industry who publishes this report in complete form or simplified form. According to the regulations the balance would have a similar shape to that specified in Art. 10 of the Fourth Council Directive EEC, and the profit and loss account would have a similar shape with that specified in Art. 23 of the Directive. Also, a series of regulations would be applied different from the common regulations specified in the Accountancy Law, like:

- the depreciation value should be equal with the entering value minus estimated residual value;
- the constitution expenses can be activated, not being mandatory any more;
- the goodwill can be depreciated over a maximum 20 years period - in the common norms this is possible only in specific circumstances;
- the own funds category disappear;
- supplementary the following accounting principles are added: principle of separate evaluation of assets and liabilities elements, principle of economic prevalence over juridical and principle of the significance level;
- other methods of stock inventory acquit are recognised etc.

Legal Entities which don't comply with the established criteria produce only *simplified yearly financial reports*, according to the European directives: balance sheet, profit and loss account, accounting policies and explanatory notes. One copy of the yearly financial report is sent to the General Direction for Public Finance within 90 days from the end of the financial year and then to the County Chamber of Commerce and Industry who publishes this report in complete form or simplified form.

The yearly financial reports for micro-enterprises are composed from balance sheet and profit and loss account. One copy of the yearly financial report is sent to the General Direction for Public Finance within 60 days from the end of the financial year and then to the County Chamber of Commerce and Industry who publishes this report in complete form or simplified form. Tax payers, which are considered micro-enterprises would use a simplified model of the chart accounts and a simplified system for reporting.

The yearly financial reports are accompanied by the *administrators' report*; except for the micro-enterprises where this report is optional.

The Micro-enterprises are legal entities that cumulatively put in practice, at the 31-st December of the last year, the following conditions:

- produce material goods, offer services and/or develop commercial activities,
- have up to nine employees,
- have realised incomes representing the equivalent in ROL of up to 100,000 Euro, inclusive,
- have private capital integrally.

Are not accounted as micro-enterprises even when complying with the conditions the following: the banks, the insurance re-insurance companies, the investment companies, the investment-administering companies and depository companies, the real estate companies and the companies with exclusive export activities.

7.4 Differences between the Yearly Financial Report for Romanian Agricultural Companies and BML-Jahresabschluss

The yearly financial reports are the only documents that can be access by external persons interested in the business development. For this reason they have a critical importance. Their structure inside the Romanian Accounting System is a general one, and applies to all fields of activity. For this purpose the Agricultural companies offer the investors, creditors, state controlling institutions and all other interested bodies, through this reports, a *general overview*. Making a parallel between the yearly financial reports draw by the agricultural companies in Romania and *BML-Jahresabschluss*, yearly financial reports draw by the German agricultural companies, we observe that the only similarities are those concerning the general structure of the balance sheet and profit and loss account, all the rest is different. The Test-Companies in Germany that supply information for the Farm Accountancy Data Network (FADN) are asked to draw this yearly financial report elaborated by *Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft*.

The Balance Sheet from the BML-Jahresabschluss, compared to the Romanian yearly financial reports, contains extra items:

- livestock is grouped into a distinct category situated between intangible and circulating assets. In the Romanian balance sheet the livestock is not distinctively grouped, but is separately included into the intangible assets, respectively circulating according to their nature;
- the intangible assets group is far more detailed;
- the post of 'Subscribed but unpaid capital' is a distinct position before intangible assets and not in fluid assets category like it is in Romania;
- the inventory objects and advance payments made for the acquisition of intangible assets enter the category of intangible assets, not the fluid ones, as in Romanian balance sheet;
- equity has a different structure for each legal form;
- there is a liability post between 'Equity' and 'Provisions' called 'Special post of reserves' consisting in equity that has not been already taxed and which, after retaining

the tax, represents the equity [1]. Also, in this account, is registered the difference between exceptional and linear amortisation, subventions for investments. These posts are mixed as they represent both equity and borrowed capital, while in the Romanian balance sheet is considered as being 100% equity.

In *the Profit and Loss Account* of BML-Jahresabschluss, incomes and expenses grouping is made like in the Romanian one, but the subgroups are adapted to the specific conditions in agriculture and are more detailed. As a consequence the turnover is detailed on branches and sub-branches, going even up to cultures, species and even categories of livestock, and the material expenses are detailed on production branches and sub-branches and inside these on types of expenses. In the profit and loss account made by Romanian agricultural companies the turnover is marked cumulatively and the material expenses are grouped only on expenses types.

Appendixes to the balance sheet of the German agricultural companies contain extra items, livestock evaluation, and the other appendices of the BML-Jahresabschluss (fixed assets, stock, claims, debts toward the State, manpower) are more detailed and contain quantitative data as well.

Other *components* of the BML-Jahresabschluss that are not present in the Romanian yearly financial report are the followings:

- situation regarding cultivated surfaces, obtained physical productions and also average prices;
- situation regarding the stocks ins and outs is drawn up separately for livestock, respectively for the stocks of raw materials, auxiliary materials and fuels, other products in execution, finite products, merchandises;
- situation regarding agricultural area.

As we could see from the parallel between the BML-Jahresabschluss and the yearly financial reports in Romania, the last ones are much to general to constitute a supporting element for decision making on micro- or macroeconomic level. Unfortunately the reports from the Romanian agricultural companies do not contain quantitative information about the production means specific to the agriculture: land and livestock. Also, only 0.1% of the total private agricultural exploitations, meaning those that have a legal status of commercial or agricultural company, and that hold in property 11.4% from the total agricultural area of Romania, are drawing up yearly financial reports. Most of the agricultural enterprises are family farms with no accountancy. For this type of exploitation the only information available to the State decision makers are those collected by the local Directorates of Ministry of Agriculture and Food. These data are collected through enquiries, the sample representing 10% of the families in the village, and recorded in the so-called *Agricultural Recording-Book*. The data are referring to the: household component persons, area in property, agricultural area usage and employment (leasing, association etcetera), cultivated area for the main crops, orchards, irrigated area, livestock, machinery and installations, transportation means, households constructions.

[1] Special posts for reserves are constituted on the basis of fiscal regulations and contain the difference between economical evaluation and the fiscal ones that are more reduced.

7.5 Tax System

Regarding the tax system applied in Romanian agriculture we can mention the fact that it is adapted to the precarious situation of the 'after 90's' agriculture. The Romanian small-scale farmers who are practising subsistence agriculture, but represent the large majority, do not pay any kind of taxes on the agricultural incomes and are exempted from value-added tax (VAT) disbursements. The main taxes for the agricultural companies are resulting from the figure 7.1.

7.6 Conclusions

Watching the Romanian accounting system evolution we can draw the following *tendencies*:

- the Romanian accounting system adapts more and more to the Fourth Council Directive EEC and to the International Accounting Standards; the first step in this direction was made in 1994 by implementing a totally restructured system, inspired from the French model; a second important step was made this year by gradual imposition of several new regulations harmonised with the EU norms, to the companies that are characterized by specific conditions of size;
- simplifying the accounting system for the small size enterprises.

Family farms with small area in property represents the large majority of the agricultural exploitations, but these are not holding any accountancy. The only available data concerning their activity are collected by surveys and refer to main crops cultivated area, livestock and machinery. In conclusion the decision making state authorities do not have information concerning the production costs, incomes etcetera.

Although the agricultural enterprises with legal status are drawing up yearly financial reports, those contain information that is much to general and quantitative data is completely missing.

Implementing the FADN in Romania - as a starting point in agricultural statistics - is therefore a necessity. Considering the precarious situation of the Romanian farmer it will be necessary to subsidise those farmers offering information to the FADN.

Figure 7.1 Tax System for the Agricultural Enterprises in Romania

TAX	Profit Tax	Income Tax for micro-enterprises	Dividend Tax	Income Tax on Individual Independent Activities	Agricultural Activity Income Tax	Real Property Tax	VAT
Official Document	O.G. 70/1994	O.G. 24/2001	O.G. 26/1995 O.G. 7/2001	O.G. 7/2001	O.G. 7/2001	O.G. 8/2001	O.G. 17/2000
Taxpayers	Legal Entities, except for Micro-enterprises (partially 1+2)	Micro-enterprises (partially 1+2)	all shareholders	Authorised Physical Persons and Family Associations (3+4)	Physical Persons (partially 5+6)	Physical Persons detaining agricultural area in property (partially 5+6)	- Legal Entities (1+2) - Authorised Physical Persons and Family Associations (3+4)
Generating Event	obtaining profit	obtaining income	receipt of dividends	obtaining net income	obtaining income from flower and vegetable production in glasshouses, as well as from shrubs, ornamental crops, mushrooms, vine and tree nursery and other similar production	owning in property more then 10 hectares of agricultural area	selling goods and/or services
Tax Basis	Pi = Pb - Vd + Cnd - Pierdr	total income	dividends	VN = VB - Cd	State established incomes	State established incomes for the arable area or arable equivalent, function to the fertility category of the land	- selling price without VAT - negotiated price without VAT
Tax Rate	25 %	1.5 %	10% - legal entities 5% - physical persons	progressive quota between 18% and 40%	15%	15%	19% for exporting: 0 %

Exemption and/or Allowances	- for the taxed profit share corresponding to the exportation goods and/or services, tax rate o 5% - Tax reduced with 50% for the profit share used in the current fiscal year for investments etc.	- investments form the profit can be deducted from the due income tax - tax reduction with 20% in the event of jobs creation etc.	n.a.	at the end of the fiscal year these incomes globalise with those from the wages and from the usage leased goods, and from this amount the personal deductions can be withdraw	n.a.	tax reduced with 50% for the taxpayers with disabilities, elderly persons of more than 65 years of age etc.	exempted from VAT: - private house holds - economic entities activities with incomes from taxable events of up to la 125 [1] millions ROL yearly (approximate 4,450.0 Euro)

where:

O.G. - Governmental Ordinance
Pi - taxable profit
Pb - gross profit (total incomes - total expenses)
Vd - fiscal deductible incomes (e.g.: legal reserves, dividends received from another legal entities)
Cnd - fiscal non-deductible expenses (e.g.: profit tax, fine, protocol and sponsoring expenses that exceeds the established limits, any expenses in favour of the shareholders)
Pierdr - accumulated losses brought forward (maxim 5 years)
VN - net income
VB - gross income

[1] In the Law Project concerning Regulation's Changes of VAT it is previewed that starting from 01.01.2002 the limit increases to 500 millions ROL. In this way 75% from the companies required to pay VAT until then, could renounce to the VAT tax payment.

Cd - deductible expenses

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8. Exchange network for the setting up of FADN in Candidate Countries

F. Simon and B. Del'homme

8.1 Context and assessment

During the last years, many PHARE projects and twinning have been launched by the European Union in order to support the CEEC to develop information systems in Agriculture. Part of these projects were devoted to the setting up of the Farm Accountancy Data Network (FADN). Thus, CEEC could have benefited from European experts' experience, these experts who are concerning by such topics in their country.

At present, we enter a phase where many PHARE projects or twinning just ended or are already finished (Czech Republic, Hungary, Estonia ...). Some countries have got no European projects yet on this topic (Romania, Bulgaria …).

Even in countries where projects are ended, there are still many questions or points to raise out as countries go further in their learning and putting into practice. The need to exchange on practices and experiences still remains.

To manage such questions and such exchanges can be difficult for the FADN unit at the European Commission, considering their present tasks and what could be requested in the task linked to CEEC.

Furthermore, some European experts who took part in different European projects have expressed the necessity to continue to accompany these future European partners in order to support them not only to set up and develop the FADN (application of the European rules for data collecting (farms selection, farm return) and data controlling) but also to take over this tool (data analysis).

These experts have also expressed the need for a coordination space in order to avoid dispersion and to think over the cooperation on FADN in CEEC in a more relevant way in order to work better all together.

At the end, this could lead to the standing out of reflections about new interest fields. Today, it leads us to propose the project for the creation of an exchange network on the development of FADN in the CEEC.

8.2 Objectives

In order to better answer the needs of the CEEC and to allow the European experts and the Commission to better co-ordinate their actions, we propose a project based on 3 main objectives:

1. the taking over of FADN tools by future member states;
2. the co-ordinated exchange between the different people who intervene on FADN issues in CEEC;
3. the development of specific reflections linked to the entry of new member states in the EU (very big farms, non-economical dimensions such as social or environmental, pluri-activity, ...).

8.3 Different proposed actions

For each objective, we can advance several elements to justify its interest and its feasibility. We draw here only the main points. They could be completed through discussions as we do not intend to be exhaustive.

8.3.1 To attend to the development of FADN tools appropriation dynamic by the countries

In countries which have already adopted an organisation as FADN as well as in countries which are thinking about it, to set up FADN means generally functional and structural changes in data collecting, processing and analysis of farms sample. To better analyse these changes and above all to better accompany them, it is necessary to see the effects. That is why we propose to:

- Work on the perception of FADN compared to other available information systems
  A first step would be for each country to present the situation or the project for its FADN tool (collecting, processing-controlling and analysis). Then, through information exchange on FADN tool, on FADN structural organisation, on actors' role (liaison agency, national committee, data collecting offices, users and external partners as statistical office) and on the relation among actors, a comparison could be done. Then each country (and each expert) could discover new ideas. At that level, we would have to bring out strengths and weaknesses of the tool already set up or nearly to be set up.
- Work on solving concrete problems
  To set up FADN systems always goes with methodological, organisational or technical problems. In order to better bring out practical solutions, we have to separate the different kind of problems we have to face:
  - *at the data collecting and processing level*
  For instance: data quality, links with the national farm return, data collecting software, data sampling, …
  - *at the data use level*
  For instance: to set up aggregate indicators, relevant typologies, or even econometrical models in order to develop data analysis (knowledge of farmers' economical situation and consequences of CAP measures (evaluation and simulation).
  During the setting up and development of FADN tools, a regular exchange on these different problems would facilitate the research and the adoption of relevant solutions. This exchange must be between future member states with the participation of experts groups concerned by each particular problems.

The setting up of such a appropriation dynamic works towards:

- insuring and improving the quality of existing systems;
- developing FADN data use culture.

If such a dynamic is created in these countries, the evolution of FADN tools and the follow up of CAP will be easier. Then such a dynamic could go on with no particular support.

If, in these countries, the setting up of such a dynamic is essential, in our project, we have also to take into account the dynamic of concerned experts who intervene in different projects (PHARE or twinning).

8.3.2 To allow the information exchange between experts concerned by the setting up of FADN in CEEC

When an expert is requested to intervene in a FADN project, most of the time, he stays confined in his competency field and in one country (it is the tender logic which creates this). However, sometimes, this expert can communicate with the other experts working on the same CEEC. But he rarely exchanges on what happens in other countries, which are yet concerned by the same issues. SO we could also take advantage of our project to:

- create a space for the experts to meet and exchange on their experiences, the on going projects and so on. Organised by subjects linked to FADN setting up or FADN data use, on the basis on meetings and then forums, these exchanges would make easier the experts' intervention in the projects. It is useless to find again each time relevant solutions that have been provided in previous projects and which have suit perfectly the situation. As, furthermore, we are on non competitive topics, it is very important to encourage information exchange. Everybody can benefit from it (the country, the experts, the European Commission).
- to favour co-ordination and co-operation between all people who intervene in on going of future projects. By meeting themselves on a regular basis, the experts could better co-ordinate their intervention in a same country. It is not always possible in the projects, for instance due to calendar constraints. So, outside these projects but while they are going on, to allow exchanges between experts, and also with the concerned persons in the country, would contribute to improve the efficiency.

These two first objectives are based on improvement of future or on going or just realised projects. But our proposal aims also at tackling new elements.

8.3.3 To encourage the development of specific reflections (very big farms, non productive dimensions of farms such as social or environmental, pluri-activity)

Considering the entrance of CEEC in the EU, new forms of farms appear. Avec l'arrivée des pays d'Europe centrale et orientale (PECO) dans l'Union européenne, de nouvelles formes d'exploitations agricoles apparaissent. And neither the Common Agricultural Policy was created for such particular forms, nor the management reasoning used for the running of the today European farms. In this way, the setting up of a network on agriculture in

CEEC allows to tackle new research and experiment topics for experts and researchers dealing with agricultural policy issues. Two main working axis could be developed:

- Work on emergence of new research topics (see K.J. Poppe's proposal):
  - development of economical analysis models for big farms'
  - development of management models for these big farms;
  - development of computer tools which would support these models, …
- Work on methodological issues
  - How to take into account only the agricultural activity in these big farms, how to clearly separate this activity to the other activities, how to diagnose the agricultural working out of such structures, which valuation method to use, which indicators to hold, … ?
  - How to consider the non productive farm dimensions (such as social, environmental, educational dimensions, …). To study how such farms operate requires to have measure and evaluation tools for all the activities on these different dimensions.

For each of these main lines, to share experiences and to establish a research and development project which includes different European partners would allow to formalise and to give relevant answers to these new farms structure.

8.4 Conclusion - proposals

Action

We propose to set up a group of around thirty persons called - interested partners - and who are representative of European Commission, of CEEC, of PACIOLI contacts, of liaison agencies and European experts who intervene in FADN projects in CEEC.

The action could be the following: Every six months: a 3 days meeting included the 3 objectives defined at the beginning. The meetings could have both a common working group (discussion on common problems) and specific working groups (specific issues considered in workshops).

Time schedule

2 years, with a beginning in 2002. Tender at the beginning of 2002.

Budget

To finance meetings and travels for all the - interested persons - to allow them to exchange information (transportation, hotels and restaurants, overheads).

Financing

Concerted action, PHARE projects, research projects (DG Research, DG Agriculture).

Groups for Plenary Session IV - CC Session

Group 1

J. Aamisepp
S.C. Cernea
H. Vrolijk
Z. Jurisic
K. Grabowska
N. Taragola
A. DeCicco

Group 2

J. Jalast
Y. Plees
A. Tabeau
S. Trione
M. Njavro
D. Osuch
E. Øvren

Group 3

J. Bjarnason
J. Boone
B. Del'homme
A. Latukka
A-M. Karlsson
H.H. Sundermeier
M. Lekesova

Group 4

Z. Kubikova
S. Perachino
W. Kleinhanss
D. van Lierde
V. Bratka
G. Larsson
S. Trione
B. Meier

Group session CEEC Candidate Countries

Group 1 Chair: Zjakelin Jurisic
Group 2 Chair: Jaanika Jalast
'Topics to be discussed in concerted action: What are the bottlenecks'

Group 3 Chair: Michaela Lekesova
' Which working-methods should be applied'

Group 4 Chair: Valda Bratka
Why not: Risks - and how to deal with them

Group 1

1. Methodology
2. Organisation
3. Use of FADN data
4. Links with other statistics

1.
- Guidelines for direct payments
- Thresholds for FADN
- inclusion of big farms?
- representativeness of the sample
- sampling procedures
- valuation of assets & equity
- forestry, fisheries?
- accounting on small farms
- guidelines - definition
- definition of the farm
- separation of ag & non ag activities
- non farm income
- SGM's for regions

2.
- financing
- who collects the data
- motivation to participate
- software
- typology

3.
- use of data for policy analysis
- making FADN well-known
- modelling with FADN

4. .

Group 2

1. Financing
2. Quality of EU experts
3. Different development in different countries
4. - Communication between Comission and countries and experts
   - Communication - language
5. Administrative problems

Group 3

Which working methods should be applied
- meeting twice a year
- different fields of problems
- little groups of experts from East and West
- groups of each CEEC Country
- to combine plenary sessions to share experiences and specific session on one domain for example data modelling or software development
- make a concerted action like PACIOLI

Group 4

Risks:
* no plans:
  - bad defined goals
  - big difference participants:
    - background, interests, problems
* high costs:
* overlapping;
* availability of knowledge
* different needs and interests (EU & CEEC)
* support from DG Agri
* forget national needs
* language problem
* political support from national government
* competition among experts
* different schedule.

9. Phasing out of milk quotas - impacts on German agriculture

W. Kleinhanss, M. Bertelsmeier and F. Offermann [1]

9.1 Introduction

During the negotiations of Agenda 2000 four Member States explained their resistance against the continuation of the milk quota regime. Within the mid-term review of Agenda 2000, starting next year, the milk market regime has to be evaluated including policy options of a phasing out of the milk quota.

Former German agricultural policy makers were much in favour of an introduction of the milk quota regulation in the EU. One of the main goals, the stabilisation of farm income, has been achieved at least during the first period. However, important structural change problems arose due to milk quotas:

- currently, about 50% of the quota is bought or rented. Rents of quota are partially passed on from 'active producers' to (former) owners of quota, thus reducing the positive income effects for 'active' producers;
- aiming at the resolution of high quota costs a system of quota trade by regional auctions was introduced last year. Nethertheless, quota price is still high, especially in the south (up to 1 €/kg). The system does not allow the optimal allocation of milk production due to limitations of quota trade at the level of the Laender or smaller administrative regions.

For several years now, the quota regime has been criticised mainly by large dairy farmers.

Due to the need for policy assessments on this subject we started with a study on 'phasing out of milk quotas - impacts on German agriculture' at the beginning of this year (Kleinhanss et al., 2001). The model system of FAL, consisting of market, regional and farm models, has been used to deal with the different aspects of a phasing out of milk quotas. This paper concentrates on two aspects: In the first part the main outcomes of this study are reviewed. In the second part, a more detailed analysis of distribution effects, including savings of quota costs, is presented based on the results of a representative farm model.

[1] Institute of Farm Economics and Rural Studies. Paper presented at the Workshop Pacioli 9, Braunschweig 11-14, Nov. 2001.

9.2 Models and scenarios

For the quantitative impact assessment the system of 'complementary models' of FAL, including market, regional and farm models, has been used. The main features of the models are:

- *GAPsi* and *MIPsi* are partial equilibrium models for agricultural product markets respectively milk and final products. They are regionally differentiated by EU member states, CEC's and the rest of the world. The models are used for the definition of scenario conditions (market equilibrium) and the prediction of welfare effects;
- *RAUMIS* is a regionally differentiated model for the German agricultural sector based on 330 'regional farms'. The model is calibrated to the sector balance sheets and is based on the PMP method. It is mainly used to assess regional effects of policy changes;
- *FARMIS* is a farm group model for the German agricultural sector. Homogeneous farm groups are built on the base of national FADN data (210 groups for this study). It uses the PMP method for model calibration and an improved weighting scheme for the aggregation of results to the sector level;
- *BEMO* is a mixed-integer linear programming model for 'representative' farms. Almost all farms with milk production (>10 tons per year) available in the national FADN were used. Adaptation strategies are determined on developments of milk production in the past as well due to investments. Weighting the results allow aggregation to the milk sector. A modified version of the model is used to assess impacts of quota trade within the quota scheme, to determine income effects between the former owner and user of the milk quota;
- *TIPI-CAL* is an expert based dynamic simulation model for typical farms. The network of experts is used to define and to evaluate farm specific adaptation strategies. Simulations are carried out for 3 typical dairy farms in the north, south and east of Germany.

Table 9.1 Scenarios 'phase-out of milk quotas'

Year		04/05	05/06	06/07	07/08	← 2008 →
Baseline : Agenda 2000			**Ref_5**	**Ref_10**	**Ref_15**	
Phase-out of milk quotas		← Transition period →				← Phase-out of quota →
Intervention price milk	%	-5.0	-10.0	-15.0	-20.0	← without →
Producer price milk	%	-3.6	-7.3	-11.2	-18.7	-22 -25 -30
Δ Milk quotas	%	0.5	1.0	1.5	2.0	← without →
Direct payments						
Milk premium	€ / t	8.3	16.7	25.0	33.3	← 33.3 →
Grassland premium	€ / ha					← 353 →

As far as possible the models are used interactively. FARMIS and BEMO were used to adjust the supply functions of the market models and to determine the supply impacts of direct payments. Adaptation strategies were mainly defined on the expertise of the working group TIPI-CAL/IFCN.

Scenarios are defined on the base of negotiations with experts and simulations with the market and farm models (see table 9.1):

- b*aseline*: The final stage of Agenda 2000 has been taken as reference;
- *transition period*: Related to other policy reforms we assume a stepwise introduction of new policy instruments. Policy measures of the milk market reform of Agenda 2000 could be used to prepare a phasing out of milk quotas in 2008. During a transition period quota should be devaluated by further reductions of milk prices and the de-coupling of direct payments. Therefore, milk premia, which is related to milk quota, should be transformed into headage or grassland premia. A further step of the milk market reform seems to be necessary, i.e. the introduction in 2004/05. Therefore, at the end of the transition period the intervention prices for milk will be reduced by 20%, accompanied by milk premia of 33.3 €/t and an increase of milk quota by 2%;
- *phase-out of quota in 2008*:
  - changes of *producer prices for milk* of alternatively -22%, -25% and -30%;
  - *direct payments* related to the sector volume of premia at the end of the transition period, alternatively specified as:
    - *milk premium* referring to a reference quantity (33.3 €/t);
    - *grassland premium* based on the total volume of beef and milk premia, without regional differentiation (353 €/ha, which can be claimed for grassland use and for arable fodder crops other than forage maize).

Basically, milk price changes are related to model results of GAPsi. Without quota the market equilibrium at the EU level would be reached (2008 compared to 1997) with milk price changes of -24.2% and an increase of production of 7.5%, if direct payments were paid. Without direct payments the change of prices and production will be less (-20.4% respectively +4.8%). The study of Bouamra-Mehmache et al. (2001) shows higher price changes depending on de-coupled or coupled payments (-26.1% respectively -33.3%) and a lower increase of production (2.9% respectively 5.5%). Due to these differences and other supply effects of the farm models we assume a rather broad range of milk price changes between -22% and -30%. Despite the price changes the premia level is fixed. This induces an increasing under-compensation and negative income effects for the highest price changes.

The assumption of de-coupled premia seems to be rather unrealistic compared to existing premia schemes. Therefore, we distinguish between coupled and partially de-coupled premia:

- the *milk premium* is taken as an example for a coupled premia. Compared to measures of Agenda we assume the following: a) milk premia are only paid for production within a reference quantity, b) premia rights are not tradable. Such a system induces different producer incentive prices based on a) the reduced price for productions beyond the reference quantity and b) milk price plus milk premia for productions within the reference quantity;

- a *grassland premium* is partially de-coupled from production. It can be seen as a subsidy for grassland use. The system includes a fundamental reform of beef premia schemes, which induces significant changes of the competitive relationship between milk and beef production, male and female cattle as well as between grassland use and forage maize. Due to the unified premium for the whole country greater distribution effects on incomes might be induced.

Due to the different databases, cost functions (linear/non-linear, based on variable/total costs), aggregation levels, planning intervals (short-medium, medium-long term) and methods (optimisation/simulation) the results of the different models are not always identical, especially at the regional level. Nevertheless, there is a good coherency of aggregated results for the German agricultural sector.

9.3 Elimination of quota - impacts at sector level

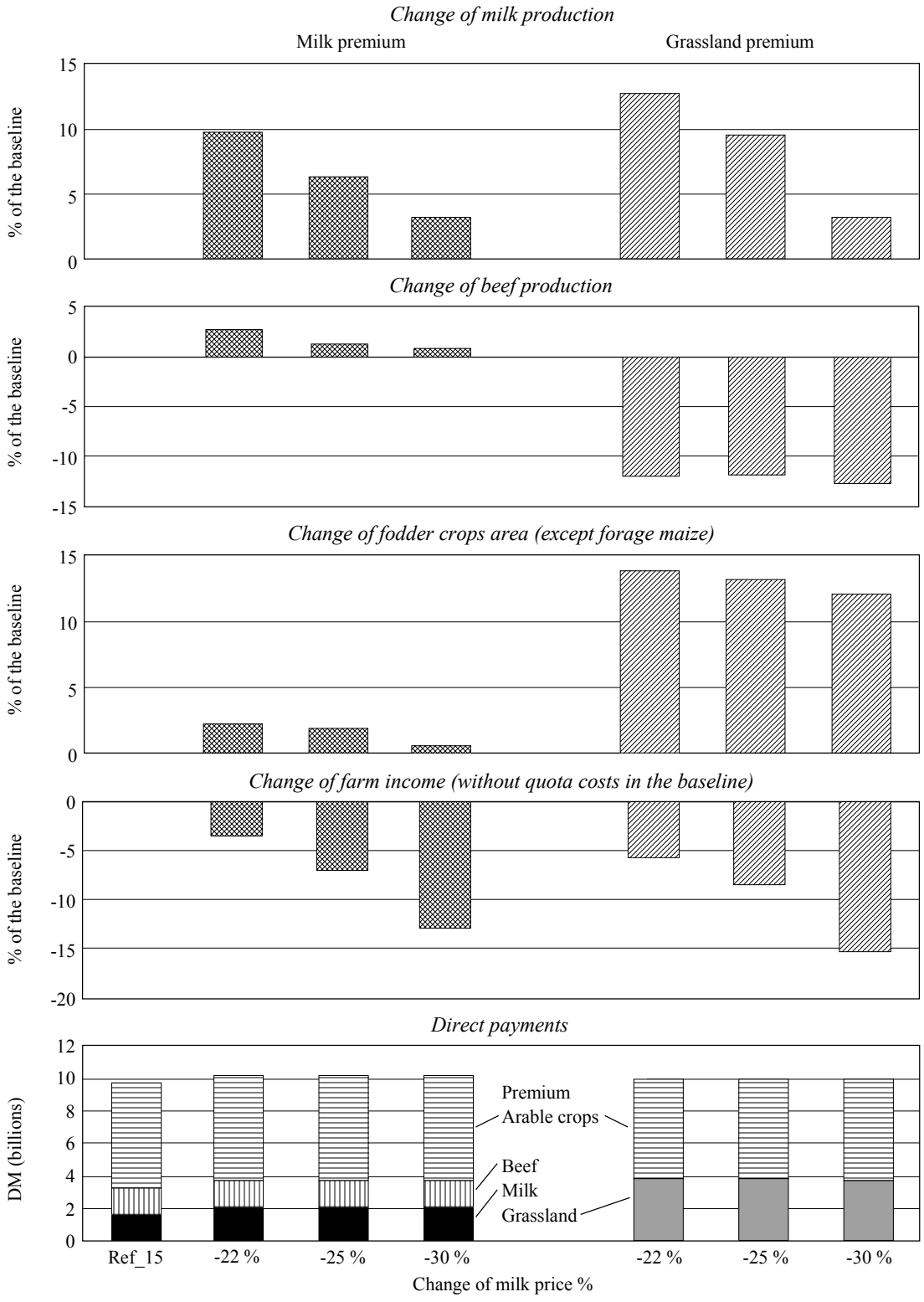
In the following the main impacts of a phasing out of quotas in 2008, referring to the final stage of Agenda 2000, are described based on the results of FARMIS. Specific aspects of premia schemes including savings of quota costs are discussed in chapter 4 based on results from BEMO [1]. Income effects shown in this chapter don't include savings of quota costs against the baseline.

Supply effects

For the scenario *milk premia* milk production increases by approximately 10% under condition of a 22% lower milk price (see figure 9.1). With price reductions of 30% the milk production would rise by 3% only. Profitability of milk production will decrease because price changes beyond -20% are not compensated. Referring to the results of the market models, a price change of -25% seems to be most realistic. Regarding changes of production with respect to farm size there is a clear indication that mainly larger farms (>35 dairy cows in the base situation) increase milk production (table 9.2). Large differences can also be seen at the regional level. Milk production in the north and east will increase while they will be rather constant in the south (see table 9.3).

Changes in *beef production* are mainly determined by cow meat, and are therefore strongly correlated with milk production. Extensive beef fattening and suckler cows' holdings will not be affected. Despite the expansion of milk production there is no considerable change in fodder production. Additional fodder requirement is partly covered by the intensification of grassland use.

[1] Results from RAUMIS and TIPI-CAL are not discussed in this paper (see Kleinhanss et al., 2001).



Source: FARMIS, Offermann/Bertelsmeier FAL-BAL (2001).

Figure 9.1 Sectoral impacts of quota exit on production and income

For the scenario grassland premia milk production will increase by 13% (10%) for milk price changes of -22% (-25%). This is due to the following factors:

- extensive production systems will be favoured;
- beef production will be reduced by about 15%; this mainly holds for intensive fattening systems and suckler cows. Therefore, roughage areas will become available for milk production. The competitive relationship of milk against beef production increases;
- the use of grassland and of arable fodder crops - excl. forage maize - increases. Grassland under fallow will be used rather extensively, such that premia can be claimed.

Income effects

It has to be mentioned that in the following paragraph, quota costs incurred in the reference scenario are not taken into account for the calculation of income effects. Income effects are determined by lower output due to price changes, changes in production costs due to farms' adaptations and changes of direct payments.

Table 9.2 Impacts on dairy & beef farms by size class (milk price -25%)

Size class ... dairy cows in the baseline	Milk premium % of the baseline	Grassland premium % of the baseline
	Change of milk production	
< 20	0.2	2.9
20-35	0.8	2.6
35-100	12.1	14.3
> 100	8.3	16.7
	Change of farm income (without quota costs in the baseline)	
< 20	-39.2	-35.0
20-35	-20.1	-30.7
35-100	-8.7	-12.9
> 100	-22.2	-6.8

Source: FARMIS, Offermann/Bertelsmeier FAL-BAL (2001).

For the scenario *milk premia* the sector income decreases by 3.5% (milk price -22%). Milk price changes by -30% induce increasing income losses of about 13% because output losses due to price changes between -20 and -30% are not further compensated [1]. The total of direct payments amounts to 10 billion DM.

For the system of *grassland premia* the total of direct payments is lower although the premia is defined on base of the sector accounts. Reasons are that within the national

[1] If higher subsidies to compensate highter milk changes (e.g. -25%) were granted, milk production would also increase.

FADN only 90% of the grassland is represented. Grassland used by small part-time farms is not included in the data. Due to these inconsistencies income losses for this scenario are a little bit higher than for the other scenario.

Income effects in dairy and beef farms by farm size are shown in table 9.2. Compared to the average income losses are higher in dairy farms. Due to low incomes and their lower capabilities for farm adaptations, relative income losses in the small farms would be higher than for larger farms. Regarding the regional level, income losses in the north would be only half as for other regions (see table 9.3).

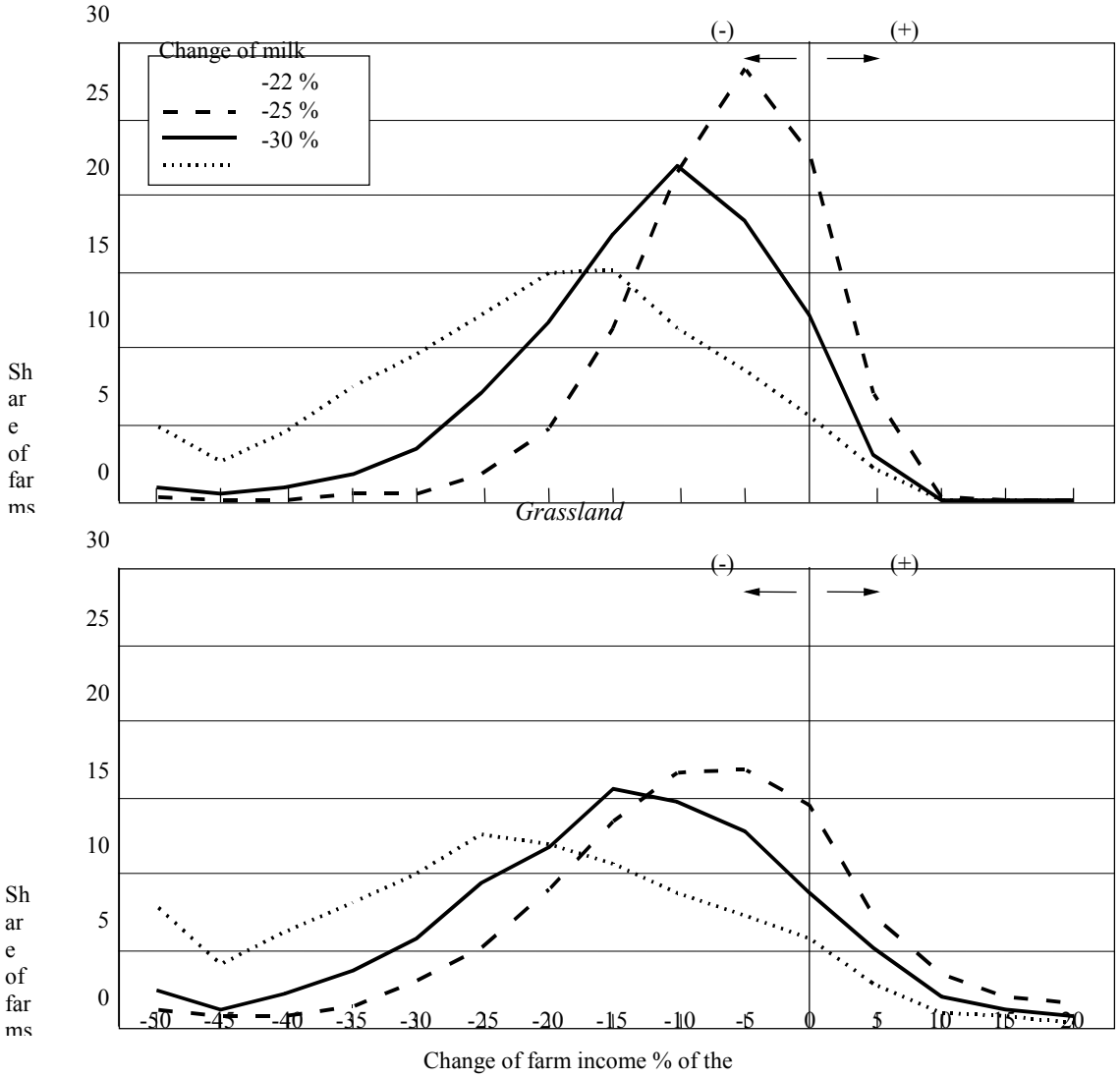
Table 9.3 Regional impacts (milk price -25%)

Region cows in the baseline	Milk premium % of the baseline	Grassland premium % of the baseline
	Change of milk production	
North	12.3	14.5
Centre	3.1	5.9
South	0.4	2.5
East	6.7	13.7
	Change of farm income (without quota costs in the baseline)	
North	-4.1	-6.4
Centre	-10.2	-3.1
South	-11.5	-18.9
East	-9.0	-2.0

Source: FARMIS, Offermann/Bertelsmeier FAL-BAL (2001).

Besides these average figures the abandoning of the quota scheme induces significant distribution effects in incomes. There are some winners, but many losers especially for higher prices decreases (see figure 9.2, considering the non-weighted results of BEMO). Referring to *milk premia* most farms would have income effects among +5% and -20% with low milk price changes. High milk price changes would induce drastic income reductions.

Distribution effects are more pronounced for *grassland premia* due to the fact that a) they are not as closely coupled to production and b) the total volume of milk and beef premia is transformed into uniform grassland premia. Farms with a high milk production per hectare will have greater income losses than rather extensive farms. Distribution effects could be reduced, if the grassland premium would be regionally differentiated. The regional differentiation has no significant supply effects but would induce lower distribution effects on incomes.



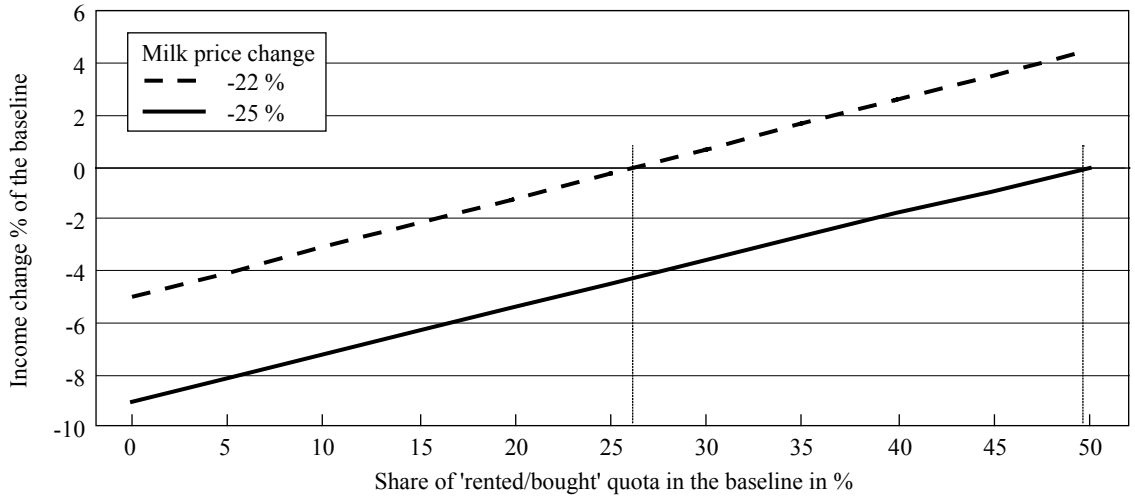
Source: BEMO, Kleinhanß FAL-BAL

Figure 9.2 Distribution of income changes (whithout quota costs in the baseline)

9.4 Income effects including savings of quota costs

Besides the analysis of specific scenario conditions the representative farm model is used to deal with quota costs and to determine distribution effects between former owners and user of the milk quota. Quota costs are not included in the farm models because of missing data in the farm accounts. On the other hand, saving from quota costs is an important point for a phasing out of milk quota:

- about half of quota were transferred from former owner to milk producer;
- quota costs are quite high (0.5 to 1 €/kg).



Source: BEMO, Offermann FAL-BAL (2001).

Figure 9.3 Income changes including quota costs in the baseline - Milk premium - Average of all dairy farms

Calculations are carried out in the following way:

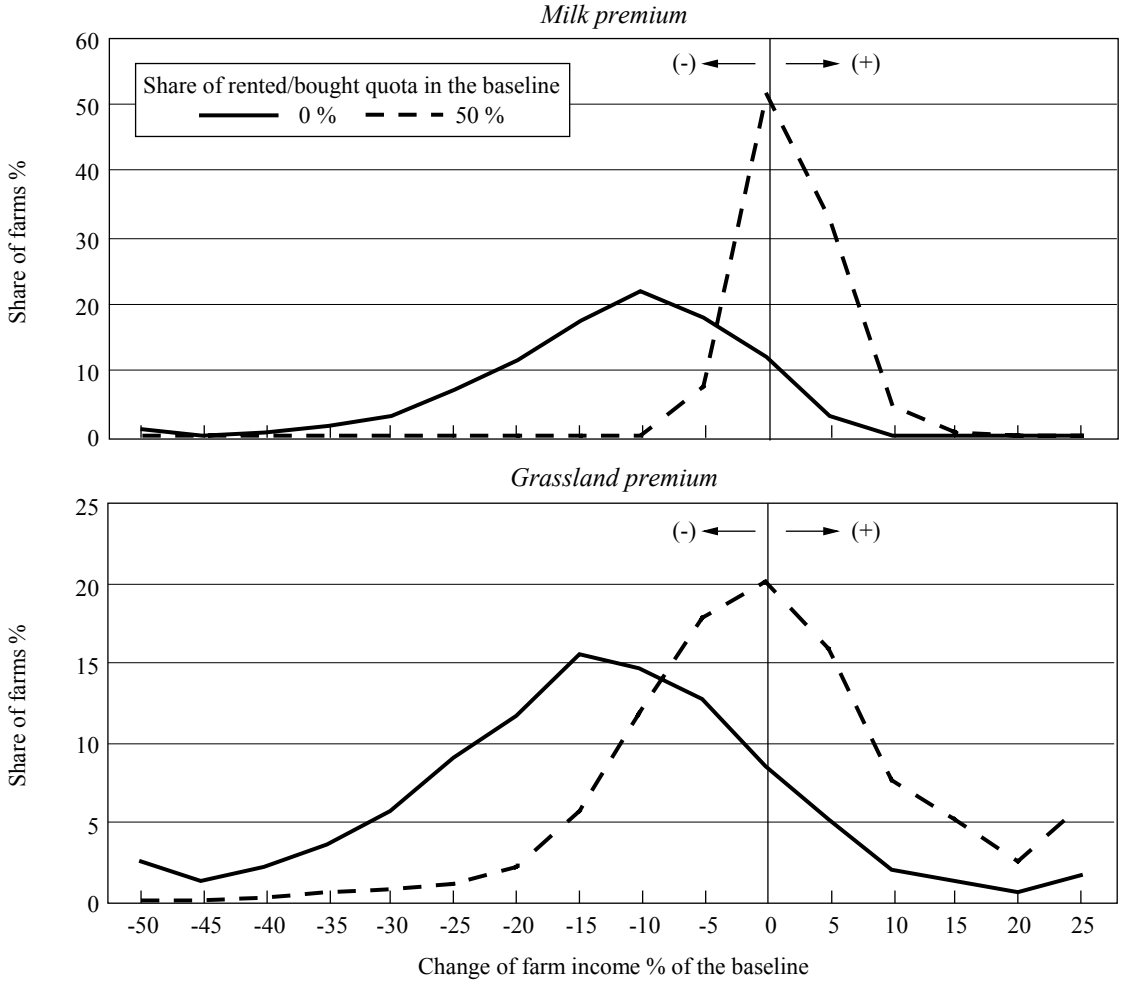
a) equilibrium prices of milk quota (lease) are calculated with the representative farm model neglecting existing regional restrictions on quota trade; equilibrium price at the final stage of Agenda 2000 is 5 cents/kg;
b) saving of quota costs are calculated assuming different shares of leased quota for all farms (various shares between farm size and regions are not taken into account);
c) to differentiate income effects between former lessors and tenants of quota income effects are calculated for both groups with and without milk quota.

The calculations are carried out for the scenario milk premiums. Figure 9.3 shows, that positive income effects can be expected with shares of rented quota:

- >25% with milk price changes of -22%;
- >50% with milk price changes of -25%.

Figure 9.4 shows the frequency distributions of income effects for both scenarios with shares of 0% respectively 50% quota rented, assuming milk price reductions of 25%. With increasing shares of the rented quota the frequency distribution becomes more tight and is shifted towards positive income effects. A significant difference exists between the two premium systems:

- in the case of milk premiums the majority of farms would have income effects between ±5%;
- in the case of grassland premiums about 40% of the farms would have income reductions greater than 5% even if half of quotas are rented. On the other side there is a considerable share of winners. Distribution effects of grassland premiums are thus not substantially reduced even with high shares of formerly rented quota.



Source: BEMO, Kleinhanß FAL-BAL (2001).

Figure 9.4 Distribution of income changes - including quota costs in the baseline (milk price -25%)

Distribution effects between former quota lessors and tenants

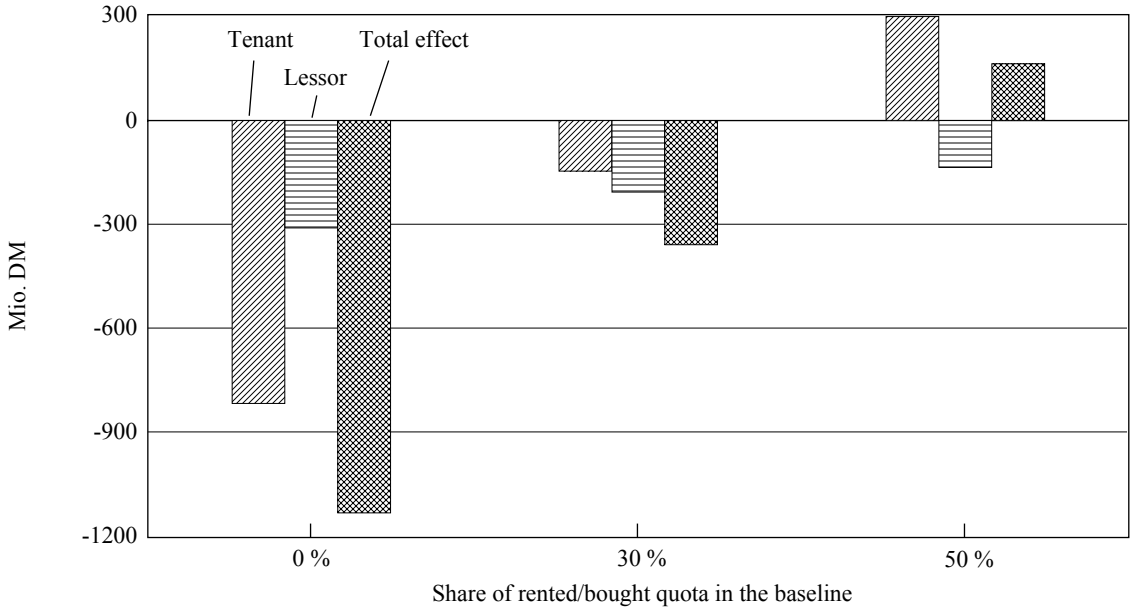
With the underlying modelling approach we can also differentiate the income effects between former lessors and tenants of the milk quota. Compared to the reference (including quota trade) the total of income losses would be about 1.1 billion DM, if savings of quota costs are not taken into account (milk price -22%). About 0.8 billion DM remain to the user and 0.3 billion DM to the former lessors of quota. For shares of 50% of quota rented positive income effects of 0.15 billion DM remains, which is composed by income losses of 0.14 billion DM of former lessors and 0.3 billion DM higher incomes for the user of quota. Winners of an exit of the milk quota regulation are farms growing in the past by quota lease while the lessors will lose due to the devaluation of the milk quota.

The exit from the milk quota regulation has therefore the following advantages:

- farm growth can be achieved without the acquisition of production rights; this reduces the costs and creates also better planning security;

- the regional restrictions for quota trade will no longer be in effect such that milk production will move towards the most favourable regions and effective farmers. Thus efficiency reserves can be mobilised.

For quotas already acquired no direct savings can be realised. To relieve active producers of the quota costs, an early announcement of the elimation of the quota scheme is therefore essential to prevent high purchase prices.



Source: BEMO, Kleinhanß FAL-BAL (2001).

Figure 9.5 Distribution of income effects between former tenants and lessors of quota (milk price -22%)

9.5 Summary and conclusions

The Agenda 2000 provides for a revision of the milk market regulations within the framework of the mid term-review. On the base of the model calculations, the following conclusions can be drawn:

1. The abolishment of the milk quota seems feasible, provided that the general conditions are set accordingly:
   - early announcement and preparation of the abolishment of the quota by implementing a transitional period of several years (earlier implementation of the milk market reform than planned under Agenda 2000, continuation and modification of the respective policy instruments);
   - devaluation of the quota by reducing support price levels;
   - de-coupling of transfer payments from production as far as possible.

2. Premia schemes, which are related to the production volume and which mainly focus on the compensation of income losses as compared to the previous agricultural policy, has to be restricted to a transitional period. Partly de-coupled systems by the way of grassland premia possess certain advantages.
3. The results indicate that milk production will increase up to 10%, depending on price changes and the level of direct payments. For more de-coupled premia (i.e. grassland premia), a higher reduction of beef production is to be expected, which in turn will affect beef prices.
4. Income losses at sector level can be expected if reductions in quota costs are not taken into account. Regarding the high share of rented/bought quota of about 50% in Germany, the exit of the quota regime will lead to positive income effects. Income deficits will be incurred by former lessors, e.g. those farmers which under the current milk market regime achieve a higher income by selling or leasing quota than by using the quota themselves.

The abolishment of the milk quota would allow improving the efficiency and the allocation of milk production.

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10. Accounting data as an aid for decision making of Belgian glasshouse managers

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Abstract

According to decision making theory information plays a central role in decision making. Therefore, one would expect a major interest from glasshouse growers for accounting data and other relevant information. However this topic is seldom discussed in the literature and information on the use of accounts by farmers is scarce. The aim of the research is to analyse the use of accounting data for production and investment decisions, as compared to other information sources; to determine the influence of personal characteristics of the firm manager and characteristics of the firm on the use of accounting data and to analyse the relationship between the use of accounting data and innovative behaviour. The results indicate that the average glasshouse grower makes low use of information for decision making. Own accountancy data are quite important for investment decisions in glasshouses and installations. However important differences of information use can be observed among the growers. The importance attached to 'creativity and innovation' is an important determinant of the use of accounting data. Although no significant differences could be found between the group of the 'innovators and early adopters' and the 'majority', the use of accounting data was significantly less important for the 'laggards'.

Keywords: accounting data, decision making, innovation, glasshouse holdings

10.1 Introduction

Since the beginning of the nineties Belgian glasshouse growers are faced with important changes in their competitive environment. Not only the increasing production in the southern countries, but also the relocation of the glasshouses in the Netherlands from the traditional production areas to new locations with a better infrastructure will result in a higher competition on the export markets. Moreover the countervailing power of retailers and the changing consumer preferences will force the Belgian glasshouse growers to change from a production-driven to a customer-driven strategy, with special attention to product innovation, product quality and environmental sound production (Van Lierde et al., 1998, 1999; Ministerie van Middenstand en Landbouw, 2000; Saverwyns et al., 2000a,

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2000b; Taragola and Van Lierde, 2000; Taragola et al., 2000a, 2000b). More than ever, use of information will become a critical factor in this changing competitive environment.

According to decision making theory information plays a central role in decision making. Therefore, one would expect a major interest from glasshouse growers and farmers in general for accounting data and other relevant information. However, according to Poppe (1988, 1991) this topic is seldom discussed in the literature and information on the use of accounts by farmers is scarce. He also states that keeping accounts and using them are two different things. This finding is also confirmed by Ohlmér (2000), who found that farmers are not using accounting data, despite that the data are available.

In the current paper the use of accounting data by the glasshouse managers of the Belgian FADN is analysed. The objective is to find an answer to the following questions:

- what is the relative importance of the use of accounting data, compared to the use of other relevant information sources ?
- what is the influence of personal characteristics of the firm manager and characteristics of the firm on the use of accounting data ?
- is there a relationship between the use of accounting data and innovative behaviour of the glasshouse manager ?

The first part of the paper focuses on the use of information for investment decisions, whereas in the second part attention is given to production decisions.

10.2 Factors influencing the use of information for decision making: theoretical framework

Most research and teaching in the field of farm management focuses on how farmers should make decisions. A standard section in most farm management texts is a list of five to eight decision making steps (Boehlje and Eidman, 1984; Kay and Edwards, 1994). Ohlmér, Olson and Bremer (1998) distinguish four functions or phases in the decision making process: problem detection, problem definition, analysis and choice and implementation. According to Ohlmér (2000) accounting data could provide information for each of the phases.

At this moment there is still a lack of research on how farmers in the 'real world' make decisions. This lack of knowledge about 'how' may be one reason that management information systems are not used by farmers to the extent expected (Taragola et al., 2001).

Several researchers have attempted to uncover relationships between managerial and firm characteristics and the use of information (e.g. Garcia et al., 1983; Driver and Onwona, 1986; Holmes and Nicholls, 1989; Jones et al., 1989; Ford and Babb, 1989; Schnitkey et al., 1992; Ortmann et al., 1993; Lybaert, 1998; Gloy et al., 2000).

Age and education are thought to influence the use of information. These factors are related to a decision maker's ability to create value from the information gathered from different sources. Various research shows that the more the firm manager is educated, the more use is made of information. More specifically, Holmes and Nicholls (1989) found a positive relationship between education and the importance attached to detailed accounting information. The influence of age is not so clear. Schnitkey et al. (1992) argue that age is

related to farming experience and that farmers with more experience should have less demand for information. However, according to Ford and Babb (1989) more experienced farmers relied more on the extension service than younger farmers for information about cropping decisions. Kool, Meulenberg and Broens (1997) found that input suppliers were more likely to have established relationships with older producers. As the Belgian FADN does not have a rotation system (contrary to the Netherlands) the older producers are already member of the FADN for a longer time period than the younger ones. Consequently one can hypothesize that older producers also do have a stronger relationship with their accountant.

According to Gasson and Errington (1993) the presence or absence of a successor may have more influence upon decision making than the farmer's age. One can expect that firm managers with a successor will make more use of information.

According to research in the field of 'objectives, behaviour and decision making', personal objectives can be important in explaining behaviour of the firm manager. Expressive objectives consist of ambition, achievement, self development, ... and are expected to be positively related to the use of information.

Based on sociological literature (e.g. Gasson and Errington, 1993), one can assume that firm managers who attach a great importance to the 'lifestyle' or intrinsic aspects such as independence, working with plants, ... will think in a traditional way and do not attach a high importance to information.

Firm managers attaching a high value to instrumental objectives see their business as an instrument to obtain a high income or status. According to innovation diffusion theory (Rogers, 1995) status motivation can play a role for adoption of innovations, especially for new investments. However one can assume that in this case the use of information will be low.

A reason why firm size might be related to the use of information is that large firms should be able to derive a greater benefit from the use of information. Most of the researchers found that firm size was positively related to the use of information (e.g. Ford and Babb, 1989; Jones et al., 1989; Schnitkey et al., 1992; Ortmann et al., 1993). Holmes and Nicholls (1989) have shown that growing and/or larger firms gather more detailed accounting information than stagnating and/or smaller firms.

One can expect that differences in the use of information will exist among the growers of glasshouse vegetables and the growers of ornamental plants. The sector of glasshouse vegetables is characterized by a co-operative commercialisation structure (auctions), with a great number of producers per product (homogeneous production), stimulating an open structure of knowledge exchange. The sector of ornamental plants on the other hand is characterized by individual commercialisation and a small number of producers per product (heterogeneous production), resulting in a closed structure of knowledge exchange (Vijverberg, 1996). With respect to accounting data, one can hypothesize that it is more useful to compare accounting data in a more homogeneous sector.

Based on the innovation diffusion theory (Rogers, 1995) one can hypothesize that growers who attach a high importance to the objective 'creativity and innovation' will make more use of information. This finding was confirmed by Jones et al. (1989).

According to research in small and medium sized enterprises the business objective 'growth' will have a positive influence on the use of information, whereas 'stabilisation' will have negative influence (Donckels AND Lambrecht, 1995, 1997; Lybaert, 1998).

10.3 Data collection

The data of the research are obtained from a representative sample of 148 glasshouse holdings belonging to the FADN (Farm Accountancy Data Network) of the C.L.E. (Centrum voor Landbouweconomie - Centre of Agricultural Economics). The sample consists of 89 holdings specialised in production of ornamental plants and 59 specialised vegetable producers. Data on objectives and several management aspects were obtained from personal interviews performed during the first half of 1999 using a pre-tested questionnaire (Taragola, 1999).

The respondents were asked to rate on a five-point Likert-type scale how often they make use of several information sources for strategic and tactical decision making. Among the different information sources attention was paid to the use of own accountancy data and average accountancy data calculated by the C.L.E. The strategic decisions concerned were the decision to invest in glasshouses and installations and the decision to invest in machinery. For tactical decision making the use of information sources for production decisions (choice of cultivation plan) was analysed.

In addition to the personal interviews at the glasshouse holdings, in the year 2000 a workshop was organised with the accountants of the C.L.E. During this workshop the glasshouse holdings were classified according to their degree of product innovation on the one hand, and according to their degree of process innovation on the other hand.

10.4 Use of accounting data and other information for investment decisions

10.4.1 Importance of different information sources

Table 10.1 shows the distribution of the ratings, the mean and the standard deviation of the different sources of information for investments in glasshouses and installations. In table 10.2 these statistics are presented for investments in machinery.

For investments in glasshouses and installations the most important sources of information are the partner (4,59), own farm accountancy data (3,14), trade fairs and demonstrations (3,12), horticultural magazines (3,05), the fiscal accountant (2,98), the bank (2,77), publications of suppliers (2,70) and family members (2,57). An average score of less than 2.5 was obtained for colleagues glasshouse growers (2,39), research institutes (2,39), consultants (2,37), the accountant of the C.L.E. (2,30), public servants (2,30), publications from government (1,74), publications from the bank (1,70) and colleagues from other sectors (1,26).

The most important sources of information for investments in machinery are the partner (4,35), trade fairs and demonstrations (3,27), publications of suppliers (2,91), horticultural magazines (2,80), colleagues glasshouse growers (2,76) and family members

(2,51). Low average scores were found for the own farm accountancy data (2,31), the fiscal accountant (2,24), consultants (2,03), the bank (2,00), the accountant of the C.L.E. (1,76), publications from the government (1,51), publications from the bank (1,29) and colleagues from other sectors (1,23).

One can conclude that the average glasshouse grower makes low use of information for investment decisions, especially for investments in machinery. Own farm accountancy data are quite important for investment decisions in glasshouses and installations. Although the standard deviations indicate that an important variation can be observed among the growers.

10.4.2 Factors influencing the use of accounting data

In table 10.3 the influence of firm manager and firm related characteristics on the use of the own accountancy data for investment decisions is presented. The relationship between producers' ratings of the use of their accountancy data and the factors that influence these ratings were examined with logistic regression models, allowing to test the 'ex ante' hypotheses.

The use of the own accountancy data is quite important for investments in glasshouses and installations. 45.3% of the respondents makes often to always use of these data. The logistic regression on the left side of table 10.3 gives an estimation of the influence of the different variables on the probability that the producer makes often to always use of his/her accounting data. Overall, the goodness-of-fit measures indicate that the model fits the data well. The estimated model correctly classified 67.6% of the respondents. The results reveal that a significant positive effect can be detected of the importance attached to the business objectives 'creativity and innovation' ($p = 0.02$) and 'growth' (0.04). The probability to make use of the own accountancy data decreases for growers older than 50 years without a successor ($p = 0.07$). For the other variables no statistically significant effects were found.

For investments in machinery the use of own accountancy data seems to be lower. Only 22.3% of the respondents makes often to always use of these data whereas 19.6% makes regular use of these data and 59% never or seldom uses them. The logistic regression on the right side of table 10.3 gives an estimation of the influence of the different variables on the probability that the producer makes regularly to always use of his/her accounting data. Overall, the goodness-of-fit measures indicate that the model fits the data well. The estimated model correctly classified 64.8% of the respondents. The importance attached to the objective 'creativity and innovation' seems to have a highly significant effect (0.02). Here again, the probability to make use of the own accountancy data decreases for growers older than 50 years without a successor ($p = 0.10$).

An interesting finding is that the importance attached to 'creativity and innovation' is highly significant. This variable was also highly significant in the logistic regression models estimated for the other information sources.

Table 10.1 Use of information sources for investments in glasshouses and installations at Belgian glasshouse holdings (percent of respondents - mean - standard deviation) (n = 148)

	1 never (%)	2 seldom (%)	3 regular (%)	4 often (%)	5 always (%)	mean	Stand. dev.
Interpersonal information sources							
- partner (n=140)	5.7	1.4	4.3	5.0	83.6	4.59	1.05
- family members	49.3	5.4	11.5	6.1	27.7	2.57	1.74
- fiscal accountant	30.4	10.1	18.2	13.5	27.7	2.98	1.61
- accountant C.L.E.	47.3	14.9	14.2	8.1	15.5	2.30	1.51
- bank	38.5	11.5	12.8	8.8	28.4	2.77	1.69
- consultants	51.4	9.5	6.8	16.2	16.2	2.37	1.60
- colleagues glasshouse growers	32.4	23.6	23.6	13.5	6.8	2.39	1.25
- colleagues other sectors	83.4	10.8	4.1	1.4	0.7	1.26	0.66
- public servants	47.3	16.9	10.8	8.1	16.9	2.30	1.53
Written and other mass media information sources							
- own farm accountancy data	25.7	10.8	18.2	14.9	30.4	3.14	1.58
- horticultural magazines	20.3	14.2	24.3	23.0	18.2	3.05	1.39
- publications government	60.1	18.2	11.5	7.4	2.7	1.74	1.10
- publications bank	62.2	18.2	10.8	5.4	3.4	1.70	1.08
- publications suppliers	36.5	12.2	15.5	16.9	18.9	2.70	1.56
- trade fairs and demonstrations	16.9	14.9	28.4	18.9	20.9	3.12	1.36
- research institutes	39.2	20.3	14.9	16.2	9.5	2.39	1.39

Table 10.2 Use of information sources for investments in machinery at Belgian glasshouse holdings (percent of respondents - mean - standard deviation) (n=148)

	1 never (%)	2 seldom (%)	3 regular (%)	4 often (%)	5 always (%)	mean	Stand. dev.
Interpersonal information sources							
- partner (n=140)	10.0	2.9	5.7	5.0	76.4	4.35	1.31
- family members	49.3	8.1	9.5	8.1	25.0	2.51	1.71
- fiscal accountant	52.0	12.8	11.5	6.8	16.9	2.24	1.55
- accountant C.L.E.	66.9	11.5	8.8	4.1	8.8	1.76	1.29
- bank	62.8	10.1	6.8	5.4	14.9	2.00	1.51
- consultants	56.8	11.5	13.5	8.8	9.5	2.03	1.39
- colleagues glasshouse growers	24.3	14.9	31.8	18.9	10.1	2.76	1.29
- colleagues other sectors	86.5	7.4	3.4	2.0	0.7	1.23	0.67
Written and other mass media information sources							
- own farm accountancy data	48.0	10.1	19.6	7.4	14.9	2.31	1.49
- horticultural magazines	25.7	19.6	20.9	16.9	16.9	2.80	1.43
- publications government	71.6	14.2	8.1	3.4	2.7	1.51	0.97
- publications bank	84.5	8.8	3.4	1.4	2.0	1.29	0.77
- publications suppliers	29.7	8.8	21.6	20.9	18.9	2.91	1.50
- trade fairs and demonstrations	16.9	14.9	15.5	29.7	23.0	3.27	1.41

Table 10.3 Influence of firm manager and firm related characteristics on the use of accounting data for investment decisions at Belgian glasshouse holdings

Variable	Own accounting data for investments in glasshouses and installations			Own accounting data for investments in machinery		
	estimate (st. err.)	prob-ability (p)	exp (β)	estimate (st.err.)	prob-ability (p)	exp (β)
Intercept	0.25 (0.81)	0.76		-0.11 (0.77)	0.06	
PERSONAL CHARACTERISTICS						
- AGE (dummy)						
age 2 (36-50)	-0.72 (0.64)	0.26	0.49	-0.15 (0.60)	0.80	0.86
age 3 (>= 50 without successor)	-1.70 (0.93)	*0.07*	0.18	-1.68 (1.02)	0.10	0.19
age 4 (>= 50 with successor)	-0.69 (0.70)	0.32	0.50	-0.52 (0.66)	0.43	0.60
- EDUCATION LEVEL (dummy)						
education 2 (lower secondary)	0.01 (0.43)	0.99	1.01	0.13 (0.45)	0.77	1.14
education 3 (higher sec. & higher)	-0.60 (0.60)	0.32	0.55	0.13 (0.58)	0.83	1.13
- PERSONAL OBJECTIVES (factor scores)						
expressive objectives	-0.01 (0.22)	0.95	0.99	-0.22 (0.20)	0.27	0.80
intrinsic objectives	-0.26 (0.21)	0.22	0.77	-0.07 (0.21)	0.72	0.93
instrumental objectives	0.32 (0.20)	0.11	1.38	0.23 (0.20)	0.24	1.26
FIRM CHARACTERISTICS						
- ECONOMIC DIMENSION						
economic dimension 2	0.38 (0.53)	0.47	1.47	-0.80 (0.54)	0.14	0.45
economic dimension 3	0.38 (0.53)	0.47	1.47	0.33 (0.53)	0.52	1.40
economic dimension 4	0.39 (0.58)	0.50	1.47	-0.11 (0.57)	0.85	0.90
- FIRM TYPE (dummy)						
type vegetables	0.19 (0.41)	0.63	1.21	0.35 (0.41)	0.40	1.41
- BUSINESS OBJECTIVES (factor scores)						
creativity and innovation	0.51 (0.21)	*0.02*	1.67	0.52 (0.22)	*0.02*	1.67
growth	0.47 (0.23)	*0.04*	1.61	0.20 (0.22)	0.37	1.22
stabilisation	0.23 (0.21)	0.29	1.25	-0.14 (0.21)	0.50	0.87
	-2LogLL = 173.76; X^2 = 26.42; p = *0.03* Member pred. rate = 61.2% Non memb. pred. rate = 73.1% Overall pred. rate = 67.6%			-2LogLL = 173.22; X^2 = 23.46; p = *0.07* Member pred. rate = 53.3% Non memb. pred. rate = 72.9% Overall pred. rate = 64.8%		

10.4.3 Use of information and process innovation

During the workshop with the accountants of the C.L.E. the glasshouse holdings were classified according to their degree of process innovation. 21, or 14% of the glasshouse growers were attributed to the group of the 'innovators and early adopters' (group 1); 61, or

41% to the group of the 'majority' (group 2) and 66, or 45% to the group of the 'laggards' (group 3).

The influence of the use of the different information sources on the membership of these 'process innovation groups', is analysed by means of 'multiple group' discriminant analysis. As some of the glasshouse growers do not have a partner or family members who are working in the business it was decided to exclude these information sources from the analysis. For the analysis the sample is divided into two parts. One part of the sample (the 'analysis sample') is used for estimation of the discriminant function. The other part (the 'holdout' or 'validation sample') has been reserved for validating the discriminant function. Two thirds of the observations serve as the analysis sample, and the other third is used for validation. The distribution of the number of cases in the analysis and validation sample is equal to the distribution in the total sample. The results are presented in table 10.4. The probability of the univariate F ratios indicates that when the predictors are considered individually, the use of information from the fiscal accountant ($p = 0,01$), colleagues from other sectors ($p = 0,02$), own farm accountancy data ($p = 0,04$) and horticultural magazines ($p = 0,03$) for investments in glasshouses and installations and the use of information from colleagues glasshouse growers ($p = 0,00$), colleagues from other sectors ($p = 0,03$), horticultural magazines ($p = 0,03$) and trade fairs and demonstrations ($p = 0,04$) for investments in machinery significantly contribute to the differentiation between the groups. Also publications from government ($p = 0,06$) and research institutes ($p = 0,09$) seem to contribute to differences between the groups. Two discriminant functions are estimated. The eigenvalue associated with the first function is 0.89 and this function accounts for 65.6% of the explained variance. The second function has an eigenvalue of 0.46 and accounts for 34.4% of the explained variance. The value of Wilks's λ is 0.36 with 52 degrees of freedom. This transforms to a chi-square of 84.73, which is significant ($p = 0,003$). Thus, the two functions together significantly discriminate among the three groups. The interpretation of the results is aided by an examination of the standardized discriminant function coefficients and the structure matrix of pooled within-groups correlations between the discriminating variables and the canonical discriminant functions. Variables with correlation coefficients which are larger for function 1 than for function 2 are shown with asterisks, and vice versa.

The correlation coefficients for function 1 indicate large coefficients for the use of information from the fiscal accountant (0,32), colleagues from other sectors (0,30), publications from government (0,26) and research institutes (0,24) for investments in glasshouses and installations, and the use of information from colleagues glasshouse growers (0,38), colleagues from other sectors (0,30) and trade fairs and demonstrations (0,28) for investments in machinery. For function 2 large correlation coefficients are found for the use of own farm accountancy data (0,38) and horticultural magazines (0,31) for investments in glasshouses and installations and the use of horticultural magazines (0,36), own farm accountancy data (0,30) and publications from government (0,25) for investments in machinery. Function 1 tends to separate group 1 (highest value) from the groups 2 and 3 (lowest value). Function 2 separates group 2 (highest value) from group 3 (lowest value).

For these information sources the standardized canonical discriminant function coefficients reveal that membership of group 1 is positively associated with use of information from the fiscal accountant, colleagues from other sectors, publications from government and research institutes for investments in glasshouses and installations and the use of in-

Table 10.4 Use of information sources by glasshouse growers according to 'process innovation group' membership (three group discriminant analysis)

	Univariate F-ratio		Standardized canonical discriminant function coefficients		Structure matrix correlation coefficients	
	F-ratio	probability	function 1	function 2	function 1	function 2
Investments in glasshouses and installations						
Interpersonal information sources						
- fiscal accountant	5.39	*0.01*	0.48	0.54	0.32*)	0.22
- accountant C.L.E.	0.01	0.99	-0.07	-0.36	0.01	0.02*)
- bank	0.52	0.59	0.31	-0.38	0.10*)	0.07
- consultants	1.63	0.20	0.20	0.37	0.19*)	0.08
- colleagues glasshouse growers	1.67	0.20	0.09	0.01	0.17*)	0.13
- colleagues other sectors	3.91	*0.02*	0.04	0.22	0.30*)	0.04
- governmental services	1.51	0.23	-0.23	-0.05	0.17*)	0.10
Written and/or mass media information sources						
- own farm accountancy data	3.37	*0.04*	0.04	0.48	0.06	0.38*)
- horticultural magazines	3.54	*0.03*	0.29	0.05	0.18	0.31*)
- publications government	2.90	*0.06*	0.24	-0.74	0.26*)	0.06
- publications banks	1.90	0.16	0.21	-0.21	0.18*)	0.16
- publications suppliers	0.63	0.54	-0.18	0.15	-0.06	0.14*)
- trade fairs, demonstrations	0.63	0.53	-0.86	0.49	0.03	0.16*)
- research institutes	2.48	*0.09*	0.42	-0.40	0.24*)	0.07
Investments in machinery						
Interpersonal information sources						
- fiscal accountant	0.10	0.91	0.00	-0.35	-0.01	0.06*)
- accountant C.L.E.	0.03	0.97	0.10	-0.27	-0.02*)	0.02
- bank	0.92	0.40	-0.88	-0.13	-0.14*)	0.05
- consultants	1.381	0.26	-0.04	-0.33	0.18*)	0.06
- colleagues glasshouse growers	7.16	*0.00*	0.22	0.52	0.38*)	0.22
- colleagues other sectors	3.72	*0.03*	0.39	0.13	0.30*)	-0.04
Written and/or mass media information sources						
- own farm accountancy data	2.35	0.10	-0.09	0.56	-0.09	0.30*)
- horticultural magazines	3.49	*0.03*	-0.37	0.67	0.11	0.36*)
- publications government	2.83	*0.06*	0.44	0.61	0.18	0.25*)
- publications banks	0.43	0.65	-0.53	0.22	-0.04	0.13*)
- publications suppliers	1.35	0.27	-0.21	0.30	0.12	0.19*)
- trade fairs, demonstrations	3.32	*0.04*	0.71	-1.01	0.28*)	0.04

formation from colleagues glasshouse growers, colleagues from other sectors and trade fairs and demonstrations for investments in machinery. Membership of group 3 is negatively associated with the use of own farm accountancy data and horticultural magazines for investments in glasshouses and installations and the use of horticultural magazines, own farm accountancy data and publications from government for investments in machinery. The classification results based on the analysis sample indicate that 75.8% of the cases are correctly classified. When the classification analysis is conducted on the independent holdout sample a hit ratio of 42.6% is obtained. By chance alone one would expect a hit ratio of one third or 33.3% (given three groups of equal size).

One can conclude that the use of the own farm accountancy data is significantly less important for the 'laggards' than for the other 'process innovation' groups. However the use of the own accountancy data does not seem to discriminate the group of 'innovators and early adopters' from the 'majority'.

10.5 Use of accounting data and other information for production decisions

10.5.1 Importance of different information sources

Table 10.5 shows the distribution of the ratings, the mean and the standard deviation of the different sources of information. The most important sources of information are the partner

Table 10.5 Use of information sources for production decisions at Belgian glasshouse holdings (percent of respondents - mean - standard deviation)(n=148)

	1 never (%)	2 seldom (%)	3 regular (%)	4 often (%)	5 always (%)	mean	Stand. dev.
Interpersonal information sources							
- partner (n=140)	16.7	2.2	6.5	4.3	70.3	4.40	1.31
- family members	54.7	6.1	7.4	6.1	25.7	2.42	1.74
- fiscal accountant	92.6	4.7	1.4	0.7	0.7	1.12	0.51
- accountant C.L.E.	79.1	6.1	8.8	2.7	3.4	1.45	1.00
- consultants	39.9	12.2	17.6	10.1	20.3	2.59	1.57
- colleagues glasshouse growers	45.9	18.9	20.3	11.5	3.4	2.07	1.20
- auction	61.5	16.2	8.1	9.5	4.7	1.80	1.21
- traders	52.7	11.5	15.5	11.5	8.8	2.12	1.39
- suppliers plants and seeds	29.7	14.2	18.9	16.2	20.9	2.85	1.52
Written and other mass media information sources							
- own farm accountancy data	24.3	4.7	9.5	14.2	47.3	3.55	1.66
- data of consultants	43.2	10.8	14.9	14.2	16.9	2.51	1.56
- average accounting data C.L.E.	31.1	20.9	18.9	10.8	18.2	2.64	1.48
- publications research institutes	44.6	19.6	14.9	9.5	11.5	2.24	1.40
- data in horticultural magazines	34.5	18.9	18.9	15.5	12.2	2.52	1.41
- demonstrations experimental stations	41.9	21.6	16.2	9.5	10.8	2.26	1.37

(4,40), own farm accountancy data (3,55), suppliers of plants (2,85), average accounting data of the C.L.E. (2,64), consultants (2,59), horticultural magazines (2,52) and data of consultants (2,51). An average score lower than 2.5 was obtained for the family members (2,42), demonstrations in experimental stations (2,26), publications of research institutes (2,24), traders (2,12), colleagues glasshouse growers (2,07), auction (1,80), the accountant of the C.L.E. (1,45) and the fiscal accountant (1,12). From the results one can conclude that also for production decisions the average Belgian glasshouse grower makes low use of information. Own farm accountancy data and average accounting data are quite important. However, the standard deviations indicate an important variation in information use among the growers.

10.5.2 Factors influencing the use of accounting data

In table 10.6 the influence of firm manager and firm related characteristics on the use of accounting data for production decisions is presented. The use of the own accountancy data seems to be quite important for the majority of the growers. 61.5% of the respondents makes often to always use of these data. The logistic regression on the left side of the table examines the relationship between producers' ratings of the use of their own accountancy data and the factors that influence these ratings, permitting to test the 'ex ante' hypotheses. The results are presented corresponding to the natural logarithm of the cumulative odds that a producer rated the use of this information source as often to always as opposed to never, seldom or regular. Overall, the goodness-of-fit measures indicate that the model fits the data well. The estimated model correctly classified 65.5% of the respondents. The results reveal that a significant positive effect can be observed for 'expressive objectives' ($p = 0,04$) and the business objectives 'creativity and innovation' ($p = 0,03$) and 'growth' ($p = 0,05$). As expected, a negative effect was detected for the importance attached to the business objective 'stabilisation' ($p = 0,09$).

Besides their own accountancy data every year the participating growers receive a confidential publication with individual anonymous results and averages of the other growers with the same firm type. Only 29% of the respondents makes often to always use of these data; 18.9% uses them regularly and 52% never or seldom uses them. The logistic regression on the right side of table 10.6 gives an estimation of the influence of the different variables on the probability that the producers make regularly to always use of the average accounting data of the C.L.E., as opposed to the probability that they never or seldom use them. Overall, the goodness-of-fit measures indicate that the model fits the data well. The estimated model correctly classified 69.2% of the respondents. Here again, the importance attached to the objective 'creativity and innovation' seems to have a highly significant effect ($p =0,00$). An interesting finding is that the importance attached to 'expressive objectives' is having a highly significant but negative effect. During the interviews it became clear that the ambitious growers (who want to be better than their colleagues) do not find it very useful to use information from the less ambitious growers being part of the sample of the FADN. They prefer to use other and more specialised information. Positive effects ($p = 0,08$) are also observed for age class 2 (36-50) compared to age class 1 (<36), economic dimension class 2 compared to economic dimension class 1 and the business objective 'growth'.

It appears that the 'moderate' but growth-oriented growers are attaching the highest value to the average accounting data calculated by the C.L.E. for production decisions. This finding is in line with the results of a survey of small businesses in the U.S. regarding their accountant's services (Dunn et al., 2000). The authors of this study emphasize that for an accounting firm to be a full service advisor it is essential to create alliances with experts and specialists outside the profession and make referrals when needed. These professionals can provide solutions to problems identified by the accountant.

Table 10.6 Influence of firm manager and firm related characteristics on the use of accounting data for decision making at Belgian glasshouse holdings

Variable	Own accounting data for production decisions			Own accounting data C.L.E. for production decisions		
	estimate (st. err.)	prob-ability (p)	exp (β)	estimate (st.err.)	prob-ability (p)	exp (β)
Intercept	-0.31 (0.82)	0.70		-1.39 (0.90)	0,12	
PERSONAL CHARACTERISTICS						
- AGE (dummy)						
age 2 (36-50)	1.04 (0.69)	0.13	2.84	1.26 (0.71)	*0.08*	0.65
age 3 (>= 50 without successor)	0.84 (0.74)	0.26	2.32	0.29 (0.47)	0.84	0.84
age 4 (>= 50 with successor)	0.33 (0.93)	0.72	1.39	-0.21 (0.76)	0.78	0.84
- EDUCATION LEVEL (dummy)						
education 2 (lower secondary)	-0.21 (0.44)	0.63	0.81	-0.42 (0.48)	0.39	3.98
education 3 (higher sec. & higher)	0.79 (0.67)	0.24	2.20	-0.25 (0.62)	0.69	1.23
- PERSONAL OBJECTIVES (factor scores)						
expressive objectives	0.41 (0.20)	*0.04*	1.50	-0.54 (0.22)	*0.01*	1.20
intrinsic objectives	0.19 (0.21)	0.37	1.21	0.04 (0.22)	0.85	1.90
FIRM CHARACTERISTICS						
- ECONOMIC DIMENSION						
economic dimension 2	0.12 (0.53)	0.82	1.13	0.91 (0.52)	*0.08*	1.71
economic dimension 3	0.27 (0.56)	0.63	1.31	0.28 (0.52)	0.60	1.71
economic dimension 4	-0.26 (0.59)	0.67	0.77	-0.33 (0.58)	0.57	1.78
- FIRM TYPE (dummy)						
type vegetables	0.06 (0.42)	0.89	1.06	0.46 (0.41)	0.26	7.15
- BUSINESS OBJECTIVES (factor scores)						
creativity and innovation	0.48 (0.21)	*0.03*	1.62	0.85 (0.26)	*0.00*	1.74
growth	0.45 (0.23)	*0.05*	1.56	0.39 (0.22)	0.08	0.84
stabilisation	-0.37 (0.22)	*0.09*	0.69	-0.24 (0.21)	0.25	0.76
	-2LogLL = 164.53; X^2 = 27.95; p = *0.01* Member pred. rate = 80.0% Non memb. pred. rate = 41.8% Overall pred. rate = 65.5%			-2LogLL = 169.35; X^2 = 32.94; p = *0.00* Member pred. rate = 74.7% Non memb. pred. rate = 64.0% Overall pred. rate = 69.2%		

10.5.3 Use of information and product innovation

During the workshop with the accountants of the C.L.E. the glasshouse holdings were classified according to their degree of product innovation. 14% of the vegetable growers and 19% of the growers of ornamental plants were attributed to the group of the 'innovators and early adopters' (group 1); 51% of the vegetable growers and 38% of the growers of ornamental plants were attributed to the group of the 'majority' (group 2) and 35% of the vegetable growers and 43% of the growers of ornamental plants were attributed to the group of the 'laggards' (group 3).

The influence of the use of the different information sources on membership of the 'product innovation groups', as determined during the workshop, is analysed by means of 'multiple group' discriminant analysis. As the commercialisation channels and the knowledge structure with respect to product information is different for both sectors it was decided to make a separate analysis for the sector of the glasshouse vegetables and the sector of the ornamental plants.

The results for the vegetable growers are presented in table 10.7. The probability of the univariate F ratios indicates that when the predictors are considered individually, colleagues growers ($p = 0,00$), own accounting data ($p = 0,01$), average accounting data C.L.E. ($p = 0,04$) and consultants ($p = 0,04$) significantly contribute to the differentiation between the groups. Also data of consultants ($p = 0,06$) and horticultural magazines ($p = 0,06$) seem to contribute to the differentiation between the groups. Two discriminant functions are estimated. The eigenvalue associated with the first function is 0.71, and this function accounts for 76.8% of the explained variance. The second function has an eigenvalue of 0.21 and accounts for 23.2% of the explained variance. The value of Wilks's λ is 0.48 with 24 degrees of freedom, which is significant ($p = 0,045$). Thus, the two functions together significantly discriminate among the three groups. The interpretation of the results is aided by an examination of the standardized discriminant function coefficients and the structure matrix of pooled within-groups correlations between the discriminating variables and the canonical discriminant functions. Variables with correlation coefficients which are larger for function 1 than for function 2 are shown with asterisks, and vice versa.

The correlation coefficients indicate large coefficients for colleagues glasshouse growers (0,58), own farm accountancy data (0,53), consultants (0,41), average accounting data of the C.L.E. (0,38), publications of research institutes (0,38), horticultural magazines (0,30), demonstrations in experimental stations (0,29) and the accountant of the C.L.E. (0,25) on function 1; whereas function 2 has relatively larger coefficients for traders (-0,49), colleagues glasshouse growers (-0,29) and average accounting data of the C.L.E. (0,27). Function 1 tends to separate the groups 1 and 2 (highest value) from group 3 (lowest value). Function 2 separates group 2 (highest value) from group 1 (lowest value).

For these information sources the standardized canonical discriminant function coefficients reveal that membership of the groups 1 and 2 is positively associated with use of information of colleagues glasshouse growers, own farm accountancy data, consultants, average accounting data of the C.L.E., publications of research institutes, horticultural magazines, demonstrations of experimental stations and accountants of the C.L.E. Membership of group 1 is positively associated with use of information from traders and colleagues glasshouse growers. The classification results indicate that 76.3% of the cases

are correctly classified. One can conclude that personal as well as mass communication information sources are significantly less important for the 'laggards'. However a significant higher use of information from traders and colleagues glasshouse growers was observed in group 1. The importance of the use of information from traders in the sector of the glasshouse vegetables can be explained by the emergence of new commercialisation channels. This finding is in accordance with the findings of Diederen et al. (2000), who found that product innovations often go hand in hand with organisational innovations.

One can conclude that the use of the own farm accountancy data and the average accounting data of the C.L.E. is significantly less important for the 'laggards' than for the other 'product innovation' groups. However the use of accountancy data does not seem to discriminate the group of the 'innovators and early adopters' from the 'majority'.

In table 10.8, the results of the discriminant analysis are presented for the growers of ornamental plants. The probability of the univariate F ratios indicates that when the predictors are considered individually, the auction ($p = 0,00$), consultants ($p = 0,00$), data of consultants ($p = 0,01$) and demonstrations of experimental stations ($p = 0,05$) significantly contribute to the differentiation between the groups. Two discriminant functions are estimated. The eigenvalue associated with the first function is 0.51 and this function accounts for 60.0% of the explained variance. The second function has an eigenvalue of 0.34 and accounts for 40% of the explained variance. The value of Wilks's λ is 0.49 with 24 degrees of freedom, which is significant ($p = 0,00$). Thus, the two functions together significantly discriminate among the three groups. In table 10.8 the standardized discriminant function coefficients and the structure matrix of pooled within-group correlations between the discriminating variables and the canonical discriminant function are presented. Variables with correlation coefficients which are larger for function 1 than for function 2 are shown with asterisks, and vice versa. The correlation coefficients indicate large coefficients for consultants (0,50), data of consultants (0,45), auction (0,41) and colleagues glasshouse growers (0,32) on function 1. Function 2 has relatively large coefficients for consultants (0,51), demonstrations of experimental stations (-0,42), auction (-0,38), horticultural magazines (-0,31) accountant C.L.E. (0,22) and data of consultants (0,21). Function 1 tends to separate the groups 1 and 2 (highest value) from group 3 (lowest value). Function 2 separates group 2 (highest value) from group 1 (lowest value).

For these information sources the standardized canonical discriminant function coefficients reveal that membership of the groups 1 and 2 is positively associated with use of information of consultants, data of consultants, the auction and colleagues growers. Membership of group 1 is positively associated with use of information from demonstrations of experimental stations, horticultural magazines and the auction and negatively associated with use of information from consultants and the accountant of the C.L.E. The classification results indicate that 67.4% of the cases are correctly classified.

Table 10.7 Use of information sources by vegetable growers according to 'product innovation group' membership (three group discriminant analysis)

	Univariate F-ratio		Standardized canonical discriminant function coefficients		Structure matrix correlation coefficients	
	F-ratio	probability	function 1	function 2	function 1	function 2
Interpersonal information sources						
- accountant C.L.E.	1.48	0.24	0.22	0.31	0.25*)	0.18
- consultants	3.44	*0.04*	0.46	-0.30	0.41*)	0.12
- colleagues glasshouse growers	7.24	*0.00*	0.61	-0.36	0.58*)	-0.29
- auction	0.38	0.69	-0.78	0.35	-0.11	0.16*)
- traders	1.48	0.24	-0.18	-0.77	0.04	-0.49*)
- suppliers plants and seeds	0.14	0.87	0.13	0.11	0.08*)	0.00
Written and other mass media information sources						
- own farm accountancy data	0.83	*0.01*	0.37	0.24	0.53*)	0.16
- data of consultants	0.91	0.06	-0.08	0.58	0.36*)	0.24
- average accounting data C.L.E.	0.89	*0.04*	0.24	0.76	0.38*)	0.27
- publications research institutes	0.91	0.06	-0.04	-0.68	0.38*)	-0.08
- horticultural magazines	0.94	0.18	-0.14	0.05	0.30*)	-0.06
- demonstrations experimental stations	0.94	0.20	0.36	-0.26	0.29*)	-0.01

Table 10.8 Use of information sources by growers of ornamental plants according to 'product innovation group' membership (three group discriminant analysis)

	Univariate F-ratio		Standardized canonical discriminant function coefficients		Structure matrix correlation coefficients	
	F-ratio	probability	function 1	function 2	function 1	function 2
Interpersonal information sources						
- accountant C.L.E.	0.71	0.50	-0.60	0.41	-0.03	0.22*)
- consultants	9.42	*0.00*	0.55	0.61	0.50	0.51*)
- colleagues glasshouse growers	2.25	0.11	0.19	0.13	0.32*)	0.02
- auction	5.78	*0.00*	0.65	-0.56	0.41*)	-0.38
- traders	0.96	0.39	-0.02	0.15	0.17*)	0.15
- suppliers plants and seeds	0.31	0.73	0.16	-0.07	0.12*)	-0.02
Written and other mass media information sources						
- own farm accountancy data	0.16	0.85	-0.68	0.05	-0.08*)	-0.04
- data of consultants	5.10	*0.01*	0.42	-0.06	0.45*)	0.21
- average accounting data C.L.E.	0.65	0.52	0.62	0.06	0.17*)	0.03
- publications research institutes	0.56	0.57	-0.44	0.29	0.16*)	-0.02
- horticultural magazines	2.33	0.10	0.64	-0.39	0.20	-0.31*)
- demonstrations experimental stations	3.00	*0.05*	-0.37	-0.07	0.13	-0.42*)

Personal as well as written information sources are significantly less important for the 'laggards'. Contrary to the results of the vegetable growers the group of the 'innovators' and 'early adopters' makes significantly more use of information from demonstrations of experimental stations and horticultural magazines than the 'majority'. One can conclude that the use of the own farm accountancy data does not seem to discriminate the 'product innovation' groups. The use of the average accounting data of the C.L.E. is less important for the 'laggards' than for the other groups. The results show that the most innovative growers of ornamental plants prefer to use more specialised information sources.

10.6 Conclusion

Although the use of information and innovation will become critical factors in the changing competitive environment, one can conclude that the average Belgian glasshouse grower makes low use of information for investment decisions, especially for investments in machinery. Own farm accountancy data are quite important for investment decisions in glasshouses and installations. Although the standard deviations indicate that an important variation can be observed among the growers. Especially the importance attached to the business objective 'creativity and innovation' is an important factor influencing the use of the own accountancy data. When the glasshouse growers are divided in three groups according to their degree of process innovation during last years, one can conclude that the use of the own farm accountancy data is significantly less important for the ‘laggards’ than for the other groups. However the use of the own accountancy data does not seem to discriminate the group of the 'innovators and early adopters' from the 'majority'.

For production decisions the use of the own accountancy data seems to be quite important for the majority of the growers. A significant positive effect was found for 'expressive objectives' and the business objectives 'creativity and innovation' and 'growth'. A negative effect was found for the importance attached to the business objective 'stabilisation'. The use of the average accounting data of the C.L.E. is not so important; more than half of the growers never or seldom uses them. It appears that the 'moderate' but 'growth-oriented' growers are attaching the highest value to these data. The most ambitious growers prefer to use more specialised information sources. Consequently, it will be important for the accountant to create alliances with experts and specialists outside the profession and make referrals when needed. These professionals can provide solutions to problems identified by the accountant.

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11. Estimation of feed utilisation matrices and demand for feed using farm data [1]

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In this paper we developed a new method for joint estimation of the feed demand model and feed utilisation matrices on a basis of the farm data supplemented by the macro-data. The theoretical framework for our method forms the non-linear programming model describing the profit-maximising behaviour of the compound feed producers (the compound feed model). The specification of the model ensures continuous and smooth feed allocation responses to price changes and allows to include the linear restrictions to account for both engineering information and other *a priori* restrictions. To estimate the compound feed model, a three-step iterative procedure was developed. For testing the jack-knife method was proposed. The proposed method was tested using the farm data for the Netherlands provided by the European Farm Accountancy Data Network.

The developed method provides a consistent framework, which can be used to estimate feed utilisation matrices as well as other unobserved macro-data from micro (farm) figures. Moreover the usage of farm data allows for a relatively high disaggregation of the model in terms of numbers of products and production factors.

11.1 Introduction

The feed-livestock sector plays a key role in European Union (EU) agriculture. Knowledge of the feed-livestock relationship is particularly important in assessing the impact of pricing policies on livestock production, feed use and trade in feed components. The EU's Common Agricultural Policy (CAP) influences prices of agricultural products which in turn affect the growth of livestock production and generate shifts in the composition of European feed demand [3]. Therefore, models describing the feed-livestock sector are of particular interest to policymakers.

Despite the importance of the feed-livestock economy, relatively little has been written on empirical modelling of the feed demand relationship in the European Union (see Peeters and Surry, 1997 for an overview). A major problem concerning feed demand modelling is the limited availability of data. In particular, national feed balances per animal type, so-called feed utilisation matrices (FUM's), are usually not compiled by national sta-

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[3] In general, cereals have persistently been displaced by so-called cereal substitutes in the last three decades. This was caused by a steady increase in the ratio of the price of cereals to that of the cereal substitutes.

tistical institutes. This leads to the need of developing methods and standardised procedures, which consistently estimate FUM's and feed demand relationships.

Three basic approaches can be distinguished for obtaining the feed demand estimates when no FUM's are available. The first two of them employ a dual (cost function) method, while the third approach uses a primal (production function) method.

In the first approach, the feed demand equations are derived from a single-output multiple-input cost function, specified by animal types. The derived equations are estimated using separately constructed FUM's (Folmer et al., 1995 and Tabeau, 1999a). FUM's are constructed on the base of information on the total usage of feed, expert knowledge, and feeding norms for animals, such as feeding requirements of particular livestock categories, nutritional contributions of concentrate feeds, and various conversion ratios (see e.g. Wolf (1995)).

The second approach uses multiple-output multiple-input cost functions. This approach makes it possible to estimate the total (i.e., for all livestock categories jointly) demand for feed components without using FUM's. This method assumes that feed input is non-separable among livestock categories and uses information on the total usage of feed components (Surry and Moschini, 1984, Mergos and Yatopulos, 1988, Surry, 1993 and Peeters, 1995). An extension of this method was proposed by Peeters and Surry in 1993. They relaxed the non-separability assumption and used the symmetric McFadden cost function to jointly estimate demand equations and FUM's.

The third approach applies the least-cost linear programming (LP) model with constraints describing technical and nutritional restrictions. This model is used to generate feed inclusion rates and price elasticities of feed demand (Peterson, 1986, Peeters, 1990, McKinzie et al., 1986). The parameters generated are in turn used to calibrate the feed demand equations (Surry, 1993).

However, all the approaches presented above have some shortcomings. The first approach is inconsistent, because it estimates the FUM's and the feed demand equations independently. It ignores the fact that the same technologies may generate quite different feed utilisation patterns due to differences in relative prices. Therefore, FUM's created in this way do not allow us to correctly quantify the impact of prices on feed demand. When feed input is non-separable among livestock categories, the dual approaches make it impossible to estimate feed demand equations by animal types. Moreover, the dual approaches do not take into account technical-nutritional restrictions of feed substitution. The LP approach considers these restrictions explicitly and can cover a multitude of feed ingredients and feed aggregation levels. This approach suffers, however, from two other limitations. First, the estimated price responsiveness is conditional upon a given level of output since the LP models do not incorporate expansion effects. Second, LP models have a piecewise linear response function which may lead to very large feed composition responses to price changes.

To overcome these problems, we have developed a new model for joint estimation of the feed demand model and the FUM's. The proposed approach has the advantages of both primal and dual approaches without their disadvantages. Our method is in line with the primal approach with production technology being described by a non-linear feed mixing function, technical-nutritional restrictions and feed balances. The non-linear feed mixing

function ensures smooth price responses and expansion effects. The total feed balances guarantee the macro consistency of the estimated FUM's.

The method proposed by us is not designed to estimate any specific form of the demand function. Demand for feed will be derived from the non-linear programming model describing optimisation behaviour of the (compound) feed industry. The parameters of this model (parameters of the feed mixing function) will be estimated using data about compound feed cost and animal numbers available from farm data (from the European Farm Accountancy Data Network). The use of primary micro-data improves the quality of the estimates and allows deep disaggregation of the model.

To estimate the model, we developed a three-step iterative procedure, which estimates the unknown parameters of the model and the FUM's jointly. Both micro (farm) and macro (national) data are used to estimate the model. This approach has three advantages. First, it allows us to estimate the model parameters and the FUM's consistently. Second, the estimated FUM's are consistent with macro-data. Finally, the use of the individual data makes it possible to investigate farm specific feed-livestock relationships. This in turn allows the investigation of the impact of various policy measures on the behaviour of different types of farms as well as the impact of farms' decisions on the feed-livestock economy as a whole.

The paper is organised as follows: In Section 2, we formulate a compound feed model. Sections 3 and 4 describe estimation and testing procedures of the model, respectively. Section 5 characterises the data used to estimate the model and deals with data issues. In Section 6, the estimation results are described. Section 7 concludes.

11.2 The theoretical model

We assumed that allocation of the compound feed components to animal types (i.e. FUM's) results from the profit-maximising behaviour of feed compounders. In this way we ensure a micro-economic interpretation of the results obtained. We have used a non-linear programming model to describe the behaviour of the feed compounders. This has two advantages. First, a properly specified non-linear program ensures continuous and smooth feed allocation responses to price changes and expansion effects. Second, the non-linear programming model can also include linear restrictions to account for both engineering information and other *a priori* restrictions.

To derive the model, we assume that the feed compounders buy the feed components on the market, mix them to produce compound feed, and sell the compound feed to farmers. Since the supply of some feed components is restricted and since different animal types require feed having different nutrient compositions, the feed components are substitutes. This is ensured by assuming a non-linear mixing technology. On the other hand, the produced compound feed has to meet certain nutritional requirements, which is described by linear restrictions on the feed components. To choose the optimal composition of the compound feed components, the feed compounders maximise their profit given the non-linear mixing technology and nutrient restrictions.

To formalise our model, we assume that the compound feed industry produces feed for L animal types using J feed components and that K nutrient ingredients (i.e., metabo-

lised energy, crude proteins, dry matter component, and so on) are distinguished. To describe the model, we use the following symbols:

$A_l=[a_{kj}]$ - nutrient composition matrix for the feed components;
β_l - parameters of the mixing function;
s_l - ratio of non-feed component costs in value of the compound feed;
$d_l=[d_{kl}]$ - required contents of the nutrient ingredients in the compound feed;
$F(\beta_l,v_l)$ - concave mixing function;
$p=[p_j]$ - feed components prices;
q_l - compound feed production;
r_l - compound feed price;
$v_l=[v_{jl}]$ - feed component input;
$\bar{v}_l=[\bar{v}_{jl}]$ - committed feed component input.

Using the above symbols, the model describing the feed compounders' behaviour can be written as follows:

1. $\max_{q_l,v_l \geq 0} \{\sum l \, (r_l \, q_l - s_l \, r_l \, q_l - p \, v_l)\}$

subject to:

2. $q_l = F(\beta_l, v_l) \quad l=1,2,...,L$

3. $A_l v_l \stackrel{\geq}{=} d_l \quad l=1,2,...,L$

4. $v_l \geq \bar{v}_l \quad l=1,2,...,L$

where symbol $\stackrel{\geq}{=}$ indicates that some costaints are satisfied as equalities and some as inequalities.

We will call the model (1) - (4) 'the compound feed model'. The objective function (1) is the profit function. Profit is equal to the value of production sold ($r_l \, q_l$) minus the cost of input. This cost is equal to the cost of feed components ($p \, v_l$) used to produce the compound feed plus other costs (equal to $s_l \, r_l \, q_l$). Equation (2) describes how the feed components v_l are mixed to produce the compound feed q_l. β_l is a vector of parameters of the mixing function F. Nutritional constraints (3) ensure that farm demands for nutrient ingredients is fulfilled. It is assumed that there are no nutrient losses in the production process. We also assume that at least one nutrient constraint is satisfied as an equality constraint, so that the mathematical program (1) - (3) is bounded [1]. According to constraint (4), the minimal quantity of the compound feed components used in production is equal to the committed level.

[1] In our application, we assume that the nutrient constraint for metabolised energy is the equality constraint. According to the literature, the metabolised energy provided by compound feed does not meet the total energy requirements necessary to feed animals and the metabolised energy provided by roughage closes the balance. On the other hand, compound feed and roughage usually provide surpluses of the other nutrient components.

11.3 The estimation procedure of the compound feed model

The parameters A_l, s_l, d_l, p and r_l of the compound feed model (1) - (4) have been calculated using different data sources (see section 5). To apply the compound feed model (1) - (4), the unknown parameters β_l of the mixing function F have to be estimated. Then the optimal values of the model variables can be calculated. They can be used in turn to compile the FUM.

To estimate the compound feed model we assumed that the farm gate cost $r_l q_l$ of the compound feed should fit as much as possible farmers' expenditures on the compound feed available in the FADN database. Moreover, we assumed that the estimated feed components input vl should be as much as possible consistent with the available macro-figures on feed components supply V_j. The estimated feed component input is the optimal solution of the compound feed model and as such it solves the first order conditions of the optimisation problem (1) - (4). Therefore, we solve the following mathematical programming problem to estimate the parameters β_l and feed component input (v_l):

5. $$\min_{\beta_{nl}\geq 0} \{L(\beta_l);\ L(\beta_l) = \sum_{nl}(c_{nl}^{-1}(c_{nl} - r_l F(\beta_l, v_{nl})))^2 + \sum_j (V_j^{-1}(\sum_l M_l(\sum_{nj}/\sum_n \mu_{nl}) - V_j))^2 + (\sum_{nl} c_{nl}^{-1}(c_{nl} - r_l F(\beta_l, v_{nl})))^2\}$$

subject to:

6. $$(-p - (1-s_l)\, r_l\, F'_{v_{nl}}(\beta_l, v_{nl}) + \lambda^d_{nl} A_l + \lambda^v_{nl}) = 0 \qquad \text{for all l, n}$$

7. $$\lambda^d_{nl}\,(A_l v_{nl} - d_{nl}) = 0 \qquad \text{for all l, n}$$

8. $$\lambda^v_{nl}\,(v_{nl} - \bar{v}_{nl}) = 0 \qquad \text{for all l, n}$$

9. $$\lambda^d_{nl} \geq 0, \qquad \lambda^v_{nl} \geq 0, \qquad A_1 v_{n1} \geq d_{n1} \qquad v_{n1} \geq v_{n1} \qquad \text{for all l, n}$$

where the following represent:

n	-	farm index (n=1,...,N);
$L(\beta_l)$	-	loss function
c_{nl}	-	cost of the compound feed provided by the FADN data-base;
μ_{nl}	-	number of animals in the FADN data-base;
M_l	-	number of animals in the macro data;
V_j	-	quantity of the feed components provided by the macro-data;
$F'_{v_{nl}}(\beta_l, v_{nl})$	-	first derivatives of $F(\beta_l, v_{nl})$ with respect to v_{nl};
λ^d_{nl}, λ^v_{nl}	-	Lagrangean multipliers associated with the constraints (3) and (4).

Constraints (6) - (9) are the first order conditions of the optimisation problem (1) - (4) [1]. The loss function (5) consists of three terms. The first term is a weighted (by c_{nl}^{-1}) sum of squared differences between the observed farmers' expenditures on the compound

[1] Using (2), we replaced q_l by $F(\boldsymbol{\beta}^t_l, \mathbf{v}_{nl})$ in the problem (5) - (9).

feed and farm gate compound feed cost calculated from the compound feed model (1) - (4). The second term represents the micro-macro consistency conditions weighted by V_j^{-1}, which compare the estimated amount of the compound feed components used by compound feed industry with the available macro-figures. The third term is the usual condition that the sum of residuals (weighted by c_{nl}^{-1}) of the estimated model should be equal to zero.

Program (5) - (9) is hard to solve because it is highly nonconvex. Therefore, we have developed an iterative procedure to solve this problem [1]. The procedure developed solves three programs in each iteration 't': the inner program, the outer program and the step-length determination program.

Given the starting values of the model parameters β^{*t}_l, for the iteration 't', the inner program solves the model (1) - (4) for every farm 'n'. It generates the optimal values of the feed component input (v^*_l) and the Lagrangean multipliers λ^d_{nl} and λ^v_{nl} associated with the constraints (3) and (4).

The outer program calculates a gradient λ^β_l of the loss function $L(\beta_l)$ with respect to β_l and for $v_l = v^*_l$, which provides direction for adjusting β_l. The following method of steepest descent is applied to calculate the new betas:

10. $\beta^{*t+1}_l = \beta^{*t}_l - \omega \lambda^\beta_l$ for all l

where $\omega>0$ is the step-length and λ^β_l serves as the search direction.

Since it is not possible to derive the loss function analytically in our case, we calculate the gradient λ^β_l as the Lagrange multiplier associated with restriction $\beta_l = \beta^{*t}_l$ imposed on the parameters β_l. To calculate this multiplier the optimisation program (5) - (9) is solved with the additional restriction:

11. $\beta_l = \beta^{*t}_l$ for all l

The outer program (5) - (9), (11) is highly nonconvex similarly to the program (5) - (9), but if the optimal solution v^*_l, λ^d_{nl} and λ^v_{nl} of the inner program (1) - (4) is locally unique, it will be the single feasible solution of the outer program. Therefore, the optimisation procedure is only needed to compute the Lagrange multiplier λ^β_l. It is normally calculated very rapidly since the outer program is initialised at optimal v^*_l, λ^d_{nl} and λ^v_{nl}.

To calculate the optimal step-length ω for the steepest descent method (10), we solve a step-length determination program in each iteration 't'. This program follows the outer program and has the same specification as the outer program except for the last equation (11), which is now replaced by an equation analogous to (10), which has the following form:

12. $\beta_l = \beta^t_l - \omega_l \lambda^\beta_l$ for all l

where the step-lengths ωl are choice variables of the step-length determination program. To speed up the estimation process, we assumed that the step-length in formula (10) and (12) depends on the animal type.

[1] The estimation procedure uses an approach proposed by Keyzer, 2000.

A loop over all three programs with an adjustment of parameters based on a gradient of the loss function yields the best possible fit with the observations. The iterative procedure is repeated until convergence is reached. The proposed procedure is a steepest descent approach that generally converges to a local optimum.

11.4 Jack-knife testing procedure the compound feed model

The mathematical programming (MP) estimation technique has one important shortcoming. It produces estimates without any statistical properties because in general the underlying sampling distributions of the error terms and parameters are either unknown or have no analytical representation. Hence, in this case, it is impossible to evaluate the estimated model statistically. This limitation of the MP method can be overcome by using the jack-knife method to assess the statistical characteristics of the compound feed model.

The jack-knife technique is a non-parametric approach based on a resampling estimation procedure. This procedure is used to generate pseudodata for the parameters of the model by resampling the original observations and calculating pseudovalues for the parameters of interest for each sub-sample. By resampling from the original sample (randomly or based on a certain rule), each new sub-sample will be different from the original one. Hence, each new sub-sample will likely generate different pseudovalues for the parameters. By generating many sets of pseudodata, and hence estimating many pseudovalues, the relevancy of the parameters of interest can be statistically tested by examining the stability of their associated pseudovalues. The generated pseudovalues can therefore be used to calculate model statistics of interest, e.g., measures of variability and confidence intervals for parameters.

The core of the jack-knife technique is to partition out the effect of a particular subset of the data on an estimate of parameters derived from the total sample (see Tukey, 1958). The effect of a particular subset of the data on the target parameter is determined by deleting that subset and re-estimating the parameters. In the most frequently used version of the jack-knife procedure only one data point is deleted each time from the original data set and the estimator is calculated based on the rest of data. For large databases, however, 'z' observations are deleted. This procedure is called deleted-z (z>1) jack-knife procedure. The deleted observations can be chosen in different ways (see Shao and Tu, 1995).

The deleted-d jack-knife estimator θ^* of the parameter θ and variance estimator S^2_θ of θ are given by the following formulas:

13. $$\theta^* = \frac{1}{T} \sum_t^T \theta^*_t$$

14. $$S^2_\theta = \frac{N - z}{zT} \sum_t^T (\theta^*_t - \theta^*)^2$$

where θ^*_t is the estimator of θ after deleting the subset t of size z from the complete sample, T is the total number of subsets and N is a size of the complete sample.

The jack-knife variance estimator S^2_θ is consistent under some smoothness conditions for many statistics including functions of sample mean (see Shao and Tu, 1995). The interesting feature of the jack-knife procedure is that the pseudovalues θ^*_t can be treated as

independent and identically distributed random variables and, hence, can be used to infer statistical significance test using t-Student statistic with T-1 degree of freedom (Mosteller and Tukey, 1968).

To test the compound feed model for the Netherlands, we used the deleted-d jack-knife procedure with z=5. Observations were deleted sequentially (starting with first five observations, then the second five observations, and so on). In our case N=50 and therefore T=10.

11.5 Data used to estimate the compound feed model for the Netherlands

There are two types of data necessary to estimate or derive the parameters of the compound feed model: the micro-data from the FADN database and the macro-data from SPEL, CRONOS and other sources. In our research we used data for the Netherlands for 1994.

11.5.1 The micro-data

The necessary micro-data were extracted from the FADN database for 1994. They provide information about the number of animals and feed costs per farm for 1,528 farms. A preliminary analysis of the micro-data was necessary to compute their characteristics, compare them with the macro data, and to develop a procedure to create a database for the estimation of the compound feed model. This preliminary analysis was done using micro-data for all farms having animals. The main characteristic features of the micro-data are as follows:

- the price of a unit of metabolised energy required to feed animals differs substantially between farms. For instance, for poultry, it varies from 86 to 403 ECU per unit and its variation coefficient is equal to 25%;
- the number of hectares which can be used to produce roughage for grazing animals differs substantially by farm (the variation coefficient is 62%) and the metabolised energy which can be produced using roughage ranges from 0 to 1,500% metabolised energy requirements. Therefore, these data do not give a reliable indication of the production and use of roughage and we estimate the amount of roughage used to feed animals using other information;
- farms having contract production (farms which have animals but do not own them) do not have any feed cost. The feed cost has to be estimated for these farms.

The micro-data provide the number of animals μ_{nl} per farm. The cost of the compound feed purchased by the farm is available in FADN only for grazing animals, pigs and poultry and it should be further disaggregated to match the disaggregation level assumed for the model. The required content d_{nl} of the nutrient ingredients in the compound feed is not available in the database. A data-model was built to generate these figures.

11.5.2 The macro-data

The macro-data contain information about the animal population (SPEL and CRONOS), available feed (SPEL), feed prices (SPEL) and metabolised energy, crude proteins and dry matter contents of feed (SPEL). They show that about 63% of metabolised energy for grazing animals is provided by non-roughage feed. There are substantial differences between the animal populations provided by SPEL and CRONOS. For example, CRONOS reports that there were 680,000 (4.7%) more pigs than SPEL registers for the Netherlands in 1994.

The macro-data provide figures for the feed component prices p, compound feed prices rl, cost ratios cl, nutrient composition matrix Al, number of animals Ml and quantity of the feed components Vj.

We used the following additional data sources to specify nutrient requirements and nutrient constraints by type of animal: Bolhuis, et al. (1995), CVB (1997) and OECD (1986).

11.5.3 Comparison of data from different sources and disagregation level of the model

Comparison of data coming from different sources is hampered by three obstacles:
- not fully representative micro-data;
- differences in animals' classification;
- differences in nutrient requirements for particular types of animal.

A preliminary investigation of the data set for the Netherlands for 1994 shows that the FADN data are not fully representative for all herds. For example, the number of dairy cows in the FADN equals 1.08 times the number of dairy cows in the Netherlands according to CRONOS data. For different types of pigs, this proportion varies between 0.63 and 1.2. This was taken in to account when the micro-macro consistency conditions were specified in the model.

The classification of animals differs across statistical sources. The classification used in the model was obtained by grouping animals belonging to the same animal category (i.e., grazing animals, pigs and poultry) and having similar metabolised energy requirements. In this way, we lowered the impact of the internal structure of aggregates on the nutrient requirements for animal groups distinguished in the model. The metabolised energy requirements for the animal groups present in the model were calculated using data for the Netherlands (Bolhuis, et al., 1995).

For most animals, the nutrient requirements used in SPEL are lower than those published in Bolhuis, et al. (1995). This implies that the total metabolised energy requirement calculated using SPEL data is lower by 24% than the results obtained from data from Bolhuis, et al., 1995. These latter data are considered to be more reliable and therefore they are used in the model.

After the analysis of data sources we chose the most suitable for our research classification of animals, feed components and nutrient ingredients. We distinguish ten animal types (index l): horses and pony's (HOPO), calves (CACA), dairy cows (CADC), other cattle (CAOT), sheep and goats (SHGO), pigs for fattening (PIFA), sows and stock boars

(PISB), piglets (PIPI), laying hens (POLH) and poultry for fattening (POFA); five compound feed components (index j): cereals (FCER), rich protein fodder (FPRO), energy rich fodder (FENE), milk and dairy products (FMIL), and other fodder (FOTH); and three nutrient ingredients (index k): metabolised energy (ENE), crude proteins (PRO) and dry matter component (DRM). The dry matter component is only relevant for grazing animals. The other feed components are internally (on farm) produced (compound) feed (INTF), roughage (ROUG) and suckled milk (SUMI).

11.5.4 Data-model

The data-model generates the farm and animal specific data about cost c_{nl} and desired content of the compound feed d_{nkl} that are unavailable in the FADN database. The FADN database provides information about cost of the compound feed purchased by farms [1] and cost of the internal feed produced on farm [2] for three animal groups: grazing animals, pigs and poultry. The data model disaggregates these cost over the animal types in the model disaggregation. Figures about nutrient content of the compound feed are not provided by the FADN data. We derive these figures using the FADN data about number of animals and some supplementary technical coefficients.

We disaggregate the compound and internal feed cost by animal type proportionally to the metabolised energy provided by compound and internal feed. In the disaggregation procedure, differences between the metabolised energy prices for different animal types are taken into account. The relative prices are calculated using the FADN data. As result, the compound and internal feed cost c_{nl} and c'_{nl} by farm and animal type are computed. The following equations are applied:

15. $$c_{nl(i)} = \gamma_{ni}\, \rho_{nl(i)}\, f_{nENE\, l(i)} / (\sum_{l(i)} \rho_{nENEl(i)}\, f_{nENEl(i)})$$

16. $$c'_{nl(i)} = \gamma'_{ni}\, \rho_{nl(i)}\, f_{nENE\, l(i)} / (\sum_{l(i)} \rho_{nENEl(i)}\, f_{nENEl(i)})$$

where the following represent:

- i - animal group index: pigs (i = PI), poultry (i=PO) and grazing animals (i=GA);
- l(PI) - different types of pigs (l(PI)= PIFA, PISB, PIPI);
- l(PO) - different poultry types (l(PO)= POLH, POFA);
- l(GA) - different types of grazing animals (l(GA)=HOPO, CACA, CADC, CAOT, SHGO);
- γ_{ni}, γ'_{ni} - cost of the compound and internal feed respectively for different animal groups;
- $\rho_{nENEl(i)}$ - metabolised energy price index;
- $f_{nENEl(i)}$ - total metabolised energy provided by the compound and internal feed.

[1] In the FADN, this cost is called the purchased feedingstuffs for pigs and poultry and purchased concentrated feedingstuffs for grazing animals. It includes not only feed cost but also some other costs.

[2] In the FADN, this cost is called the feedingstuffs produced and used on the farm and includes only the marketable products used as feedingstuffs. Therefore, data on these feedingstuffs do not provide full information about the cost of internally produced and used feed.

The minimal nutrient content f_{nkl} of the compound and internal feed for pigs and poultry is given by the formula:

17. $f_{nkl} = \omega_{kl}\ \mu_{nl}$ for l = PIFA, PISB, PIPI, POLH, POFA; k= ENE, PRO

where ω_{kl} denotes nutrient requirement per animal. We assume that the compound and internal feed provide just the minimal amount of metabolised energy required for pigs and poultry [1].

The formula (17) is not applicable for grazing animals because they eat roughage and the amount of roughage used to feed these animals is unknown. According to feed norms, roughage has to provide some minimal amount of the metabolised energy for grazing animals [2]. Therefore, for grazing animals we assume that $f_{nENEl(GA)}$ is equal to the maximal amount of the metabolised energy which can be provided by the compound and internal feed. The following formula is applied:

18. $f_{nENEl} = (1-\alpha_{ENEl})\ \omega_{ENEl}\ \mu_{nl} - \sigma_{ENEl}\ \mu_{nl}$ for l = HOPO, CACA, CADC, CAOT, SHGO

where the following represent:
α_{kl} - minimal roughage share in total nutrient supply;
σ_{kl} - suckled nutrient ingredients per animal type.

To calculate the desired nutrient contents of the compound and internal feed (d_{nkl} and d'_{nkl} respectively) for pigs and poultry, we disaggregate the minimal nutrient contents f_{nkl} (see 17) of the compound and internal feed proportionally to the compound and internal feed cost obtained from formulas (15) - (16). In the disaggregation procedure, differences between the nutrient prices for the compound and internal feed are taken into account. The price correction coefficients are calculated using the FADN data. This results in the following formulas:

19. $d_{nkl} = (\phi_{kl}\ c_{nl}\ f_{nkl})/(\phi_{kl}\ c_{nl} + c'_{nl})$ for l = PIFA, PISB, PIPI, POLH, POFA; k= ENE, PRO

20. $d'_{nkl} = (c'_{nl}\ f_{nkl})/(\phi_{kl}\ c_{nl} + c'_{nl})$ for l = PIFA, PISB, PIPI, POLH, POFA; k= ENE, PRO

where ϕ_{kl} represents nutrient price of the internal feed compared with the nutrient price of the compound feed.

The calculation procedure described above cannot be applied to grazing animals, because for these animals the minimal amount of nutrient ingredients provided by the compound and internal feed cannot be calculated. To calculate the desired nutrient contents

[1] See footnote 3.
[2] The feed norms provide the coefficient α_{kl} for the minimal dry matter contents of feed provided by roughage. We applied the same coefficient for the metabolised energy.

of the compound and internal feed for grazing animals we assume that the unit prices of the nutrient components for these animals are proportional to the average unit price of the nutrient components for pigs and poultry. The proportionality coefficient takes into account differences between the nutrient prices for grazing animals and pigs and poultry and is calculated using the FADN data. The following formulas are used:

21. $d_{nkl} = c_{nl} / \pi_k$ for l = HOPO, CACA, CADC, CAOT, SHGO; k= ENE, PRO

22. $d'_{nkl} = c'_{nl} / \pi'_k$ for l = HOPO, CACA, CADC, CAOT, SHGO; k= ENE, PRO

where:

23. $\pi_k = \varepsilon(\sum_{i=PI,PO}\sum_{nl(i)} c_{nl})/(\sum_{i=PI,PO}\sum_{nl(i)} d_{nkl})$ for k= ENE, PRO

24. $\pi'_k = \varepsilon(\sum_{i=PI,PO}\sum_{nl(i)} c'_{nl})/(\sum_{i=PI,PO}\sum_{nl(i)} d'_{nkl})$ for k= ENE, PRO

and where π_{nk} and π'_{nk} represent nutrient prices for compound and internal feed respectively and ε is a relative nutrient price for grazing animals compared with the nutrient price for pigs and poultry.

Finally, we calculate the roughage intake for grazing animals as a closing variable for the metabolised energy balance:

25. $y_{nl} = ((\omega_{ENEl} - \sigma_{ENEl})\,\mu_{nl} - d_{nENEl} - d'_{nENEl})/\kappa_{ENEl}$ for l = HOPO, CACA, CADC, CAOT, SHGO

where y_{nl} denotes roughage used to feed grazing animals and κ_{kl} is the nutrient contents of a unit of roughage. This in turn allows us to apply the following formula to calculate the desired dry matter contents of the compound feed for grazing animals:

26. $d_{nDRMl} = \alpha_{DRMl}\, y_{nl}\, (1+ c'_{nl}/(\phi_{DRMl}\, c_{nl}))$ for l = HOPO, CACA, CADC, CAOT, SHGO

This formula results from the feed norms for grazing animals according to which some minimal dry matter contents of feed has to be provided by roughage.

11.6 Estimation results of the compound feed model for the Netherlands

In this section we report results obtained from estimating the compound feed model for the Netherlands. The model was estimated using data for 50 aggregated farms obtained by aggregation of farms represented in FADA database. To program, estimate and test the compound feed model the General Algebraic Modelling System (GAMS) was used. To solve a model with the required precision 46 iterations and almost 4 hours were necessary

[1]. Testing a model takes 10.5 hours. The biggest optimisation problem is the outer problem, which contains almost 3,400 equations and 3,600 variables.

To apply the model (1) - (4), we assumed that the mix function has the constant return to scale Cobb-Douglas form [2], i.e.:

27. $q_{nl} = \beta_{0l} \prod_j v_{njl}^{\beta jl}, \qquad \sum_l \beta_{jl} = 1$

As a starting point for our estimation, we used betas which were equal to shares of the compound feed components in the total metabolised energy provided by the compound feed for different animal types. These shares were calculated using data published in Helming et al., 1995 [3].

To calculate a measure of fit for the compound feed model (1) - (4) for the Netherlands, we compared the observed compound feed cost c_{nl} obtained from the micro-data and the theoretical cost $r_l F(\beta_l^*, v^*_{nl})$ calculated from the model. Table 11.1 shows some indicators of goodness of fit. They indicate that the model fits the data very well. The micro-macro consistency conditions perform quite well, however, the use of cereals, energy rich fodder and other fodder are underestimated by 7.2, 25.5 and 9.4% respectively.

Table 11.1 Goodness of fit indicators

The measures of fit for the compound feed model for the Netherlands:	
- the percentage estimation error a):	5*10-8
- the correlation coefficient b):	0.991
The accuracy of the micro-macro consistency conditions c):	
- cereals (FCER)	92.8%
- rich protein fodder (FPRO)	101.6%
- energy rich fodder (FENE)	74.5%
- milk and dairy products (FMIL)	100.0%
- other fodder (FOTH)	90.6%

Note:
- sum of absolute differences between the observed farmers' expenditures on the compound feed and the estimated feed costs related to the total observed farmers' expenditures on the compound feed;
- the correlation coefficient between the observed farmers' expenditures on the compound feed and the estimated feed costs;
- accuracy of matching of the observed macro data V_j on available quantities of the feed components by the estimated micro data v^*_{nl} on the compound feed components calculated as a percentage of macro-data covered by micro-data.

Source: Owncalculations.

[1] We assume that the sum of relative differences between parameters' values obtained in two following iterations should be lower than 0.1%.
[2] To ensure that $\sum_l \beta jl = 1$, we calculate one parameter residually in the program.
[3] Helming et al., 1995 provide data only for cattle, pigs, poultry for fattening, laying hens and other animals. Therefore we applied betas calculated for cattle for all types of cattle distinguished in our model. The same procedure was applied for pigs.

Table 11.2 Estimation results

- mathematical programming method

l/j	βjl					β0l
	FCER	FPRO	FENE	FMIL	FOTH	
HOPO	0.229	0.252	0.361	0.011	0.147	3.919
CACA	0.011	0.395	0.424	0.028	0.141	3.266
CADC	0.026	0.375	0.411	0.047	0.140	3.265
CAOT	0.012	0.394	0.429	0.030	0.141	3.266
SHGO	0.224	0.251	0.361	0.015	0.148	3.919
PIFA	0.056	0.259	0.319	0.110	0.157	3.594
PISB	0.132	0.380	0.315	0.046	0.128	3.596
PIPI	0.136	0.378	0.316	0.041	0.128	3.596
POLH	0.338	0.236	0.132	0.056	0.238	5.596
POFA	0.249	0.424	0.065	0.100	0.162	4.333

- Jack-knife method

l/j	βjl					β0l
	FCER	FPRO	FENE	FMIL	FOTH	
HOPO	0.229	0.252	0.361	0.011	0.147	3.919
	(+∞)	(5300)	(+∞)	(500)	(4600)	(+∞)
CACA	0.012	0.395	0.424	0.028	0.141	3.266
	(6.729)	(290)	(680)	(500)	(700)	(+∞)
CADC	0.027	0.375	0.411	0.047	0.141	3.265
	(4.945)	(80.493)	(210)	(220)	(560)	(+∞)
CAOT	0.012	0.393	0.423	0.030	0.141	3.266
	(5.696)	(240)	(550)	(450)	(560)	(+∞)
SHGO	0.224	0.251	0.361	0.015	0.146	3.919
	(+∞)	(880)	(6.600)	(160)	(1.100)	(+∞)
PIFA	0.057	0.357	0.319	0.110	0.157	3.595
	(5.806)	(32.788)	(99.914)	(170)	(41.956)	(+∞)
PISB	0.132	0.379	0.315	0.046	0.128	3.596
	(61.027)	(860)	(750)	(28.118)	(92.465)	(+∞)
PIPI	0.136	0.378	0.316	0.041	0.129	3.596
	(120)	(170)	(490)	(68.052)	(120)	(+∞)
POLH	0.338	0.235	0.132	0.056	0.238	5.184
	(110)	(110)	(400)	(22.664)	(100)	(+∞)
POFA	0.249	0.424	0.065	0.100	0.163	4.333
	(160)	(64.799)	(97.364)	(34.321)	(35.950)	(+∞)

Note: T-student statistic in brackets. +∞ means the T-student statistic higher than 10,000. All parameters are significant at 0.05% significance level.
Source: Own calculations.

In table 11.2, the estimated coefficients of the Cobb-Douglas mix functions and results of the Jack-knife testing are presented. All estimated coefficients are significantly different from zero at the 0.05% significance level. We conclude that estimates are statistically reliable.

We used the estimated v^*_{nl} to calculate the compound feed composition for animal types and the feed utilisation matrix (FUM). Table 11.3 provides data on the compound feed structure and total feed structure for the animal types. The estimation results show that the main components of compound feed for cattle and pigs are protein rich fodder and energy rich fodder. Their total share amounts to more than 71%. There are three main compound feed components for horses, pony's, sheep and goats: cereals, protein rich fodder and energy rich fodder. Their total share in compound feed is about 89%. Cereals and protein rich fodder provide about 69% of the metabolised energy for poultry. These outcomes are consistent with estimations results obtained for the mix function. The most important compound feed components have the largest parameter values. The feed composition obtained is in general consistent with results, which can be calculated from data published in Helming et al., 1995 (see table 11.4).

According to results presented in table 11.3, compound feed satisfies almost 100% of demand for metabolised energy for pigs and poultry. The remaining demand, which is less than 0.5% of the total demand, is satisfied by internal feed. For grazing animals, compound feed satisfies between 18 and 29% demand for metabolised energy. The rest of metabolised energy is provided by internal feed (between 9.5 and 14%), roughage (from 51 to 73%) and, for calves and sheep and goats, by suckled milk (0.5 and 6.6% respectively).

Table 11.3

Compound feed structure (metabolised energy units):

	HOPO	CACA	CADC	CAOT	SHGO
FCER	0.301	0.015	0.036	0.016	0.279
FPRO	0.332	0.424	0.410	0.423	0.253
FENE	0.362	0.448	0.441	0.448	0.358
FMIL	0.001	0.003	0.005	0.003	0.001
FOTH	0.104	0.110	0.108	0.110	0.109
	PIFA	PISB	PIPI	POLH	POFA
FCER	0.098	0.094	0.200	0.471	0.386
FPRO	0.413	0.674	0.387	0.214	0.407
FENE	0.368	0.174	0.324	0.122	0.063
FMIL	0.010	0.004	0.004	0.006	0.011
FOTH	0.111	0.054	0.085	0.187	0.133

Total feed structure (metabolised energy units):

	HOPO	CACA	CADC	CAOT	SHGO
FCER	0.054	0.004	0.008	0.004	0.080
FPRO	0.042	0.106	0.087	0.103	0.072
FENE	0.065	0.112	0.094	0.109	0.102
FMIL	2.3*10-4	7.6*10-4	0.001	7.9*10-4	4.2*10-4
FOTH	0.019	0.028	0.023	0.027	0.031
INTF	0.095	0.110	0.099	0.111	0.141
ROUG	0.724	0.634	0.688	0.644	0.508
SUMI		0.005			0.066
	PIFA	PISB	PIPI	POLH	POFA
FCER	0.098	0.093	0.199	0.471	0.385
FPRO	0.410	0.671	0.385	0.214	0.407
FENE	0.367	0.173	0.322	0.122	0.063
FMIL	0.010	0.004	0.004	0.006	0.011
FOTH	0.111	0.054	0.085	0.187	0.133
INTF	0.004	0.005	0.005	5.0*10-4	0.001

Source: Own calculations.

Table 11.4 Differences between the compound feed structure calculated using the compound feed model and the compound feed structure obtained form data provided by Helming et al., 1995

	Cattle	Pigs for	Poultry for fattening	Laying hens	Other animals
FCER	2	-5	0	5	5
FENE	1	0	1	-1	-1
FMIL	-1	0	1	1	0
FOTH	-3	-2	1	-3	-4
FPRO	1	7	-3	-2	0

Source: Own calculations.

Using the estimated data on individual farms, we can also calculate farm specific feed characteristics including the feed utilisation matrices (FUM's). Analysis of these data shows that the compound feed composition for given animal type is the same for all farms [1]. This is because only one constraint of the compound feed model (1) - (4) is binding for the optimal solution and because we used the constant returns to scale mix function. This result is, however, consistent with the theoretical specification of the compound feed model that describes behaviour of the compound feed industry. In this context it is reasonable to assume that compound feed production technology does not depend on characteristics of individual farms.

Table 11.5 Structure of the feed utilisation matrix FUM (quantities)

	FCER	FPRO	FENE	FMIL	FOTH
HOPO	0.003	0.001	0.003	3.2*10-4	0.002
CACA	0.003	0.032	0.053	0.011	0.032
CADC	0.027	0.113	*0.194*	0.076	0.116
CAOT	0.004	0.039	0.066	0.018	0.040
SHGO	0.018	0.006	0.014	0.002	0.010
PIFA	0.166	*0.300*	*0.419*	*0.420*	*0.314*
PISB	0.048	0.150	0.061	0.047	0.047
PIPI	0.076	0.064	0.083	0.036	0.054
POLH	*0.237*	0.058	0.051	0.082	0.152
POFA	*0.418*	*0.237*	0.056	*0.307*	*0.233*

Note: The most significant shares are in italic.
Source: Own calculations.

This last result has however two negative consequences. First, it hampers the possibility to apply the standard regression method to estimate and test statistically the following relationship between the observed and theoretical compound feed cost:

[1] It means that FUM's for farms are linearly dependent.

28. $c_{nl} = r_l F(\beta_l, v^*_{nl})$

where the estimated values v^*_{nl} are treated as the given data.

Second, independence of the compound feed composition and farm characteristics means degeneration of the model what can be a source of numerical problems when the model is solved. There are three possibilities to overcome this problem in the future. First, we can use the decreasing return to scale mixing function F instead of constant return to scale function. Second, we can assume the mix function is farm specific, which can by done by introducing some farm dependent variables in its specification. Thirdly, we can assume that it is a *trade-off* between feed components purchased and produced by farms. This means that the nutritional constraints and feasibility constraints of the compound feed model (1) - (4) should include the compound feed produced by farms (called 'the internal feed' in our paper) [1].

11.7 Conclusions

In this paper we developed a new method for the joint estimation of a feed demand model and feed utilisation matrices based on farm data supplemented the macro-data. The theoretical framework for our method is a non-linear programming model describing profit-maximising behaviour of compound feed producers. The specification of the model ensures continuous and smooth feed allocation responses to price changes and allows to include linear restrictions to account for both engineering information and other a priori restrictions. To estimate the compound feed model, a three-step iterative procedure was developed. The jack-knife method was use to assess the reliability of the estimates.

The estimation procedure uses individual farm data while additional macro-data are used to ensure the consistency of micro-estimates with macro-aggregates. In this way micro-macro consistency is maintained. To generate unavailable farm data necessary for the estimation, a special data-model that generates unavailable figures from available farm data was developed.

The method proposed was applied to farm data for the Netherlands provided by the European Farm Accountancy Data Network. Estimation results show that the model performs very well. The model parameters were estimated with high precision but at high computational costs. The feed utilisation matrix obtained is consistent with results presented in other sources. The estimation procedure was, however, slow and should be improved.

The developed method provides a consistent framework, which can be used to estimate feed utilisation matrices as well as other unobserved macro-data from micro (farm) figures. Moreover, the usage of farm data allows for a relatively high disaggregation of the model in terms of numbers of products and production factors.

The modelling framework proposed in this paper can be extended to model compound feed and roughage production on farms consistently with compound feed production

[1] We applied the first solution proposed above in our investigation, but it did not improve the estimation results significantly. The two other solutions lead to a model explaining livestock producers' behaviour. It will be a subject of future research.

by the feed industry. In this case the compound feed model should be reformulated to describe farmers behaviour with respect to animal production. It should take also into account the vertical integration of the compound feed industry and farms having livestock production. The advantage of such an approach would be the consistent modelling of the whole feed-livestock sector. Such a model could be easily extended to represent the farmer's decision process concerning all agricultural production. Placed in a partial or general equilibrium framework, such a model would be a powerful tool to answer policy questions related to particular farms.

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Workgroup session 3: Discussing bottlenecks and wildcards

Theme

Based on the results in workgroup session 2, Krijn Poppe and George Beers have chosen 8 bottlenecks or 'wildcards': very attractive, but risky suggestions. We are going to discuss these items.

Method

We introduce the Open Space Technology (originally developed by Harrison Owen, USA). The idea behin Open Space is self management: there is an optimum in participation and involvement if experts like you get the space and time to discuss their favourite topics with other interested persons. This self management leads to quality. Why spend your time on topics selected by a conference organiser, and listen tot speeches you're not interested in? The most interesting things are always discussed in the lobby of a conference, not in the official sessions.

Open Space has four principles:

1. whoever comes to a discussion, they are always the right persons;
2. whatever happens: that's fine;
3. it starts when it starts;
4. it ends when it ends.

And there is one big rule: the law of *voting with your feet*. If you have the impression that you're in a place where you can't learn anything or can't contribute anything, just leave for a better place.

Our Open Space works as follows: we have put the 8 themes on a flip chart in different places. You are invited to go to the flip chart and discuss what ever you wish (more or less related to the theme, but you can even change that) with other persons available. We assigned one person to each theme, and request him to make notes on the flip chart of things that seems to be important for the future. Remind the principles: just start with who is there.

Whenever you think that the law of voting with your feet applies: just leave. This is also true for the persons that make notes: he or she can always give somebody else the pen, and leave.

We stop after 1 hour and then discuss results and method.

Theme's during Open Space

* Interactive Discussion Forum
* Servicing Research Forum
* 'Other links' (coöperation/examples)
* Papers and documents (results of use of FADN-data)
* School classes for development (contest)
* Advertisements/commercials
* Interactive database with different levels/entries
* F.A.Q.

what must be done/what certainly not to do

Chairpersons for the workgroup session 'Discussing Bottlenecks and wildcards'

- J. Boone
- W. Kleinhanss
- G. Larsson
- B. Meier
- S. Perachino
- H. Vrolijk
- H.H. Sundermeier
- D. Osuch

OPEN SPACE SESSION

INTERACTIVE DISCUSSIONS FORUM

What must be done

* Alert by email -
* easy to access -
* 'discussion leader' must from time to time exist and suggest themes and delete 'nasty contributions'.
* everybody should be able to start a new discussion forum
* register before use
* close link with papers (discuss papers among others)
* split between main themes and others (by discussion leader)
* content management/manager (assure subject retrieval of actual themes)
* links to related fora
* connect the forum with 'events' in normal life (e.g. the agenda of the next RICA comm. meeting)
* make the forum a supporting tool for clearly indentified (regular) processes

What certainly <u>not</u> to do

limitation on themes
limited access to site
- use the registration data without permission (sending too much emails)
- no discussions that are 'timeless'

OPEN SPACE SESSION

SERVICING RESEARCH PROCESS

What must be done

* Analyse research process:
  - idea
  - review literature
  - search data
  - review first results
  - local expertise
* provide 'pages' for each process
* 'membership' pages: researchers contribute page that describe their skills
* organize a group of FADN-research-managers
* identify <u>needs</u> of researches
* call it EU-research <u>infrastructure</u>
* methodological background
* is there a need for <u>interactive</u> research
  ↓
  yes: local expertise
  ↓
  then run it as an interactive project. Not as your own project, asking for input/ favours.
  ↓
  groupware for interactive research
  'peer to peer' → Napster Gnutella
* remember need of extension
* organise downstream info-flow to stake-holders
* e-mail adress of FADN-representatives
* instruction about <u>main</u> differences in methodology
* all documents in english (or at least summary)
* research oriented links

What certainly <u>not</u> to do

- leave it to the goodwill of some individual researchers
- complicated solutions:
  - technically
  - maintenance
  - training of users
- 12 languages
- don't focus on technics it's a communication issue

OPEN SPACE SESSION

'OTHER LINKS' (co-operation/examples)

What must be done

- Eurostat:
  - EAA
  - IAHS
- Liaison Agency (MS) (national FADN)
- what to find at links
- research institutes
- search engine
- contact persons
- update
- grouping links (structure)
- European Commission
- Pacioli website (under construction)
- FADN: non member states
- Governmental websites
- national FADN websites should provice national links
- food consumer-oriented site
- make link with 'nice to known' sites
- make cost-benefit analysis to each link

What certainly not to do

- outdated links
- links to commercial firms
- not relevant links
- not maintaining the links (add NEW links)
- structure links at the development stage

OPEN SPACE SESSION

PAPERS + DOCUMENTS

What must be done

* identify responsible persons/institutions + link
* solutions to multi-language problems
* site X by language?
* search by language
* possibility to give comments on papers
* Site 'X' shouldn't be only for managers but for large public
* prepare data base
* apply search engine
* structurising by users, topics, ...
* clear ID of authors and how to contact (standard format?)
* identified person:
  George

What certainly not to be done

* gathening all types of documents
  → see 'quality level'
* not to use unreadable formats
* no anti-virus check

OPEN SPACE SESSION

PAPERS & DOCUMENTS (RESULTS OF USE OF FADN-DATA)

What must be done

1. establish an attitude among researchers:
   - if FADN data used, send it to SITE 'X'
2. SITE 'X':
   implement a central forum/platform for/ by FADN-managers
3. 'Energy maintenance'
   - monthly price for the test upload
4. solution for ©-issues
5. facility for recommendations on publication
   * comments 'reviews'

What certainly not to do

* go home and do nothing after PACIOLI
* no copyright-barriers for upload
* no limitations for uploads (technical, reviews ...)
* no limitations for down loads
* not ignore general conventions for interest use

OPEN SPACE SESSION

SCHOOL CLASSES FOR DEVELOPMENT (CONTEST)

What must be done

* find schools, that are interested
* provide task formulationm, expected outcomes
  → write good projectplan
* price (attractive !)
* contact person / helpdesk during development
* task form (including proposal for maintenance, long term costs)
* try to organize international cooperation
* multilingual
* state professional requirement definition
* start without a preselection of schools
* give ideas on a portal for agr. statistics (incl. FADN)

What certainly <u>not</u> to do

* forget ENITA
* avoid preelection of schools

* no contest because then it is not possible to cooperate closely with FADN-manager (?)

OPEN SPACE SESSION

ADVERTISEMENTS / COMMERCIALS

What must be done

- inventerisation of experiences
- identify:
  1. content
  2. users → community
  3. companies with commercial interest in the community
  4. board of interest groups
- maintain a level of seriousness/objectivity
- develop conceptual framework
- somebody as driving force
- businessplan 'money in/out'
- project manager
- international orientations

What certainly <u>not</u> to do

- make a dot.com company
- advertisement & commercials !
- give false expectations

OPEN SPACE SESSION

INTERACTIVE DATABASE WITH DIFFERENT LEVELS/ENTRIES

What must be done

- keep it as simple as possible
- official comments (EU + national level)
- statistics + economics
- requests
- select + gathering
- give results + links + advices + helps + competent administrator
- provide replies step by step
- tables with raw data
- results of 'ready to use' analysis with comments
- tables easy to download (access)
- consider OLAP-services
- define privacy rules
- make it an application (i.s.o. a database)

What certainly not to do

- complex database (simple isn't for all clients)
- make false interpretation
- automatisation of replies
- just dates, tables, figures and charts without a clear glossary containing definitions (possibly in more than a language)
- overestimate privacy and other restrictions on the use (don't behave as a monopolist)

OPEN SPACE SESSION

FAQ

What must be done

- Easy to acces
- Find the FAQ
- Handle CEEC questions
- Make clear who is answering questions
- make clear when you answer the question (next day ...)
- frequently updated
- if many questions: search engine or themes
- structure questions
- answer the questions fast
- only top 10 questions
- structure for different types of users - FAQ for ... (different groups)
- change management content management
- connection to discussion FORUM-site
- link to glossaries definitions and methods

What certainly not to do

- not too many
- give unreliable answers !

12. A new methodology for stratification and weighting of the Belgian FADN

Dirk Van Lierde, Nicole Taragola, Jean-Marie Bouquiaux and René Hellemans [1]

Abstract

In PACIOLI 3 the Belgian delegation presented a paper on the revision of farm typology in order to obtain more continue accountancy data series. This paper reports on how these propositions were developed, introduced and worked out in the Belgian FADN. The most important change was that for the determination of the farm typology the most recent sets of standard gross margins (SGM) are used, and that this SGM's are calculated over a period of five years instead of three. The observation field of the farm accountancy data network (FADN) has now a lower and an upper limit, before there was only a lower limit. The limits of the field of observation and the dimension classes were expressed in standard units of dimension (SUD). When a new set of SGM's is used the value of a SUD is adapted using the evolution of the weighted total SGM. The results of working with the new system were satisfying and the results of the Belgian FADN are now more adapted to the evolutions in the agricultural sector.

Keywords: accounting data, standard gross margins, profitability, agriculture, typology

12.1 Introduction

In the PACIOLI project a lot of attention was paid to the improvement of data-models of farm accountancy and the improvement of the calculation of results based on the data of farm accountancy data networks. In PACIOLI 3 the Belgian delegation presented a paper 'Revision of farm typology in order to obtain more continue accountancy data series' (Taragola N. and D. Van Lierde, 1996). This item was selected as one of the project proposals that were developed at PACIOLI 4. The project proposal included the development of a new farm typology that is more stable, less complex and less expensive and that provides a better methodology for classification and weighting of the Farm Accountancy Data Network results (FADN), provides a simplified Standard Gross Margins-classification (SGM) system, is adapted to the new member states, includes new aspects in typology (environment, regional diversity, ...) and were the costs for classification of farms would be lower. This project proposal was named 'Typo 2000^{+}' (Beers et al., 1997). Unfortunately till now no stakeholders are prepared to fund this project. On the other hand the Belgian project to

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improve the own farm typology was continued and finally finished in 2000. The results of this project will be presented in this paper.

12.2 Former situation in the Belgian FADN

In 1986 a new weighting system was developed for the Belgian FADN. In this system the community typology for agricultural holdings as described in the Official Journal of the European Communities (N° L220) was used. At that time the researchers decided to use the set of standard gross margins that are centred on '1980', and to use the same set of SGM's for ten years and then change. The lower limit of the field of observation was fixed at a total SGM of 0.5 million Belgian francs, and the limits of the dimension classes were expressed in monetary values. As it was clear that the same set of SGM's was used for a longer period than ten years, and as the use of the same set of SGM's for a longer period gave difficulties for the continuity of the data series, propositions were made to change this system. The intention was to change the typology and the weighting system in order to obtain more continue accountancy data series. The most important changes that were proposed were:

- changing regularly the set of SGM's that were used;
- calculation of sets of SGM's for a longer period than three years;
- limiting the field of observation, excluding the smallest and largest holdings from the population;
- expressing the limits in something else than monetary values.

The ideas to change were first mentioned in 1996 at PACIOLI 3. It took several years before the work was started but finally it was done in 2000. The exercise was done with the data of the agricultural census and the accountancy data of 1997. The results that were obtained in the Belgian FADN are discussed in the following sections.

12.3 Adapting the period to calculate the SGM

Normally the sets of SGM's are calculated over a period of three consecutive years. SGM's are calculated as the difference between products and direct costs, they are strongly influenced by the quantities and prices of products and costs. In general, and for the same production, the quantities of means of production are rather stable for the consecutive years, the prices of the means of production are also rather stable. This results in rather stable direct costs for a production over the years. This is not the same for the products. At the production side there can be rather great differences in produced quantities of products, due to changing weather conditions and other events. Also for some products prices are very unstable, for example slaughtering pigs, potatoes etc. For some of this products there are even real price cycles. All this results for some products in great differences in SGM's over the years. For an efficient use of the farm typology it is better to smooth down this temporary differences. On the other hand it is a fact that in the long term, as a result of technical changes or changes in market conditions SGM's will change, and the ratio be-

tween SGM's of different productions will change. Consecutive sets of SGM's should reflect the changes in the long term but temporarily fluctuations should be smoothed down. It was proposed to adapt the calculations of the SGM's by extending the period of three years.

At the Belgian FADN a number of calculations were done, SGM's were calculated for periods of 3, 5 and 7 years. For productions susceptible to strong price fluctuations, for example slaughtering pigs, a clear improvement was obtained calculating the SGM's over a longer period. Figure 12.1 shows the different sets of SGM's for slaughtering pigs calculated for different periods. Figure 12.1 shows that the annual fluctuations of the gross margin of slaughtering pigs are important. The SGM's calculated for a period of three years still show rather great differences. The variability of the sets of SGM's calculated for a period of five years is already less important, and it is very small for SGM's calculated for a period of seven years. The longer the period the better a possible trend can be discovered. A disadvantage of a longer period is that the set of SGM's is not very close to the actual situation. Suppose the most recent accountancy data available for the calculation of a set of SGM's is 1998 (available at the end of 1999 or at the beginning of 2000), then a set of SGM's based on a period of seven years is calculated for the period 1992-1998 and is centred on 1995. This set of SGM can be first used on the data of the census of 2000 or the accountancy year 2000. This results in a weaker relation with the actual developments in agriculture. Considering these elements the Belgian FADN decided to use a set of SGM's based on a period of five years. For practical reasons (availability of staff members) the sets of SGM's are not calculated every year, but they are determined every two years.

Figure 12.1 Different sets of Standard Gross Margins of slaughtering pigs; sets based on 1, 3, 5 or 7 years

12.4 Limiting the field of observation

Just as in the FADN's of other countries the sample of the Belgian FADN is not representative for the whole population of farms in the country. The smallest farms are not represented in the sample. In the community FADN the lower limit of the Belgian FADN was 12 European standard units (ESU), this was recently increased to 16 ESU. For national purposes the standard gross margins of the holdings were calculated using the set of SGM's based on '1980', and the lower limit was fixed at a SGM of 0.5 million Belgian francs. This national limit is in the average the minimum dimension of a farm that guarantees the full employment of one person. When the same set of SGM's is used every year, there is no problem to fix the lower limit of the field of observation; it does not change and is always 0.5 million Belgian francs. If one uses a new set of SGM's it is necessary to fix new limits of the field of observation.

In the new adapted system the smallest farms are excluded from the field of observation. To determine the lower limit of the field of observation a new technique was used. All the holdings of the population were ordered beginning with the smallest holding and ending with the largest farm. The SGM of the smallest holding was added up with the SGM of the second smallest holding and so on till the sum of SGM's was 5% of the total SGM of all the farms in the population. The SGM of the last farm that had to be added to reach this 5 pct. was 800,000 Belgian francs (using the set of SGM's based on '1994'). This limit coincides almost with the limit of 500,000 Belgian francs that was used in the old system of SGM's '1980'.

A problem in the old system was that it is very difficult to be representative for the very large holdings. There are only a limited number of large holdings in the population and including some of these holdings in a representative sample is very difficult. So it was decided that in the new system the largest holdings representing together 5% of the total SGM of the population would no longer be represented in the sample. Using the set of SGM's '1994' the upper limit was an SGM of 15 million Belgian francs.

It is much easier to work with limits that are not expressed in monetary values, so the standard unit of dimension (SUD) was introduced. A SUD was fixed at a value of 200,000 Belgian francs (using the set of SGM's '1994'). The lower limit of the field of observation is now 4 SUD and the upper limit is 75 SUD.

In the new system one changes every two years to the most recent set of SGM's available at that moment. This means that every two years the lower and higher limits of the field of observation should be fixed by excluding the smallest holdings representing 5 pct. of the total SGM of the population and the largest holdings representing 5 pct. of the total SGM. In actual practice this is too expensive and difficult to realise with the present staff. Another, less complicated method was developed.

To adapt the lower and upper limit of the field of observation when a new set of SGM is used, these limits are multiplied with a coefficient. This coefficient is based on the development of the new set of SGM's compared to the basis set '1994'. This coefficient is determined every two years and is calculated using the national agricultural census of the odd years. The total SGM of the whole population is calculated with the new set of SGM that will be used (based on the year that precedes with three years the year of the census that is used). On the other hand the total SGM of the population is calculated using the ba-

sis set of SGM's '1994'. By dividing the total population SGM obtained with the new set of SGM by the total population SGM obtained with the basis set '1994' one obtains the coefficient that is used to adapt the limits. The value of one SUD (basis '1994') is multiplied with this coefficient to obtain the new value of one SUD. For the different series of SGM's the following coefficients and values of SUD were calculated:

Series of SGM	Agricultural census	Coefficient	Value of SUD (Belgian francs)
'1986'	1989	0.840	168,000
'1988'	1991	0.930	186,000
'1990'	1993	0.985	197,000
'1992'	1995	0.985	197,000
'1994'	1997	1.000	200,000
'1996'	1999	1.045	209,000

This way of calculation gives an indication of the evolution of the weighted SGM's according to the composition of the population. The advantage is that the limits of the field of observation always are the same, namely 4 and 75 SUD, and are no longer expressed in monetary values. For the census of 1997 there were 61% of the holdings of the population that belonged to the field of observation. Most of them were small holdings, only some hundreds were holdings larger than 75 SUD (Hellemans, R., 2001).

12.5 Dimension classes

As the economical dimension is the factor that explains most of the differences in profitability of farms the sample and the field of observation is divided into dimension classes. The use of these classes makes it possible to weight the data of the sample in order to obtain more representative results. In total four dimension classes were determined. The limits of these classes are expressed in SUD. The determination of the limits of these dimension classes was based on the composition of the population and on the possibilities to recruit holdings in the FADN. The limits of the dimension classes were fixed so that there was an equal distribution of the holdings of the population over the dimension classes. Four dimension classes were defined, the limits of these classes were chosen in function of the distribution of the holdings in the population (agricultural census of 1997). In the smallest dimension class there were 40 pct. of the holdings of the observation field, in the three other classes there were 20 pct. of the holdings in the observation field. The problem with the first dimension class was that if this class would count the same number of holdings as in the other classes the dimension class would be to small (difference between upper and lower limit). The more it would be rather difficult to recruit enough small holdings that would be willing to keep accountancy. On the other hand variance analysis demonstrated that the proposed classification allowed a better estimation of the average results than if the holdings of the observation field would be equally distributed over the four

dimension classes (the variance of the profitability criteria is smaller between smaller holdings than between larger holdings, so less observations are needed).
Finally the following four dimension classes were proposed:

Dimension class	Limits in SUD	Number of holdings in the field of observation in 1997	
Dim 1	4 - <11	13,072	38.0%
Dim 2	11 - <16	7,490	21.8%
Dim 3	16 - <23	6,982	20.3%
Dim 4	23 - <75	6,831	19.9%

This calculation was only done for the agricultural census of 1997; it was too expensive to do this exercise every year. For the other years the limits of the dimension classes were fixed in SUD as for 1997. As the value of one SUD is automatically adapted when a new set of SGM's is used this means that the limits expressed in SUD do not change.

12.6 Differences between the old and the new system

In the new system a lot of the propositions that were presented in PACIOLI 3 were effectively introduced in the Belgian FADN. The most important change is that every two years a new set of SGM is used. This is necessary as the ratio of the SGM of different productions is not stable over years. Using the same set of SGM for a longer period makes it impossible to take these changes into account. That the ratio between SGM of different productions can evolve in different ways is shown by the evolution of the SGM of milk cows and broilers. The SGM '1989' (based on the data of 1987 to 1991) of a milk cow was 45,972 Belgian francs, according to the SGM '1996' (based on the data of 1994 to 1998) this increased to 50,196 Belgian francs. The SGM '1989' of broilers (production on the basis of an entire year) was for the SGM '1989' 55 Belgian francs, and for the SGM '1996' this decreased to 31 Belgian francs. This decrease was due to a real downward trend of the SGM. This means that according to the SGM '1989' one milk cow corresponds to 836 broilers. Seven years later the SGM of one milk cow corresponds with the production of 1,619 broilers. This means that due to technical evolutions and permanent changes in market conditions the ratio between the SGM of the two productions has changed. This also means that a farm with one milk cow and a farm with 836 broilers had the same economical dimension according to the SGM '1989'. Seven years later, and with the same number of animals, the farm with the milk cow has according to the SGM '1996' an economical dimension that is twice as big as the farm with the broilers. This also means that in mixed farms the importance of the group 'milk production' becomes more important than the group 'poultry'. This can lead to another classification of holdings, even if their structure does not change (same surface of crops, same number of animals).

The typology of the farms of the 1997 agricultural census was calculated once with the SGM '1980' (period of three years, old system) and once with the SGM '1994' (period

of five years, new system). It appeared that about 12.5% of the holdings switched to another farm type when the two sets of SGM were used. For the holdings of the specialised types such as type 1 (general crops), different types of horticultural holdings, fruits and permanent crops, type 42 (beef production), type 502 (poultry) the number of holdings that changed their type was limited to about 1,5% of the holdings. For specialised pig producers, type 501, there were about 6 pct. of the holdings that changed their type. The exceptions on this rule were the specialised dairy farms, type 41. About 20 pct. of this holdings changed their type. Most of them (about 75 pct.) became a type 43 (mixed dairy and beef), the other holdings passed to the types 7 and 8 (mixed farms). For the type 43 almost 18 pct. of the holdings changed their type, most of them became types 7 and 8. The holdings of the mixed types 7 and 8 changed most their type, between 20 and 40 pct. of them changed their type. This indicates that for a good follow up of developments in the population, and for a better representative sample it is necessary to change regularly the set of SGM's.

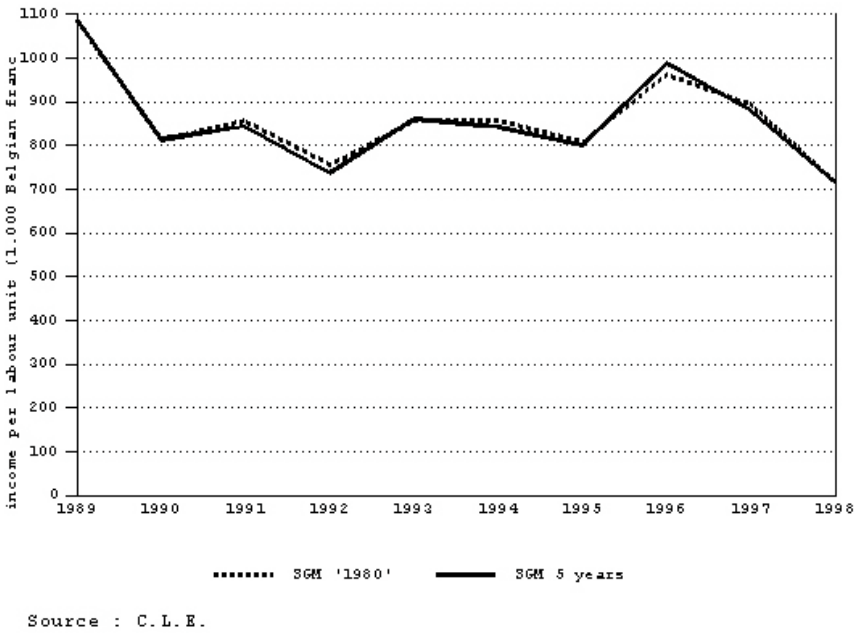

Figure 12.2 Comparison of the evolution of the income per labour unit on the average Belgian farm based on the use of the set of SGM >1980' and the sets of dynamic SGM

As shown before the use of the most recent set of SGM's is very important if one is interested in the evolution of the number of holdings per type. Another important item is that even for holdings that keep their type over the years, it is possible that they change from dimension class. This is important if one uses a stratified sample and weighting system. Holdings of the sample can go to another dimension class and influence the results calculated by the weighting system. Figure 12.2 presents the evolution of the income per labour unit on the average Belgian farm, calculated in the old system and in the new system. It seems that the average calculated income is almost the same for both systems. If

one goes more in detail and compares the incomes for different types of holdings then the differences become more important.

12.7 Conclusions

The changes to the farm typology and weighting system proposed in PACIOLI 3 for the Belgian FADN were finally achieved. Although the idea to use the same set of SGM's for a longer period to determine the typology of farms has some advantages, it has the disadvantage that the link with the developments in agriculture is lost and that it is difficult to find the time one day to change the system. The use of the most recent set of SGM's available for the calculation of typology offers the possibility to follow much closer the actual developments in agriculture. The calculation of the SGM's over a longer period than three years make them more stable, and using these SGM's reflects better trends. The fixing of the limits of the field of observation based on the composition of the population, and the continuous adaptation to developments in the population reflects better the link between this limits and reality. Due to a lack of staff it was not possible to realise exactly what was proposed in 1996, but the new system was very close to this proposals.

The researchers of the Centre of Agricultural Economics used the new system to determine the typology of all the farms in the population (agricultural census) and to calculate the financial results based on the FADN data from 1989 till now. The results were published in some publications (Bouquiaux, J.M. et al., 2000; Van Lierde, D. and Taragola, N., 2000; Hellemans, R., 2001). Most of the stakeholders are satisfied with the new procedures, although it is not always easy for all of them to accept that a farm with the same structures can change in farm type and dimension over the years.

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13. Working procedures for the selection of farms in the FADN

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Abstract

The quality and the representativity of the data of the FADN system depends for a large extend on the farms that are being included in the FADN. To assure a good quality of the sample sound procedures for the selection and recruitment of farms should be established. This paper provides a framework for establishing these procedures.

Keywords: Sampling, Representativity, Selection Plan

13.1 Introduction

FADN is based on a sample of farms. An often-mentioned criterion by the stakeholders is the representativity of the sample. Elaborating on this issue shows that there is not a single clear definition of representativity. Some define representativity as the overall quality of data. Others require that all possible groups of farms should be included in the sample. Groups can be defined on basis of region, type of farming, size class, legal status, age group etc.

To assure a good quality of the sample it is important to establish sound procedures for the selection and recruitment of farms. The EU requires the yearly submission of a report describing the selection plan. Furthermore, a report should be submitted containing a description of the results of the execution of the selection plan.

In this paper the activities that have to be conducted in the creation and execution of a selection plan are described. In section 2 these activities will be described. The description will be given at a somewhat functional level. The actual performance of the activities will require more detailed information. Section 3 describes the organisational responsibilities for the activities and the flows of information between the involved organisations.

13.2 Activities for the selection of farms

The selection and recruitment of farms requires the yearly performance of a number of activities. The yearly activities are:

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- calculate SGM's (every two years!);
- establish Typology of Farms;
- assign Farms to Strata;
- calculate Homogeneity of farms in population strata;
- establish number of farms in population strata;
- decide on number of farms per strata;
- selection of farms;
- recruitment of farms;
- collection of data on farms;
- calculate weights of farms;
- evaluate quality of sample.

Besides these yearly activities, it is worthwhile to conduct a set of initial activities. These initial activities are:

- establish Goals of FADN;
- definition of the population;
- selection of Important goal variables;
- analyses and selection of stratification variables;
- definition of strata;
- choice of allocation procedure.

The activities will be described in more detail in the next paragraph. The next figure displays the dependency relationships between the activities. In this figure also some initial activities are displayed. These initial activities have to be conducted before a thorough selection plan can be established. These activities are initial activities, because they don't have to be repeated every year (however, an evaluation of the results of these activities after a couple of years is useful).

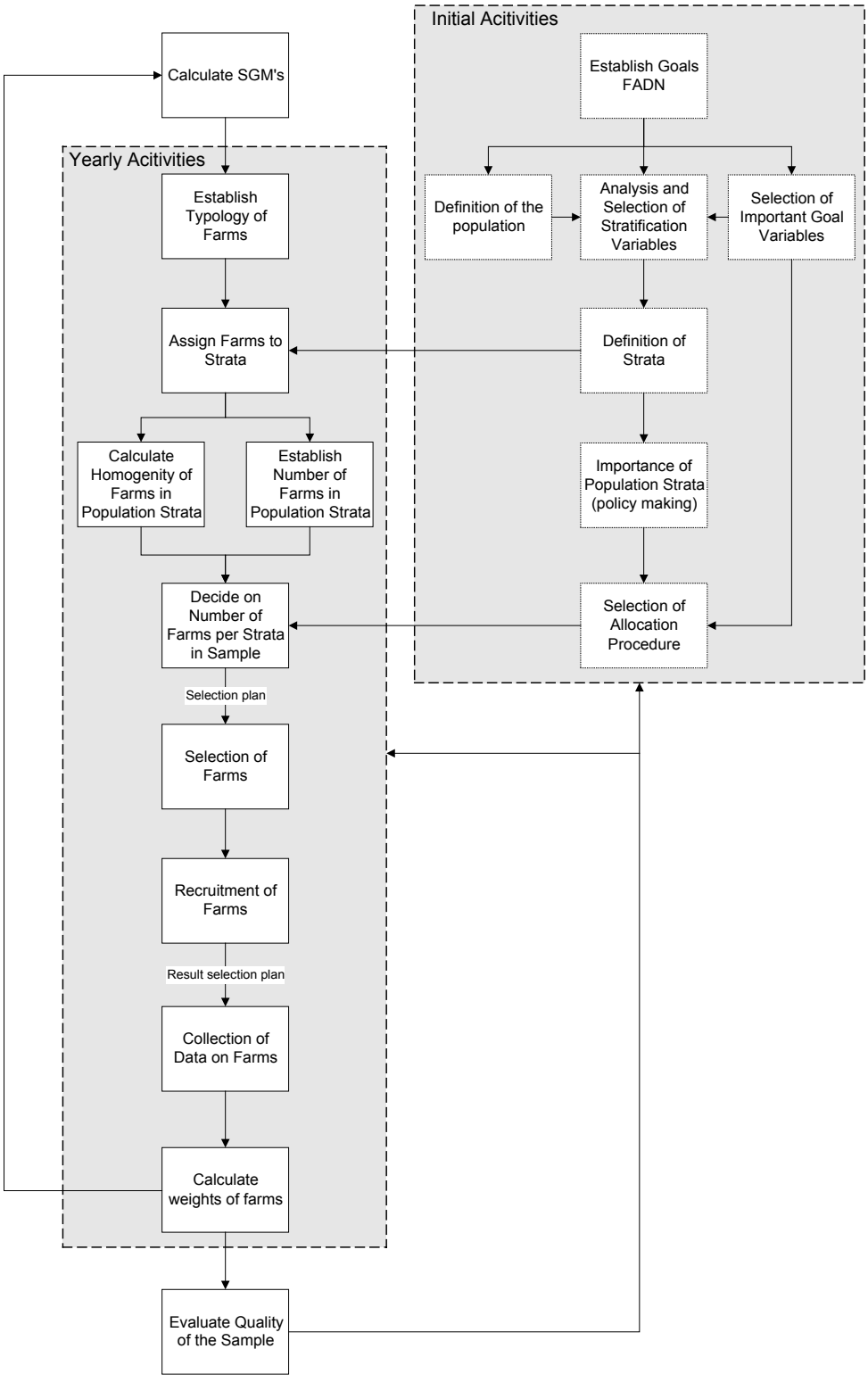


Figure 13.1 Activities related to the selection of farms

Calculate SGM's

Based on the FADN and other data the Standard Gross Margins are calculated. Standard Gross Margins (SGM) are used to determine the economic size of the activities of farms. The standard Gross Margin (SGM) of a crop is calculated as the value of the output from one hectare minus the cost of variable inputs to produce that output. In case of a livestock item it is defined as the value of output from one animal less the cost of variable inputs required to produce that output.

In the European Community the Member States calculate the SGM's on the basis of empirical data collected from farms. To avoid biases caused by fluctuations, the calculations are based on empirical data from 3 years. The fluctuations can for example be caused by weather conditions or variations in input and/or output prices. SGM's have to be updated every two years. Separate SGM values are calculated for different regions and for more than 90 types of crops and livestock.

Establish Typology of Farms

The typology of a farm gives a description of the principal type of farming on that farm. The principal type of farming can subsequently be broken down in a more detailed type of farming. The typology defined at the European Union level is broad enough to cover the many different types of farming that are found in the Union. The type of farming of a farm is established by calculating the economic importance of the different activities on the farm. The relative economic size of the activities determines to what type of farming the farm belongs. The economic importance is measured by the amount of SGM's.

Assign Farms to Strata

Based on the FSS data, farms can be assigned to the defined strata. These strata will be based on the Typology. The EU prescribes the use of type of farming and size (and region) as variables to include in the definition of strata. Member States are allowed to apply a more detailed stratification scheme. Therefore it's necessary to conduct a one time more thorough discussion about the required stratification scheme. This scheme can be applied for some years. Based on this definition of strata, the farms in the population can be assigned to the strata.

Calculate the Homogeneity of Farms in Strata

In some Member States information is available on the homogeneity of farms in the population and within the different groups of farms. This information can be used to compute optimal sampling fractions. If this information is not available sampling fractions can be set according to the number of farms in each stratum/group. To be able to compute optimal sampling fractions it is necessary to calculate the homogeneity of farms in the strata.

Count the number of Farms in Strata in the Population

After assigning the individual farms to strata it is easy to count the total number of farms in each stratum in the population. In case of proportional allocation the number of farms in each strata is used to decide on the distribution of farms in the sample.

Decide on Number of Farms per Strata in Sample

Based on the information from the previous stages, a decision can be made about the number of sample farms per stratum. As stated before, a possible allocation would be based on the number of farms in the population; this is the so-called proportional allocation. In case additional information is available about the homogeneity of farms, this information can be used to make more precise estimates, this is called optimal allocation. The principle of optimal allocation is based on the fact that fewer observations are needed when the farms in a stratum are rather homogeneous. This point is easily illustrated. In the extreme case that all farms would be exactly the same, it would be enough to have one observation to make perfect estimates for all farms in that stratum. If farms would be very diverse, a larger number of observations would be required to say anything useful about this stratum.

Selection of Farms

This task involves choosing the farms that will be asked to participate in the FADN. The actual selection of farms can be done in several ways. From a theoretical point of view there are two approaches: random selection and non-random selection. Random selection means that each unit in the population has a known chance of being included in the sample. In non-random sampling it's not a statistical chance but for example a human being who decides which farm is appropriate to be included in the sample. The latter approach introduces subjective elements in the sampling process. This means that not every farm has the same (and known) chance of being included in the sample. In that case it's difficult to make projections to the population based on the information in the sample. The non-random sampling procedure, which is most useful and provides at least a minimal amount of representativity, is quota sampling. In quota sampling the population is divided into a number of groups (quota) and one continues selecting units in each quota until the number of sample units in a quota equals a predefined number of units. At a first glance this might look similar to stratified random sampling. The main difference is that in quota sampling a human being chooses units that belong to a quota and in stratified random sampling the units are randomly selected from each quota.

In case of (stratified) random sampling, a sampling frame from which to randomly choose the farms must be available. For the FADN sampling process a recent Farm Structure Survey is a good sampling frame. Based on this survey, a list of farms per stratum can be made available. Actually choosing farms can be done in several ways. Using random numbers assures the randomness of the sample. For example, each farm in the list is assigned a random number and the farms with the highest random numbers are selected.

Although random sampling is the most preferred option from a theoretical point of view, practical problems might prevent the use of random sampling:

- the availability of a sampling frame (for example a farm structure survey) is necessarily;
- participation in the FADN is voluntary. If a large percentage of farmers refuse to participate, the recruitment of randomly selected farms can be very cumbersome.

If random sampling is not a feasible solution, quota sampling might be the second best option. In practise, in quota sampling the actual selection of farms is often done by accounting offices.

Recruitment of Farms

Selected farms should be visited in order to ask whether they are willing to cooperate. A certain percentage of farms will refuse to participate. This causes a few problems. The first evident problem is that the cost of recruitment increases due to the fact that a larger number of farms must be visited. A second and from a statistical point more serious problem is the possible bias in the non-response. A bias might occur when the farms that are willing to cooperate are systematically different from the farms that refuse to cooperate. If for example only efficient firms are willing to cooperate the results of the FADN will give a to positive picture of the population.

Collection of Data on Farms

This step involves the actual data collection on the farms. This step will not be further discussed in this paper.

Calculate the weights of farms

At the European level a weighting system is used in the calculation of FADN results. The purpose of the weighting system is to take into account the different sampling fractions for different cells. In the production of FADN results, weighted averages are calculated. For each holding in the sample, an individual weight is calculated. In order to calculate this individual weight, holdings in the sample and in the field of survey are stratified according to the same criteria: type of farming and economic size class and national sample criteria. The individual weight is equal to the ratio between the number of holdings in the population and in the sample (in a specific stratum).

Evaluate Quality of the Sample

After the sample has been established (when the farms have been recruited) the quality of the sample can be evaluated. A first simple check is whether the number in the selection plan is equal to the number of farms in the sample. A more sophisticated check is whether the characteristics of the firms in the population are different from the farms in the sample. This gives some indications about the representativity of sample with respect to these variables. For examples, a comparison of the average economic size in the population with the average economic size in the sample will indicate whether the sample is representative for

the economic size. To make a real comparison not only the average in the sample should be calculated but also the standard error of the estimate. Economic size is not the only indicator. A list of variables could be constructed to conduct this analysis, for example: the number of animals, the acreage of the farm etc. The list of variables is of course limited to the variables, which are available in the Farm Structure Survey.

The conclusions of the evaluation can result in short term changes in the yearly activities, and in long-term changes (periodic re-evaluation of the initial activities).

The initial activities are:

- *Establish Goals of FADN*

The design and construction of a Farm Accountancy Data Network should start with a thorough discussion about the goals of the FADN. For EU member states one of the obvious goals is the provision of data to the European Community. It should be made clear whether national use of the data is also important. The national goals can for example influence the definition of the types of farming. If a specific group of farming is very important from a policy making point of view, it can be considered to include this group as a separate type of farming in the FADN design.

- *Definition of the population*

According to the EU regulation the field of observation consists of 'commercial' farms. A commercial farm is defined as a farm which is large enough to provide a main activity for the farmer and a level of income sufficient to support his or her family. In order to be classified as commercial, a farm must exceed a minimum economic size. The economic size of farms is expressed in terms of European Size Units (ESU), which is based on the total SGM of the farm. As stated before, those farms, which exceed a certain economic size in ESU, are defined as commercial, and thus fall into the field of observation. However, because of the different farm structures in the European Union, it is necessary to specify separate thresholds for each Member State.

- *Selection of Important goal variables*

In the deliberations on the goals of the FADN it's also important to pay attention to the question what the important goal variables are in the FADN. Or in other words what kind of information needs to be collected in the FADN. The answer to this question directly affects the information to be collected in the FADN. If the only goal of the FADN is to provide Brussels with information, the answer to this question can to a large extend be found in the European Farm Return. Besides the content of the information to be collected it also affects more fundamental design issues of the structure of the sample. This will be further discussed in the following steps.

- *Analyses and selection of stratification variables*

Stratification is a statistical technique that is used to increase sampling efficiency (i.e. to minimise the number of farms required to represent the variety of farms in the field of observation). The Commission makes extensive use of this technique and uses three criteria for stratification: region, economic size and type of farming.

An interpretation of representativity in the meaning of including all possible groups (and intersections of groups) in the sample easily leads to a sample design in which as many variables as possible are used as stratification variables. The obvious advantage of this approach is that all groups are included in the sample; the major drawback of this approach is that in most occasions the number of sample farms is insufficient to be able to draw even one farm from each stratum.

It's therefore interesting to study this problem from the other extreme. No stratification at all. A sample can be drawn based on a simple random sampling procedure (in which each farm has the same chance of being selected into the sample). This sample can be used to make estimates for the population. This is a very acceptable procedure to make estimations for the population.

Subsequently one can consider distinguishing a limited number of groups/strata in the sample. The available number of sample farms will give some space to define strata. Two reasons for defining strata can be applied:

- reporting considerations. If policy analysis or other research questions are related to specific groups it's useful to have separate estimators for these groups. In that case it might be worthwhile to define the groups as separate populations and treat them as separate strata;
- content considerations. If the total population is rather heterogeneous, but at the same time more homogeneous sub-groups can be defined, it can be worthwhile to define these groups as separate strata in order to make more reliable estimates. Judging whether the population is homogeneous or heterogeneous requires the selection of important goal variables.

If separate reporting is not necessary and the groups are rather similar, it's not worthwhile to define them as separate groups. If there are homogeneous groups in which the farms are rather similar and there are large differences between the groups, it is interesting to define more strata from a statistical perspective. If one wants to report or study separate groups, it can be interesting to define separate strata even if the groups are homogeneous. This depends on the number of population units, the number of sample units and the resulting chance of having enough sampling units of each separate group when these groups are not explicitly distinguished in the sample design.

- *Definition of strata*

Given the selection of the stratification variables the definition of the strata is a rather straightforward activity. Each combination of the levels of the stratification variables results in a stratum.

- *Importance of strata*

For the allocation of sample farms over the strata it is necessary to make some statements about the importance of strata. There is no unique indicator of the importance of strata. Indicators for the importance of strata that could be used are for example the number of population farms in a stratum or the economic importance of a stratum (sum of the SGM's). Another aspect might be the policy importance of certain types of farming. Policy makers

might be more interested in types of farming that get more financial support from the government.

- *Choice of allocation procedure*

Sampling fractions vary from cell to cell. In some Member States, the Liaison Agencies have sufficient data on the variability of farms within the field of observation to compute optimal sampling fractions (optimal allocation). In other cases, this is not possible and sampling fractions are set according to the number of farms in the cell (proportional allocation).

13.3 Organisational responsibilities

In chapter 2 the activities related to the selection and recruitment of farms are described. In this description no attention has been devoted to the question who is responsible for the performance of these activities. This chapter will deal with this question.

The organisations involved are mainly dependent on the availability of information. The most important information sources to fulfil the activities are the Farm Structure Survey and information from the FADN itself. If these sources are available within one organisation, all activities can be conducted by this organisation. In many EU member states the FSS data are not available to the organisation or unit, which is responsible for the FADN. In this case some kind of co-operation between organisations is required. Co-operation between organisations of course requires a lot of co-ordination and communication. The extent to which this is possible depends on the interest of both organisations in co-operation and on the quality of the relationship between both organisations.

The decision whether to co-operate or not also affects other decisions. For example, if random sampling is preferred, it is necessary to have access to the individual FSS data. If this access is not available, random sampling might not be a feasible solution and quota sampling might be the preferred alternative.

13.4 Summary

To assure a good quality of the sample it is important to establish sound procedures for the selection and recruitment of farms. The EU requires the yearly submission of a report describing the selection plan. Furthermore, a report should be submitted containing a description of the results of the execution of the selection plan. In this report the activities that have to be conducted in the creation and execution of a selection plan are described. A distinction is made between initial and yearly activities. These initial activities have to be conducted before a thorough selection plan can be established. These activities are initial, because they don't have to be repeated every year. An evaluation of the results of these activities after a couple of years is useful. The yearly activities have to be done every year to establish the yearly selection plan.

This report also devotes attention to organisational responsibilities for the activities. The organisations involved are mainly dependent on the availability of information. The

most important information sources to fulfil the activities are the Farm Structure Survey and information from the FADN itself. If these sources are available within one organisation, all activities can be conducted by this organisation. Otherwise co-operation might be necessary. In that case special attention should be devoted to the communication and co-ordination between the organisations. A plan can be established to make sure that the activities are finalised in time.

14. FADN as a part of the statistical system - the case of Sweden

Ann-Marie Karlsson and Gunnar Larsson, Statistics Sweden

Comparability and coherence are important aspects of the quality concept of Statistics Sweden. Harmonised definitions is a basic requirement to achieve this. A comparison of definitions of the agricultural sector in FADN and EAA can illustrate this. There are also differences in definitions between Swedish FADN and EU-FADN.

OH-1

EU-FADN DEFINITIONS OF THE AGRICULTURAL HOLDING

AGRICULTURE, HORTICULTURE, FORESTRY AND TOURISM CONNECTED WITH THE FARM

Lower cut off limit: 90-95% of total SGMs must be included

Not included:

Non-farming activities of the holder or of his family

The holding's production resources (paid or unpaid labour, machinery or equipment) used to increase fixed assets are only included in the depreciation.

The definition of agricultural holding differs between the Swedish FADN and EU FADN.

OH-2

NATIONAL FADN DEFINITIONS OF THE AGRICULTURAL HOLDING

ACTIVITIES IN AGRICULTURAL HOLDING:
- *Production of field crops and animal products*
- *Horticulture (if it is not dominating up to 50% of turn over)*
- *Maintenance of machinery, equipment and buildings*
- *Contract work, machinery for hire (if it is not dominating, up to 50% of turn over)*
- *Planning, bookkeeping, administration*
- *Forestry (results are split up between agriculture and forestry)*

Not included
- *Farm tourism (letting of cottages)*
- *Aquaculture*
- *Processing of food, marketing*
- *Handicraft*

There are also other differences in definitions between Swedish FADN and EU-FADN. The main reason for limited comparability between EU- and national level is that the users wanted unchanged time series before and after Sweden entered the EU.

OH-3

COMPARABILITY BETWEEN SWEDISH FADN AND EU-FADN

Farm Return, income indicators

Typology

Weighting

OH-4

ECONOMIC ACCOUNTS for AGRICULTURE (EAA)

BASIC UNIT
Local kind-of-activity units (KAU)

AGRICULTURAL 'INDUSTRY'
By grouping KAU:s engaged in the same activity an 'industry' is established
Analytical approach - statistical approach

Activities included
- *Crop growing, market gardening, horticulture*
- *Farming of animals*
- *Agricultural contract work (including specialised units providing machines and personnel for p-erformance of agriculture)*
- *Hunting, trapping*

INSEPARABLE NON-AGRICULTURAL SECONDARY ACTIVITIES
- *Intended for sale*
- *Characteristic of agricultural holdings*
- *Must not be ancillary activities*
- *Must not include activities involving gross fixed capital formation*

Activities included:
- *Processing of agricultural products*
- *Grading and packaging*
- *Agro-tourism*
- *Sports and rural recreation*
- *Agricultural services for third parties*
- *Landscaping services*
- *Fish-farming*
- *Other activities involving the use of the land and the means of agricultural production*

As can be seen the definition of the agricultural sector differs between EAA and FADN (at EU-level as well as national level). This must be taken into account when FADN macro estimates are used in EAA.

Regarding statistical methods the Swedish FADN is integrated the Swedish statistical system.

OH-5

STATISTICAL METHODS

Sampling, non response

Information on accuracy

Documentation

Also in dissemination FADN is integrated in the Swedish statistical system.

OH-5

DISSEMINATION

Sweden's Statistical Databases

Statistcs Directly on the website

Portal site 'Directory of Swedish agricultural statistics'

Quality work in FADN

The Swedish FADN is part of the Official statistics of Sweden and is produced by Statistics Sweden. This means that the quality measurements implemented at for Official statistics at the central level of Statistics Sweden also are relevant for the production of FADN.

The quality work can be divided in the items shown below:

OH-6

Quality Policy: Official statistics of Sweden
- Focus on user needs
- Contents
- Timeliness
- Availability
- Accuracy
- Comparability

The quality work is carried out systematically for example in different projects. A number of documents have been produced in order to find the Current best methods of doing different parts of the survey processes. Quality development for example timeliness

is monitored by means of an annual quality survey. Studies are also made to find out about the users view of the Statistics and the services provided by Statistics Sweden.

OH-7

Systematic quality work

- Total Quality Management projects
  - User demands for quality
  - Description of the process
  - Identification of basic causes to problems
  - Collection of meaningful data
  - Possible solutions
  - Implementation
  - Continued development
- Current Best Methods, Quality Policies
  - Standardise processes
  - Make use of the latest best practices
  - Provide reference documents
- Annual quality survey
- Studies of the user's view of statistics

Workgroup session 4: Making an action plan on the FADN web site

Theme

Based on all our discussions related on the FADN web site for clients, we make action plans for the things to do. An important challenge is to make SMART (specific, measurable, acceptable, realistic and time-specific) plans for things to do. It is not necessary that you commit yourself to the plan or parts of it. That is a different topic, that however can be discussed.

Method

Different groups are asked to discuss and write down an action plan, using the following format:
- objective;
- actions;
- deadline;
- resources needed;
- who wants to take action?

On a EU-FADN-site

Group 1 'School classes for development'
Koen Boone

Group 2 'Interactive discussions forum'
Bernard Del'homme

Group 3 'F.A.Q.'
Arto Latukka

Group 4 'Papers and documents'
Nicole Taragola

Group 5 'Servicing research process'
Ann-Marie Karlsson

- learn how open-space ideas go into project plan
- support your own website development
- perhaps a PACIOLI website or EU FADN release 2.0 website?

Workgroup session 4: Groups for the workgroup session 'Making an actionplan on the FADN web site'

Group 1 'School classes for development'
J. Boone (chairperson)
Y. Plees
M. Njavro
H.H. Sundermeier
S.C. Cernea

Group 2 Interactive discussions forum
B. Del'homme (chairperson)
Z. Kubikova
S. Perachino
W. Kleinhanss
K. Grabowska

Group 3 F.A.Q.
A. Latukka (chairperson)
D. van Lierde
J. Jalast
G. Larsson
D. Osuch

Group 4 'Papers and documents'
N. Taragola (chairperson)
H. Vrolijk
V. Bratka
E. Øvren

Group 5 'Servicing research process'
A-M. Karlsson (chairperson)
B. Meier
Z. Jurisic
M. Lekesova
A. Tabeau

Workgroup session IV Group 1

Objective
* content → FADN unit
  realisation it → school (design etc., graphs)
* assumption content as known

1. Task description (what do we want?)
   - technical constraints
   - time
   - selecting committee
2. organising contest
   - number of schools
   - countries
   - publish
3. selecting schools
4. make a final proposal
5. contact person + helpdesk
6. Check the end result

Deadline:
Start 1 january 2002?
Time needed: half a year (after project is offered to school)

Total: about 1 year

Resources needed:
* 25 days
if procedures Commission are needed > 25 days

Who wants to take action:
?

Workgroupsession IV Group 2

Interactive discussions forum
(part of a larger website)

Objectives:
- open but identification of speakers
- general subjects (no pre-defined) (chat)
- some domains pre-defined (either differentiation/tasks/countries)

Actions:
- find people able to create such forum or to maintain, to sustain
- find money
- advertising once created

Deadline:
- beginning 2002

Resources needed:
- few at the beginning

Who wants to take the action?
- see stakeholders (FADN managers, research institutes, universities)

Workgroup session IV Group 3

Objective:
FAQ
- more information to clients
- decrease work burden on national level and in EU

Actions:
- questions from national level/EU
- answers
- application

Deadline:
A.S.A.P.

Resources needed:
- Money
- Time
- People

Who wants to take action:
- someone in Commission
- national level help

Workgroup Session IV Group 4

Objective:
Development of a website which provides access to relevant papers and documents for the stakeholders of the FADN

Actions:
1. define users and their needs
2. make an inventory of existing documents and papers
3. design structure of the website
4. implement the structure
5. uploading of existing papers and documents

Deadline:
1/6/2002

Resources needed:
Project-manager → 12 days
Interviewer(s) → 30 days
Designer → 10 days
Web-developer → 15 days
Content manager → 15 days

Who wants to take action:
?

Workgroup session IV Group 5

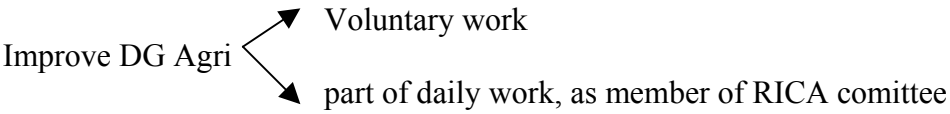
Objective:
Servicing research process
- public meeting place for
  - discussing problems
  - sharing results
    - tables
    - commentes
    - etc.
  - organize up-stream of information

Objective not clear ⟷ ideas for DG Agri or totally new website

Actions:
* make a business-plan (step by step)
* establish working group
* analyze what already exists (benchmarking)
* collect useful information ⟷ user needs

Deadline:
Improve DG Agri → 6 months
Completely new: → 1 year

Resources needed:



Completely new: 3 people working a year Instrastructure etc.

Who wants to take action:
Existing network, institutions
- for example PACIOLI

15. Information on PACIOLI 10 - European farmers and the growing of data [1]

Background

European agriculture has become data intensive. A modern farmer runs his operations with the help of geographical information systems and global positioning systems; machines that recognise individual weeds and store their location in real time are now tested. The records on feed intake and the health situation of many animals are much more detailed than those of small children. In addition to this the farmer has to deliver a lot of data to public authorities, in order to justify his environmental performance, to get subsidies, to pay taxes, or to track the movements of animals. Consumers and down stream industries are also increasing their demand for data in the name of food safety issues (tracing and tracking) and quality management.

Policy makers, and their policy economists, have also become 'addicted' to data. With the introduction of direct subsidies, and tailored to specific situations by modulation, the execution of the Common Agricultural Policy has led to an increase in paperwork and to large databases. In policy research micro economic data sets (like the European Farm Accountancy Data Network) have become very important for ex-ante and ex-post evaluation of agricultural policies, as normal statistics cannot provide simulations on micro level with the quality that micro economic data sets can provide.

The big driving force behind all these developments is of course the Information and Communication Technology (ICT) revolution. It made data more easily available, and it induced farmers as well as policy makers to use it in new ways of working.

The consequences of this growing importance of data and information in agriculture is however not very well taken into account, and even not very much studied. Most of the research in this field has a high degree of system design or empirical analysis: information systems for farmers or the production chain are developed, and only get wider attention if they use the latest techniques. A lot of the policy research with micro economic data remains unpublished, and focuses on the effect of a policy proposal. Sometimes it gets wider attention because new econometric techniques are used.

A number of more fundamental issues however are not often discussed:

- The integration of data in order to reduce 'the administrative burden': in the design of information systems for farmers and in the agricultural production chain, the initiative is often with the downstream industry or a government agency, focused on a limited set of data. The result is that a lot of data has to be provided more than once, sometimes even to the same agency. Farmers, by profession not very interested in paperwork, complain about such an administrative burden, even if it provides them with income. The changes in data needs due to changing laws, makes it hard for software developers to provide farmers with tools for central data management. Pol-

[1] Motta di Livenza (near Venice, Italy), December 1-4, 2002.

icy information systems like Farm Accountancy Data Networks (FADNs) face a similar problem. Can they solve this issue in cooperation?

- The effects on farm size and the future of the family farm: the growth in data reflects the higher levels of control that farmers now have regarding the production process. It means that a skilled farm manager can be responsible for much bigger areas or number of animals than ever before. It also means that he can control the performance of less skilled workers. What does this mean for the future of the small family farm: how large has it to grow, and can this be financed or will the family farm in the end be replaced by another type of operation? Is this an advantage for central European regions? And how will it influence policy information systems like FADNs, that have already problems to handle the very large commercial farms ?
- The effect on the rationale of the agricultural policy: the Common Agricultural Policy started in an area where farmers dominated rural economies, but were often not integrated in tax and social security systems as they were not able to keep books that would be good enough to be audited properly. An agricultural price policy was an efficient transmission mechanism to improve incomes in imperfect labour markets. Nowadays farming counts less in the regional economies and the (fiscal) accounts at farms in many EU countries (be it for VAT, tax or income support reasons) are not only superior in a historical perspective but also compared to many other small enterprises. This raises serious doubts on the efficiency of the CAP as a transmission mechanism to raise incomes of poor rural families. What type of agricultural policy instruments will develop over the next years, and what does this mean for policy information systems like FADNs ?
- The usefulness for agriculture of new types of accounting like green (environmental) accounting, social accounting and accounting for corporate responsibility. How can such forms of accounting be implemented successfully and do they contribute to transparency in the food chain?

The role of farm accounting and farm information systems for farm management and micro economic policy research has been discussed for seven years in a group of practitioners and scientists under the name of PACIOLI. After nine successful workshops (of which the first 4 were organised as an EU concerted action), the group would like to celebrate its Xth meeting with a workshop in the neighbourhood of Venice, where Luca PACIOLI published the first book on double entry accounting in 1494.

Scope

The workshop operates on the crossing roads of ICT, farm economics, accounting, econometrics, agricultural policy, public administration, food production and rural development. Experts and representatives of related disciplines will combine their knowledge on issues like new rural statistics, advanced data gathering methodology and data mining (new) data sources. FADNs are an application in which these disciplines come together to solve actual issues.

This workshop will not focus on the issues discussed from the point of view of one theory or discipline. A multi-disciplinary approach will be followed to improve our knowledge on the more fundamental effects of the ICT revolution in agriculture.

Objectives

The above mentioned issues can be addressed from different points of view. The workshop welcomes theoretical and empirical papers that critically review new developments on:

1. new roads for accounting and FADNs;
2. chain management information systems;
3. policy research with advanced use of micro economic data;
4. the administrative burden connected to policy implementation;
5. the effect of the ICT revolution on farming and agricultural policy.

Papers and discussion notes that present empirical cases or discuss certain issues in the topics mentioned are welcome. Papers on a meta level that signal or analyse trends or review strong and weak points in a number of applications, are especially welcome. The language of the seminar is English.

As in previous PACIOLI workshops, the event will be organised in an interactive way, to stimulate the exchange of ideas. In addition there are plans to organise an invited session that discusses the fundamental issues mentioned above. Due to the workshop character, the number of participants is limited to 40 persons.

Organisation

The workshop is organised by the Agricultural Economics Research Institutes INEA in Rome (Italy) and LEI in The Hague (Netherlands).

Local organising committee:

Carla Abitable, INEA, Rome
Guido Bonati, INEA, Rome
Andrea Povellato, INEA, Padua (chair)
Krijn J. Poppe, LEI, The Hague
Colinda Teeuwen-Vogelaar, LEI, The Hague (secretariat)

Workshop management:

George Beers, LEI, The Hague
Krijn J. Poppe, LEI, The Hague
Colinda Teeuwen-Vogelaar, LEI, The Hague (secretariat)

Date and location

The workshop will be held from Sunday evening 1st December to Wednesday 4th December, 2002. The location will be in an agro-tourism environment at Motta di Livenza, 50 km North of Venice (Italy). An excursion will be held on Tuesday afternoon, December 3, to

Venice, the city where Luca PACIOLI published his famous book on double entry accounting in 1494.

Detailed information on the venue as well as on transport and accommodation will be sent to those who pre-register or is available upon request from the secretariat of the local organising committee.

Call for contributions

Participants who would like to present a paper or provide another contribution are invited to join as soon as possible the interactive preparation of the workshop at the PACIOLI-website: www.lei.nl. or contact the secretariat.

The papers will be published in 2003 in a workshop report by the LEI.

Registration and participation costs

The cost of the seminar is € (to be announced). The participation fee includes registration, refreshments and coffee breaks, lunches and dinners, welcome drink, lodging and excursion. Participants will receive a binder with papers presented and a volume of the workshop report.

Further information on the workshop, registration and accommodation as well as detailed registration forms will be send to those that pre-register. Information will also be available on the web sites of LEI and INEA.

Address for further information and pre-registration:

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