Pacioli 16

Changing agricultural markets: Consequences for FADN

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The PACIOLI network explores the need for and feasibility of innovation in farm accounting and its consequences for data gathering for policy analysis in Farm Accountancy Data Networks (FADNs). PACIOLI 16 took place in Zagreb, Croatia in June 2008. The theme of the workshop was 'Changing agricultural markets: Consequences for FADN'.

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Contents

1 Introduction

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 content of their work and their organisations. For farm accounting and policy supporting FADNs it is appropriate to do this in an international context: this creates possibilities to learn from each other. By bringing FADN managers and data users in micro economic research together, feedback is fostered.

It is with this background that the Pacioli network organises a workshop every year. This year the 16th edition already took place. This small but open network has become a breeding place for ideas on innovations and projects. Pacioli was originally a Concerted Action in the EU's Third Framework Programme for Research and Technical Development (AIR3-CT94-2456). After completion of the contract with the PACIOLI 4 workshop, the partners decided to keep the network alive at their own costs.

1.1 The theme of PACIOLI 16

Agricultural markets are rapidly changing. High economic growth, globalisation and liberalisation had already an enormous influence on agriculture in the last decade with for example a strong demand for agricultural products from China and India. During last years a new customer appeared on the market: a growing demand for biofuels and even more challenging targets for the future as part of the policy to fight climate change. Food surpluses become deficits. Because of these low stock levels prices of agricultural products become very volatile and some of them reach record levels. Countries introduce exports bans and food security is an issue again.

Opposite to these globalisation and liberalisation developments, organic and locally produced foods are the largest growth markets. Next to the production of food, farmers are expected to deliver local services (landscape management, recreation, education, water management).

It is clear that agriculture is searching for new equilibriums. This workshop concentrated on the consequences for FADN.

1.2 Programme PACIOLI 16

Sunday, 8 June 2008

21.00 Meeting at Hotel Laguna Zagreb

Monday, 9 June 2008

09.00 Welcome, introduction workshop programme (Koen Boone)

Paper Session I: Renewal of FADN

09.30 *'Redesigning Swiss FADN - Actual challenges '*
Kaspar Muehlethaler, ART

10.15 *'FADN data collection and processing in Italy: the renewal process'*
Antonella Bodini, INEA

10.45 Break

11.00 Workgroup session 1:'FADN in 2020'

12.45 Lunch

14.00 *Excursion*

Tuesday, 10 June 2008

Paper Session II: Overview of National FADN's

8.45 *'Croatian FADN'*
Kristijan Jelakovic, Croatian advisory service

9.15 *'Dutch FADN - Overview and recent developments'*
Koen Boone, LEI

10.00 *'Collection of additional data in FADN, case of environmental impact of farms'*
Hans Vrolijk, LEI

10.30 Break

10.45	*Workgroup Session 2: 'New information demands for FADN'*
12.30	Lunch
	Paper Session III: FADN in a wider perspective
13.30	*'Exchange of data for decision making in Norwegian agriculture and Consequences for the Norwegian FADN'* Erland Kjesbu, Eva Øvren and Torbjørn Haukås, NILF
14.00	*'On agricultural taxation and competition - an explorative case study concerning the EU's direct payments'* Hennie van der Veen and Krijn Poppe, LEI
14.30	*' Integration of agricultural statistics; Agricultural census and FADN'* Hans Vrolijk, LEI

Tuesday, 10 June 2008 (continuation)

15.00	Break
	Paper Session IV: FADN and other agricultural statistics
15.15	*'Agricultural Statistics and FADN in Denmark - recent developments'* Henrik Pedersen, FOI
15.45	*'Improvements on quality of FADN data for EAA purpose'* Violeta Cadikovska, SSO
additional discussion	*'The Measurement of the Development Sustainability in Agriculture: Experiencing the Web of Statistical Indicators'* Dominique Desbois, INRA- SCEES and Abdoulaye Adam, African Development Bank
16.15-18.00	*Workgroup session 3: 'Differences between national FADN and EU-FADN'*

20.00 Dinner

Wednesday, 11 June 2008

Paper Session V: New data in FADN

9.00 *'Monitoring of the diversification of agricultural activities in Flanders'*
An van den Bossche, Flemish Government

9.30 *'Quality Labels: what kind of economic results for the producer?'*
Dominique Desbois, INRA- SCEES and Jacques Nefussi, AgroParisTech - INRA

10.00 Comparing organic and conventional dairy producers in Sweden using FADN data'
Lovisa Reinsson, Statistics Sweden

10.30 Break

10.45 *Workgroup session 4: 'The future of Pacioli'*

12.00 Lunch

13.00 Departure for the airport

2 Redesigning Swiss FADN

Current Challenges

Kaspar Mühlethaler

Summary
It is intended to revise the Swiss Farm Accountancy Data Network (FADN) inter alia for the following reasons:
- at present, the farms in the sample are not selected at random;
- certain groups of farms are currently underrepresented in the sample;
- there are new data requirements in the Ecology sphere;
- the bookkeeping software used to date is due to be replaced soon.

This document sets out and discusses selected suggested solutions for the existing challenges. All of the ideas outlined aim to reduce the requirements for the data and the amount of data as much as reasonable. Among other things, the taking of two samples with different requirements in terms of amounts of data is proposed.

Keywords
Farm Accountancy Data Network, Switzerland, methodology, sampling procedure, data requirements.

Abbreviations

ART	Agroscope Reckenholz-Tänikon Research Station ART, Switzerland
FADN	Farm Accountancy Data Network
CHF	Swiss Francs

2.1 Introduction

As in other European countries, bookkeeping data from farms is gathered, analysed and published in Switzerland. Responsibility for the Farm Accountancy Data Network lies with the Agroscope Reckenholz-Tänikon Research Station ART, which is part of the Federal Office for Agriculture.

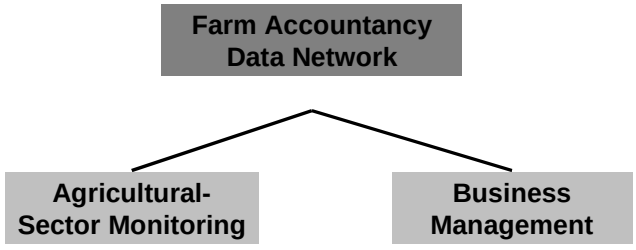
For various reasons, the existing system for sampling and analysing data is to be adapted to future requirements. The project is currently in the planning phase. This document sets out and discusses selected challenges and ideas for solutions.

2.2 Current system

2.2.1 Purposes

Shows the two main purposes of the FADN data: firstly, it issues a statement on the economic well-being of the farming sector (agricultural-sector monitoring); secondly, it makes decision-making bases such as benchmark data available to farm managers and financial advisers (business management).

Figure 2.1 Purposes of the FADN data



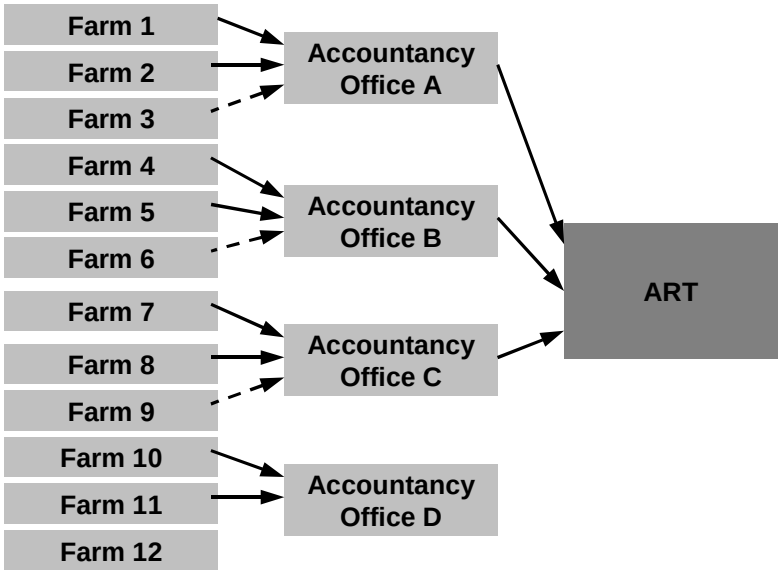
2.2.2 Dataflow and farms for which data cannot be collected

The dataflow is depicted figure 2.1. The data of the farms (e.g. farm 1) are worked up by accountancy offices (e.g. accountancy office A) into a bookkeeping system. The accountancy offices relay the data from the bookkeeping system to ART via the Internet.

Data cannot actually be collected effectively for all farms which would be necessary for a perfect sample. There are various reasons for this, which are depicted schematically, again in figure 2.2:

- although farms 3, 6 and 9 are supervised by an accountancy office which in principle provides ART with data, this data is nevertheless not relayed to ART. The reason for this may, for example, be that these farms do not permit data to be passed on to ART, or that they prefer a less complicated bookkeeping system, or that the accountancy office in question cannot pass on the farm's data for functional reasons (e.g. the accountancy offices have seasonal work peaks in spring and hence cannot finish all bookkeeping tasks by the beginning of August);
- farms 10 and 11 are supervised by an accountancy office which does not provide ART with data. The reason for this may, for example, be that the accountancy office in question does not wish to compile accounts as detailed as those required by ART. It may also be because the accountancy office uses bookkeeping programs which are not suitable for supplying data to ART;
- farm 12 does its own accounts, and does not work with an accountancy office at all.

Figure 2.2 **Dataflow in the Farm Accountancy Data Network**



2.3 Reasons for revising the system

Various reasons have led to the decision to adapt the current system for sampling and analysing data to future requirements. The most important of these are listed below.

2.3.1 Non-random selection of farms

At present, the farms are selected by the accountancy offices supervising them. Selection is non-random. Non-random selection of farms entails various problems, such as e.g.:

- conclusions extrapolated from the sample to the field of survey are only partly reliable;
- the stating of confidence intervals is actually not permissible, since the distortion owing to the non-random selection of farms can hardly be quantified.

Today, ART is attempting to offset part of the distortions with the help of a farm-weighting system. In principle, however, the ability to select the farms randomly in future is desirable.

2.3.2 Underrepresented groups of farms

At present there are groups of farms that are underrepresented in the sample. Farms growing special crops (vegetables, fruit, etc.) or farms in the cantons of Ticino and Geneva are cases in point.

Through graduated financial compensation, ART is attempting to recruit more farms from the 'underrepresented' group; however, this measure has only met with limited success.

2.3.3 New data needs

The Federal Office for Agriculture has also instructed ART to gather and evaluate data in the ecology sphere in future. Just like the economic data, these ecological data are also meant to come from individual farms. It was requested that, where possible, the economic and ecological data be collected on the same farms. Since the effort involved in recording the economic data is already

high, however, this would lead to an additional burden for the farms in question and their accountancy offices.

2.3.4 Replacement of the bookkeeping software currently used

The only software used at present for data collection, Agro Twin, must be replaced for technical reasons. AgroTwin is a software program offering capabilities above and beyond those of other programs, making it possible, for example, to keep two mutually independent balance sheets over several years. This is necessary nowadays, since ART for example has defined rules for depreciation differing from those of the tax authorities (see paragraph 2.0).

2.4 Ideas for solutions: reducing the data requirements

All Swiss farms possess a minimum level of financial records, since these must be shown to the tax authorities. However, ART's requirements in terms of scope and degree of detail of the data are much higher than the tax authorities'.

All of the ideas for solutions listed below aim as far as possible to meet the demands made of both the data and of its scope per farm. This makes the provision of the data for the farm and for the accountancy offices easier. This would have the following advantages, among others:

- random selection of farms becomes more easily possible;
- underrepresented farm groups can more easily be motivated to take part;
- several common bookkeeping programs which are also simpler can be used.

This means that farms working with these programs could more easily bemotivated to participate in data collection.

It must also be borne in mind, however, that the satisfaction of the data needs implies certain minimum demands on the data and the scope of the data. Besides the reduction of the demands on the data, other additional measures such as, for example, other technical data-transmission systems or a differently organised data-gathering process are of course also conceivable. With regard to the ideas for solutions presented here, it has not yet been decided whether and how these are to be implemented.

2.4.1 Idea 1: illustrating farming only (without subsidiary earnings and private income)

Nowadays, ART also requires information on the income from non-agricultural activities of all people living on the farm. Information on private expenditure is required as well. There are farming families that for various reasons do not wish to provide information on these areas. Moreover, the provision of this information implies additional effort for both the farming family and the accounting office.

Many data users wish to obtain data on these areas. This information is valuable e.g. for agricultural policy, since it makes it easier to assess the economic condition of the farming population.

2.4.2 Idea 2: illustrating selected farm activities only

Today, ART requires information on all agricultural activities taking place on the farm. It is conceivable that in future, farms might only have to give information on individual farm activities that are either of special interest or of key importance for the farm. This measure would reduce the time and effort spent by both the farm and the accounting office in providing the data.

This variant would make it impossible to record farm income and work earnings, however, since the income from all farm activities must be borne in mind to do this. Nevertheless, both variables are considered essential for monitoring the sector.

2.4.3 Idea 3: approach to the data required by the tax authorities

Since 1993, all farmers in Switzerland have been obliged to keep records for the attention of the tax authorities. ART's requirements differ from those of the tax authorities in various respects. Figure 2.3 shows a selection of these differences which are then explained.

Balance sheet after farm succession

This involves the disclosure in the balance sheet of assets after farm succession (see). At the point in time (a), the father sells the farm at price (b) to the son. The farm was listed in the father's balance sheet at the book value (c). The father therefore suffers a book loss to the extent of (D).

In bookkeeping, the 'actual costs' principle is valid. This means here that the son must list the farm in the balance sheet at the purchase price (b) paid.

Nevertheless, the tax authorities permit a deviation from the 'actual costs' principle in that they allow the son to adopt his father's balance-sheet value (c) although it does not correspond to the purchase price (b) paid. For the son, the adoption of (c) has the advantage of him being able to use the additional depreciation potential (D) to reduce his taxable income in future. This voluntary balance-sheet-value adoption does, however, also have drawbacks for the son, which we will not go into further here. ART does not allow this deviation from the 'actual costs' principle.

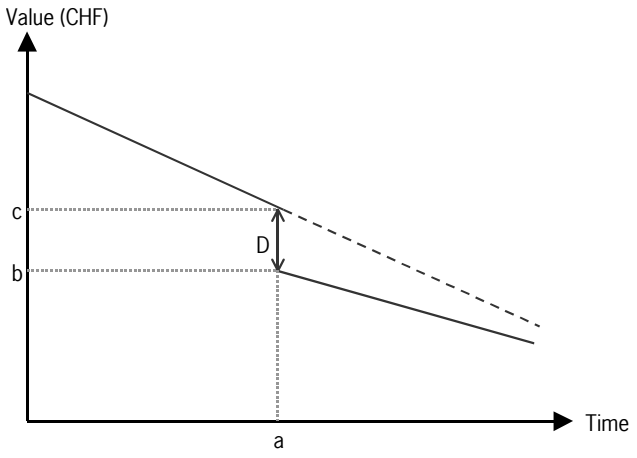
Since the balance sheet for the tax authorities according to the above illustration may differ from the ART balance sheet, the keeping of a second balance sheet nowadays within the framework of the FADN is necessary (see further below). Authorisation of the adoption of balance-sheet values in a similar manner to the tax authorities would entail various advantages and disadvantages requiring closer analysis.

Figure 2.3 Selected different requirements of the tax authorities and ART

	Tax authorities	**ART**
Balance sheet after farm succession a)	As per actual costs, or adoption of their predecessor's balance sheet.	As per actual costs.
Depreciation of capital equipment a)	Depreciation according to purchase price ('linear') or according to book value ('degressive'). Depreciation rates are annually selectable between 0% and a stipulated maximum rate.	Depreciation according to purchase price (linear). Depreciation rates are stipulated and fixed.
Degree of detail of balance sheet and profit and loss account	Usually low, but can also be high.	High and precisely defined.
Owner's equivalent rent for his own residence	Based on the Farm Tenancy Law.	Calculated on the basis of the actual costs.
Private remuneration of foodstuffs, etc.	Costs of actual remuneration or lump sums as a function of household size.	Costs of actual remuneration.

a) Difference requires a second balance sheet to be kept.
Source: Own description.

Figure 2.4 **Disclosure in the balance sheet at farm succession**



Depreciation of capital equipment

Assets that are used for more than a year are termed 'capital equipment'. These must be depreciated in order to take account of their decrease in value owing to wear-and-tear and ageing.

The tax authorities permit a variation of the depreciation rates over the years. In this way, the farmer can compensate for annual income fluctuations and thus save on taxes. By contrast, ART stipulates fixed depreciation rates in this context (see figure 2.5).

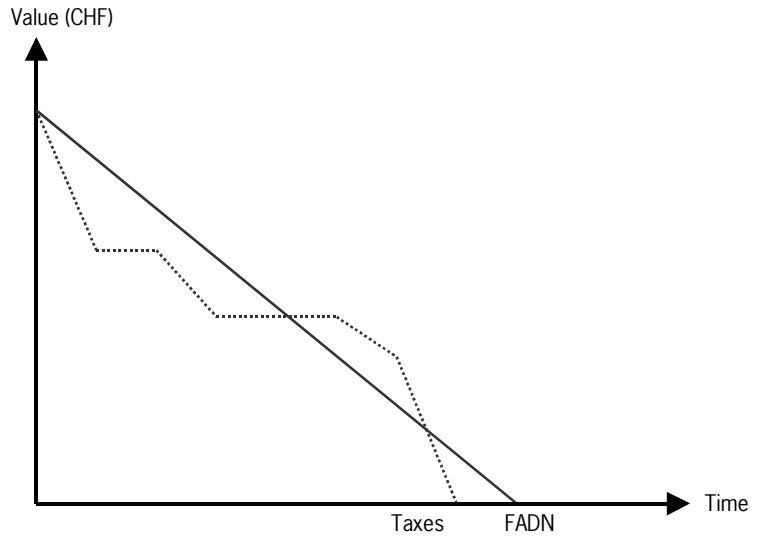
Here too, the keeping of a second balance sheet is nowadays necessary within the framework of the FADN (see below). The authorisation of variable depreciation rates in a similar manner to the tax authorities would result in it no longer being possible to portray certain income fluctuations of the farms. We have yet to determine what the extent of this income smoothing for a group of farms would be.

Necessity of keeping a second balance sheet

The spheres described above - 'balance sheet after farm succession' and 'depreciation of capital equipment' - nowadays require the keeping of a second balance sheet. There are yet other spheres which are not depicted here.

A second balance sheet means more work for the accounting offices. Moreover, only a few bookkeeping programs allow a second balance sheet to be kept, which drastically limits the choice of farms for ART.

Figure 2.5 **Depreciation**



Forgoing a second balance sheet would therefore have a number of advantages for ART. Compromises would have to be made to this end in terms of the significance of the data gathered, however.

Degree of detail of balance sheet and profit and loss account
The balance sheet and profit and loss account must follow a predetermined structure for the FADN, in order to ensure that the results of different farms are comparable with one another. ART therefore stipulates a structure for which a high degree of detail is required.

The tax authorities do not explicitly call for a specific structuring of the balance sheet and profit and loss account, and the minimum degree of detail required is much lower. Essentially, the only valid provision is that the records must 'depict the farm appropriately,' which is, of course a fairly imprecise requirement.

ART may possibly be able to dispense with a certain degree of detail in future. It is crucial, however, that a clearly defined structure be retained.

Owner's equivalent rent for own dwelling

In Switzerland it is usual to regard one's residence as a business asset. Since living is a private activity, however, the farm assigns a notional rent to the private household. With regard to tax, this owner's equivalent rent (OER) is calculated on the basis of the Farm Tenancy Law. ART requires the listing of the actual costs, which are on average higher.

Here too, the adoption of the tax solution would mean a simplification, but at the same time a loss of information on the actual costs.

Allocation of lump sums

As with residence, foodstuffs and other goods or services are often also assigned to the private sphere of the farm.

The tax authorities accept both the declaration of the actual remuneration as well as lump sums, depending on the size of the household. ART requires the declaration of the actual remuneration. The tax authorities allow lump sums in order to save persons liable to tax the effort of declaring the actual remunerations. ART does not allow any lump sums because these do not correspond to the goods or services actually purchased.

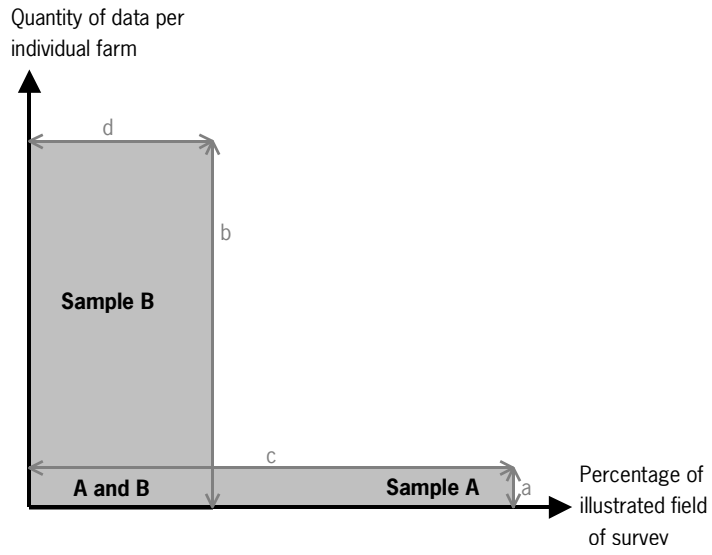
The authorisation of lump sums as with the tax authorities would lead to a certain loss of information for ART. This measure would probably distort agricultural income only slightly: the influence on the portrayal of the private consumption of the farming family would be stronger.

2.4.4 Idea 4: two samples

The simplification options described in the above chapters need not necessarily be implemented for the entire sample. A splitting of the sample, for instance, into a sample A and a sample B according to is conceivable.

In *sample A*, little information is required per farm. This could be because only aggregated key figures are recorded for the entire farm, such as e.g. the agricultural income or the balance-sheet total. Since little information is called for, a sample can be taken which portrays a majority of the farms in the field of survey. This sample would primarily enable the monitoring of the agricultural sector.

Figure 2.6 Two samples



The farms in *sample B* must furnish substantially more information. Thus, for instance, variable costings are required for individual or all farm activities. Since participation in sample B is a good deal more complicated, part of the field of survey (e.g. special farm groups or special farm activities) cannot be portrayed. This sample would primarily supply benchmark figures for business management as well as information on on-farm interrelationships.

2.5 Conclusions

For the reasons explained above, it makes obvious sense to give some thought to a possible reduction of demands on the information for the Farm Accountancy Data Network. Of the ideas for solutions listed, a partial approach to the tax requirements seems to be a particularly good option for recruiting a fairly large proportion of farms from the field of survey as potential sample candidates. In order to take account of the two purposes of the FADN, two samples could be a practicable solution.

ART is currently in the planning phase. The ideas introduced in this paper have yet to be soundly tested and discussed.

3 FADN data collection and processing in Italy: the renewal process

Antonella Bodini

3.1 Foreword

The following overview describes briefly the renewal process in the Italian FADN system, which involves the sample design (random selection) adopted in Italy. In particular a focus is offered on the replacement of the bookkeeping software with a new one.

3.2 Reasons for revising the sample

Some critical assessment of the 2003 sample has come by DG-AGRI basically due to the fact that all large size holdings were included in the sample, thus inconsistencies in the sample stratification strategy.

Since 2003 the Italian FADN survey has been integrated with the survey organized by the National Institute of Statistics (ISTAT). Most recent policy planning (2007-2013) have raised new information needs to be met by using FADN data as well as the need for improvement of the quality and reliability of farm accountancy information.

Important structural changes have been involving the Italian agricultural sector since 2000. The number of holdings has decreased by 425.000 between 2000 and 2005 (-19,7%), therefore statistical significance need to be reconsidered.

3.3 Sample design and sampling strategy

The definition of the sample to be used in the 2008 FADN survey is a joint effort of INEA and ISTAT. Since 2002 the field of observation includes all farms >4 ESU. The sample must include a sufficiently large number of holdings to allow estimating the main accountancy variables at the national level (sampling error

<5%). the sample size is constrained by survey costs. The field of observation is described by all farms >4 ESU, 722.544 farms corresponding to nearly 45% of EU universe and accounting for 90% of total agricultural SGM. Non-commercial farms and forest farms are not included. The definition of the field of survey is based on the 2000 Agricultural Census updated by the 2005 FSS and the 2004 FADN-REA survey. No longer existing farms are replaced by new farms.

The stratification complies with EU requirements and is based on the following variables:

- FADN regions: for Italy these are 19 regions and 2 independent provinces;
- economic size: 6 ESU classes (4-8 ESU, 8-16 ESU, 16-40 ESU, 40-100, 100-250 and >250ESU);
- type of farming: 17 principal types of farming.

The final stratification is achieved in subsequent steps:

- step 1: initial stratification produces 2.142 cells (21 regions x 6 ESU classes x 17 types of farming);
- step 2: only 1.893 cells contain at least one farm;
- step 3: the number of cells to be sampled is further reduced to 1.145 by aggregating or eliminating cells with very few farms on the basis of minimum thresholds for cells contribution to regional SGM.

Cell aggregation respects the following criteria:

- a farm type class is aggregated when farms in that class (o cell, o stratum?) contribute to less than1% of the regions' total SGM;
- a cell is aggregated when farms within the cell contribute less than 0.1% of the regions' total SGM;
- preference is given to aggregation of the same ESU class/es across different types of farming rather than aggregation of different ESU classes within the same type of farming (higher cell's homogeneity);
- the stratification places particular attention to regional peculiarities as to the importance of different farm types (21 samples, one per each region).

The sample size is determined on the basis of the coefficients of variation for the strategic variables, by applying Bethel's procedure for optimal allocation and by ensuring a minimum of 5 farms in each cell.

The problems encountered are essentially due to the heterogeneity of Italian agriculture across regions. There is large share of small size farms in some regions (e.g. Valle d'Aosta, Trentino, Alto Adige, Molise). Some regions are

highly production specialized (e.g. horticulture in Liguria, livestock in Valle d'Aosta). And the presence of some types of farming is only significant for few regions (e.g. poultry and pigs, sheep). Therefore it is necessary to define sampling plans specific by regions.

3.4 RICA's applications in Italy

The two main applications of RICA survey involves a) economic analysis of the farming system at national and regional levels; b) use in Value Added calculations for National Accounts and c) use in CAP evaluation. In the latter case the use of RICA data can be applied to:

- context description;
- agro-environmental policy evaluation (integration of FADN data needed);
- economic justification of rural development subsidies.

3.5 The new software GAIA

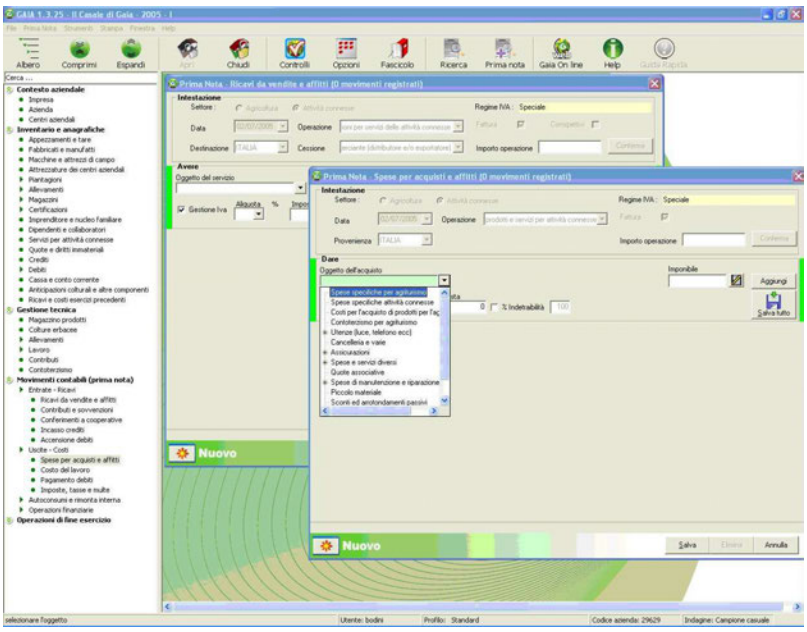
Starting from 2008 FADN Survey, the Italian FADN system is going to adopt a new software to data collection and primary data processing (i.e. analysis for individual/single agricultural holdings of the sample).
The new software is called GAIA which stands for Business Management of Agricultural Enterprises (Gestione Aziendale delle Imprese Agricole).

By means of GAIA, INEA is equipped to modernize FADN information system, from both an Infortmation-Technology and a methodological point of view. In fact the new software is a user-friendly accountancy tool (see screen dump nr.1) and facilitates the use of collected data for further purposes, such as the comparison with FADN database and other statistical and administrative references.

In figure 3.1, the left column shows the structure of data collection, which is divided into:

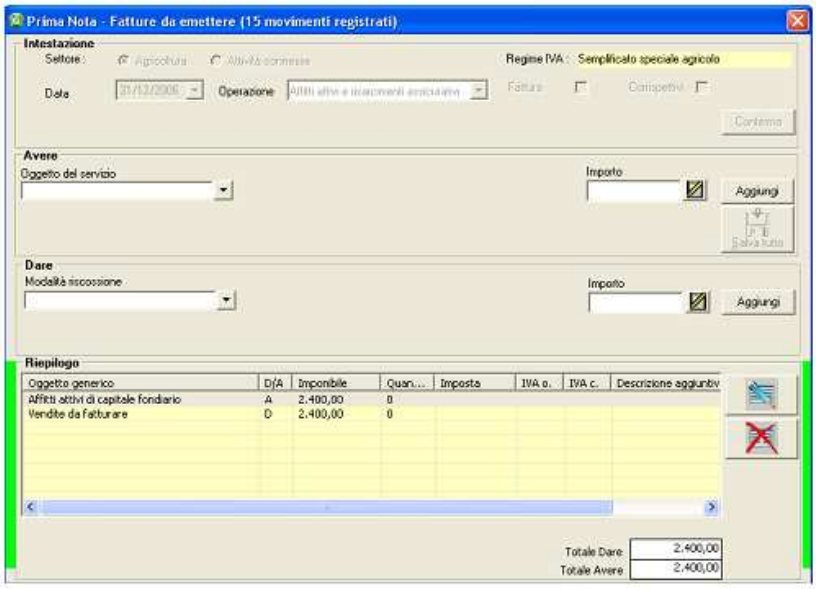
- the farm context with information on the farm location and facilities;
- the year-start and year-end inventory of farm's input and output;
- the technical management of crops and livestock, labour, public payments and contractor services;
- the accountancy year with cash and capital flows;
- the year-end operating computations.

Figure 3.1 Overview of the menu and windows for data imputation



Beside the improved graphic interface, that simplifies data entry, a rigorous accounting method has been created to include both technical and economic information, together with financial and capital assets.

Figure 3.2 **Double-entry imputation of an invoice**

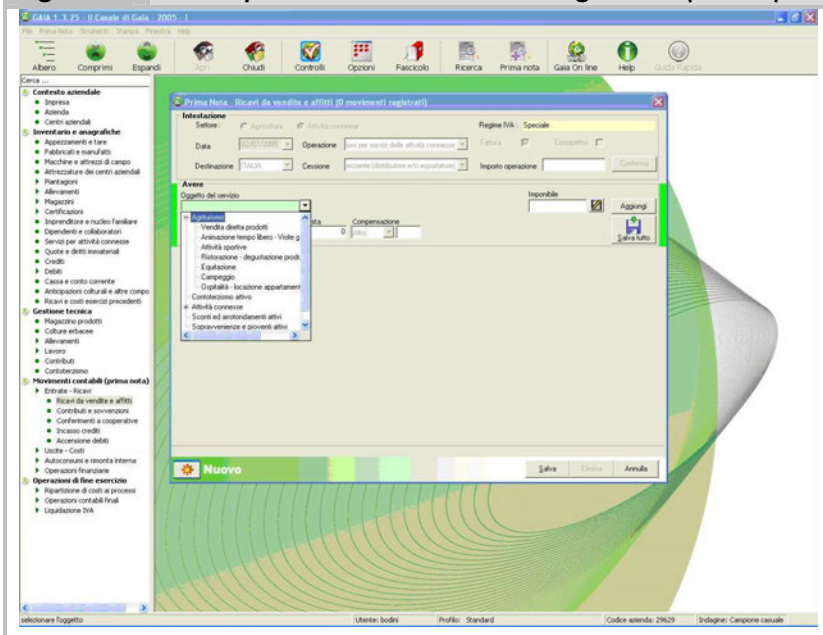


Data assembling in the Italian FADN involves also side activities (agro-tourism and contractor services as well as Other Gainful Activities - OGA) and social indicators.

Among the former, information collected on agro-tourism involves camping, guided tours, direct sale, equitation, apartment rental, recreational activities and entertainment, restaurant activities, whereas about OGA information is collected about didactic farms, artisan activities, renewal energy production, equipped room rental (for courses), recreational activity different from agro-tourism, machinery rental.

Among the latter information on demographic issues on labour is collected (household composition, level of education, degree of specialization of workers, etc.).

Figure 3.3 **Data imputation of activities linked to agriculture (tourism)**



GAIA allows:

- getting detailed information of single production processes (i.e. gross margin);
- producing Farm Accountancy Sheet (overall farm management or single operational issues);
- building different types of balance sheets: EU standard balance sheet (simplified edition) and INEA reclassified financial statement. The second one involves the above mentioned information integration, thus takes into account farm multi-functionality.

As for the target of a FADN software, besides FADN technicians and INEA data collection mangers, GAIA can be addressed to individual or associated farmers, agricultural extension services and assistance centres, management consultants, specialised trainers in agricultural issues, and teachers and researchers. To sum up, new elements of the software are the following:

- the integration of accountancy data with extra-accountancy information of an agricultural holding;
- information is organized into a database by calendar years;
- possibility to create own bookkeeping record including farm facilities and business recourses;
- control over input and output data accuracy and plausibility;
- help users with low knowledge of accountancy rules and computer science in data input by means of a user friendly interface.

Gaia elaborates and produces information on wide range of ways. First information is directly shown in the data entry process and elaborated into reports.

Secondly, GAIA includes general accountancy data, detailed of single production process (gross margin included). Thirdly information collected provided a comprehensive overview of overall farm management and single operational aspects. Fourthly a structured system of indicators and ratios provides management results and complex information framework with regard to economic returns and corporate capital's use. GAIA provides a basis for analysis at different levels:

- at business level to evaluate managerial results and potential challenges;
- at aggregated farms level to identify a homogenous group of farms to be monitored year by year by means of efficiency measurements;
- at territorial level, to understand the prevailing agricultural systems, markets, and local productions;
- at macroeconomic level, to analyze socioeconomic developments and the impact of agricultural policies and use of natural resources.

3.6 The prototype of RICA Data Warehouse

The growth and diversified information needs along with diversified target users have led INEA to implement the new software GAIA and a DWH to provide users with online consultation without the assistance of experts and at different levels of query and to customize reports.

As previously examined, the new software GAIA permits to collect different kinds of information regarding the farms and their accounting system. To permit the best exploitation of all the information, the INEA has designed a Data Warehouse (DWH) system that would allow an easy access to the survey results.

It is a very common method used to diffuse statistical data and to present the statistical data very quickly.

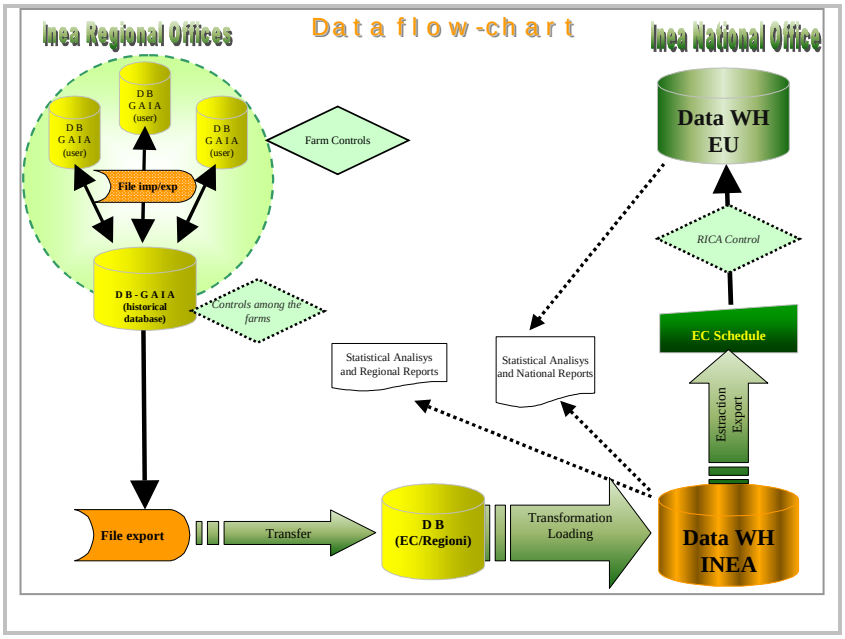
Table 3.4	Economic analysis with GAIA database		
Classification	**Information**	**Objective**	**Final Reports**
General Analysis	Structural, economical and financial aspects of the farms	To make a frame of the general characteristics of the farms in terms of productive factors, work, income indicators	- crop and unfarmed area, work, livestock, ESU, farm typology - total output, net added value and income for region, province, kind of farm - …
Specific Analysis	Single farm process and productive sector as cultivation or livestock but also work, subsidies, specific issues	To have a detail of different farm sector and of specific issues useful for the agricultural system analysis	- gross income for specific cultivation or farm typology - different kind of public subsidies in the single farm activity - …
Regional Analysis	It is possible to refer the data to the different regions using the weight of the sample farms	It is possible to have a description of particular agricultural system in the territory and their evolution during the time	- production, surfaces, yields of regional cultivations - farm incomes of regional systems - …
Temporal comparison (time series)	The data coming from the old record (CONTINEA) are linked with those of new methodology (GAIA)	The aim is to have time series that permit a continuity with the past	- farm area, UAA, total output for year and region - productivity of land and work in different years - …
Spatial comparison (among farms)	The data coming from GAIA are aggregated following different criteria	The aim is to permit comparison among the different farm	- production costs in different farm typologies - balance indicators in different farm typologies

Technically, INEA has realized a procedure to transfer the database from GAIA to an IT platform that permits the realization and visualization of different kinds of reports, whose scheme is predetermined and not modifiable.

All the information collected in GAIA can be displayed in the final reports. However, the actual content of the final reports depends on the informative needs and on the final users. In fact, there are different levels of access to information according to users' typology. In practice, the RICA DWH has been developed as prototypal, so it can be improved over time. The table above shows the main analysis that can be run by means of the GAIA database.

The following scheme illustrates the operational interconnections of the DWH as developed by INEA. Farm surveys are made at Regional Offices using GAIA. Then data undergoes to different control procedures before being exported to the Regional RICA Database. At this level, information is used to create a central Data Warehouse (DWH INEA). As results, information can be used to make statistical analysis both at regional and national level, as well as to elaborate specific reports depending on particular information needs and inquiries.

The National Data Warehouse could be exported in the EC Schedule, thus with the challenge of designing an European Data Warehouse that can be used to make cross-country comparisons.



3.7 Current research developments and further perspectives

INEA is aiming at improving FADN data quality with regard to reliability, accuracy and plausibility. For this reason, INEA has started to involve and implement procedures of data acquisition from regional Administrations. In particular, data on public payment received by FADN surveyed farms is valuable information to FADN technicians (archives from AGEA, the Italian Agency fro agricultural grants and subsidies).

For what concerns scientific outputs, at national levels work teams are active on issuing regularly (yearly) reports on Italian FADN data as well as at regional level, a work team has set up guidelines to make reports that have a similar structure in terms of contents and data processing.

To meet farms need for business plan implementation to have access to EU funds may be achieved with the new software, thanks to the above reported features.

Acknowledgments

Special thanks to Alfonso Scardera for providing useful materials, to Andrea Povellato for suggestions and reviewing of previous draft of this document and to Sonia Marongiu who has contributed to paragraph 6.

References

Seroglia G., Bonati G. (2002): Farms and Databases: the Italian case, In European Farms and the growing of data, Poppe K.J. and Povellato A. Editors.
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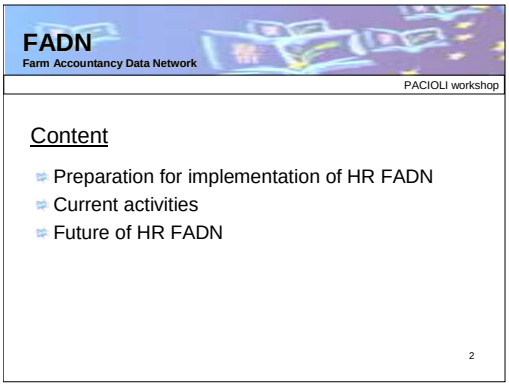
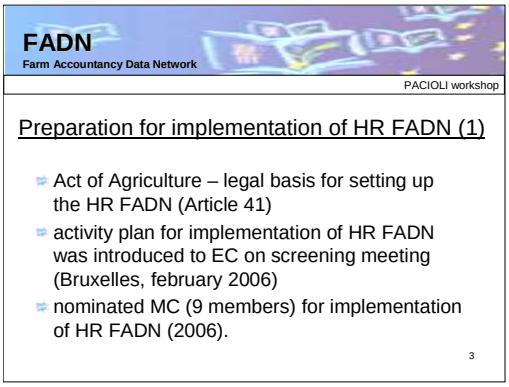
4 FADN in Croatia - overview





FADN
Farm Accountancy Data Network

PACIOLI workshop

Preparation for implementation of HR FADN (2)

- cooperation aggrement sign up between nominated institutions for implementation of HR FADN (June 2007)
  - Ministry of agriculture, fisheries and rural development (MAFRD)
  - Croatian Agriculture Extention Institute (CAEI)
  - Central b of statistics (CBS)
  - Faculty of Agriculture Zagreb (FA)
- technical support within World bank project

4

FADN
Farm Accountancy Data Network

PACIOLI workshop

Preparation for implementation of HR FADN (3)

Project objectives:

- define organisational structure of the HR FADN implementing agency (CAEI)
- design organisational structure of the HR FADN pilot project

5

FADN
Farm Accountancy Data Network

PACIOLI workshop

activity	bodies involved
•preparation of the methodology manual (including forms and instructions for accountants)	**FA, CAEI**
•bringing the FADN system closer to farmers (seminars, workshops, brochures)	**CAEI**
•adoption of an ordinance on FADN establishment (appointment of the National Committee and the Implementation Agency) by the Minister for agriculture	**MAFRD**

6

FADN
Farm Accountancy Data Network

PACIOLI workshop

activity	bodies involved
•training for accountants	**CAEI, FA**
•preparation of FADN software (IT support)	**CAEI**
•carrying out of a survey on an intended sample with a view to collecting data to calculate the SGM (Standard gross margin) and to control methodology and organisational aspects (Pilot project)	**CAEI**
•data control and processing (Pilot project)	**CAEI, FA**
•application of typology of farms by means of SGM collected in the Pilot project •definition of FADN population •definition of FADN sample	**CBS**

7

FADN
Farm Accountancy Data Network

PACIOLI workshop

activity	bodies involved
•carrying out of FADN survey in line with EU regulations	**CAEI**
•FADN results	**CAEI**

8

FADN
Farm Accountancy Data Network

PACIOLI workshop

Pilot project

9

FADN
Farm Accountancy Data Network

County	Sample Farms						
	Sample size	Status			Accountig level		
		Indiv. farms	Craft	Ltd.	Without	Simple	Double side
City of Zagreb	8	3	4	1	2	5	1
Zagreb *	25	23	1	1	6	10	1
Karlovac	9	5	3	1	3	5	1
Brod-Posavina	12	8	2	2	3	7	2
Vukovar-Srijem	15	15	0	0	4	11	0
Lika-Senj	7	7	0	0	4	3	0
Zadar	5	4	1	0	3	2	0
Šibenik-Knin	5	4	1**	0	1	4	0
Total	**86**	**69**	**12**	**5**	**26**	**47**	**5**

10

FADN
Farm Accountancy Data Network

Current activities

- employment of new staff for implementing agency (assistent + IT expert)
- preparing a pilot project (building a questionnaire and manual)
- SGM calculations

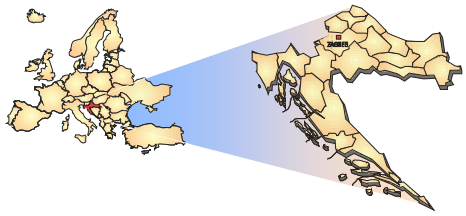
11

FADN
Farm Accountancy Data Network

Future of HR FADN

- establish of FADN agency
- training the FADN staff on EU methodology
- define FADN regions (NUTS 3)
- SGM calculation
- determination of sample farms
- stratification
- annual survey in year 2010

12



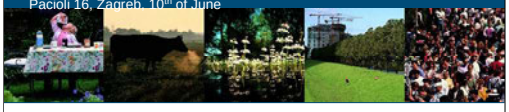
THX for your attention

13

5 Dutch FADN - Overview and recent developments

Dutch FADN
Overview and recent developments

Koen Boone
Pacioli 16, Zagreb, 10th of June



Content

- Dutch Farm Accountancy Data Network
  - Introduction
  - Concept
  - Research themes
- Data assembling from accounting offices (EU farms)
  - History
  - XBRL

Introduction Dutch FADN

- Data networks for agriculture, fisheries (including aquaculture) and nature management
- Agriculture: 1,500 farms
  - 1,100 farms: full detail
  - 400 farms: limited dataset (EU: economics/structure)
- Randomly selected from farm census and representative for 80% of farms and >90% production
- Regional offices LEI for data assembling full detail farms
- Accountancy offices for assembling EU farms

Data collected (full detail farms)

- Nearly all available data on individual invoices
  - Value
  - Name product (>2,000 pesticides)
  - Quantity (kg, liters, ha)
  - Quality (fat content milk, capacity waterpump)
  - Date
  - Supplier/buyer
- Bank transactions (electronic)
- Inventory/questions
- Coupling of databases (water quality, administrative data)

Concept of FADN

- Not FADN but Firms Information Network
- Integrated structural data assembling instead of ad hoc based on research questions:
  - Cheaper
  - Quality (Quality process, specialists)
  - Lower administrative burden
  - Consistence
  - Data can be coupled

FADN concept in practice

- Data collection on the lowest possible level of detail and interpretation free recording
- Use (electronic) available data elsewhere
- Flexible IT structure and culture
- Close contact with clients (researchers, MoA)
- Accessible (Internet, Microlab, Helpdesk)

Research themes

- Off farm income
- Other gainful activities (tourism, energy production etc.)
- Environment
- Animal health/food safety
- Nature management
- Social indicators/innovation
- Production chain (suppliers/buyers)

Income and wealth farmers

- Farm income
- Other Gainful activities
- Off farm income (labor, capital, social benefits)
  - Farmer
  - Spouse
  - Others who provide labor and capital to the farm

  -> Not necessarily total household income
- Balance sheet
  - Including private bank accounts, debts, second house, etc.

Other Gainful activities:

- Recreation (camp side, houses, guided tours)
- Processing and sales on the farm of agricultural products
- Nature management
- Energy production
- Care farming (disabled, addicted, elderly, reintegration)
- Renting of assets
- Contract work

- Allocate costs to OGA
- Only include farms with:
  - > 25% of output from traditional agricultural activities
  - Traditional agricultural activities and OGA are largest output

Environmental indicators

- Pesticides
  - Use of each individual product (>2000) per crop
  - Coupling with active substances
  - Coupling with environmental burden points
  - Management practices (machines used etc.)
- Minerals:
  - Mineral balances
  - Very detailed information on mineral content in feed, fertilisers, manure transport
  - Management practices
  - For Dairy farms: Urea content milk, grazing days etc.
  - Coupling with water quality tests

Environmental indicators (2)

- Energy
  - Quantity (kg/liters and Joules) used per type and CO_2
  - Buildings/machines used: Climate computer, Green label glasshouses etc.
  - Indirect energy use (animal feed, artificial fertilizers)
  - Life Cycle Assessments
- Water
  - Quantity consumed
  - Ha of sprinkled
  - Capacity of water pumps
  - Exact location of all plots
- Smell/Noise: GIS location, type of stable

Biodiversity: Nature management

- Contracts on nature management
- Management practices (# animals per ha, manure management, grassland management etc.)
- Pilotprojects to couple with data on nature quality (number of birds, plants etc.)
- Future goal: Compare information with Network on nature management (costs and quality of nature)

Animal health and food safety

- Animal health
  - For number of farms medical treatment and use of medicines
  - Use of antibiotics
  - Co-operation with institute for Healthy Animals
    - Link between management indicators and animal diseases
- Food safety
  - Co-operation with research institute for food safety
  - Relation between management indicators and contamination of winter wheat

"Social" indicators

- Education of entrepreneurs
- Professional magazines
- Participation in farmers networks/study groups
- Innovation
- Risk aversion
- Type of entrepreneur
  - External/Internal focus

History of EU farms

- Accounting 2000: Complete renewal of system

Reason for starting with EU farms:

- In first years large capacity and performance problems
- For some farm types hardly any research
- Efficiency (budget cuts)

History of EU farms (2)

- Start with just EU data using spreadsheet
  - Not easy accessible by researchers
  - Comparability problems with full detail farms (differences in definitions, valuation, depreciation)
  - Farms only used in research for data about "Dutch agriculture in total"
  - Deadline problems (9 months) in relation to selection plan

Add extra data

- Better comparability
  - More detailed split of output/costs
  - Use own system for assembling data about following assets (valuation/depreciation)
    - Biological assets
    - Machines/buildings
  - Control purposes
- New data
  - Off farm income

Current way of assembling

- Spreadsheet based on EU tables
- Program to converse data from data into LEI database
- Part of the data in the datamodel of full detail farms
- Part of the data in separate data model

New possibilities for data assembling

- One datamodel for all farms

How to assemble data?

- Adapt Spreadsheet
- Accounting offices use LEI software
- (extended/agro) XBRL

Use LEI software

Advantages:

- Efficient for LEI
  - No conversion of data to LEI database anymore
  - One set of screens, instructions and controls
- Better comparability between two types of farms
- Data faster available

Disadvantages:

- Accounting office needs to learn to work with LEI software and LEI software might be less efficient for them

Use XBRL

Firms deliver three times financial data to:

- Chamber of Commerce
- Central Statistical Office
- Tax authority

XBRL: Development of dictionary of financial terms and format (XML)

Result:

- Only one dataset has to be delivered
- Harmonisation of definitions between 3 organisations
- Financial software is adapted so that dataset is automaticly created from own financial administration.

Update ledger (system of accounts)

- '80/'90 Development of GRAS by LEI and accounting offices (Uniformed system of accounts for agriculture)
- 2007: Organisation of Accounting offices for SME's (SRA) wants to update GRAS based on Data model Dutch FADN
- LEI responsible for maintenance of datamodel of GRAS (-> complete harmonisation with LEI model)
- Adaptations of software accounting offices needed

XBRL

Advantages

- Lower costs for accounting offices (0 for data that they do already assemble)
- Extra farms available with very limited extra costs
- Harmonization between accounting offices
- Lower mistakes (no retyping)
- Data faster available
- Accounting offices assemble more data per farm -> Growing part of data might be assembled through accounting offices (Update GRAS also useful for full detail farms?)

Disadvantages:

- Investment to develop XBRL (agro taxonomy) and software
- Second system needed for data assembling if not all accounting offices participate
- Changes in basic data difficult or impossible
- The available data differs per accounting office and per farm within accounting office
- Project to develop XBRL agro postponed

Next steps

- Check the opinion of accounting offices
  - Use LEI software
  - XBRL
  - Data availability and future plans
  - Use of new GRAS
- Check the development of (agro) XBRL
- Make decision

Next to XBRL

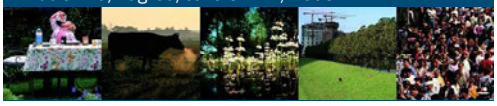
- Use other data that is electronicly available
  - EDI-Circle
  - Management software (experiment to assemble pesticide use for horticulture)
  - Administrative data (use “my account” of MoA)
  - Animal health
  - Quality of land

Thank you for your attention

6 Collection of additional data in FADN

Collection of additonal data in FADN

Dr. Hans C.J. Vrolijk
Pacioli 16, Zagreb, June 8—11, 2008



Content

- Dutch FADN
  - Use of electronically availabe data
- Extending the scope of FADN
  - Collecting additional information
  - Integration with other datasources
- Case: LMM
  - Goals
  - Approach
  - Results
- Discussion

Use of electronically available data sources

- Agricultural census – selection of farms and weighting
- ERI – payments by banks – bank account number
- NRS – number of cattle
- Fish auctions
- EDI dairy – milk sales
- EDI Circle – large fodder suppliers
- Energy suppliers (under construction)
- Ministry – subsidies

Collection of additonal data in FADN

Dr. Hans C.J. Vrolijk
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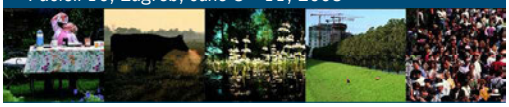

Content

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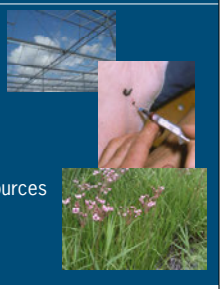
  - Results
- Discussion

Extending scope of FADN

- Collection of additional data
  - Energy monitor
  - Innovation monitor
  - Use of animal medication
  - Ad hoc questionnaires
- Integration with other data sources
  - Ecological data
  - Quality water



Goals of LMM

- LMM = National program for monitoring the effectiveness of the minerals policy
  - Yearly monitoring of water quality (RIVM) and farm management (LEI) on a number of selected farms
  - Clients ministry of Agriculture and Environmental Issues
- Main goals of LMM:
  - Describe and analyze developments in water quality and farm management in relation with (agricultural) policies

Use of electronically available data sources

- Agricultural census – selection of farms and weighting
- ERI – payments by banks – bank account number
- NRS – number of cattle
- Fish auctions
- EDI dairy – milk sales
- EDI Circle – large fodder suppliers
- Energy suppliers (under construction)
- Ministry – subsidies

Connection LMM and Dutch FADN

- Information on farm structure, farm management and farm results on selected farms
- Enables integral and efficient analyses of the whole chain:

  policy=> farm management => environmental impact => environmental quality

- Size and uniformity
- Harmonized

Data required by LMM

- Farm structure data (cropping plan, animal number, soil type, stable characteristics)
- Data to determine potential use of N and P;
- Data to determine manure and mineral production
- Data on the use of minerals:
  - Artificial fertilizers
  - Animal manure (meadow and application)
  - Other organic fertilizers

Data required by LMM

- Data to determine N and P loads (kg/ha)
- Data on regulations in the manure policy (ploughing of grassland, aftercrop, manure storage capacity, autumn application)
- Cost and method of removal of manure, crop margins, farm results, off farm income
- Data on the continuity perspective (modernity machinery, solvability, successors etc.)

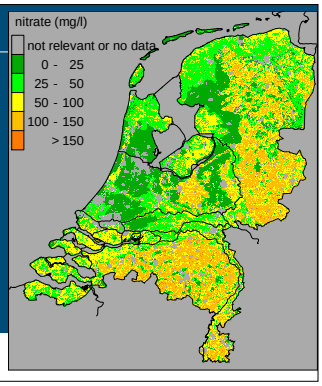
Measurement of water quality (RIVM)

- Per farm
- Dependent on soil type:
  - Upper level (meter) ground water
  - Drain water
  - Ditch water

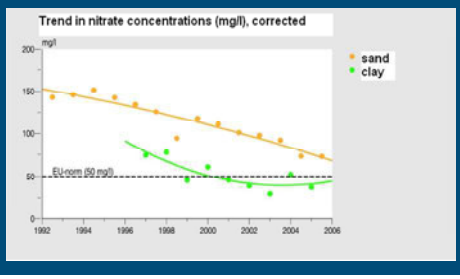


Water quality

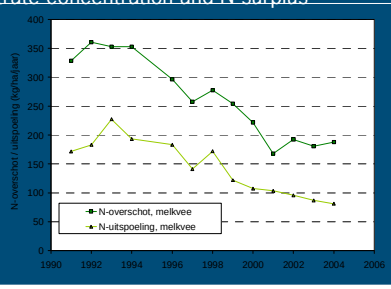
- Nitrate



Nitrate concentration in different soils



Nitrate concentration and N surplus



Comparison of dairy farms with same intensity

	High	Low	Difference
Fertilizer (kg N per ha)	164	89	75
Slurry (kg N per ha)	272	242	30
Nitrogen surplus (kg N per ha)	226	147	79
Gross margin (euro/100 kg milk)	30,5	30,5	0

Future activities

- Analysis between nutrient surpluses, water quality and economic performance
- International cooperation and publication of results
- Linking with regional monitoring programs (water framework directive)

Discussion

- Increase value of FADN
- Facilitates integrated analysis
- Use of FADN infrastructure saves money
- Use of FADN infrastructure increases quality
- Confidentiality issues require attention

7 Exchange of data for decision making in Norwegian agriculture

And consequences for the Norwegian FADN

Erland Kjesbu, Eva Øvren and Torbjørn Haukås,
Norwegian Agricultural Economics Research Institute

7.1 Pilot project for exchange of farm level data for better basis for decision making in Norway

7.1.1 Introduction

A pilot project was initiated in autumn 2006 concerning an easier dataflow between processors and users of farm level data in the agricultural sector in Norway. The goal for the project was to map needs and possibilities for more goal orientated and efficient exchange of farm level data, for better decision making in the agricultural sector. Uncovered needs and revealing potential for improvement was important, and the project was to end up with cost-benefit analyses for a common model of data exchange in the agricultural businesses. The first part of the project was ended in a report in April 2008. The cost benefit analysis shows a great potential for more goal orientated and efficient data flow. A follow up project is suggested to develop common standards and infrastructure for dataflow. Common standards and infrastructure will give an easier access to relevant data for the farmer and other users of farm level data.

The participants in the project were different processors and users of farm level data like representatives from accounting offices, unions for accountants, farmers unions, dairy industry, slaughterhouses, purchase cooperatives, banks and software programmers. NILF was asked to lead the project.

The goal for the project was to exchange farm level data for better decision making in the agricultural sector in an efficient way. Uncovered needs and revealing potential for improvement was important, and the project was to ending up in possible solutions and efforts. The first part of the project was ended in a report in April 2008. A follow up project is suggested to continue the process with an easier access to relevant data for the farmer and other users of farm level data.

The participants in the project were different processors and users of farm level data like representatives from accounting offices, unions for accountants, farmers unions, dairy industry, slaughterhouses, purchase cooperatives, banks and data programmers. NILF was asked to lead the project.

7.1.2 Needs analysis

The agricultural sector is changing rapidly in Norway. The needs for better knowledge, information and basis for decision making are increasing. The farmers, the advisors, the banks and the authorities ask for relevant and fresh data for analysis and decision making. The project revealed an increasing demand for adequate information for decision making. The future farmers demand more from their advisors than their parents did.

In the project a survey among the participants revealed a need of more knowledge about understanding of account and interactions between economy and production. The demands for quality and availability for decision making are increasing. At the same time the farmers demand efficiency according to accounting and advice. A simple tool for decision making and a common standard for operational accounts are wanted from the participants in the pilot project.

The farmers want to deal with one system. They ask for one web site or portal to log on and do all the needed services like updating the animal register, report environmental data, get benchmarking services communicate with their accountants etc. Today the farmers have to register the same data for different purposes several times. They also have to log on several places with different passwords. Coordination among the users of the data is important, and an easier exchange of data among the different users is strongly wanted by the farmers. All the participants in the project have pointed out that cost reductions are a central motive for easier exchange of data. They have to make a profit on the project to go on in the follow up step.

7.1.3 Present situation

Figure 7.1 **Data flow of farm level data in the Norwegian agricultural sector**

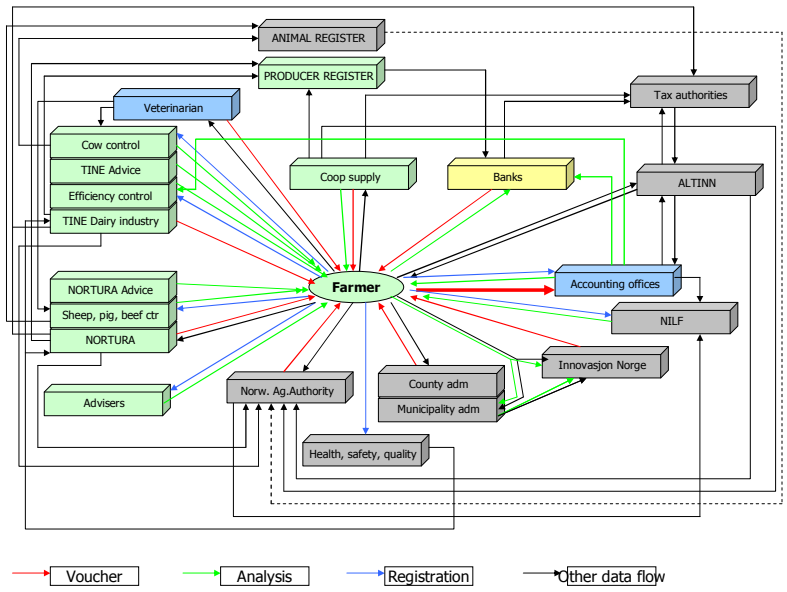


Figure 7.1 is a description of the present situation regarding data flow in Norwegian agriculture. Most of the organisations and businesses in the agricultural sector are developing their own data systems to improve efficiency and availability for their own use. The cooperation between the different organisations is next to nothing. A survey among the participants in this project showed a large potential for improvements, by implementing standards and building a common infrastructure for dataflow and decision basis. Private businesses report a lot of data in to different public registers. Most of them are transmitted electronically, but in different formats, with different systems and programmes, mostly with different types of file transfer. Lack of standards and organizing cause a bothersome and expensive transmission of data and it is negative for the quality and the availability for the data meant for decision making.

A lot of data needed for different purposes are collected and stored in different databases in the agricultural sector in Norway. Financial data like invoices for the accounting are sent by post to the farmer. The farmer is handling the voucher and sends it to the accountancy office. The accountant keys in the data on his computer once again. Another example is the farmers' registration of animals. He reports the same information to the animal register, the insurance company, to the grant register, the farmers union and to the accountancy office. It would be easy to transmit these data from one system to another electronically. Better organizing and common standards could improve quality and availability to the needed data for advisers, banks, farmers, etc.

A system for exchange of public data called 'Altinn' is developed to increase the efficiency for input and output of data to the public sector. Today this system touches the agricultural sector in different ways. It is mostly used to communicate tax data from the farmers to the tax register. Most of the tax reports are carried out electronically from the farmers and the accountancy offices into the tax register today. The accountancy offices have also access to their customers' temporary tax data made by the Tax Inspectorate. In Norway we also have a register called 'Produsentregisteret' operated by the farmers' customers and suppliers. This register arranges for exchange of data throughout the producers number which is an ID used by many organisations.

Different kinds of e-invoices are developed by the banks. That will open up new possibilities for data exchange.

A new E-tracking system is now being developed to track the food through the food chain from the farmer to the consumer. According to this system a new infrastructure in cooperation between private organisations and public control authorities developed, which can be relevant for other exchange of farm level data.

It is not easy to coordinate all these systems to make an easier exchange of data. The project has not concluded on bringing these existing systems into data exchange of accounting data.

7.1.4 Uncovered needs and possible improvements

The pilot shows a requirement for goal-oriented and efficient exchange of data to improve quality and availability for decision making in agriculture. By standardisation, better organizing and technology it is possible to implement better analysis and a better foundation for decision making in the whole sector. It is also necessary to upgrade the agricultural and the economical knowledge through this process. The farmers' use of IT-technology will affect the support of

these new systems, and parallel projects helping the farmer becoming more comfortable using IT-tools should be initialized. The project concluded with 4 measures:

1. developing new systems and standards for goal-oriented and efficient exchange of data;
2. professional development of the production economy and business management in the agricultural sector;
3. skills upgrading of different actors in economy and production;
4. efforts for increased use of IT-tools among the farmers.

The pilot project has concentrated on item one. This will be the basis for work on item two, and the foundation for better quality, availability and efficiency. There is a continuous need for item number three, and item number four is important for the support *on* new systems.

One of the conclusions from the pilot project was to work on specific tasks. At the same time it is important with a broad support to common long-term objectives and to ensure the totality related to professional development and common structure for exchange of data. An initiating task is a system for electronically transmitted invoices. This will be an efficiency improving measure for the farmer and his business partners.

7.1.5 Requirements for possible efforts and solutions

Central actors in the agricultural sector have to develop common infrastructure and standards to obtain the main objectives in this process. This means a common portal where all the partners have access to register data, to register and download data and mark different data. The producers of data have to register the data only once. The users of the data should get all the required data in one operation if the owners of the data have given them the necessary access to the data. The main principle has to be that the ownership to the data belongs to the producers. Only the owners are permitted to give access to their data source.

One of the conclusions in the pilot project is to start with a portal for electronically transmitted invoices. The architecture of the portal has to take into consideration future enlargements including a lot of discussed topics. An important part of the development has to be technical standards for exchange of data and professional standards for the content of analysis and accountant reports. Further development of performance measurements, layout and methods for analysis and planning are important parts of this work.

7.1.6 Cost benefit analysis

In the pilot project there were carried out some qualitative benefit factors related to the needs analysis and situation analysis. In addition a quantitative survey was carried out among the accounting offices and other central actors in the farmers' business circles. The investigation shows a large potential for cost reductions along the value chain by transition to electronically transmission of vouchers. The quality of the data will also improve, and it will allow more data follow the value chain to a lower cost. This will cause a better foundation for decision making and also create a better data source for research and different investigation.

During the pilot project it is stipulated benefit to different efforts. Total benefit for the different steps is calculated to a net present value of 200 millions NOK (€25 millions). The estimates are calculated as net present value along the whole value chain of vouchers but it is not including potential profit for the farmer.

In addition utility value for some other users is estimated. It is for example possible to reduce the time spent on the work with the Account statistics in NILF and for the some other users of the farm level data.

It is not carried out cost benefit analysis for the whole agricultural sector according to a better basis for decision making. If easier exchange of farm level data could lead to a better basis of decision making and fewer mistakes in future investments and planning, the benefit for the farmers and the society could potentially be of a very large amount.

7.2 Effects for the work with Account statistics (Norwegian FADN)

The spin off effects from the pilot project for exchanging farm level data for the Account statistics (Norwegian FADN) could be of a great value, not only in cost reductions, but also for a lot of other measures like networking and professional cooperation. During the pilot project the institute have established co-operation with new partners who are in possession of valuable data for Account statistics. Budget cuts and pressure for more detailed data and better quality enforce new methods and technology for cheaper data collection.

7.2.1 Future prospects

If the visions from the pilot project will be fulfilled a lot of possibilities open for more efficient collecting of data for the Account statistics. A common portal for the users of the farm level data simplifies collecting of data, labour input and other costs can be cut. The quality of the data will be improved and number of details transmitted electronically can be enlarged to a lower cost. The portal will also open for increased competition among the users of farm level data according to access to a large amount the farm level data for several users. Different services which are connected to exclusive data today will be available for new actors within easier exchange of farm level data.

Anyway, a common portal are some years ahead. The work with more efficient data collecting has to show rapid results. The network connected to the pilot project open for bilateral data transmission between NILF and some of the participants in the pilot project.

7.2.2 Needs analysis

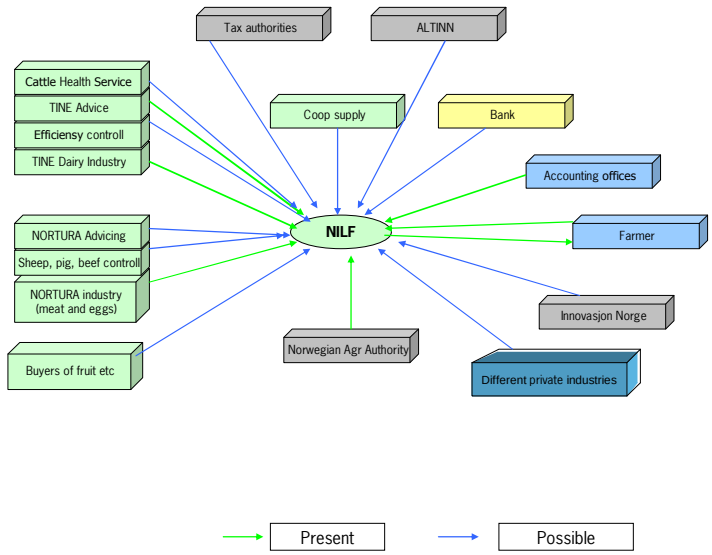
The accounts for taxations have been simplified during the last years and harmonized with account for other businesses. The specifications concerning types of income and costs have become less detailed and the efforts for collecting those details have been more noticeable for the Account Statistics. Till some years ago the whole household economy was presented in the tax account. The tax account was previously also meant for business management. Present tax accounts contain only data from the business, and the specifications are limited. Private savings, shares and wages, private houses and cars are not presented in the tax account. NILF has always presented family net income and own capital (net worth), but this has become more labour-intensive since the taxation change took place. Increasing pressure for cost reductions and more efficiency enforces the institute to look into new solutions concerning data collection. Account Statistics are supposed to answer more questions using less time on collecting data, and some of the data have become more difficult to collect. Easier ways of collecting the data and new data sources are required.

7.2.3 Potential data sources

The main source of data for the statistics has always been and still is the tax accounts. If we are able to get the farm level data transmitted electronically, and not only the bottom lines of the statements, we are able to get details on quantities and prices. Every large buyer and seller of agricultural products could be a useful source as well as the tax authorities and Norwegian Agricultural Authority. For the work with the Account statistics we have looked into the most labour intensive operations concerning needed specifications and decided to ask for electronically transmitted data sets for some selected businesses. For the coming year we have chosen the large cooperatives in the Norwegian agriculture like dairy and meat industry and the Norwegian Agricultural Authority to ask for data sets for the participants in the Account statistics.

Figure 7.2 is an illustration of the data flow regarding to the Account statistics might be in the future.

Figure 7.2 **Potential data sources for electronic transmission of farm level data for NILF**



7.2.4 Contract with the farmer

Participating in the Account statistics in Norway is voluntary. We have no limit for how long the farmer can participate, and the annual replacement rate is about 10 per cent. The Data Inspectorate in Norway demands a written agreement between organisations that collect and store data and the informants. For some years we have had such an agreement between participants in the Account Statistics and the institute. It states the duties of both parts. The agreement lasts till one of the parts want to end it, and it should be done in writing.

Who are the parts of the agreement? NILF is the one. A member of the staff signs the agreement, often while visiting the farm. The farmer and his/her spouse, if any, is the second part. Some information like personal taxation data requires signature from both the farmer and spouse, but for data concerning the production and the business like specification of animals and other products, the farmer's signature is enough.

The agreement turned out to be a useful tool for the work with electronic data transmission of farm level data. The agreement allows NILF to collect administrative data about sold animal and plant products, production allowances, information on use of agricultural area and figures for taxation. The agreement list a number of organisations that NILF can collect administrative data from, and gives us the right to use the register data set for the Account statistics and other research. We can store the data and exchange anonymous data with other researchers. In return NILF pays the farmer a small amount for filling in forms or doing other services for NILF. The farmer also gets a production analysis and the annual publication with the results from the Account statistics.

7.2.5 Costs and benefits

The quality of the data will often be better transmitted directly from the original source than after being reproduced through the accountancy office. There will be a better and more secure distinction between for instance cows and heifers, piglets and pigs for slaughter. The numbers and weights of animals and crops will be exact. Specification of quality and other information will also be available in a larger extent. The quality of the data for research purposes increases.

For the accounting year 2007 NILF hope for a more effective data collection. For the participants that have valid agreements, we will be able to

get information on the size of milk quota, milk sold and the number of dairy cows and goats from the biggest dairy company (covering about 95% of the production) and numbers and types of animals sold and the meat weight in kilograms for each type from the biggest meat company (covering about 70% of the animals for slaughter). Both companies will also give the value of the products in NOK and the amount paid in production allowances for the same products. The Norwegian Agricultural Authority has agreed to give us data on the use of agricultural area and the type and amounts of grants paid to each farmer. Questions about the amount of grants are often asked, and the size of each type of grants is of interest for instance when information from parts of the Account Statistics is used in the negotiations between the Farmers Unions and the government on prices and support. The tax authorities will give us a lot of figures for taxation this autumn.

The number of participants in the Account statistics is annually between 900 and 1,000.The benefit of using administrative data is calculated to about one hour and a half per participant. Spending less time in handling the data is one of the measures concerning these efforts. 1,500 labour hours are about 10% of the total budget for 2008. It is still a bit early to estimate the exact benefit of this year's efforts with electronic data transmission from the new data sources. Some data were not available in time, and the last agreement is still not signed. The cost savings will be much less than the amount shown above. The data suppliers are paid for their extra work with extracting data for the participants in the statistics, but that is just a few hours work. The costs concerning data from registers are limited for NILF. Developing new systems for handling and import of data sets create some internal costs for NILF. Our institute has used some labour on this issue, but we consider that the effort will pay. This is an investment for future benefit. We also intend to enlarge the work with electronically data transmission of farm level data from other sources the coming years.

7.3 Conclusions

The pilot project for exchange of farm level data has revealed needs for better knowledge, information and basis for decision making. Electronic transmission of farm level data will cut costs and secure out better data quality.

Coordination among the users of the data is important, and an easier exchange of data among the different users is strongly wanted by the farmers.

For many kinds of data they have to register same data many times for different users.

There is a need of standardization to improve communication. The institute is asked to lead the work with the common standards. Organizing and cooperation between the different participants are to achieve a better data flow.

There is a need for simple software tools for better strategic decisions, and this is the main motivation for this project.

To succeed in the project it is necessary that all collaborators have benefit from the cooperation, or else the effort will fail.

The visions of the pilot project with a common portal for farm level data are some years ahead. The co-operation with the partners has opened for bilateral data transmission between NILF and some of the participants.

Lower budgets and increased demand for higher effectiveness in the Account statistics combined with a request for more and better data cause a need for changes. Electronic data transmission can be a part of the solution.

The number of manual operations has to be reduced. The pilot project opened for an easier collaboration with potential data sources. The potential for expenditure cut in the Account statistics is calculated to 1-1.5 hours per unit. There is uncertain utility value the first year, but undoubted potential in the future.

There will be a lot to gain in electronic collection of data for the Account statistics. For less costs NILF will be able to make more precise statistics with more details.

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8 On agricultural taxation and competition - an explorative case study concerning the EU's direct payments

Hennie van der Veen and Krijn J. Poppe[1]

8.1 Introduction

The Common Agricultural Policy was born in the late 1950s and early 1960s when the founding members of the EEC had just emerged from over a decade of severe food shortages during and after the Second World War. The aim of the CAP is to provide farmers with a reasonable standard of living and consumers with quality food at fair prices. In 2003, the European Commission introduced with the reform of the CAP a new system of direct payments, known as the single payment scheme, which is implied from 2006 on. Under this system, aid is in principle no longer linked to production (decoupling).

Despite the fact that the CAP aims at strengthening the competitive position of EU agriculture, it also influences the internal market. These influences include the national decisions that are taken on the implementation of the CAP. These decisions not only deal with the choices left to member states on e.g. a historic payment or a flat rate, but also decisions on taxation. As we will show in this paper, this influences transfer efficiency and probably also competition.

The taxation[2] of direct payments is not a case on its own. Decisions on ownership of the direct payment titles in the case of rent and decisions on tradability and deprecation of titles (like in the past with milk and sugar quota) could influence competition too. The issue is also of interest since in an EU of 27 countries re-assigning more responsibility to the national level (renationalisation) is likely. National policies might give more attention to the production of public goods by the agricultural sector. That could raise more discussions on national state support in the future. This paper explores the differences between the national taxation on EU subsidies and discusses the consequences of the observed differences.

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[2] In this paper with taxation we mean both income tax and obligatory social security contributions.

8.2 Taxation of subsidies

The subject of tax harmonization in the European Union has received a lot of attention (Sorensen 2004, Salvatore 2002). Some high-tax countries demand for harmonization of taxes in order to establish an undistorted competition between countries. Traditionally, the tax subject is not well explored for the agricultural sector, although in recent years more attention is given to this subject. The OECD (2005) focused on differences in tax treatment between agriculture and non-agriculture, suggesting that these differences should in some way be included in the PSE concept. The Dutch government, concerned about comparative advantage and competition commissioned a study by LEI (Van der Veen et al., 2007) to investigate differences in agricultural tax systems. These studies show that in most countries, not only the general tax system affects the taxation of the agricultural income, but also additional special agricultural provisions exist. In the LEI study (Van der Veen et al) besides the Netherlands, the main competitors of the Netherlands and three new EU countries are included. Countries where the EU subsidies are treated as normal income and for that reason are taxable under the income tax system are for instance the Netherlands, Czech Republic, Denmark and the UK. Some countries that offer special provisions for farmers are:

- France and Germany: both forfait and real income calculation. If the forfaits are applied, the EU subsidies are not (completely) taxable for the personal income tax and the social security contributions. Only smaller farms are allowed to apply the forfait system;
- Spain: both forfait and real income calculation. The forfait profit calculation is based on fixed profit indices. This provision is only available for smaller farmers;
- Belgium offers an optional special rate of 16.5% for EU subsidies for direct payments, which will be chosen by the farmer if it is more favorable than the normal rate. Additionally social security contributions are levied. The single farm payments are not included in the fixed standards (Barema's[1]) and consequently increase the taxable income. Farmers can choose between normal profit calculation and applying the Barema's;

[1] Under the per unit valuation method, the income will be determined according to fixed standards (Barema's). There are different Barema's for each form of agricultural production.

- Hungary offers a broad range of provisions for small farmers. In many cases no income tax or social security contributions are due;
- in Poland, most farmers only apply agricultural land tax. No tax on EU subsidies is due.

The differences between the countries raise the question how much the tax systems influence the net amounts received from EU subsidies and whether this distorts the competition between the countries.

8.3 Method

To get insight in the marginal taxation of EU subsidies, we constructed two sample farms, based on averages in the Netherlands (Table 8.1): a small arable farm and a large dairy farm. For these sample farms we calculated the amount of tax due in every country. Although the sample farms might not be a realistic farm for every country, by distracting from other factors that vary between the countries, this method gives a good view on the differences between the tax systems. For both samples, we calculated the marginal taxation on the EU subsidies, based on the most prevalent business form for both size categories.

Table 8.1 Characteristics sample farms

	Small arable farm	**Large dairy farm**
Total turnover	€57.000	€287.000
Of which EU subsidies	€5.000	€17.000
Family farm income	€8.000	€68.000
Total family income	€31.000	€79.000
Business form Netherlands	*One-man-business*	*Partnership*
Total acreage (hectares)	21,6	55,9
Acreage rented (hectares)	3,8	20,6

In Poland, the business form is irrelevant since in most cases no income tax is due. In both France and Germany tax is due on the income at family level. As long as only one family owns the farm (which we assume), the business form is irrelevant. In all other analysed countries, the one-man-business is the most prevalent business form for the small arable farm. For the large dairy farm we assumed the following business forms in the other countries:

- one man businesses, found in Belgium, Denmark and Spain;

- partnerships, found in the Netherlands and the UK;
- corporate farms, found in the Czech Republic and Hungary.

Since many tax systems include credits or allowances for children, we made an assumption about the number of children: in all cases two children. To keep the calculations simple, no additional allowances and tax credits are included. The marginal tax is calculated as the difference between the total amount due on tax and obligatory social security contributions on the income with and the income without the received EU subsidies. It could be that in some tax systems by coincidence the last euro of subsidies is taxed at a higher progressive rate than the first euro of subsidies, but we have not taken that detail into account.

8.4 Results

Figure 8.1 shows the marginal taxation of EU subsidies for the small arable farm in the 10 analyzed national tax systems. In some countries[1], small farmers pay (hardly) any tax on the received EU subsidies: France, Germany and Poland. The Spanish farmers also pay a modest amount of tax on the received subsidies. Especially the small farmers in the UK pay a considerable amount of tax on their received subsidies. In the UK, within a certain income range, additional income leads to both higher taxes and social security contributions and lower tax credits, leading to a very high marginal tax rate.

Figure 8.2 shows the marginal tax rate for the large dairy sample farm. In most cases, the marginal tax rate is higher for the larger farm than for the smaller farm, due to progressive taxation.[2] Noteworthy are Poland, where no tax is due on the EU subsidies and Belgium where the marginal tax rate is constrained by the special tax rate. In Spain, only a share of the EU subsidies is taxed if the fixed profit indices are applied. The highest tax burden on EU subsidies is found in Denmark, the Netherlands and the Czech Republic.

[1] For simplicity we refer to countries when we mean the national tax system of that country applied to the income and subsidies of the Dutch sample farms.

[2] A progressive tax is a tax imposed so that the effective tax rate increases as the amount to which the rate is applied increases.

Figure 8.1 **Taxation of EU subsidies on the small arable sample farm**

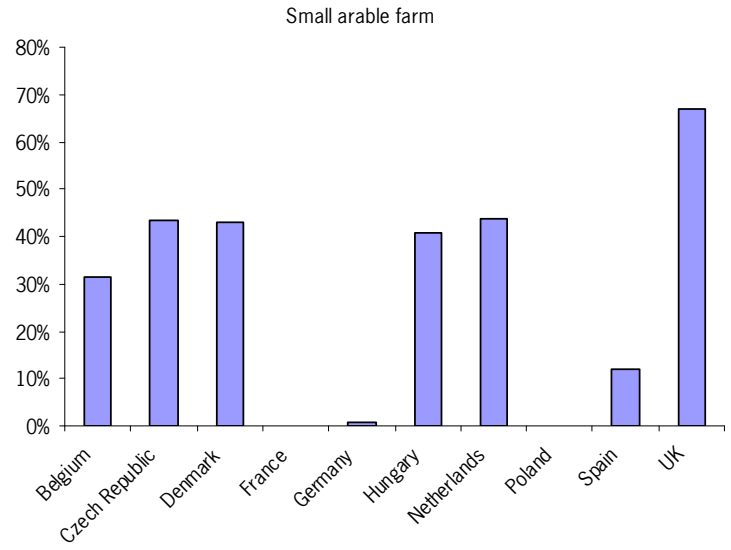
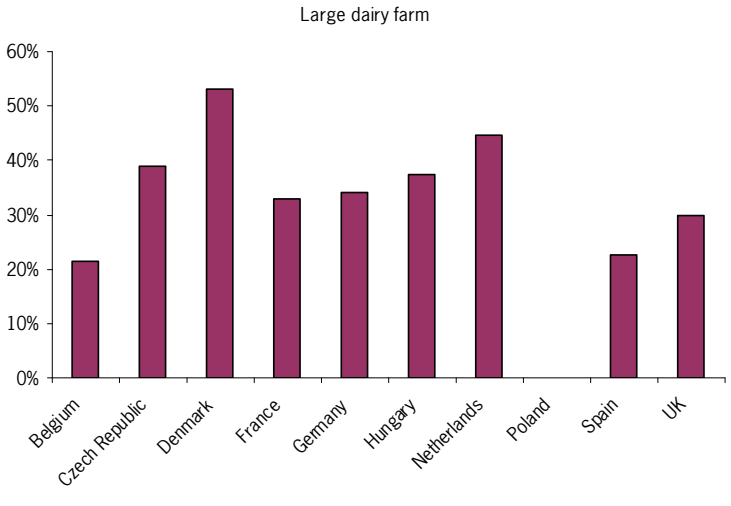


Figure 8.2 **Taxation of EU subsidies on the large dairy sample farm**



8.5 Methodological discussion

This analysis shows that taxation on EU subsidies differs within Europe. However, some comment has to be made on the research method. The figures only show the outcomes of the sample farms, excluding additional tax allowances and credits. Many countries offer additional allowances, which can be related to for example investments. From Van der Veen et al. (2007), we know that especially the Netherlands and the Czech Republic offer favorable investment incentives.[1] This implies that the marginal tax rates in particularly these countries might be overrated.

Additionally, we are aware that the marginal taxation is not only based on the tax system, but additionally on the level of income. From the FADN database, we know that the actual agricultural income differs per country. However, our focus is on the differences in the tax systems, which for the moment does not deal with the empirical reality. Of course the real incomes and taxes are an issue that has to be considered in decisions on the political importance of the issue of taxes on subsidies and in further research.

8.6 Policy implications

As our analysis shows, the taxation on EU subsidies differs across Europe. In some countries this is caused by special agricultural tax provisions, in other countries this is caused by differences in the general tax system. In this section we discuss the impact of these differences.

First of all, the transfer efficiency of the Common Agricultural Policy is reduced by the differences on taxation within Europe. In criticism of the older versions of the CAP, much attention was paid to the fact that a large share of the benefits of price support leaked to other stakeholders as landowners, traders, owners of storage facilities etc. Direct payments have a higher transfer efficiency (OECD, 2002), although in a flat rate systems also landowners clearly benefit from higher land prices. This analysis shows that the national ministries of finance benefit from higher taxes and influence the transfer efficiency. For the farmers, it might lead to a feeling of unfairness: farmers in other countries receive money from the same authority on the same entitlement but get a

[1] It should be mentioned that the investment incentives in the Netherlands aim at compensating for additional costs related to environmental and energy saving investments.

higher amount of cash on their bank account as they pay less or no tax on the received amount.

Of course one might argue that the tax system corrects European payments towards the nationally held views of a fair, and often progressive, taxation of income as expressed in national systems of income tax and social security, just as with other forms of income. But that view raises the question of the efficiency of public policy. Such an objective of fairness is also the objective of a limit on the payments of e.g. €100,000 euro per farm. And more fundamentally, one could examine in which situations the income tax and social security systems as such are better suited to fulfill the objective of providing a reasonable standard of living. Figure 8.1 and 8.2 show that in several tax systems 40% and more of the direct payment is taxed away. EU subsidies are actually money that is first transferred to Brussels from the Ministries of Finance, then transferred back to Ministries of Agriculture, that pay the money to the farmers. Subsequently, tax is levied on the received amounts. A direct support from the domestic Ministries of Finance might be a more efficient way to support those who need it.

Next to transfer efficiency and the coordination issues of multi-level government, there is the issue of the potential distortion of competition between countries. In the literature (Van der Laan and Nentjes, 2001), two views can be distinguished: the inequity of starting conditions and the inefficiency of allocation.

In the first view, a situation of distorted competition implies that firms do not operate under equal conditions, which in this view is not acceptable. This vision demands for a level playing field: all players play by the same set of rules. It is rather juridical in its view. Does the difference between the analysed countries concerning EU subsidies lead to inequity in starting conditions?

At first sight our analysis confirms that the differences between the countries affect the international competitiveness. However, the tax pressure in a country only shows the costs of taxation, without showing the benefits provided by the tax money. A country with a high general level of taxation, might offer a higher level of education or a better general infrastructure, be it for agriculture (extension service, port facilities) or the society at large. Firms might in that case be willing to pay a higher tax. Higher levels of taxation might consequently not automatically lead to a worse competitive position.

Yet, as we already stated, some countries offer special agricultural facilities that limit the marginal taxation on EU subsidies. These special provisions can be seen as 'harmful' taxation. Only the agricultural sector benefits from these provisions, while the general level of for example the infrastructure and other

domestic benefits are not influenced. Special provisions for farmers also play a role in the calculation of the Producer Support Estimate (PSE) of the OECD (2007). The PSE is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income. Next to the tax provisions, also provisions related to economic, social and environmental policies are included.

The second view on distortion of competition does not focus on the starting conditions, but on the outcome of the competition. The goal is to achieve some kind of efficiency instead of fairness. It can be summarized in the Heckscher-Ohlin theorem: free trade results in an efficient distribution of industries. Countries specialize in industries that require inputs that are abundantly available in that country. International free trade and specialisation based on comparative advantages is superior for the participating countries. In this view distortion of competition leads to inefficiencies, which can not be accepted.

Does the unharmonised taxation of EU subsidies lead to an inefficient allocation of agricultural production? To answer this question we have to know to what extent agricultural production is substitutable over countries, and to what extent is agricultural production within a country substitutable with other kinds of agricultural production or other industries.

We know that the agricultural production is really linked to the land. From the point of view of the farmer, a transfer of the farm to another country is not an easily made decision, which is based on many more factors than taxation alone. But more often than in the past, cross border farming occurs due to globalisation and the potential enterpreneurial income from investments by West European farmers in new member states (Meulenkamp et al, 2006). In the case of the Dutch farmers, the Dutch tax system penalizes a farming exit (which emigration technically is) with a high cash outflow as taxes have to be paid on profits from sold assets. Whether the EU grants lead to entrance from other sectors depend on the entrance barriers. We know from the Dutch situation that entrance from outside the agricultural sector is almost impossible due to the high land prices. For other countries, the barriers might be more limited.

Production can also be reallocated between countries without transferring the farm and farmers. Favourite provisions for the taxation of EU subsidies, as present in Belgium, might in theory lead to an inefficient allocation of production. Products that receive EU subsidies are more attractive than other products. However, there are a number of measures in the policy that counterbalance the substitutability trend. The total amount of subsidies available

is fixed for the country and often on a historic basis for the farm (unless it is a flat rate). So increasing the cereal area in this example does not lead to more subsidies received. The scrapping of provisions that the area of vegetables might not be increased, moving to a flat rate or scrapping the obligation to produce something at all in order to receive subsidies are all measures that weaken potential distortions.

8.7 Conclusions regarding research implications

In this paper, the taxation of EU subsidies is discussed as a case in the discussion about the relation between tax systems and competitiveness. It is known that more differences in the treatment of farmers exist between the European countries, which are not all related to taxation. For instance, the fiscal treatment of production rights differs over Europe and the status of the lessor and lessee concerning the single payment scheme also differs.

In this paper it is shown that the taxation of the EU subsidies differs over Europe. For farmers this might lead to a feeling of unfairness. The transfer of money from the domestic Ministries of Finance to Brussels, then back to the Ministries of Agriculture and an additional transfer of tax payments to the Ministries of Finance does not seem to be very efficient. A direct support from the domestic Ministries of Finance might be a more efficient way to support those who need it.

At first sight, the competitive position is affected by the differences in taxation, since it leads to unequal starting conditions for the farmers. However, this is only valid for special agricultural provisions. A higher tax burden caused by the general tax system might be related to a higher level of public facilities such as education and infrastructure. A second view on the distortion of competition focuses on the outcome of the competition and aims at achieving efficiency. Since agricultural production is linked to land, transfer of production between countries is not easily realized. Furthermore, entrance into agriculture from other sectors is, at least for the Netherlands, not easily realized due to high entrance barriers.

Although the effects of the taxation on the distortion of efficient production are probably small, it seems that more research on this issue could be interesting. Arguments for that are the internationalisation of farms, the potential renationalisation of at least the implementation of the CAP, the attention to impact analysis on (European) policies to improve their efficiency, and efforts by OECD to include this issue in PSE calculations. In addition it might

be an interesting topic from a scientific perspective to reflect on the economic effects of taxation and on efficiency in multi-level governance.

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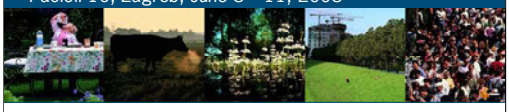
9 Integration of agricultural statistics Agricultural census and FADN

Integration of agricultural statistics Agricultural census and FADN

Dr. Hans C.J. Vrolijk
Pacioli 16, Zagreb, June 8—11, 2008



Content

- Background
- Estimation
- Approach
- Example
- Future activities

Background: Research questions

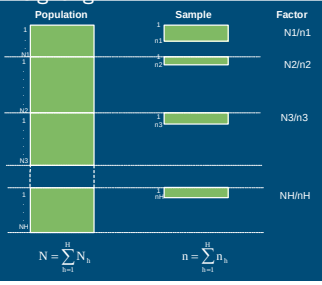
- Increasing importance of regional results
  - Rural development
  - Cross compliance
  - Waterframework directive
  - Local administrators
- How to make estimates for small areas?

Background: Agricultural statistics

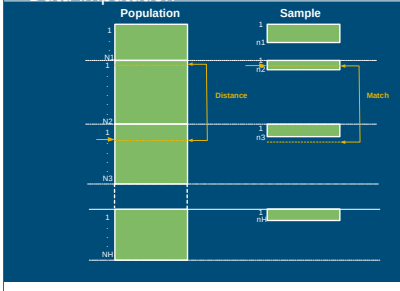
- Agricultural census
  - Limited information on all farms
- FADN
  - Extensive set of information on a selection of farms
- Integration of agricultural statistics

Background: Example

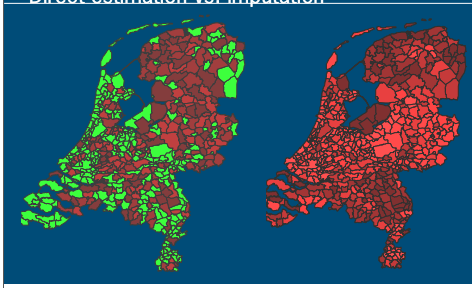
FADN weighting



Data imputation



Direct estimation vs. imputation



Dairy example

Dairy example

Table 2 Results of imputation process (multiple imputation)

	Mean	Standard error	Min	Max
Revenues	417203	16723	405002	431081
Costs	505405	16354	492738	521129
Net farm result	-76984	5502	-85138	-69606
Labour income per entrepreneur	63899	6459	56126	75055
Number of entrepreneurs	1,49	0,05	1,4	1,6

Dairy example

Table 6 Imputation based on age, ha grass, ha fodder crops, number of dairy cows and economic size

	Real value	Estimated value	Standard error
Revenues	476902	470917	34330
Costs	569488	560114	33836
Net farm result	-79303	-76492	9182
Labour income per entrepreneur	67817	68500	11297
Number of entrepreneurs	1,53	1,53	0,09

Discussion

- Small area estimation asks for alternative methods
- Data imputation can improve estimations by including more information
- Wide range of applications on different data sets
  - Applications on FADN data, but also:
    - Economic damage of muskrats
    - Costs of maintaining parks
- Further activities:
  - Support for selection of imputation variables
    - genetic algorithms
    - stepwise selection

10 Agricultural statistics and FADN in Denmark - recent developments

By M.sc. Henrik B. Pedersen, Institute of Food and Resource Economics, University of Copenhagen, Denmark

In this paper and presentation I will give a short introduction to the Danish system and recent development in the organization.

10.1 Data system

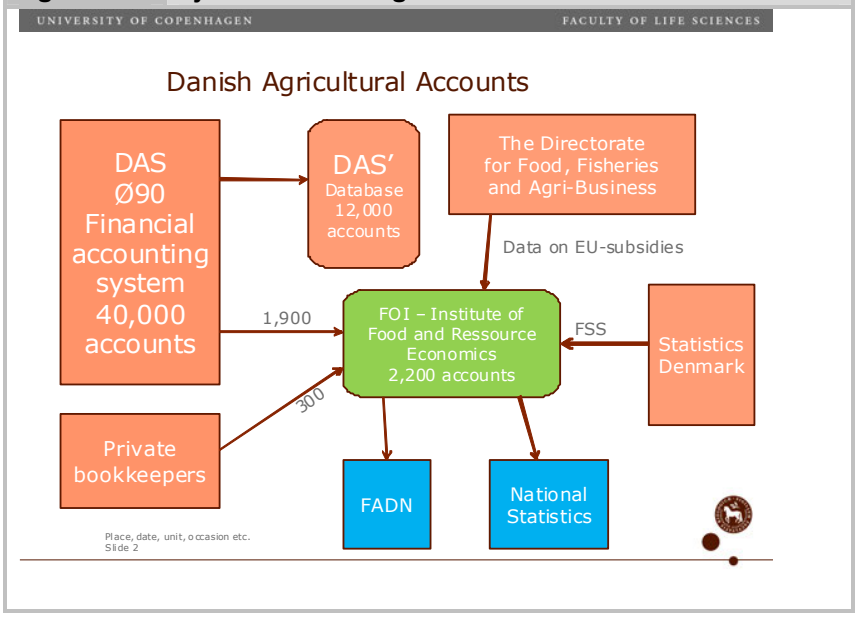
In Denmark almost all agricultural economic accounts are elaborated in Ø90 which is a comprehensive accounting system developed by the Danish Advisory Service, DAS. This system was introduced in 1990 and is used by all the local offices organized in DAS. This means that the accounts are based on the same accounting plan and in principle on the same accounting practice.

Data from Denmark to the FADN system and to national account statistics for agriculture, horticulture and organic farming are based on data from Ø90. In cooperation with DAS our Institute of Food and Resource Economics (FOI) have developed a key to the accounting plan specific to our use. The system Ø90 has been supplied with some extra questions that are related to the FADN statistics. Also some tests have been introduced in the system to minimize the test burden at FOI. For example the logic connection between yield, sale, internal use and stocks of a certain crop is tested.

This way we receive about 1,900 accounts through weekly electronic data transmissions. It could also be mentioned that DAS have their own database for advisory purpose. This database has about 12,000 accounts and is among other things used for benchmarking between farms. The system for Danish agricultural accounts is showed in figure 10.1.

Of course not all holdings in the agricultural sector in Denmark are organized in DAS. From private bookkeepers we receive about 300 accounts, mainly filled in to a excel form.

Figuur 10.1 **System for Danish agricultural accounts**



All together this gives us our sample with 2,200 accounts covering Danish agriculture. The sample is based on data from the Farm Structure Survey compiled by Statistics Denmark. We also get information about organic holdings from the Danish Plant Directorate and about farms with furred animals. Fur farming is a substantial part of farming in Denmark but is not part of FADN. So these accounts are only used for our national statistics. At national level we have a threshold of 8 ESU or 10 hectares of arable land.

We merge our account data with data from the administrative register from The Directorate for Food, Fisheries and Agri-Business which is the national paying agency for agricultural support in Denmark. Thereby we get the exact figures about subsidies due to the single payment scheme and the few coupled subsidies that remains. We are able to merge data due to The Central Business

Register (CVR) which is the central register containing primary data on all businesses in Denmark, regardless of economic and organizational structure.

Our output is of course data to the FADN system which is all accounts with more than 8 ESU, our national threshold which corresponds to a little more than 10 hectares with wheat. Our national statistics is for agriculture, for horticulture

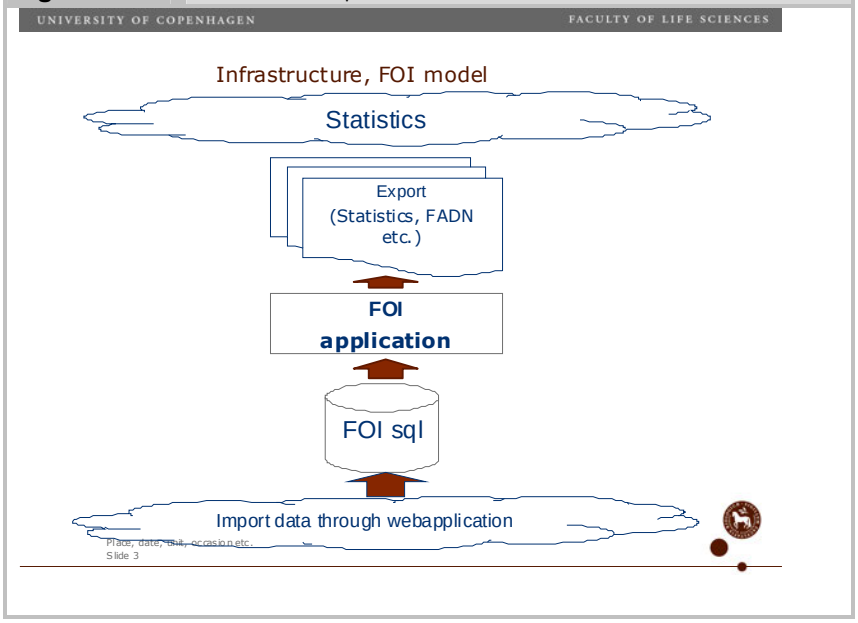
and for organic farming. Both for horticulture and organic farming we select more accounts to be able to publish detailed statistics for these sectors.

Besides these statistics FOI also has account statistics for fishery and aquaculture. All together 12 persons are working with statistics at FOI.

10.2 New IT-application

In 2007 we introduced our new SQL-database, 2006 being the first accounting year handled. Actually before that we worked in a VMS solution for the period 1990-2005.

Figuur 10.2 **Infrastructure, FOI model**



The new SQL database has been developed by a private IT company. Of course the content is determined by FOI to meet the demand for national statistics and FADN.

In short we have a web application to feed data into the base (accounts, basic selection data about the holdings, data about subsidies etc).

Then we have another application to see and handle the data on daily basis. And we export our data set to the statistical programme SAS to make statistical tables.

Figuur 10.3 **Print from 'handling' application**

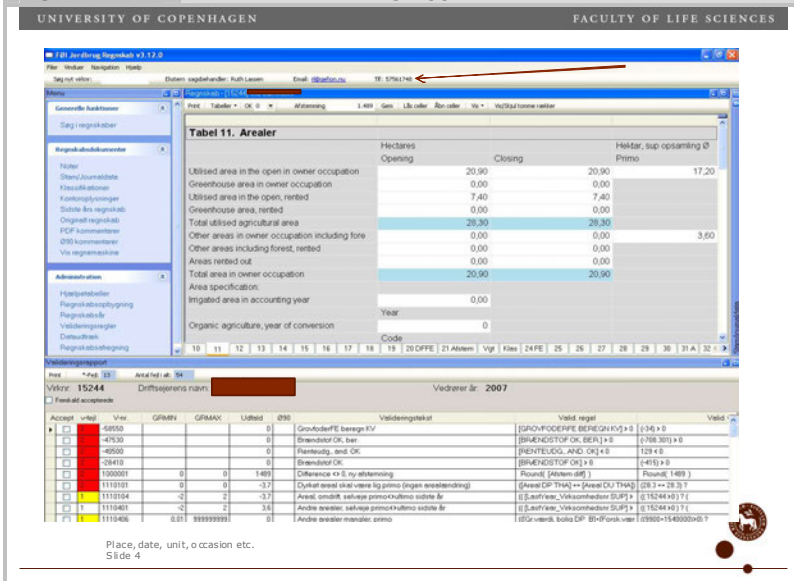


Figure 10.3 shows a print from our handling application showing an actual account.

We have information about the person who has supplied the account. When an account is transferred to FOI each assistant is asked to deliver name, phone number and email (showed at the top of the figure, the email is clickable). We have a window with the data and another window with a test report. Every time a figure is changed in the window with the data the account goes through a validation and a new test report is instantly ready - in much less than a second.

We have access to documents related to the account data, showed at the left pane 'Regnskabsdokumenter'. Very important, each assistant at the local DAS office are asked to upload a PDF copy of the farmer's actual account. This is of great use in validating and we are able to check about 95% of all errors by looking in to the actual account. Another document is 'Ø90 kommentarer' where we are able to see notes done by the local assistant, for example an explanation if yield is lower than expected.

The statistics for 2006 were the first in our new system. Improvements are still in progress but we are very satisfied with an effective system.

10.3 Recent organisational development

FOI was an independent sector research Institute sector for agricultural and fisheries economics under the ministry for Food and Agriculture up to 2004.

By 1st of January 2004 FOI merged with the institute of economics at the Royal Veterinarian and Agricultural University forming a new FOI with more than 100 researchers, in fact the largest environment for economic research in Denmark, and also taking care of education.

By 1st of January 2007 the Royal Veterinarian and Agricultural University merged with University of Copenhagen as part as of a big reform of the universities in Denmark. FOI is still an independent unit with its own board of governors.

These two mergers had relatively little impact on the production of statistics although the staff has been more involved in education and data has been used more by students. Positive effects.

The latest development has been that after the election in Denmark in autumn 2007 Agricultural Statistics were mentioned in the working program of the new government!

> 'The government wants to unite the official production of Statistics in Statistics Denmark, including innovation- and research statistics and agricultural statistics. The purpose will be better quality of the statistics, better access and administrative savings.'

Before the government decision to gather all official statistics in Statistics Denmark we already started a closer cooperation.

Already before the suggestion FOI and Statistics Denmark have been working closely together on a number of subjects. Latest we started working on introducing data from the primary sector in Statbank Denmark with the same range of definitions as other sectors and classified by the European NACE classification.

Also, FOI has delivered a dataset with micro data to be used in Statistics Denmark's researcher database where approved researchers can get access to micro data and combine them with other registers. And we have a well developed cooperation on education.

At the moment it is up to our ministries to decide whether they will move the FADN data collection to Statistics Denmark or they will support a model with even more close cooperation between the existing organizations. We realize that in all other EU countries but Sweden this work is organized in the Agricultural ministry or a research institute related to it.

Discussion: What is best: A division specialized in statistics in an environment on a (agricultural) university or a division specialized in agricultural statistics in a statistical environment?

- Advantages: Statistics Denmark has more experience and critical mass concerning IT and methods. Close cooperation with FSS. Extended use of administrative registers. Increasing critical mass on agricultural statistics in Statistics Denmark.
- Disadvantages: risk of losing close contact to researchers.

11 Improvements on quality of FADN data for EAA purpose

Author: Violeta Cadikovska, Macedonia[1]

Abstract

The paper is mostly focused on the surrounding in which the farm production takes place, the trade of agricultural and food products, and the agricultural policy and its approximation towards the common agricultural policy (CAP) of the EU, all in the light of the acquired candidate status and the expected start of negotiations for full EU membership.

Governments need information on individual households using as wide a definition as possible of the farm household. This would allow policy makers to select the most appropriate group of households for analysis and comparison depending on the question to be answered. In some cases this might be a household whose main occupation and source of income is farming, but in others, it might include all households with any income from farming. All sources of income in the household should be taken into account, preferably on a comparable basis across the whole economy. Policy makers also need information about the structure and behavior of farm households if they are to identify the cause of individual income problems and design appropriate remedies.

Statistics can become policy management tools. In some countries, for example, it is not uncommon for one farm to support two or more households; this is an additional reason to focus on the household instead of the farm.

With the development of the agricultural informational system, most recent data sources are appropriately used, especially the data obtain through FADN, which continuously develop and improve the economic accounts for agriculture.

Key words: Economic Accounts for Agriculture, Farm Accountancy data Network, Farm Monitoring System.

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11.1 Introduction

The agriculture has been very significant for the national economy of the Republic of Macedonia. Besides the many policies and economic problems, that were previously stated, this sector has indicated an important flexibility, and for this period it has contributed significantly to the social and economic stability.

The agriculture has a share of about 12% in the GDP, two thirds of which are covered by crop production and the remainder by livestock production. The total share of the agri-food sector, coupled with the food industry, accounts for approximately 16% of the GDP.

The share of the labour force in agriculture, in relation to the total labour force is noteworthy, representing about 20%. Unpaid family workers are more than 90% of total labour force in agriculture.

The State Statistical Office is an independent professional organization responsible for the production of official statistics in the Republic of Macedonia, and at the same time it is a coordinator of the national statistical system.

The Office makes significant efforts to harmonize the national statistical system with the statistical systems of the member-countries of the European Union, in order to satisfy the needs for comparable statistical data of the domestic and the foreign users.

State Statistical Office is responsible to provide data for the Economic Accounts in Agriculture. They are produced on the basis of methodological concepts, definitions, accounting rules and unified classifications applied by the Member Countries of the EU, contained in 'Manual on the Economic Accounts for Agriculture' EAA 97 (rev. 1.1), published by Eurostat.

It is necessary to improve data sources to follow up EAA recommendation.

11.2 The situation in the agricultural sector

11.2.1 Major sectors

The four principal groups represent the crop production: cereals, industrial (including fodder) crops, fruit (including grapes) and vegetables (including potatoes). The general production trends in this sub-sector are positive, but at the largest part of the crops, the yields are low and lower than the EU average, especially with regards to the cereals and industrial crops. The cereal crops do

not satisfy the domestic demands, even though they have strategic significance and are the most present crops.

> 'Vine growing is a significant sub-sector for Macedonia, especially in combination with the wine production, which has major export significance. Vine growing is probably the most important and most strategic industry in the field of plant production, since together with the wine production it contributes to about 17%-20% of the agricultural share in GDP.'

As the most significant industrial crop, tobacco takes up 1/3. Tobacco has a long tradition and is a strategic product for Macedonia, mostly because of its social aspects (engages a significant labor force in the rural areas and in specific production regions). Also, tobacco is one of the main export products.

There has been a decreasing trend of livestock production in the last decade. The number of livestock has decreased, while the yields, although still comparatively low, are constantly increasing.

The Republic of Macedonia greatly depends on the imported feed, maize, proteins and vegetable fats as well as complete fodder mixtures or additions (combination of proteins or proteins, minerals and vitamins).

11.2.2 Agricultural trade

During the period 2000-2005, the agricultural trade has been stable, with agricultural exports accounting for 15.4 - 18.8% of the total exports, and agricultural imports accounting for 12.4 - 14.9% of the total imports.

In relation to the tobacco, beverages (wine, spirits and mineral water), meat (mostly lamb), and fruit and vegetables account for 70-80% of all agricultural exports.

As global demand recovers, and trade liberalization and market integration proceed, the traditional markets for agricultural products will become increasingly competitive. Macedonian exporters will need to improve product quality and reliability if they are to retain and increase their market share.

11.2.3 Farm structure

The agricultural companies represent the farm structure in the Republic of Macedonia. (mostly originating from former state-owned holdings) and the family farms.

The family farms own or lease around 80% of the arable land, whereas the remaining 20% are in the ownership of the state and have been leased by the agricultural companies.

The privatization process did not include the state agricultural lands, which were managed by the public enterprises and agro-combines. The reason for this was that law has defined the agricultural land as goods of special interest, by which the state keeps the right to this asset. There has been a reduction in the effective utilization of the agricultural land in the Republic of Macedonia due to the problem of its parceling out and fragmentation, which arise from the previous constraints to the land ownership (land maximum), long history of informal relations on the land market.

However, in spite of such small property and fragmentation, and according to certain researches, it appears that in the past the small family farms realized better production and larger profitability than expected, despite the negative institutional circumstances they were faced with during the transition period. Contrary to this, the large state-owned enterprises (privatized and non-privatized) were less productive and non-profitable despite the institutional privileges they were provided with. This was a result of the significantly high total costs per hectare, higher operational costs, maintenance, and insurance and interest payment.

The official statistical data on the production and yield per farm structure support these conclusions, provided that one takes into account the fact that almost 80% of the total agricultural production has been produced by the family farms. Nevertheless, recent years reveal that there has been a mild up trend in the production index of the agricultural companies. This has been a result of the completion of the transformation process, i.e. the privatization and beginning of the market-oriented production strategies and organizational strengthening.

The Republic of Macedonia has received a loan from the International Bank for Reconstruction and Development toward the cost of Agriculture Strengthening and Accession Project, and it intends to apply part of the proceeds of this loan to payments under the under the agreement(s) resulting from this IFB: Supply and installation of application software package (Farm Registry Software).

The Ministry of Agriculture, Forestry and Water Economy serves as the implementing agency for the project and now invites sealed bids from eligible Bidders for integration, customization and installation of the system, training, technical support and maintenance. The intention of the Ministry is to set up an integrated administrative register of agricultural holdings as an umbrella register over all other registers carrying the information important for effective decision

making (the way of using the future statistical farm register to be specified) and implementation of direct payments policies.

The farm register will form the basis for managing national and EU support schemes (IPARD and after accession EU support payments. The main purpose of the integrated Farm register is to link and thus unify all registers by setting a unique farm identification number. The register will provide additional data (in addition to agricultural statistics, FADN, AMIS etc.) for policy analysis and planning.

The farm register should be developed in such way, that it forms the basis for managing aid applications and payments (national support payments, IPARD and future CAP-payments after accession) and at the same time improves the basis for policy analysis. The immediate priority will be to cover all farmers applying for IPARD and national support. This applicant's register can be enlarged into a comprehensive full farm register within a second step. This second step should be done in very close coordination and cooperation with the Statistical Office.

11.2.4 Agricultural policies

Agrarian policy is based on the "market-price" activities, which, basically, treat market interventions through tariff protections and trade limitations and the subsidies for the prices of certain agricultural products. This type of approach, along with the low budget of Ministry for Agriculture, Forestry and Water economy MAFWE (around 1% of the budget of the Republic of Macedonia), is further increasing the problems of this sector; where discontent, especially on part of the producers, has been growing.

MAFWE defined the new goals for the agricultural development in 2002, which is confirmed by the latest strategy of the year 2007:

- strengthening of the competitive ability of the Macedonian agriculture on the integrated regional markets of the European Union and South-East Europe by introducing measures for increasing the efficiency of the agricultural production, processing and marketing;
- building appropriate, effective public and private institutions;
- improving the agricultural income;
- ensuring that the consumers have access to safe and healthy food;
- optimum usage of the limited resources of land, forests and water in an ecologically sustainable manner;
- for rural development building sustainable rural communities.

MAFWE is responsible for: the formulation and implementation of agricultural policy and related strategies, the drafting of legislation, the planning and administration of government-funded programs and investments, including bilateral and international programs, and providing monitoring, inspection and regulatory services.

Further responsibilities for food safety and water resource management are shared with other ministries, although the allocations of responsibility lack clarity and consistency. MAFWE is not directly responsible for agricultural extension, research or agricultural industry.

In relation to the planning of future support funds for agriculture and rural development, the Government is projecting funds totaling 210 million euro for the period 2008-2010. The increased subsidies and the implementation of the national measures for rural development and the co-financing of the IPARD measures will be facing the gradual implementation of the principles and measures of the Common Agricultural Policy (CAP) of the EU and the harmonization of the Macedonian agricultural policy with EU's CAP.

During the entire period, the measures of the group of general services were a part of the agricultural policy. Extension services are mainly provided by the National Extension Agency, which are publicly funded advisory services. It performs agriculture-related services, tailored to the needs of the family farms. Currently, the Agency funding is provided completely from the state budget without additional earned incomes, which is sufficient only to cover the salaries and basic operational costs. Professional services consist of measures for genetic improvement, breeding control, selection and seed production, services provided by different institutions.

The agricultural research system consists of 5 research institutes, plus the Faculty of Agriculture and Food in Skopje and the Faculty of Biotechnology in Bitola. MAFWE has no formal responsibility for the agricultural research, although it is consulted on major issues and can fund specific research projects.

Rural development policy is a second pillar of the agricultural policy within MAFWE. The measures were directed towards increasing the competitiveness (investments at the farm).

11.2.5 Agricultural income

The principal objectives of the economic accounts for agriculture are to measure agricultural income and changes therein. The sequence of accounts of the agricultural industry makes it possible to calculate three balancing items which can be used as an income aggregate for the agricultural industry: net value added, net operating surplus (net mixed income) and net entrepreneurial income.

Information about the total income of farm households can inform policy makers of the income status of the sector, but its usefulness does not stop there. This information is also needed if policy makers are to be able to measure how effective and efficient social, fiscal and agricultural policies are in meeting any income objectives.

Particularly when evaluating the effects of agricultural policy, governments need to be able to measure the impact of other types of policies affecting household income and thus need to collect appropriate data, including social payments and tax flows.

Such comprehensive data at household level also make it possible to construct models of household behaviour and to integrate these into economy-wide.

11.3 FADN in Macedonia

On the basis of the advisory service reforms in Macedonia by the Law on National Extension Agency was established National Extension Agency (NEA), supported by the World Bank project for support of the private farmers and in accordance with the Republic of Macedonia agricultural development strategy for 1995-2010.

The activities of the Agency and its organizational structure are based on specialized sectors of agriculture production: crop farming, livestock breeding, vine and fruit growing, vegetable growing and agro economics.

NEA provides direct advisory assistance to independent individual farmers, by providing practical implementation of certain technologies, that is, providing technical information related to the agricultural production process compiled as technical responses to questions, aimed at increasing the quality and quantity of agricultural production. The Agency seeks to tailor these services to the actual demand of the individual farmers and their associations.

In accomplishing the planned activities, NEA has been assisted by several projects funded by Sida, such as MAASP in increasing the functional value of the advisory services; the Project 'Improvement of Agricultural Statistics', implemented by the Swedish Statistics focused on the further development of the Farm Monitoring System (FMS). FMS is the name of the national Macedonian survey that is the basis for FADN. FMS and its approximation to the standards of the European Farm Accountancy Data Network (FADN), as well as the Project SFARM - Support to Farmer Associations of the Republic of Macedonia, which helps in conducting training for the advisors and the farmers.

The summary FADN report for particular farm shows variety of data types at basic level. These data are divided according to time of producing, type of cost etc. There are data for general indicators as association membership, having off-farm income, investments, processing types in farm etc.

The Information system enables the basic data for specific farm given in the table to be grouped according to different criteria, i.e. type of production (animal/crop), type of cost/income from final processing of agricultural products (animal/crop) etc. The data-base gives opportunities for satisfaction of statistical needs, especially for EAA compilation.

With the adequate activities in the development field on the basis on FMS, the Agriculture Structural and Legal Reforms Project of the MAFWE, which is funded by EU and managed by EAR, is also included. FADN in Macedonia has taken a step forward since the organisational structure has been decided by law. Hopefully this will mean that the different organisations can focus on working with their part of the task of implementing FADN.

A law for FADN was put into force January 1st, 2008. In the law what data should be collected as well as the role of different organisations for preparing FADN and how they should interact are addressed. The law stipulated that the parties involved are; the Ministry of Agriculture, the National Committee of FADN, (a part of the Ministry of Agriculture that will form the Liaison Agency for FADN), SSO, NEA and the farmers participating in the survey.

> 'The role of the Ministry of Agriculture is to approve a plan of what farmers are to be included in FADN, to approve a list of representative farms to approve an agreement of how to collect data and finally to approve the data.'

The role of SSO is to make the plan for the representative farms and give these to NEA as well as providing a list of the actual holdings sampled. NEA should have the list two months before the reference year.

The role of NEA is to collect and prepare the data. NEA should also make contracts with the farmers about their participation in FADN.

The law also regulates how data is to be protected, and that it can only be used for the purposes stipulated in the law. The timetable for the different tasks and the cooperation with the parties involved in FADN is also regulated. The law covers the financial aspects. There will be a budget from the Ministry of Finance that should cover material cost for the committee, cost for the part of the ministry of agriculture, costs for NEA and costs for the farmers. By the law will be done the following steps:

- have available results about the universe of farms from a farm census;
- develop the EU-typology for Macedonia;
- apply EU-typology on the farms in the census and then classify all holdings according to size, type of farm and region;
- decide the FADN-population. The FADN-population should cover at least 90% of the SGM/TO of the universe of farms;
- make a selection plan for FADN according to type, size and region;
- draw the sample.

The basic principle of FADN is using accountancy data based on double entry bookkeeping. The Macedonian FADN data does not fulfill this requirement. There are some areas where the quality is low. The areas are: the value of land and buildings, dead stock and circulating capital and debts. For quite a few items the data required for FADN-purposes can be derivable for example annual working units (AWU) and the evaluation of crop and livestock.

The private farms in the Republic of Macedonia are not obliged to keep books. The enterprises and the agricultural co-operatives are required to keep books and the Ministry of Agriculture collects some data from the bookkeeping.

11.4 Census of Agriculture, 2007

During the period from 1 to 15 June 2007, the State Statistical Office of the Republic of Macedonia carried out the Census of Agriculture in the Republic of Macedonia which, as specific statistical operation, was carried out for the first time in about 40 years.

The reference date of this Census was the situation on 31 May 2007, and for certain questions the data referred to the period of one year prior to the Census, i.e. from 1 June 2006 to 31 May 2007.

The Census was carried out according to the Law on Census of Agriculture in the Republic of Macedonia, 2007. The methodology, the definitions and the standards for this Census are harmonized with the statistical practice in the Republic of Macedonia, as well as with the Recommendations of the Statistical Office of the European Union- EUROSTAT and the Food and Agriculture Organisation of the United Nations -FAO.

'The final results of the census are published in two books with data for basic statistical data on individual agricultural holdings and business entities in Republic of Macedonia by region and by municipalities.'

11.4.1 Method of enumeration

The Census was organized according to the concept of complete coverage ('door to door'), which means that during the Census all households on the territory of the Republic of Macedonia were visited and recorded.

The Census was carried out by trained authorized persons (enumerators) by interviewing (face to face interview) and the data were recorded in printed census forms (questionnaires). Data on business entities and the local units that perform agricultural production are filled in by an authorized person, verified by the responsible person-manager/head of the business entity and delivered by post to the State Statistical Office. Basic census forms used in the Census were:

- questionnaire for Individual Agricultural Holdings - for each individual agricultural holding, as well as for a household that owns forest or fishpond;
- questionnaire for Business Entities - for each business entity and local unit covered by the Census.

11.4.2 Units covered by the census

The following units were covered by the Census:

- individual agricultural holdings;
- households that own forest;
- households that own fish pond;
- business entities and the local units that in accordance to the National Classification of Activities, by main activity are distributed in the sector of Agriculture, hunting and forestry.

11.5 Main problems and key challenges of the agro-food sector concerning its adaptation to the European market conditions

In June 2007, the Macedonian government accepted the National Agriculture and Rural Development Strategy (NARDS) for the period 2007-2013. According to this Strategy, agriculture and rural development became the key pre-accession elements for the Republic of Macedonia's approach towards EU.

The goal of the National Agriculture and Rural Development Strategy (NARDS) is to contribute to the reaching of the Strategic aim stated in the National Strategy for Economic Development 2007-2009, which states the following: 'increasing the international competitiveness of the country that is necessary for a sustainable economic growth and a higher level of employment'

In order to reach the above said strategic aim, the strategic policy should include five major issues in the period 2007-2013:

- increase in the sector's competitiveness;
- reaching quality and safety of food;
- reaching a sustainable resources management;
- improvement of the living conditions in the rural areas;
- the regulatory and institutional framework reforms.

'The measures for the direct payment shall represent the basic instrument of the national policy for the agricultural support. They shall consist of direct payments per hectare in the plant production and per head in the livestock sector. The rural development policies shall be financed by national funds and by the EU (via IPARD), and shall follow the concept of the rural development of the EU. National program for the adoption of the acquis has been accepted. A certain number of important parts of the primary legislation and sub-legal acts have already been coordinated to the EU and have been passed (the Law on Plant Protection, the Law on Seed and Planting Material, the Law on Wine etc).'

11.6 Conclusions

The EAA are satellite accounts of the European System of Accounts (ESA95) providing complementary information and concepts adapted to the particular nature of the agricultural industry.

The Economic Accounts for Agriculture provide a wide range of indicators on the economic activities in the agricultural sector: Output, Intermediate consumption, Gross and net value added, Compensation of employees, Other taxes and subsidies on production, Net operating surplus or net mixed income, Property income, Net entrepreneurial income, at current and at constant prices.

Labour indicators are also obtained, being the Annual work units (AWUs) the most important. AWUs are defined as full-time equivalent employment (corresponding to the number of full-time equivalent jobs).

In SSO Economic Accounts for Agriculture have been published in June 2005, for the first time, covering the period from 1998-2003. From 2006 EAA are being published as regular annual statistical release. The completed EAA data set has been transmitted to EUROSTAT, using standard transmission tables. This included EAA by current prices and constant prices, Unit Values statistics and Annual Working Units.

Data obtained from EAA are include in national accounts and are very important structure used in compilation of supply and use table.

'Having in mind that agriculture is the main sector in the Macedonian economy, EAA statistics at SSO have quality level that they present important information about the economic situation for the agricultural sector in Macedonia.'

Recently conducted Census of Agriculture will provide more available data to create statistical farm register and also improve input data. Statistical farm register will be good frame for carrying out statistical surveys among household farms.

In a process of restructuring agriculture the support for the development of the agricultural sector in Macedonia from the government and other international institution will be significant. Development of the quality of FMS, and therefore of FADN, enabled a solid basis for their implementation in the EAA compilation. The challenges and responsibilities in the process of European integration increase the challenges in the agriculture as a sector and in agricultural statistics too.

12 The measurement of the development sustainability in agriculture: experiencing the web of statistical indicators[1]

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'I will conclude with a final observation about the importance of indicators. Therefore, by implication, we play a critical role in measuring the effectiveness of public policy and private business decisions that influence national agricultural performance.'
R. Ronald Bosecker

International Interests In Agricultural And Rural Statistics
ICAS III *'Measuring Sustainable Agriculture Indicators'*

The sustainable character of the economic development process ranks among the most critical issues of the statistical system integration into their economic environment. Indeed, the World Summit for Sustainable Development, organised

[1] The authors thank Georges Decaudin, sub-director for the statistics of farms and forest with SCEES, Christian Gay, operations manager for international affairs at SCEES and Céline Rouquette sub-director for syntheses and incomes with SCEES, for their attentive second reading of this text, while remaining the sole responsible for the possible errors or omissions. This work profits from a financial support granted under the *Impacts* project of the Agriculture and Sustainable Development (*ADD*) program of the French National Agency of Research (*ANR*). This text is a revised version of our communication to the Fourth International Conference On Agriculture Statistics (ICAS IV) held from 22 to 24 October 2007 in Beijing, China.

in Johannesburg from 26th August to 4th September 2002, reaffirms the commitment of the international community for sustainable development and invites in its analysis and statistics action plan[1] to reinforce the national and regional information services which refer to the policies and measurements of sustainable development (§ 129), while encouraging further work on the indicators (§ 130 and 131).

12.1 The genesis of the sustainable development concept

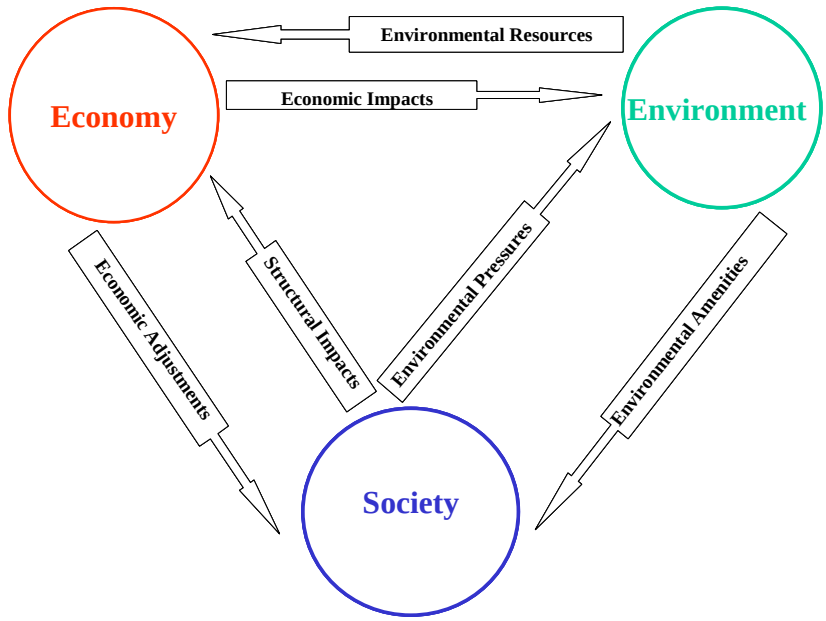
In the recent history of the theories of economic development, the concept of sustainability is for the first time explicitly associated with that of growth by the economist Walt Whitman Rostow to qualify one of the phases of economic development while speaking about the takeoff towards self-sustained growth.[2] The problems of sustainable development are already embedded in the Club of Rome[3] theses about the limits to growth,[4] which will be spread at the end of the Sixties by the Meadows report. During the Seventies, in answer to this radical calling into question of the development idea , taking the environment into account as a critical factor is establishing through the development of strategies of ecological development or 'ecodevelopment'.[5]

A concept suggested in 1987 by the United Nations, sustainable development is defined as a type of development likely to ensure the needs for the present generations without compromising the possibilities offered to the future generations. It supposes the coherence of public policies followed by the various geopolitical entities, at the global level (continental block, under-regions, nations) as well as local one (districts, counties). The World Commission Report on the Environment and the Development, chaired by Gro Harlem Brundtland,[6]

[1] cf. www.agora21.org/johannesburg/rapports/plan-action.pdf, Means of execution, p. 76.
[2] W.W.Rostow (1956) 'The Takeoff into Growth Coil-Sustained', *Economic Newspaper*, n°66, pp. 25-48.
[3] The Club of Rome, founded on 1968 April 8, by Aurelio Peccei and Alexander King, is a non-governmental organisation sensitising the governmental leaders with the complex problems of the development (<www.clubofrome.org>).
[4] *The Limits to Growth*. Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William W. Behrens III, Universe Books, New York, 1972.
[5] Strategies reaffirming the objective of the development in a reorientation of the priorities and methods integrating environmental protection and of the natural resources, cf. Sachs, I. (1974). 'Environnement et styles de développement,' *Annales-Economies, Sociétés, Civilisations*, (3), pp. 553-570.
[6] *Our Common Future (The Brundtland Report)*, World Commission on Environment and Development, Oxford University Press, 1987.

alerting the General Assembly of the United Nations to the accelerated degradation of natural resources and its negative impact on economic and social development, has led to the A/RES/38/161[1] resolution recommending the implementation of environmental policies likely to guarantee a sustainable development. Five years later, Agenda 21,[2] a program resulting from the United Nations Conference on Environment and Development held with the Summit of the Earth in Rio de Janeiro in 1992, specifies that the concept of sustainable development defined by the Brundtland report rests on the harmonious integration of the economic, environmental and social spheres.

Figure 12.1 **Interactions between the three spheres of sustainable development (according to OECD)**



[1] *A/RES/38/161 - Process of preparation of the Environmental Perspective to the Year 2000 and Beyond*, General Assembly of the United Nations, 1983 ,September, 19.
[2] *Action 21, Rio Declaration on environment and development*, The United Nations Conference on Environment and Development, the United Nations, New York, 1993. <www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>

12.2 New deals for the South: the Millennium Development Goals

Issued in 2000 under the aegis of the Program of the United Nations for Development (UNDP), the eight Millennium Development Goals[1] (MDG) from here to 2015 are clearly within the perspective of sustainable development, in particular explicitly for the MDG 7 'To ensure a sustainable environment' and MDG 8 'To set up a world partnership for the development'. Bringing up to date and carrying out the synthesis of the specific objectives of the UNDP and the Program of the United Nations for Environment (PNUE), the MDGs were devised with an aim of breaking with the underdevelopment of the southern countries while limiting the perverse effects of an uncontrolled economic development and a too brutal growth: climate change, disappearance of the primary forests, desertification, decline of the bio-diversity.

Focusing on the problems facing by the southern countries, the Millennium Development Strategy favour the reduction of hunger and poverty (MDG 1), primary education (MDG 2), the gender equality and women empowerment (MDG 3), the reduction of child mortality (MDG 4) and maternal health (MDG 5). Thus, some targets such as those of the MDG 6 (malaria) can appear less priority to bestow a sustainable character on human development, in the northern countries. Nevertheless, this divergence between North and South, perfectly legitimate at the development goal level, constitutes an additional source of difficulties for the evaluation, the comparison and the coordination of the government policies between international partners.

12.3 Structure, relevance and inflation of the indicators of sustainable development

The indicators are tools answering three key objectives: to simplify systemic complexity by integrating information to describe studied systems qualitatively and quantitatively, in order to be able to communicate operational information necessary to decision making by the actors of sustainable development.

[1] In 2002, Kofi Annan, General Secretary of the United Nations, charges an independent commission (Millennium Project) with proposing an action plan to achieve the Goals of the Millennium. In 2005, Jeffrey Sachs, chairing the Millennium Project, submits the final report, entitled 'Investing in Development: With Practical Plan to Achieve the Millennium Development Goals', cf. <www.unmillenniumproject.org/reports>

12.3.1 Synthetic indicators of sustainable development

The communication about the objectives of sustainable development directed towards the citizens requires a selection of indicators understandable by all and likely to gain the support of the majority in order to influence the individual behaviours, thus increasing the effects of the incentive measures. Synthetic indicators like gross domestic product (GDP) per capita adjusted for the depreciation of the natural capital,[1] are classically used. Other synthetic indicators such as the 'adjusted clear saving'[2] are used by the World Bank to take better into account some commercial or non-commercial components more or less ignored by the GDP. Alternate indicators, like the 'ecological footprint'[3] largely popularised by some non governmental organisations (NGO) or that of the 'economic well-being'[4] resulting from academic work still present an experimental character, the estimates being available only for some countries sometimes for lack of consensus on the methodology of estimate or reliable statistical data to estimate some components.

In spite of their teaching qualities, these synthetic indicators are too general for a follow-up targeting the specific objectives of the environmental public policies. One then calls upon composite indicators like those of the 'human

[1] In 2002, the GDP does not take into account the exhaustion of the natural resources and consumption and environmental pollutions due to the production activities. Moreover, the 'defensive' expenditure devoted to environmental protection induces an increase in GDP. In the same way, the restorations even partial of a degraded environment lead to an artificial increase in the GDP. In order to take into account these effects, two corrections of the GDP were proposed: i) GDP reduced by the natural capital depreciation, denominated as 'green' GDP; ii) 'green' GDP reduced by expenditure restorers and defensives, denominated as 'sustainable' GDP.

[2] The 'adjusted clear saving' is defined as the clear saving increased of the expenditure of education but decreased by the consumption of fixed assets and the damage in the natural resources (e.g., production of gas with greenhouse effect). This adjustment leads to an estimate being able to represent only half of the monetary saving (Esty D.C., 'Toward dated-driven environmentalism: The Environmental Sustainability Index'. *The Environmental Law Reporter* n° 31, pp. 10603-10612, 2001.

[3] The 'ecological footprint' measures for an individual or a population surface necessary for the production of the main resources consumed by this population and to the absorption of waste ('Ecological footprints and appropriated carrying capacity: what urban economics leaves out', William E. Rees, *Environment and Urbanization* n° 4, pp 121-130, 1992).

[4] Osberg, Lars and Andrew Sharpe (2002) « An Index of Economic Well-being for Selected OECD Countries», *Review of Income and Wealth*, Ser. 48, n° 3, pp. 291-316.

development index'[1] of the Program of the United Nations for the Development (UNDP), or like the index of environmental sustainability (*Esi*[2]) of the Davos Forum.

12.3.2 The development of environmental accountancy

The objective of the international framework of environmental accountancy (SEEA[3]) is to provide an integrated and coherent framework of the relations between economy and environment, while bringing closer physical and monetary data and by connecting flows to stocks. In this context, a certain number of tools has been developed according to the countries to try to connect economic activities and environmental pressures, among which figure the development of national accounts increased by environmental accounts, comparing economic data with physical data according to the activity sector. Thus, the NAMEA[4] methodology developed by CSO, the Netherlands Statistical Office, at the end of the Eighties is based on the development of input-output tables from national accounting increased by environmental accounts expressed in physical units. The accountancy of material flows counts the entirety of the material flow entering in and going out of the economy. When related to economic aggregates such as the GDP, the accounts of material flow[5] inform about the productivity of the resources mobilized in running the economy.

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[1] Since the first report on human development in 1990, the UNDP proposes a family of composite indicators allowing a progress evaluation of human development by country: the indicator of human development (HDI), the indicators of human poverty declined in two versions (HPI1 for the developing countries, HPI2 for the developed countries), the indicator measuring the inequality of gender (GDI) and the measure it of women responsibility (GEM), cf. <www.hdr.undp.org/hdr2006/statistics/indices>.

[2] Environmental Sustainability Index (*Esi*), joint initiative of the Yale Centre for Environmental Law and Policy (YCELP) and of the Columbia University Centre for International Earth Science Information Network (CIESIN), evaluates for 146 countries according to 21 criteria 'the capacity to protect the environment in the next decades'. In this evaluation, published in the World economic forum 2005 in Davos, the first place goes to Finland and the last one to North Korea.

[3] *System of integrated Environmental and Economic Accounting*

[4] *National Accounting Matrix including Environmental Accounts*

[5] Material Flow Accounts (MFA), cf. Accounts Department environmental and economic integrated. Handbook of the operations. Methodological studies, Series F n°78, the United Nations, 2001, (<www.unstats.un.org/unsd/publication/SeriesF>).

12.3.3 Sustainable development strategies as conceptual frameworks for the development of indicators

The follow-up of the governmental measures in favour of sustainable development with an aim of evaluation of the public policies assumes to decree technical standards on the basis of the posted and scientific knowledge available then to work out batteries of indicators reliable statistics and detailed objectives, usable by the specialists for thorough analyses. In order to claim relevance, the intrinsically multidimensional character of sustainable development (cf. figure 12.1, multiplicity of the interactions between the three spheres of development) leads necessarily to providing a rather broad range of indicators. One must also face the multiplication and the diversity of the reference systems promulgated by the various sustainability observatories, which they are regional offices, governmental institutes or international programs. From the 45 indicators presented in 2003 by the French Institute for the Environment (Ifen), to the 155 indicators proposed in 2005 by the European Union (EU), to the 900 World Bank indicators on development in 2007,[1] these reference systems have reached a level of complexity that makes difficult any attempt at synthesis.

It is thus necessary to establish conceptual frameworks in order to be able to manage this complexity by organising it so that the selected indicators can be easily put in relation to the objectives of the public policies in order to be exploitable directly by the decision makers in the public sphere concerned. Carried out by OECD, the inventory[2] of the batteries of sustainable development indicators shows that in order to be able to reconcile legibility and precision, the national and international institutes of statistics structure the battery of indicators in a hierarchy of topics and sub-topics. The existence of theme sets makes it possible to structure work by groups of indicators and induced statistical series.

The national strategies of sustainable development (*SNDD*) have vocation to federate the public policies followed in each sphere of the development in order to make sure of the compatibility between the objectives of economic growth, environmental protection and social wellbeing.

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[1] World Development Indicators 2007
http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS

[2] « Overview of Sustainable Development Indicators Used by National and International Agencies », J. L. Hass, F. Brunvoll et Henning Hoie, *Statistics Working Paper 2002/2*, OCDE, cf. http://www.oecd.org

Thus, certain countries rely explicitly on their *SNDD* to structure their battery of indicators: it is the case of Austria mobilising 48 indicators to estimate the progress carried out in the achievement of the 20 key objectives stated in its *SNDD*. Other States like Canada or Norway, pioneers on the matter, decline the concept of capital according to various dimensions of the development in as many national credits than it is desirable (financial, but also natural, human, and social capital, even by subdividing it in produced credits), which makes it possible to reason in terms of stocks and flow. For example, Norway evaluates its natural capital in renewable terms of resources and ecosystems while the financial capital is evaluated in terms of savings adjusted for petroleum consumption and net income per capita. OECD also adopted this approach for its series of fundamental indicators of sustainable development,[1] which are organised in environmental credits, active economic and human capital.

In 1995, the Commission of the United Nations for Sustainable Development has adopted a list of 134 indicators organised in three sections: driving forces, state and answers. The relevance and the feasibility of these indicators were tested in 1998 by a panel of applicant countries (Germany, Austria, Belgium, Finland, France, the United Kingdom) in co-operation with developing countries (Morocco and Tunisia for France). Among the encountered problems, appeared the absence of statistical data for some indicators, the methodological problems of estimation for others, and finally the difficulties of interpretation in the comparisons. By way of example, the rate of households equipped with a fixed phone does not have the same significance for a Tunisian or French village. Since, the United Nations gradually gave up proposing universalist indicators.

From now on, the 138 basic indicators of the United Nations are gathered around a core of 58 indicators structured according to four chapters subdivided in topics: social (education, equity, housing, population, health, safety); environment (atmosphere, bio-diversity, land water, seas, soils); economy (mode of consumption and production, economic structures); institutions (institutional frame, potentialities of the material and cultural infrastructures). These indicators are implicitly designed in reference to the objectives of the special programs of the United Nations. At the regional level, the EU worked out a pyramidal hierarchy of indicators on the basis of European strategy endeavouring to integrate the strategies of the Member States.

[1] Développement durable. Les grandes questions, OECD, 2001.

12.4 Sustainable development and the integration of European statistical systems

Signing the declaration of Rio, the EU subscribed to the commitments stated by Agenda 21, in particular to the development of indicators of sustainable development (chapter 40) in order to be able to coordinate the *SNDD* on the basis of information exchange between States. Thus, the European Council of Gothenburg adopted in June 2001 a European strategy of sustainable development (*SEDD*), explicitly mentioned in article 2 of the Treaty establishing the EU. The *SEDD*, evaluated then renewed by the European Council of June 2006, envisages a battery of indicators to ensure and to determine the follow-up of priorities that are articulated with the strategy of Lisbon.[1] This battery comprises 155 indicators organised into a pyramidal hierarchy on 3 levels: the first level (topics) is that of the sustainable development strategy, that is to say 12 indicator-keys; the second level (sub-topics) corresponds to the sustainable development policies, that is to say 45 priority indicators; the third level (actions) is associated with the evaluations of the sustainable development policies and with the analysis of their interrelationships, that is to say 98 analytical indicators. In order to integrate the European sector policies within the *SEDD*, the task force European mobilized, in addition to work of UN[2] and those of OECD,[3] the structural indicators of the Lisbon strategy and the specific batteries of indicators, in particular those on the integration of the environmental concerns (*Irena*[4]) in the common agricultural policy (CAP), but also the European indicators of health (*Echi*), those of ageing (*CPS*[5]), of poverty and social exclusion (*Laeken*[6]) and those on the effects of transport on the environment (*Term).*

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[1] The European Council of Lisbon (March 2000) laid down the following strategic objective: to make European Union the 'economy of knowledge the most competitive and most dynamic of the world from here at 2010, capable of a durable economic growth accompanied by a quantitative and qualitative improvement of employment and by a greater social cohesion'.

[2] *Indicators of Sustainable Development*. (<www.un.org/esa/sustdev/natlinfo/indicators/isd.htm>), 2006.

[3] *Indicateurs clés d'environnement de l'OCDE* (<www.oecd.org/dataoecd/33/0/31558903.pdf>), 2004.

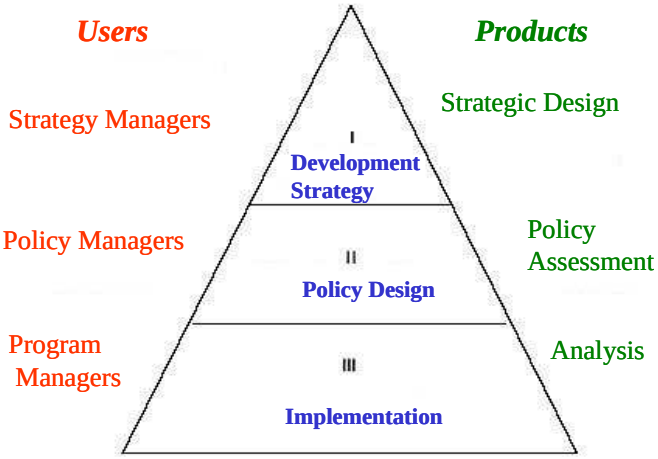
[4] *Indicator reporting on the integration of environmental concerns into agricultural policy* (<www.eea.europa.eu/projects/irena>), 1995-2007.

[5] 'Committee of social protection'.

[6] European indicators on the poverty and social exclusion validated at the Summit of Laeken-Brussels (December 2001). The revised list of Laeken indicators includes 11 primary education indicators exploring essential dimensions of poverty (income, employment, education, health) and 9 secondary indicators for the analysis of social situations and welfare transfers.

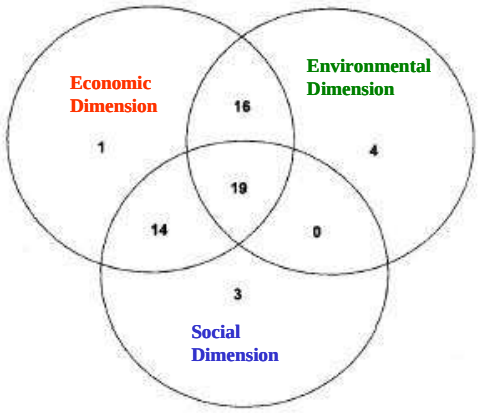
Graph 2	The pyramidal hierarchy of sustainable indicators in Europe (according to Insee)

The Pyramidal Hierarchy of Sustainable Indicators in Europe



Graph 3	The 3-dimensional integration of sustainable development indicators (according to Insee)

3-dimensional integration of sustainable development indicators



The analysis of the pyramidal battery of the European indicators of sustainable development (*IEDD*) shows that social and environmental dimensions are not neglected. But, as an example of potential flaws in the European system of indicators, let us consider (cf. graph 3) the figures of indicators involved in the three spheres of sustainable development, at level 1 (for strategy) and level 2 (for policy): there are plenty of economic indicators (50 out of the 57 indicators). A second remark is the low number of « pure » indicators (8) and any indicator belonging both to the social dimension and to the environmental one.

The same criticisms have been recently addressed to *Inra*, the French national agronomic research institute, for the 2013 Prospective Exercise, with respect to French Agriculture missions.

For all this, some topics (good governance, total partnership) remain rather little explored by the public statistics because the methodology of investigation remains to be improved if not to be designed for a great part. Thus, the rate of participation in the European elections measures the degree of confidence of the citizen in the EU institutions: the use of tools such as Eurobarometer[1] should make it possible to improve this measurement.

With regards to the environmental indicators, it is also difficult to propose a synthetic indicator of the bio-diversity in the current state of knowledge. Thus, the specific bio-diversity is measured by the evaluation of the sole stock in the North Atlantic as a species threatened by over-fishing (priority indicator). The ecosystem biodiversity is evaluated on the basis of the evolution of the common bird populations (key indicator),[2] their rarefaction alerting on imbalances of the ecosystems, which shelter them. Measurement can be indirect: for example for the natural resource management: in order to follow the presence of pollutants of the soil, the system of the *IEDD* is based on the percentage of soil exposed to the risk of contamination, in terms of total area. The dangers of eutrophisation[3] are announced by an indicator of organic material emission such as a biochemical requirement of oxygen in the rivers.

[1] *Eurobarometer standard* n°67. The public opinion in the European Union, 2007, April-May. European commission, 2007, June (<www.ec.europa.eu/public_opinion/archives/eb>).

[2] Program STOC, temporal follow-up of common birds: larks, sparrows, and other endemic species of birds of the fields.

[3] Excessive development of algae stimulated by nitrates resulting from the contributions of nitrate fertilizers.

The impact of the socio-economic activities on the diversity of the European landscapes is measured by two indicators based on the European investigation Lucas[1] of visual observation of geo-referenced points.

The works in progress relates to the necessary integration of the *IEDD* into the common tool of the European statistics, following the requests addressed by the European Council to Eurostat and to the national statistical institutes. Initially, it would be advisable to bring closer these *IEDD* indicators to those worked out for agriculture (*Irena*) and to those for industry (key environmental indicators of OECD).

Secondly, the Commission has recommended supplementing the structural indicators of the Lisbon strategy by 34 environmental indicators, following the February 2005 revival. Thus, there is an opportunity to integrate the Lisbon strategy into the *SEDD*. According to the task force report 'the principal weakness [note: of the *IEDD* system] lies in the absence of indicators measuring at the same time the social dimension and the environmental dimension'. The adoption in June 2006 by the EU of a new sustainable development strategy implies the revision of the *IEDD* battery at the end of 2007, to take into account the former evaluation and the *SEDD* reformulation.

12.5 Characteristics of national systems: the French context

12.5.1 Genesis and development of the statistics with environmental vocation

In France, if the creation of *Ifen*, the French Institute for the Environment, in 1991[1] constituted a decisive stage in the implementation by the public

[1] *Land Use/Cover Area frame Statistical survey*. The implementation of this project is consecutive with the Decision 1445/2000/EC of the European Parliament and the Council of May 22, 2000 on the application of spatial investigations and satellite imagery techniques to agricultural statistics from 1999 to 2003, prolonged until 2007 by the Decision 2066/2003/EC of 10 November 2003 and extended to the ten new Member States by the Decision 786/2004/EC of 21 April 2004. In 2001, Lucas covered 13 Member States of the EU. In 2002, because of the foot-and-mouth disease, Lucas was differed in United Kingdom and Ireland like in Estonia, Hungary and Slovenia. The investigation was renewed in 2003 in all the Member States of EU-15 as in Hungary, allowing at constant methodology the comparison of the changes occurred in the occupation of soils between 2003 and 2001. Some statistical problems related to the quality of the estimates arose from editions 2001 and 2003 so much because of the survey methodology adopted (impossibility of using a suitable stratification) that comparability of the collected environmental parameters, even, need for improving the cost ratio/effectiveness of investigations and for reaching the appropriate mid-July date to provide statistical data.

statistical system of the recommendations put forth by the Gruson's report (1974)[2] then Ader's (1982)[3] as regards environmental information, it was necessary to await the law of February 2, 1995 (known as 'Barnier's law') so that are registered in the national legislation the four principles founding the national strategy of sustainable development: prevention at the source; polluter-payer; participation and precaution. The principle of prevention at the source implies that the whole of the departmental statistical services (*SSM*) can be seized of specific information request in the investigations coordinated by the National council of statistical data (*Cnis*[4]). Formulated by OECD since 1972, the polluter pays principle has led to the creation of a satellite account relating to the environmental economics and the introduction of an Audit Committee for environmental economics. The taking into account of the environmental costs is carried out by way of the impact studies in the evaluations of public policies, the law of orientation, installation and sustainable development of the territory (known as 'Voynet's law') having imposed it in June 1999, in particular at the local level, by an implementation under the aegis of the Councils of development for rural and urban areas. The principle of participation supposes that the access to information is facilitated for each citizen. The convention of Aarhus, writing this principle within the framework of the Economic Conference of the United Nations for Europe, was ratified by France in October 2002, and was transformed into Community legislation by the Directive issued on 28 January 2003. Lastly, the precautionary principle forces the continuation of research in natural and social science to lead to a better statistical knowledge of the environmental state.

As a statistical service with national competence of the Ministry for Ecology, Sustainable Development and Environmental Planning, *Ifen* in charge of producing and disseminating environmental information in France, is the French correspondent of the European Agency for environment (AEE). The work of *Ifen*

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[1] Created by the Decree n° 91-1177 of 18 November 1991, the French Institute for the Environment (*Ifen*) received the statute of public corporation of the State in administrative matter, placed under the supervision of the ministry in charge of the environment. On January 2005, *Ifen* became a service with national competence, directly attached to the Minister for Ecology (decree n° 2004-936 of 30 August 2004).

[2] *Rapport d'activité du Groupe Interministériel d'Évaluation de l'Environnement*, Claude Gruson, La Documentation française, Paris, July 1974.

[3] *Les statistiques de l'environnement, Rapport de mission au ministre de l'Environnement*, Gérard Ader, Insee, Paris, 1982, 239 p.

[4] Created by the decree 84-628 of 17 July 1984, *Cnis* coordinates the statistical surveys of the public services in order to guarantee their economic and social relevance, ensuring the dialogue between producers and users of the public statistics with regards to the modified law 51-711 of 7 June 1951, 'about the obligation, coordination and the secrecy regarding statistics'.

on the environment is articulated according to three dimensions: the state and evolution of the natural environments and the biodiversity; pressures exerted on the environment by the economic and human activities; impacts of the environment on the economy and the society. On a primarily pragmatic basis (statistical sources available, needs for information for the citizen and international comparisons), the ad-hoc interdepartmental work group controlled by the General Planning Committee retained 45 national indicators[1] including 12 leading indicators finally selected in November 2006[2] as much as possible to approach level 1 of the *IEDD*.

12.5.2 Tools of observation of the territory

In order to be able to measure the artificiality[3] of natural space from the point of view of sustainable planning of the territory, France has acquired two tools of observation on complementary scales of resolution, which are the Teruti annual survey and the Corine Land Cover inventory.

The *Teruti* (use of the territory) annual survey, realised by SCEES,[4] the statistical service of the Ministry for Agriculture and Fishing, makes it possible to know and monitor the distribution of the territory according to various criteria, from a sample of geo-referenced 'points' which an investigator goes on. The nomenclature of this investigation was conceived originally to describe the occupation and the land use, in particular by agriculture. Each point is described at the same time in a physical manner (surfaces occupied by crops, meadows, waste lands, moors, forests and other natural spaces, developed sites, roads, etc) and a functional one (agriculture, highway network, habitat, etc). Stemming from an area sample survey on the basis of a mesh of 144 km^2, marked out by 8 segments, made up each of 10 observation points (cf. graph 2), the surface estimates obtained are affected of a computable relative error, namely less than 5% for the 35 major categories of the physical nomenclature covering 95% of the national territory. The categories whose error is greater than 10% are

[1] *45 indicators of sustainable development: a contribution from Ifen*, Etudes et Travaux n°41, Ifen, 143 p.
[2] *Agir dans la dynamique européenne : douze indicateurs « phares » de développement durable*, Stratégie nationale de développement durable 2003-2008, Services du Premier Ministre, November 2006, 27 p., (<www.developpementdurable.gouv.fr>).
[3] Term indicating the extension of the peri-urban and urban areas to the detriment of natural environments favourable to biodiversity like littoral or other agricultural surfaces such as bocage or meadows.
[4] '*Service central des enquêtes et études statistiques*' (Statistical Office of the French Agriculture Department).

relating to zones of lesser importance (less than 55,000 ha), apart from the salt marshes (88,000 ha) and the closed areas (127,000 ha) which can however be of some environmental interest, locally.

The 2006 Corine Land Cover[1] inventory (CLC 2006) carried out for France by *Ifen* in collaboration with the European Agency of Environment (AEE) will make it possible to shed light on the evolutions which have occurred since 2000 as regards occupation of space, relating to in particular the evaluation of the dynamics of urban sprawl and its impact on the artificiality of the territories. The territory is analysed on the basis of satellite images like a sum of polygons distinguishing forests, urban fabric, natural environments, etc. Contrary to *Teruti*, the nomenclature of description is quite limited but however envisages mixed zones (bocage, for example) combining several types of occupation. Corine Land Cover does better to provide results for relatively fine geographical levels: objects described starting from a surface of more than 25 hectares. Combined with inventory CLC 2000,[2] the operation 2006 should constitute a reference index to appreciate the changes occurred on the coast line or having affected the agricultural territories. Lastly, the availability of a high-resolution product within the framework of the operation 2006 will contribute to raising the uncertainty, which surrounds the areas occupied by the forests.

Distributed according to the 6 criteria of sustainable management of Helsinki,[3] 'the indicators of sustainable management of the French forests 2005'[4] of the National Forest Inventory (*IFN*) present the 35 quantitative

Graph 4 **Grid diagram by Teruti covering the metropolitan French**

[1] The Corine Land Cover geographical database is produced within the framework of the European programme of Coordination of information on the environment (Corine). This biophysics geo-referred inventory provides information on the various modes of occupation of soils for the 29 European States and the coastal strips of Morocco and Tunisia. Ifen is charged to ensure production, maintenance and diffusion of Corine Land Cover in France.

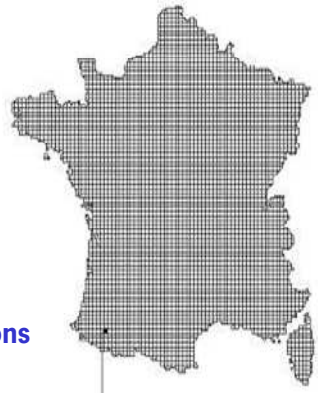
[2] The Corine Land Cover 2000 database (CLC 2000), carried out on the basis of satellite images starting from 2000, constitutes a framework of reference of soil occupation, near by the date to the censuses of population (1999) and agriculture (2000). A first release of the database, known as CLC 1990, carried out on the basis of images acquired between 1987 and 1994, was rectified for comparisons with CLC 2000.

[3] Ministerial conference for the protection of forests in Europe (1993). These criteria are: i) conservation and suitable improvement of the forest resources and their contribution to the world cycles of carbon; ii) maintenance of the health and the vitality of the forest ecosystems; iii) maintenance and encouragement of production functions in forests (wood and not wood); iv) maintenance, conservation and suitable improvement of biological diversity in the forest ecosystems; v) maintenance and suitable improvement of protection functions in the management of forests (in particular soil and water); vi) maintenance of other benefit and socio-economic conditions.

[4] *Indicators for the sustainable management of French forests*, IFN, 2005, 136 p. www.ifn.fr>

territory (according to SCEES)

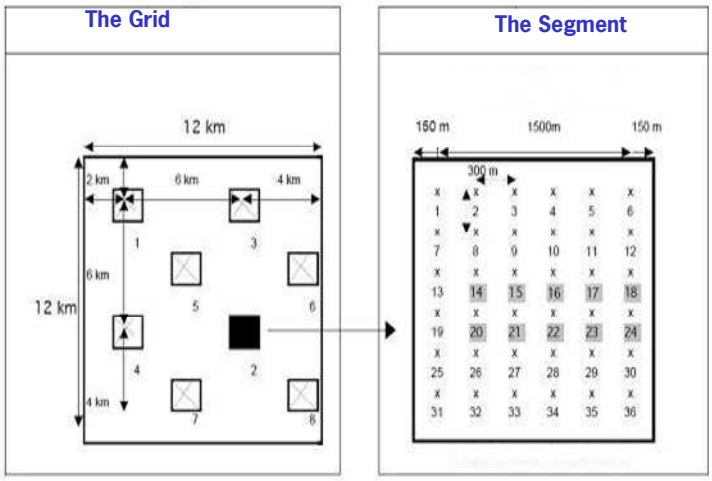
The French metropolitan territory



4,700 grids

8 positions by grid

10 sampled points by segment



indicators adopted by the Vienna Conference in 2003. This list was supplemented by 21 indicators, of which some constitute an innovation, making it possible to take into account the specificity of the French forest. A systematic methodology of survey should allow a yearly national forest Inventory and a better precision in its results. Currently, the inventory is generalized and synchronous in the whole French territory, instead of a partial inventory but repeated during the decade. The change of method making it possible to have homogeneous annual data will in the future facilitate the follow-up and the evolution of many indicators.

12.5.3 Framework of reference for the administration of the water resource and the follow-up of the irrigation

Intended to answer the new requirements of the European parent water directive on 23 October 2000, the water information system (*SIE*) succeeded the domestic network of the data on the water, itself set up following the 3 January 1992 Water Act. The objective of the *SIE* is to give a progress report on the whole of the needs for data in the field of water. From this point of view, the Service of national administration of the data and framework of reference on water (*Sandre*) worked out a common language for the data on water because the public actors are numerous: Ministry for Ecology and Sustainable Development, Regional Management of the Social and Sanitary Affairs , local departments of Agricultures and Fishing, Higher Council for Fishing, French Institute of Research for the Exploitation of the Sea (*Ifremer*), Water Agencies, Office of Geological and Mining Research, Research Institute for the Engineering of Agriculture and the Environment (*Cemagref*), local government agencies, federations of the fishing for leisure, Coast Line Cell for the monitoring of water quality. Thus, a certain number of geographical frameworks of reference for water were born: the hydrographical framework of reference for surface fresh water , the hydro geologic framework of reference for subterranean water, the framework of reference for the water masses, etc.

In a context where the risk of drought is more probable, agriculture must be regarded at the same time a contributor and as a consumer of the water resource on a territory scale. Because of complementarities between irrigated agriculture and rainfed agriculture, these two functions are interdependent within a territory of quantitative management of water and must be analysed simultaneously and spatially on a basin scale.

The irrigation initially developed in the zones with arid tendency profiting from contributions of mountain water (e.g. basin of the Rhone in the South-east

of France). It has been then extended to other areas, by an active policy of the installation (flood barriers, hill reserves), of investments in the networks of irrigation as in the individual irrigation and of development of the resources locally available: individual pumping into underground water-level and river.

The most complete statistical data relates to the irrigated surfaces, which are quantified in the successive censuses of agriculture (1970, 1979, 1988, 2000) and in the inter-census surveys on the structure of the farms ('Farm Structure Survey'), like through the CAP declarations for the surface in cereals, oilseeds and protein crops. With regards to consumed volumes of water, one has only recent data, based on the irrigation royalties paid to the Water Agencies, but very unequally accessible and studied. For the quantities brought per hectare, information is limited to that provided by the *SCEES* 'Cultivation methods' survey for 2001 (rather wet year), and to data for more restricted zones. The sampling data for irrigation provided by the Water Agencies was regarded as not fully reliable before 2000 (in particular because of the possible undervaluation of the surfaces declared with the fixed price, still important at this time).

The generalisation of the volume-meters has made it possible for a few years to estimate with a better precision the volumes actually sampled, via in particular the use of various statistical databases (Agricultural Census, *SCEES* practical cropping at farm survey, CAP declarations, etc). The professional literature and the studies produced by the Chambers of Agriculture *('Chambres d'Agriculture')* offer more specific information in addition, and field studies undertaken by the *Cemagref*[1] can also be used. The integration of the sources of available data at the national level within the same datawarehouse could constitute a significant advance for the study of the practices of irrigation in France, a point already underlined in the *CGGREF* report[2] in 2005, even if progress was already recorded, in particular via the reorganisation of the regional statistical services of the ministry for Agriculture.

[1] *Cemagref* is a public research institute that targets results directly useable in land and water management.

[2] The *CGGREF* is the National Audit Council for the French ministry for Agriculture.

12.5.4 Quality of the soils, management of waste and exposure to risks

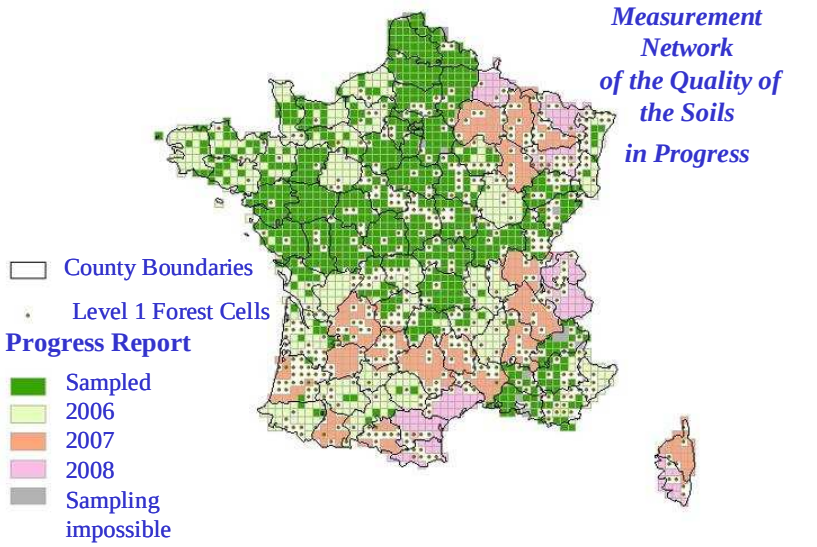
How can an environmental pressure measurement be obtained on the soils when that exerted by the population is provided at the municipality level and that of the livestock units is provided at the municipality cluster level ('*canton*')? The Network for the Measurement of the Quality of Soils (*RMQS*[1]) takes samples of soils on more than 2,000 sites distributed uniformly over the French territory according to a square grid of 16 km x 16 km. The grid of the *RMQS* represents 25,600 ha, indeed a spatial unit small enough to allow a comparative study of the distribution of the environmental pressures at the national level and large enough to authorize the aggregation of the various indicators within this one.

The battery of the environmental indicators for the *RMQS* is defined on the basis of the European indicators elaborated by the European Agency of the Environment, supplemented at the national level by *Ifen* and *Inra*, that is to say on the whole more than one hundred indicators and components. The battery of indicators is structured in three types according to the model 'Pressure-State-Response' (PSR) developed by OECD, that is to say: pressure measures such as the density of the highway network, the population, the number of cattle units; indicators of state like the percentage of carbon in the soils, the texture of the soils, the drained surface; and indicators of response such as the number of measuring sites of plant health products, and the progress report of the *RMQS*.

Model PSR was amended by the European Agency of the Environment in a model 'Driving Forces-Pressure-State-Impact-Response' (DPSIR). The environmental indicators of the RMQS are computed on the basis of multiple national databases (Corine Land Cover, digital model of altitude, France pedology map, agricultural census, population census, base of polluted sites and soils, database of the French hydro-geological Framework of Reference, etc.). Among the challenges that the French national statistical system attempts to raise, figures Regulation 2150/2002 of the Parliament and the EuropeanCouncil of 25 November 2002 determining the statistical data that the Member States must provide on production, valorisation and waste disposal. The next answer concerning the year 2006 must be sent in June 2008. A work group controlled by Ifen was formed in order to better fulfil the requirements of this European regulation, in particular by direct surveying of the companies in trade and industry, of the estimates in agriculture and services, a better

[1] The *RMQS* is managed by the *SOL* scientific consortium in which *Ifen* collaborates with the Agency of Environment and Control of Energy (*Ademe*), *Inra* and the Research Institute for Development (*IRD*).

Graph 5	Progress report of the RMQS (according to the SOL Scientific Consortium)



exploitation of the dangerous waste declarations from the companies and waste processing installations. In this context, the complete cover of the territory by the Network for the Measurement of the Quality of Soils (*RMQS*) is planned for 2009.

Another challenge, there is an important demand for a better knowledge of the human and economic stakes of the zones exposed to the harmful effects and the natural and technological risks. It is desirable that sources, such as the population census or the *Sirene*[1] repertory of companies, can be mobilized to obtain a better knowledge of the floodplain situation, and of the zones exposed to noise or harmful effects and industrial risks. The test study on the evaluation of the zones vulnerable to the flood risk in the French county ('*département*') of Loiret has led to the development of a methodology and a set of treatments making it possible to estimate the number of inhabitants and residences present

[1] National identification system of the natural and moral persons and their establishments (articles R. 123-220 with R. 123-234, D. 123-235 and D. 123-236 of the commercial law) articulated around the repertory of companies and establishments. The management of this repertory is entrusted to *Insee*.

on the floodplains, according to whether the commune is covered or not by the *Insee* Inventory of Buildings (*Ril*). In the communes of more than 10,000 inhabitants for whom *Ril* is available, this administrative data then makes it possible to characterize populations (population pyramid, occupational and professional status) and the stakes such as economic activities and public equipments.

Lastly, the knowledge of material flows and the productivity of resources are gaining increasing importance within the framework of the international approach for sustainable development, as the promotion efforts carried out by OECD and Eurostat testify some.

The first estimates for France should be available at the end of 2007. In 2008, *Ifen* will be implied in the biannual supply of NAMEA matrices, according to the Eurostat recommendation.

12.6 Towards individual indicators of sustainability at the farm level: the IDERICA experiment

Under the combined pressure of the new trends of consumption, evolution of the rules of the international business, widening of the EU to the Central and Eastern Europeancountries, French agriculture has been led to re-examine a certain number of its orientations. The current context of redefinition of the CAP proposes a renewed framework which one can synthesize as follows: a more competitive European agriculture and an agricultural policy more favourable to international trade, more focused on the consumer needs and nevertheless more respectful of the environment and natural resources.

12.6.1 Farm, a nodal organisational entity

Facing these challenges, the program 'Agriculture and Sustainable Development' of the National Agency of Research (*ANR*)[2] stresses that the farm constitutes an organisational entity impossible to overlook as a meeting point of public policies, and the market mechanisms, with respect to the economic,

[1] The Inventory of Buildings (*Ril*) is a geographical database including the set of addresses and their geographical location for the communes of 10,000 inhabitants or more. It contains the addresses of dwelling, the establishment *SIRENs*, the communities and in the medium-term, the urban equipment.

[2] Agriculture and Sustainable Development (*ADD*) is a federalising development and research program of which the ambition is to renew and widen the manner of apprehending the agricultural activities on the basis of sustainable development stakes, cf. <www.agence-nationale-recherche.fr>.

environmental, social and territorial issues. The instruments and the models established during the last decades to study and accompany the evolution of the farms must however be re-examined in order to take account of the transformations in progress, whether it is the context, the goals pursued or the types of innovation which have to be taken into account.

The identification of the relevant indicators of sustainability at the farm level requires a critical survey of the increasing literature on the indicators, their methodologies of development, the advantages and the disadvantages of each method of analysis.[1] Once these indicators have been clearly identified, it will be possible to work on the construction of proxies of the ideal indicators when the latter cannot be computed on the basis of available statistical data, i.e. individual information extracted from public surveys on agriculture (*RICA*FADN, Agricultural Census, Farm Structure Surveys, etc). Indeed, many indicators of sustainability require the recourse to specific data, which cannot only be obtained by individual surveying of farmers. In addition to the recourse to the economic, bio-technical and environmental processes which generate them, one can also imagine the design of proxies on statistical bases, for example by identification of robust statistical relations between the indicators provided by the data of investigations and the proxies designed on the basis of the official statistics. It is in particular within the framework of these problems that the IDERICA experiment was undertaken.

12.6.2 Lessons from the IDERICA experiment

Among the studies carried out on the measurement of sustainability on the basis of individual information extracted from public surveys on agriculture, appears the Exploratory study on the characterisation and the follow-up of the sustainability of French farm holdings (*IDERICA*[2]). The objectives laid down for this programme of studies by the French Department of Agriculture were: i) to consider the current elements of sustainability of French agriculture; ii) to define the criteria (and the corresponding indicators) allowing to carry out a follow-up of the most sustainable farm holdings on the environmental, social and

[1] A critical work survey of durability evaluation methodologies was undertaken within the framework of the *ADD/Impacts* program, cf. 'Analysis of 15 years of agriculture sustainability methods evaluation', Rosnoblet J., Girardin P., Weinzaepflen E., Bockstaller C., *IX*th *ESA Symposium*, Warsaw, 2006.

[2] *IDERICA, étude prospective sur la caractérisation et le suivi de la durabilité des exploitations agricoles françaises*, Direction des Affaires Financières - DAF - Institut national polytechnique de Lorraine - P.Girardin ; C.Mouchet ; F.Schneider ; P.Viaux ; L.Vilain ; P.Bossard - December 2004, 72 p.

economic level for each technical-economic orientation of production; iii) to make territorial analyses. This study generalises the *IDEA* method[1] to quantify the sustainability of French farm holdings at the national scale on the basis of the French Farm Accounting Data Network (*RICA*) and of the agricultural census for 2000 (RA 2000). It shows that the sustainability of the farm holdings within each dominant production and each area is variable, and that margins of progression exist whatever the systems of production and their localisation. According to the evaluation report of *Coperci:*[2] it must be regarded a stage in research on appreciation of the sustainability of the farm holdings and not as a result. Indeed, with regards to the *IDEA* method there are problems of measurement resulting from some imbalance between the three scales of sustainability.

Thus, only 7 indicators out of the 16 indicators of the socio-territorial sustainability scale can be indicated according to the *IDERICA* methodology whereas 13 indicators out of 19 for the agro-ecological sustainability scale and all 6 indicators of the sustainability economic scale. Because of the aggregation criterion, which retains the minimum of the scores obtained for each scale, the value of the synthetic indicator of sustainability (*ISD*) is equal to the lowest scores obtained by the farm holdings according to the three selected scales of sustainability (agro-ecological, socio-territorial, economic). The result is almost always a mechanical alignment of the synthetic indicator of sustainability with the sum of the indicators for the socio-territorial sustainability scale.

A complementary study[3] based on the multidimensional analysis of the scores however showed that the variability of the scores in the universe of French farms is organised according to the following two major dimensions: the first opposes agro-environmental sustainability and economic sustainability, the second opposes temporary crops and permanent crops.

On the basis of barycentres of the *IDERICA* multidimensional analysis individual scores for each type of farming, the hierarchical clustering allows us to propose a typology of the farm holdings in the forms of large technical-economic orientations ('*GOTEX*') as relevant clusters for the measurement of sustainability.

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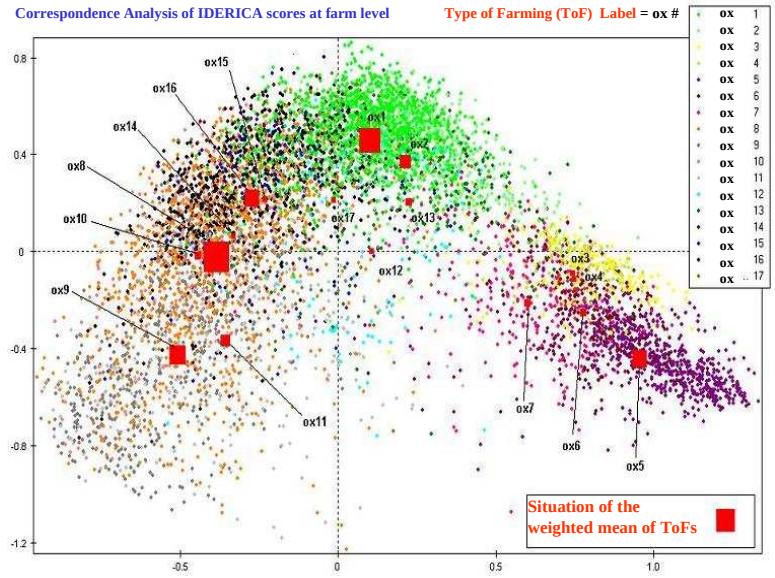
[1] *'La méthode IDEA', Indicateurs de durabilité des exploitations agricoles*, 2003, Educagri Editions, Dijon.

[2] Comité Permanent de Coordination des Inspections du ministère de l'Agriculture, *Evaluation de l'étude prospective sur la caractérisation et le suivi de la durabilité des exploitations agricoles françaises,* Report by A. Barbaroux, J.-P.Roubaud, Ministère de l'Agriculture, June 2005, 5 p.

[3] *Etude d'une méthode de quantification de la durabilité des exploitations agricoles françaises*, Ambroise M., Beaujour M., Robert A. and Sauvadet L., directed by D.Desbois, *Ecole Nationale de la Statistique et de l'Analyse de l'Information*, 2005.

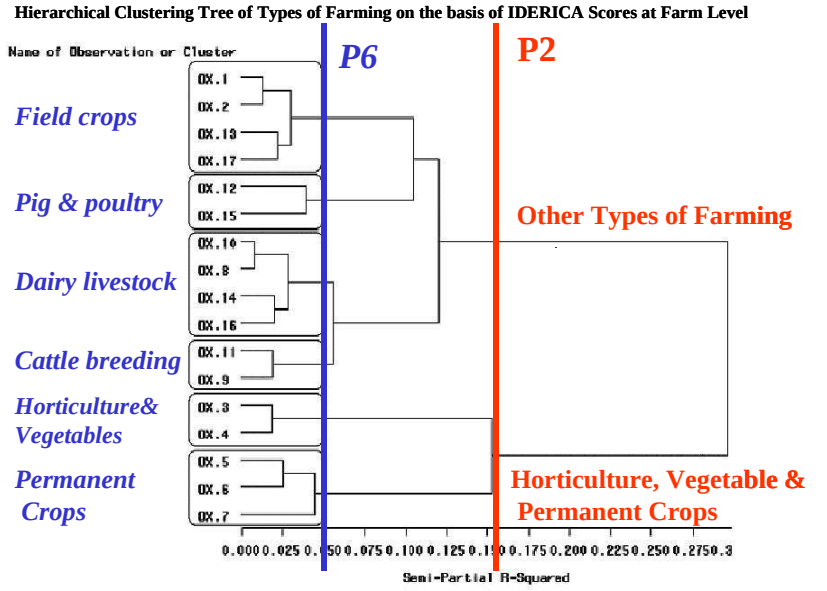
Graph 6 **Multidimensional sustainability of the French farm holdings analyzes according to IDERICA**



Reading the graph: in the factorial design crossing the first two axes of the analysis of the multiple correspondence, the farms scattergram presents a 'Guttman effect' of score ordination, which is interpreted as follows: at the ends of the individual scattergram scored rather well, in South-West of the graph thanks to good scores on the agro-environmental scale are, in South-East of the graph thanks to the scores obtained on the economic scale; at the centre of the scattergram, North of the graph, are the individuals rather badly scored. The horizontal axis (first factorial axis), interpretable general component of durability, seems very related to the Type of Farming (ToF).

ToF Nomenclature of farms in 17 categories (ox): ox1, Cereals, oilseeds, protein crops; *ox2*, Other field crops; *ox3,* Vegetable cropping; *ox4*, Flowers and other horticulture; *ox5*, Quality wine; *ox6*, Other vine growing; *ox7*, Fruits and other permanent crops; *ox8*, Dairy farms; *ox9*, Cattle rearing and fattening; *ox10*, Dairying, rearing and fattening; *ox11*, Ovine, caprine and other herbivores; *ox12*, Granivores; *ox13*, Mixed-cropping; *ox14*, Mixed livestock, mainly grazing; *ox 15*, Mixed livestock, mainly granivores; *ox 16*, Field crops - grazing livestock combined ; *ox17*, Various crops and livestock combined.

Graph 7 **Typological clustering of the types of farming according to the IDERICA measurement of sustainability**



Reading of the graph: the dendrogram resulting from hierarchical classification makes it possible to distinguish two partitions; the finest partition comprises 6 large technical-economic orientations (field crops, pig and poultry, dairy livestock, cattle rearing, vegetable cropping and horticulture, permanent crops); the coarsest partition opposes in two classes horticulture and permanent crops to the other types of farming (OX).

The complementary analyses carried out for each main technical-economic trend considered, suggest that it would be possible to work out, by means of a suitable weighting of the battery of scores, an individual indicator of sustainability which is specific to each type of agricultural activity. The conclusions of this study suggest that the individual measurement of the farm sustainability can be broken up according to a general factor particular to the the productive profile of the farm holding and factors specific to the various types of agricultural activity.

Thus, the results of this study show that the multidimensional analysis makes it possible to extract, in the dimension specific to the indicators of sustainability

on the one hand, the synthetic indexes of sustainability and, on the other hand in the dimension specific to the farms, a typology of the types of farming, which is adapted to the measurement of sustainability.

12.6.3 The problem of coupling the measurement devices on various territorial scales

However, in terms of the degree of completion of the agro-environmental goals, the mobilised statistical sources do not make it possible to fully exploit the micro-level *IDEA* methodology of sustainability evaluation. Moreover, the sampling of the *RICA*, designed to ensure a statistical representativeness at level 2 of the NUTS[1] (area), is insufficient to incorporate these measurements of sustainability at the most appropriate territorial scale which could be that of the Small Agricultural Area (SAA). Thus, a territorial measurement of the farm sustainability s supposes the adaptation and the coupling of the existing devices of investigation, the mobilisation of administrative data and the implementation of satellite devices for further enquiry (e.g., installation of a technical-economic probe on the management of inputs).

12.7 Future challenges for the French statistical system in the measurement of sustainability

12.7.1 To meet the commitments made as regards the environment for the development of the acquired community know-how in agricultural statistics

Even if the budgetary commitments, undertaken by the European Council in December 2005 regarding the CAP over the period 2007-2013 did not reach the level desired by the Commission to finance the second pillar devoted to the environment and rural development, new orientations are gradually implemented to preserve the natural resources (reduction of inputs - plant health and manure, saving of water and energy, management of the bio-diversity), and to limit the health hazards (e.g. fight against the mycotoxins, or detection of residues related to the veterinary or plant health treatments in food). Thus, following the

[1] The Nomenclature of the statistical territorial units subdivides the countries of the European Union and Switzerland in areas, definite for the needs of public statistics on the basis of administrative unit clusters, according to the population living in the corresponding country, cf. Regulation of the Parliament and European Council (EC) n° 1059/2003 on 26 May 2003. This nomenclature is structured according to 3 levels: NUTS 3 (from 150,000 to 800,000 inhabitants); NUTS 2 (from 800,000 to 3,000 inhabitants); NUTS 1 (from 3 to 7 million inhabitants).

European statistical regulation on waste, a new European statistical Regulation on the marketing and the use of pesticides could be adopted in 2008[1] and generate work in 2009. The year 2008 will be also that of the first supply of accounts of material flows, in accordance with the new Eurostat regulation.

12.7.2 To follow the adaptation of agriculture to climate changes

Over a long period, among the determinants of the evolution of the agricultural sector, one can quote them technological innovations in particular in biotechnology, the increasing internationalisation of the agricultural markets, the industrialisation and 'tertiarisation' of agriculture (vertical integration, formalisation by contract in the sector, development of the service dimension), multi-functionality of agriculture (environmental impact, capacity required to provide a public good) and, as a more recent concern, climate change.

Indeed, the Intergovernmental Panel on Climate Change(*IPCC*[2]) envisages an increase in the variability of the climate, regarding as probable the increase in the risks of summer drought on the majority of the continental terrestrial zones of average altitude. Taking into account global warming, the adaptation of agriculture to climate change, in particular to the episodes of drought, is likely to become a crucial question for the next decades.

[1] Europa Press Releases (<www.europa.eu/rapid/>) IP/07/970, Brussels/Luxembourg, on 28 June 2007. ' Water quality standards. The Commission welcomes the political agreement on water quality standards which will reinforce the Water Framework Directive, the cornerstone of the European Union's water protection policy. The agreement endorses the core elements of the Commission proposal (see IP/06/1007), including environmental quality standards and the phasing out of some substances. The new directive will establish limits for concentrations of substances such as pesticides, heavy metals and biocides found in surface water ' (underlined by the authors).

[2] The Intergovernmental Panel on Climate Change and Albert Arnold Gore Jr. were jointly awarded of the Nobel Peace Prize 'for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change', on 10 December 2007 at Oslo (cf. www.ipcc.ch/).

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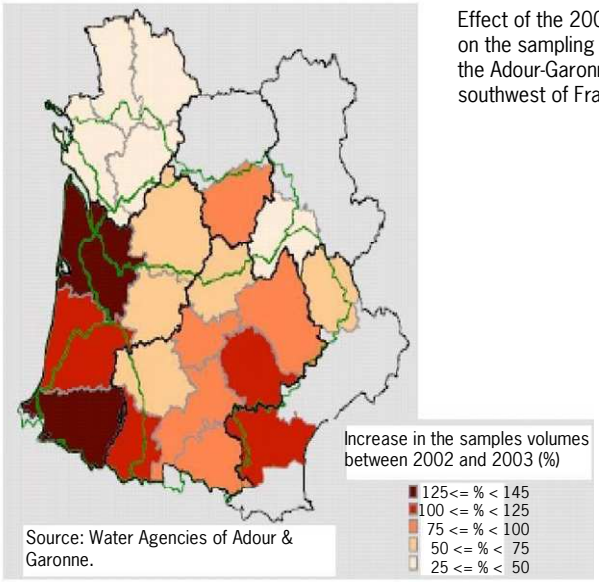
Graph 8 **Effect of the 2003 drought on the taking away of water in the Adour-Garonne basin (according to Inra)**



Effect of the 2003 drought on the sampling of water in the Adour-Garonne basin, southwest of France

The collective scientific report entitled' To reduce the vulnerability of agriculture to an increased risk of lack of water', financed by the French ministry of Agriculture and Fishing and controlled by *Inra*, announces the defect of databases necessary to the use of analytical tools available like the cropping models. The report of this expertise recommends the establishment of hydrous assessments of the watersheds on the basis of most plausible crossing (soils) X (climates) X (farming systems), with micro-economic studies prioritising knowledge of the costs and the benefit of irrigation and, more generally, the economic control of the choices of farming systems and of technical equipment of irrigated perimeters. The collection and the management of the necessary information for such studies will be under supervision of regionalized geographical information systems to be implemented in the southernmost French areas. Moreover, this collective scientific report recognizes that the insufficient development and organization of the sources of available data at the national level as regards irrigation hamper the study of irrigation practices in France, already underlined in the report of the General Council for Rural

Engineering, Water Resources and Forestry (*CGGREF* 2005), even if progress proves to be real (via the statistical services of Regional Offices for Agriculture and Forest in particular).

Thus, the information relating to water consumption by irrigation on the scale of a plot, a farm holding, or a territory are largely lacking, the sampling data from the Water Agencies have to be analysed with precaution because of a non-exhaustive cover. The generalisation of the volume-meters will in the future make it possible to provide more detailed evaluations.

To attenuate the impact of a drought risk materialisation, one can resort to changing the irrigation technology used (the adoption of drip irrigation), changing farming systems (crop rotation, variety) but also to the covering of risk by a system of crop insurances, even compensating for agricultural disasters.

12.7.3 To accompany the systems aiming at reducing the exposure of the agricultural producers to the risks

In France, the protective system against agricultural disasters dated from the Framework Laws on Agriculture of 1960 and 1962 and a specific law of 1964. Since then, the nature of the risks and economic realities have evolved: the intensification and the specialisation of the farm holdings expose them to more important risks; the health hazards take up an increased importance; the economic risk, in particular the market risk, increases because of - globalisation and the deregulation of the agricultural markets. Thus, this evolution of the risks making the system of 1964 increasingly unsuited, the Framework Laws on Agriculture of 5 January 2006 reinforced the capacity of the holdings to be guarded against the risks, in particular by adapting the legislative framework so that insurance-harvest can be generalised to cover all the agricultural productions and over all the territory.

The determination of the levels of premium and compensation supposes being able to quickly deliver reliable estimates concerning surfaces, the outputs and the prices observed. The more so as the economic losses relative to these risks can be very important: for example, the losses incurred by the producers at the time of drought 2003 were estimated at €13 billion for the European Union and at €4 billion for France.

It proves that, for the estimate of the amount of compensation for the losses due to the drought of 2003 in France, the Statistical Office of the Ministry for Agriculture was widely involved. The *Teruti* survey on the use of the territory (direct observation of 555,000 points) was used for the estimate of surfaces

jointly to an investigation into the average yields registered after harvest concerning 9,000 owners, in addition to the mobilization of data from administrative registers. In 2004, *Teruti* got up to 155,000 points of observation, while keeping a satisfying level of precision in the estimates of surface areas since the 35 major stations of the detailed physical nomenclature record a relative error lower than 5%, these stations covering 95% of the national territory in 2004.[1] Sometimes thus, the introduction of methodological innovations for an optimal use of the means reserved for the public statistics makes it possible to realize substantial savings. In the case of a crop insurance covering the variability of the outputs for an agricultural produce, the study of the statistical properties of such an insurance product (average and variance of the allowances, correlation of individual allowances) supposes having outputs of reference on an adequate temporal basis and for a rather fine level of territorial division as well as individual yields resulting from a constant sample of farms over the period of reference.

Whether it concerns the prevention of risk or of the answer to the risk materialisation, these examples show that the capacities of the agricultural statistical services are strongly mobilised to ensure the availability of unbiased statistical data oriented towards operational use. Indeed, asymmetries of information were identified like one of the main obstacles to the development of the systems of harvest insurance.

12.7.4 To reconcile European agriculture with society: the framework of multi-functionality

Multi-functionality, as a political concept, can be seen as a means of reconciling European agriculture with society by providing an analytical framework of reference likely to support the increase in sustainability while contributing to the key goals of the European strategy of sustainable development: equitable regional development, health and food safety, conservation of natural resources, diversification of the incomes in the rural environment and global sustainability.

Thus, within the framework of the multilateral negotiations within WTO on the trade of agricultural produce,[2] the concept of multi-functionality, emerging as of

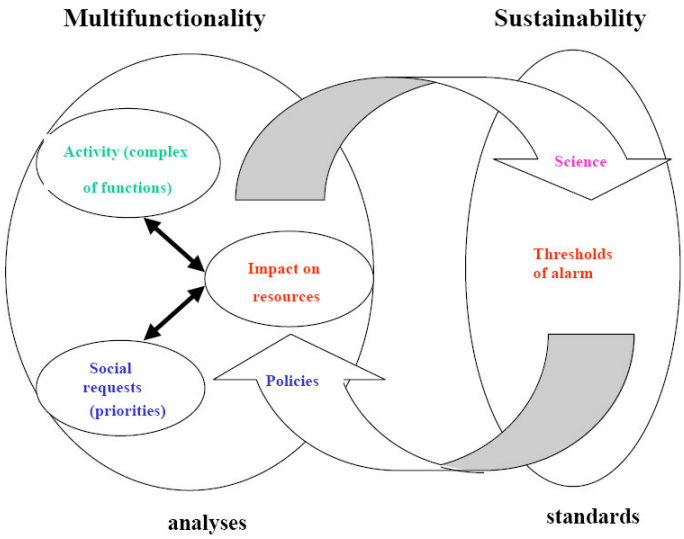
[1] In fact, the precision in the estimates depends more on the number of primary education units in the spatial survey than on the number of observation points per primary unit.

[2] On 5 February 2007, World Trade Organisation Director-General Pascal Lamy, in an address to the UNEP Global Ministerial Environment Forum in Nairobi, warned that a failure of the Doha negotiations 'would strengthen the hand of all those who argue that economic growth should proceed unchecked'

the eighties, has aroused increasing attention during the last decade in the discussions relating to the changes of orientation of agricultural policies. Multi-functionality intervenes in the problems of sustainable development at the heart of the adjustments which take place between productive complexes and social demands, the bond between multi-functionality and sustainability being established because of the impacts that the activities can have on the resources. From this point of view, multi-functionality provides an analytical framework enabling us to make the concept of sustainability operational on the basis of the functions filled by agriculture.

without regard for the environment. He stressed that 'trade, and indeed the WTO, must be made to deliver sustainable development' cf. www.wto.org

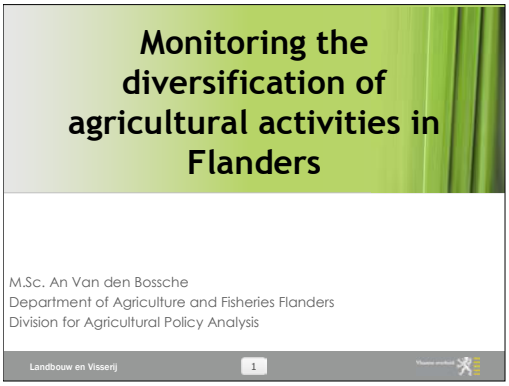
Graph 9	Relations between sustainability and multi-functionality (according to Multiagri [1])

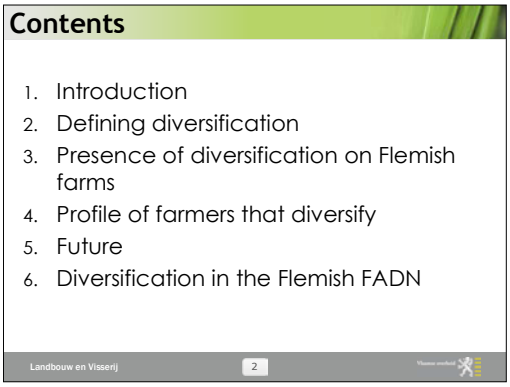


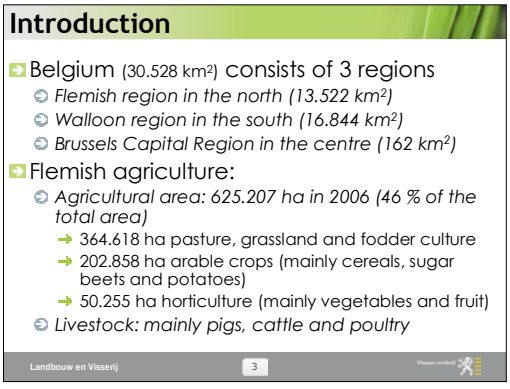
The analytical framework makes it possible to specify the functions on the basis of the social demand and the combination of activities. The study of the systemic attributes concerned with these functions (for example at the farm level, production, tourism and the protection of water resources) should make it possible to evaluate the modifications intervening in the combination of concerned attributes, to simulate the impact, which a policy change could induce on these combinations, and thus to explore a set of potential inflections while answering the normative question about the alarm thresholds.

[1] Cairol, D., Perret, E., Turpin, N., 2006. 'Results of the Multagri project concerning indicators of multi-functionality and their relevance for SEAMLESS-IF', *SEAMLESS Report* # 11, SEAMLESS integrated project, EU 6th Framework Programme, contract no. 010036-2, http://www.SEAMLESS-IP.org, 100 pp, ISBN no. 90-8585-040-1.

13 Monitoring the diversification of agricultural activities in Flanders

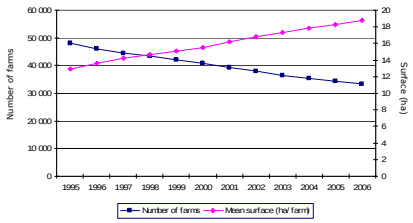






Introduction

Total number agricultural and horticultural farms and mean surface per farm (ha) (1995-2006)



Source: FOD, Algemene Directie Statistiek en Economische Informatie

Introduction

- Agricultural policy in Flanders
  - *Dual structure of CAP (European Common Agricultural Policy)*
    - Pillar I: measures focused on price and income support
    - Pillar II: measures for rural development
  - *The Flemish Rural Development Plan (RDPII)aims:*
    - to improve the economic viability of the agricultural sector and make rural areas more sustainable, with particular attention to diversi-fication of activities in the agricultural sector and to increased care for the environment

Introduction

- Flemish Rural Development Policy:
  - *Specific measures to encourage the diversification of agricultural business*
    - Financial support for diversified activities (including investment support)
    - Financial backing for time consuming measures which positively contribute to nature, landscape or caring activities and support for forestry.
    - 12 mill € in 2006

Defining diversification

- Definition of Diversification:
  - *Research project 2007 (Idea-UGent, ordered by AMS)*
- Multifunctional agriculture as broader context:
  - *Implies that the farmer extends his scope beyond the intrinsic food production activity to other functions to society*
  - *Agricultural production not only provides food and fibres, but also non-market commodities (externalities or public goods)*

Defining diversification

- Multifunctional agriculture: 4 types of functions :
  (Van Huylenbroeck, Vandermeulen et al. 2007)
  - *Green functions:*
    - → Objective: to improve environment and nature
  - *Blue functions:*
    - → Implementing water policy
  - *Yellow functions*
    - → Role in vitality of countryside, cultural historical inheritance, regional identity, farm tourism and education
  - *White functions*
    - → Food safety and security

Defining diversification

- Diversification can be defined as being the multifunctional activities having a link to the rural context
- Delimiting the activities:
  - *classification according:*
    (Research by Vakgroep Landbouweconomie- Universiteit Gent & IDEA Consult 2007)
    - → Degree of income diversification
    - → Degree of diversification of activities

Defining diversification

		Income diversification			
		No income diversification	Sale of products	Sale of services	Outsourcing production factors
Diversification of activities	Production related	Traditional agriculture	- Organic farming - New crops (e.g. energy crops) - MA water - MA Nature - Mechanical weed control - MA protein production	Agricultural nature management -MA meadow bird -MA botanical management -MA hamster -MA erosion - Active flooding areas	-Contract work (outsourcing human or physical capital)
	Product related	labelled products	Market - Farm shop -door-to-door selling -Agricultural fairs Production - Home processing - Processing of wood - On farm energy production	-Caring for animals of private persons	-Dike management (sheep on dikes of the Scheldt)
	Business related	Maintenance Small landscape amenities without compensation	- Wind and solar energy - Aquaculture	Agricultural landscape - Edge of plots - Small landscape amenities	- Temporary letting land, infrastructure, machines
			Tourism - Farm tourism	Social activities - Care farm Tourism - Education - Daytrip	
	Non-business related		Additional enterprise on the farm (e.g. sale of inputs, restaurant)	Maintenance of gardens and parks, collection of waste etc.	Social bonuses

MA = Management Agreement (beheersovereenkomst)

Defining diversification

- **Social tourist activities** (so-called yellow services):
  - *Farm Tourism & recreational and educational daytrips: e.g. children's farm, guided tours, educational centres, etc.*
  - *Social activities: care farms*

Defining diversification

- **Environment, nature & landscape** (so-called green services):
  - *agricultural nature management: MA meadow birds, MA botanical management, MA hamster, MA erosion, Active flooding areas, local management agreements (provinces/ municipalities)*
  - *agricultural landscape management: MA edges of lots, MA small landscape amenities, local management agreements (provinces/ municipalities), etc.*

Presence on Flemish farms

	Source	Number	%	Year	Overlap
Social tourist activities					
Farm tourism, recreational and educational daytrips	Stats of the May-count	190	0,6	2005	144 only have this activity, 34 also have processing and sale at the farm
	Countryside Tourism in Flanders (ngo)	56	0,2	2007	
	Countryside classes – rural Guilds (show farms)	55	0,2	2007	24 also have processing and sale at the f arm
	Flemish information Centre on Agriculture and Horticulture – show farms	27	0,1	2007	Overlap with Rural Guilds– countryside classes: 17
Care farms	Division for Sustainable Agricultural Development	226	0,6	2007	
Combination agricultural nature and landscape management	Flemish Land Society	3700	11,1	2005	

Presence on Flemish farms

	Source	Number	%	Year	Overlap
Agricultural landscape management	Province of Antwerp	51	0,2	2007	
	Province of Limburg	15	0,4	2006	
	Province of Eastern-Flanders	30	0,1	2006	
	Province of Western Flanders	150	0,5	2006	
Production and market					
Processing and sale at the farm	Flemish Centre for Agro and Fisheries Marketing	1150	3,5	2007	
Production of energy and new consumer goods	Stats of the May-count	5	0,0	2005	
Outsourcing production factors					
Contract work	Stats of the May-count	369	1,1	2005	346 exclusively have this kind of diversification

Presence on Flemish farms

- Conclusion of the monitoring framework:
  - *Maximally 17, 9 % (double counts included)*
  - *14% of Flemish farms have at least one diversification activity in 2006 (4.644 out of 33.272 farmers): After deduction of known double counts*

Type diversification	% unique farmers	Number of unique farmers
Social tourist activities	8,0	371
Environment, nature and landscape	65,9	3.061
Production and market	18,7	866
Outsourcing production factors	7,4	346
TOTAL	100,0	4.644

Profile farmers that diversify

- For most of the diversification activities:
  - *Medium-sized and large farms*
  - *Horticulture underrepresented*
  - *Higher educated than average*
  - *Have more often access to computer and internet*
- For activities related to environment, nature and landscape:
  - *Regional factors*

Future

- Few data available at the level of individual farms
- No data about level of incomes out of the diversification activities
  - *Are these activities profitable?*
  - *How do policy measures have effect?*
- Opportunity: Completing the monitoring framework by means of Flemish FADN

Diversification in the Flemish FADN

- Current situation
  - *Some diversification activities are already registered in the Flemish FADN in a limited way:*
    - Some of the above mentioned diversification activities are registered, others aren't
    - In the currently registered activities the link with the classical farm activities is lost (e.g. meat from cattle to farm butcher's).
    - Is not sufficient to calculate the contribution of the diversified activities in the total farm income.

Diversification in the Flemish FADN

- Adjustments in FADN software
- For each defined diversification activity :
  - *Costs*
  - *Revenues, receipts*
  - *Investments*
  - *Farm production/farm use*
  - *Extra information on results for farmer*
  - …

Diversification in the Flemish FADN

- Provisional planning:
  - *Ranking of the selected activities according to the complexity of the necessarily software adjustments*
  - *This ranking determines the order in which the activities will be studied and implemented*

activity	analysis	
1. Agricultural landscape management	2008	Edge of plots
		Small landscape amenities
2. Temporary letting of farm capital	2009	Machines
		Infrastructure

Diversification in the Flemish FADN

Contract work	2009	
Care farms	2009	Guidance and support
		Provision of infrastructure
Farm tourism	2009	Renting out rooms
		Camping site
Daytrip and education	2009	Farm visits
		Renting out bicycles
		Recreation
Production of energy	2009	Cogeneration
		Biogas
		Wind energy
		Solar energy

Diversification in the Flemish FADN

Farm processing	2009	Dairy
		Meat
		Fruit
		Vegetable
		Other (potato, bread, …)
Farm sale	2009	Farm shop
		Trading

- How do other countries gather data on diversification? Degree of detail?

14 Quality Labels: economic results for the producer[1]

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Jacques Nefussi
AGROPARISTECH

14.1 Introduction

The agricultural production is not homogeneous, it exists a large variety of product types for the same production. The extent of this diversity depends on the productive model dominating at a given time. Thus, the installation of an 'intensive model' during the Sixties aimed to reduce the production costs by imposing 'good practices' defined on the basis of scientific knowledge and technical know-how. This model led to a reduction in the diversity of the products compared to the former 'peasant production.'

Then, starting from the middle of the eighties, a new type of model emerged with a differentiation of the agricultural produce carried out on the basis of official quality labels. Then, the nineties were remembered by a new type of differentiation which is based on the 'management system quality': technical paths, risk management, guaranties concerning some characteristics, traceability of the agricultural product, associated performances of service, logistics, direct sales, etc. The concept of quality extends to cover various forms with differentiation from the agricultural produce.

[1] The original French version of this study has been previously published in *DEMETER 2008 - Economie et Stratégie agricole*, entitled: *'Signes de qualité : quels resultats économiques pour le producteur?',* pp. 69-119.

This work has been carried out with the financial support of the ANR - '*Agence Nationale de la Recherche*', the French National Research Agency, under the PADD-'*Programme Agriculture et Développement Durable*', a French program for Sustainable Development in Agriculture, to the *ANR-05-PADD-Impacts* project.

The authors thank Marie-Roberte Bedes - Head of the Club DEMETER, Emmanuel Chantry - Head of the French FADN-RICA and Prof. Yves Surry (Swedish University of Agricultural Sciences), coordinator of the FACEPA project (7th EU Framework Program), for the support and encouragements they provided. However, the authors of this text are fully responsible for any error or missing information.

With the 2003 Common Agricultural Policy (CAP) reform, the role of the market is accentuated in the regulation of the agricultural production; the commercial choices take an increasing importance. The agricultural producer is less and less a deliveryman, only worried by the technical optimization of his farm holding, to become a business leader which must make strategic choices, even if these choices are constrained by his agronomic environment and the possibilities of transformation taking into account the industries present near the farm holding. Among the possible options, the choices as regards quality policy take a new importance.

In the agricultural sector, the word 'quality' refers to various realities. They are initially the official quality labels (PDO, Red Label, Organic Farming), but also professional labels testifying to professional approaches (reasoned agriculture, codes of good practices, compliance certificates), or an absence of distinctive labels (it is the case for products 'without label' whose production can be optimized under other constraints). The productions 'without label' of quality are the productions for which the definition of quality is only elaborated in the relationship between an agricultural supplier and his customer, taking into account the requirements of the downstream industry. In this last case, there is no third-part organization that intervenes in the definition of quality. The absence of a third party does not mean that the quality of the delivered products is lower. It only means that food industry or the mass marketing controls quality on the basis of «customer» condition schedule. The presence of a third introduces rules which transcend the basic commercial relationship: the tradition, the territory, international agreements on good practices related to the control of the risks or as regards environmental protection, etc.

The 'official quality labels' already were the subject of many analyses on behalf of economists, sociologists, anthropologists, geographers, historians, and finally of multidisciplinary studies. In this paper, the financial approach is favored: what is the financial interest for a farmer to commit in a strategy of differentiation with an official quality label?

Beyond the estimates of profitability, this study seeks to clarify the concepts of 'quality' and 'service': a production can be marketed with an official quality label, but if it does not render services, it is not developed, and it cannot be profitable. For example, sold 'Red Label' table fowls are products of higher quality, which do not render services to the outside home catering because it uses the products of the poultry cutting (chicken legs, chicken breasts, etc.) that cannot be labeled under the current rules. A quality, which does not correspond to the particular, needs for a customer does not render him service.

This question is crucial in a context of liberalization of the agricultural markets where choices of strategies will be binding to the farmers more and more.

To compare strategies of differentiation and strategies based on the costs is possible solely because the agricultural production belongs to different competing universes. This context of competing universes is not specific to agriculture but common to many economic sectors. Also, we initially present the concept of 'competing universes' while seeking to position agricultural productions in these universes. These competing universes are characterized by the rules of the competing game between producers. This general framing will show how the agricultural strategies can evolve in time.

In a second part, we present cartography of the quality labels in France, in order to clarify the relations between the quality labels and the various productions. Then, taking into account the territorial dimension for the PDO as well as the regional traditions for other labels, we analyze the links between local areas and quality labels. Lastly, it is necessary to present the relation between the labels and the economic size of farm holding. These three factors (products, regions, economic size) have a great importance in addressing the topic of financial interest for some products under quality labels.

Lastly, we analyze the economic result in some strategies developed by the farm holdings for some livestock productions: cow milk, pigs and poultries. We carry out a statistical analysis of dispersion to compare the economic results of the farm holdings which have a strategy of differentiation by an official quality label, compared with those of a 'pilot population' of farm holdings which produce 'without official quality label ', this last kind of farm holding being the most numerous in France. Our approach takes into account the bias that could introduce factors such as the regional area or the farm holding size. The two sources used are the French Farm Accounting Data Network (FADN-RICA) and the French Agricultural Census (FAC).

Box 1 RICA, the French FADN

The FADN-RICA

The French Farm Accounting Data Network ('*RICA - Réseau d'information comptable agricole*') collects the accounting data of the professional farm holdings in order to provide an empirical base to microeconomic analyses on the agricultural production. This sample survey is carried out according to the quotas method, targeting the population of the 'professional farms', concept implying that their agricultural products have to be marketed. One of the main objectives of microeconomic studies is to evaluate the economic results obtained by the professional farmers, on the basis of the accounting and financial data to finally analyze individual dispersion of the various technical and economic indicators.

Professional farm holding

The professional farm, in addition to the generic criteria used to define the farm at the time of the French Agricultural Census ('*Recensement de l'Agriculture*'), must reach an economic size of at least 8 European Size Units (ESU), equivalent to 8 dairy cows or 12 hectares of soft wheat, and to use the equivalent work of a person occupied with the three quarters of its annualized time, that is to say 0,75 Annual Work Unit (AWU). With the last French Agricultural Census carried out in 2000 (FAC 2000), reference for the methodology of the present study, the universe of the professional farm holdings comprised 393,000 professional holdings on all 664,000 farms, accounting for approximately 60% in number but especially more than 95% of the released gross margin.

Universe of the French producers

In 2000, the RICA sample comprised approximately 7,700 farm holdings representing the 393,000 French professional farms while the 2004 sample comprised approximately 7,300 farm holdings.

Cohort 2002-2004

In order to study the influence of the quality labels on the economic results of the producers, we merge two statistical complementary sources, on the one hand, the Census of agriculture for information on the quality labels and, on the other hand, the RICA for the economic results.

Prices at production stage estimated from the RICA

The estimate of the price at production stage provided by the RICA is computed as the ratio of the annual sum of the sales to the annual sum of the sold quantities for homogeneous products. Thus, these are average costs paid to the producer; they integrate the elements of remuneration (rebates) on the quality of the product paid during the financial year.

14.2 The positioning of agricultural productions in the 'competing universes'

We are based on the traditional concept of 'competing universes' that the Boston Consulting Group defines to analyze the strategy of companies. These competing universes make it possible to characterize the rules of the competing game for a branch of industry. Although the agricultural producer has less room for maneuver in his choices of strategies compared to other economic sectors, the successive reforms of the CAP and the liberalization of the agricultural production will reinforce the strategic and commercial dimensions of the farm holding management. These types of competition thus require an adaptation in the agricultural context taking into account the specific regulation modes of the agricultural activities, and the regional context. In fact, a production considered at the national level can concern several competing universes according to the regional contexts. This typology can thus be used in analyzing the changes for some regional productions which switch from a competing universe to another one over time: either because the advantages in terms of cost reduction are reduced, or because the possibilities of differentiations appear or disappear.

The typology of the competing universes is generally presented in the shape of a matrix that makes it possible to specify the dominant characteristics of competition on an activity on the basis of two assessment criteria. The first criterion relates to the possibility of being different. In some cases, there exists very few possibilities of being different; in other cases, there is a lot of it. The second criterion does not relate on the possibility of a differentiation, but on the benefit which one can gain from a differentiation. The two criteria are thus:

- the number of existing sources of competing differentiation. These sources of differentiation can be numerous or relatively few taking into account the sensitivity of the customers to differentiation;
- importance of the competitive advantage that it is possible to build in the sector. It is not enough that there are possibilities of being different so that a differentiation generates a competitive advantage with respect to the other producers.

The matrix thus makes it possible to define four universes called: 'Fragmentation', 'Specialization', 'Dead end', and 'Volume/Cost'. These four terms indicate rules of competition, which are essential on the companies present in a given sector. One can thus define four types of competing universes.

Graph 1	Typology of the competing universes		
		Competitive advantage	
		Weak	**Strong**
Possibilities of competing differentiations	Numerous possibilities	Fragmentation	Specialization
	Few possibilities	Dead end	Volume/Cost

Boston Consulting Group, (1985), 'L'évolution des systèmes concurrentiels,' Perspectives et stratégie.

On the basis of the definition of these competing universes, we will initially analyze their relevance to characterize agricultural productions either at the national level, or at the regional level. Lastly, these competing universes make it possible to characterize the great historical changes, which we present as illustrations.

- 'Fragmentation'
  This universe is made of competing systems in which there exist a lot of companies in competition, each company having its own elements of differentiation. However, these sources of differentiation are compensated and neutralized. There is no possibility of building a competitive advantage on the basis of a specific source of differentiation. The size of the company does not have either a positive effect in terms of costs; it can even generate a loss of competitiveness. It is, indeed, the fast adaptation to the market that is the independent factor of success here. The margins are various and unstable. An often-quoted example is the small retail business or automobile repair.

In the agricultural sector, this competing context exists in productions where the size of the farm holdings corresponds to a technical optimum and where the agricultural produce is a raw material with little differentiation. The production of consumption potatoes was in this competing universe during a very long time. In some regions, at the time where the intervention price was high, the production of soft wheat was also in a fragmented universe. In the same way, there can be

fragmentation in very regulated sectors. For example, it is the case of the protected-designation-of-origin (PDO) productions, where differentiation between producers is very limited, and where the farm holding sizes do not generate significant variations of costs.

- 'Specialization'
  This universe is made of competing systems in which there exist many sources of differentiation that are significant for the customer and thus that may undergo beneficiation. The company position on small segments of production, and competitiveness is based on the specific costs. Several companies are very profitable.

Many farms are committed in productions requiring a particular know-how or their localization allows them a strong differentiation. Since the beginning of the eighties, the production of consumption potatoes is in a universe of specialization where the possibilities of differentiations are many and which may undergo beneficiation at the product level. In the same way, the production of soft wheat evolves to specialized universes, in some regional areas.

- 'Volume/Costs'
  They are competing universes in which volume brings an important advantage in terms of cost, and thus of price. It concerns activities for which there exist a few possibilities of product differentiation. The main part of the efforts relates to the management of the shared costs. It is necessary to grow more quickly than the competitors to improve its position in terms of cost. Irons and steel industry were an example of volume industry. In the agricultural sector, they are especially based on strategies of cost reduction with or without enlarging of the farm holding.

Again, the production of common wheat was subjected to this type of competing environments in the great cereal regions. It was the same for the production of pigs or milk in Brittany at one time.

- 'Dead end'
  They are competing universes in which the sources of differentiation are few, and cannot get a decisive competitive advantage. In the same way, volume does not bring any advantage in terms of costs. If nobody reduces his production, everyone loses money. The more modern companies are involved in debt, and the most obsolete ones are financially the most solid ones.

One finds situations of dead end for the agricultural productions of some regional areas, which began in strategies of reduction of the costs without obtaining possibility of differentiating their production. The concentration of the farm holdings lead to comparable performance levels which do not give any more advantages in terms of costs, whereas there are no possibilities of being different.

We analyze now how productions passed from a universe to another because introducing new methods of production or marketing (such as the opening of rays self-service in the distribution for the fresh produce), some changes in the regulation, a new policy for some joint-trade consortium, or due to the evolution of the international context.

Graph 2	**Changes of competing universes in the sector of poultry production**		
		Competitive advantage	
		Weak	Strong
Possibilities of competing differentiations	Many possibilities	Fragmentation (1) 'The Fifties' Poultry	Specialization (3) « 85 - 00 » Poultry
	Few possibilities	(4) « 2000 - » Poultry Dead end	(2) « 60 - 85 » Poultry Volume/Cost

The production of table fowls makes it possible to illustrate this matrix (cf. graph 2). This production of poultry knew changes of very interesting strategic universes during the last fifty years. Indeed, one passed from a fragmented universe (1), where each producer can be different from the other producers by many possibilities without building a competitive advantage, to a volume/cost universe of (2) with integration. This type of relation between the upstream and

the downstream allowed a very fast fall of the production costs. Competition relates primarily to the prices for standardized products. Then, during the Eighties, differentiation appears possible with the Red Label and the competing universe becomes a universe of specialization (3). Lastly, since the end of the Nineties, the multiplication of the labels, standardization of the products, and the opening of the European borders lead the production of poultry to the 'dead end' (4).

The analysis of the competing universes makes it possible to represent each family of production and to determine in which competing universe it is. Is differentiation by the quality labels possible? Is differentiation by official quality labels profitable?

The answer to these questions initially supposes to perform an analysis of the relationship between the quality labels and the various productions, because some productions having different economic and institutional possibilities to create of a quality label. Then, it is necessary to take into account territorial dimensions: some regions have specific possibilities of differentiation that other regions cannot mobilize, in particular with the PDO. Lastly, it is necessary to analyze the size of the farm holdings, which is likely to have an important effect on the profitability of the differentiation policies based on quality labels. One can indeed make the assumption that the small-scale farm holdings can compensate for structural disadvantages of competitiveness by the costs, thanks to policies of differentiation.

Thus, we will initially analyze the relations between the quality labels and the groups of products. Then, in a second step, we will study how the various regions position with regards to the quality labels. Finally, the influence of the farm holding size is compared with that one of the quality labels. We thus constitute a kind of cartography of the quality labels in France.

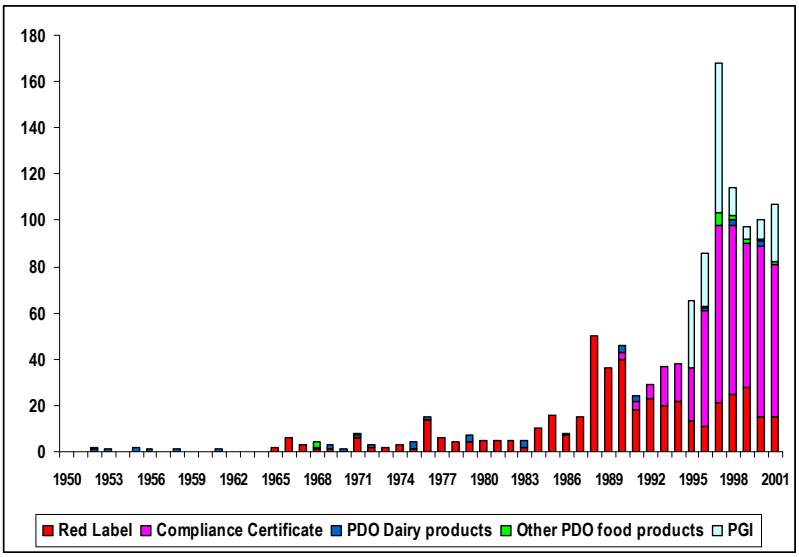
14.3 The cartography of quality labels in France

The differentiation of the food products on the basis of differentiation of the raw material is a specificity of the food industry: in general, in the sector of consumer goods, differentiation is the result of industrial innovation. In the food sector, the innovation rests initially on industry, as in the other economic sectors, but a specific source of innovation comes from the differentiation of the agricultural raw material. All the public measures concerning official quality labels aim to make recognize this source of differentiation for the processed products. In this field, the action of the public authorities is old: the existence of

quality labels defined by third parties initially appeared in the vine growing sector at the beginning of the XXth century with the Protected Designation of Origin (PDO) in 1935. Then, are successively introduced the Agricultural 'Red' Label (1960), the Organic Farming (1980), the Compliance Certificate of food products (1988) and eventually the Protected Geographical Indication (PGI). During the nineties, other certifications appeared, they relate to environmental protection, good practices, even ethics and, finally, sustainable development.

If the public measures concerning official quality labels are old, the economic weight of these differentiation forms of food products based on differentiated agricultural raw material, dates only from the middle of the eighties.

Graph 3 **Annual number of new notifications for official labels of food products quality (except wines and alcohols)**



Source: According to data from INAO, the French Institute for Quality and Origin.

The presence of labels certified by third parties does not relate to all agricultural productions on the same basis. In the same way, these strategies of differentiations are rather developed by farm holdings of intermediate or small sizes. Finally, some of the regions are not committed in this logic of differentiation with the same intensity than the other ones.

14.3.1 Labels and productions

To have a comprehensive view of the presence of the quality labels in the various productions, we retain five French labels that the agricultural census treated in 2000. They are the Protected Designations of Origin (PDO), the Agricultural Labels (AL), the Organic Farming (AB), the Compliance Certificates (CC), and the Codes of Good Practices or other quality labels with schedules of conditions (CGP).

Box 2	**Chi-Square test**
The independence test based on Chi-Square tests the assumption of independence in probability: two factors are independent in probability if the probability of the joint event is the product of the elementary event probabilities. Under this assumption, the D2 statistic follows a Chi-Square distribution of probability, function of the independent variation source number (i.e. the degrees of freedom for the cross-table with p lines and q columns, that are equal to [p-1]* [q-1]). If, taking into account the number of lines and columns of the table, the value of D2 is considered to be too important for probably belonging to the values of a distribution of a Chi-Square distribution with the same degrees of freedom, then assumption of independence is rejected. The risk of error (p-value) associated with this decision of rejecting the assumption of independence is then quantifiable.	

To evaluate the statistical significance of the relationship between labels and productions, we use the Chi-Square test. This test leads to reject the assumption of independence between the two criteria, 'quality labels' and 'groups of products.' Thus, there is a statistically significant relationship between the quality labels and the types of production.

Box 3	Correspondence Analysis

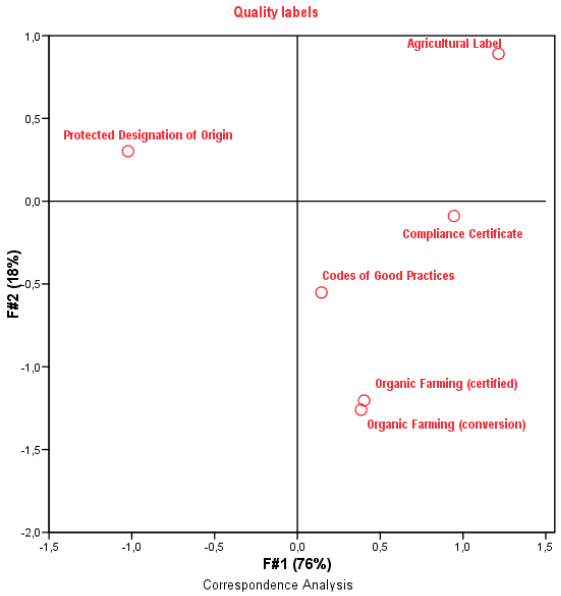
The correspondence analysis (CA) reveals the links (correspondences) between the categories of two qualitative criteria. This exploratory factorial technique makes it possible to graphically represent these interrelationships projecting on a scatter-diagram the categories of the two criteria analyzed. This projection is carried out on the basis of their departure from a theoretical situation of independence between these two qualitative criteria represented by the origin of the scatter-diagram. The location of the points representing the categories is computed according to the absolute frequency (i.e. the 'contingency table') resulting from the crossing of these two criteria. The factors of the correspondence analysis are interpreted in terms of independent dimensions making it possible to describe the analyzed relationship.

For each relationship considered to be statistically significant according to a Chi-Square test between the quality label criterion and one of the structure criteria analyzed (productions, regions, and economic size of the farm holdings), the CA of the contingency table (counting the various quality labels announced by the farmers listed according to each studied criterion) makes it possible to analyze the distribution profiles of the quality labels characterizing this relationship for the population of French farm holdings.

To analyze the statistically significant relations between labels and productions, we carried out a correspondence analysis, which makes it possible to visualize the structure of the interrelationships between labels and productions. Visualization is carried out on the basis of the factorial two-dimension plots, which gather the greatest part of information available. The first factorial plot accounts for 96% of total variability: thus, it is enough to represent the interrelationships existing between labels and products. Indeed, the first factor explains 76% of inertia (the weighted-case measure of variability for CA) and the second one, 18%.

The geometrical projections of quality label categories along those two factorial axes (graph 4) and the analysis of their contributions to the axis variability show that the first axis opposes the PDO to the Agricultural Labels and Compliance Certificates and more largely to the whole set of the non territorialized quality labels. The second axis opposes PDO and Agricultural Labels to the other quality labels, in particular Charters of Good Practices and Organic Farming where the CGP certified production presents a profile similar to that one of Organic Farming Conversion.

Graph 4 **CA of quality labels by products, factorial plot of quality labels**

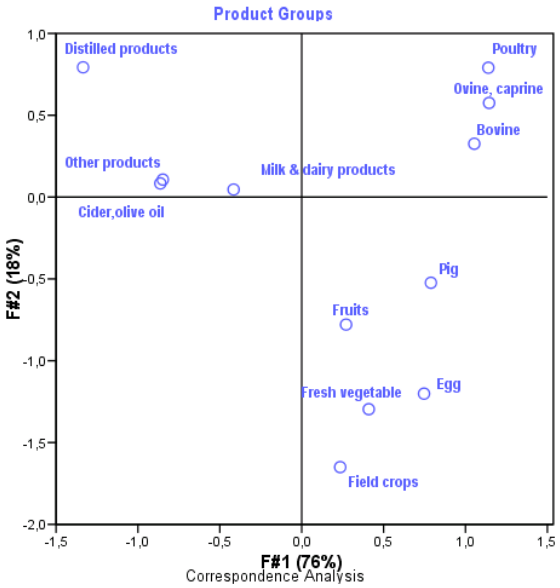


Source: According to the FADN-FAC data from SCEES.

The projection of the product groups on this factorial plot (Graph 5) shows that the Agricultural Label relates to primarily the livestock productions: poultry, sheep, caprine, bovine, pig, egg. The other relations highlighted are:

- field crops related with organic farming;
- fresh vegetables with Codes of Good Practices;
- fresh fruits with Codes of Good Practices;
- distilled products with PDO;
- bovine meat products with Agricultural Label and Compliance Certificate
- ovine and caprine products with Agricultural Label and Compliance Certificate;
- poultries and Agricultural Label;
- pig with Compliance Certificate;
- milk and dairy products with PDO.

Graph 5 **CA of quality labels by products, factorial plot of products**



Source: According to the FADN-FAC data from SCEES.

These relations between labels and products lead us to privilege some groups of products to carry out our analysis of the quality approach valorisation. They belong to competing universes, which comprise various possibilities of differentiation. Analyses of differentiation strategies by the quality labels are thus possible, but the available information imposes a second selection of (products *x* labels) couples. Table 14.1 presents the products and the labels that can be studied on the basis of the available data.

The valorisation analysis of the quality labels requires a second framework of selection for the farm holdings: the territory. Indeed, some regions have specific differentiation opportunities, which need to be clarified.

Table 12.1	Field covered by the statistical analysis, products and quality labels			
	PDO	Label	CC	CGP
Milk	x			
Poultry		x		
Pigs			x	x

14.3.2 Labels and regions

We proceed as for the relations between the labels and the products: we test initially the assumption of independence, and then carry out a correspondence analysis when the rejection of the test justifies the use of this exploratory tool. In a similar way with the products, the Chi-Square test leads us to reject the assumption of independence between the two criteria: quality labels and regions.

Again, the first factorial plot (Graph 6) summarizes the main part of information: the first factorial axis explains 50% of the inertia and the second 38%: thus, on the whole, this factorial plot accounts for 88% of total variability.

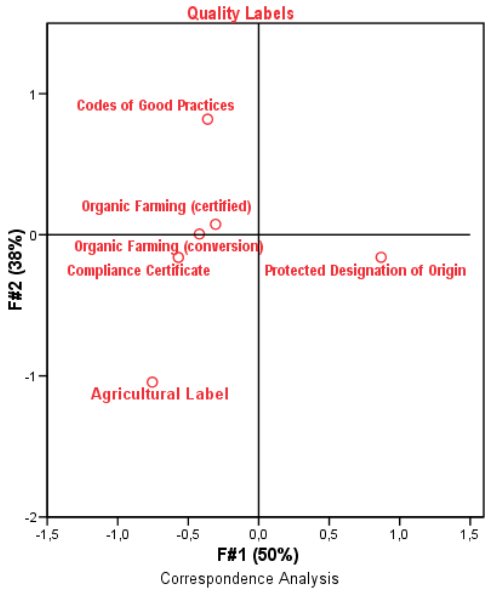
The first axis contrasts the Protected Designations of Origin with the Agricultural Labels. The second axis contrasts the Codes of Good Practices with the Agricultural Labels.

On the graph of the regions (Graph 7), one notes that the first axis contrast 'Champagne-Ardenne', 'Alsace', 'Poitou-Charentes' with Brittany, 'Pays de la Loire' and 'Limousin'. The second axis is structured by the contrast on the one hand, 'Languedoc-Roussillon', 'Nord-Pas-de-Calais', Picardy and Brittany, with on the other hand, 'Limousin' and 'Aquitaine'. A detailed analysis of the contributions to inertia shows in fact the existence of four poles:

- a 'PDO' pole which comprises a higher proportion in Protected Designations of Origin;
- for 'Champagne-Ardenne', with less Agricultural Labels and Codes of Good Practices;
- for 'Franche-Comté', with less Codes of Good Practices;
- for 'Alsace', 'Poitou-Charentes' and 'Rhône-Alpes';
- for 'Aquitaine', a higher proportion in PDO and Agricultural Labels and a lower proportion of Codes of Good Practices;
- for 'Provence-Alpes-Côte d'Azur', with lower proportion in Agricultural Labels;
- a Label pole which comprises a higher proportion in Agricultural Labels;

- for 'Midi-Pyrenees';
- for 'Limousin' and 'Pays de la Loire', with less PDO;
- a 'CGP' pole which comprises a higher proportion in Codes of Good Practices;
- for 'Nord-Pas-de-Calais' and 'Lorraine', with a lower proportion in PDO;
- for Brittany, with less PDO and a higher proportion in Compliance Certificate,
- for 'Languedoc-Roussillon', with less Label and Compliance Certificate;
- a 'Compliance Certificate'pole which comprises a higher proportion of Compliance Certificates;
- for 'Basse-Normandie', with a lower proportion of PDO.

Graph 6 **CA of quality labels by regions, factorial plot of quality labels - for 'Basse-Normandie', with a lower proportion of PDO**



Source: According to the FADN-FAC data from SCEES.

Thus, the space of quality labels seems to be structured on two dimensions:

- the first dimension contrasting the PDO on the one hand with on the other hand Labels, constitutes a differentiation separating the regions from the preferential PDO pole ('Champagne-Ardenne', 'Alsace', 'Franche-Comté', 'Poitou-Charentes', 'Aquitaine', 'Rhone-Alpes' and 'Provence-Alpes-Côte d'Azur') from the other regions;
- the one second dimension allowing to distinguish between the regions not belonging to the PDO pole, a first subgroup of regions (Nord-Pas-de-Calais, Lorraine, Brittany and Languedoc-Roussillon) belonging to a CGP preferential pole, from a second subgroup of regions ('Midi-Pyrénées', 'Limousin' and 'Pays de la Loire') belonging to a Label preferential pole.

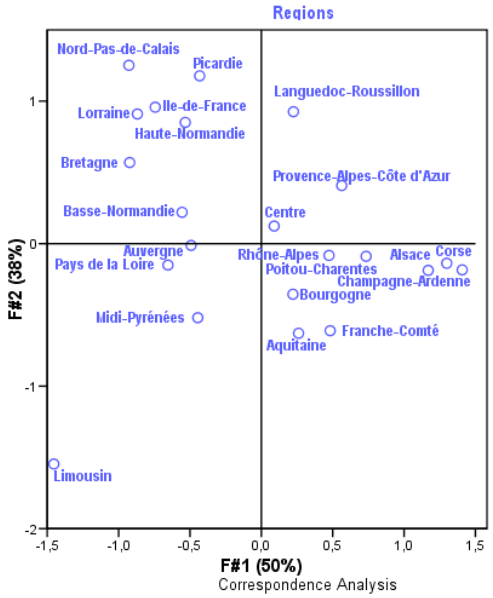
The Organic farming and Compliance Certificate labels are not highlighted by the study of the regions - labels links because they present little regional tropism, excepted for the Compliance Certificate association with 'Basse-Normandie.'

Major differentiations take place on the one hand in terms of labels between ('Champagne-Ardenne', 'Aquitaine'), ('Nord-Pas-de-Calais', Brittany, 'Languedoc-Roussillon') and ('Limousin', Midi-Pyrénées) for the regions, and on the other hand in terms of regions between PDO, Agricultural Label and Codes of Good

Practices for the quality labels. These particular relations between the regions and the labels lead us to analyze the valorisation of the quality labels on specific regional subsets.

Lastly, the relations between the economic size and the labels must be highlighted in order to prevent our analyses from biases related to by this scale factor.

Graph 7 **CA of quality labels by regions, factorial plot of regions**



Source: According to the FADN-FAC data from SCEES.

14.3.3 Labels and farm holding economic sizes

To study the links between the quality labels and the farm holding economic sizes, we use the ESC, a European classification that is based on the standardized gross margin of the farm holdings. This classification enables us to define farm holding sub-populations of comparable economic size between different productive orientations (cf. box 4).

As for the previous analyses, the Chi-Square test leads to the rejection of independence between the two criteria: quality labels and economic size classes (ESC) of farm holdings are dependent.

Box 4	The farm holding typology, from the standard gross margin (SGM) to classifications according to the type of farming (ToF) and economic size class (ESC)

To analyze the agricultural diversity of the production systems in the context of the unified European market implies to have a reference framework making it possible to perceive the structural evolutions of the various farm populations. For this purpose, the European community 'acquis' as regards agricultural statistics uses since 1978 a typology established on the basis of the two following criteria of classification: the Types of Farming (ToF) indicating the type of productive specialization and the farm holding economic size class (ESC) assessing the scale of its productive potentialities.

These two criteria of classification, in their definition, are based on the key-concept of standard gross margin (SGM, as a balance between the standardized value of the production and the standardized amount of some costs, which are specifically dependent there.

The unit SGM of each agricultural product is given for each European region in order to take account of the diversity of the production conditions. Applied to the various plant and animal speculations of the farm holding, these unit coefficients are multiplied by the physical quantities expressed in terms of surface or cattle. The sum of the valorisations thus calculated for the overall set of farm products defines the MBS of the holding.

The SGM is expressed in a standardized way in European size units (ESU), a unit of this economic size measure being equivalent to the gross margin brought by 1,5 hectare of soft wheat or a milk cow, is approximately 1,200 euros.

The ToF categories form a classification of the farm holdings revealing, on the basis of the contribution profiles to the SGM, the majority share taken by the greater group of products generally joined or associated (for example 'field crops' 'market gardening and horticulture', etc) in the SGM of the farm holding. The category specialized in dairy production is the bovine 'milk' ToF (ToF 41 in the 17-categories nomenclature).

The ESCs constitute a classification of the farm holdings according to the scale of their standard gross margin (SGM) expressed in ESU, the holdings of the smallest economic sizes being gathered in the ESC 1, and the holdings of the largest economic sizes in the ESC 10.

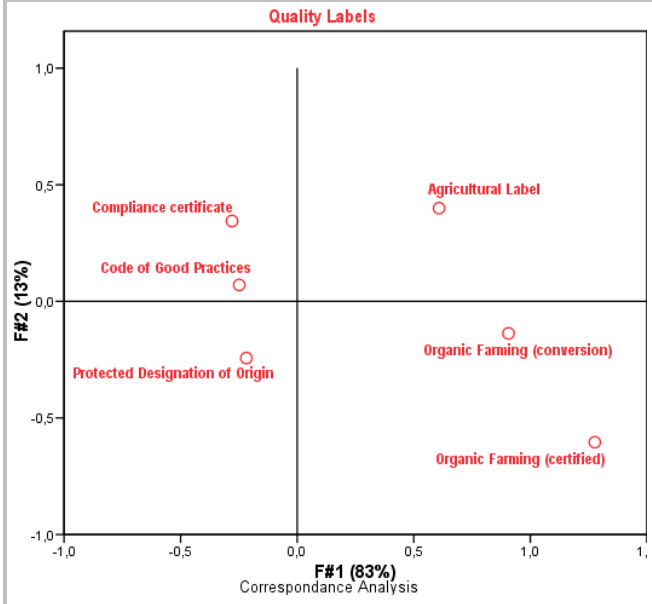
On the first factorial plot (Graph 8), the first axis contrasts Organic Farming with Agricultural Label. The second axis contrasts Agricultural Label and Compliance Certificate with PDO and certified Organic Farming. On the whole, this first factorial plot represents 96% of the variability.

The analysis of the economic size class (ESC) locations (Graph 9) highlights that the first axis contrasts the ESC 5,6 and 7 with the ESC 9 and 10. The opposition between the ESC 10 and the ESC 8 structures the second axis.

Explaining 83% of variability, the first axis plays the part of a scale in economic size,[1] ordering the classes of economic size from the smallest one (ESC 5) to the largest one (ESC 10). The analysis of the contributions to the axis inertia shows that:

- the ESCs 5 & 6 have a higher proportion in certified Organic Farming;
- the ESC 7 has a higher proportion in certified Organic farming and Agricultural Label and a lower proportion in Code of Good Practices;
- the ESC 9 has a higher proportion in Code of Good Practices and a lower proportion in Labels;
- the ESC 10 has a higher proportion in PDO and a lower proportion in Labels.

Graph 8 **CA of quality labels by ESCs, factorial plot of labels**



Source: According to the FADN-FAC data from SCEES.

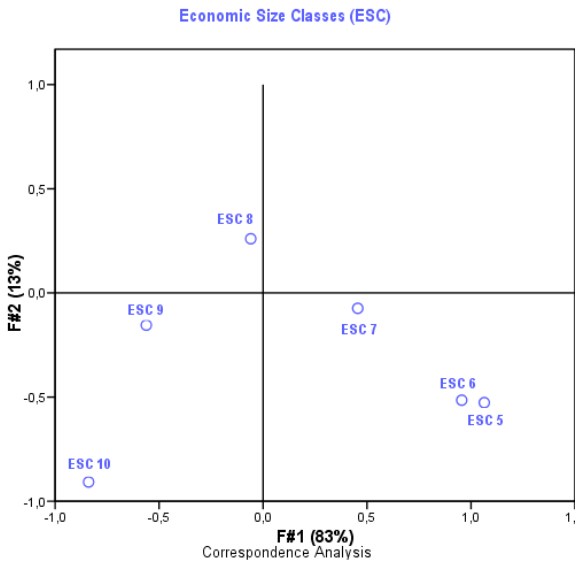
[1] It is noted that projections of the various ESCs in the first factorial plot is organized according to a Gutmann effect: the classes whose marginal frequency is weaker (ESC 5,6 and 10) being located at the ends of the axis while the classes whose marginal frequency is larger are close to the barycentre of the graph (ESC 7,8 and 9).

Thus, the space of quality labels seems to be structured on several dimensions:

- the first dimension contrasts the ESC 5, 6 and 7, expressing preferentially the Organic Farming as a quality label, with the group of ESC 9 and 10 expressing an aversion for the Label;
- the second dimension characterizing well the preferential profile of the ESC 8, contrasts a relative tropism for the Label, Compliance Certificate and Code of Good Practices with a relative aversion for the Organic Farming and the PDO;
- major differentiations take place on the one hand in terms of labels for the classes of economic size between the ESC 9 and the ESC 7, and on the other hand in terms of ESC for the quality labels between the certified Organic Farming and the Agricultural Label.

To take account of the size effect in the study of the quality label valorisation, we carry out an analysis that comprises classes of economic size. Thus, we can reason controlling the possible biases induced by the economic size of the farm holding.

Graph 9 **CA of quality labels by ESCs, factorial plot of ESCs**



Source: According to the FADN-FAC data from SCEES.

14.4 The valorisation of quality labels

14.4.1 Milk production: the PDO-based strategies of differentiation

The production of milk is characterized by structural changes in the competing environment. As in the illustrating case of poultry, the dairy production is in a fragmented universe at the beginning of the fifties. But in the middle of the Fifties, this universe swing over a universe of volume under the combined action of the milk industries, the overproduction which weights on the prices and favors the concentration, and of the professional organizations (Joint-Trade Council, Technical Institutes, Agricultural Cooperative Council).

This universe of volume leads to strategies of growth in the size of the farm holdings in order to reduce the costs. This orientation currently remains dominant.

From the middle of the eighties, there is a change of competing universe: differentiation becomes possible on important market segments. Two factors are combined: a new food request carried by the desire of authenticity, the search of a territorial rooting, a differentiation of the dairy products, in particular of cheeses, and the existence of public institutional measures which allow the recognition of qualitative specificities as official quality labels: PDO, Red Label, Organic Farming, and PGI. Some farm holdings specialize in particular on such milks making it possible to manufacture cheeses under PDO, or butters and creams under Red Label.

Table 14.2 Economic weight of the dairy cow cheese productions under quality labels

Sales at the first marketing	CC	Label	PDO	Total
K€				
Soft paste cow cheese	0	1,900	294,620	296,510
Squeezed paste cow cheese (not cooked or half-cooked)	15,460	7,190	461,380	484,030
Squeezes paste cow cheese (cooked)	2,140	64,020	288,430	354,590
Spotted pasted cow cheese	0	0	94,150	94,150
Total cow cheese	17,600	73,110	1,138,570	1,229,280

Source: SOQO Official Quality Label Survey 2004, SCEES.

In parallel, the transformation at the farm level and the direct sales constitute forms of differentiation very present in the dairy sector. These strategies develop in a universe marked by numerous possibilities for differentiation from a farm to another one, limiting the opportunities of competitive advantages.

Lastly, during the nineties, some new requirements appear: the sanitary characteristics are increasingly strict, the organization of the farm holding (the control of the risks, the traceability…) become factors of differentiation on the segment of the dairy products with the Compliance Certificate, in particular for the production of dairy products for the distributor trademarks. Other labels such as the codes of good practices attest of an organization which controls the risks and which respects professional reference frames. In the same way, animal well-being, or animal feed allow to build new strategies of differentiation based on with the prevention for the risks of some diseases (heart or brain cardiovascular attacks): for example, a food for cow comprising a proportion of linseeds in order to enhance the OMEGA3 content of milk which would allow the processing industry to differentiate their dairy products.

These various types of strategies coexist in the dairy sector. They often correspond to regional orientations. Graph 10 displays a representation of these strategies in 2007.

Thanks to the merging of the French Agricultural Census and the FADN-RICA files, we can analyze the valorisation of the various dairy farm holding strategies over the period 2000-2004. To give a measurement of the differences in valorisation, we study the price differences of milk at the agricultural stage taking into account its aptitude to carry quality labels.

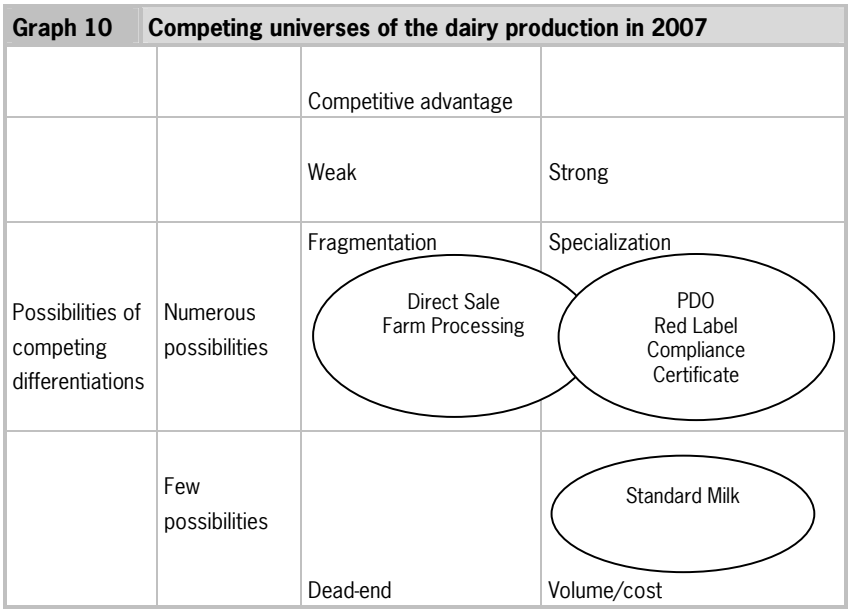
In the case of milk, many labels make it possible to build strategies of differentiation: 'General public' quality labels such as the Protected Designations of Origin, the Red Label or the Organic Farming, but also of the 'Professional' ones such as the Compliance Certificates or the Codes of Good Practices. These differentiated milk strategies are in competition with strategies based on the cost reduction or with a differentiation, which is defined within the sole client- supplier relationship.

Taking into account the available information, we must limit the analysis to the comparison of the strategies of differentiation based on the PDO with the strategies based on the cost reduction (absence of labels). Three classes of farm holding are distinguished according to their economic size in terms of dairy cow unit (DCU):

- ESC 6 & 7: from 16 to less than 40 DCU;
- ESC 8: from 40 to less than 100 DCU;

- ESC 9: 100 DCU or more.

Graph 10 Competing universes of the dairy production in 2007



In the case of the dairy production, we can analyze valorisation on the basis of the prices to which milks are sold.[1] But the price is not sufficient; we must analyze the profit margin that we estimate by the EBITDA.[2] We can thus study the rate of margin (EBITDA divided by the sales). Finally, we analyze the profitability of capital invested (EBITDA divided by the fixed assets) and the margin by agricultural working unit (AWU) in the farm holding.

On the overall farm holding population, the price differences between milks carrying a differentiation thanks to the PDO and milks without label are important and statistically significant: the difference in the averages of price is €3.88 hl in 2000 (table 14.3).

In 2004, the difference is even more important since this is on average €4.71 hl that separates «PDO» milks from 'no-quality-label' (NQL) milks. This

[1] The price is equal on the total sales of milk of the farm holding divided by the quantities of delivered milk..

[2] In the case of French farm holdings, we can say that EBITDA (Earnings before interest, tax, depreciation and amortization) is roughly the same as *EBE (Excédent Brut d'exploitation)* upon which these analyses are based.

increase in variation is explained by a slight increase in prices for PDO-milks against a fall in prices of NQL-milks.

Table 14.3	Average costs of PDO-differentiated milks and no-quality-label (NQL) milks according to the economic size classes					
€/hl		2000			2004	
ESC	PDO	NQL	Total	PDO	NQL	Total
ESC 6 & 7	36.81	31.60	32.09	37.62	30.30	31.06
ESC 8	35.81	32.09	32.32	35.53	31.08	31.45
ESC 9	34.54	32.35	32.41	33.10	31.36	31.41
Total	35.95	32.07	32.30	35.76	31.04	31.37
Source: According to the FADN-FAC data from SCEES.						

If we analyze the price differences to the average costs (32.30 € in 2000) according to the farm holding economic size, we note that the PDO factor has a distinct effect according to the classes of economic size.

Table 14.4	Deviations of average costs between the Protected Designation of Origin (PDO)-milks and the No-Quality-Label (NQL)-milks according to the farm economic size classes					
€/hl		2000			2004	
ESC	PDO	NQL	Total	PDO	NQL	Total
ESC 6 & 7	4.51	-0.70	-0.21	6.25	-1.07	-0.31
ESC 8	3.51	-0.21	0.02	4.16	-0.29	0.08
ESC 9	2.24	0.05	0.11	1.73	-0.01	0.04
Total	3.65	-0.23	32.30	4.38	-0.33	31.37
Source: According to the FADN-FAC data from SCEES.						

On the one hand, the dairy farm holdings without quality labels are penalized in the level of prices when they are in the small size categories: the deviation with the global average of prices is negative for the ESC 6 & 7, and equal to -1.07 €/hl. On the other hand, the price differences are as more positive for these small size farm holdings as they benefit from a Protected Designation of Origin. This report for the year 2000 is more evident in 2004. For example, for the ESC 6 & 7, the price difference due to the PDO passes from 4.51 €/hl in 2000 to 6.25 €/hl in 2004.

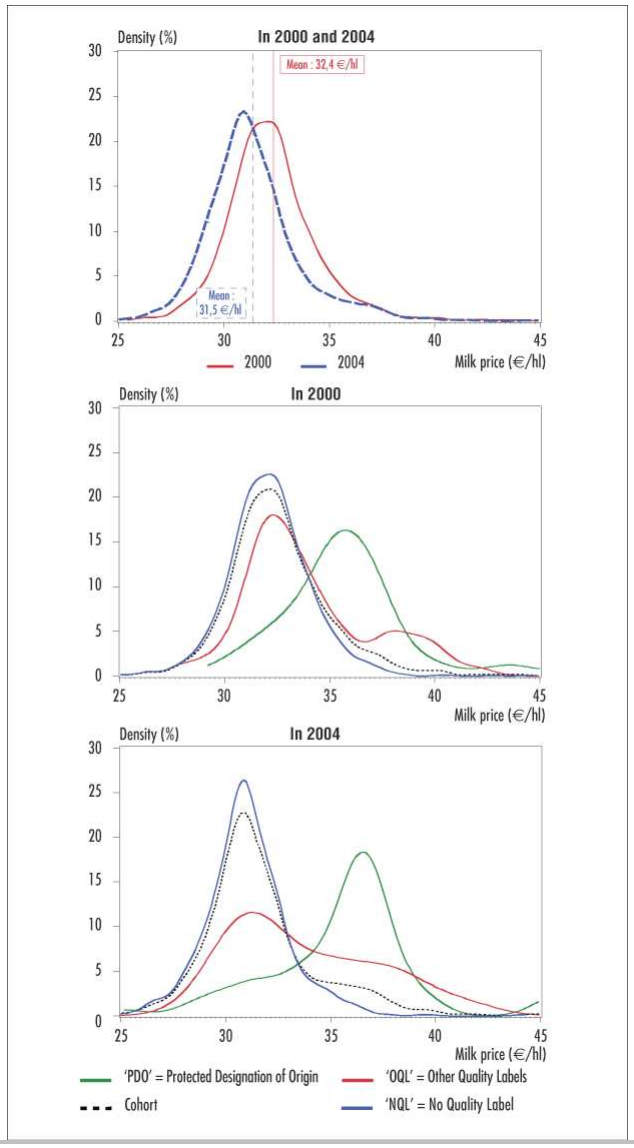
Thus at the price level, differentiation by a Protected Designation of Origin results in appreciations which are all the more large as the farm holding is of small size.

The question arises now of knowing if these variations of selling price are found in the margin, which the farm holdings earn. The differentiation strategies can be very expensive and generate only a low margin if the costs are higher than the added value. To assess the consequences of the dairy producer strategic choices, we analyze the rate of margin (EBIDTA/sales).

The analysis of the rates of margin shows that PDO milks have rates of margin higher than no quality label (NQL) milks for the overall of the farm holdings and significantly higher for the small economic size farm holdings. Thus, the increase in the associated costs to PDO does not absorb the added value generated. It is the same for the evolutions: the rate of margin of the farm holdings PDO-milks increases by 3 points between 2000 and 2004. However, unlike the prices, the rates of margin of the NQL farm holdings also increase (2 points) in spite of a fall of the prices.[1]

[1] We make the assumption that this increase of two points of the rate of margin is ascribable to the payment of the direct dairy assistance granted to support the income of the dairy producers in the context of the reform of the common organization of market of milk envisaged by the Luxembourg agreement in June 2003; its amount in 2004 was established at €11.81 per ton of milk quota. Under this assumption, the impact of the PDO label could thus be evaluated to 1 point of the rate of margin.

Graph 11	Towards a differentiation in the prices of milk at the production stage



Reading the graph: nonparametric estimates of the price density are displayed for 2000 and 2004. The slightly bimodal character of the density in 2004 seems to be explained by a growing price difference between milk under PDO and the other categories (other quality labels and no quality label), and an increasing dispersion of the prices for the official quality labels, namely the PDO (a more important share of PDO is paid at the modal price in 2004) or other labels (the fraction remunerated by levels equivalent to the PDO increased in 2004). The nonparametric estimate of density allows providing a plot of the density without carrying out assumption on the nature of the empirical distribution.
Field: population of the farm holdings producing bovine milk, cohort 2000-2004.
Source: French Agricultural Census - Farm Accounting Data Network 2000-2004.

Table 14.5 Rate of margin (EBITDA/sales) in 2000 and 2004 in percentage, according to the economic size classes

%	2000			2004		
ESC	**PDO**	**NQL**	**Total**	**PDO**	**NQL**	**Total**
ESC 6 & 7	53.8%	49.0%	49.6%	60.4%	51.1%	52.3%
ESC 8	48.8%	47.1%	47.2%	51.6%	49.0%	49.2%
ESC 9	49.2%	48.2%	48.2%	a)	50.5%	50.0%
Total	50.7%	47.7%	48.0%	53.8%	49.7%	50.1%

a) Not available.
Source: according to the FADN-FAC data from SCEES.

In 2000, the analysis of the rates of margin per class of size again highlights that small-scale farm holdings (ESC 6 and 7) gain from the strategy of differentiation a benefit significantly higher than the larger farm holdings (ESC 8 and ESC 9). Indeed, the differences in rate of margin for the ESC 8 and ESC 9 are not significant.

In 2004, the interaction between the economic size factor and the quality label factor ends in a rate of margin significantly higher for the small-scale farm holdings producing under PDO while the intermediate size farm holdings producing without quality labels have a lower rate of margin.

Thus, the appreciation observed on the prices in 2000 leads indeed to a better valorisation (rate of margin) for all the farm holdings and, in particular, for the smallest ones. In 2004, this benefit obtained on the prices leads to a reinforcement of the positive effect of the PDO quality label on the rate of margin for the benefit of the small structures.

The rate of margin analysis is interesting because it informs us about the relationship between the appreciations and the over costs generated by strategies of differentiation. It must be thorough by the analysis of essential resources to the various strategies: work and capital resources. To carry out this analysis, we study profitability (EBITDA/fixed assets) and the ratio (EBITDA/annual working unit on the farm holding).

The taking into account of the funded capital modifies the analysis of valorisations that we have observed with the prices and the rates of margin. Indeed, the profitability of the farm holdings, which follow PDO-based differentiation strategies, is equal to that of the NQL without quality label farm holdings in 2000. In 2004, the profitability of the farm holdings committed in differentiation strategies appears even lower than that of the farm holdings, which produce milks without quality label. However, this difference is not significant from a statistical point of view, taking into account the profitability dispersion.

In the same way, the variations observed between the classes of economic size are not either significant for the same reasons.

Table 14.6 Profitability (EBITDA/fixed assets) in 2000 and 2004, according to the economic size classes

%		2000			2004	
ESC	**PDO**	**NQL**	**Total**	**PDO**	**SS**	**Total**
ESC 6&7	26.9%	27.1%	27.1%	28.1%	32.2%	31.7%
ESC 8	29.0%	28.7%	28.7%	26.1%	28.9%	28.6%
ESC 9	28.7%	29.7%	29.6%	a)	30.6%	30.4%
Total	28.2%	28.4%	28.4%	26.5%	30.0%	29.6%

a) Not available.
Source: According to the FADN-FAC data from SCEES.

Thus, with regards to the profitability of capital, the strategies of differentiation do not lead to profitability of fixed assets different from the strategies based on the costs.

It remains to asses the effect of differentiation strategies on the remuneration of the labour as a productive factor that we analyze with the ratio (EBITDA/annual working unit on the farm holding). This ratio makes it possible to estimate the profit per annual working unit (AWU) on the farm holding. It supplements our analysis of the quality label valorisation.

Table 14.7	EBITDA per annual working unit in 2000 and 2004, according to the economic size classes					
€	2000			2004		
ESC	PDO	NQL	Total	PDO	NQL	Total
ESC 6&7	26,050	21,070	21,670	32,060	22,600	23,820
ESC 8	34,370	31,220	31,490	33,400	32,610	32,700
ESC 9	41,450	42,180	42,140	a)	45,230	45,190
Total	31,740	29,890	30,060	33,090	32,020	32,130

a) Not available.
Source: According to the FADN-FAC data from SCEES.

If the valorisation by the PDO with regards to the capital does not seem in favour of this differentiation strategy, the valorisation by the PDO in terms of labour shows that this strategy is very interesting for the farmers who have taken this way. Indeed, in 2000, there is a variation of EBITDA per AWU statistically significant for the small or medium-size farm holdings between those that are committed in the PDO and those that do not have quality labels. The variation of €1,850 per AWU for the total of the farm holdings is not statistically significant taking into account the global dispersion of the results. However, if one analyzes the variations by economic size class, it clearly appears that the small-size farm holdings gain a much more important added value, i.e. €4,980 by AWU, that if they did not have quality labels. This relative profit is all the more noticeable as the EBITDA per AWU is lower than the average if these small-scale farm holdings do not have a quality label. The deviation of €3,150 for the ESC 8 farm holdings remains statistically significant (with a risk of first species lower than 10%). For the large farms, the PDO differentiation strategy does not seem efficient since one observes a depreciation of €730 per AWU which is however not statistically significant.

In 2004, the situation is less favorable to the PDO for the overall of the farm holdings since the deviation is not any more but of €1,070. The deviation dropped but it remains statistically significant at the 5% p-level for the small-size farm holdings. However, it is not statistically significant any more for the intermediate size farm holdings.

In 2004, the differences between the economic size classes remain statistically significant, as in 2000.

Thus, between 2000 and 2004, the PDO-based strategies of differentiation lost at the labour factor level their capacity of rebalancing between the small-

scale farm holdings and the large ones. The cost-based strategies remain most powerful.

All in all, the differentiation policy of the dairy production by way of PDO is very powerful in 2000, in particular for the small-size farm holdings. It makes it possible to compensate for production costs higher than the large farms by a service: the differentiation of dairy products, namely the PDO mainly based on cheeses. This strategy brings even an excellent valorisation of the labour factor for these farm holdings.

In 2004, these differentiation strategies of are less efficient in terms of capital profitability of and labour valorisation. But, these differentiation strategies continue to partly compensate for disadvantages the least competitive farm holdings in terms of production costs. In fact, it is necessary to wonder about the relevance of the differentiation strategies: it is not enough to make 'quality' or 'PDO', to generate a valorisation; it is still necessary that this differentiation would be relevant for the processing industries, the distributors and the consumers. What are needed are services for the industry and eventually for the consumer: it is clearly the case in 'Franche-Comté'.

14.4.2 Pig production: the differentiation strategies with Compliance Certificates and Codes of Good Practices

Like the other agricultural productions, the pig production knew intense upheavals since the Fifties. The production was 'industrialized:' automation of the labour operations, food with free-access to feeders, and gratings to collect the dejections in the form of liquid manure easy to pump. These changes switched the porcine production in the universe of volumes in an all the more powerful way as was founded a free-competition European market. The 'pig cycle' is one of the evidences deriving from this competing environment. For little differentiated products, commercial mechanisms of supply control the price and offer. In this competing context, the differentiation strategies relate to some niches that are dependent on the products or particular commitments as regards schedules of conditions.

Taking into account the available information, we analyze two types of quality labels: the Compliance Certificates and the Codes of Good Practices.

The dominating productive model has eliminated the smallest size farm holdings, so that we limit the study to the two economic size classes of farm holdings expressed in fattened swine equivalent (FSE): ESC 8 (from 700 to less than 1,700 FSE) and ESC 9 (1,700 FSE and more).

Graph 12 **Competing universes of the pig production**

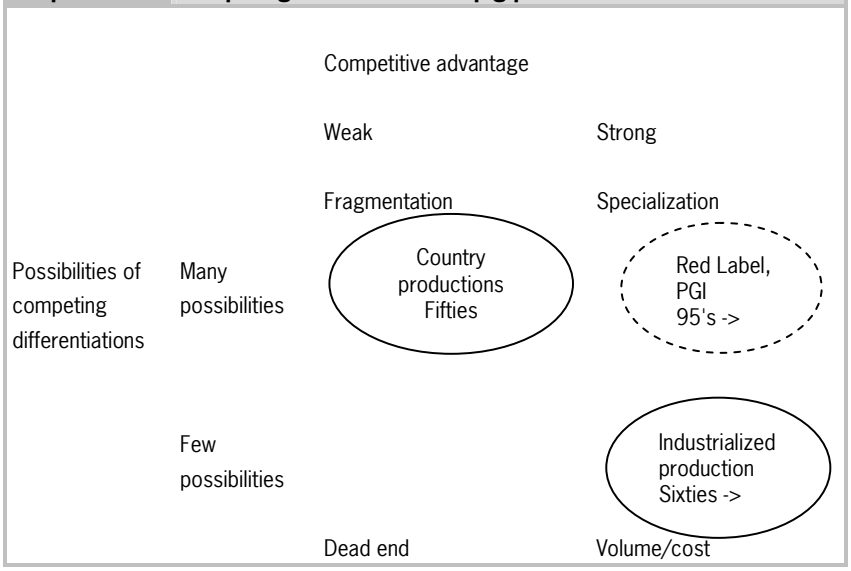


Table 14.8 **Distribution of quality labels among the 2000 cohort of pig producers according to the economic size classes (metropolitan French territory)**

Population	Quality Label			France
ESC	**CC**	**CGP**	**NQL**	**Total**
ESC 8 (from700 up to 1,700 FSE)	1,100	1,330	3,740	8,020
ESC 9 (1,700 FSE and more)	1,220	1,820	2,470	6,170
Total	2,320	3,150	6,210	14,190

Source: According to the FADN-FAC data from SCEES.

Moreover, Brittany occupying a particular place, the analysis of differentiation relates to this region.

As for the dairy production, we can analyze valorisation on the basis of the prices to which the pigs are sold: the price is equal to the whole sales of the fattened swine divided by the number of sold animals. Countable information does not enable us to analyze the prices per unit of weight. This absence of information on the weight poses problem because the weight per animal can be

Table 14.9	Distribution of quality labels among the 2000 cohort of pig producers according to the economic size classes (Brittany)			
Population	**Quality Label**			**Brittany**
ESC	**CC**	**CGP**	**NQL**	**Total**
ESC 8 (from700 up to 1,700 FSE)	580	1960	1350	3380
ESC 9 (1,700 FSE and more)	570	2260	1060	3310
Total	1150	4220	2410	6690
Source: According to the FADN-FAC data from SCEES.				

variable.[1] This restriction is all the more important as the weight of the animals is one of the rare factors of differentiation with regards to the use of this animal: for example, there exists a particular request for heavy pigs to satisfy the needs for the dry transformation, in particular for dry hams. The heavier parts can indeed support long lives of drying and being covered with more intramuscular fat, they make it possible to develop the lipolysis and the flavours.

Thus, it would be necessary to relativize the estimates of valorisation derived from the prices. In any case, the price is not sufficient per se; we must analyze the raw margin, which we estimate by the EBITDA. On this basis, we can study the rate of margin (EBITDA divide by the sales). Lastly, we analyze the capital profitability (EBITDA divided by the fixed assets) and the margin per annual working unit in the farm holding makes it possible to estimate the impact of the differentiation strategy with regards to the labour factor.

Taking into account the productive orientation towards a model focusing on the cost reduction, it is relevant to analyze a possible size effect on the pig production preliminarily to the analysis of the differentiation strategies. In 2000 as in 2004, no factor differentiates the paid prices with the producers on France as a whole; the deviations, which can be observed, are not significant. It is the same when one analyzes France as a whole excluded Brittany. The economic size of the farm holdings does not lead to any price effect that could result from better logistic services, for example.

[1] In 2000, according to the French Technical Institute of Pig ('*IFIP*), the average weight of the fattened swine at exit of fattening is 110.2 kg with a standard deviation of 3.9 kg for the breeders-fatteners; the regions with lower regional average are in Northern France with 108 kg; the area with stronger regional average is South-western France with 112.5 kg; the regional average of Brittany is 110.2 kg.

Table 14.10	Fattened swine average prices paid over the French producers in 2004, according to the economic size classes		
€	CC	CGP	NQL
ESC 8	115.8	110.7	114.5
ESC 9	111.6	110.0	114.5
Total	112.9	110.2	114.5
Source: According to the FADN-FAC data from SCEES.			

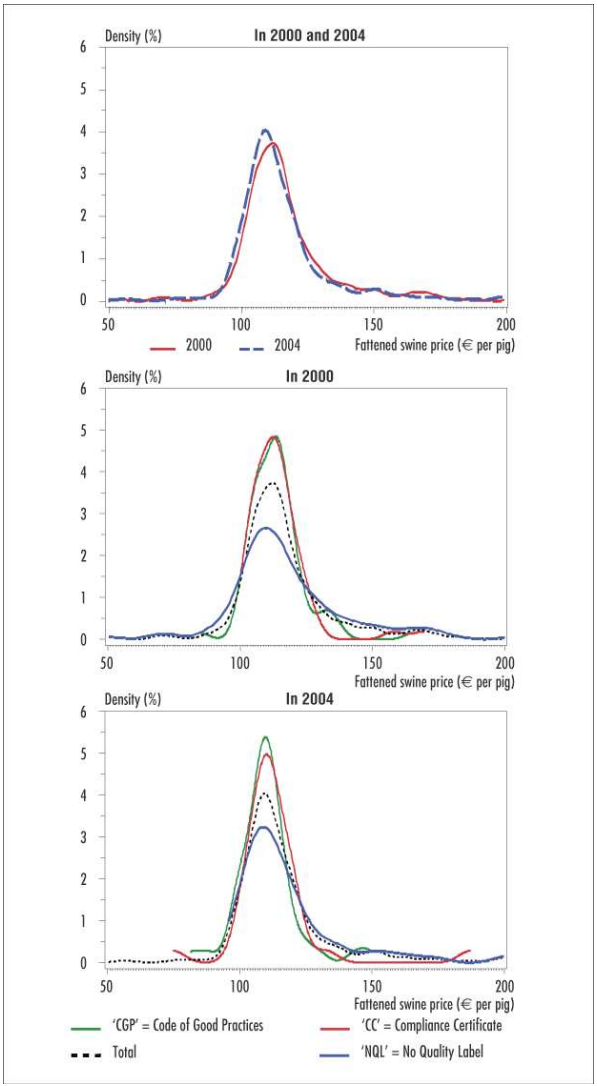
In this competing universe dominated primarily by logic of production costs, the strategies of specialized fattening swine producers can be analysed thanks to the ToF 50 subpopulation that joins together farm holdings specialized in porcine production.

The analysis is carried out on Brittany that constitutes a homogeneous territory from the regional point of view. This limitation of field is imposed by the French FADN sample size, which unfortunately does not allow analyzing the productions in the French South-West. In fact, the French South-West offers differentiation possibilities due to the 'Bayonnisable' ham productions, particularly with the 'Jambon de Bayonne' PGI. We analyze the valorisation of two types of quality labels: the 'Compliance Certificate' and 'Code of Good Practices' certified by third parties.

In Brittany, for the year 2000, if it appears price differences, they are small and not statistically significant: neither the economic size classes nor the quality labels lead to a significant differentiation in the prices paid to the producer. But it shall be noted that the combination of the two factors can lead to significant price differences. For example, the absence of labels and a smaller farm holding economic size (ESC 8) in Brittany lead to an average price significantly lower than the average price computed over the other producers.

In Brittany, the comparison between specialized and not specialized producers shows the same price standardization: the Compliance Certificates and the Codes of Good Practices do not bring more added-value to the breeders who adopt these systems of production, compared to those which produce without official quality label. In the same way, the economic size class criterion (ESC 8 versus ESC 9) does not constitute a factor of price differentiation.

Graph 13 **No price differentiation for the professional quality labels**



Reading of the graph: the professional quality labels most widespread in pig do not lead to a differentiation by the prices, but rather to a standardization of the prices and a smaller dispersion compared to the reference group with no quality label.

Source: According to the FADN-FAC data from SCEES.

Table 14.11	Fattened swine average prices paid over the Brittany producers in 2000, according to the economic size classes		
€	CC	CGP	NQL
ESC 8	113.5	108.8	105.4
ESC 9	110.9	112.2	114.4
Total	112.0	110.9	110.3
Source: According to the FADN-FAC data from SCEES.			

Table 14.12	Fattened swine average prices paid over the Brittany specialized producers in 2000, according to the economic size classes		
€	CC	CGP	NQL
ESC 8	115.45	112.03	107.73
ESC 9	111.24	113.33	108.08
Total	113.83	112.83	107.92
Source: According to the FADN-FAC data from SCEES.			

In 2004, the situation slightly changed for the specialized producers in Brittany. Indeed, for the not specialized producers, no factor of differentiation, taken separately, appears: neither the economic size classes nor the quality labels allow obtaining significantly more added value for a producer. However, one notes as in 2000 a penalization of the ESC 8 producers that does not have official quality labels: there is a significant effect of the combination of the 'size' and 'label' factors.

For the specialized breeders, on the one hand w observe an evolution in favour of the 'Compliance certificate' label, namely: there is a variation of €8.5 between the prices of a pig having a Compliance Certificate compared to a pig without quality label. This deviation is statistically significant. On the other hand, the price differences between the economic size classes are not significant. In the same way, the Codes of Good Practices do not bring significantly more added value to the producers.

The prices not being different in 2000, the analysis of the rates of margin does not show any significant difference in the rates in margin in 2000. In 2004, the price differences observed for the specialized producers are not reflected at the level of the rates of margin.

Table 14.13	Fattened swine average prices paid over the Brittany producers in 2004, according to the economic size classes		
€	CC	CGP	NQL
ESC 8	114.5	107.3	105.1
ESC 9	107.7	110.3	111.8
Total	109.8	109.4	109.1
Source: According to the FADN-FAC data from SCEES.			

Table 14.14	Fattened swine average prices paid over the Brittany specialized producers in 2004, according to the economic size classes		
€	CC	CGP	NQL
ESC 8	121.1	108.6	106.4
ESC 9	112.5	110.3	108.3
Total	115.9	109.7	107.4
Source: According to the FADN-FAC data from SCEES.			

Table 14.15	Rate of margin of the specialized fattened swine producers		
%	CC	CGP	NQL
ESC 8	24%	23%	15%
ESC 9	18%	20%	21%
Total	20%	21%	18%
Source: According to the FADN-FAC data from SCEES.			

To estimate the capital profitability, we use the relationship between the EBITDA and the fixed assets, as in the dairy production. Again, there are no statistically significant differences in profitability between the producers committed in quality labels and producers who do not have any label. This situation in 2000 is found again in 2004. Thus we do not observe statistically significant effects on the profitability from the differentiation strategies in the porcine production. At the capital level, there is no valorisation of the 'Compliance Certificate' label, or for the other official quality labels, in spite of empirically noticeable deviations. These observations must be extended to larger samples.

Table 14.16	Capital profitability (EBITDA/fixed assets) of the specialized fattening swine producers of Brittany in 2000, according to the economic size classes		
%	CC	CGP	NQL
ESC 8	33%	42%	40%
ESC 9	28%	27%	33%
Total	31%	33%	36%
Source: According to the FADN-FAC data from SCEES.			

It remains to assess the effect of differentiation strategies in terms of labour force valorisation. The indicator used is the ratio between the EBITDA and the annual working unit of farm holdings.

Table 14.17	Capital profitability (EBITDA/fixed assets) of the specialized fattening swine producers of Brittany in 2004, according to the economic size classes		
%	CC	CGP	NQL
ESC 8	40%	36%	20%
ESC 9	24%	30%	31%
Ensemble	31%	32%	25%
Source: According to the FADN-FAC data from SCEES.			

In 2000 as in 2004, for the specialized or not specialized producers of Brittany, the differentiation strategies based on quality labels lead to any significant return for the breeders at the labour force level. The valorisation deviations are not statistically although we observe a positive variation for the ESC 8 farm holdings producing within the Compliance Certification framework. In the same way, on the one hand, the differences between economic size classes are not significant in Brittany; on the other hand over France, even more in France excepting Brittany, the valorisation deviations are significant for farm holdings of different sizes.

In the case of the porcine production, the official quality label does not pay for the productions labeled by the 'Compliance Certificate' or the 'Code of Good Practices' certified by third parties. No valorisation indicator shows a positive and statistically significant deviation in favour of these differentiation strategies.

This report can be explained by some theoretical considerations.

The universe of the pig production of is a competing universe dominated by logic of production costs. The farm holdings having the optimal size cannot resist a competition by the costs. Finally, it would be necessary to analyse the other differentiation factors such as the animal weight, which can be major factors of valorisation. Indeed, the heavier animals are included in the 'No Quality Label' productions what can tend to reduce the deviations with the products differentiated by official quality labels.

Table 14.18	**Valorisation of the labour factor (EBITDA/annual working units) for the Brittany specialized producers in 2000, according to the economic size classes**		
€	**CC**	**CGP**	**NQL**
ESC 8	51,210	42,850	36,340
ESC 9	46,910	48,450	46,370
Total	48,820	46,380	41,770
Source: According to the FADN-FAC data from SCEES.			

Table 14.19	**Valorisation of the labour factor (EBITDA/annual working units) for the Brittany specialized producers in 2004, according to the economic size classes**		
€	**CC**	**CGP**	**NQL**
ESC 8	67,280	39,860	40,850
ESC 9	47,410	49,780	59,670
Total	53,520	46,680	52,030
Source: According to the FADN-FAC data from SCEES.			

Unlike the dairy production where strategies of differentiation made it possible to compensate production cost differences, it is not the case in the porcine production. Indeed, diversity is more reduced and the differentiation of live animals does not generate any differentiation perceptible by the consumer so much for the cooked pork meats, as for the cooked dishes or the fresh meat. It is not either carrying a history or a particular image. This absence of difference perception does not make it possible to create a valorisation capacity. Moreover the 'Compliance Certificate' or 'Code of Good Practices' labels are not readable by the consumers. In fact professional labels can guarantee some outlets but which do not bring added value. Lastly, it is remarkable to notice that evidences prevailing in Brittany are found in the other regions: the analyses we carried out on France excepting Brittany lead to the

same report. The differentiation strategies by the 'Compliance Certificate' or the 'Code of Good Practices' do not bring any statistically significant added value to the producers.

14.4.3 Table fowls production: the strategies of differentiation by Red Labels, Compliance Certificates and Codes of Good Practices

The production of table fowls knew many phases, which we already introduced to illustrate the competing universes (cf. supra §1). The current period is marked by the questioning of historical differentiation bring by the Red Label. The Compliance Certificates, the Codes of Good Practices, the progresses made by the standard productions and the first-price chicken importation created a competitive market very open to third countries contrary to the porcine production.

The differentiation capacity of poultries is found in the spectrum of prices offered. The density estimates of prices make it possible to visualize the extent of those prices. It is necessary however to keep in mind that it is expressed in price per chicken and not in price per kilogram, because available information relates to the sales and the number of chicken sold.

This price dispersion lead to many paradoxes when one analyzes the prices according to the various quality labels like the Red Label, the Compliance Certificates, the Codes of Good Practices and table fowls without quality label (NQL). The sample available for the Compliance Certificates and the Codes of Good Practices being insufficient to make a deepened statistical analysis, we limit ourselves to the performance analysis of the producers under Label compared with those of the reference group, which constitute the producers without quality labels (NQL).

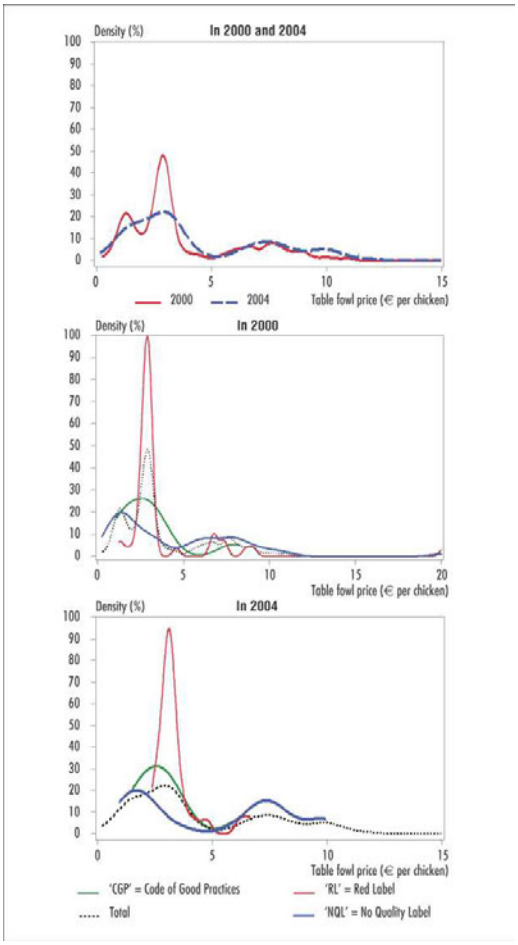
First of all, the analysis of the price dispersion can be ran according to the economic size factor categorized in three classes: a first class gathering the ESC 5, 6 and 7, going from 5,000 to less than 33,000 equivalent-table fowl (ETF); one second class corresponding to the ESC 8, going from 33,000 to less than 83,000 ETF; and a third class corresponding to the ESC 9, corresponding to 83,000 ETF and more.

Table 14.20	Unit prices of table fowls sold for France in 2000, according to economic size classes	
€	Label	NQL
ESC 5 & 6 & 7	2.7	6.5
ESC 8	3.0	4.9
ESC 9	2.8	2.9
Total	2.9	4.5
Source: According to the FADN-FAC data from SCEES.		

It appears that the 'No Quality Label' chickens are sold more expensive than those that have a label, in particular in the ESC 5 to 7. A thorough analysis shows this paradoxical situation corresponds to a possibility of direct sales in the production of poultries. This type of marketing is, in a statistically significant way, more present in the small-size farm holdings than in the ESC 9 farm holdings. Moreover, the direct sales are, in a statistically significant way, fewer presents in the producers under Label than in the other producers.

Table 14.21	Unit prices of table fowls sold for France in 2000, according to the type of marketing		
€	Label	NQL	Total
Without direct sales	2.9	2.8	2.8
With direct sales	3.0	6.9	5.6
Total	2.9	4.5	3.7
Source: According to the FADN-FAC data from SCEES.			

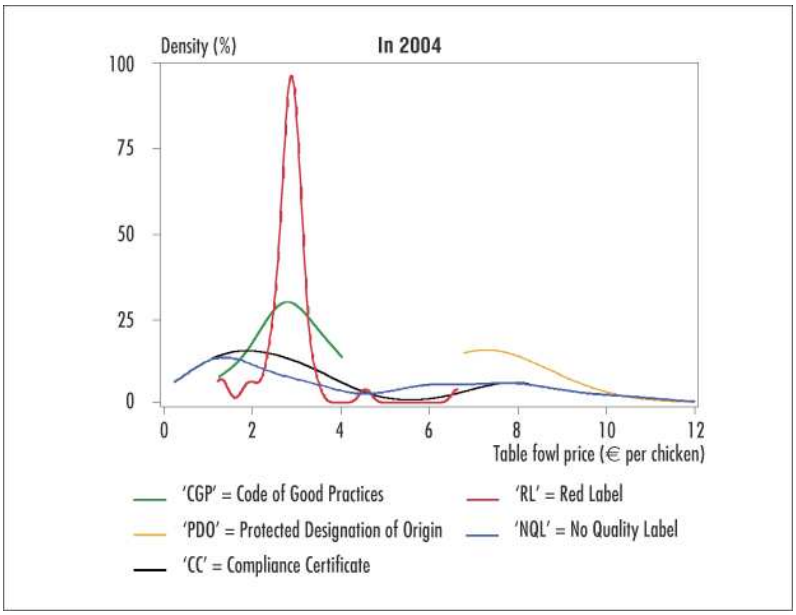
Graph 14	For the table fowl, the label induces a concentration of prices at the production stage as an index of the product homogeneity



Reading the graph: the Red Label lead to a distribution of the unit prices much more concentrated than the Code of Good Practices, for which we note a decreasing price in 2004.

Source: according to the FADN-FAC data from SCEES.

Graph 15	Table fowl price in 2000, heterogeneity in the scales of unit price



Source: according to the FADN-FAC data from SCEES.

The price differences between chickens with or without quality labels and with or without direct sales explain the result, which we obtain, about the prices of table fowls in France. The direct sales correspond to a service very well valued by the breeders. It is difficult to analyze the profitability of this differentiation strategy because generally it does not relate solely to table fowl. In addition, regional effects are noted. To eliminate these regional biases, taking into account the available information, we can focus the analysis on the Brittany and 'Pays de la Loire' regions and on the Red Label.

In Brittany and 'Pays de la Loire', it initially appears that the direct sales effect is highly statistically significant and very important in value. To eliminate the bias generated by the direct sales, we restrict the analysis to the farm holdings producing table fowls without direct sales in the Western France. Only the ESC 8 and 9 farm holdings are taken into account.

Table 14.22	Unit prices of table fowls sold for Brittany and 'Pays de la Loire' in 2000, according to the type of marketing		
€	Label	NQL	Total
Without direct sales	2.7	1.7	2.3
With direct sales	3.0	5.5	4.0
Total	2.7	2.3	2.5
Source: According to the FADN-FAC data from SCEES.			

With regards to this productive context in 2000, the Red Label is valued in a very significant way since there is a considerable price difference: the price of chicken under Label is approximately the double of that without quality label. In 2004, the deviation is developed: the fall in the price of chickens without quality label being proportionally more important than the rise in price of the Red Label. Even if this deviation is statistically[1] less significant from the statistical point of view, the price dispersion is increasing in a more important way within the producers without quality labels than within the producers under Label.

Table 14.23	Unit prices of table fowls sold for Brittany and 'Pays de la Loire' in 2000 and 2004, except direct sales			
Average	2000		2004	
€	label	NQL	label	NQL
Total	2.70	1.27	3.27	0.95
Source: According to the FADN-FAC data from SCEES.				

The price difference is found with the rates of margin in 2000. The rates of margin of the farm holdings that produce under the Red Label are equal to the double of the producing rate of margin of the table fowls farm holdings without quality label. Thus, the effect of the Red Label is highly significant from the statistical point of view, whereas we note no effect of the economic size class on the margin either within the producers under Label as within the producers without quality labels. In 2004, if the Red Label effect slightly developed, the rate of margin dispersion within each group also increased: on the whole, the difference in rate of margin remains however very significant.[2]

[1] The risk of first species to affirm wrongly that this deviation is significant, remains lower than 5 per thousand.

[2] With a risk of first species lower than 1%.

Table 14.24	Rates of margin for the farm holdings producing table fowls sold in Brittany and 'Pays de la Loire', except direct sales			
Average	**2000**		**2004**	
%	**label**	**NQL**	**label**	**NQL**
Total	34%	16%	36%	17%
Source: According to the FADN-FAC data from SCEES.				

Again, as in the milk or pig productions, these differences grow blurred with the analysis of the capital profitability of the fixed assets. On an empirical level, the farm holdings producing without quality label appear more profitable than those producing under Red Label, but these differences are not statistically significant.

Lastly, there is no either significant deviation in terms of labour factor profitability (EBITDA/annual working units).

The difficulties encountered by the table fowl breeders under the Red Label can be explained by several factors: changes in poultry market regulation, attenuation of the differences between the various productions of table fowls, multiplication of quality labels and marks. These factors are well known, the analysis should be supplemented by a study of the service dimension in the Red Label production.

In the Red Label reference frame of table fowl, only the sale of whole poultries was authorized: the products resulting from cutting cannot be marketed with the Red Label. This limitation not only does not give access to a market of consumption in strong growth, but also almost prohibited some uses of the Red Label chicken. It is particularly the case in the out of home foodservice which uses practically only cutting because of the make-ready times, of the raw material optimization and the medical standards. In this case, the product of higher intrinsic quality, namely the Red Label poultry, does not render service to a major actor of the food industry. Currently, the reform of the Red Label reference frame in poultry make it possible to raise this obstacle to the valorisation of the Red Label.

From the same point of view, the 'direct sales' bring many services that can be developed to the benefit of the consumer as well as the producer's one.

14.5 Discussion

Innovation is the heart of the food market dynamics. Food industry is the main actor of the food innovation processes: during the sixties and the seventies, the time-saver in the meal preparation and the fall in the food prices were the independent factors of the food consumption development. The modern forms of distribution then played a crucial role in this dynamics that directed the change of the agricultural production during this period.

In the middle of the eighties, the food innovation rested on a new type of innovations: the differentiation of the agricultural raw material. The idea and its implementation are old (wines, cheeses, poultries), but they extend to new products and broad segments from the food offer during the eighties. This form of innovation rests on public measures, within French regulations then extended to European ones: the 'official quality labels'. Many farmers seized themselves of this new productive orientation: they invested and committed into the new schedules of conditions for these reference frames of production under official quality labels.

Which judgements can be issued about the economic results of these strategic choices? Such is the question to which we bring moderated answers either for the known-by-consumer official quality labels or the only known-by-professional ones. According to the economic context, valorisations are different.

The financial interest of a production under official quality labels is variable according to the productions, the regions, and the types of farm holdings. In the dairy production, the 'PDO' label make it possible farm holdings of small sizes to compensate for deviations as regards production costs. It is particularly sensitive in regions that could accompany differentiation of agricultural milks and regional cheeses at the national level, for example with strong trademarks

In the porcine production, differentiation by the 'Compliance Certificate' or the 'Code of Good Practices' does not bring additional valorisation. Excellence as regards production costs on the schedules of conditions defined by the customers remains the main leverage of economic performance. The deviations observed on an empirical basis are not validated by statistical tests: hence, these deviations cannot be taken in account.

In the poultry production, it is almost the same. We observe prices significantly different, but the valorisation of the 'Red Label' in terms of capital profitability or labour earnings is not significantly established by statistical methodology that we implemented. Only the direct sales lead to significant

deviations, but for productions that remain marginal on the scale of the table fowl consumption in France.

The 'PDO' label and the 'Red Label' are known of the general public: they can generate in some economic contexts more added value. For the professional labels, namely the 'Compliance Certificate' and the 'Code of Good Practices', we could not highlight significantly different valorisations neither of the capital nor of the labour force. In general, their prices are higher than those of the products without official quality label, for which there are no third intervening parties. However, these prices do not seem to compensate for the over costs in capital or labour.

Taking into account the available information, these results must be regarded with prudence and as incentives for further statistical studies: the CAP reform leads to a reinforcement of the client/supplier relationships compared to a logic of market on which operate anonymous actors. The prices resulting from these commercial relations comprise the particular payment for services that does not appear in quotations on the standardized product markets. The valorisation analysis of these services must deepen with the liberalization of the agricultural markets: the quantitative studies on the differentiation of the agricultural products must be reinforced. In this concern, these results constitute an encouragement to reason on the services rendered by the products under official quality label, as these services are rendered to the ultimate consumer or to the operators in the food industry.

Lastly, the mitigated results that we obtain about the valorisation of the official quality labels from the beginning of the year 2000 can be interpreted like the exhaustion of a source of innovation in the food products: the differentiation of the agricultural raw material on the basis of traditional value, regional or farm traditions becomes standardised vis-à-vis the new orientations of food industry, in particular the linkage between health and food. A fraction of the agricultural production 'without official quality label', which constitutes our control sample, probably begins to answer to these new orientations of the food industry. In this economic context, the 'food engineering' and the marketing of the industrial companies would again be the principal leverages of the food consumption dynamics: the identity of the agricultural products would not be central anymore.

14.6 Appendix A; Reshaping the valorisation public measures of agricultural products

Introduced by article 73 of 5 January 2006 law of agricultural orientation, the reform of public valorisation measures for agricultural products and food promulgated by the ordinance of 7 December 2006 aims to reinforce the policy of the 'quality' approaches.

First point of this reform, the new system structures the approaches of valorisation for the agricultural produce around three complementary categories:

- identification labels of quality and origin which are the Protected Designation of Origin (PDO),[1] the Protected Label of Origin (PLO),[2] and the Protected Geographical Indication (PGI)[3] for the valorisation of the origin, the Red Label[4] for the guarantee of a higher quality, the Traditional Speciality Guaranteed (TSG)[5] and Organic Farming[6] (AB);
- the valorizing mentions which are the denomination Mountain,[7] the Farm Product,[8] the Local Product[9] and the Local Wine;[10]
- the certification approaches of various products.

Second point of the reform, the inspecting procedure of the products is unified for its reinforcement. From January 1, 2007, the National Institute for Origin and Quality,[11] new public corporation always identified by acronym *INAO*, takes again the competences exerted by the National Institute for the Labels of Origin and by the National Commission for Labels and Certifications (*CNLC*)[12] which both disappear. Certification bodies accredited by the French Committee for Accreditation[13] ensure the control of the product certification procedures.

[1] In French, 'Appellation d'origine contrôlée (AOC)'.
[2] In French, 'Appellation d'origine protégée (AOP)'.
[3] In French, 'Indication géographique protégée (IGP)'.
[4] In French, 'Label Rouge (LR)'.
[5] In French, 'Spécialité traditionnelle garantie (STG)'.
[6] In French, 'Agriculture biologique (AB)'.
[7] In French, 'Montagne'.
[8] In French, 'Produit fermier'.
[9] In French, 'Produit de pays'.
[10] In French, 'Vin de pays'.
[11] In French, 'Institut national de l'origine et de la qualité (INAO)'.
[12] In French, 'Commission nationale des Labels et des Certifications'.
[13] In French, Comité français d'accréditation'.

The French valorisation policy of the agricultural produce and food strongly inspired the European regulation on the matter (cf. regulations CE 509 and 510 published in 2006): the PDO (European equivalent of the French '*AOC*') guarantees quality resulting from a soil; the PGI (European equivalent of the French '*IGP*') offers a guarantee of the quality of a product drawing its specificities from the geographic origin; the TSG traditional speciality (European equivalent of the French '*STG*') guarantees the traditional aspect of a product.

14.7 Appendix B; Testing the effects Statistical tests of the effect for a qualitative criterion

Pair wise comparisons

The pair wise comparisons (i.e., between two groups) of this study are validated using the following statistical tests: the Student test for the comparison of averages, the Wilcoxon signed W test for the comparison of medians. The first test supposes the normality of the observed value distribution (parametric test) while the second, based on ranks, is carried out independently of the nature of the observed value distribution (nonparametric test).

The tests on the rows are used since the distributions of price or ratio are considered to be asymmetrical. Less powerful in a Gaussian context than the parametric tests on the averages (relative effectiveness of 95%), the nonparametric tests can in a no Gaussian context being arbitrarily more powerful than a Student test and prove more robust with regards to the sampling fluctuations.

Comparison of averages: the Student T test

The tests of Student are carried out on the basis of the statistic $t = \frac{\bar{x} - \mu_0}{s^* / \sqrt{n}}$ where $\bar{x}$ is the empirical average, μ_0 the average of the population of reference, s^* the standard deviation of sampling, and *n* the sample size.

For the comparison of two independent samples (types of quality labels, classes of economic dimension, regions), the null assumption H0 tested is the equality of the averages for the factor of studied interest (price or management ratio). For the comparison of two matched samples (test of temporal evolution between 2000 and 2004), the null assumption tested is the nullity of the average of the individual differences. The Student tests are implemented by means of UNIVARIATE or TTEST procedures from the statistical software SAS.

Comparison of medians on matched samples: Wilcoxon signed W test

The Wilcoxon signed W tests are carried out on the basis of the statistic

$$W_+ = \sum_{i:y_i - x_i > 0} r_i^+ - \frac{n_t(n_t+1)}{4}$$

where r_i^+ is the rank of the absolute difference $|y_i - x_i|$ between the two matched values for the farm holding *i*, n_t the number of values $|y_i - x_i| \neq 0$, while assigning to the tied, the average of their respective rows.

For a size of sample $n \leq 20$, the probability of W_+ is calculated on the basis of the exact distribution, as a convolution of binomial distributions. For a sample size $n > 20$, the probability of W_+ is approximated by considering the statistics

$$t_w = \frac{W_+}{\sqrt{\left(nV - W_+^2\right)/(n-1)}}$$

with

$$V = \frac{n(n+1)(2n+1)}{24} - \frac{1}{48}\sum_j t_j(t_j+1)(2t_j+1)$$

where t_j is the number of tied for *the j*th tied group, which then follows a Student distribution with $(n-1)$ degrees of freedom. For the comparison of two matched samples (test of temporal evolution between 2000 and 2004), the null assumption tested is the nullity of the individual difference median (Hodges-Lehmann's estimator). The Wilcoxon signed W tests are implemented by means of UNIVARIATE procedures from the statistical software SAS.

Comparison of medians on independent samples: Mann-Whitney U test

The Mann-Whitney *U* test, still called Mann-Whitney-Wilcoxon test (*MWW*) or the Wilcoxon sum of ranks test, is based on a linear statistic of the ranks

$$U = \sum_{i=1}^{n} \delta_1^i \times s(R_i)$$

where δ_1^i is a membership index function of the farm holding *i* to the class C_1 presenting the lowest ranks, $s(R_i)$ the rank score R_i of the farm holding *i*, et *n* the total number of farm holdings in the FADN sample.

For the comparison of two independent samples (quality label types, economic size classes, regions), the null assumption tested is the equality of the two probability distributions. Although this assumption is not strictly equivalent to the median equality assumption that is often deduced from it, the test is usually used as a median equality test.

For a sample size of $n > 20$, the probability of u_{obs} (value drawn from the observations) is asymptotically calculated by considering the test statistic

$\bar{s} = \frac{1}{n}\sum_{i=1}^{n} s(R_i)$ with n_1 the class size of C_1, n_2 the class size of C_2,

$z_u = \frac{u_{obs} - E_0[U]}{\sqrt{Var_0[U]}}$ the average score,

$E_0[U] = \frac{n_1}{n}\sum_{i=1}^{n} s(R_i)$ the mathematical expectation of *U* under the null hypothesis, and

$Var_0[U] = \frac{1}{(n-1)}\frac{n_1 n_2}{n}\left[\sum_{i=1}^{n}(s(R_i) - \bar{s})^2\right]$

the variance of *U* under the null hypothesis, this statistic following a standardised normal distribution. In this paper, the score function used is the Wilcoxon score: $s(R_i) = R_i$. The Mann-Whitney U tests are implemented by means of NPAR1WAY procedure of the statistical software SAS.

Proper and joint effects of qualitative factors: quality label and economic size

Generally, the impact of the quality label have been controlled with the impact of the economic size class testing the possible interaction of the two criteria by a two criteria with interaction analysis of variance with an unbalanced design (groups with unequal size). The estimates were computed using the additive two-factors analysis of variance or with or without interaction depending it is relevant or not, otherwise tests of multiple comparison when only one of the factor presents a statistically significant effect.

Analysis of variance

The impact of qualitative factors such as quality labels or economic size classes on the variable of interest, consisted of the producer prices or the farm holding earnings, even a management ratio, can be tested via an analysis of variance model with fixed levels (factor categories being a priori chosen). The sum of

squared deviations of the individual values to the median values breaks up into two independent sums: the sum of the squared deviations explained by the model (e.g. price deviations explained by the presence of a quality label) and the sum of squared residuals (i.e. gathering the deviations due to the set of uncontrolled factors).

The comparison of these sums is carried out dividing them by their respective degrees of freedom (i.e. the number of independent deviation sources), operation whose result gives the mean square (MS), as an estimate of variability.

One then compares the explained mean square with the residual mean square via the ratio

$$F = \frac{MS_{EXPlAINED}}{MS_{RESIDUAL}}$$

Under the null assumption stating that the analyzed factor has no effects, the ratio F follows a Fisher-Snedecor distribution. The observation of values much higher than 1 for the F ratio will lead to the rejection of the null assumption and thus to the assertion of a statistically significant effect of the factor analyzed on the variable of interest, with a computable associated risk of error (p-level) to this assertion. The homogeneity of variance assumption founding the analysis of variance model is tested by means of the Levenne statistic (analysis of variance on the absolute values of the deviations). If the variance homogeneity assumption is rejected by the Levene test, we use the Welsch statistic (analysis of variance weighted by the standard deviation of each class) to test the effect of the criterion considered.

The analyses of variance related to unbalanced designs (groups with unequal size), the variance analyses are carried out by means of the GLM procedure (Generalized Linear Model) of the SAS statistical software.

Multiple comparisons

The multiple comparisons (i.e., between more than two groups) of this study are validated using the following statistical tests: one-way analysis variance for the effect of a qualitative criterion, the test of Kruskall-Wallis for the multiple comparisons of medians. The first test supposes the normality of the distributions (parametric test) while the second, based on the ranks, is carried out independently of the distributional nature of observations.

The multiple comparison tests a posteriori carried out (SMM - Studentised Maximum Modulus) aim establishing which are the categories (even which groups of categories) of the criteria studied that induce statistically significant

differences for the mean levels of the factor analyzed, while controlling the multiple risk of comparison.

Multiple comparisons a posteriori: studentised maximum modulus (SMM) test
Suggested by Hochberg, the SMM test, or GT2 test, is an alternative of the multiple-comparison -Tukey-test based on the studentised absolute deviations and conceived for the balanced designs (groups of equal size). The test SMM makes it possible to control the experimental error of multiple comparisons (MEER-Maximum Experiment wise Error Rate) on a fixed level for unbalanced designs (groups of unequal size). The Test SMM is less powerful (more conservative) than the Kramer-Tukey test, adaptation of the Tukey test of for the groups of unequal size.

Multiple comparisons of medians: Kruskal-Wallis test
The Kruskal-Wallis multiple comparison test is based on the statistic of test *KW* as a sum of squares of the score (rank function) deviations to their mathematical expectation which, under the null hypothesis assuming identity of the distributions related to the *K* sub samples defined by the membership to the studied criterion categories, asymptotically follows a Chi-Square distribution χ^2 with $(K-1)$ degrees of freedom:

$$KW = \frac{1}{S^2}\sum_{k=1}^{K}\frac{1}{n_k}\left(T_k - E[T_k]\right)^2$$

where $T_k = \sum_{i=1}^{n}\delta_k^i \times s(R_i)$

is the score total of the class C_k,

$$E_0[T_k] = \frac{n_k}{n}\sum_{i=1}^{n} s(R_i)$$

is the mathematical expectation T_k under the null hypothesis,

$$S^2 = \frac{1}{(n-1)}\left[\sum_{i=1}^{n}\left(s(R_i) - \bar{s}\right)^2\right]$$

is the sampling la variance of the scores, and

$\bar{s} = \frac{1}{n}\sum_{i=1}^{n} s(R_i)$ the average score.

Nonparametric estimate of the density
The nonparametric estimate of density makes it possible to provide a density plot without assuming the nature of the empirical distribution. The nonparametric estimate of density is carried out by means of a density estimation method based on a Gaussian kernel (procedure *KDE - Kernel Density Estimate- STAT* module of the statistical analysis software *SAS*).

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14.8 Appendix C; Quality in questions

In 2000, the agricultural census introduces questions about the quality labels of the farm holding products: the raw or processed products are concerned

A quality label is never allotted on a simple declaration of the producer, but must on the contrary be allotted and controlled by an approved organization. The official quality labels (Organic Farming, Labels, Compliance Certificates) are those whose schedule of conditions is recognized by the public authorities or the National Commission of Labels and Certifications.

The French ministry for Agriculture and Fishing allots the 'Organic farming' denomination (*AB* logo). An organic farming product is either an agricultural produce or a foodstuff whose conditions of production are in conformity with the European regulation (crop products) or with the national schedules of conditions approved (produced animal) as regards the production mode

(limitation of the inputs, primacy to the natural inputs, exclusion of the majority of the synthesis chemical compounds), work methods (recycling the organic matters and rotating crops), biological fight and respect of the 'conversion towards the organic farming' schedule. The organic farming producer is held to declare itself with the county department service of Agriculture and the Forest and is subjected to the control of an independent certification body approved for the Organic Farming ('Ecocert', 'Qualité France'). Before being able to use the '*AB*' logo, the farmer must respect a minimum two years period for the annual cultures, three years for the perennial cultures, and two years for the animals, except out-ground breeding where the period of conversion is lower than one year

Table C.1 **Quality Labels of the farm holding products, the FAC 2000 form**

10.1 Signes de qualité des produits de l'exploitation

	Code	Agriculture biologique	AOC	Label	Certification de conformité	Autres avec cahier des charges
		oui = 1 conversion = 2 non = 0	oui = 1, non = 0			
Grandes cultures *(céréales, cult. ind., légumes secs et protéagineux)*	01	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Légumes frais *(y c. fraise, melon)*	02	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Fruits	03	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Cidre, huile d'olive	04	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Produits distillés	05	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Bovins	06	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Ovins, caprins	07	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Porcins	08	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Lait, produits laitiers	09	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Volailles *(y c. palmipèdes gras)*	10	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Œufs	11	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
Autres produits	12	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋	⌊_⌋
VÉRIFICATION INFORMATIQUE (01 à 12)	13	⌊_,_⌋	⌊_,_⌋	⌊_,_⌋	⌊_,_⌋	⌊_,_⌋

Source: French Agricultural Census (FAC 2000) SCEES.

A Protected Designation of Origin (PDO) protects the geographical denomination applied to a product whose quality of manufacture, being based

on traditional know-how of the producers, is founded on tradition and soil. The PDO, originally developed for the wines and cheeses, has been extended to a larger set of food products. In order to obtain the PDO official recognition pronounced by decree published in the Official Journal, the certification must be submitted to the National institute for Labels and Origins (INAO).

The agricultural Label announces for a food product of t specific characteristics, fixed as a preliminary, establishing a level of quality higher than the similar products, directly perceptible by the consumer. In 2000, one distinguishes two types of Labels: the Red Label, marks collective ministry for Agriculture, and the regional Labels presenting the more specific characters of a region. In 2002, the regional Labels were transformed into Protected Geographical Indication (PGI). A «quality consortium», collective structure gathering the various operators and holding the property of the schedule of conditions, manages each Label. The request for homologation of the Label is carried out by the National Commission of Labels and Certifications (CNLC) and becomes effective by joint decree of the ministers in charge for agriculture and consumption. An independent certification body approved for the products concerned must control the producers operating under a Label.

The Compliance Certification (CC) of products attests that a not processed agricultural produce or a foodstuff is in conformity with specific characteristics or rules fixed as a preliminary bearing according to the cases on the origin, manufacture, the transformation and conditioning. Consigned in a schedule of conditions, the certified characteristics are different from those of the organic farming or of those determining a Label, and could not exclusively rest on the medical and hygienic obligations envisaged by the regulation, finally must be measurable and significant for the consumer. The National Commission of Labels and Certifications validates the schedules of conditions and the corresponding standards. An approved certification body controls the producers.

The Codes of Good Practices (CGP) relate to all the nonofficial quality labels for which there exists a pre-established schedule of conditions whose respect is controlled by a third party. A nonofficial label corresponds to a strictly private schedule of conditions that has not been the subject of a homologation by the public authorities or an opinion from the CNLC. Thus, the producer is subjected to the control of the conditions of production by the organization allotting the label, which can be possibly carried out by a certification body also intervening on official quality labels.

Table C.2	Agricultural product direct sales from the farm holding to the consumer, transformed or not, the FAC 2000 question

Source: French Agricultural Census (FAC 2000) SCEES.

The direct sales relate to the current practice for some farm holding products directly sold to the consumer: it can take place with the farm, in edge of road, on a market, in shop, with the restoration, etc. The direct sales includes the sales to the restaurants, the coffee shops, the work councils and other groups of private individuals, including the sales actual via an Economic Interest Group.[1]

[1] In French, '*Groupement d'intérêt économique*'.

15 Comparing organic and conventional dairy producers in Sweden - using FADN data

Lovisa Reinsson[1]

Abstract
As a result of higher demand for analyses of downsides and benefits of organic production, Statistics Sweden revised FADN data from 2006 for the Swedish Dairy Association, dividing organic and conventional dairy holdings in separated groups. In those regions where the holdings where comparable, an economic analysis of the farms were made. In the southern and middle parts of the flat country as well as on a national level, organic dairy farms had higher income and lower costs, which led to higher profit compared to conventional dairy farms.

Keywords: FADN, organic dairy production, Swedish dairy farms

15.1 Introduction

Political leaders all over the world are discussing on how to reduce the greenhouse emissions and the climate change has been on top of many agendas for the last years. But it is not only politicians who are concerned about the environment. Consumers care more about the origin of the products they consume, and how they are produced, than they did before. Many companies do not only take their responsibility concerning this issue but do also see the profits, economic as well as environmentally, they can make by producing more environmentally friendly. The agricultural sector is no exception.

With an increasing demand for organic and locally produced food, the incentives for farmers to convert their production increases. The demand for analysis of the downsides and benefits of organic production is increasing as

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well. The interest from researches and farmers' organizations for statistics from where such analysis can be made is therefore higher than ever before.

In Sweden, organic weighed in milk has increased with almost 180 percent for a period of ten years. The Swedish Dairy Association is one of the users of Swedish FADN data that now demands data divided on organic and conventional farming. For their yearly report *Konjunkturmätning mjölk* (State of the Dairy Market), FADN data are used to analyze development of profitability, earnings and capital gains. One of the news for the report 2008 is to compare organic producers with conventional ones.

This report focuses on the economic comparison between organic and conventional dairy producers and is based on Swedish FADN data revised for the Swedish Dairy Association.

15.2 Conditions and assumptions

There are slightly over 7 000 dairy farms in Sweden with an average of 51 cows per stock. The average yield is 9 200 kg/year. Between 1998 and 2007, the organic part of the total dairy production went up from 2 to 6 percent. The demand for organic products is increasing with an even higher speed and is currently higher than production.[1]

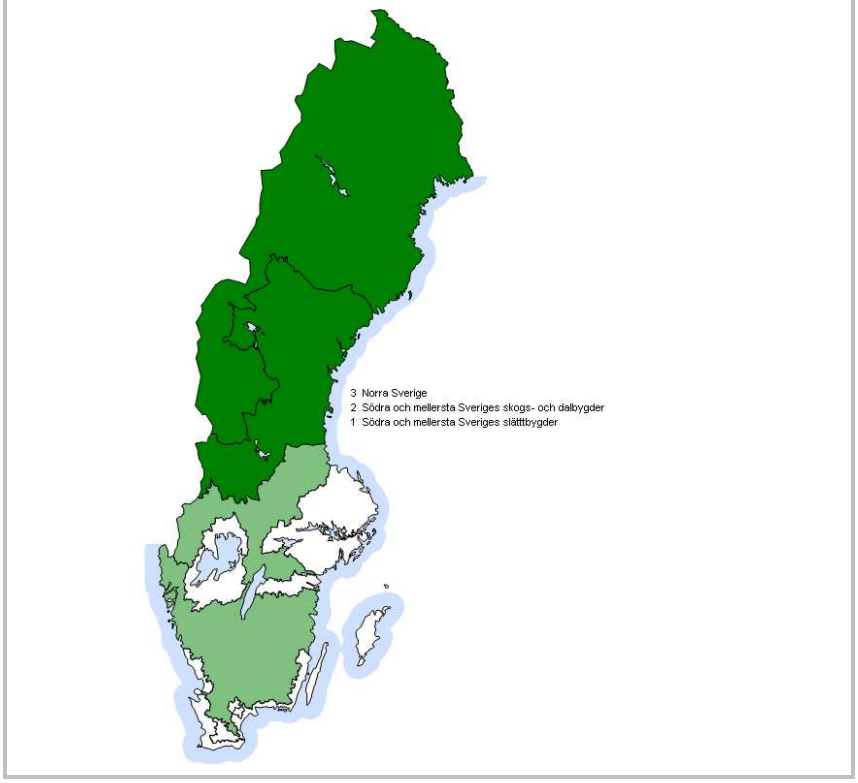
In the Swedish FADN 2006 there were 368 dairy farms. There were no information given whether the milk produced by these companies were certified by KRAV (the organization that develops the organic standards for dairy producers in Sweden). What was known was whether or not the cultivation was organically grown according to EU standards. This is not equivalent with having organic dairy production as there are farms with organically grown land, which do not certify the bovine production.

However, having the entire land organic but not the animal production is unusual, especially amongst those who use their land mainly to produce fodder for farm use. When looking at the results from this study, the producers with organic cultivation had lower yield per cow, which indicates that also the dairy production was organic. The results also show that the ecologic farms used more of the land to grow fodder for farm use than the convensional ones. With these conditions given, an assumption is made that organic field production, in this case, indicates organic dairy production.

[1] Swedish Dairy Associacion, www.svenskmjolk.se/Default_9.aspx.

In the Swedish FADN, there are three major regional areas. Major area 1 comprises the southern and middle parts of the Swedish flat country, Major area 2 is the southern and middle parts of the woodlands and valleys and Major area 3 is the northern parts, see map 1. In general, in the northern parts the farms are quite small with low productivity. In the south and middle of the flat country most of Sweden's larger farms are situated.

Figure 15.1 **The three Major areas of Swedish agriculture**



15.3 Results

Of the 365 dairy producers in the Swedish FADN 2006, 55 farms were cultivating their entire farm land organically according to EU standards. Amongst the 313 farms that did not do so, part of the land or no land at all was organic. These farms will be referred to as conventional farms. 71 percent of

both the organic and conventional producers had less than 50 cows. The average per farm was 42 for both groups on a national level.

The main part of the conventional farms, almost 50 percent, where situated in Major area 2, followed by Major area 1. The largest group of organic farms was found in Major area 3, followed by Major area 1 as well.

The farms with most farm land and the highest number of cows were located in Major area 1, irrespective of which group they belonged to. The smallest conventional farms were to be found in Major area 2, while the smallest organic farms were situated in Major area 3. The area of farm land is higher for the organic farms in all groups except in Major area 3. In conclusion, in the Swedish FADN 2006, there were many small conventional farms in the woodland and valleys, and many small organic farms in the northern parts of the country, whilst the largest farms, conventional and organic, were situated in the flat country. This is supported by the hours put into farm labor, where the conventional farms work more hours in Major area 1 and 3 and organic farms work more hours in Major area 1 and 2. Conventional farms work a few more hours in average than organic farms. This can be seen in table 1 and 2.

Table 15.1 Basic information about organic farms in the Swedish FADN 2006

Heading	Major area 1	Major area 2	Major area 3	Total, organic farms
Holdings per group	20	14	21	55
Cows	52	51	21	42
Cereals	21	15	10	16
Seeded grassland	78	76	41	66
Total farm land	116	101	54	93
Pasture	24	25	3	18
Delivered milk, ton	375	392	137	308
Hours worked at the farm	4974	5219	3270	4526

Table 15.2	Basic information about conventional farms in the Swedish FADN 2006			
Heading	**Major area 1**	**Major area 2**	**Major area 3**	**Total, conventional farms**
Holdings per group	101	142	70	313
Cows	49	37	39	42
Cereals	34	16	13	22
Seeded grassland	41	42	62	45
Total farm land	88	62	78	74
Pasture	19	20	26	21
Delivered milk, ton	421	330	310	359
Hours worked at the farm	5147	4634	4834	4852

The uneven distribution of holdings in Major area 2 and 3 makes it difficult to compare results in these areas. The average holding in Major area 2 had 37 dairy cows if it was conventional and 51 if it was organic, which gave a higher total turnover for the organic farms. In Major area 3, the situation is the opposite. The average holding had 39 dairy cows if it was conventional and only 21 if it was organic. Continuously, only the average for the country as a whole, with an average of 42 dairy cows for both groups, and in Major area 1, where the conventional farms had 49 dairy cows and the organic had 52 in averages, will be compared.

The milk delivery is lower for the organic farms on a national level, 308 ton compared to 359 ton for conventional farms. The larger organic farms in Major region 1 had lower delivery of milk as well.

Figure 15.2 **Total revenue for holdings where the total field area is organic (includes changes in stock)**

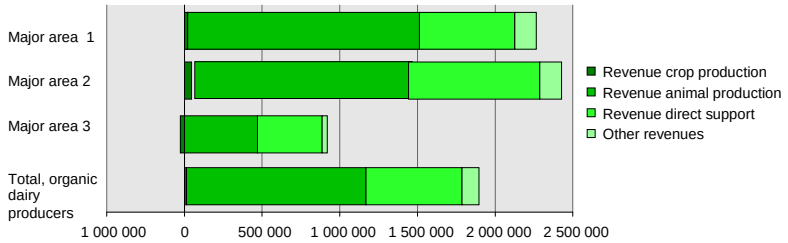
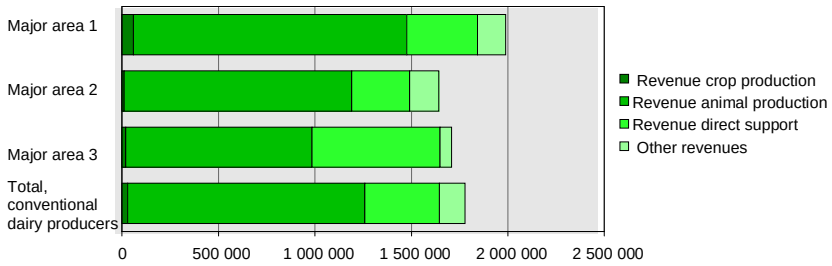
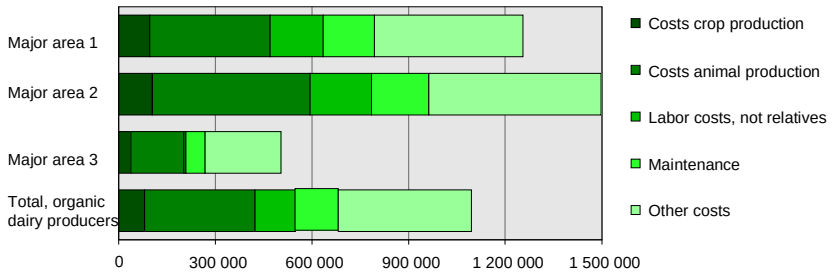


Figure 15.3 **Total revenue for holdings where the total field area is not organic (includes changes in stock)**



The total average revenue is higher for the organic producers. This depends mainly on higher revenue from direct support. The revenue from crop production and animal production, where milk is the main part, is in general higher for the conventional farms. However, in Major area 1 (and 2), the revenue from milk production was higher for the organic farms.

Figure 15.4 **Average costs for holdings where total field area is organic**



The total costs are lower for the organic farms. One part of the costs that do not follow this pattern is seed where the organic producers have substantially higher costs. Seed is included in 'Costs crop production'. Cost for crop production is in total lower for the organic farms as well as for animal production.

Figure 15.5 **Average costs for holdings where total field area is not organic**

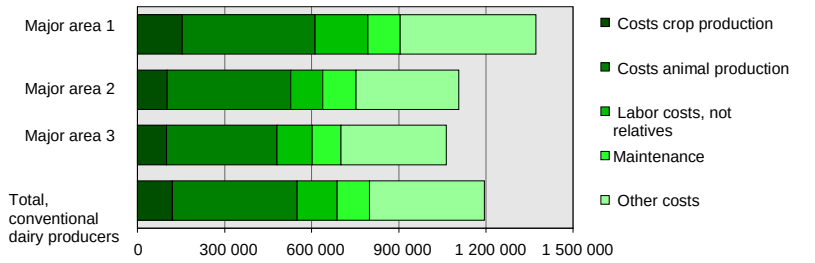
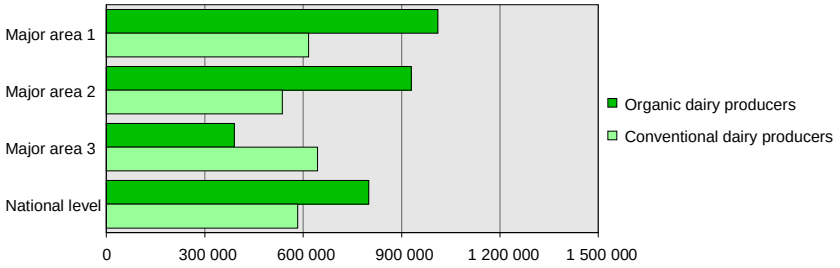


Figure 15.6 **Financial gross result for holding where the total field area is organic (organic dairy producers) and for holdings where the total field area is not organic (conventional dairy producers)**



Higher revenues and lower costs give a higher financial result for the organic producers, both on a national level and in Major area 1. In Major area 2 and 3, the difference mainly depends on differences in sizes of farms.

Comparison with Economic accounts for Agriculture (EEA)

The report *Hushållsinkomster för hushåll vid jordbruksföretag med ekologisk produktion år 2001* (Household incomes for agricultural households with organic production in 2001) made by Statistics Sweden in 2004, compared incomes of

organic farm households with conventional ones. The definition of organic production was all households that received environmental aid from the EU. Limited and trading companies were not included in the study.

The assessed income from business activity for households with organic agriculture in Major area 3 was 60 percent higher than the income for conventional households. The big difference is explained by the fact that the organic farms where substantial larger than the conventional ones. Measured in standardized working units the organic farms in Major area 3 were 52 percent larger. In Major area 1 and 2, the difference was smaller even though the organic farms were larger in these areas as well.

For most sizes of holdings, both the standardized labour units as well as the assessed income were higher for organic farms. For most lines of production, the organic farms were smaller and the assessed income lower. Exception from this was mainly beef cattle where the organic farms where 11 percent larger and income 45 percent higher than for conventional farms. Younger organic farmers had in average smaller farms with lower income compared to conventional farmers in the same age. For elderly farmers it was the opposite, the size was larger and income higher for organic producers.

In table 15.3, data for dairy producers in the three major areas in Sweden are shown. Since the holdings are grouped after standardized working units, the differences in size are small. However, the difference in assessed income is significant. In all areas, the income is higher for organic farms in three of four size groups.

Table 15.3	Standardized working units and some income measurements for households with organic farms with dairy production expressed as an index where 100 equivalents the value of households with conventional farms		
Type of holding	**Standardized working units**	**Income from business activities**	
		assessed income	**calculated total income**
Standardized working hours			
Major area 1 Dairy cows			
1600-2399	102	83	136
2400-3199	100	101	96
3200-3999	101	110	105
4000-5599	100	123	122
Major area 2 Dairy cows			
1600-2399	102	136	122
2400-3199	100	95	92
3200-3999	100	105	109
4000-5599	99	114	120
Standard area 3 Dairy cows			
1600-2399	100	111	112
2400-3199	100	107	105
3200-3999	100	100	106
4000-5599	100	94	94

15.4 Conclusions

The size and location of the holdings are the most important factors when comparing the economic situation for dairy producers. When these two factors are similar, there are also differences between whether the production is organic or not. In this study, the organic farms receive environmental aid for producing according to the EU standards for ecologic farming. This leads to a higher income of supports for these farmers compared to conventional ones. So even if the dairy production might not be certified the income differs between the groups.

The income from milk production is higher for the organic farms in the most fertile parts of Sweden, even though the amount of milk delivered from these farms are lower. This can be explained by the higher payment received by organic producers from the milk co operations. The higher income for organic farms is also shown in the EEA-report. The revenue from crop production is lower for organic farms even though the price paid for the products are higher; however, most organic farms uses their yield for fodder for their own production so the products never reach the market. Observe that the revenue from horticulture was particular low in 2006 due to bad harvests and the income therefore lower than usual.

Costs are generally lower for organic farms. Costs for fertilizers and pesticides hardly exist for organic producers but are quite high for conventional ones. Seeds make a higher share of the costs for organic farms due to a higher price. But even fodder is more expensive for organic farms and as a result, costs should be higher for animal production. However, this is not the case for the holdings included in this study. One reason for this could be a higher degree of self-support and a higher part of roughage than cereals for organic fodder. The price for organic fodder has gone up even more than conventional fodder the last year so this could differ a lot if compared to a study for 2007. However, the difference in costs for animal production divided per kilo milk delivered is very small.

As a result of better payment for organic milk and lower costs, the organic farms gets a higher result than conventional farms of the same size even though in general, the milk yield is lower and the price of inputs is higher.

16 Workgroup Session 1

'FADN in 2020'

In this workgroup session we worked on the long term future of FADN. Agriculture is on the front pages of the newspapers again: bio-energy, high prices, food deficits. Agriculture policy was already changing rapidly but these developments will also influence policy development. Some people propose the abolishment of direct payments while incomes are high. On the other hand, strong government intervention is proposed to deal with global warming, water and food deficits.

Depending on these future changes, the demands for FADN will differ. We tried to figure out how FADN might look like using scenario analysis. We worked with two extreme scenarios of agricultural policy:

1. liberal and regional. Hardly any specific EU policy for agriculture exists anymore. Direct payments have decreased a lot due to high world market prices and are not dependent on delivering of services. Brussels does give the possibility for regional agricultural/rural policies but does not co-finance them;
2. influential EU agricultural policy. Agricultural Policy will concentrate on substantial direct payments per ha with strong cross compliance demands. Payments are made for environmental services and other public goods provided by farmers financed by the EU. Part of the implementation for these payments may be on a regional level but with strong monitoring demands set by Brussels to keep competition between countries fair (payments may not be higher than costs of delivering them).

Probably the real situation will be somewhere in between but using these two scenario's the differences in consequences for FADN might become more clear. We tried to figure out how the scenario's might influence:

- the kind of information that is assembled;
- the harmonization between the countries within the EU;
- the financing;
- the number and type of farms in FADN.

Group A took scenario I as starting point and group B and C scenario II.

Group composition

Group A
Chair: Kaspar Mühlethaler
Reporter: An van den Bossche
Members: Henrik Pedersen, Ulf Svensson, Mirjana Žanić, Ivana Čorni

Group B
Chair: Dominique Desbois
Reporter: Torbjørn Haukås
Members: Antonella Bodini, Jeppe Strandgaard-Herring, Branka Sakic

Group C
Chair: Hans Vrolijk
Reporter: Eva Øvren
Members: Violeta Cadikovska, Lovisa Reinsson, Kristijan Jelakovic

Outcome

Group A

The kind of information that is assembled
- Less detailed information needed.
- EU-level: no information needed on micro-level; macro-level could use tax data, + some structural data (surveys) of the farms (like in other sectors).
- Perhaps there is still a European environmental or sustainability policy: rules without payments?
- In this case FADN will be assembling environmental information on farms.
- National level: depending on national needs.
- Perhaps more monitoring the environmental indicators.
- For research purposes: best practices, advise.

Harmonization between countries within EU
- Different surveys can be used.
- Need for more regional data, statistics.
- According to needs of the country.
- Less data on agriculture that have to be assembled within EU; but not less harmonized (benchmarking).

The financing
- On national level?
- Approved at EU level to prevent false competition.
- EU doesn't pay for agriculture policy measures but wants to monitor, there are still (reduced?) payments for FADN's.

The number and type of farms in FADN
- Less farms, less types of farm: EU-level.
- Less relevant to know for each type of farming.
- Certain number is needed when you want to know the income on a broad level.
- National FADN size depends on the national policy.
- According to the national budget for FADN.

Group B

Objectives
- Different regions - different information needed.
- Protecting special biotops.
- Water resources - sharing with other activities.
- Using agriculture land for other purposes.
- Landscape protection -prevent overgrowing.
- Rural development to prevent moving out from the region.

Kind of information assembled
- FADN, agricultural sensus.
- Complementary data for rural tourism.
- Water use.
- Farm level data needed or regional data?
- Environmental data.
- Soil types.

Number and types
- Increase the number of farms.
- More groups with OGA.

Group C

Policy Objective
- Sustainable fair standard of living.
- Still a future for FADN.

Data (FADN+)
- Costs of environmental friendly production.
- Environmental impact of farms.
- Public goods? (how?).
- Harmonisation (fair competition).
- EU has to pay.
- Large agricultural budget.
- EU wants to active goals.

Number of farms

- No substantial reduction (increased heterogenity, more specialisation, importance of natural conditions).

17 Workgroup session 2

'New information demands for FADN'

While our first workgroup session looked at the long term future of FADN, in this session we have focussed on the coming years. There is a growing interest in information about some new subjects. Should we assemble information on these subjects in FADN and if so, what kind of information?

We used the Open Space method to work on these issues. Open Space is based on the idea that the most interesting things are discussed and exchanged in the corridors and the bar, not in a meeting. 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.

At the beginning of this Open Space 3 themes were put on a flip chart in different places.

A Environment

Not really a new subject. There is on European level however a growing interest in data on farm level on environmental subjects. Average mineral balances for countries or large regions are not very informative if large differences exist within the region. If you want to improve the environmental performance of farms, differences in performance of farms in very important information. The water and soil directives of the European Commission might have large impacts on agriculture. Therefore Eurostat and others are trying to set up new questionnaires on farm level for minerals, water use and pesticides.

B Risk management

While agricultural prices in the European Union will be more in line with World prices, farm income might become more volatile. Therefore policy will focus more on risk management. The European Commission thinks about subsidizing

farm insurance on large scale. Probably they would also like to monitor the effects of these policies.

C Animal health and animal welfare

Animal diseases and welfare are a growing concern in the world. Animal diseases may have large economic consequences (BSE, blue tongue) and may also threaten human health (BSE, bird flue, resistance to antibiotics). In some countries of the EU, animal welfare is getting more and more important. Not only does this lead to new regulation but also to products with a guaranteed higher level of animal welfare.

Outcome

Environment

- Sustainability assessment.
- from existing FADN to calculation of indexes.
- FADN + Agricultural Census?
- organic famers' statistics.
- in compliance with EU regulation.

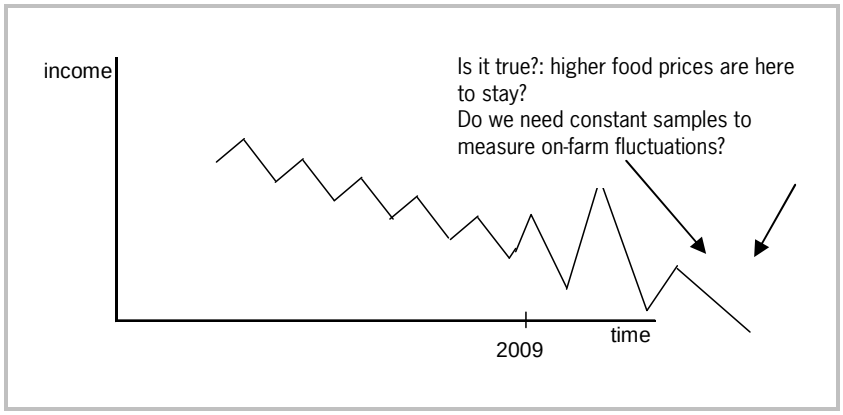
Data needs

- nitrogen/phosphours (B, NL, F).
- soil quality (HR).
- water use/water quality (HR, F).
- greenhouse gas emissions (NL)/stable system (F).
- energy use (NL, F, B).
- land set aside.
- cropping practice/erosion.
- use of pesticides (HR, NL, F).
- biodiversity (plants, animals).
- grassing.
- density of animals.
- forest management/prevent fires (HR).
- mechanisation - soil structure.
- use of agricultural land for other purposes (HR).
- land out of use (neglected/brakk) (HR).
- concentration of heavy metals.
- special biotops (costal area, climate change).

Data sources/users

- Ministry of construction/ecology.
- Ministry of environment (-> they gathered the data from others).
- water agency.
- NGO's (collecting data).
- Faculties (land analysis).
- FAQ, ICCP.
- UNDP, OECD.
- see institute.
- international agency for energy.
- local governments (land policy).

- forestry agency.
- Eurostat (EU environmental indicators).



Riisk management

- Data on income fluctuations is available.
- More interest in agri/FADN is welcome.
- Investment pattern/saving/viability of farms is available.
- Insurance data is in FADN, mainly on buildings etc.
- Data on insurance-payout/disasterpayment is in FADN.

  private / ↳ government
- use of furure markets/contracts.
- subsidies paid for risk management goes to farmer (difficult if paid to insurance company).
- can we collect data on using advisors on risk, their know-how on risk.
- measure risk aversion of farmer.
- events on farm: drought, flooding etc. that 'explains' results.
- role of tax systems in income stabilization -> paid taxes.
- technical/operational decisions by farmers to reduce risk: irrigation/ cropping plan etc.
- what is the best income indicator (cash flow/operational income?).
- don't forget the 3 D's for the biggest risks: Disability, Divorce, Death (and: not finding a wife at all).
- should we measure perceived policy-risk?
- portfolio effect.
- diversification <-> specialisation (farm size).

Animal health and animal welfare

- Link between welfare of animal and economy importance for users (politiciens, consumers, producers).

Measurements

- Costs for veterinary services in more detail than now.
- Preventional costs.
- Time spent on animal welfare.
- Animal density in a region/risk for desease of eac animal.
- Space.
- Building costs.
- Stable system.
- Time outdoors for animals.
- Tracability -> link/connect with the overall system of tracability.
- Cofinancing? (-> Ministry of Health, Ministry of Agriculture, ….) should be broadened to food safety.
- Manage the questionnaire -> replace these by others <-> adding.

Disadvantage -> sceptisism of participators:

- feeling /risk to be tracked;
- misuse of data;

- Labels on animal welfare?
- Distance of transport;
- Antibiotics;
- Restrictions of feed (hormons, antibiotics, use of by-products of food industry?);

Animal deseases, cooperation with other institutions.

18 Workgroup Session 3

'Differences between national FADN's and EU-FADN'

The EU-FADN is a harmonized database of all member states. The source of this database are the national FADN's. Although the EU database is harmonized over all countries, national FADN's most of the time differ from the EU FADN. In this workshop we tried to find out what the differences are and why they exist. Questions were:

- why it exists?
- what is your current opinion on it;
- introduce it in EU-FADN;
- advice it to member states where it is relevant;
- continue with it;
- stop with it when EU demands;
- stop with it in the near future.

Group composition

Group A
Chair: Henrik Pedersen
Reporter: Jeppe Strandgaard Herring
Members: Kaspar Mühlethaler, Ivana Čorni, Antonella Bodini

Group B
Chair: Mirjana Žanić
Reporter: Branka Sakic
Members: Krijn Poppe, Hans Vrolijk, Lovisa Reinsson, Ulf Svensson

Group C
Chair: Kristijan Jelakovic
Reporter: Violeta Cadikovska
Member: Torbjørn Haukås, Eva Øvren, An van den Bossche, Dominique Desbois

Outcome

Group A

Differences between national FADN's and EU-FADN
- Numbers of farms.
- Different countries have different goals.
- Some collect data for EU-FADN purpose.
- Others collect data for national statistics and may need a larger number of farms.
- Stratification should be carried out in order to meet the national requirements. Geographical reasons (mountains, flat land etc) goal of the survey. Stratification is needed in order to identify your details.
- The differences in stratification is needed and relevant.

Weighting
- Differences in availability of data. Differences in calculation SGM.
- EU-FADN could take in to account the national weighting in stead of using their own.

Thresholds
- Different levels of when a farm is commercial. (90% SGM).
- Should be more focus on commercial farms and not covering 90% of SGM.
- Maybe small farms could be used for other purposes (more variables).

Detailed cost-output
- Specification of costs is very detailed. A greater level of details might lead to calculated variables.
- Level of detail is appropriate.

More variables
- More variables gives a better picture. Income from all family members.
- Living standard on the farm is important to eu.
- Too private.

Accounting Principles
- Important in order to compare countries. Depreciation is different from country to country.
- It should be harmonized among the countries. It is a difficult task.

Group B

No new questions in FADN -> cut administrative burdens

Differences
- Stratification variables.
- Small one, but exists.
- SGM in NL is more detailed.
- Size classes.
- Types of farms.
- Flowers in NL.
- Forestry in S (not include in EU FADN - more off farm income).
- Organic farming.
- Regions (S) different, but not so much -> weighting.
- NL uses annual cenzus.
- More variables.
- In S not so many as in NL.
- Allocation of costs (NL do it).
- Own indicators used.
- Differenc exist because of specialised production.
- Plan to continue with it (NL).

Adopt new variables - ex. environment (in FADN or special ones)

Group C

Differences

Belgium
- Number of farms the same 580 + 720.
- Principles for stratification are the same. FADN are not suitable to local conditions.
- Selection the same.
- More production data like numbers, amounts and other details in National FADN.
- More variables for OGA and environment.
- More detailed costs.
  Why: The government ask for more data.

France

- One more stratification investment, type of accounting data source.
- Difference between the National and the farm structure.
- Same treshold 8ESU.
- Gather less data on the category on cattle than EU request because categories of cattle are not convenient.
- Less variables like OGA.
- Costs the same except the fodder farm used.
- Accounting period different - practical reasons for some difference.

Macedonia

- Started to send data for Brüssel.
- 400 farms.
- Differences because they are in a prossess.

Norway

- Started in 1911.
- Do not send data to FADN.
- One system.
- 948 units last year.
- 8 ESU.
- A lot of OGA and forestry variables.
- Also private economy.

19 Workgroup session 4

'Future of PACIOLI'

The last workshop focussed on the future of the Pacioli-workshops. The participants got the following assignment:
Imagine that the LEI stops organizing the Pacioli workshops. You would like to continue and you are responsible for the next workshop. As new organiser you would also like to check if improvement of the formula could be achieved. You organize a brainstorm on other ways or organizing such a meeting. Everything could be changed:

- subjects (Accountancy Network on fisheries/forestry, statistics in general, Micro economic research in general, research on modelling, exchange of data in agriculture);
- work forms (presentations, workshops, excursion);
- type of presentations (a paper should be available, peer reviewed, invite speakers);
- type of excursions (visiting farms, statistical offices, FADN offices, fun);
- participants (users and managers of FADN);
- frequency (every year, once in three years);
- places (Brussels each time, outside Europe, video conferencing);
- organisation (each year a different country is responsible for the both the scientific and practical organization; LEI keeps organizing scientific part);
- number of days (now 2,5 day).

Group composition
Group A
Chair: Torbjørn Haukås
Reporter: Kaspar Mühlethaler
Members: Dominique Desbois,
Hans Vrolijk, Kristijan Jelakovic

Group B
Chair: Mirjana Žanić
Reporter: Henrik Pedersen
Members: Antonella Bodini,
An van den Bossche, Lovisa Reinsson, Eva Øvren

Group C
Chair: Jeppe Strandgaard Herring
Reporter: Ivana Čorni
Members: Violeta Cadikovska,
Ulf Svensson, Branka Sakic

Outcome

Group A

Topics
- Making a list of relevant topics before the workshop. → Better preparation of the workshop.
- Discussion group between two meetings: how to make it run?
- Publish the report in the next meeting.
- Pay the person who organizes the workshop.
- Are the topics too spread in PACIOLI?
- More specific topics?
- Parallel sessions?
- There must be a good reason for the participants to get the costs of PACIOLI paid.

Lengths and participants
- Length of the workshop?
- Time is not a limited resource. Money is more limited.
- Open the workshop to other countries (e.g. Morocco, Tunisia).
- Invite through bilateral network (e.g. France).

Contents of the workshops?
- Analysis of data.
- Applications of the data.
- Research methods./Most of the methods used are traditional.
- How to do things.
- Making the network evolving (e.g. environmental subjects).
- The different countries are in different stages (e.g. Croatia is on the beginning).

Excursion
- A combination of cultural aspects and agriculture would be good.
- Visit a farm that is in the national sample (e.g. a farm with other gainful activities, explanations of the farmer about economic aspects).
- Visit of a research institute.

General

- A meeting every year is okay.
- Changing place every year is good.
- It is not official → good point.

Group B

- Every year in different country, participants to decide on topics.
- To put posters on the wall with issues and questions.
- To have presentations about FADN in general (for new countries) and about specific issues.

3 parts:

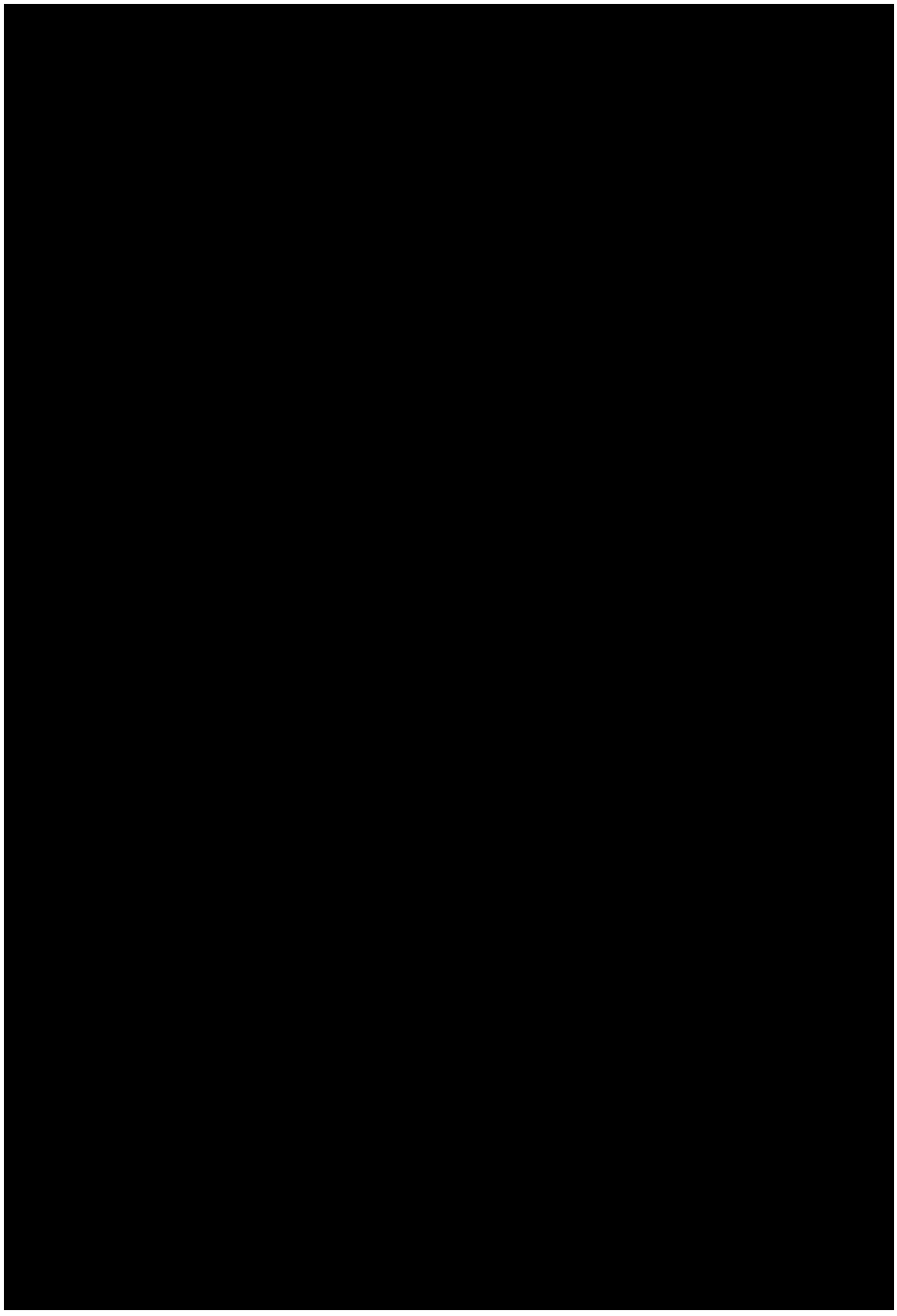
- general overview;
- specific calculations;
- specific area - quality labels etc.
- Form is good - presentations and gatherings (to getting to know each others).
- Frequency every 2 years or every year.
- To have someone from EU FADN for general issues.
- Duration 2,5 days.
- Excursion: cultural and agricultural combined.

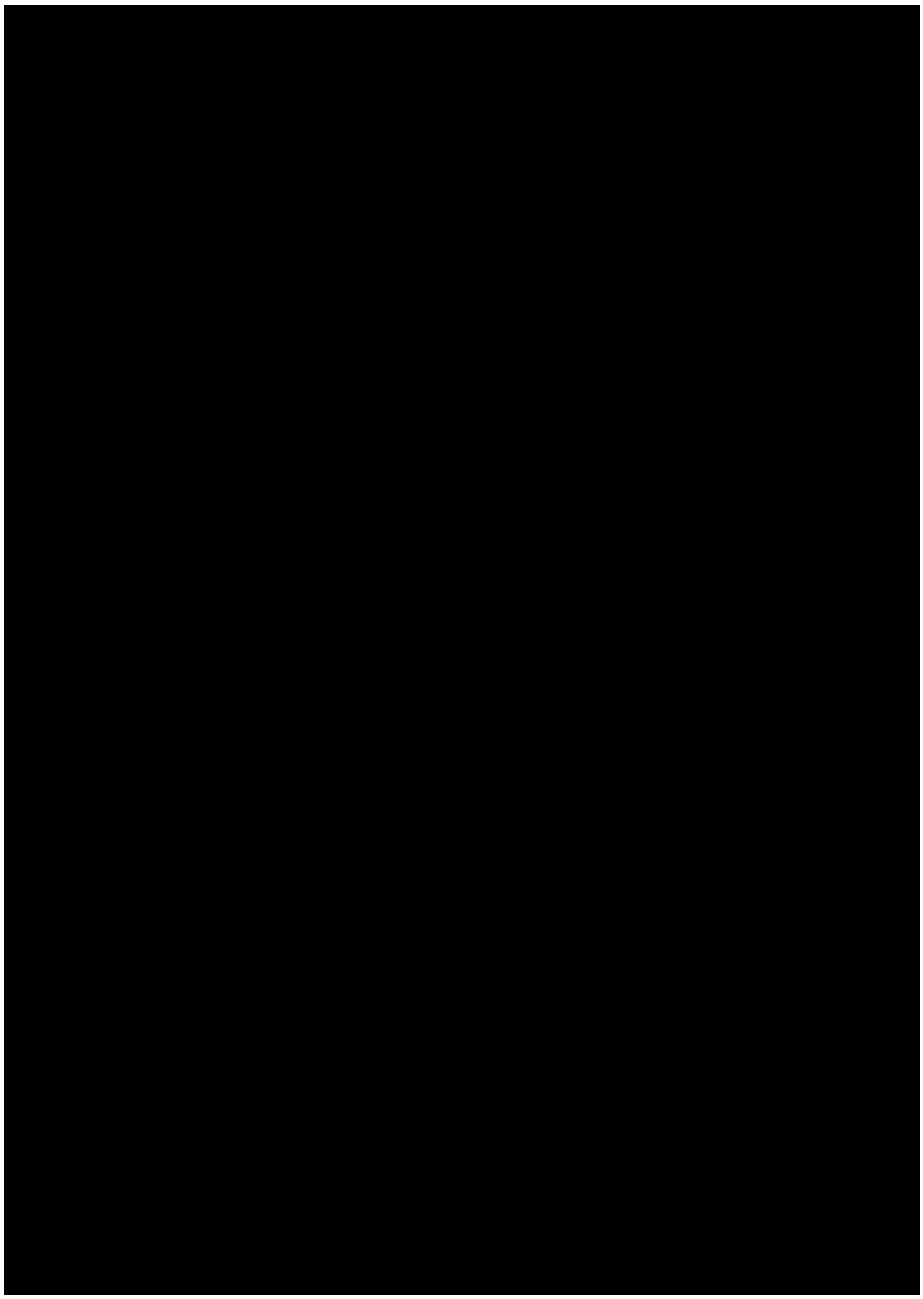
Group C

- Scientific workshop? Bad idea.
- Mix between scientific and FADN persons is good. 1+1 from each country.
- Participation from new states? (Fee, possible to combine with Brussels meeting.) (exclud. too many). Money from EU-budget.
- Posters.
- Compulsory txt-document related to presentations (om web in advance).
- Excursion: would like a farm visit.
- Nice LEI has capacity to organize.

Appendix 1

List of participants





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