Pacioli 17

Innovation in the management and use of Micro Economic Databases in Agriculture

Koen Boone
Colinda Teeuwen (eds.)

Report 2009-085
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- Development issues
- Consumers and supply chains
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This report over the research area Sectors and enterprises

Photo: LEI Wageningen UR

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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 17 took place in Ettenhausen, Switzerland, in June 2009. The theme of the workshop was 'Innovation in the management and use of Micro Economic Databases in Agriculture'.

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Contents

Preface

Innovative ideas face many hurdles to become successful implementations. This is also true in farm accounting and in Farm Accountancy Data Networks (FADNs). Therefore it makes sense to bring together the 'change agents', the persons that have a personal drive to change the 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 already the 17th edition took place. This small but open network has become a breeding place for ideas on innovations. The 17th workshop had a record number of participants, a record number of nationalities and a record number of papers!

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.

Pacioli 17 was organised in cooperation with Tänikon Art (Ettenhausen, Switzerland). We want to thank them, and especially Andreas Roesch, for a perfectly organised workshop.

Prof Dr R.B.M. Huirne
Director General LEI Wageningen UR

1 Introduction

1.1 Theme of Pacioli 17

From 7-10 June, 2009, in cooperation with Tänikon Art, LEI organised the 17th international Pacioli workshop. This time the workshop took place in Ettenhausen, Switzerland. The theme of the workshop was 'Innovation in the management and use of Micro Economic Databases in Agriculture'.

1.2 Pacioli 17 programme

Sunday, 7 June 2009

21.00 Get together for informal drink (at Tänikon ART)

Monday, 8 June 2009

08.30 Welcome by Robert Kaufmann (Tänikon ART)
08.45 Introduction workshop programme (Koen Boone)

Paper Session I: Research with FADN: Micro Economic Modelling

09.15 *'Using FADN data to develop the agent-based model SWISSland'*
Gabi Mack, Tänikon ART
09.40 *'Assessing the joint ecological and economic efficiency of the Swiss dairy farms located in the mountainous area using FADN data'*
Pierrick Jan, Tänikon ART
10.05 *'Farm Level Analysis of Risk, and Risk management strategies and Policies; Evidence from German crop farms'*
Shingo Kimura, OECD
10.30 *'Development of economic performance of dairy farms in Germany and further prospects with regard to current milk prices'*
Werner Kleinhanss, Johann Heinrich von Thuenen Institut

11.00 Break

Paper Session II: Methodological issues: Definitions, Valuation and New data

11.15 *'Farm Family data in Canada: Sources and measurement issues'*
Dave Culver, Agriculture and Agri-Food Canada
11.40 *'Links between farm household data & National statistics: The US experience'*
Mary Ahearn, Economic Research Service, USDA
12.05 *'Change of Valuation Method for Buildings in Swedish Farm Accountancy Data Network, FADN'*
Lovisa Reinsson, Statistic Sweden
12.30 *'Additional environmental data in Hungarian FADN - analysis of crop farms'*
Csaba Pesti and Szilárd Keszthelyi, Agricultural Economics Research Institute Hungary

13.00 Lunch

14.00 *Workgroup Session 1: 'Strategic Management: SWOTs and KSFs'*

15.45 Break

Paper Session III: National FADNs in Europe

16.00 *'Evaluation & Comparability of EU and Member Country FADN Databases'*
Nathalie Delame, INRA

16.25 *'Installing an FADN in a new member state: some guidelines and principles from several experiences in eastern countries'*
Bernard Del'Homme, ENITA Bordeaux and Marju Aamisep, RERC Estonia

16.50 *'Changes of Lithuanian family farms during 2003 -2007'*
Arvydas Kuodys and Rima Daunyte, Lithuanian Institute of Agrarian Economics

17.15 *'Standardised method for credit rating of agricultural holdings - an alternative utilisation of FADN data'*
Szilárd Keszthelyi, Agricultural Economics Research Institute Hungary

17.45 Break

Paper Session IV: Research with FADN: Sustainability and regulation

18.00 *'Farmers allowance against tax according to subsidies in Norwegian agriculture'*
Torbjørn Haukås and Eva Øvren, NILF

18.25 *'Farm land transfer and economic performance'*
Beat Meier, bemepro, beat meier projekte

18.50 *'From farm-level variables to indicators of sustainability - The example of the North China Plain'*
Yannick Kühl, University of Hohenheim

19.15 *'Melkveecafé, a discussion group with farmers on sustainable agriculture'*
Joost D'hooghe, Flemisch Department of Agriculture

20.00 Dinner

Tuesday, 9 June 2009

Paper Session V: Methodological issues: Sampling and typology

8.30 *'Survey on economic results of farms in Italy: Sample design and sampling strategy based on the new typology'*
Concetta Cardilo and Laura Esposito, INEA

8.55 *'Sampling in the FADN: limitations and consequences'*
Hans Vrolijk, LEI Wageningen UR

9.20 *'Selection and sample size in Danish agriculture account statistics'*
Dorte Hækkerup, Statistics Denmark

9.45 *'Reorganisation of the Swiss farm accountancy data network: random sampling and population'*
Andreas Roesch, Tänikon ART

10.10 *'The use of the Economic Accounts for Agriculture in the typology work'*
Ann-Marie Karlsson, Swedish Board of Agriculture

10.35 Break

10.50 *Workgroup Session 2: 'Other activities of farmers that contribute to income'*

12.30 Lunch

13.30 Excursion (including visit to dairy farm and cheese cellar)

Wednesday, 10 June 2009

Paper Session VI: Innovation in FADN: IT and cost of production

8.30 *'Innovation in the Italian FADN (RICA) survey system approach: the new software (GAIA) and its implication on the Italian agricultural accounting system'*
Sonia Marongiu and Antonella Bodini, INEA

8.55 *'How to build up a datawarehouse: Do's and Do not's'*
Boris Tacquenier, Flemisch Government

9.20 *'MetaBase, a new concept for data handling and use of meta information'*
David Verhoog, LEI Wageningen UR

9.45 *'Quantile Estimation of Agricultural Production Costs: A First Approach with Application to Plant Protection'*
Dominique Desbois, Service de la Statistique et de la Prospective

10.10 *'Agricultural Products Data Collection System AGRICOSTS as a microdata resource'*
Marcin Cholewa, NRI Poland

10.35 Break

10.50 *Workgroup session 3: 'Strategic action points'*

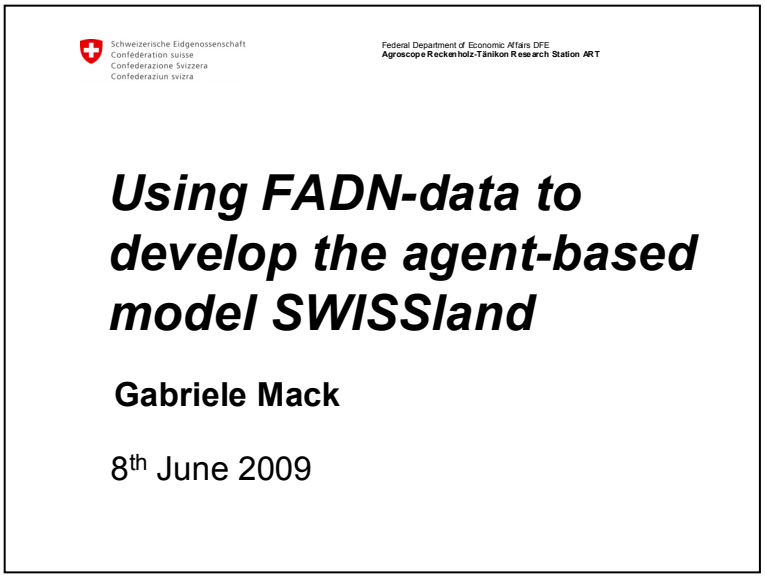
12.30 Closing workshop

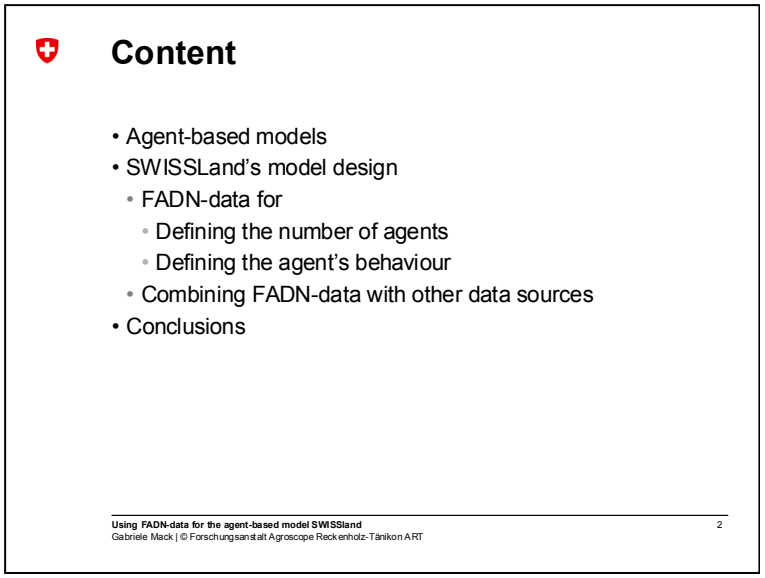
12.45 Lunch

13.45 Leave for the airport

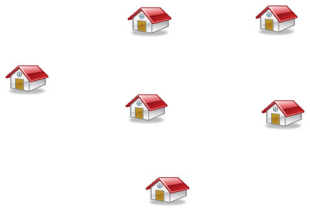
2 Using FADN data to develop the agent-based model SWISSland

Gabriele Mack
Tänikon ART



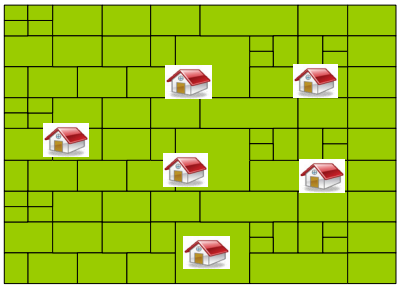


Agent-based models...



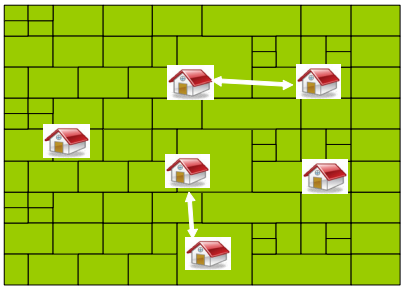
(Parker et al. 2002)

Agent-based models...



(Parker et al. 2002)

Agent-based models...



Agents behave like real farms:

-Production decisions

-Investment decisions

-Farm succession decisions

-Land leasing or leasing out decisions

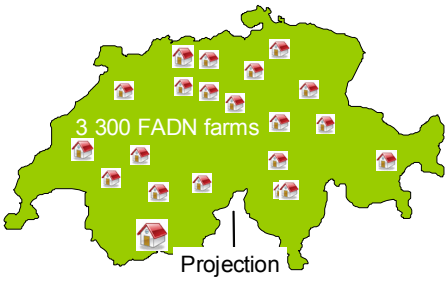
(Parker et al. 2002)

Why SWISSland?

- To forecast the sectoral income of Swiss agriculture
- To forecast the supply of all agricultural products
- To forecast structural change
  - Number of farms, farm-size, farm abandonment, farm succession
- To cover the heterogeneity of agricultural production in Switzerland (regions, farm-types, farm-size).

Design of SWISSLand

- Number of agents
- Agent's behaviour



Each FADN-farm is characterized by a projection factor

Total number of farms = 50 000
Total area = 1 000 000 ha

Solving projection problems

- Method:
  - Determining an identical projection factor for each FADN-farm type
  - Recalculating the number of FADN farms agents
    - Adding farm types, which are underrepresented
    - Deleting farm types, which are overrepresented.
  - Solving the problem by a minimization process, taking into account that several sectoral parameters (area, farm size, farm-type) have an adequate representation

Minimization:

$$\sum_{g}\left(\sum_{g}\frac{w_g * M_{gg}}{MSW_g}-1\right)^2 * MZ_g \rightarrow \min \qquad \text{Sum of square deviations}$$

Constraints:

$$\sum_{w_g \in MS_g} w_g = NSW_g \qquad \text{Agents per group}$$

$$w_g \geq 0 \qquad \text{Weighting factor } w$$

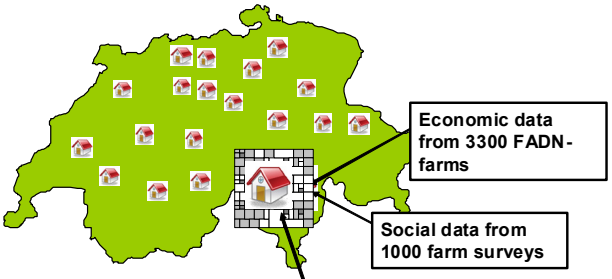
$$NSW_g \geq NZ_g : w_g \geq 1 \qquad \text{For not represented FADN-groups: } w_g = 0$$

$$NSW_g < NZA_g : w_g \leq 1 \qquad \text{For over represented FADN-groups: } w_g = 1$$

$$uMSW_g \leq \sum_{g} w_g * M_{gg} \leq oMSW_g \qquad \text{Constraints}$$

Defining the agent‘s behaviour

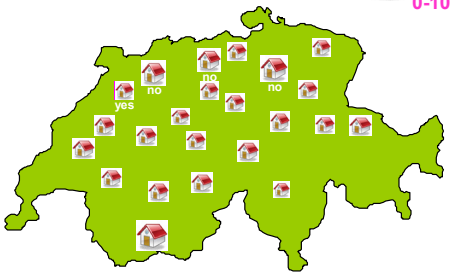
Database



Defining the agents’ farm succession behaviour

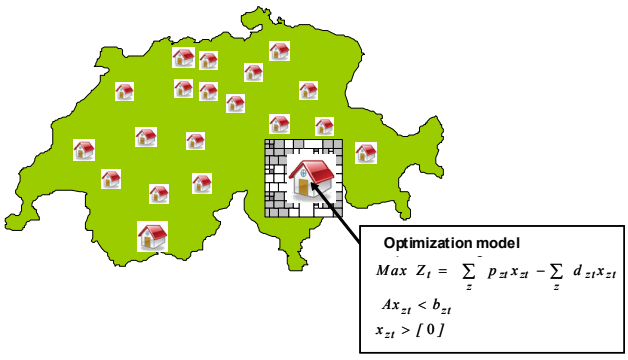
FADN-data and social data

FADN-farm, valley, 0-10 ha



Region	Farm-Size	Farm succession: NO	Farm succession: YES
valley	0_10_ha	75%	25%
valley	10_20_ha	54%	46%
valley	>_20ha	32%	68%

Modelling production and investment decisions



Modelling realistic production decisions

Positive mathematical programming (PMP)

Optimization model

$$Max\ Z_t = \sum_z p_{zt} x_{zt} - \sum_z d_{zt} x_{zt}$$

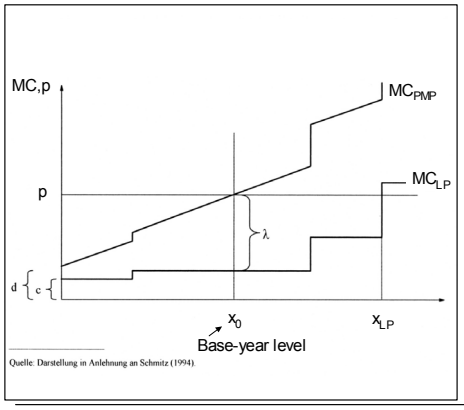
$$Ax_{zt} < b_{zt}$$

$$x_{zt} > [0]$$

Base-year Calibration

•The agent‘s behaviour in terms of production planning is more realistic than using linear programming

Estimating the marginal cost function of the agent



Quelle: Darstellung in Anlehnung an Schmitz (1994).

Optimizing the agents

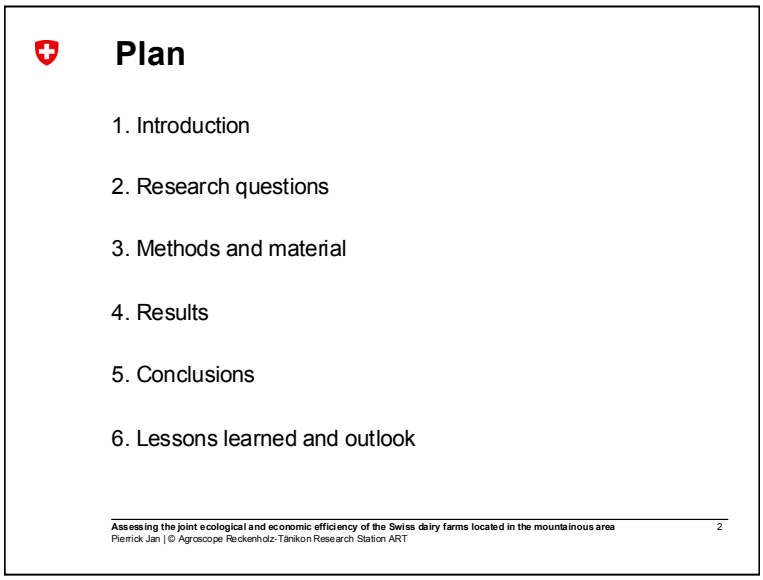
- Defining production activities
- Taking into account technical, ecological and financial constraints
- Each agent has a defined objective function
- Maximizing the household income
- Data-base: FADN-data
- Splitting up total costs of FADN-farms to single production activities
  - Labour costs are split up by standard labour requirements factors

Conclusions

- FADN data as an important future source for agent-based models
- Do data requirements have to be changed due to this new application?

3 Assessing the joint ecological and economic efficiency of the Swiss dairy farms located in the mountainous area using FADN data

Pierrick Jan
Research Group Farm Economics
Tänikon ART



1. Introduction

- Mountainous area: 28% of the CH-agricultural holdings, mainly dairy farms
- These dairy farms:
  - 1/3 of the milk production of Switzerland
  - play a major role in...
    - ... the conservation of national resources and the upkeep of rural scenery
    - ... the decentralised inhabitation of the country
- Promotion of a sustainable agriculture stipulated by Article 104 of the Swiss Federal Constitution
- Aim of the present work: analysis of the ecological and economic resources use efficiency of these farms using FADN data

2. Research questions

- What is the relationship between ecological and economic efficiency?
- Can good ecological and good economic performance go hand in hand?
- Do farms, that are ecologically and economically highly efficient, differ from other farms?

3. Methods and Material

Terminology

- Efficiency = relative efficiency of a farm in its resources use for the production of its output in comparison with the other farms
- $\text{Efficiency} = \frac{\text{observed Productivity}}{\text{maximum attainable Productivity}}$
- Ecological efficiency = efficiency of the use of natural resources for the production of milk in kg
- Economic efficiency = efficiency of the use of economic resources for the output production in Swiss Francs

3. Methods and Material
Data Envelopment Analysis

- Efficiency measured with the non parametric DEA approach (Data Envelopment Analysis)

- **Principles**

  - Using linear programming methods, a non-parametric piece-wise surface (or frontier) is constructed over the data

  - Inefficiency = radial distance from the DMU (Decision Making Unit) under investigation to the frontier

3. Methods and Material
Data Envelopment Analysis

- **C**harnes, **C**ooper, **R**hodes Model (**CCR**; Charnes et al., 1978) used

  - Input orientation procedure

  - Assumption of the **CCR** model: **C**onstant **R**eturns to **S**cale (**CRS**)

calculated efficiency (**CRS TE**) = total technical efficiency
= pure technical efficiency (**TE**) X scale efficiency (**SE**)

3. Methods and Material
Material

- Entities analysed: dairy farms located in the mountainous region

- Data basis: cross section of 327 farms of the mountainous zone 2, year 2006

  Source: Swiss Farm Accountancy Data Network, Agroscope Reckenholz-Tänikon Research Station ART

3. Methods and Material

Inputs and outputs considered

	Inputs	Output
ecological efficiency	▪ Nitrogen-Input in kg N Nitrogen input from own livestock (via manure or slurry) + Nitrogen input via mineral fertilisers ▪ Primary energy demand in MJ Direct and indirect energy inputs, upstream process chains included	produced milk in kg
economic efficiency	▪ Land in ha U.A.A. ▪ Capital (without land) in CHF ▪ Labour Force in AWU (Annual Work Unit)	value added in CHF

3. Methods and Material

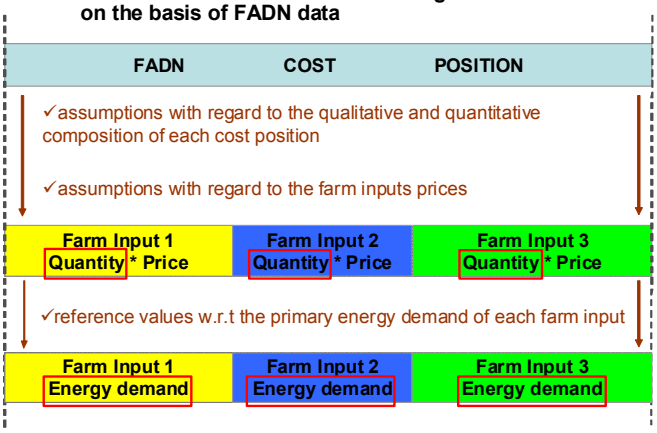
Assessment of the amount of ecological resources used on the basis of FADN data

- Primary energy demand in MJ and Nitrogen input in kg N
  - not directly available in the Swiss FADN
  - have to be estimated using costs variables or any other variables available in the FADN data
- **FADN Variables used**

Nitrogen Input	Primary Energy Need
▪ Livestock Inventories ▪ Costs for mineral fertilisers	Costs for diesel, electricity, mineral fertilisers, concentrates, minerals, forage bought, pesticides, seeds and own machinery

3. Methods and Material

Assessment of the amount of ecological resources used on the basis of FADN data



3. Methods and Material
Building of groups

- On the basis of the two performed DEA, 3 classifications are built...

... according to the ecological efficiency

EcolBest	Farms of the third tercile
EcolMedium	Farms of the second tercile
EcolWorst	Farms of the first tercile

... according to the economic efficiency

EconBest	Farms of the third tercile
EconMedium	Farms of the second tercile
EconWorst	Farms of the first tercile

... according to the joint ecological and economic efficiency

G1	EcolBest	EconBest
G2	EcolBest	EconMedium
G3	EcolBest	EconWorst
G4	EcolMedium	EconBest
G5	EcolMedium	EconMedium
G6	EcolMedium	EconWorst
G7	EcolWorst	EconBest
G8	EcolWorst	EconMedium
G9	EcolWorst	EconWorst

3. Methods and Material
Building of groups

- On the basis of the two performed DEA, 3 classifications are built...

... according to the ecological efficiency

EcolBest	Farms of the third tercile
EcolMedium	Farms of the second tercile
EcolWorst	Farms of the first tercile

... according to the economic efficiency

EconBest	Farms of the third tercile
EconMedium	Farms of the second tercile
EconWorst	Farms of the first tercile

... according to the joint ecological and economic efficiency

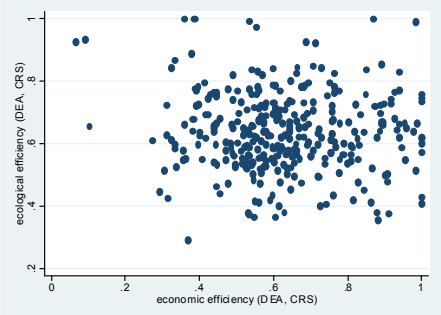
G1	EcolBest	EconBest

How do the farms of Group 1 differ from the other farms?

G2	EcolBest	EconMedium
G3	EcolBest	EconWorst
G4	EcolMedium	EconBest
G5	EcolMedium	EconMedium
G6	EcolMedium	EconWorst
G7	EcolWorst	EconBest
G8	EcolWorst	EconMedium
G9	EcolWorst	EconWorst

4. Results

- **No significant relationship between economic and ecological efficiency (p=0,30, n=327)**



Source: own calculations

4. Results

- **The farms are almost equally distributed in the 9 groups of joint ecological and economic efficiency**

Group	Ecological efficiency class	Economic efficiency class	Proportion of farms (n=327)
G1	EcolBest	EconBest	10%
G2	EcolBest	EconMedium	12%
G3	EcolBest	EconWorst	11%
G4	EcolMedium	EconBest	12%
G5	EcolMedium	EconMedium	10%
G6	EcolMedium	EconWorst	11%
G7	EcolWorst	EconBest	11%
G8	EcolWorst	EconMedium	12%
G9	EcolWorst	EconWorst	11%

Source: own calculations

4. Results

- **Characteristics of the farms of G1 (BestEcol & BestEcon) in comparison with the „Not-G1" farms**

Characteristic	G1	Not-G1	Significance level
Amount of milk produced (in kg per year)	126'323	93'197	***
Proportion of the farm land owned by the farmer (in % of the U.A.A.)	51%	66%	**
Proportion of organic farms (in %)	35%	26%	ns
Milk production intensity (in kg milk per ha)	5'622	4'609	***
Milk yield (in kg milk per cow and year)	6'393	5'963	*
Culling rate in %	29	37	*
Costs for concentrates (in Rappen per kg milk)	9,4	11,6	*

Source: own calculations

The significance of the differences between the two groups has been investigated using the non parametric Test of Mann and Whitney (for interval scaled variables) and the Chi-Square Test (for categorical variables).

All values presented in the table: averages

*Significance level: *** = p<0.001 - ** = p<0.01 - * = p<0.1*

4. Results

- **Characteristics of the farms of G1 (BestEcol & BestEcon) in comparison with the „NotG1" farms**

Characteristic	G1	NotG1	Significance level
Costs for veterinary services and products (in Rappen per kg milk)	2,5	4,2	***
Intermediate consumptions / total output (in %)	38%	47%	***
Agricultural income (in CHF per Family Annual Work Unit)	54'687	33'566	***
Proportion of farm managers with an agricultural education (in %)	85%	87%	ns
Nitrogen input (in kg N per ha)	118	117	ns

Source: own calculations

The significance of the differences between the two groups has been investigated using the non parametric Test of Mann and Whitney (for interval scaled variables) and the Chi-Square Test (for categorical variables).

All values presented in the table: averages

*Significance level: *** = p<0.001 - ** = p<0.01 - * = p<0.1*

5. Some first conclusions

- Good ecological and economic performance are not antinomic
- Farms with both a high ecological and a high economic efficiency...
  - ... tend to be bigger farms with a high milk production intensity
  - ... are managed by farmers with very good technical management skills
- A cost saving behaviour seems to be, amongst others, one of the most important key to a good joint ecological and economic efficiency
- Farms with both a high ecological and a high economic efficiency do not show a higher nitrogen input per ha, i.e. the better performance in terms of efficiency does not happen to the cost of the ecosystem

5. Some first conclusions

- But keep in mind…
  - The calculated efficiency has always to be interpreted in a relative manner
  - Only two environmental issues considered
  - Assessment of the amount of energy and nitrogen used based on FADN data: influence of the assumptions met on the end result?

6. Lessons learned and outlook

- The assessment performed here raises the more general question of the suitability of FADN data to perform an assessment of the environmental performance of farms
- Assessing the amount of environmental resources used or the amount of environmental impacts generated by a farm on the basis of FADN data: a quite challenging task
- For the environmental issues, for which such an assessment is possible, reliability of such an assessment may be questioned, as many assumptions are required
- For many environmental issues: such an assessment is impossible
- Such an assessment is more feasible for very specialized farms as for farms with several different activities
- In a context where sustainability has become a major issue in the debate on agriculture, extension of FADN data with environmental data seems an imperative

6. Lessons learned and outlook

- In the Swiss case, two projects follow this objective:
  - **The LCA-FADN Project (Life Cycle Assessments – Farm Accountancy Data Network)**
  - **The AEI-FADN (Agri-Environmental Indicators – Farm Accountancy Data Network) Project**

6. Lessons learned and outlook

- **The LCA-FADN project (Life Cycle Assessments – Farm Accountancy Data Network)**
  - Objective: to carry out a joint economic and environmental performance assessment
  - Time frame: 2007-2010
  - Data collected: LCA of 300 Swiss farms (years 2006 to 2008)
  - Results
    - Very detailed information required, time consuming data collection
    - Difficulties in recruiting farmers (123 farms assessed instead of 300)
  - Perspectives: no possibility of collecting LCA of FADN farms on a long term basis

6. Lessons learned and outlook

- **The AEI-FADN (Agri-Environmental Indicators – Farm Accountancy Data Network) Project**
  - Objectives: to monitor the environmental performance of the Swiss agricultural sector
  - Time frame: start in 2009, planed on a long term basis together with FADN data collection
  - Data collected: selected environmental indicators easy to collect
    Ecological issues covered: nitrogen, phosphorous, energy, water, soil and biodiversity
  - Framework: DSR Model OECD
  - Statistically firm results are aimed
- **Experiences of other countries in collecting environmental data together with FADN data are welcome!**

Thank you for your attention!

4 Farm level analysis of risk and risk management strategies and policies: evidence from German crop farm

Shingo Kimura[1]
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Organisation for Economic Cooperation and Development[2]

Farmers face a large variety of risks that originate from different sources: from production risk to market risk, and from financial risk to institutional risk. Different government policies and programmes contribute to reducing these risks directly (for example, through counter-cyclical payments) or indirectly through the market mechanisms they support (for example, insurance subsidies). The set of policies can significantly modify the distribution of returns or income of the farm or the farm household, but they also modify the whole production and risk management strategy of the farmer. If some of the risks are somehow covered by government programmes, the incentives to use other strategies are reduced. These may include market instruments such as crop yield insurance or price hedging, and the use of on-farm strategies such as crop diversification. A good understanding of the net impact of government policies related to risk management in agriculture needs to analyse the interactions between different sources of risk, different farmers' strategies and different government programmes. This is called the 'holistic approach' to risk management in agriculture (OECD, 2009).

In Europe, policy reform towards less distorting direct payments has allowed the enhancement of farm income, while increasing exposure to price risks due to reduced price support. At the same time, some countries implement programmes to manage risks. However, the interactions between decoupled payment and the risk reducing government policies need to be analysed. The European Union recently approved the Health Check of the Common Agricultural Policy and opened the possibility for using EU funds for some risk management policies such as financial contributions to crop insurance and mutual funds (EC, 2008).

The first impact of government programmes on farmers' risk has been studied in the literature. OECD (2005) goes a step further developing a micro model in which the farmers maximise expected utility and obtain policies that can potentially crowd-out market instruments covering similar or correlated risks, and sometime crowding-in may occur for risks that are negatively correlated. The same type of results is found in Coble et al. (2000). Bielza et al. (2007) provided a similar analytical model and empirical application, focusing on the price risk of the Spanish potato sector. Goodwin (2009) uses a similar simulation to analyse the effects of payment limitations on acreage decisions in the U.S. However, these studies analyse a single source of risk or do not analyse the farmer's crop diversification strategy.

This paper has two major components. The first part examines risk exposure at the farm level by using a longitudinal panel data of German crop farms (e.g., the variability of yields and output prices, and correlations between risk factors).The statistical effects of aggregating risk variables are discussed by comparing the risk variable obtained at the farm level data and that from the aggregated data. This distinction is very important for policy design on risk management. Farmers are affected by individual risks and variability and make their decision on this basis. However, sometimes policy discussions focus on risks measured at the aggregate level, which may bias the policy focus. Following the analysis of producer's risk exposure, the second part of this paper models the behaviour of a risk averse farm producing six crops, facing uncertainty in yield and output price that are calibrated at the average levels of the individual farm data. This simulation model introduces three risk management strategies, namely crop diversification, crop yield insurance and forward contracting in addition to the single farm payment. The model also analyses empirically the producer's participation in the risk market and its impacts on farm welfare. Interactions between single farm payment and the use of risk market instruments

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[2] The views expressed in this article are those of the authors and not those of the OECD or its member countries.

are also investigated. The paper concludes with preliminary findings and the agenda for the next stage of this part of the project on risk management.

4.1 Risk exposure of individual farms: the case of crop farms in Germany

The availability of historical farm level data is a major constraint to the analysis on the risk exposure of individual farm. Coble et al. (2007) and OECD (2008) conclude that the assessment of risk faced by producers requires historical series of farm-level data since aggregate data can be misleading and they can severely underestimate the farm-level production risk. The characteristics of producer's risk exposure are also a key to determine risk management strategies. This paper is based on the statistical information of historical individual farm level data from German FADN data which is contributed by the German Institute of Farm Economics (INLB) through OECD's network for farm level analysis. In total, the panel of 262 crop farms are identified for a 12-year-period between 1995/96 and 2006/07. The variance-covariance matrix of relevant risk variables is calculated for each farm. The distribution of the variance and covariance across farms is presented with statistical indicators such as the mean and standard deviation. They are reported by three regions (North, Centre/South and East).[1]

The characteristics of sample farms are summarised at Table A.1 in the Appendix. The averages of price, yield and planted area are reported by six crops: oilseeds, rye spring barley, winter barley and wheat in addition to the averages of total cost, variable cost, subsidy receipt, farm revenue, farm income, farm equity and labour inputs. Wheat is the main crop in all the regions and has between 30 to 40% share in total planted area, followed by barley. The average farm size in the eastern region is more than four times larger than those in the other two regions, and the farm operation in this region depends on hired labour.

4.1.1 Variability in crop yield and price

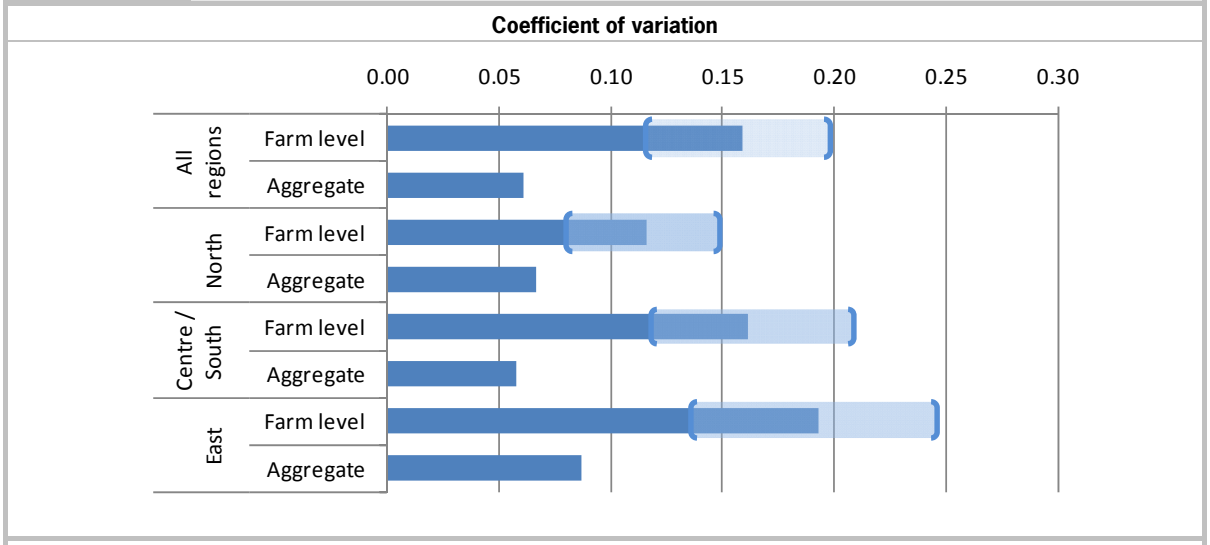
The coefficients of variations of yield and price of six crops, farm revenue, variable and total cost, net farm income and subsidy are calculated by region both from farm level and aggregated data. In the farm level data, the information concerning the distribution of variance-covariance matrix allows to calculate the standard deviations of the coefficient of variation in addition to the mean level across farms (Appendix A, Table A.2).

Variability of crop yield

Figures 4.1 and 4.2 compare the average coefficients of variation of yields observed at the farm level with those observed at the aggregate data for wheat and winter barley, respectively. The figures also show the dispersion of the yield coefficient of variation across farms from the farm level data, which represent the yield variability across farms expressed as a standard deviation. The data show that the observed average yield variability is much higher at the farm level than at the aggregate level. Since the yield risk is location specific, a favourable yield in one location can be offset by an unfavourable yield in another location within the aggregated data, leading to the difference of average yield variability between the farm level and aggregated data. This is called a spatial aggregation bias in previous studies (e.g., Coble et al., 2007). The aggregation bias may mislead policy maker to underestimate the yield variability by observing the aggregated data. The aggregation bias has to be taken into consideration to assess the producer's exposure to yield risk.

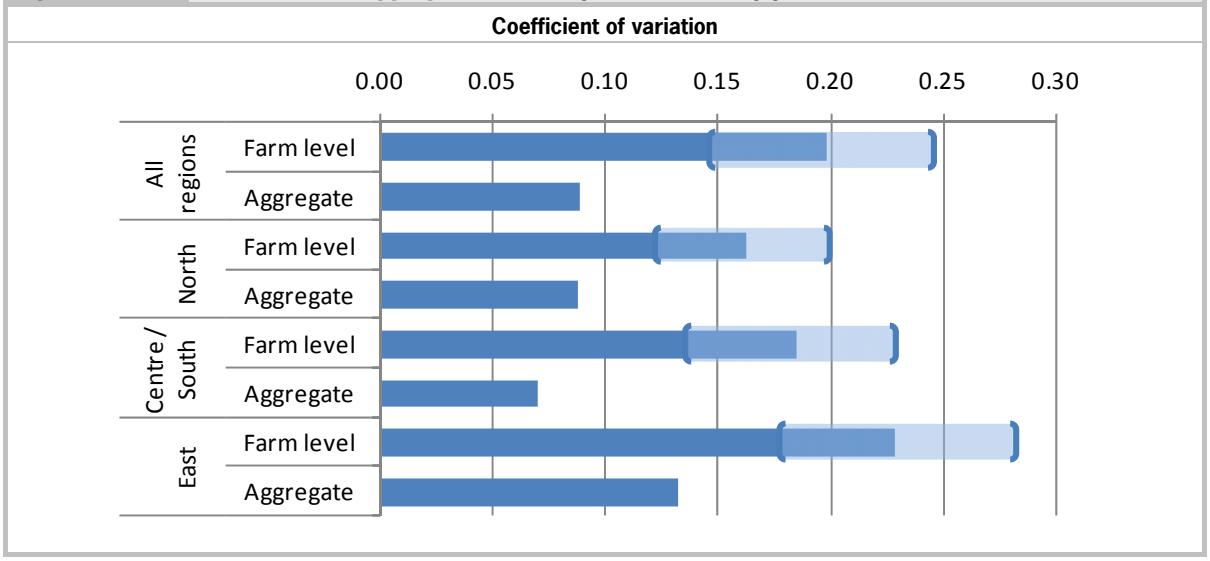
[1] Since the reported information concerns the distribution of the variance-covariance matrices across farms, it does not include any information that can identify specific farmer in the data.

Figure 4.1 **Farm level and aggregated variability of wheat yield**



* The bracket indicates the mean plus minus the standard deviation of the coefficient of variation across farms.

Figure 4.2 **Farm level and aggregated variability of winter barley yield**



Variability of output price

The average coefficients of variation of wheat and winter barley prices observed at the farm level are presented in comparison with that observed for the aggregated data (Figures 4.3 and 4.4). The figures also show the standard deviation of the price coefficient of variation across farms in the farm level data. As for the crop yield variability, the variability of output price is observed to be higher at the farm level data than at the aggregated level data. However, the difference found to be much smaller than is the case for the yield coefficient of variation. The spatial integration of output market equalises output prices across locations, making the price variability less location specific than yield variability. It can be argued that the special aggregation bias is smaller in the case of price risk. In contrast to the observations from the farm level data, the average price coefficients of variation is in many cases found to be higher than the average yield coefficients of variation in the aggregated data (Appendix A, Table A.2). Policy makers could conclude that the farmer is more exposed to price risk than to yield risk. However, once the spatial aggregation bias is taken into account, in many cases this is found to be wrong (e.g. winter barley in Figures 4.2 and 4.4). On the other hand, the difference of price variability across farms is found to be much larger than that of yield variability, meaning that the farmer faces a wider range of

price risks than yield risk. This result implies that price risk at the farm level may depend in part on the farmer's ability to manage price risk.

Figure 4.3 **Farm level and aggregated variability of wheat price**

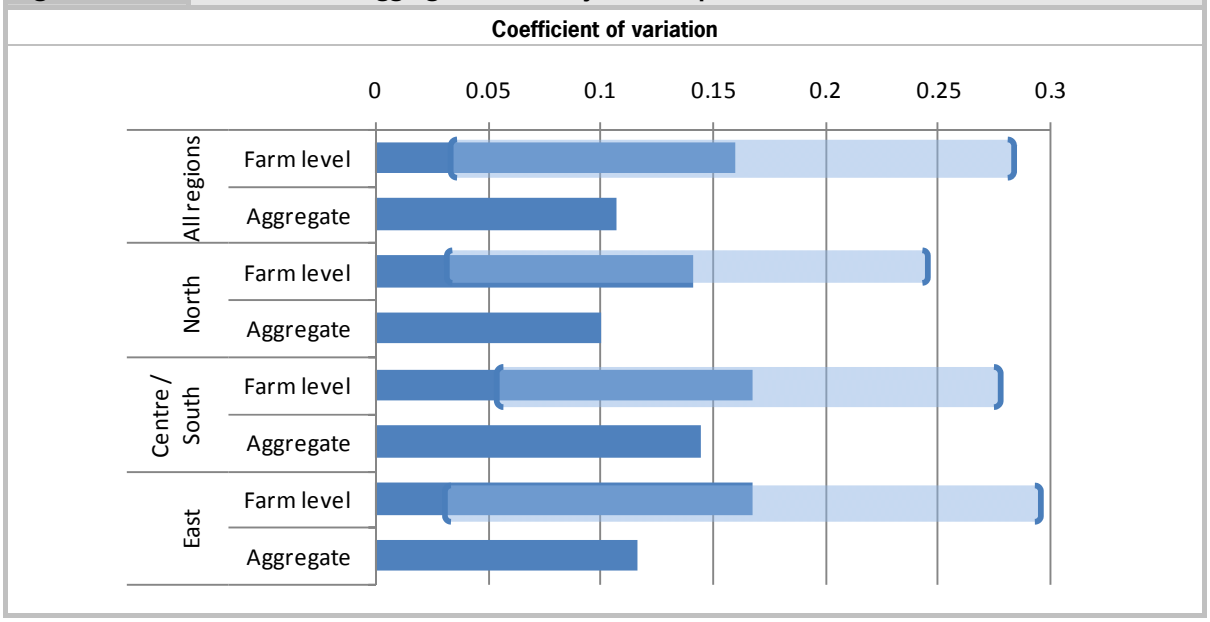
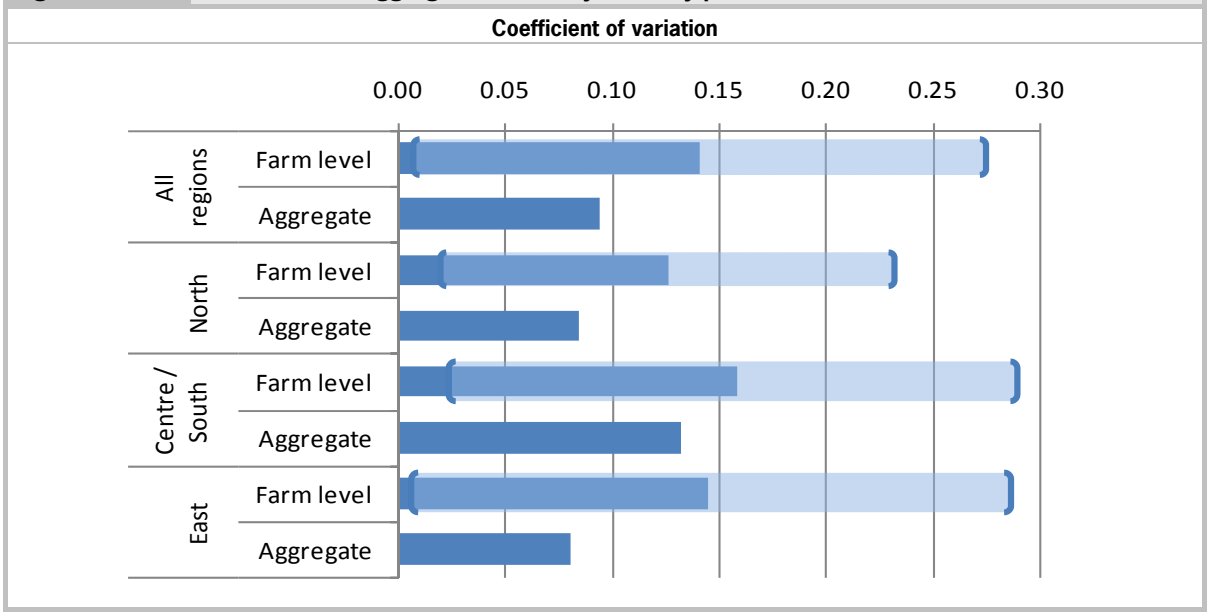


Figure 4.4 **Farm level and aggregated variability of barley price**



4.1.2 Correlations between uncertain variables

The coefficients of correlation between uncertain variables (between yield and price of six crops, wheat price and other crop prices, wheat yield and other crop yields, and farm revenue, cost, subsidy and net farm income) are calculated both from farm level and aggregated data (Appendix A, Table A.3). Correlations between uncertain variables are important in the producer's risk management strategy because they make use correlations to reduce the joint variability.

Price-yield correlation

The negative correlation between yield and price naturally stabilises the crop revenue and is expected to constitute an important part of the farmer's risk management strategy. The data shows that negative correlations are found between crop yield and price both in farm level and aggregated data as general economic theory predicts. However, the mean coefficients of correlation between crop yield and price are found to be much higher in the aggregated data than in the farm level data (Figures 4.5 and 4.6). This is most probably because the aggregated yield outcome affects market prices through changing the total market supply, while the yield of individual producer does not affect the market price directly. On the other hand, the standard deviation of coefficient of correlations between price and yield is found to be very high, meaning that farmer faces very wide range of price-yield correlation. The degree of the farmer's use of price-yield correlation may depend on the characteristics of the individual farmer.

Although the observed negative price-yield correlation is lower at the farm level data, this does not mean that the price-yield correlation is irrelevant in stabilising revenue. In order to analyse the significance of price-yield correlation in stabilising revenue, the distribution of per hectare wheat revenue is simulated from the yield and price data, assuming multivariate normal distribution. The simulation indicates that the negative coefficient of correlation of -0.19, which is observed in the farm level data, reduces the coefficient of variation and the level of wheat revenue by 2.1 percentage points and 0.5%, respectively compared to the case when there is no price-yield correlation. On the other hand, higher negative price-yield coefficient of correlation of -0.59, which is found in the aggregated data, reduces the revenue coefficient of variation by 7.8% points, but at the same time reduces the expected revenue by 1.5% relative to the zero correlation case. This simulation exercise implies that the trade-offs between the variability and expected level of revenue may exist and moderately negative yield-price correlation could provide risk averse farmer with higher welfare. However, the welfare outcome depends on the degree of risk aversion as well as on the distributional characteristics of yield and price. The analysis on the significance of price-yield correlation in revenue stabilisation will be further elaborated in the next step.

Figure 4.5 **Farm level and aggregate level wheat yield-price coefficient of correlation**

Values are expressed in negative terms

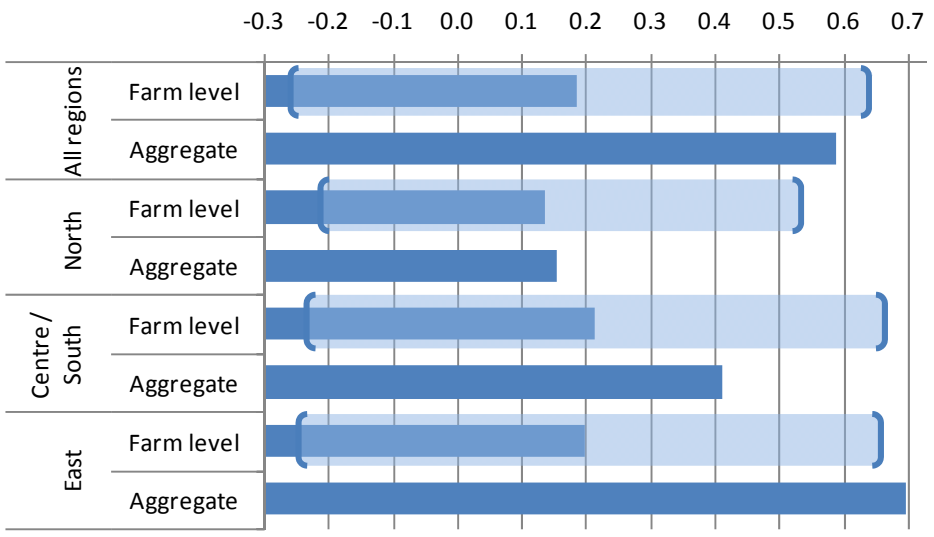
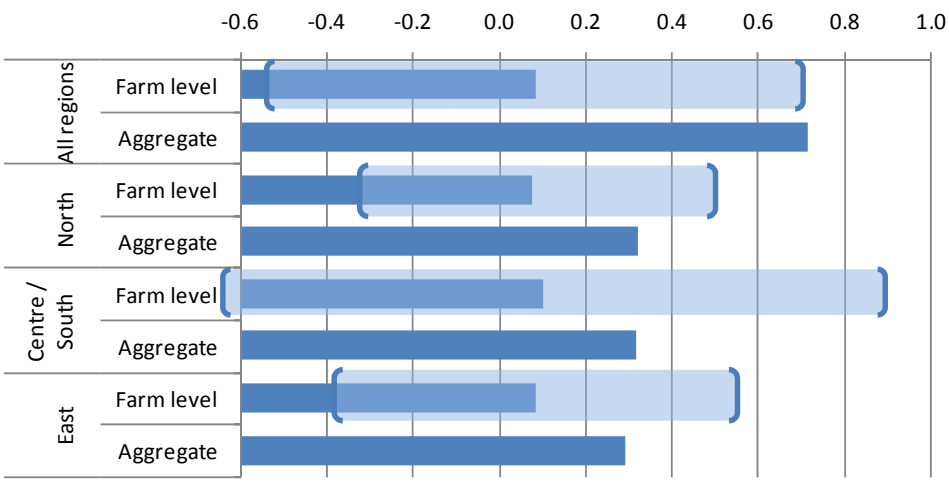


Figure 4.6 **Farm level and aggregate level barley yield-price coefficient of correlations**

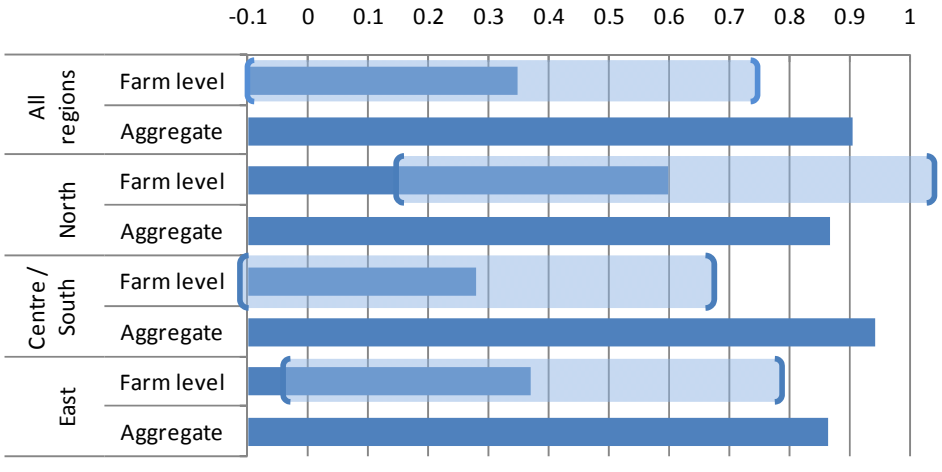
Values are expressed in negative terms



The correlations of yields and prices across commodities

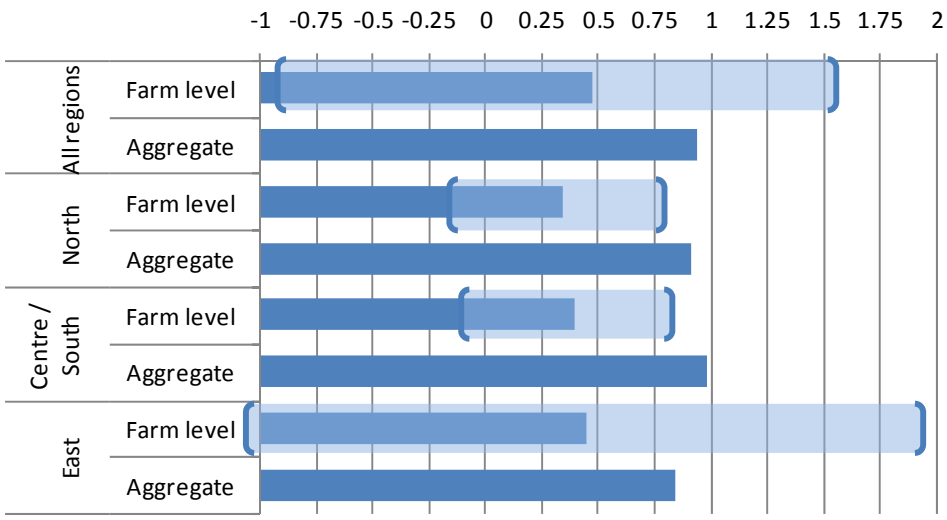
Figures 4.7 and 4.8 demonstrate the average yield-yield and price-price coefficient of correlation between wheat and winter barley from both farm level and aggregated data and the standard deviation of them across farms. These correlations across crops determine the correlations of per hectare revenue across crops, which is the basis for producer's crop diversification strategy. Positive yield-yield and price-price correlations are found between wheat and winter barley both in the farm level and aggregated data. Correlations of yields and prices between crops are observed higher in the aggregate level data than in the farm level data in most of the cases. Price correlation across crops might be observed higher at the aggregate level data because market price of one commodity to respond more to the price of another crop in the aggregated level. On the other hand, the lower yield correlations across crops at the farm level data could be the consequence of crop rotation in which the farmer does not plant multiple crops in the same year, but rotates crop across several years.[1]

Figure 4.7 **Farm level and aggregate level wheat and winter barley yield coefficient of correlation**



[1] In Germany, farmers usually apply a three-year crop rotation: wheat, barley and sugar beets (or oilseeds). In the region with sandy soils, mainly located in the East region, a rotation is usually rye, barley, oilseeds.

Figure 4.8 **Farm level and aggregate level wheat and barley price coefficient of correlation**



Correlation between crop revenue, cost and subsidy

The correlations between the components of farm income reflect the producer's risk management strategy (Appendix A, Table A.3). The farm level data indicate the positive coefficient of correlation (0.67 on average) between farm revenue and total cost, allowing farmers to reduce the variability of farm income to less than that of farm revenue. The positive correlation between revenue and cost implies that the farmer may be adjusting the cost depending on the farm revenue to stabilise his income. It is found that the amount of subsidy is positively correlated with farm revenue (coefficient of correlation of 0.19 on average), meaning that subsidy is paid cyclical to the revenue. However, positive correlation (0.24 on average) between the total cost and subsidy may have a role in stabilising the farm income.

4.1.3 Decomposition of farm income risk

Decomposition of farm income

If farm income is composed of three elements -revenue, subsidy and cost- farm income can be expressed as the sum of crop revenue and subsidy less cost such as,

Farm Income (I) = Revenue (R) + Subsidy (S) - Cost (C).

Suppose that these three elements are independent and not correlated with each other, the variance of income is the sum of the variance of revenue, subsidy and costs (variance components in the following equation). However, this is not the case when these elements are correlated. For example, a positive correlation between cost and revenue (or subsidy) or a negative correlation between revenue and subsidy could reduce the variance of income. In this case, the variance of farm income can be expressed as the sum of three variances and twice the covariance (the sum of variance components and covariance components in the following equation). This simple decomposition recalls the basic proposition that risk is not simply an additive concept, but is also determined by the interactions among risks.

$$Var(I) = \underbrace{Var(R) + Var(S) + Var(C)}_{\text{Variance components}} + \underbrace{2Cov(R,S) - 2Cov(R,C) - 2Cov(S,C)}_{\text{Covariance components}}$$

The positive correlation between farm revenue and total (and variable) costs in Appendix A, Table A.3 implies that the correlations between the elements of income reduce the overall income variability. In order to investigate the significance of these correlations, the variance of income is decomposed (Table 4.1).[1] The sum of variance components are equivalent to the variance of income when there is no correlation among the income elements. The decomposition shows that the variance of cost and crop revenue accounts for 57% and 41% of the sum of variance components on average, respectively, indicating that cost and revenue are the major source of income variability. However, observed variance of income is only 45% of the sum of the variance components on average. The covariance components reduce the variance of income by 55% on average relative to the case of no correlations among income elements. Among the covariance components, the covariance between crop revenue and costs contributes to the majority of the reduction in the overall income variability. These decompositions of income risk reveal the significance of positive correlation between revenue and cost in the farmer's strategy to stabilise farm income.

Table 4.1 Decomposition of the variance of income

		All regions (%)	North (%)	South/Centre (%)	East (%)
	Sub total	*100*	*100*	*100*	*100*
Variance	Crop revenue	41	59	49	34
Components	Cost	57	40	50	65
	Subsidy	2	1	1	1
	Sub total	*-55*	*-39*	*-93*	*-59*
Covariance	Crop revenue and cost	-65	-39	-92	-72
Components	Crop revenue and subsidy	3	2	1	2
	Subsidy and cost	-5	-4	-2	-4
	residual	12	2	1	14
Variance of income relative to the case without correlations		45	61	7	41

Decomposition of crop revenue risk

When farm income risk is decomposed, the variability of crop revenue is found to be the major component in the variability of farm income. One of the most important risk management strategies to reduce revenue risk is crop diversification. The combination of crops that have a lower correlation than one always reduces the variability of the total revenue. The decomposition of revenue risk can reveal the crop diversification strategy adopted by the farmer. Table 4.2 demonstrates the mean and the coefficient of variation of the simulated per hectare revenues from monoculture crop productions, as well as the simulated per hectare revenue from the observed crop diversification of average farm in the data. Among the six crops, per hectare monoculture revenue from spring barley has the highest coefficient of variation on average (0.38), followed by oilseeds (0.31). Sugar beet production generates by far the highest per hectare revenue with the lowest coefficient of variation in all regions. However, actual land allocation to sugar beet production remains 9% on average among the six crops, due presumably to the production quota. The risk reducing effect of producer's crop diversification strategy is clearly shown by the lower coefficient of variation of per hectare revenue of observed crop allocation than that of per hectare revenue from monoculture production in all regions. This result indicates that producers are making use of crop diversification strategy to reduce the revenue risk.

[1] Since some cost data are not reported, the residual of variance of farm income is considered to be the variance/covariance of unknown costs.

Table 4.2	Simulated per hectare revenue; monoculture and observed crop diversification								
		All regions		North		Centre/South		East	
		mean	C.V.	mean	C.V.	mean	C.V.	mean	C.V.
From each crop production (monoculture)	Oilseeds	792	0.31	818	0.33	714	0.31	804	0.29
	Rve	649	0.29	790	0.22	719	0.29	581	0.32
	Spring barley	557	0.38	538	0.29	689	0.42	524	0.37
	Sugar beet	2,632	0.16	2,732	0.11	3,292	0.13	2,359	0.20
	Winter barley	698	0.23	793	0.20	662	0.23	646	0.26
	Wheat	848	0.20	955	0.17	898	0.21	757	0.23
From observed crop diversification		915	0.12	1,166	0.11	1,088	0.12	816	0.14

In order to investigate which variability or correlation is important in determining the simulated crop revenue from observed crop diversification, the variance of simulated per hectare crop revenue is decomposed to each variance and covariance term according to the following equation.

$$Var(Crop\,\mathrm{Re}venue) = \sum_{n=1}^{6} a_i^2 Var(R_i) + 2\sum_{i,j:i<j} a_i a_j Cov(R_i, R_j)$$

a_i proportion of land input to crop i

Table 4.3 presents the change in variance of diversified crop revenue relative to the wheat monoculture production as well as the contribution of each variance and covariance term.[1] Since wheat per hectare revenue has a relatively low coefficient of variation, crop production other than wheat leads to the positive contribution of variance terms. However, the larger variance terms are offset by negative contribution of covariance terms, which reduce the variance of per hectare revenue by 57.5% on average relative to wheat production. In particular, low (sometimes negative) correlations of per hectare revenue between sugar beet and other crops contributed more than 30% of the reduction of variance on average.[2]

Table 4.3	Reduction of variance of per hectare revenue due to crop diversification					
Relative to per hectare monoculture wheat revenue						
			all regions (%)	north (%)	centre/south (%)	east (%)
Change in variance of per hectare revenue -			57.5	-55.0	-53.6	-57.4
Contribution of variance	Oilseeds		3.3	5.0	1.4	2.6
	Rye		0.7	0.4	0.6	0.4
	Spring barley		1.0	0.0	8.1	0.3
	Sugar beet		6.7	14.6	12.4	5.7
	Winter barley		-0.6	-0.1	-1.3	-0.6
Contribution of covariance	Wheat	Oilseeds	-13.6	-10.4	-13.5	-14.6
		Rye	-11.4	-7.2	-6.6	-12.6
		Spring barley	-8.6	-6.5	-9.0	-8.6
		Sugar beet	-14.2	-28.7	-15.4	-12.6
		Winter barley	-14.9	-12.7	-14.0	-17.3
	Winter barley	Oilseeds	-6.0	-4.9	-6.5	-6.3
		Rye	-6.8	-4.2	-4.5	-7.3
		Spring barley	-4.5	-5.8	-6.7	-4.0
		Sugar beet	-6.0	-11.5	-6.5	-5.4

[1] Each variance and covariance term of diversified crop revenue is compared with the decomposed wheat monoculture revenue in which the observed ratio of crop diversification is applied.
[2] The coefficients of correlation between per hectare revenue of 6 crops are reported in the Appendix A, Table A.4.

Table 4.3	Reduction of variance of per hectare revenue due to crop diversification (continued)					
Relative to per hectare monoculture wheat revenue						
			all regions (%)	north (%)	centre/south (%)	east (%)
	Sugar beet	Oilseeds	-2.7	-7.0	-8.9	-1.5
		Rye	-5.9	-7.9	-4.7	-4.8
		Spring barley	-3.0	-5.6	-6.2	-2.1
	Spring Barley	Oilseeds	-3.7	-1.0	-9.4	-2.8
		Rye	-3.6	-2.4	-4.9	-2.8
	Oilseeds	Rye	-6.1	-4.0	-4.5	-5.8

4.2 Risk management strategies and policies

4.2.1 Stochastic simulation model

While the first part of the paper presents the preliminary findings on the producer's exposure to risks and the use of correlations among uncertain variables from farm level data, the second part investigates farmer's response to risk market instruments and the interaction between a government programme and risk management strategy. In order to simulate farm behaviour, a farmer with specific risk preference is calibrated on the average level of the farm level data from Germany, in which he produces six crops facing uncertain output prices and yields. The main focus of the stochastic simulation is to analyse the policy impacts on the distribution of farm income, farm welfare and farm behaviour. In this model, three risk market strategies are available; crop diversification, crop yield insurance and forward contracting. On the other hand, government programme includes the singe farm payment, subsidy to yield insurance premium and to forward price.

The model adopts the power utility function which assumes constant relative risk aversion (CRRA). Similar simulation analysis has already been conducted for example on recent policies in the United States (Gray et al., 2004). These studies, however, take decisions on the farm as given in each of their scenarios. Coble et al. (2000) analyse specific instruments such as yield and revenue insurance and their impact on hedging levels. However, the advantage of this model is that it treats farmers' risk management strategies as endogenous, allowing the interaction between policies and farmer's decision to be analysed.

$$(1) \qquad U(\tilde{\pi}+\omega)=\frac{(\tilde{\pi}+\omega)^{(1-\rho)}}{(1+\rho)}$$

where the utility (U) depends on the uncertain farm profit and initial wealth; ρ stands for the degree of constant relative risk aversion (CRRA).[1]

The uncertain farm profit ($\tilde{\pi}$) is defined as the crop revenue less variable production costs plus net transfer or benefit from a given risk management strategy. The revenue from each crop is expressed as the multiplication of uncertain output price and uncertain yield, less average production cost per hectare.[2] The model assumes that total land input is fixed and is allocated between six crops.[3]

$$(2) \qquad \tilde{\pi}=\sum_{i=1}^{6}[(\tilde{p}_i * \tilde{q}_i - c_i) * L_i] + g(\tilde{p}_i, \tilde{q}_i, \lambda)$$

[1] The degree of CRRA of 2 is chosen for the entire simulation analysis. The initial wealth is set as €2,694 per hectare based on the farm equity of average farm in the data.

[2] Since the crop specific cost data is not available in the data, the production cost is calibrated for each crop so that the initial land allocation is the optimum.

[3] It is assumed that land allocation to sugar beet cannot exceed 8.9% of total land due to the production quota system.

where:

$\tilde{p}_i$ uncertain output price of crop i

$\tilde{q}_i$ uncertain yield of crop i

c_i variable production cost of crop i

L_i area of land allocated to crop i and $\sum L_i = \bar{L}$

g transfer from government or benefit from risk market instruments

λ level of coverage decided by farmer

Given the distribution of profits in combination with government payments and benefits from risk management instruments, certainty equivalence of profit is used to compute the farmer's welfare for a given level of risk aversion.

(3) $$CE = [(1-\rho)EU\ (\tilde{\pi} + \omega)]^{1/(1-\rho)} - \omega$$

ω Initial wealth of the farmer

The simulation scenarios are based on this model structure for a given set of decisions; the land allocation and the coverage level of risk market instruments. Since the first order conditions to maximise the expected utility lead to analytical expressions that are difficult to quantify, the analysis depends on simulation with an empirically calibrated model. The first step of calibration generates the multivariate normal distribution of uncertain prices and yields that have already been performed to simulate crop specific revenue in the previous section. The second step calibrates two risk market strategies; crop yield insurance and forward contracting strategies.[1]

Crop yield insurance strategy

The calibration process of crop yield insurance follows the one applied in OECD (2005). The benefit from crop yield insurance strategy g_1 is the net of an indemnity receipt and insurance premium payment. The indemnity is paid in case the crop yield turns out to be below the insured level of yield ($\beta_q * q_{hi}$) and the payment is determined by the area of land that the farmer insures (L_{Ii}).[2] To avoid moral hazard and adverse selection effects (e.g., increase the historical yield to receive indemnities in the future), the model assumes the perfect insurance market so that risk neutral insurance companies offer crop insurance contact at the price equal to the expected value (fair insurance premium) without administrative cost and government subsidy.[3]

[1] Given the Monte-Carlo draws made for 1,000 times from the joint distribution of price and yield, the model optimizes the crop diversification and the coverage level of risk market instruments to maximize the expected utility.
[2] The insured level of yield is set as 95% of historical average yield for all the commodities in line with OECD (2005). It is also assumed that producers cannot insure more area than the area they plant.
[3] The forward price applied to calculate the insurance premium is set at 5% lower then the expected price.

$$g_1 = \underbrace{\sum p_{fi} * q_{h1} * L_i * Max(0, \beta_{qi} - \frac{\tilde{q}_i}{q_{hi}})}_{\text{Indemnity receipt}} - \underbrace{(1+\gamma) * p_{f1} * q_{hi} * L_i * E[Max(0, \beta_{qi} - \frac{\tilde{q}_i}{q_{hi}})}_{\text{Insurance premium payment}}$$

p_{fi} forward price of commodity i

L_{Ii} area of land for commodity i which farmer insures its yield

q_{hi} historical average yield of commodity

β_{qi} proportion of yield insured for commodity i

γ net of administration cost of insurance and subsidy to insurance premium

Forward contracting strategy

Calibration of the forward contracting strategy follows the process adopted in OECD (2005), where the model applies the basic model of perfect futures market by Holthausen (1979). The farmer simultaneously takes his planting and hedging decisions, at which time he can commit himself to forward sell any quantity of output (h_i) at the date of harvesting at a certain forward price (p_{fi}). Unlike the price hedging through futures market which does not cover a basis risk arising from a mismatch between the futures price at the expiration date and the actual selling price, price hedging through tailored forward contract covers also his basis risk. The model assumes that the transaction cost and subsidy are reflected in the forward price. If there is no transaction cost or subsidy, the forward price will be equal to the expected price.

$$g_2 = \sum (p_{fi} - \tilde{p}_i) * h_i$$

h_i amount of commodity i that farmer hedges price

p_{fi} forward price specified in the contract

4.2.2 Incentives to use market strategies

Producer's response to the cost of crop yield insurance

Figure 4.9 demonstrates the relationship between the cost of insurance and the producer's demand for crop yield insurance. The cost of insurance and demand for crop yield insurance are expressed as the percentage additional cost to the fair insurance premium and the proportion of planted area insured, respectively.[1] The simulation result shows that the farmer does not purchase any crop insurance unless the percentage additional cost is below 6% and most of the crops are not insured unless the percentage additional cost becomes less than 4%. This result illustrates the difficulty in letting farmers participate in the yield insurance market. The sugar beet yield is not fully insured even if the cost of insurance is equal to the fair insurance premium. It may be the case that some crops may not be fully insured even if the fair insurance premium is offered.

[1] The simulation changes the cost of insurance for all the crops at the same rate.

Figure 4.9 **Demand for crop yield insurance**

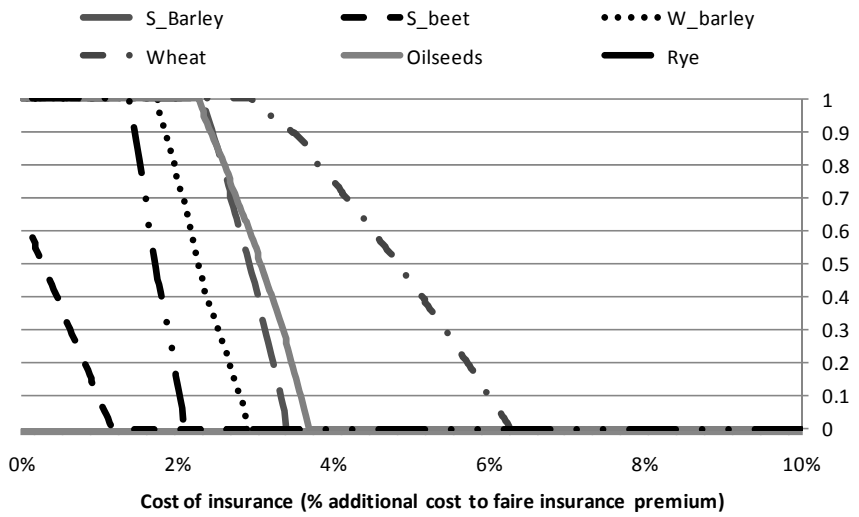
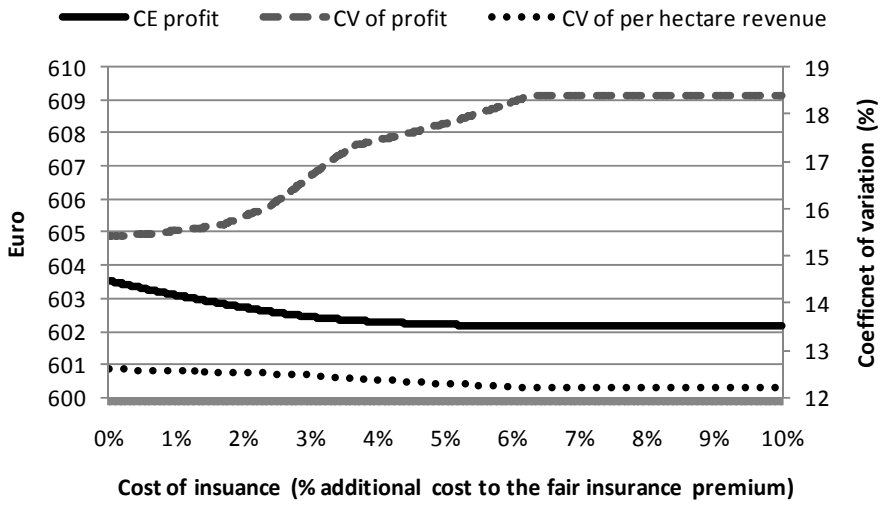


Figure 4.10 presents the cost of insurance and the associated level of farm welfare, and profit and revenue variability.[1] Lower cost of insurance allows the farmer to insure a higher proportion of land and to reduce the profit variability as the yield risk is covered by the insurance. The lower profit variability leads to a welfare gain indicated by an increase in certainty equivalent profit. In addition to the effect of covering yield risk, the use of crop yield insurance affects the farmer's crop diversification strategy. The simulation results indicate that the coefficient of variation of per hectare revenue increases as farmers start to participate in the insurance market, meaning that farmers reallocate crop diversification to achieve higher revenue. This is because lower yield risk brought by yield insurance allows the farmer to adopt a riskier crop diversification strategy and generates higher expected return with higher variability. These simulation results imply that government efforts to reduce farm income risk through an insurance subsidy may partly be offset by the farmer's crop diversification strategy to make riskier crop choice.

Figure 4.10 **Cost of crop yield insurance and farm welfare**



[1] Since farm size does affect the simulation result in this model; farm size is normalized to one hectare in the simulation.

Producer's response to the cost of forward contract

Figure 4.11 shows the simulated relationship between the cost of a forward contract and the demand for the price hedging through forward contracting. While the cost of a forward contract is expressed as the percentage additional forward prices relative to the expected price, the demand for forward contract is shown as the proportion of crop yields whose prices are hedged.[1] The simulation result indicates that farmer does not hedge the price of any commodity unless the cost of forward contract is less than 1.5%. Spring barley has the highest price coefficient of variation and is the first commodity which farmer hedges price when the cost of forward contract reaches the threshold. The prices of oilseeds are not hedged even the cost of forward contract is zero, indicating that the price of some crop may not be hedged even if the cost of forward contact is zero.[2] On the other hand, the producer forward contracts some crops more than the actual yield. The range of the cost of forward contract at which the farmer participates in the market is found to be narrower than is the case for crop yield insurance. The simulation result indicates that the use of forward contracting strategies would most probably be limited for forward contracts that cost more than 1% of the expected price.

Figure 4.11 **Demand for forward contracting**

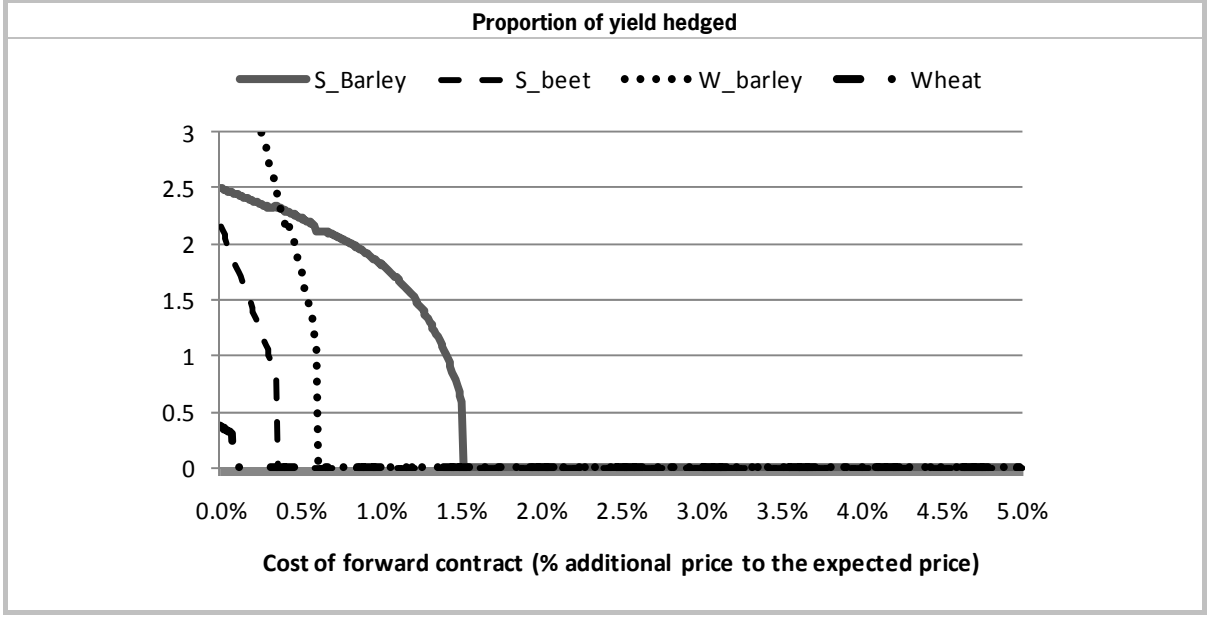
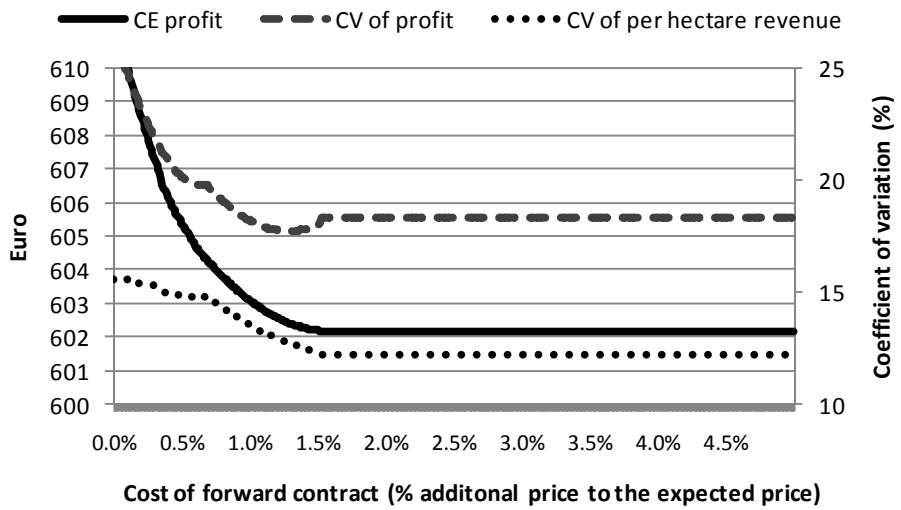


Figure 4.12 presents the relationship between the cost of the forward contract, and the associated level of farm welfare and profit (and per hectare revenue) variability. Once the cost of the forward contract becomes lower than 1.5% of the expected price, the producer starts to take the forward contract and reduce the profit variability through covering price risk. However, more use of forward contracting also affects the farmer's crop diversification strategy. As the forward contract covers more price risk, the producer adopts the riskier crop diversification strategy indicated by the higher coefficient of variation of per hectare revenue. As a result, the coefficient of variation of profit also starts to increase because the effect of reduced price risk on profit variability is dominated by the effect if increased per hectare revenue variability. Nonetheless, the producer welfare as measured by the certainty equivalent profit continues to increase due to the higher level of profit achieved.

[1] The simulation changed the cost of forward contract for all crops at the same rate.
[2] The endogenous crop diversification leads to no production of rye when the cost of forward contracting is zero.

Figure 4.12 **Cost of forward contracting and farm welfare**



4.2.3 The impact of single farm payment on risk management strategies

The impact of single farm payment on crop diversification strategy

The simulation is conducted to estimate the impact of single farm payment (SFP) on the farm profit and per hectare revenue in the absence of risk market instruments (Table 4.4). The level of €334 per hectare payment is chosen, assuming that the subsidy receipt in the farm level data is paid entirely as SFP. The simulation result shows that mean profit increases slightly more than the payment (€0.35) and lowers the coefficient of variation of profit (-6.42% points). It is also found that the payment leads to a higher level and variability of per hectare revenue. This is because the higher level of wealth gained from the payment makes the farmer less risk averse, allowing them to adopt the crop diversification strategy that provides higher return with higher variability. Moreover, a higher level of profit may have an impact on the risk management strategy through a different channel. For example, SFP may reduce the cost of credit, affecting the producer's decision making dynamically. It can be argued that even the most decoupled payment could affect the farmer's production decision and endogenous risk management strategy.

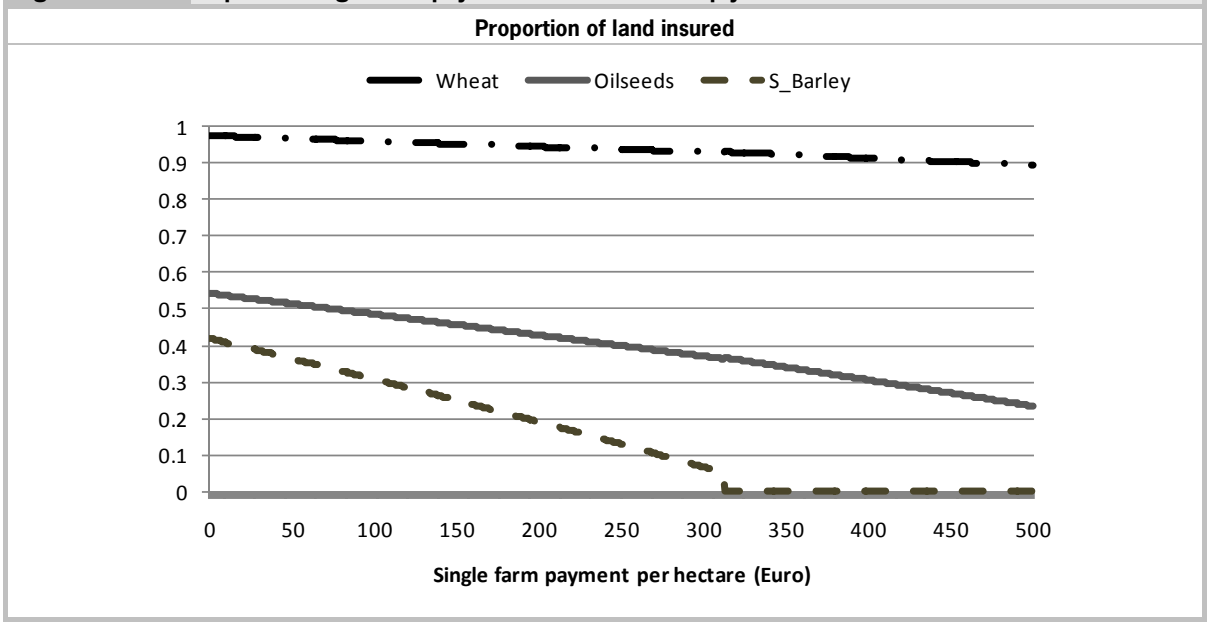
Table 4.4 **The impact of single farm payment on farm welfare**

	Change in per hectare profit			Change in per hectare revenue	
	certainty equivalent (€)	**mean (€)**	**coefficient of variation (% points)**	**mean (€)**	**coefficient of variation (% points)**
SFP (€334)	334.35	334.07	-6.42	3.77	0.07

The impacts of single farm payment on crop yield insurance strategy

When several strategies and programmes are available to the farmer, there will be interactions between different policy measures that can generate some crowding out of market strategies and make some support measures ineffective in reducing risk (OECD 2005). The effect of SFP on the use of crop yield insurance is simulated, assuming that only crop yield insurance is available as a risk market instrument and the percentage additional cost of yield insurance is constant at 3% to the fair insurance premium (Figure 4.13). The simulation result clearly shows the negative relationship between the size of SFP and the proportion of land insured, indicating the potential crowding out effect of market strategies by SFP. The result implies that inducing farmers to participate in crop yield insurance may become more difficult when the government provides direct payment. It can be inferred that policy makers should carefully take into consideration this interaction between risk markets and government programmes.

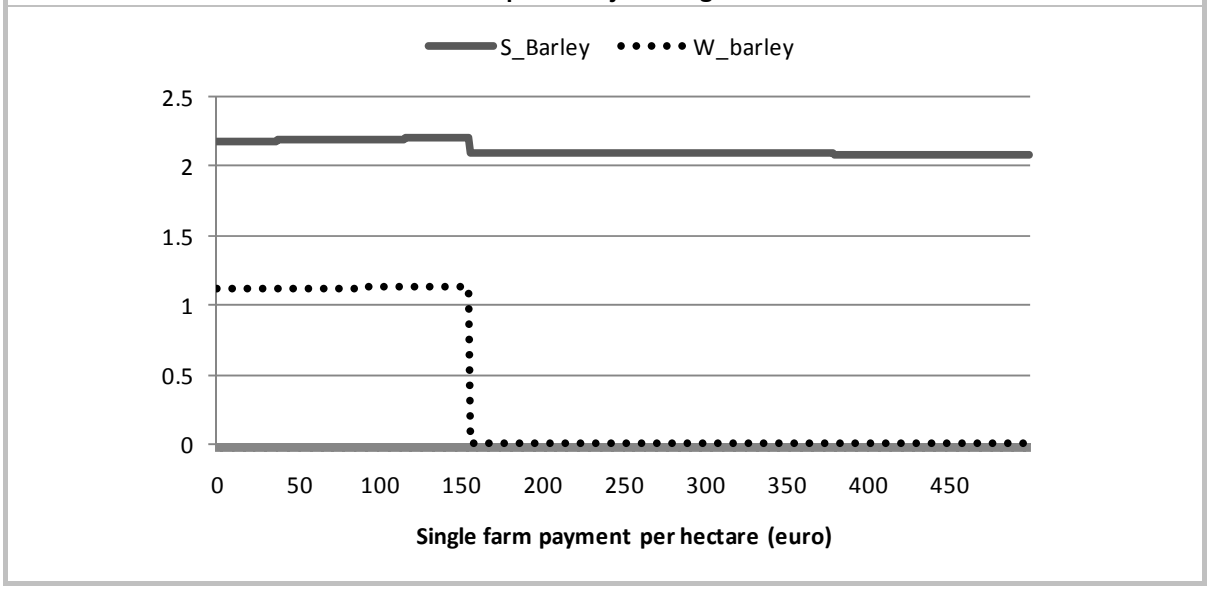
Figure 4.13 **Impact of single farm payment on the use of crop yield insurance**



The effect of single farm payment on forward contracting strategy

The simulation is also conducted on the impacts of single farm payment on the use of forward contracting strategy when only forward contracting is available as a risk market instrument and the percentage additional price of forward contract is 0.6% of the expected price (Figure 4.14). The simulated relationship between the single farm payment and the proportion of yield that the producer hedges the price indicates the crowding out effect of the risk market instruments by the payment. However, unlike the previous simulation for the crop yield insurance market, a discrete change of the use of forward contracting can be observed, where farmer suddenly changes the forward contracting strategy depending on the cost. This result implies that the characteristics of interaction between different policy measures may be different depending on the farmer's endogenous risk management strategy.

Figure 4.14 **Impact of single farm payment on the use of forward contracting**



4.2.4 Comparison of impacts of government subsidy through different channels

Finally, the simulation is conducted to compare the impact of €2 subsidy per hectare on farm welfare through different policy instruments. Notable differences were found between the magnitude of impacts of different policy measures on farm welfare and its channel (Table 4.5). While the producer's welfare gain through SFP comes entirely from the increase in the mean profit, the major source of welfare gain from subsidising the risk market instrument is the lower profit variability, which dominates the welfare loss caused by the lower level of profit. Overall, the simulation result indicates that SFP is the most effective policy in increasing the farm welfare measured by certainty equivalent profit, followed by subsidy to crop yield insurance premium and forward price. However, SFP has little impact on the profit variability and subsidising risk market instruments, particularly crop yield insurance, is more effective in reducing the profit variability. This is also consistent with the finding by OECD (2005) that market mechanisms are better suited to reducing the relevant risk (price, yield, et cetera). These simulation results imply that the selection of policy instruments depend on the government objectives and the optimum policy mix has to be carefully determined considering its impacts on farmer's welfare and production decision as well as the interaction between risk markets and policy measures.

Table 4.5 Comparison of impacts of different policy instruments

Estimated impact of €2 subsidy per hectare				
	certainty equivalent profit (change in €)			CV of profit (change in % points)
	overall change	contributing factors		
		change in mean	change in variability	
Single farm payment	2.00	2.00	-0.00	-0.06
Subsidy to crop yield insurance premium	0.39	-0.48	0.87	-2.19
Subsidy to forward price	0.03	-0.11	0.14	-0.35

* The initial cost of insurance price premium and forward contract are set at 10% and 5%, respectively.

4.3 Concluding remarks

Preliminary findings

This paper presents the preliminary development and findings of the farm level analysis of risk management strategies and policies and does not intend to draw any conclusive policy recommendations at this stage. However, initial analysis of the farm level data provides a number of implications for the risk management policies. The comparison of farm level data and aggregated data in Germany revealed the significance of spatial aggregation bias and potential danger of underestimating yield risk relative to price risk. The decomposition of farm income and crop revenue also implies the important role of correlations between the uncertain variables in determining producer's risk management strategy. In particular, the data shows that the farmer may be benefiting from correlations between costs and revenue to stabilise his income. There is evidence that the diversification of crops where per hectare revenue is less correlated is used by the farmer to reduce variability of crop revenue. These effects are quantitatively described in this paper.

The second part of this study conducted a stochastic simulation analysis on risk market and government programme. The simulation results are subject to the choice of parameters in risk markets and the degree of farmers' risk aversion and, therefore, it remains illustrative. However, preliminary analysis indicates some important characteristics of the risk market and government programmes. The simulation indicated that producers may not participate in risk markets such as crop yield insurance and forward contracting even under relatively low administrative costs. According to the results, price hedging through forward contract may be more difficult to use by farmers than crop yield insurance.

The simulation analysis also indicated a number of potential interactions between government programme and risk management strategies. The first example is the policy impacts on producer's crop diversification strategy. It is shown that even the most decoupled payment could affect the producer's decision on crop diversification and government efforts to stabilise income through subsidising yield insurance premium or forward

price could partly be offset by the farmer's crop diversification strategy to pursue higher return with higher variability. The second example is the policy impacts on the use of risk market strategy. In some cases, the use of risk market instruments is partially crowded out by the government payments. The evaluation of the efficiency of different policy measures in terms of welfare gain and profit variability indicates the higher efficiency of decoupled payment in increasing farm welfare assuming a moderate level of risk aversion. However, decoupled payment has much less effect in reducing profit variability than in subsidising risk market instruments. One of the most important policy implications of the analysis is the potential trade-offs that policy makers confront between improving farm welfare and reducing risks. The analysis indicates the need for policy makers to take into consideration the potential interaction between risk markets and government programmes as well as the policy impacts on the farmer's production decision.

Possible extensions

There are a number of possible extensions to generalise the analyses and to draw more solid policy implications, particularly in the descriptive and simulation parts. Risk exposure of individual farmers is measured in one type of crop farm in one country (Germany). The comparison of risk exposure between different farm types and countries would provide greater inferences. The more data coverage on revenue, costs and off-farm income would reveal the underlying risk management strategy adopted by producers. In particular, individual crop revenue data allows more precise analysis on the farmer's use of price-yield correlations and crop diversification strategy. Off-farm income data can be critical because the diversification of income to the non-farm economy may be an important part of risk management strategies in some countries.

On the simulation side, since the current results may depend largely on the choice of specific parameters such as the producer's risk preference, sensitivity analyses on the selected parameters would be beneficial. Moreover, calibration of existing risk market instruments and government programme must be improved. Current parameters of crop yield insurance and forward contacting are only approximations and need to reflect the actual instruments offered in risk markets. In addition, there are more risk market instruments and government programmes available to farmers that need to be modelled. For example, while the price hedging strategy is currently simulated only by forward contacting, modelling the price hedging through futures market can provide more insights. Although the forward contracting covers the basic risk, it does not necessarily mean that the farmer prefers forward contracting to futures market. The transaction cost could be higher for tailored forward contracting than the price hedging through futures market, where the stylised future contract can be traded probably with lower transaction costs.

Next Steps

The next phase of work will improve the current analysis on the risk exposure and stochastic simulation of risk management strategies and expand country coverage. It is envisioned that the first draft of the farm level analysis of risk and risk management strategies and policies covering several countries that have decided to participate in this part of the project will be presented at the next APM meeting in October 2009.

References

Antón, J., *Agricultural policies and risk management: A holistic approach*. Proceedings of the 108th EAAE Seminar on Income stabilisation. Warsaw, February 2008, forthcoming.

Bielza, M., A. Garrido and J. Sumpsi, 'Finding optimal price risk management instruments: the case of the Spanish potato sector'. In: *Agricultural Economics* 36 (2007) 36, pp. 67-78.

Coble, K.H., R. Dismukes and S. Thomas, *Policy implications of crop yield and revenue variability at differing levels of disaggregation*. Paper presented at the annual meeting of the American Agricultural Economics Association, Portland, 2007.

Coble, K.H., R.G. Heifner and M. Zubiga, 'Implications of crop yield and revenue insurance for producer hedging'. In: *Journal of Agricultural and Resource Economics* 25 (2000) 2, pp. 432-452.

European Commission, *The CAP Health Check Proposal*. COM 306 final. 20.05, 2008.

Goodwin, B.K., 'Payment limitations and acreage decisions under risk aversion: A simulation approach'. In: *American Journal of Agricultural Economics* 91 (2009) 1, pp. 19-41.

Gray, A.W., M.D. Boehlje, B.A. Gloy and S.P. Slinsky, 'How US farm programmes and crop revenue insurance affect returns to farm land'. In: *Review of Agricultural economics* 26 (2004) 2, pp. 238-253.

OECD, *The impact of production incentives of different risk reducing policies*. Paris, 2005.

OECD, *An assessment of risk exposure in agriculture: A literature review*. Paris, 2008.

OECD, *Risk management in agriculture: A holistic conceptual framework*. Paris, 2009.

Appendix

Table A.1 Characteristics of sample farm a)

		National	North	Centre/South	East
Land (ha)	UAA	269.8	99.5	95.2	447.6
	Oilseeds	33.7	13.4	13.5	48.8
	Rye	34.2	11.4	10.8	48.0
	Spring barley	24.4	9.8	17.0	29.1
	Sugar beets	21.5	19.0	12.6	25.9
	Winter barley	41.0	16.0	14.7	66.2
	Wheat	90.7	41.7	29.3	145.5
Labour (WU)	Total AWU	2.9	1.4	1.7	4.4
	Family labour	1.5	1.2	1.5	1.7
	Hired labour	1.9	0.4	0.4	3.3
Yield	Oilseeds	37.5	38.2	34.7	38.0
(100kg per ha)	Rye	60.9	73.6	59.9	56.1
	Spring barley	45.8	48.2	48.7	44.5
	Sugar beets	537.7	561.0	639.8	489.7
	Winter barley	66.4	74.4	59.3	63.2
	Wheat	70.0	81.1	69.5	62.8
Price	Oilseeds	21.1	21.2	20.6	21.2
(€ per 100kg)	Rye	10.8	10.8	12.1	10.6
	Spring barley	12.3	11.3	14.3	11.9
	Sugar beets	4.9	4.9	5.2	4.9
	Winter barley	10.5	10.7	11.2	10.2
	Wheat	12.2	11.8	13.0	12.1
Total Cost (€)		405,022	181,646	177,953	637,565
Variable cost (€)		76,243	35,009	31,111	120,325
Farm Revenue (€)		272,477	155,234	136,630	400,524
Subsidies (€)		90,190	30,435	32,896	151,156
Net farm income (€)		66,136	53,494	39,774	84,155
Farm equity (€)		727,020	1,324,773	706,216	296,791
Off-farm income		n.a	n.a	n.a	n.a

a) The variable cost includes the cost of crop farming only.

Table A.2 Statistical information on the variability across individual farms

		All regions			North			Centre/South			East		
		individual		aggregated	individual		aggregated	individual		aggregated	individual		aggregated
		mean	standard deviation		mean	standard deviation		mean	standard deviation		mean	standard deviation	
Yield	Oilseeds	0.26	0.08	0.13	0.25	0.09	0.10	0.26	0.09	0.13	0.26	0.07	0.17
	Spring barley	0.29	0.09	0.07	0.27	0.07	0.07	0.25	0.07	0.08	0.30	0.10	0.10
	Winter barley	0.20	0.05	0.09	0.16	0.04	0.09	0.18	0.05	0.07	0.23	0.05	0.13
	Rye	0.21	0.06	0.09	0.16	0.04	0.11	0.22	0.06	0.08	0.23	0.07	0.13
	Wheat	0.16	0.04	0.06	0.12	0.03	0.07	0.16	0.04	0.06	0.19	0.05	0.09
	Sugar beet	0.16	0.02	0.07	0.13	0.02	0.07	0.14	0.01	0.09	0.19	0.02	0.08
Price	Oilseeds	0.17	0.10	0.12	0.20	0.11	0.12	0.17	0.09	0.14	0.16	0.09	0.14
	Spring barley	0.23	0.17	0.09	0.16	0.11	0.08	0.29	0.18	0.13	0.19	0.13	0.08
	Winter barley	0.14	0.13	0.09	0.13	0.10	0.08	0.16	0.13	0.13	0.14	0.15	0.08
	Rye	0.22	0.20	n.a.	0.17	0.14	n.a.	0.17	0.13	n.a.	0.25	0.22	n.a.
	Wheat	0.16	0.13	0.11	0.14	0.11	0.10	0.17	0.12	0.14	0.17	0.14	0.12
	Sugar beet	0.13	0.16	n.a.	0.10	0.14	n.a.	0.14	0.14	n.a.	0.15	0.17	n.a.
Farm Revenue		0.22	0.41	n.a.	0.29	0.67	n.a.	0.46	1.05	n.a.	0.25	0.45	n.a.
Variable cost		0.30	0.73	n.a.	0.27	0.46	n.a.	0.22	0.26	n.a.	0.29	0.55	n.a.
Total cost		0.17	0.31	n.a.	0.20	0.29	n.a.	0.36	0.81	n.a.	0.22	0.42	n.a.
Subsidies		0.14	0.23	n.a.	0.19	0.24	n.a.	0.21	0.28	n.a.	0.13	0.20	n.a.
Net farm income		0.65	1.29	n.a.	0.83	1.97	n.a.	0.54	0.54	n.a.	0.71	1.11	n.a.
Off-farm income		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Table A.3 **Statistical information of correlations**

		All regions			North			Centre/South			East		
		individual		aggregate	individual		aggregate	individual		aggregate	individual		aggregate
		mean	standard deviation	mean	mean	standard deviation	mean	mean	standard deviation	mean	mean	standard deviation	mean
Yield price	Wheat	-0.19	0.45	-0.59	-0.14	0.38	-0.16	-0.21	0.46	-0.41	-0.20	0.45	-0.70
	Oilseeds	-0.04	0.46	-0.48	0.09	0.54	-0.45	-0.05	0.36	-0.59	-0.10	0.45	-0.50
	Spring barley	0.08	0.48	0.32	-0.20	0.74	-0.56	0.17	0.40	-0.23	0.06	0.39	-0.44
	Winter barley	-0.08	0.64	-0.71	-0.07	0.42	-0.32	-0.10	0.83	-0.32	-0.08	0.47	-0.29
	Rye	-0.17	0.83	n.a.	-0.18	0.64	n.a.	0.03	0.33	n.a.	-0.20	0.89	n.a.
	Sugar beet	-0.44	0.44	n.a.	-0.58	0.59	n.a.	-0.01	0.32	n.a.	-0.33	0.35	n.a.
Wheat price and other prices	Oilseeds	0.09	0.65	0.22	0.10	0.82	0.27	0.11	0.38	0.45	0.00	0.62	0.04
	Rye	0.44	0.98	n.a.	0.34	0.91	n.a.	0.37	0.58	n.a.	0.39	1.00	n.a.
	Spring barley	0.29	1.33	0.93	0.24	0.81	0.91	0.49	1.48	0.98	0.14	0.81	0.84
	Sugar beet crop	0.03	0.49	n.a.	0.03	0.33	n.a.	0.20	0.24	n.a.	-0.04	0.55	n.a.
	Winter barley	0.47	1.20	0.93	0.34	0.42	0.91	0.39	0.45	0.98	0.45	1.58	0.84
Wheat yield and other crop yields	Oilseeds	0.22	0.50	0.64	0.28	0.56	0.44	0.18	0.81	0.56	0.26	0.37	0.74
	Rye	0.35	0.79	0.88	0.67	0.57	0.86	0.35	1.27	0.91	0.34	0.68	0.85
	Spring barley	0.22	0.55	0.58	0.45	0.78	0.71	0.10	0.45	0.40	0.24	0.51	0.65
	Sugar beet	0.13	0.32	0.26	0.07	0.32	-0.15	0.13	0.24	0.45	0.18	0.31	0.36
	Winter barley	0.35	0.44	0.91	0.60	0.43	0.87	0.28	0.43	0.94	0.37	0.43	0.87
Farm revenue and	Total cost	0.67	2.69	n.a.	0.41	0.72	n.a.	0.93	5.22	n.a.	0.77	2.94	n.a.
	Variable cost	0.37	1.36	n.a.	0.30	0.85	n.a.	0.17	0.28	n.a.	0.33	0.78	n.a.
	Subsidy	0.19	0.71	n.a.	0.15	0.47	n.a.	0.05	0.18	n.a.	0.17	1.16	n.a.
Subsidy and	Total cost	0.24	0.74	n.a.	0.34	0.82	n.a.	0.16	0.37	n.a.	0.22	0.82	n.a.
	Variable cost	0.16	0.82	n.a.	0.39	1.01	n.a.	0.36	0.77	n.a.	0.05	0.66	n.a.

Table A.4	Simulated coefficient of correlation of per hectare revenue between crops				
		All regions	North	Centre/South	East
Wheat	Oilseeds	0.16	0.22	0.10	0.16
	Rye	0.33	0.44	0.41	0.30
	Spring barley	0.26	0.46	0.34	0.20
	Sugar beet	-0.11	-0.12	-0.03	-0.10
	Winter barley	0.33	0.36	0.21	0.34
Winter barley	Oilseeds	0.18	0.14	0.17	0.20
	Rye	0.15	0.19	0.28	0.13
	Spring barley	0.19	-0.26	0.24	0.21
	Sugar beet	-0.11	-0.12	-0.03	-0.10
Sugar beet	Oilseeds	0.10	0.02	-0.13	0.14
	Rye	-0.15	-0.12	0.04	-0.16
	Spring barley	0.00	-0.02	0.07	-0.02
Spring barley	Oilseeds	0.12	0.43	-0.03	0.16
	Rye	0.19	0.26	0.18	0.19
Oilseeds	Rye	0.06	0.06	0.16	0.05

5 Development of the economic performance of dairy farms in Germany and further prospects with regard to current milk prices

Werner Kleinhanss[1]

5.1 Introduction

Following the rather stable economic situation of the dairy sector in Germany since 2000, the situation has changed dramatically since 2007. The exceptionally high rise of milk prices by about one-third in 2008 induced dairy farm incomes to increase by more than 40% on average, although drastically rising prices for roughage feed, energy and fertiliser at the same time. Since the beginning of this year the prices fell to a historically low level of a little less than 20 ct/kg in the North and to about 25 ct/kg in the South. The unexpected and drastic milk price collapse may have several causes: a) reduced world market demand, triggered by the financial crisis and the devaluation of the U.S. dollar, b) the considerable drop in domestic demand as a reaction to high prices for dairy products, c) the increase of supply due to favourable milk prices, quota expansion and overproduction with reference to milk quota.

At present, there is uncertainty about how long the milk price depression will last. The longer the price depression lasts, the more problems dairy farmers will face with reference to liquidity, profitability and stability. Some farmers might be obliged to quit milk production or to undertake other actions to overcome problems due to exceptionally unfavourable economic conditions.

This paper deals with the economic performance of dairy farms in Germany. In the first part, the development of economic performance since 2000 is analysed. In the second part, simulations are realised to predict impacts of lower milk prices. Model calculations are carried out based on the national FADN data. Profitability, stability and liquidity criteria are calculated in analogy to DLG (2006) at the farm level and results are aggregated to the farm group or sector level:

- Based on a constant (balanced) sample of identical farms, the development of the economic performance of dairy farms is analysed. The development of income, liquidity, and other indicators are shown. The underlying period of 1999/00 to 2007/08 includes milk price levels from 29 to 40 ct/kg;
- Data for 2007 are used for the simulation of the effects of lower milk prices, representing rather 'normal' economic conditions. Assuming all other conditions as constant, the partial effects of lower milk prices (down to 20 ct/kg) on performance indicators is quantified. Based on the weighting scheme the shares of farms below or beyond critical performance levels can be identified.

Conclusions will be drawn based on the results.

5.2 Method and data base

Economic performance is a matter of subject in theory and practice. Performance criteria are used to assess the short and long term performance of enterprises (Beaver, 1966), and for decision-making (Odening, 2000; Hirschauer, 2000; DLG, 2006). It is also part of sustainability assessment, which became popular a few years ago (Heißenhuber, 2000). For the evaluation of the economic performance in agriculture, statistical methods, i.e., discriminant analysis, was used (Colson et al., 1993), allowing the categorisation of farm samples with ref-

[1] Institute of Farm Economics, Johann Heinrich von Thünen-Institut (vTI), Braunschweig, Germany. Paper presented at the XVII PACIOLI workshop, Tänikon (CH), 8.-10.06.2009.

erence to performance criteria. Other studies focus purely on the statistical analysis of performance criteria (Zeddies, 1991; Bachmann et al., 2002). Reliable economic data are required for both types of analysis.

The underlying study is based on individual FADN data of the German network (Testbetriebsnetz). This data base includes roughly 11,500 farms each year, representative of the German agricultural sector, and consists of about 7,000 variables, including monetary data and physical data.

In a first step, samples of farms are selected with reference to the underlying subject:

- Farms with milk production in the economic reference year
- Equity (own capital) > 0 to avoid probably inconsistencies in data

From this data two different samples are selected:

- A constant sample of farms with complete data sets for all considered years 2000 (1999/0) to 2008 (2007/08) and milk production in each year; it includes 2,380 farms, representing 48,000 farms.
- A sample of farms of the year 2007 (2006/7) is used for the simulation with reference to lower milk prices; it includes 4,890 farms, representing 104,000 farms.

In a second step, economic performance criteria are calculated for each farm in the samples, referring to guidelines of DLG (2006). This includes the following indicators:

- Profitability
  - Based on annual profit, adjusted to the 'real' time period (Adjusted Profit). As this indicator is not appropriate for income comparisons between family farms, partnerships and legal companies the Adjusted Profit + Labour costs (APlc) (hired labour including the entrepreneur's part of social charges) is used. The following criteria are used: APlc <0; APlc/AWU >€30,000.
- Liquidity
  - Debt service limit (short term) in relation to real debt service.
  - Cashflow (CF) (short term; AP + depreciation) and CF in relation to liabilities or total assets. The following criteria are used: negative CF; CF % of fixed or total assets <14%.
- Stability
  - Debt rate (liabilities % of total assets).
  - Equity-to-fixed-assets.
  - Change of equity.
  - Net investment.

The analysis goes in two directions:

- Ex-post analysis 2000 (1999/2000) to 2008 (2007/08), based on the constant sample. Descriptive statistics is used to calculate averages and aggregated figures.[1] Selection criteria[2] for the groups are based on averages of all years (debt rate) or 2008 (farm size: <40 cows, 40-60 cows, >80 cows). Weighting factors for 2008 are used to calculate weighted averages or to sum-up results.
- Simulations with reference to lower milk prices are based on 2007 data. 2007 data are assumed to represent a 'normal year' with almost average milk prices (29.5 ct/kg), input prices, yields, et cetera. Based on this level milk prices are varied by:
  - -15% → 25 ct/kg;
  - -22% → 23 ct/kg;
  - -30% → 20 ct/kg, to take the current price situation into account.

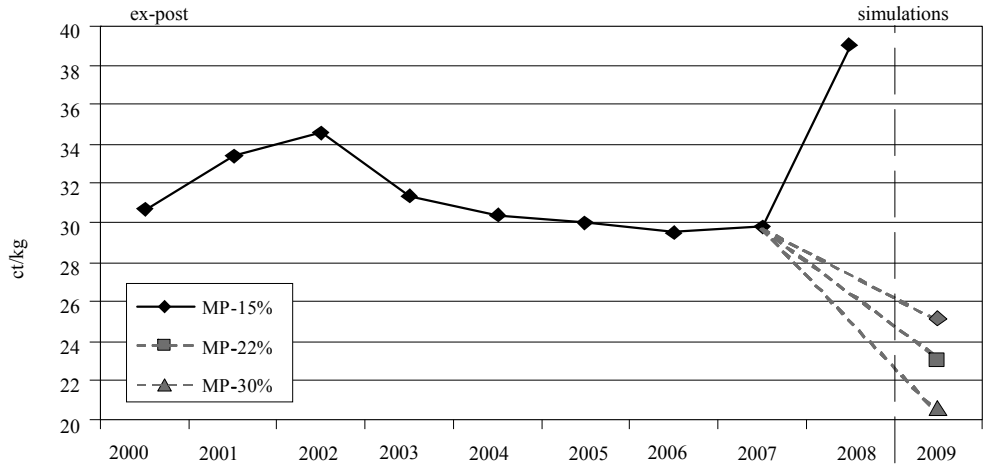
Assuming the referring price level for one year, the impacts on economic performance criteria are quantified.

Figure 5.1 shows the development of average milk prices in the ex-post period and the variation used for the simulations.

[1] Regional aggregation to 'North' (Lower Saxony, Schleswig-Holstein, North Rhine-Westphalia), 'Centre/South (the remaining Laender in the West and South); 'East', the New Laender.

[2] For the time series analysis it is necessary to use constant selection criteria for individual farms over time, otherwise the groups would not be homogeneous.

Figure 5.1 Development of milk price



Source: BMELV-INLB, own calculations.

5.3 Ex-post analysis: Development of economic performance since 2000

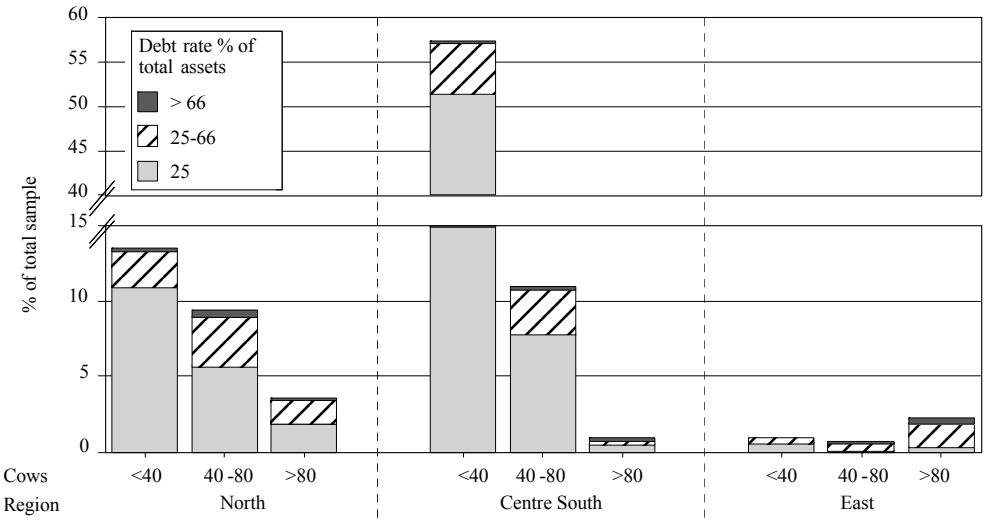
In the following we give a brief description of the distribution of farms in the sample, development of structural characteristics and income. Further, we describe the development of selected performance indicators, expressed in values or shares of farms below or above the defined thresholds. The underlying period covers rather stable milk prices of 29 to 33 ct/kg and a top level of about 40 ct/kg in 2008. With reference to visualisation we used a rather rough aggregation of results by three regions, three farm size classes, three debt rate classes and nine years, where indicators are processed at the farm level for each year.[1]

Distribution of farms in the sample

Figure 5.2 shows the distribution of farms (farms represented as % of the total sample) by regions and size classes, and within these classes differentiated by the debt rate. Farms with <40 cows in region Centre/South take the highest share of 58% on total. 51% of them have a low debt rate (<25%), a further 5% with a debt rate of 25-66% and only 0.25% with a debt rate of a critical level (>66%). Small dairy farms show also the highest share in region North with 13% on total and a higher share of farms of the medium debt rate. The share of farms is decreasing with farm size, but the share of farms with medium debt rates increase. The share of large farms is very low in region Centre/
South, while it is highest in region East, where most cows are held by partnerships and legal companies. Due to the dominating juridical status with high shares of rented land and hired labour, but also due to high investments during transformation, the share of farms with debt rates > 25% is higher.

[1] Groups with less than three observations are dropped from the output.

Figure 5.2 **Farms represented (constant sample, n= 2,380, representing 48,000 farms)**

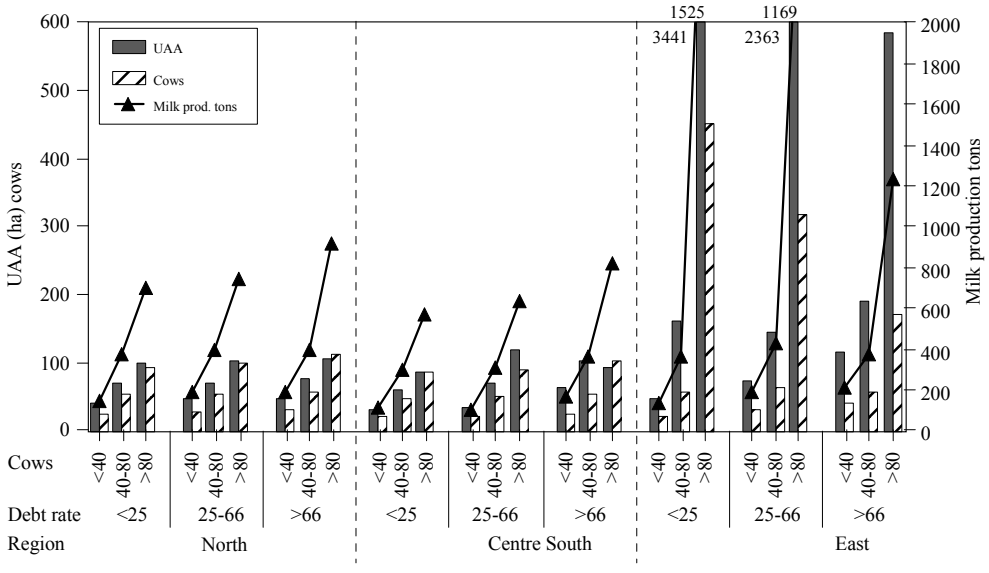


Source: BMELV-INLB, own calculations.

Structural characteristics

Concerning structural characteristics we show only a few indicators: UAA (ha), the number of cows and milk production, referring to 2008 (Figure 5.3). The main variation is related to farm size, expressed by cow numbers, to which UAA and milk production is closely correlated in the western regions. Farms with medium and high debt rates show higher levels of size indicators, indicating higher investment with reference to size expansion. Structural characteristics of farms with up to 80 cows do not deviate much to groups of region north. The opposite tendency with reference to debt rates holds for large farms in region East; farms with the lowest debt rate are the largest ones (1,500 ha, 430 cows and 3,410 tons of milk production). The size of farms with a debt rate > 66% is only about one-third of the former.

Figure 5.3 **Structural characteristics**



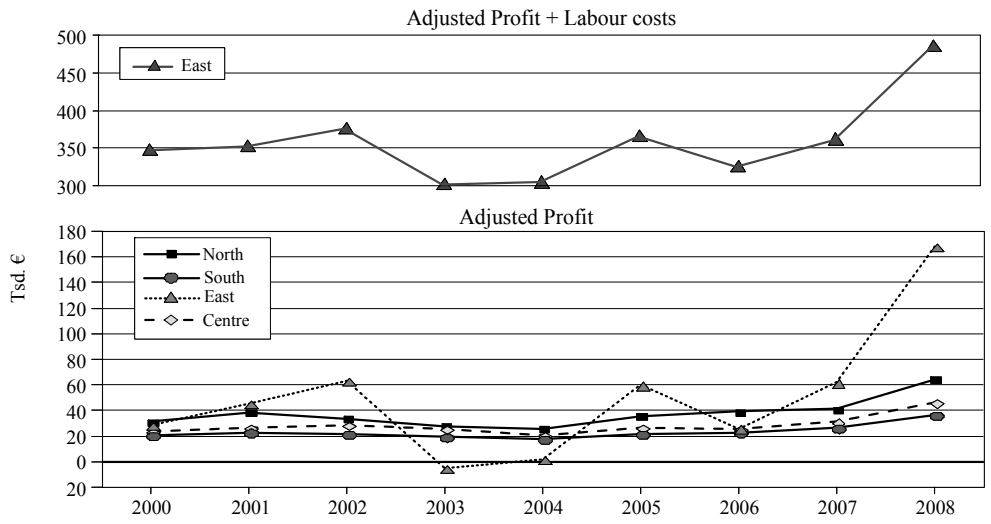
Source: BMELV-INLB, own calculations.

Development of income and performance

The development of income is shown in Figure 5.4, represented by the Adjusted Profit in the figure below, and the Adjusted Profit and labour costs (APlc) on the top. The average Adjusted Profit of farms in all four regions was almost at the same level until 2007, but with higher variation in the East. Income varies between €20,000 and €40,000 in the West and between -€5,000 and €60,000 in the East. Beside the level, there is a slight tendency towards higher income in time. Induced by a significant increase of the milk price the income increased by more than one third in the West, while it almost tripled in the East.

As mentioned before, the Adjusted Profit is not an appropriate indicator for comparisons between (small and medium sized) family farms and large legal companies. Comparisons should be based on APlc (or APlc/AWU), which do not deviate much for dominating farm types in the West. However, it is much higher in region East with levels of €300,000 to €370,000 until 2007 and €480,000 in 2008.

Figure 5.4 **Development of income a) - different indicators profit**

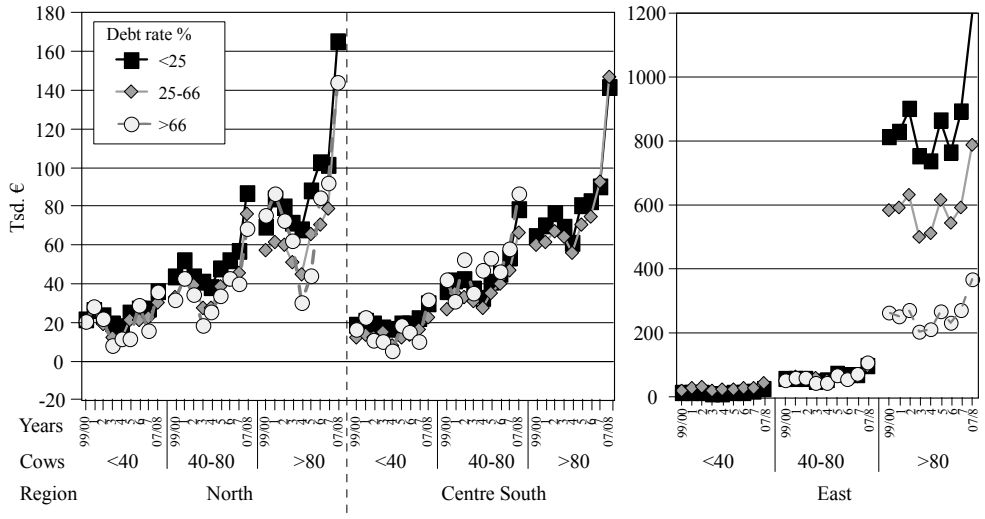


a) Adjusted Profit.
Source: BMELV-INLB, own calculations.

The development of income is further differentiated by the criteria size class cows) and by debt rates (Figure 5.5). Income of small farms in region North is rather low; it varies between €8,000 and €27,000 until 2007 and increased to €36,000 in 2008. Farms with a low debt rate have higher incomes. The higher the debt rates, the lower the income and the higher its variation. Income in the size class 40-80 cows with a low debt rate vary between €40,000 and €60,000 in the first eight years and goes up to €85,000 in 2008. Income is lower in farms with higher debt rates. The development of income and differentiation by debt rates in farms with more than 80 cows is almost the same. The increase of income in 2008 by about 70% is exceptionally high.

The development of income and ranking between debt rates is almost the same in region Centre/South, although the level is a little bit lower. Farms with 40-80 cows and debt rates of 25-66% are better off, indicating positive income effects of investments in size enlargement. In region East the development of income and its differentiation in the first two size classes is similar to the West. The development of income of farms with more than 80 cows is rather similar by its variation and the increase by one third in 2008. However, it shows a high variation by debt rates and the different farm structure in the background. As already mentioned, the cow stock of farms with the highest debt rates is only one third of those with low debt rates.

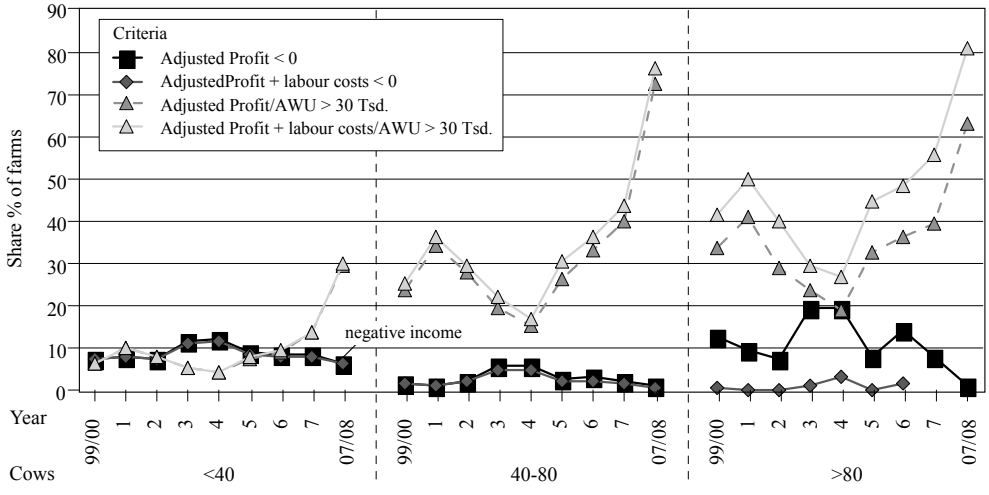
Figure 5.5 **Development of income a) ... by debt rate**



a) Ajusted Profit + labour costs.
Source: BMELV-INLB, own calculations.

Further information with reference to critical levels of income is shown in Figure 5.6; it shows the share of farms with income <€0 and incomes >€30,000/AWU, for both, AP and APlc. Within the group of small farms, about 10% of them have negative incomes or >€30,000/AWU, up to 2007 respectively. An opposite direction is true for 2003/4 and in 2008, where the share of farms with incomes >€30,000/AWU increase to 30%. The share of farms with negative incomes is less than 5% and decreases to 1% in size class 40-80 cows. 14 to 40% of them reach income levels of €30,000/AWU. The share increases to 75% under the high milk prices of 2008. Besides the already mentioned tendencies, there is a significant difference between AP and APlc for the largest farms. Whilst the negative AP is reached by 10 to 20% of farms up to 2007, the share is less than 2% with reference to APlc. Under favourable milk prices of 2008 the share drops to zero. The share of farms with incomes >€30,000/AWU goes up to 65 and 80% with reference to AP and APlc, respectively.

Figure 5.6 **Spread of income (losses: >€30,000/AWU) ... share of farms**

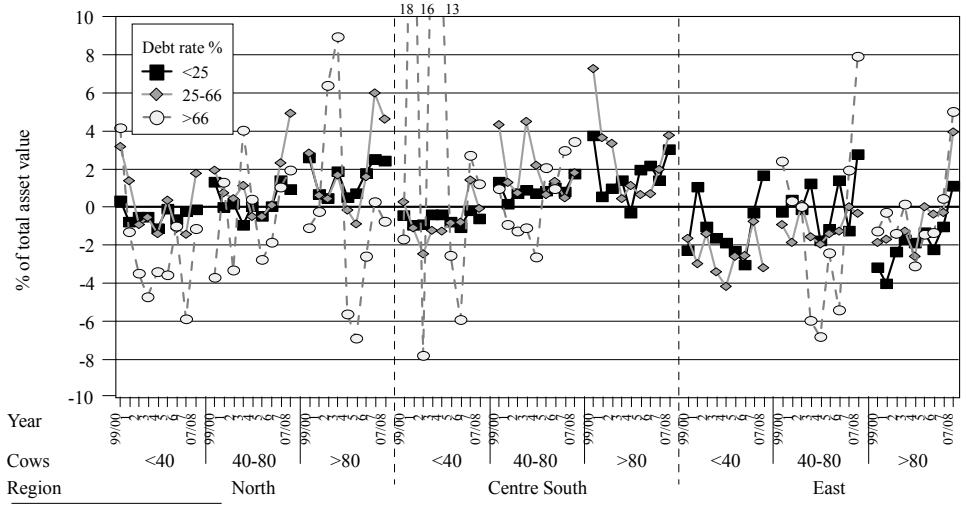


Source: BMELV-INLB, own calculations.

Development of liquidity and stability

The development of net-investments is an indicator of farmers' capacity to maintain or increase capital stock; in Figure 5.7 it is expressed as percent of total asset value. Small farms with a low debt rate in the regions North and Centre/South show small but negative net-investments in almost every year. That means, that they 'consume' part of their capital stock. The situation for farms with higher debt shares is different; as in the first years (or short periods later) there are positive net-investments, i.e., due to investments in stables, and negative net-investments in succeeding years. With high milk prices of 2008, most farms realise positive net-investments. For farms with 40-80 and > 80 cows there is a trend towards positive net-investment; however the variation between years becomes more pronounced for larger size classes. In region East most farms have negative net-investments in the first eight years. Due to transformation, farms realised large investments before 1999 and again became capable of further investments under milk price conditions of 2008.

Figure 5.7 **Development of net-investment a) ... by debt rate**

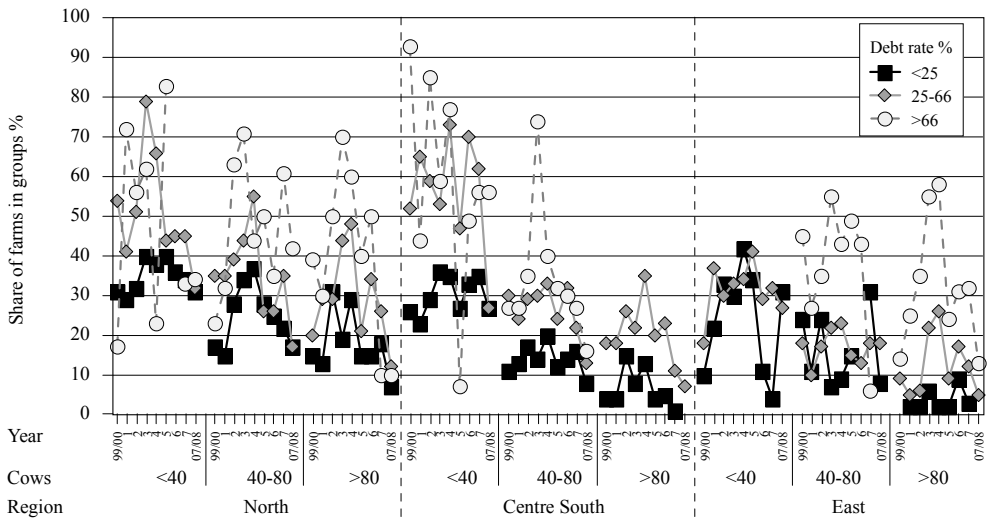


a) Including investment in milk quota.
Source: BMELV-INLB, own calculations.

Figure 5.8 shows the development of shares of farms extending their short term debt service limit (< real debt service). There are two main tendencies:

- shares of 20 to 30% of farms with low debt rates extending their short term debt limit;
  - decreasing shares with farm sizes and
  - slightly lower shares from North to Centre/South and East.
- high shares of small farms with high debt rates especially in region Centre/South, extending their debt service limit. This indicates that credit service is higher than appropriate from an economic viewpoint, especially under economic conditions up to 2007. The situation improves considerably in 2008.

Figure 5.8 **Share of farms extending their short term debt service limit**

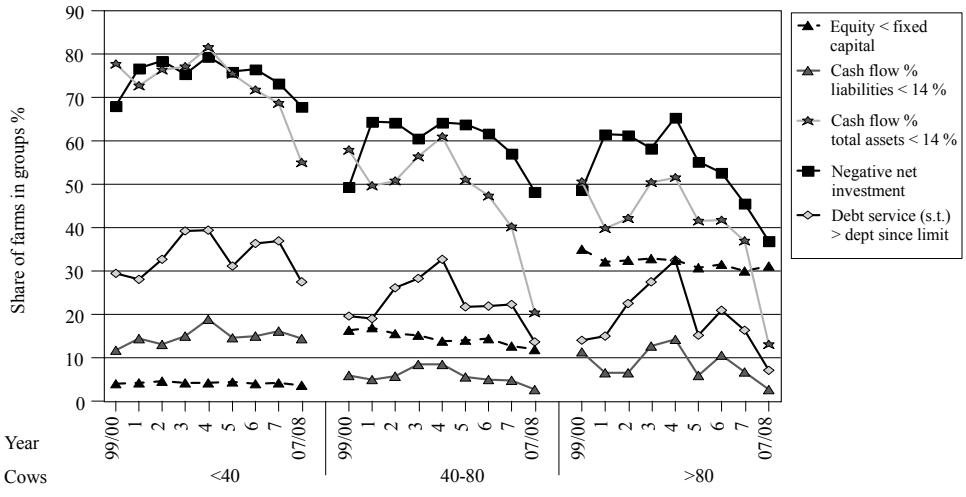


Source: BMELV-INLB, own calculations.

Other indicators are summarised in Figure 5.9, without regional differentiation.

- One rule with reference to stability is that equity should cover fixed capital. This criterion is not fulfilled by 5% of small farms and about 15% of medium-sized farms. One third of the large farms are in conflict with this criterion.
- The relation of debt service limit and net-investments have already been mentioned before and will not be described.
- The Cashflow level should be at least 14% of liabilities (Hirschauer, 2000). In addition it is related to total assets. Related to liabilities, less than 15% of farms will be in conflict with this criterion. The figure is quite high when referring to total assets.

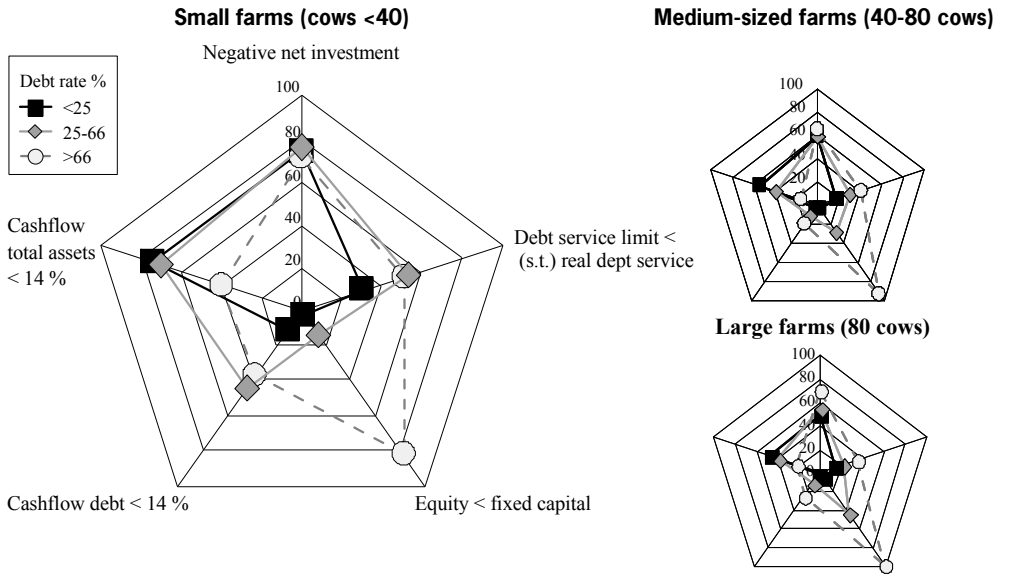
Figure 5.9 **Development of liquidity/stability criteria (share of farms)**



Source: BMELV-INLB, own calculations.

Whilst the abovementioned figures are related to single years, Figure 5.10 summarises the share of farms over all years for the abovementioned indicators and differentiated by size classes.

Figure 5.10 **Share of farms with critical liquidity/stability criteria all over the years**



Source: BMELV-INLB, own calculations.

5.4 Simulation with regards to lower milk prices

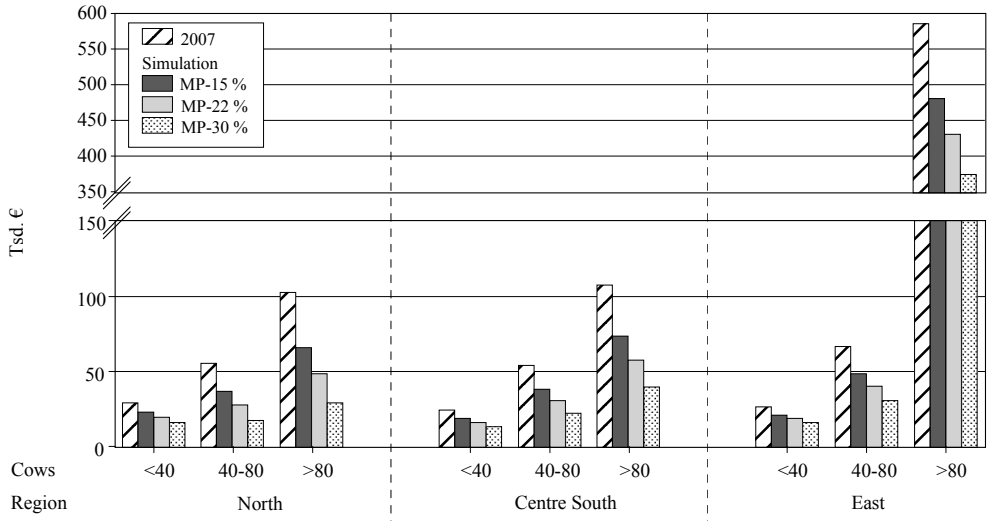
The simulations are based on 2007 being used as 'normal' year. Milk prices are varied in three steps, all other technical, input and output figure variables are held constant. Compared to the previous sample, all farms with milk production are included, which means that averages figures of structural and income parameters are somewhat different from the constant sample.

In Figure 5.11, the development of APIc is summarised for the base situation and milk prices lowered by 15, 22 and 30%. Results are aggregated by regions and size classes. The income level for each size class is similar for regions North and Centre/South, as well as of small and medium-sized farms in region East. For milk price changes of -15%, -22% and -30%, incomes will be reduced by

- -20, -30 and -40% for small farms
- -30, -40 to -50 and -50 to -70% for medium-sized farms and
- -35, -50 and -60 to -70% for large farms with the exception of region East, where relative income changes are almost half of the latter.

This further indicates that the lower the milk prices are, the more the income level of the larger farms will approach to the low level of the small farms. The opposite direction of income changes occurred under the high price level of 2008.

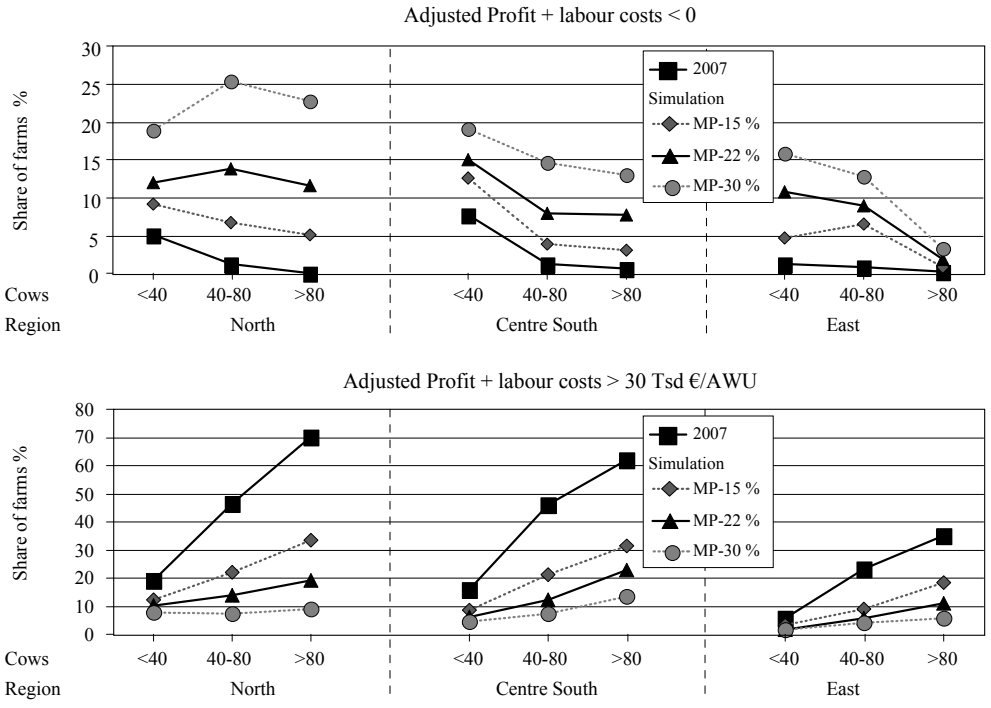
Figure 5.11 Impact on income a)



a) Ajusted Profit + labour costs.
Source: BMELV-INLB, own calculations.

Figure 5.12 shows the variation of shares of farms with negative incomes and high incomes (<€30,000/AWU), respectively. As already mentioned, negative incomes were only realised in less than 10% of small farms. The share goes up with lower milk prices and reaches 25% in medium and large farms in the North, which is larger than for small farms. In region Centre/South there is almost a proportional shift towards higher levels for all size classes. In region East, shares go up to a similar degree as for the West for small and medium-sized farms. It remains low for the large farms, which might be explained by a higher diversification and hence lower dependence on milk price changes.

Figure 5.12 Impact on Adjusted Profit and Labour costs

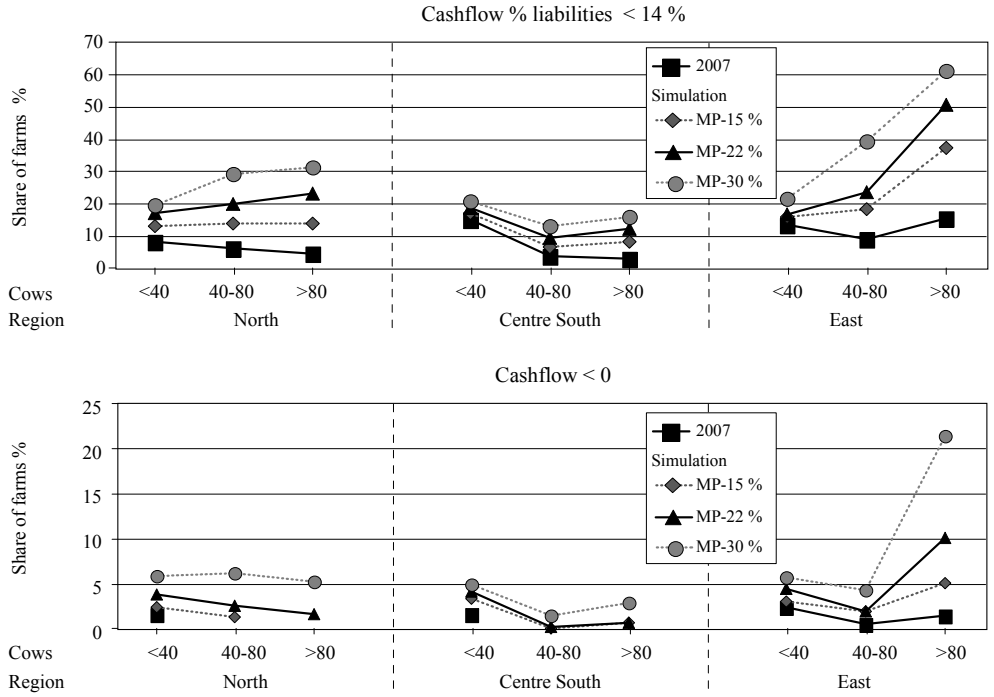


Source: BMELV-INLB, own calculations.

On the other side, the shares of farms with APIc/AWU >€30,000, which were 10-20% for small farms and 60 to 70% of large farms (33% in the East), decrease considerably. At lowest milk price level (-30%) only less than 10% of farms reach this target, where the large farms do not perform significantly better than the small ones.

Impacts on cashflow are summarised in Figure 5.13. In the base situation, roughly 10% of farms do not reach the target of at least 14% of fixed capital. The shares go up to 30% in farms in region North and 15-20% in region Centre/South. The situation becomes much worse in the large farms in region East. The latter is also true with reference to negative cashflow; under worst price conditions, about 20% of this group will have negative cashflow. This indicates that especially large farms in the East will become liquidity problems.

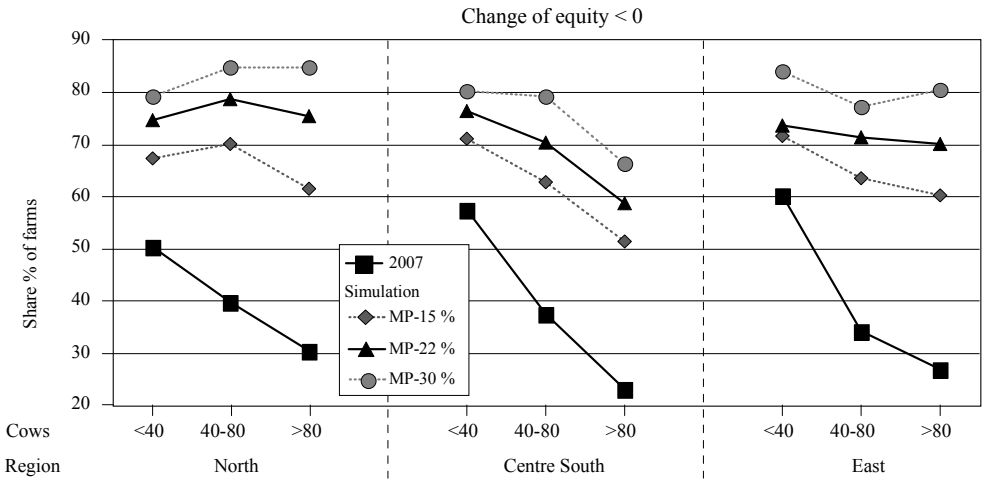
Figure 5.13 Impacts on Cashflow



Source: BMELV-INLB, own calculations.

Impacts on change of equity are shown in Figure 5.14. The shares of farms with negative figures were 50 to 60% of the small, and 20 to 30% in the large size classes. With lower income, the capability to create own equity will be reduced considerably. The share of farms with negative changes of equity goes up, especially in the large farms, and reaches 80% under worst price conditions. The capability for investments will be shortened. Further, a considerable share of farms might not sustain if the price depression holds for more than one year.

Figure 5.14 Impacts on equity



Source: BMELV-INLB, own calculations.

5.5 Summary and recommendations

The economic performance of dairy farms is influenced by structural conditions, the economic framework and the managing ability of the entrepreneurs. Small dairy farms show rather low incomes. Most of them are characterised by low debt shares, but face problems with reference to profitability, stability and liquidity if they realise large investments in size expansion. The ex-post analysis shows that there is always a significant share of farms which do not perform well, such that they will be obliged to adjust either by improving efficiency or either leaving milk production or going out of business. The price situation of 2008 has retarded structural changes, stimulated production and lower consumption due to high prices for dairy products. The induced market disequilibrium, together with the economic depression, induced lower milk prices.

After a period of rather stable milk prices and income, the income increased by more than one third due the exceptionally high milk prices in 2008. This induced positive changes with reference to investments, change of equity, et cetera. However, the outperforming economic situation last not more than one year. The price situation changed dramatically in 2009 and dropped to historically low levels close to 20 ct/kg of milk. Farmers decry their worsening economic situation and ask for assistance from the Federal and Laender governments.

Simulations with reference to current milk price levels show the huge effects on profitability and stability (referring to 30% lower milk prices compared to 2007):

- Income (APIc) will decrease by 40% in small dairy farms, by 50 to 70% for medium-sized farms and even 10%-points more in the largest size class (only 35% in region East due to lower specialisation).
- The share of farms with negative incomes will rise to 20 to 25% from a 5% share in the base situation. The share of farms with APIc/AWU >€30,000, which was 60 to 70% in large farms in the West, drops to less than 10%.
- The share of farms with negative changes of equity, which was less than 10% in the base situation, goes up to more than 70% in the large farms.
- It has considerable negative effects on the cashflow especially in large farms of region east.

Under this unfavourable price situation, the economic performance becomes much worse, and a considerable share of farms will become problems with reference to liquidity and stability. The present situation of dairy farms is similar to piglet producers in the year 2008, with the effect that a considerable share of farms was obliged to close piglet production.

References

Bachmann et al., *Kennzahlen zum Betriebsvergleich 2000/2001*. Thüringer Landesanstalt für Landwirtschaft, Jena, 2002.

Beaver, W., *Financial ratios as predictors of failure. Empirical research in accounting: Selected Studies*. Supplement to Journal of Accounting Research, Vol. 4, 1966.

Colson, F., A. Blogowski, B. Dechambre, D. Chia, D. Desarmenien and B. Dorin, 'Prevenir les defillances financieres en agriculture. Application de la methode des scores'. In: *Cahiers d'Economie et Sociologie Rurales* 29 (1993), pp. 21-49.

DLG, *Effiziente Jahresabschlussanalyse*. Arbeiten der DLG 194, Frankfurt a/d Main, 2006.

Heissenhuber, A., 'Nachhaltige Landbewirtschaftung - Anforderungen und Kriterien aus wirtschaftlicher Sicht'. In: *VDLUFA-Schriftenreihe* 55 (2000) 1, pp. 72-82.

Hirschauwer, N., 'Controlling'. In: Odening, M. en M. Bokelmann (eds.) *Agrarmanagement* (Stuttgart), 2000, pp. 276-339.

Odening, M., Investitions- und Finanzmanagement. In: Odening, M. en M. Bokelmann (eds.) *Agrarmanagement* (Stuttgart), 2000, pp. 113-161.

Zeddies, J., *Viability of farms*. Study for the Commission of the European Communities (VI/1835/90-EN- rev 1 1885/91), Luxembourg, 1991.

6 Farm Family Data in Canada: Sources and Measurement issues

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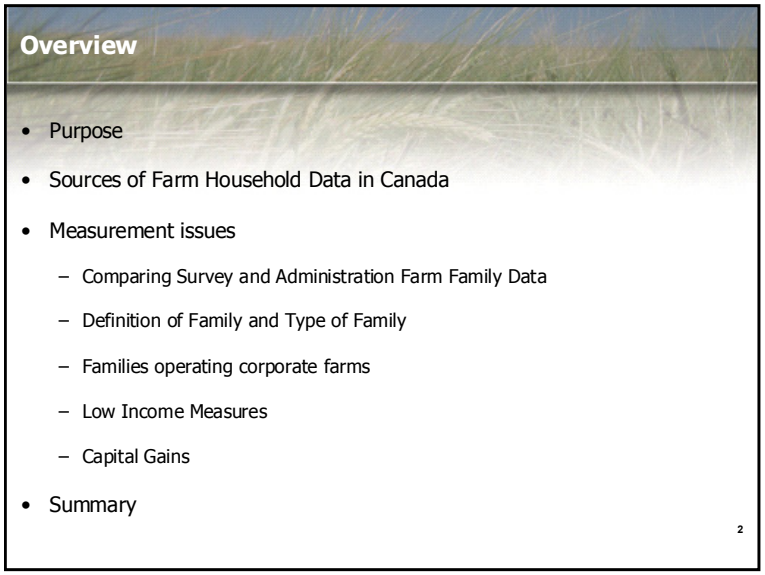
Agriculture and Agri-food Canada



Purpose

To provide information for discussion on sources and measurement issues related to farm family income in Canada

3

Sources of farm family data in Canada

1. Farm Financial Survey (FFS)
   - Annual survey of farm income, family income and farm assets
   - Collects data on annual basis for the principle farm family, by farm type, size and region
   - Includes family operating both corporate and non-corporate farms
2. Censuses of Agriculture – Population Linkage
   - Every five years
   - 20% of all Canadian farms, only unincorporated for family income
   - Data on family characteristics (i.e. education, type of occupation), by farm type, size and region
3. Tax Data
   - Annual Data by farm type, size and region (except longitudinal data)
   - Does not include corporate farms
   - Includes longitudinal data of farm families

4

Comparing Survey and Administration Data

Comparing off-farm income statistics by income source and Data source, Canada 2006, Unincorporated family farms

Data Source	Estimated number of farm families	Average Wages and salaries (farm+ non-farm)	Average Net self employment	Average Investment Income	Average Pension Income	Average Other off-farm income	Average Total off-farm income
Taxfiler	124,560	$44, 602 (75%)	$3, 824 (23%)	$6,908 (76%)	$9,123 (36%)	$5,503 (81%)	$69,960 (100%)
FFS	116,794	$26,768 (60%)	$9,506 (21%)	$4,589 (31%)	$6,030 (35%)	$3,687 (24%)	$50,582 (93%)

(%) Percent of farm families reporting

Note: Excludes cooperatives and communal operations such as Hutterite colonies

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Definition of family can impact farm family income results

- **Census Family**
  - A Census family refers to a married couple (with or without children of either or both spouses), a couple living common-law (with or without children of either or both partners) or a lone parent of any marital status, with at least one child living in the same dwelling.
- **Economic Family**
  - Refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. A couple may be of opposite or same sex. For 2006, foster children are included.
- **Household**
  - Refers to a person or a group of persons (other than foreign residents) who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada. It may consist of a family group (census family) with or without other persons, of two or more families sharing a dwelling, of a group of unrelated persons, or of one person living alone.

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In addition, family composition impacts greatly the farm family income profile

- For example, in 2006, the median income for couple families was $70,400 compared to $33,000 for lone parent families

Median family income by family composition, Canada 2006

	Median income ($)	Per capita income ($)	Percent with income below LIM-IBT (%)
Individuals	22,800	32,800	26.5
Families	**63,600**	**28,200**	
Couple families	70,400	30,000	10.8
Lone-parent families	33,000	16,700	

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Source: Statistics Canada, T1 Family File

Couple families provide the most direct comparison in Canada between farm and non-farm families

- Farm families are more likely to be in couples compared to other non-farm families
  - 76% farm families were in couple compare to 58% for non-farm families

Distribution of families and persons by composition and type, Canada 2002-2006

	Persons not in census families		Lone-parent families		Couple families		Total
	# of family heads	%	# of family heads	%	# of family heads	%	# of family heads
Small farm	23,965	23.6	4,235	4.2	73,165	72.2	101,370
Medium farm	3,070	12.1	1,070	4.2	21,205	83.7	25,350
Large farm	980	9	345	3.2	9,565	87.8	10,890
Very large farm	485	10.8	150	3.3	3,875	85.9	4,510
Rural non-farm	514,690	29.5	175,690	10.1	1,054,510	60.4	1,744,890
Urban non-farm	2,796,740	32.2	867,445	10	5,014,065	57.8	8,678,250
All families	3,339,930		1,048,935		6,176,385		10,565,260

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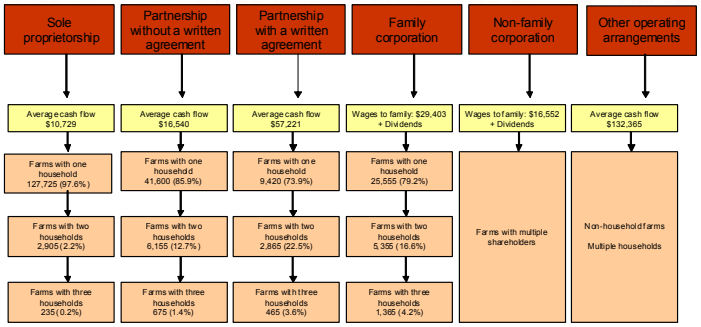
Family weights applied.
Source: Statistics Canada, LAD

A number of farms in Canada support multiple households

- Collecting income data from multiple households operating the same farm is challenging



Source: 2006 Census of Agriculture – Population Linkage

Measuring the farm family income for families operating corporate farms is much more complex

- Corporate farms account for 16% of Canadian farms and for over 50% of agricultural production.
- Their income is from various sources including dividends, wages and salaries to family members, etc
- In addition, many have arrangements between corporation and shareholders of renting and borrowing vis-à-vis to the corporation.

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Canada has various measures to determine low income families

- **The Low Income Measure (LIM)**
  - The LIM is equal to one-half of median adjusted family income. It takes into account the number of people in the family sharing the income. The LIM is available at the national level only with no adjustment for cost-of-living differences by community size.
- **The Low Income Cut-Off (LICO)**
  - The LICO is based on the expenditures of an average family in a base year. It is the level of income at which families are expected to spend 20 percentage points more than the average family on basic necessities. The LICO is adjusted for inflation every year and is available by family and community size, reflecting differences in living costs.

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The type of measures used can impact the profile of low income families and comparison among non-farm families

- LICO measures are more used when cost of living is an important factor determining the family well being.
  - In 2006, LICO measure show that urban non-farm families were likely to be low income families whereas LIM measures did not show statistical difference between rural non-farm families and urban non-farm families.

Percentage of Families and Individuals* with income below the LIM and LICO, Canada 2005

	LIM	LICO
Small Farm	14.1	10.8
Medium Farm	18.7	13.9
Large Farm	17.3	12.8
Very Large Farm	18	13.7
All Farm Families	15	11.4
Rural Non-Farm	22.6	26.4
Urban Non-Farm	21.7	29.8
All Families	21.7	28.6

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*All families and Individuals
Source: Statistics Canada, T1 Family File

Capital Gains in agriculture constitute an important factor in the overall farm family well being

- As opposed to other sectors, the farm asset, particularly land values, appreciate over years
- As such, to fully measure the well being of farm families, the capital gains realized over time should also be considered
- However, capital gains are often captured when the operator decides to sell the farm and stops farming

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SUMMARY

- In gathering income data, there are a number of measurement issues that should considered in the collection and use of farm family data, including:
  - Definition of families and type of families
  - Usage of farm family income measures
  - The sources of farm family income data (administrative versus surveys)

14


Canada

7 Change of valuation method for buildings in Swedish Farm Accountancy Data Network, FADN

Lovisa Reinsson[1]

Abstract

Sweden has used the same valuation method and depreciation calculations for FADN since the mid-1990s. The structure has changed both for the Swedish farms overall and for the farms included in the FADN sample, thus the method needed to be revised. The old method used for most holdings was based on inventories made by a private accountancy bureau that classified farm buildings according to size, age, standard and condition. Replacement value was then calculated with figures from the County Administrations. The method was time consuming and costly and gave high values and depreciation costs compared to the Economic Accounts for Agriculture (EAA) and the neighbouring countries.

The new method used in FADN 2007 is based on the acquisition value for the farm buildings less than 25 years old (10 years for inventories) and standardised values for older buildings. The replacement value is then enumerated with a price index to compensate for inflation over the years.

The new method is less costly and easier to calculate than the old method. It also gives a lower value of the buildings and a lower cost of depreciation, which makes it easier to compare overall costs and results for the Swedish farms to farms in Finland and Denmark with similar conditions.

7.1 Introduction

The method for valuating buildings in the Swedish FADN needed to be revised for several reasons. The method used until the 2007 year survey was developed in the middle of the 1990s. The conditions for the Swedish farmers and for the Swedish FADN have changed since then in numerous ways. When the method was initiated the holdings had been participating in the survey for a shorter period. Most holdings were not part of the survey for more than six years. The average participating years increased over time and for the 2007 survey there were holdings that had been in the survey for 18 years. The number of holdings changing their line of production during the period they participated in the FADN increased with participation time. The rapid change of the farming population over the last decade, where the farms are fewer but larger, has changed the use of the buildings for many farmers. These changes were not reflected in FADN.

For the last decade there has been an increased demand for comparing Sweden with other EU states. Comparisons made show substantial higher capital costs in Sweden than in both Denmark and Finland, where the conditions for the farmers are similar. Economic Accounts for Agriculture (EAA) was also compared with the survey, confirming that the capital costs are high in the Swedish FADN.

Another reason for revising the valuation method is that there have been two different methods used in the Swedish FADN since 2000. For comparability and reliability reasons it is more accurate to have one method for all holdings.

In addition, the method used in Sweden up until FADN 2007 was time consuming and complicated. This also made it costly. The new method will hopefully be more economical without giving a less accurate result.

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7.1.1 Regulatory framework of the FADN in the EU

When considering changing the valuation method for buildings, the regulatory framework for FADN must be taken into account. The main aspects of the rules with respect to the issue of valuating buildings are mentioned below.

The regulations for valuating farm buildings in the FADN are laid out in Appendix II of Commission Regulation (EEC) Nº 2237/77 of 23 September 1977.[1] There it is stated that goods subject to depreciation (including any major repairs already effected) the accounting value is determined according to the period of depreciation still to run. The accounting value is calculated on the same basis as depreciation, i.e. the replacement value. The replacement value is the value the building would have if it was build at the time it is valuated. The replacement value can be calculated from current purchase price for a new similar asset or estimated on the basis of prices index. In the FADN manual[2] it is also stated that the opening valuation should be equal to the closing valuation of the previous year.

The depreciation of buildings belonging to the holder should be the actual amount of depreciation over the accounting year determined on the basis of the replacement value. There is no regulation for whether the building depreciation rate should be calculated according to a linear or diminishing balance method. However, for equipment one of the two methods should be used. For equipment it is also stated that the accountancy offices may choose rates appropriate to the region or holding.

Total expenditures for investments made during the accounting year should be reported for purchases, major repairs and the production of fixed assets. Subsidies for investments are to be taken up separately. This includes subsidies received during the accounting year even though the investment might have been made in previous accounting years. Purchases of minor items or repairs should not be reported as an investment but under costs for e.g. current upkeep.

Total sales of assets during the accounting year should be registered at the selling price. According to the FADN manual, insurance compensation should be considered as a sale.

7.2 Method used in Sweden previous to FADN 2007

The valuation method used at Statistics Sweden until the 2007 survey had also been used on the majority of the holdings since FADN 1996. Since 2000, 140 of the 1,000 holdings have been valued in a different way by the private bookkeeping company Lantbruksekonomen.

In both methods, farm buildings have been valued in a separate way for movables than for the shell of the buildings; the values have then been added together to a full value of the whole building. Depreciation has been based on present value, which has been calculated from replacement value and present value factor, in both methods. The different ways of calculating the replacement value and the present value factor for the inventories and shell of the buildings at Statistics Sweden and Lantbruksekonomen will be presented below.

7.2.1 Valuation method at Statistics Sweden

When calculating the present value, materials were valued after inventories of farm buildings made by the agricultural departments at Sweden's County Administrations. An inventory of every farm participating in the survey was made by the private bookkeeping company LRF Konsult, the first year of participation. The size and characteristics of each farm building still in use was described and valued according to the figures from the County Administrations. The characteristics included the original purpose of the building plus features such as stories, whether the building was isolated and how many animals it was built for. The replacement value was the sum of costs for different parts of the buildings, which was then multiplied with the present value factor to get the present value.

[1] Commission Regulation (EEC) Nº 2237/77 of 23 September 1977, 1977R2237 - 11.07.2007.
[2] Community Committee for the Farm Accountancy Data Network - Farm Return Data Definitions - Accountancy years 2006, 2007, RI/CC 1256 rev 5.

The present value factor was based on age, standard, i.e. the need for reconstruction and reparation, and condition of the buildings. The standard was valued as 1=high, 0.7=average and 0.5=low. The condition was valued as 0.9=very good, 0.6=good and 0.3=poor. The present value at the closing valuation was enumerated with a price index to valuate the changes in prices during the year in order to get the opening valuation for the following year. The price index was calculated at the Swedish Board of Agriculture.

A diminishing balance method was used to determine depreciation. Using a diminishing balance method means that the depreciation value is less each year because it is calculated with the same rate but on the value that is left after last year's depreciation. When a diminishing balance method is used, the value of the building does not reach zero. For the shell of the buildings, the depreciation rate was 3.7% over a time of 45 years while the movables had a depreciation rate of 11% over 15 years (see Figure 1).

7.2.2 Valuation method at Lantbruksekonomen

In 2000, the Swedish Board of Agriculture purchased 140 holdings outside of the majority of holdings reported on by Statistics Sweden. The private bookkeeping company Lantbruksekonomen won the contract to manage these purchases and reported on these holdings until FADN 2006. From FADN 2007 another private company, the Swedish Rural Economy and Agricultural Societies, was responsible for reporting these farms to FADN.

The method used by Lantbruksekonomen was based mainly on accountancy data. The replacement value was calculated on the acquisition value, which was enumerated with a price index from the Swedish Board of Agriculture. The investments, selling and depreciation were calculated on the price level at the beginning of the year. At the closing valuation the price changes were included so the opening valuation the following year would be the same as the closing valuation the previous year.

Depreciation was calculated according to a linear method. When using a linear method the same amount is depreciated each year and at the end of the depreciation time the value is zero. In accordance with normal bookkeeping, the depreciation time was 25 years for the shell of the buildings and ten years for the movables, giving a depreciation rate of four and 10%, respectively (see Figure 1).

7.3 Method used in Sweden from FADN 2007

When choosing a new method for valuating buildings, the regulations in FADN must be considered and adjusted to the conditions in Sweden. As with the methods used previous to 2007, present values based on replacement values were being used.

The method needs to be as accurate as possible without being too time consuming and costly. It is also important that the method can be used both at Statistics Sweden and private companies that might report holdings to FADN.

As in the previous method used, the private bookkeeping company LRF Konsult, will do an inventory of holdings participating in the FADN for the first year. The forms filled out by LRF Konsult is laid out in Appendix III.

7.3.1 Calculations of replacement values for buildings

Replacement value is calculated from the acquisition value, as previously done by Lantbruksekonomen. This method is used for its simplicity and because it is in accordance with the Swedish tax system. The acquisition value and year of investment are gathered for all farm buildings invested in for the last 25 years that are still in use for farming purposes. For movables the acquisition value and investment year will be collected for all investments made greater than €300 over the last ten years. All purchases should be accounted for at the gross price and selling should be valued separately.

The acquisition cost can be found in an appendix to the farmers income-tax form or at a land registry if not known by the farmer. To get the value of own work and use of own equipment, the farmers are contacted and this value is then added to determine acquisition value. If a building is a part of a larger investment, the acquisition value for the whole investment and rateable value for the building and all buildings are considered at the point the investment is made. The value of the building is then calculated from as follows.

$$\frac{Acquisition\_\cos t}{Rateable\_value} * Rateable\_value\_all\_buildings$$

When the acquisition value is known for each farm building and its movables, the values will be enumerated by the same price index from the Board of Agriculture as used by Lantbruksekonomen when calculating for inflation. To get the right replacement value, the index for the previous year is divided by the index for the year the investment was made. This new index is multiplied with the acquisition value and the replacement value for the opening valuation is calculated. To get the closing valuation, investments made during the year are added and selling are subtracted from the opening valuation and the new value is enumerated with the price index for the present year.

By way of example, a building built in 1996 was valued at the time to SEK1,000,000. To know what the building would be worth with present money value at the beginning of 2007, the price index of 2006 is divided with the price index of 1996, both with the year 2000 as a reference year:

$$\frac{119.1}{94.67} \approx 1.258$$

The index is then multiplied with the acquisition value:

$$1000000 * 1.258 \approx 1258000$$

A building built in 1996 with the value of SEK1,000,000 would be worth SEK1,258,000 if it was built in the beginning of 2007. 1,258,000 is the replacement value for the building for the opening valuation 2007. To get the value for the closing valuation the amount is multiplied with the price index for 2007:

$$\frac{128.0}{119.1} \approx 1.075$$

$$1258000 * 1.075 \approx 1352350$$

So if nothing is invested or sold during the year the replacement value at the end of the year would be SEK1,352,350.

The same exercise is made for the movables and this value is then added to get the replacement value for the entire building.

7.3.1 Calculations of present values for buildings

When the replacement value is known, the present value can be calculated. The present value is the value a building has today, which means replacement value less depreciation.

The depreciation rate follows the general advices of the National Tax Board with 4% on farm buildings with a life time of 25 years. However many farm buildings are used in Sweden even thought older than 25 years. Older buildings still in use are therefore still valuable and a diminishing balance method is used (see Figure 1). For movables the standard for normal bookkeeping of 10% is used. Movables are usually considered written off after ten years and a linear method is used with a ten year life time.

If the example above is used with a building from 1996 for SEK1,000,000 and a replacement value of SEK1,258,000 at opening valuation 2007, the present value will be:

$$1258000 * 0.96^{10} \approx 836360$$

The depreciation rate for 2007 is laid out in Appendix II.

7.3.1 Valuation of older buildings

When a diminishing balance method is used for depreciation, the value of the frame of the building will not reach zero after the depreciation time. Even after 25 years the building is considered to have a value if it is still in use. To get a value as accurate as possible without spending too much time on old buildings, a standard value will be used for these buildings.

When the inventory is made, the farmer will be asked if there are buildings older than 25 years still in use on the farm and for what purpose such are used. The value will then be based on purpose and size of farm. If it is a stable and the holding has 100 animals it will be valued higher than if it has 50 animals. Each building older than 25 year gets a value of SEK20,000. If the building is used for dairy cows, each cow gets a value of SEK5,000, which is added to the SEK20,000. Other cattle gets a value of SEK1,000 per head. If the farm has pigs, sows gets a value of SEK5,000 and other pigs SEK500 per head.

The values used are based on comparisons with the method used before 2007, the tax value and the accounting value. There have also been discussions with Länsförsäkringar, one of Sweden's leading agricultural insurance companies.

7.4 Comparisons with Finland, Denmark and EAA

Compared to its neighbouring countries with similar farm conditions, Sweden's costs for buildings have been high in FADN. Compared to Denmark, weather conditions and regulations in Sweden do drive up the costs for buildings, but is it really such a substantial difference as was shown in FADN? Even compared to EAA in Sweden, the costs in the Swedish FADN were much higher. To be able to make a fair comparison, the method used for valuating buildings needed to be evaluated.

7.4.1 Valuation method in Finland

In 2005 a report was written by Kim Forsman at the Finnish MTT where the bookkeeping systems in FADN were compared between Finland and Sweden.[1] The facts below are taken from that report.

In accordance with the EU regulation, the values of the buildings are based on replacement value in Finland. A similar inventory is done as in the old method used at Statistics Sweden. For farm buildings still in use, data about age, standard and condition is collected. A difference is that the buildings in Finland are valued according to the present usage, not to the purpose of the building when it was built as they were in Sweden. The replacement value is then calculated on the base of the inventory with costs for different parts based on figures from the ministry of Agriculture and Fisheries.

The method used for depreciation is diminishing over 25 years with a depreciation rate of 9%. This includes the whole building, including movables.

When the valuation and depreciation are compared with Sweden, the values of buildings are higher in Sweden which leads to higher general depreciation costs. A building 25 years old will have a value of 9.5% of its replacement value in Finland and 39% in Sweden when the old method at Statistics Sweden was used. When comparing farms of the same size in both countries, the farm situated in Sweden has a lower profit as a consequence of these higher costs. This is noted mainly for farms with livestock production. In Table 7.1 the present value of farm buildings can be seen in Finland and Sweden in 2006 divided in types and sizes of farms. The values are overall higher in Sweden, especially for field crop production.

[1] Forsman, K. 'Jämförelse mellan FADN-bokföringssystemet i Finland respektive Sverige.' In Swedish, with an English abstract: 'Comparability of the FADN-bookkeeping system between Finland and Sweden.' MTT Economic Research 97. 2005.

Table 7.1	Present Value of Farm Buildings in Euros, 2006						
	16-<40 ESU		40-<100 ESU			>100 ESU	
	field crops	milk	field crops	milk	granivores	milk	granivores
Finland	36,686	30,135	54,032	105,286	152,585	345,683	409,288
Sweden	97,037	81,969	110,279	172,499	282,730	517,155	468,769
Source: EUFADN Database 15/04/09.[1]							

In Table 7.2, the cost of depreciation in Finland and Sweden is calculated as part of total costs. In Finland less than 7% of the total costs derive from buildings' depreciation while it is 10% of the costs in Sweden.

Table 7.2	Total Inputs and Depreciation for Finland and Sweden, 2006			
	Total Inputs, Euros	Depreciation costs from buildings, Euros	Depreciation costs from machinery and other assets, Euros	Part of total inputs from buildings' depreciation, %
Finland	89,100	5,900	12,700	6.6
Sweden	153,400	15,400	13,100	10.0
Source: EUFADN Database 20/04/09, MTTs database Economydoctor 21/04/09 and Swedish internal FADN database.[2]				

The structure of farms in the Swedish FADN sample differs from the Finnish one.

However, even when dividing the depreciation costs on farm size and type costs are higher in Sweden. In Table 7.3, depreciation costs are compared in different size groups and for different types of farms. The figures send the same signal as in Table 7.2, which is Sweden has a higher depreciation cost. This is most notable for smaller farms.

Table 7.3.	Depreciation costs for buildings in Finland and Sweden in Euros, 2006								
	20-<32 ESU		32-<48 ESU		48-<96 ESU			96-<144 ESU	
	cereals	milk	cereals	milk	cereals	milk	granivores	milk	granivores
Finland	2,800	2,300	4,000	4,300	4,900	10,500	11,300	28,000	33,900
Sweden	11,000	8,100	12,600	10,500	8,700	18,800	32,000	39,700	47,800
Source: MTTs database Economydoctor 21/04/09 and Swedish Internal FADN Database (conversion rate SEK9,254 = €1).									

7.4.2 Valuation method in Denmark

In Denmark a linear based method based on original cost is used, except for horticultural holdings. Some years, depreciation has been recalculated to be comparable with EAA data. When compared with Sweden the values of the buildings are in some cases higher than in Sweden, but even when they are, the depreciation costs are still higher in Sweden. In Table 7.4, the values of the buildings are compared and in Table 7.5 depreciation costs are shown. Observe in Table 7.5, total depreciation is seen, here depreciation costs from machinery and other assets are included except buildings.

Table 7.4.	Value of buildings in Denmark and Sweden in Euros, 2006		
	40-<100 ESU		
	field crops	milk	granivores
Denmark	57,313	561,975	762,488
Sweden	82,284	172,499	282,730
Source: EUFADN Database 15/04/09.			

[1] ESU, European Size Unit, is a measurement of farm size in the FADN. For more information see: ec.europa.eu/agriculture/rica/methodology1_en.cfm.

[2] Total Inputs from EUFADN Database. Depreciation based on information from www.mtt.fi/economydoctor 20/04/09 and Swedish internal FADN database. Conversion rate SEK9,254 = €1. Total depreciation costs are comparable with data from the EUFADN Database.

Table 7.5	Total depreciation costs in Denmark and Sweden in Euros, 2006		
	40-<100 ESU		
	field crops	milk	granivores
Denmark	23,339	17,316	29,335
Sweden	25,804	33,103	38,202
Source: EUFADN Database 15/04/09.			

7.4.3 Valuation method in EAA

The valuation method of farm buildings in the Swedish EAA is described in a report by the Swedish Board of Agriculture and Swedish Institute for Food and Agricultural Economics from 2001 where income measurements and comparisons within the agricultural sector were analysed.[1]

In EAA, the valuation of capital should be based on a replacement value as with FADN. Depreciation is described as predictable wear and technical aging of capital assets and should be calculated for all assets whose length of life should exceed one year. The rate of depreciation should be in line with the probable length of life for different capital assets. A difference from the regulations of FADN is that in the EAA manual it is decided that a linear depreciation method should be used as in FADN the member states can choose between a linear and a diminishing balance method.

To calculate the depreciation costs of buildings in the Swedish EAA, an indirect standard model is used based on pre-permits of livestock buildings by the Board of Agriculture. From the pre permits the total amount of livestock is calculated. The calculations are based on a relation from the end of the 1980s between the number of livestock and the costs of the building.

In this method, buildings not built for livestock e.g. buildings for machineries, are not taken into consideration. It is neither taken into account that old buildings might not longer be in use or is used in a different way than when built, nor that the buildings are built in a more rational way in recent years compared to a longer time ago. The depreciation rate is based on a length of life for buildings of 25 years.

When comparing FADN with EAA one must keep in mind FADN data is presented at micro level while EAA data is presented at macro level. The population differs as well between FADN and EAA, in FADN only commercial farms are included while in EAA the value of production from all farms with any agricultural production is included.[2] In Table 7.6, total inputs and depreciation is shown for Sweden 2006. The FADN figures are presented as Euro per farm while the EAA figures are presented as total Euro in the agricultural sector. The costs of depreciation of buildings have a larger share of the total costs in FADN than in EAA. Some of the difference might depend on different populations and different method of calculating overall input but the method of depreciation surely has an impact as well.

Table 7.6	Total Inputs and Depreciation for Sweden in FADN and EAA in 2006		
	Total Inputs, Euro	Depreciation of buildings, Euro	Depreciation of buildings, part of Total Inputs, %
FADN	153,400	15,400	10.0
EAA	4,726,712,800	167,205,400	3.5
Source: EUFADN Database 16/04/09, Swedish Internal FADN Database, EAA - ekonomisk kalkyl för jordbrukssektor and Inventory for Sweden of the EAA methodology.[3]			

[1] Jönrup, H. et al. 'Inkomstmått och inkomstjämförelser inom jordbrukssektorn'. In Swedish. SJV and SLI, rapport 2001:10. 2001.

[2] A commercial farm is defined as a farm which is large enough to provide a main activity for the farmer and a level of income sufficient to support his or her family. In practical terms, in order to be classified as commercial, a farm must exceed a minimum economic size. ec.europa.eu/agriculture/rica/methodology1_en.cfm 16/04/09

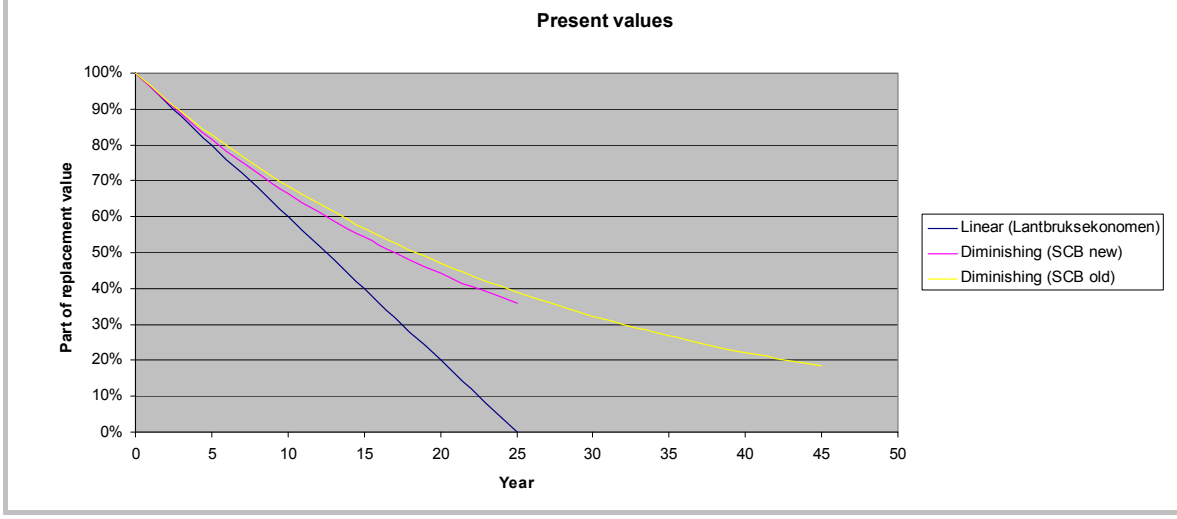
[3] Total Inputs from the EUFADN Database and EAA - ekonomisk kalkyl för jordbrukssektor. 2006. JO 45 SM 0901, Swedish Board of Agriculture. Values changed from SEK to Euro (€1 = SEK9,254).Depreciation of buildings in FADN is calculated from the EUFADN Database and the Swedish Internal FADN Database. For EAA depreciation is calculated from EAA - ekonomisk kalkyl för jordbrukssektor, 2006 and Inventory for Sweden of the EAA methodology, Swedish Board of Agriculture, 2006 where calculations from 1998 show that 21% of depreciation in EAA derives from buildings.

The costs of depreciation of buildings have a larger share of the total costs in FADN than in EAA. Some of the difference might depend on different populations and different method of calculating overall input but the method of depreciation surely has an impact as well.

7.5 Comparison of results from the old and new method in Sweden

When changing method for valuating and calculating depreciation costs for farm buildings in Swedish FADN, two methods were merged into one. Figure 7.1 shows how the new method for depreciation is a mixture between the old ways with the depreciation rate placed in between the two old curves. For buildings newer than 25 years, the new method is most in line with the method previously used at Statistics Sweden. However, buildings older than 25 years are given a much lower value with the new method, more in line with the method used at Lantbruksekonomen.

Figure 7.1 Present value calculated with linear and diminishing methods



7.5.1 Revaluation of 2006 years survey

To be able to compare the combined old methods used in Sweden with the new method, the data from FADN 2006 has been used to calculate the value of farm buildings and depreciation costs with the method used in FADN 2007 for holding participating in FADN both in 2006 and 2007. All calculations made are from data from the Swedish internal FADN database with 2006 as a reference year.

As can be seen in Figure 7.2-7.5, the values of the buildings have decreased substantially with the new method. For several groups the value using the new method is less than half compared to the old method. This is especially true for farms with grazing livestock other than dairy cows as well as for the smaller farms.

Figure 7.2. **Value of farm buildings, field crops in Euros, 2006**

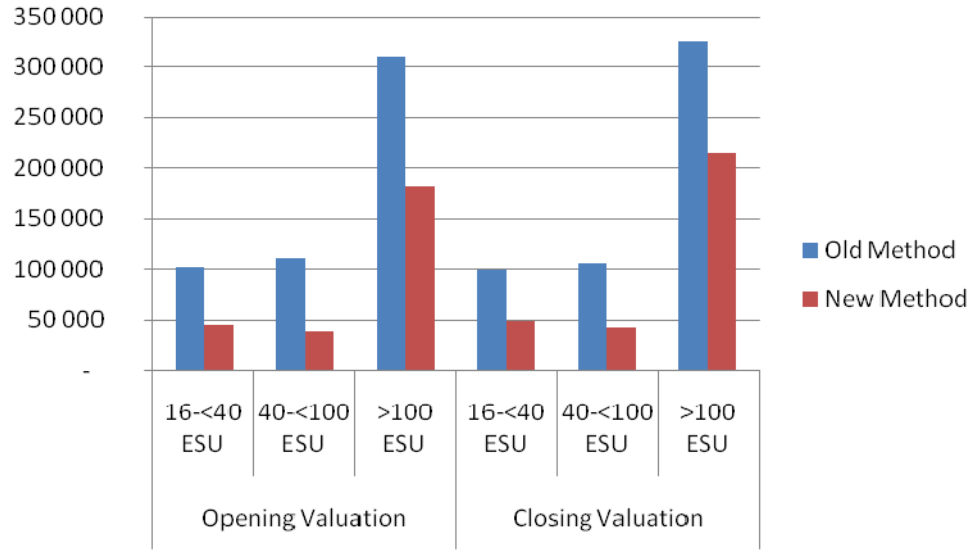


Figure 7.3 **Value of farm buildings, milk in Euros, 2006**

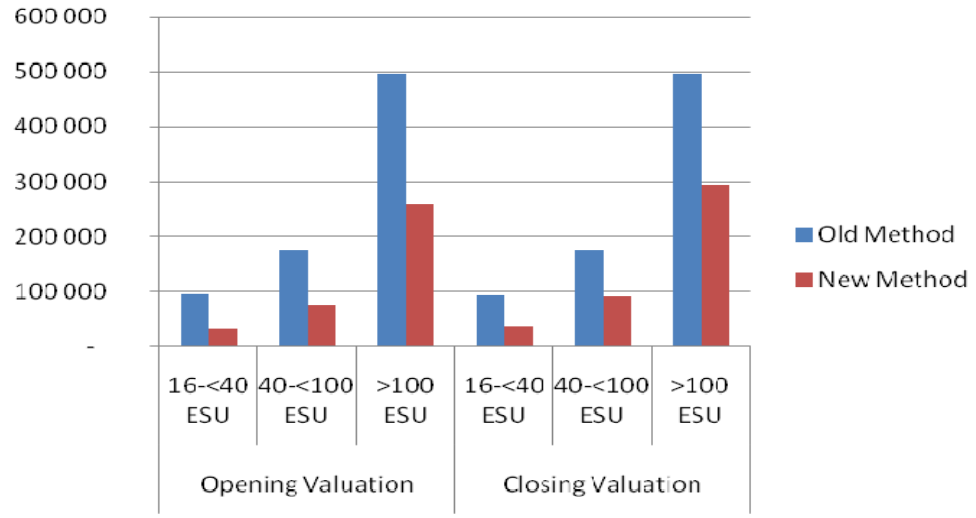


Figure 7.4 **Value of farm buildings, grazing livestock other than dairy cows in Euros, 2006**

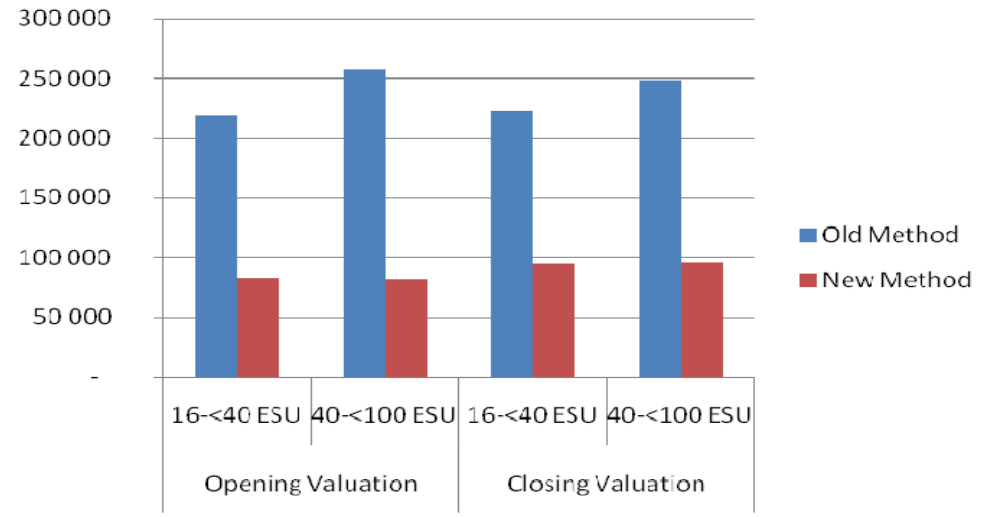
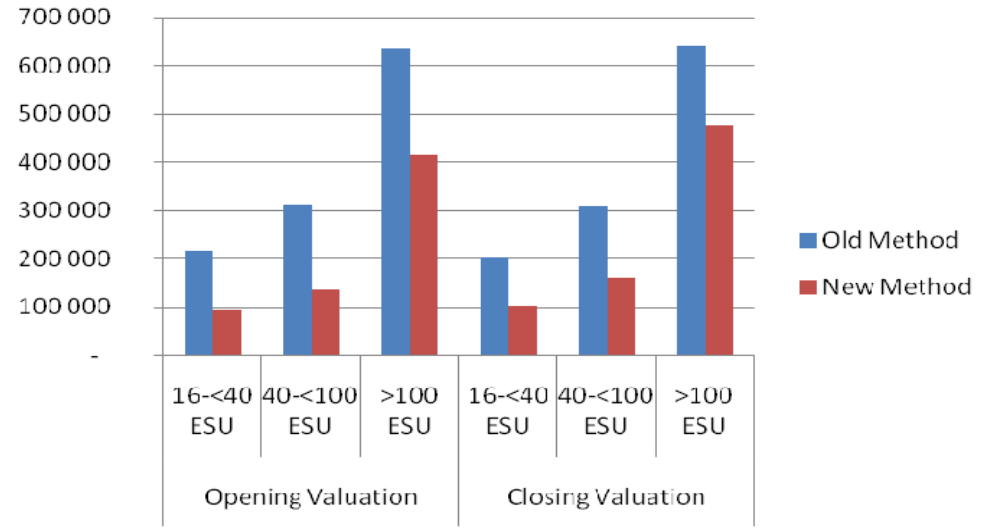
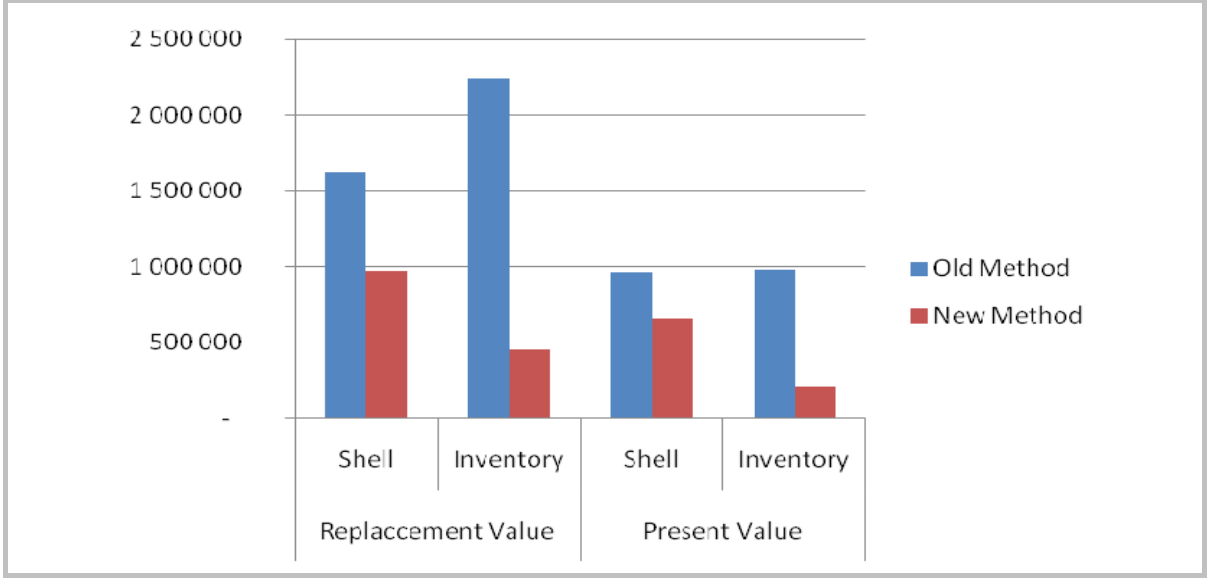


Figure 7.5 **Value of farm buildings, granivores in Euros, 2006**



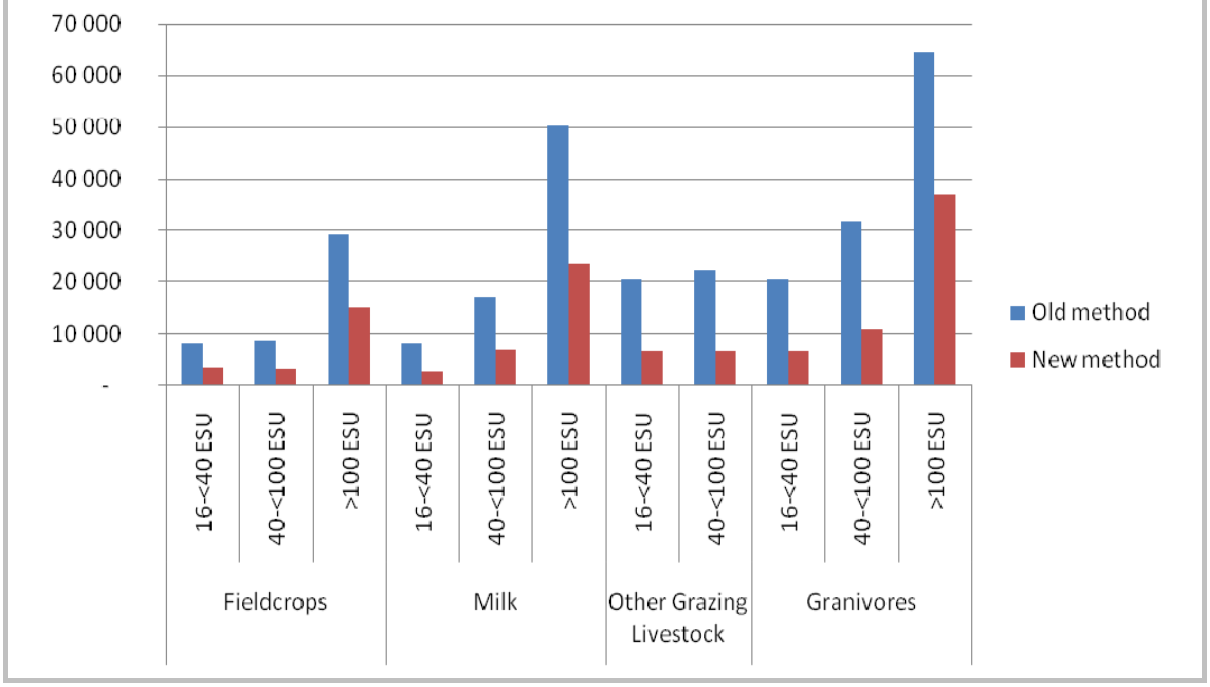
As a different method is used for the shell than for the inventories, it is interesting to see if the differences in values between the old method and the new method depend on differences for the building itself or on its movables. In Figure 7.6, both the replacement and the present value are separated on shell and inventory. The larges divergence is seen for the inventories and for the shell the value differs more for the replacement value than for the present value.

Figure 7.6 **Replacement and Present Value for the shell and inventories with the old and the new method in Euros, 2006**



For depreciation costs the figures shows the same tendency, the lower values of the new method together with a shorter depreciation period give an overall lower depreciation cost with the new method. Even here the largest differences can be seen in smaller farms and farms with grazing livestock other than dairy cows as can be seen in Figure 7.7.

Figure 7.7 **Depreciation values for farm buildings for different sizes and types of farms in Euros, 2006**



7.5.1.1 New comparison with Finland

When a new comparison is made of the average depreciation costs in Finland and Sweden, Sweden still has a higher cost but is more in line with the Finnish figures with the new method as can be seen in Table 7.7.

Table 7.7 Depreciation costs for buildings in Euros, 2006

Finland	Sweden
5,900	8,000

Source: MTTs database Economydoctor 21/04/09 and Swedish internal FADN database.

7.5.2 The impact of changing the use of the buildings

When valuating the buildings according to the old method, the type and use of the building were important factors. Due to the fact that the building was valuated from the inventories made by the Sweden's County Administrations, the value was higher for the types of buildings that were in general more expensive to build, e.g. stables for dairy production were given a higher value than barns. The use of the building is of less importance with the 2007 inventory method, where the actual given price is the base of valuation. However, when valuating buildings older than 25 years the use is again a tool for valuation but this is given a lower impact since it only concerns some buildings and the value given is in general low.

In the new inventory made in 2008, the farmers were asked which buildings (from the first inventory made when the farmer entered the FADN survey), were still in use and what the use of the building was in 2006. The results can be seen in Table 7.8.

Table 7.8 Amount and purpose of farm buildings

Use of building	Number of buildings, first inventory	Number of holdings, first inventory	Number of buildings, 2006	Number of holdings, 2006
Stable, dairy cows	328	317	288	264
Stable, cattle	445	278	469	289
Stable, pigs	447	163	394	142
Stable, laying hens	20	20	13	13
Stable, sheep, goats, ostriches	23	17	30	24
Stable, horses	46	44	46	43
Stable, other animals	0	0	14	10
Barn	474	358	463	353
Machine shop	1,084	577	1,079	584
Storehouse	246	183	255	188
Grain storage	106	92	135	117
Silo	4	3	8	5
Other farm buildings	339	240	377	253
Total	3,562		3,571	

Source: Swedish internal database at Statistics Sweden.

The calculated values for stables of dairy and pig production were in general high in the old method and were a significant part of the total depreciation costs. With the long depreciation rate of 45 years, the high value would make an impact for several years. As can be seen in Table 7.8, the numbers of stables for dairy cows and pigs and the number of holdings with dairy and pig production have decreased from the first inventory until 2006. This means that farms recruited as dairy and pig producers have changed their line of production throughout the years they have been participating in the FADN. Had a new inventory been made in 2006 and the use of the buildings at present, rather than the purpose when built, been considered, the value of the buildings would decrease even with the old method being used. Former dairy and pig producers that in many cases changed their production to cattle or field crop production had a high cost from buildings no longer in use.

When compared in the same group as cattle or crop producers that were recruited with this line of production, their old production type would distort the results and give the whole group higher costs than they have for their actual production.

7.6 Conclusions

The value of the buildings and the depreciation costs depends on the building culture, laws and weather conditions and differs between regions and countries. In Sweden the demands for buildings are very high due to climate and strong regulations for animal welfare and working conditions. This together with a high cost level gives in general a high value for buildings. Buildings are usually built to last for several years and this could justify a long depreciation time.

In a survey like FADN the value of the buildings and the depreciation costs also depend on what method is used when calculating these factors. However, the method used should not have such a strong influence on the result that it is the method rather than the real terms for the farmers that sets the level of costs for buildings. This could distort the possibility of comparisons with other countries.

With the new method, Sweden has tried to get a method more in line with its neighbouring countries. The new method is easier to use and less costly. The inventory method differs more from the one used in Finland than the old method but the depreciation rates and time are much more comparable. The values of the buildings are still higher in Sweden in general but they are now more coherent with the ones in Finland for farms with same size and production than they were when the old method was used.

Compared to Denmark the methods are more similar with the new method as the actual acquisition cost is used for the replacement value even though a diminishing balance method is used instead of a linear method for depreciation costs.

In conclusion, a lower value and lower costs is the result of the change of method. The result is more in line with neighbouring countries, which makes it easier to compare costs in the future. However, it is important to keep the change of method in mind when comparing the Swedish result over time, so as not to mistake the method change as an actual reduction of costs for Swedish farmers.

Appendix 1

Price index series FADN 2007

Buildings - Frames			
Investment year	**Index with 2000=100**	**OV**	**CV**
1982	46.83	2.54	2.73
1983	52.31	2.28	2.45
1984	56.92	2.09	2.25
1985	60.24	1.98	2.12
1986	62.40	1.91	2.05
1987	64.69	1.84	1.98
1988	69.09	1.72	1.85
1989	74.69	1.59	1.71
1990	81.25	1.47	1.58
1991	89.38	1.33	1.43
1992	89.70	1.33	1.43
1993	90.43	1.32	1.42
1994	93.77	1.27	1.37
1995	95.15	1.25	1.35
1996	94.67	1.26	1.35
1997	95.24	1.25	1.34
1998	96.38	1.24	1.33
1999	96.96	1.23	1.32
2000	100.00	1.19	1.28
2001	102.30	1.16	1.25
2002	104.70	1.14	1.22
2003	107.00	1.11	1.20
2004	109.50	1.09	1.17
2005	112.70	1.06	1.14
2006	119.10	1.00	1.07
2007	128.00		1.00

Buildings - Movables			
Investment year	**Index with 2000=100**	**OV**	**CV**
1997	95.48	1.30	1.34
1998	96.96	1.28	1.32
1999	97.97	1.27	1.31
2000	100.00	1.24	1.28
2001	103.10	1.20	1.25
2002	107.20	1.16	1.20
2003	110.50	1.12	1.16
2004	115.20	1.08	1.11
2005	120.70	1.03	1.06
2006	124.10	1.00	1.03
2007	128.40		1.00

Appendix 2

Depreciation rates FADN 2007

Building - Frames	
Year of investment	**Proportion of value left (%)**
2006	100
2005	96.0
2004	92.2
2003	88.5
2002	84.9
2001	81.5
2000	78.3
1999	75.1
1998	72.1
1997	69.3
1996	66.5
1995	63.8
1994	61.3
1993	58.8
1992	56.5
1991	54.2
1990	52.0
1989	50.0
1988	48.0
1987	46.0
1986	44.2
1985	42.4
1984	40.7
1983	39.1
1982	37.5

Buildings - Movables	
Year of investment	**Proportion of value left (%)**
2006	100
2005	90
2004	80
2003	70
2002	60
2001	50
2000	40
1999	30
1998	20
1997	10

Appendix 3

Inventory forms filled out by LRF Konsult for FADN 2007

For 2007 inventories of all holdings in the Swedish FADN were made by private bookkeeping company LRF Konsult. Form 7A was used for the shell of the buildings. In column 1, the year of the investment is registered, column 2 gives the type of building were codes used in the real estate assessment is given. Column 3 shows the acquisitions costs and column 4 the sales made during the same year. To be able to make a comparison of the use of the buildings in the new and the old method, two extra columns, 7 and 8, were added were column 7 gives the use of the building when the first inventory was made with the old method and column 8 the use of the buildings 2006.

In form 7B the inventories invested in the last 11 years were given. The extra eleventh year was filled out to be able to use 2006 as a reference year when compared to the old method.

JEU ***Jordbruksekonomiska undersökningen 2007***

BYGGNADS-STOMME 7A

SCBs id-nummer	JEU-kontor
Brukarens namn	

Byggnadsstomme JEU 2007
1980 - 2006

Kolumn 1 till 4 ifylls för nya företag

Kolumn 1 till 4 och 7, 8 ifylls för gamla företag

		Anskaffnings-år	Byggnadstyp, inventerings-år	Anskaffnings-värde, kr	Pris vid försäljning, kr	Byggnadens användning, ingångsår	Byggnadens användning, år 2006
Byggnad nr:	Rad	1	2	3	4	7	8
1	101						
2	102						
3	103						
4	104						
5	105						
6	106						
7	107						
8	108						
9	109						
10	110						
11	111						
12	112						
13	113						
14	114						
15	115						
16	116						

Äldre byggnader som används	117	

Inget att redovisa (sätt X)	130	
Anteckning	150	

Ingångsår, kol 7 = 1:a året företaget deltog i JEU

Äldre byggnader som används, rad 117 (anges endast för nya företag):
Ange för varje byggnad koder enligt byggnadstyp t. ex. 21, 22, 22, 31, 31, 60

Kod	Byggnadstyp
21	Djurstall mjölkkor
22	Djurstall slakt- och ungnöt
23	Djurstall grisar
24	Djurstall värphöns
25	Djurstall får, getter och strutsar
26	Djurstall hästar
30	Djurstall övriga
31	Loge, lada
32	Maskinhall, gårdsverkstad
33	Gårdslager
42	Spannmålslager
44	Ensilagesilo
50	Växthus
60	Övriga ekonomibyggnader

JEU Jordbruksekonomiska undersökningen 2007

BYGGNADS-INVENTARIER 7B

SCBs id-nummer	JEU-kontor
Brukarens namn	

Byggnadsinventarier 1996 - 2006

År	Typ av byggnads-inventarier (fri text)	Anskaffnings-värde, kr	Pris vid försäljning, kr
	Rad 2	3	4
2006	201		
2005	202		
2004	203		
2003	204		
2002	205		
2001	206		
2000	207		
1999	208		
1998	209		
1997	210		
1996	211		

Inget att redovisa (sätt x)	230
Anteckning	250

Exempel på byggnadsinventarier (ej komplett):

* Bås
* Boxar
* Spiltor
* Båsavskiljare
* Foderbord
* Fodertråg
* Foderstaket och -grindar
* Vattenkoppar
* Spaltgolv
* Utrustning för skrap- och svämutgödsling
* Urinbrunn och gödselbehållare
* Gödselstad
* Mjölkningsanläggning
* Kyl
* Pumpar
* Fläktar och ventilationsanordningar
* Tork- och siloanläggning (även fristående)
* Fasta transportörer, hissar och liknande
* Fläktar och ventilationsanordningar
* Tork- och siloanläggning (även fristående)

8 Additional environmental data in Hungarian FADN - analysis of crop farms

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Abstract
It is important to have representative data for the different farm types not only from the structure of production, incomes and market prices, but from the resources and the emissions. This requires an information system for assessment and evaluation of environmental impacts of agricultural production at the farm level. Involving environmental and resource use data in FADN would allow to analyse economic and environmental indices jointly.

The primary data of Hungarian FADN makes possible to calculate or estimate numerous agri-environmental indices. We evaluated the environmental impact of Hungarian crop farms based on an index-system of 60 points (Nitrogen/Phosphorus/Potassium balances, biodiversity, proportion of cereals and pulses, energy consumption, winter soil surface coverage) from 2003 to 2007 and compared it to the incomes and financial situation.

Considering many environmental indices Hungarian agriculture is 'less polluting' compared to Western Europe. However, this is not due to the environment friendly production, but partly it is explained by the lower fertiliser use (because of low incomes) and mostly by the extremely low livestock-density. In middle-terms the livestock numbers will not rise, but fertiliser use is likely to grow with the increase of incomes. If fertiliser and pesticide prices go even higher than today's level, the market will force agricultural holdings to rationalise input use, which may have the positive effect of reducing pollutions from agricultural production.

According to the analysis proper nutrient management and crop protection practices are playing key role in the agricultural production's impact on the environment as major problems are caused by the inappropriate use of inputs.

Keywords: income, resource use, emissions, nutrient balances, agri-environmental indices

8.1 Introduction

Agricultural production, resource use and emissions are interconnected. The costs of large scale food production are nitrogen leaching from soil to groundwater and rivers, decrease of water resources, emissions of greenhouse gases, erosion and deterioration of soil structures, increasing use of limited oil and natural gas stocks.

Therefore the need has arisen in an ever widening public to study agricultural production, natural resources and environmental pollution together in order to professionally substantiate agricultural politics.

Quantifiable resources are the soil quality, water, artificial fertiliser, manure, electricity, fuels and pesticides. Natural gas, primarily, plays and important role in nitrogen fertiliser production. Although, nitrogen fertiliser production accounts for only 5% of global natural gas consumption, however, its importance is crucial as the price of natural gas influences the price of nitrogen fertiliser. Yields, on the other hand, are considerably influenced by the amount of nitrogen fertilisers applied on the fields.

The most significant factors of environmental pollution linked to agriculture that can be measured or estimated are the emission of nitrate, ammonia, nitrous oxide, phosphate, methane and carbon dioxide. Nitrates and phosphates may leach to groundwater as a result of fertiliser application on the fields. From the one hand, it will cause eutrophication in the surface waters, while on the other hand, by increasing the nitrate content of potable waters it will directly endanger the health of people. More than 50% of nitrogen contamination of surface waters is caused by agriculture in the Western European countries. Additionally, fertilisers may cause the de-

creasing of the soil pH. Emission of nitrous oxide, methane and carbon dioxide increases the greenhouse effect. At least 10% of greenhouse gases are coming from agricultural origin.[1]

Pesticides, on the one hand, after accumulation may causes toxicity in the soils and in the groundwater, on the other hand, with their harmful effects may turn over the balance of the ecological systems as new, resistant pests may evolve. Accumulation of pesticides in waters can be very dangerous for the aquatic living organisms. The aim of this study is to assess the joint ecological and economic performance of Hungarian arable farms. The article focuses on the following questions: Can high profitability result an environment-friendly farming? In what extent differ farms with good economic and ecological performance from other farms?

8.2 Data and methods

For assessing sustainable farming the theory and practical use of several system of indicators has been worked out. Such systems are for example the DPSIR[2] model, the system of indicators worked out in the framework of the IRENA project, the Dialecte system of the French Solagro and the Austrian Ökopunkt[3] system.

8.2.1 Environmental indicators for crop farms

For the elaboration of our environmental indicators we used a study[4] prepared for the monitoring of Hungarian agri-environmental programmes.

The 14 indicators can be grouped into 6 topics (see Table 8.1). To the indicators the system assigns different scores. The maximum of scores to be assigned reflects the significance.

A part of the indicators can be calculated from the existing FADN data from the national Hungarian database, while the other part can be estimated on the basis of present data. In addition, there are some indicators for which the evaluation can be made only after expanding the FADN database with agri-environmental indicators.

Table 8.1 Agri-environmental indicators

I		*Nutrient management*	*30*	*24*
	1	Nitrogen balance	16	16
	2	Phosphorus balance	4	4
	3	Potassium balance	4	4
	4	Rate of organic manure in the nutrient supply	6	-
II		*Soil conservation*	*8*	*4*
	5	Rate of winter soil surface coverage	4	4
	6	Rate of non-cultivated land area	4	-
III		*Rotation*	*24*	*24*
	7	Diversity of crop production	12	12
	8	Rate of legumes in the rotation	6	6
	9	Rate of cereals and maize in the rotation	6	6
IV		*Crop protection*	*20*	-
	10	Frequency of pesticide use	10	-
	11	Toxicity of the pesticides applied	10	-

[1] European environmental agency (2005): Agriculture and Environment in EU-15: the IRENA indicator report www.eea.europa.eu/publications/eea_report_2005_6.

[2] European commission (2000): Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0020:FIN:EN:PDF.

[3] Öpul (2006): Sonderrichtlinie des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW) für das Österreichische Programm zur Förderung einer umweltgerechten, extensiven und den natürlichen Lebensraum schützenden Landwirtschaft ÖPUL 2007-2013 land.lebensministerium.at/ article/articleview/62457/1/21409/.

[4] Körtáj Tervező Iroda Kft. (2008): 'The development of AIR monitoring functions, supplying data for monitoring'. Gödöllő, Hungary.

Table 8.1		Agri-environmental indicators (continued)		
V		*Natural characteristics*	*10*	-
	12	Average plot size	5	-
	13	The size of the five biggest plots	5	-
VI		*Energy*	*8*	*8*
	14	Energy consumption	8	8
		Total	100	60

There is a possibility to calculate 60 points out of the 100 from the elaborated system for the analysis of crop production. The 60 points are made up of 8 indicators (nitrogen, phosphorus and potassium balances, diversity, the ratio of cereals and pulses, energy consumption and the rate of winter soil surface coverage) (see Table 8.1). The higher score reflects a preferred state of environmental sustainability.

From 2003 onwards we calculated the scores of agri-environmental indicators for all FADN farms that are also included in the FADN database of activities[1] (850-900 farms annually). Multiplying the FADN farms' scores by their weights and calculating the average figures has given approximate values on country level. Besides the weights we have taken into consideration the utilised agricultural area of farms. In the regional analysis we used only the utilised area as weighting factor as there are no regular weights available at LAU 1 (former NUTS IV) levels.

Depending on the nature of the analyses at several cases we used panel data of 640 farms between 2004 and 2007 which was representative for the Hungarian field crop farms.

8.2.2 Additional environmental data

Despite the missing agri-environmental data, the FADN system makes it possible to assess the farms' environmental impact to a limited extent. The agri-environmental indicators of crop producing farms can be calculated, however the indicators of farms involved in animal husbandry, horticulture and permanent crop production can not even be estimated due to the lack of sufficient data.

Indicators presented in Table 8.1 can be calculated only for arable farms in order to measure the environmental impact. To evaluate all farm types and thus the whole agricultural sector, there is a need for additional environmental data. These are the water management, manure management and genetically modified crop production data (see Table 8.2).

Table 8.2	Additional environmental data
I	*Water management*
	Land temporarily covered with water (ha)
	Areas with sub-soil loosening (ha)
	Area of drainage systems(ha)
	Area of irrigable land (ha)
	Type of the irrigation system
	Source of irrigation water Irrigated land area by crops (ha)
	Irrigated land area by crops (ha)
	Amount of water for irrigation by crops (m^3)
II	*Manure management*
	Amount of solid dung produced (t)
	Amount of solid dung spread on the fields (t) (ha)
	Amount of solid dung sold (left the farm) (t)
	Solid dung storing capacity (m^3)
	Amount of slurry produced (m^3)

[1] In Hungarian FADN the costs of different agricultural activities are also collected for 75-85% of farms, the data is used for national purposes.

Table 8.2	Additional environmental data (continued)
	Amount of slurry applied on the fields (m^3) (ha)
	Amount of slurry sold (left the farm) (m^3)
	Slurry storing capacity (m^3)
	Water consumption in the animal husbandry (m^3)
	Source of water (drilled well, mains water, et cetera)
	Utilisation of sewage sludge (t) (ha)
///	*GM crops*
	Sowing area, yields and revenues of GM species

8.3 Results and discussion

The dispersion of environmental scores of arable farms ranges from 19 to 47, the distribution of total scores follows the normal distribution curve. A curve that is very much different from the normal one would indicate that the scoring does not differentiate the farms enough.

8.3.1 Economic performance and environmental scores

The correlation analysis on panel data of arable FADN farms 2004-2007 showed no clear results. The environmental scores of farms had significant connections only to the intensity[1] of production (r=-0,373), however, there was no significant connection to farm size, net value added, investments and soil quality. From the correlation analysis the only conclusion that can be drawn is that farms applying higher inputs have a more harmful effect on the environment.

The proportion of farms according to their economic performance and environmental scores is shown in Table 8.3. The worst/medium-low/medium-high/best categories are the quartiles of the weighted sample.

Table 8.3	Proportion of farms according to their economic performance and environmental scores			
Net Value Added	**Environmental Scores**			
	worst (%)	**medium-low (%)**	**medium-high (%)**	**best (%)**
Worst	9.7	4.3	4.8	3.9
Medium-low	4.0	6.3	6.5	9.0
Medium-high	4.1	6.8	6.2	8.7
Best	7.2	7.4	8.5	2.6

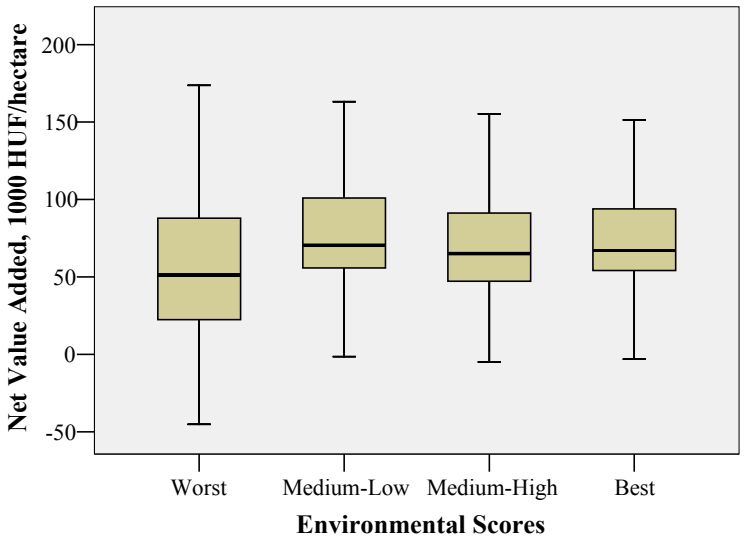
From the environmentally 'Best' performing farms the proportion of farms with a net value added above average (11.3%) is lower than the proportion of farms with a net value added below average (12.9%).

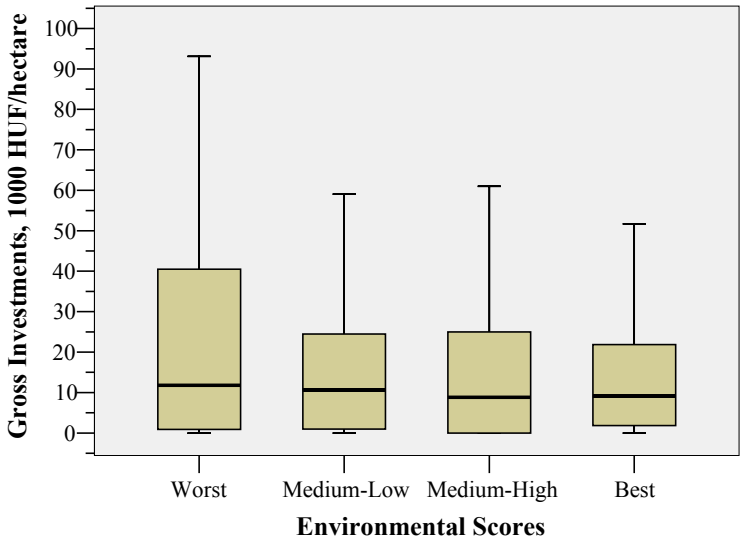
From the economic 'Best' farms the proportion of farms with an environmental score above average (11.1%) is lower than the proportion of farms with an environmental score below average (16.6%).

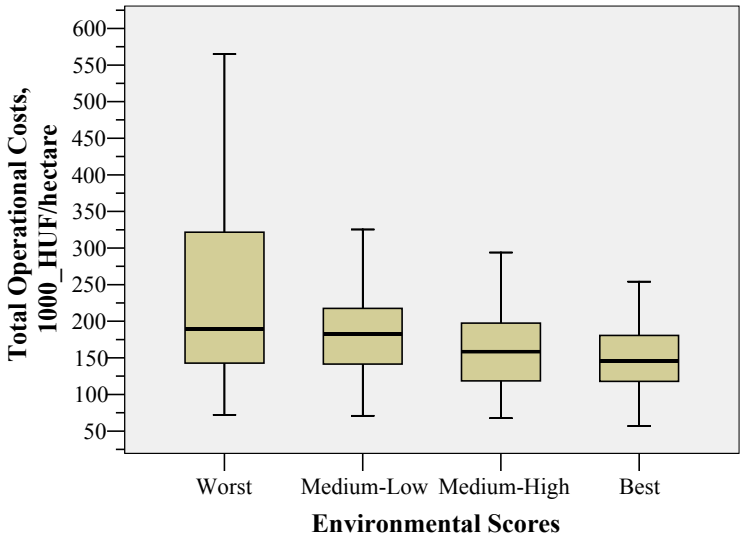
Figure 8.1 shows the relations between environmental scores and some economic indicators. The boxplots show the dispersion of the indicators according to the environmental scores.

[1] Costs of seeds, crop protection and fertilisers per hectare.

Figure 8.1 Environmental scores and economic indicators of arable FADN farms (2004-2007)







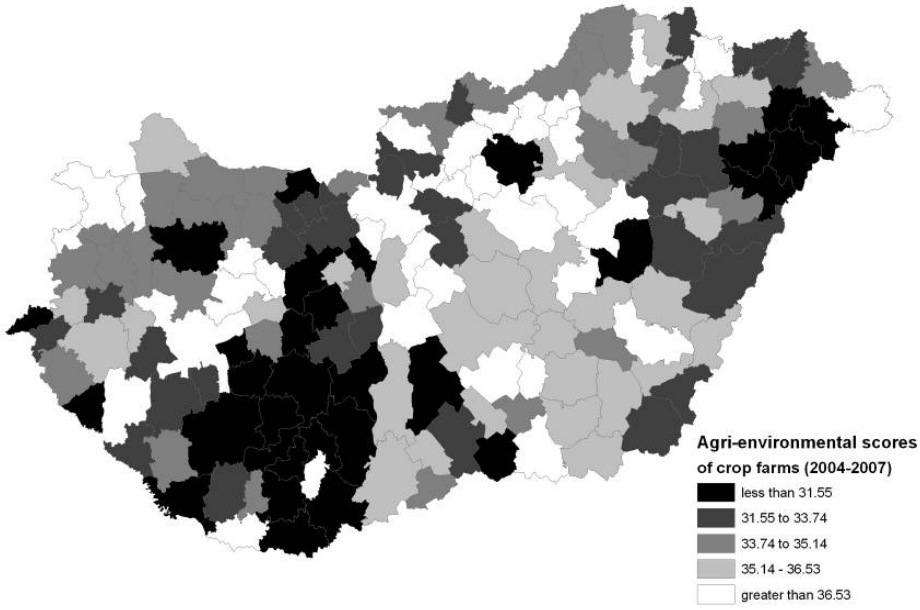
The first part of Figure 8.1 shows that there is no strong relation between environmental scores and profitability. It means farm with a higher environmental performance can be as profitable as other farms. The dispersion of net value added is the highest in the 'Worst' environmental group which means that both high and low profitability can result bad environmental impacts.

The biggest difference among the several environmental score categories can be detected in operational costs. The environmentally most harmful farms used up higher amounts of inputs.

8.3.2 Spatial analysis (LAU 1 level)

According to Figure 8.2 there are spatially detectable differences in the negative environmental impacts. The lowest scores were reached in the Southern Transdanubia region and in North-East corner of Hungary that means agricultural activity in these regions has the most unfavourable effect on the environment. The highest scores were obtained on the middle part of the Great Plain as well as on the mountainous areas. From an ecological point of view farming was the most favourable in these regions.

Figure 8.2 **The environmental scores of arable FADN farms (2004-2007)**



8.3.3 Analysis of farms taking part in the agri-environmental management programme

As from 2004 onwards approximately 20,000 farms are taking part in the agri-environmental management programme and the majority of the farms are involved in arable crop production, it is reasonable to study what effect these farms exert on the environment.

Figure 8.3 **Comparison of the scores of the farms which are and which are not taking part in the agri-environmental management programme**

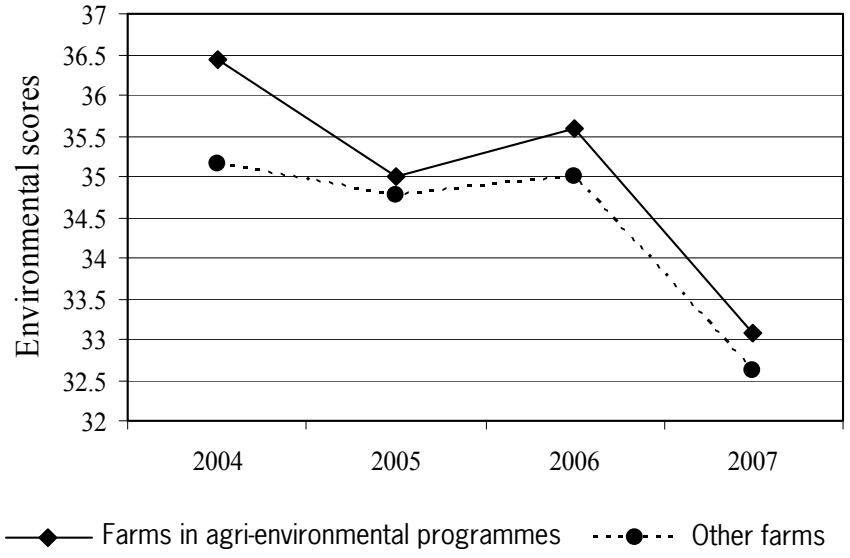


Figure 8.3 shows that farms taking part in the agri-environmental management programme overall put less pressure on the environment compared to those who are not taking part in it.

Despite the fact that the total score of farms in agri-environmental programme is higher, that is they are less harmful, they apply more nitrogen fertilisers than the farms which are not taking part in the programme (see Table 8.4). Farms taking part in the programme applied higher amounts of nitrogen year-by-year compared to the ones not taking part in it.

Table 8.4 **Comparison of farms in agri-environmental management programme and other farms**

	Gross production value	Fertiliser costs	Nitrogen fertiliser applied
	thousand HUF/ESU	thousand HUF/ESU	kg/hectare
	Farm taking part in the agri-environmental management programme		
2004	894.4	70.7	96.2
2005	778	63.6	92.6
2006	783.3	75.8	87.4
2007	842.9	82.1	95.3
	Other farms		
2004	713.6	66.8	90.3
2005	628	61.1	89.8
2006	697.8	64.9	86.4
2007	743.8	76.4	90.8

8.4 Conclusions

The results clearly show that higher profitability does not automatically result worse environmental impact, crop farms can reach high profit together with a good ecological performance.

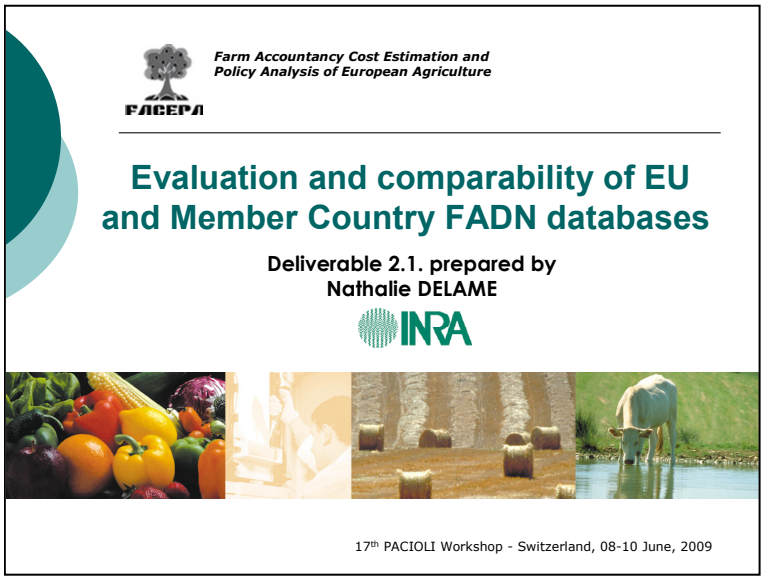
The negative environmental impact is mainly related to the inappropriate use of inputs. The cost-saving attitude of farmers results more environment-friendly crop production. Although fertiliser and pesticide prices seem to stagnate in the near future, a rise in the prices would force crop producers to rationalise their input use and avoid the waste of inputs. The possible reduction of direct payments may have similar effects.

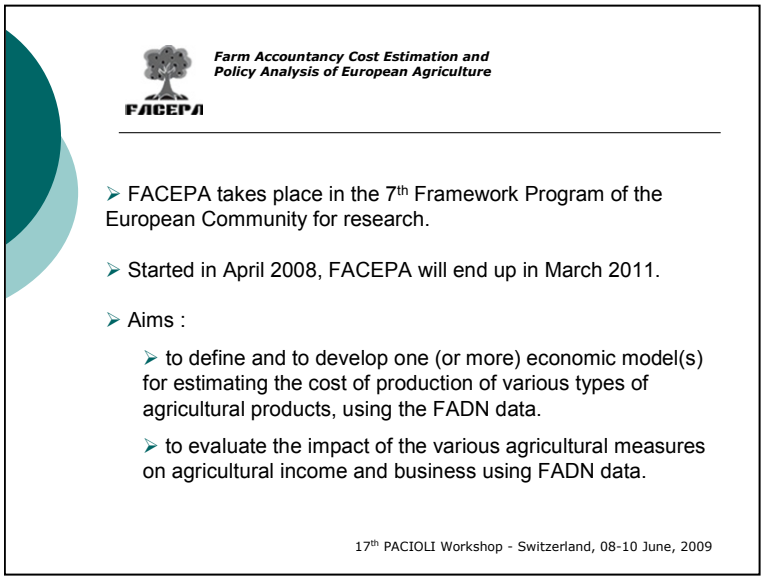
The environmental impact of farming depicts a spatially diverse picture. On the traditionally favourable cereal producing areas the simplification of the crop rotation, the dominance of cereals and oilseeds, the mainly fertiliser based nutrient supply and the high level of production intensity is characteristic. One of the important tasks of agricultural politics on these favourable areas is to facilitate the development and the wide spreading of the environmentally sound farming techniques.

This kind of tool is - among others - the agri-environmental management programme. In Hungary, the majority of the programme's funds is assigned to field crop production. As an effect of the programme, however, the fertiliser use has increased. It may have two explanations: On the one hand, in line with EU directives, the national agri-environmental management programme sets a limit for nitrogen application at 170 kg/ha, which is 80 per cent higher than the usual application rate in Hungary. Thus the agri-environmental management programme does not mean a barrier. On the other hand in Hungary the motive of lower rate fertiliser application compared to Western Europe is not the environment-conscious farming but the low profitability. This way a part of the subsidies of the agri-environmental management programme was spent on fertilisers letting the support to leek into the pockets of the input suppliers.

9 Evaluation and comparability of EU and member country FADN databases

Nathalie Delame
INRA





Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

- With 9 partners :

	Name	Short name	Country
1	Swedish University of Agricultural Sciences	SLU	Sweden
2	Institut National de la Recherche Agronomique	INRA	France
3	Université Catholique de Louvain	UCL	Belgium
4	Instituto Nazionale di Economica Agraria	INEA	Italy
5	Johann Heinrich von Thünen-Institut	vTI	Germany
6	Landbouw-Economisch Institut B.V.	LEI	Netherlands
7	Corvinius University Budapest	CUB	Hungary
8	Estonian University of Live Sciences	EMU	Estonia
9	Ministry of Agriculture and Food Supply	MAFS	Bulgaria

Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

- Organized around 9 Work Packages:

WP1	Concepts
WP2	Specification & development of a « general » cost of production model
WP3	Implementation & validation of the « general » cost of production model
WP4	Dissemination & valorisation of the production cost models
WP5	Application & extensions of cost of production model: performance analysis
WP6	Modelling farm technologies
WP7	Modelling costs & environment
WP8	Methodological applications & improvements
WP9	Evaluation of public policies

Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

- This presentation deals with WP2 aim (a):
- To analyse & compare the characteristics of EU and national FADN databases, in respect of their consistency for production cost computations;
- Results have already been presented in the 3rd FACEPA general meeting at Budapest on April 2009.

Aim

Facts : there are differences between national FADNs and EU-FADN, explained by

- Different goals among countries :
  - some collect data for EU-FADN purpose only
  - some collect data for national needs also
- Different methodologies :
  - some apply common rules (given in Commission regulation)
  - other use specific rules (from a network created before integration to the EU-FADN, for instance)

Aim: write an inventory in the framework of the FACEPA project.

Limits of the comparison

- Limited to nine countries involved in FACEPA
  Belgium – Walloon, Bulgaria, Estonia, France, Germany, Hungary, Italy, Netherlands and Sweden.
- Focused on information which can be used for the validation of the cost estimates
  - Methodology used to define sample, to calculate some costs (depreciation)
  - More detailed specification for costs or outputs
  - Available data used to complete national FADN

Purpose of the questionnaire

Information already available

- About differences between countries in the UE-FADN
  - Hungarian FACEPA working paper: deliverable 1.1.1.
- About differences between national FADN and EU-FADN
  - Documents from the EU-FADN unit : e.g. sample, depreciation
  - Karlsson's report about off-farm income and other income data in FADN

Development of a questionnaire to complete this information

- Same questions for countries involved in FACEPA but not included in documents
- New questions

What about ?

For instance:

- Sample & weighting: direct impact on results.
- Products: the number of sub-headings in countries depends on the part of this product in the national agriculture.
- Costs: few countries collect costs in detail (more sub-heading in value, some quantities, by products,...).
- Labour force. Currently, we don't know how labour will be treated in the model. We need information about the share of work-time agricultural activities / non agricultural activities / off-farm activities. Is this information available ?
- Firms and companies: different production functions.
- Other gainful activities than agricultural on the farm holding: impact on the costs.

About FADN 2005

Who, how, when ?

- Who: questionnaires have been sent to FACEPA teams with the instruction to contact the Liaison Agency in their country.
- How: by interview when it was possible. The comments were more interesting than yes or no answers.
- When: between mid-November and mid-January.
  - requests for additional information concerning some answers were sent in early March.
- Review: the nine countries have responded .

Methodology: Differences in national samples (1/2)

Excluded farms or kept farms

- **Germany**, for national needs, keeps in national FADN farms with a SGM between 8 and 16 ESUs, under the European threshold.
- **Italy**, excludes in EU-FADN almost empty cells (economic size x type of farming). This represents 0.3% of national SGM and 489 farms.

- Additional criterion
- **France** used until 2003 an additional criterion to split the universe for selection and weight the national sample. The *sub-sample* refers to a mode of data collection.
- **Netherlands** use random selection with a specific stratification. The size classes are different within different types of farming and Netherlands use sub-types of farming.
- For the stratification in the weighting system, **Hungary** uses *legal form* of the enterprise to separate private farms and economic organizations.

Methodology : Differences in national samples (2/2)

Universe and SGM

- Few Member States use the same references for the universe or for the calculation of the Standard Gross Margins. Using different SGMs in the national FADN have impacts on the selection of farms (by effect on the economic size) but also on the specialisation of the farm holding.

Year of population and SGM year used for each MS from 2000 to 2006

Année		Belgium	Bulgaria	Estonia	France	Germany	Hungary	Italy	Netherlands	Sweden	RICA UE
2000	Year of the population	**2000**		2001	**2000**	1999		2000	1997	1999	***2000***
2000	SGM year	**1998**		1998	**1998**	1999		1999	1994	1999	***1998***
2001	Year of the population	2001		2001	**2000**	1999		2000	**2000**	1999	***2000***
2001	SGM year	1998		1999	**1998**	1999		1999	**1998**	1999	***1998***
2002	Year of the population	2002		2001	2000	1999		2000	2000	1999	***2003***
2002	SGM year	1998		1999	1996	1999		1999	1996	1999	***2000***
2003	Year of the population	**2003**	2003	**2003**	2000	1999		**2003**	**2003**	1999	***2003***
2003	SGM year	**2000**	2001	**2000**	1996	1999		**2002**	**2000**	1999	***2000***
2004	Year of the population	2004	2003	2003	2005	2003	2003	2003	2003	2002	***2005***
2004	SGM year	2000	2001	2000	1996	2003	2000	2002	2000	2002	***2002***
2005	Year of the population	**2005**	2003	2003	2005	2003	**2005**	2003	**2005**	2002	***2005***
2005	SGM year	**2002**	2001	2000	1996	2003	**2002**	2002	**2002**	2002	***2002***
2006	Year of the population	2006	2003	**2005**	2005	2003	**2005**	**2005**	**2005**	2005	***2005***
2006	SGM year	2002	2001	**2002**	1996	2003	**2002**	**2002**	**2002**	2002	***2002***

Detail in products collected

Are products more broken down in the national FADN than in EU-FADN?

	Belgium	Bulgaria	Estonia	France	Germany	Hungary	Italy	Netherlands	Sweden
crop products	x			x	x	x	x	x	x
livestock and animal products									
opening and closing valuation, average number	x		x	x	x	x	x	x	
sales and purchases (in value)	x		x	x	x	x	x	x	
sales and purchases (weight)	x		x			x	x	x	
live weight	x		x				x	x	
slaughter weight						x		x	
animal products	x			x	x	x	x	x	

Netherlands: yes for all items
Belgium, Hungary and Italy: almost
Estonia for animal items
No added data for Bulgaria

Available detail in products depends on the structure of the national agricultural production

Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

Crop products: cereals… for instance

	Belgium	Bulgaria	Estonia	France	Germany	Hungary	Italy	Netherlands	Sweden
120 Common wheat and spelt	3			soft	2	=	1	=	
121 Durum wheat	Non used			=		=	=	non used	
122 Rye (including meslin)	2			rye only	=	=	=	=	
123 Barley	2			2	2	2	=	=	
124 Oats	2			=	=	=	=	=	
125 Summer cereal mixes	–			–	–	Non used	–	non used	
126 Grain maize	2			2	=	2	2	=	
127 Rice	Non used			=	Not used	=	=	non used	
128 Other cereals including seeds	15			3	2	2	7	3	

= same definition
n number of headings

No additional data in Bulgaria, Estonia and Sweden.
The number of headings for other cereals varies from 2 to 15.

Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

Variable costs in quantities

Belgium	concentrated feed for dairy cows (in kilogramme) milk for calves (in liters) fertilizers N, P, K (in units of chemical and organic N,P,K). On the basis of receipts and on the fill in of the survey, based on reality. Organic N,P,K are estimated on the basis of spread capacity of the machines.
Estonia	seeds and feeding stuffs produced and used on the farm for all products concerned (in quintals). Physical volumes are collected via an interview with farmer.
France	Fuel (in liter) and gas (in kilogramme). Receipts. Energy is collected since 2004, and electricity will be in 2007.
Netherlands	Concentrates, roughage, minerals, fertilizer, manure, crop protection, heating (gas), fuels, electricity (in Kg, liters, m3, kW). Receipts.
Sweden	In some cases : there might be more information in the bookkeeping. However data are not checked and control, so the quality of certain items is not verified.

Variable costs allocated to products in quantities

Belgium	Costs are allocated on the basis of what the farmer says (for example: 120 kg per ha for wheat, nothing for sugar beet,…). Control and tested. Out of range values have to be justified.
France	Products of farm used on the farm. Crops, vegetable processed products, and animal products, used on the farm are collected in 5 headings (for seeds, for grazing livestock, for pigs, for poultry or rabbits, for other animals). Horticultural products used on the farm are collected in 4 headings (for grazing livestock, for pigs, for poultry or rabbits, for other animals).
Netherlands	Some based on knowledge of products (e.g. particular pesticide that is only used for a particular product), other based on information from farmer.

Variable costs allocated to products in monetary value

Belgium	Costs are allocated on the basis of what the farmer says. Control and tested. Out of range values have to be justified.
Bulgaria	Information on specific variable costs (in monetary value) is collected for main crops and some categories of livestock in order to calculate SGM. For example: if the holding cultivates a wheat and barley we separated the costs for each of these crops in order to be able to calculate SGM for each of them.
France	Feed for livestock (all farms) and with more detail for a sample in the French FADN. For few "general field cropping" holdings, the French farm return has more data about variable costs by products.
Italy (optional)	Italian FADN considers three groups of costs: 1. Specific crop costs : seed and seedlings, fertilizers, crop protection products, herbicidal products, rent expenses, water, insurances, fuels, electricity, other expenses, raw materials expenses, processing expenses. 2. Specific livestock costs : concentrated feeding stuffs, fodder, litter, sanitary and veterinary expenses, rent expenses, water, insurance, fuels, electricity, other expenses, processing expenses. 3. Machinery costs : fuels, lubricants, current upkeep of machinery and equipment, other expenses, car expenses.
Netherlands	Allocation is not available for all farms. Some farms (with only one product) can be done automatically, others are not available. For each production unit per farm information is available about containing allocated costs/being allocated or not.

Fixed costs allocated to products in monetary value

The Classification used in the Hungarian FADN:

Crop production	Animal husbandery
Cost of seeds and propagation materials	Depreciation of breeding animals
Cost of artificial fertilisers	Grain fodder produced by the farm
Cost of pesticides	Purchased grain fodder
Cost of irrigation (irrigation water m³)	Coarse fodder produced by the farm
Direct marketing costs	Purchased coarse fodder
Cost of drying	Other feeding stuffs
Direct heating costs	Veterinary costs
Direct insurance costs	Cost of insemination
Other direct variable costs	Cost of performance tests
Cost of organic manure	Direct marketing costs
Machinery costs	Direct insurance costs
of which: cost of tractors	Other direct variable costs
cost of transportation	Machinery costs
cost of harvesting machinery	of which: cost of tractors
cost of other machinery	cost of transportation
Cost of maintenance	cost of other machinery
Cost of machinery services used	Cost of maintenance
Cost of family labour (hours worked)	Cost of machinery services used
Cost of regular labour (hours worked)	Cost of family labour (hours worked)
Cost of casual labour (hours worked)	Cost of regular labour (hours worked)
Social security and health insurance	Cost of casual labour (hours worked)
Rental fee	Social security and health insurance
Depreciation	Depreciation
Other costs	Other costs
Indirect costs of the activity (enterprise)	Indirect costs of the activity (enterprise)
Indirect costs of the holding	Indirect costs of the holding

Subsidies

Are subsidies more broken down in the national FADN than in the EU-FADN?

	Belgium	Bulgaria	Estonia	France	Germany	Hungary	Italy	Netherlands	Sweden
Yes	x		x			x			x
No		x		x	x		x	x	

Comments	
Belgium :	-
Bulgaria :	-
Estonia :	-
France :	French FADN uses global headings and calculates some subsidies with a distribution key.
Germany :	- in general, subsidy categories are similar, only minor exceptions (see APp7_A/B)
Hungary :	-
Italy :	-
Netherlands :	*Until 2006 the subsidies were more broken down, including all the regulations about nature. Nowadays it is not in FADN but*
Sweden :	We have available all information from IACS.

More detail information is available for countries, but it is not easy to connect the various classifications.

Labour Force : farm holder, family workers, others…

	Belgium	Bulgaria	Estonia	France	Germany	Hungary	Italy	Netherlands	Sweden
Time spent for agricultural activities	x o (spouse)					o	x o (farm regulary workers - member's family or not)		available for all types of workers
Time spent for non-agricultural activities on the holding									
Time spent for off-farm activities					x o (other family workers)	o			
Type of off-farm work	x o (spouse)								
Education level	x			x		o			

x : Farm holder o : other persons

A link between FADN and other databases

	to complete FADN	to control FADN	for studies
Belgium		x	x
Bulgaria		x	
Estonia		x	
France			x
Germany			
Hungary		x	x
Italy			x
Netherlands	x		x
Sweden	x	x	x

In respect of the law, no link is possible in Germany.

Conclusion

Comparison for a same country between national FADN and EU-FADN requires attention due to **Methodological points** to:

- the sample & the weighting, in all countries.
- the depreciation in Germany

Dutch FADN seams to have a lot of data and appears in almost points even about firms. Other countries have more focused details:

Belgian FADN is complete about production costs and subsidies.
Hungary has fixed costs and subsidies detailed.
Germany and Netherlands get details on non agricultural activities,
Germany, Netherlands and Italy have information about agricultural population and labour force.

Thank you for your attention.

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http://www2.ekon.slu.se/facepa/index.html

10 Installing an FADN in a new member state: some guidelines and principles from several experiences

Bernard Del'Homme (Enita Bordeaux) and Marju Aamisep (RERC Estonia)

With EU enlargement, new member states have a lot of activities to implement in their national organisation to be in accordance with the European system. In the agricultural field, FADN is one of those activities. Because it is the only monitoring system based on micro-economic data from farms which provides information about agricultural incomes, financial statements, and allows individual as well as collective analysis for policy making, the place of an FADN in a new country should be important. And such a system does not exist before in those new member states. But such a network is not so easy to install. First of all due to the past of those countries, this gives some particularities to be taken into account. But mainly due to the huge task that represents installing such a network, requiring technological competences as well as human adapted resources. From several experiences, mostly based on eastern countries (Czech republic, Estonia, Bulgaria, Croatia), the aim of this paper is to underline the main ideas to take into account when installing an FADN.

10.1 FADN requirements in new member states

Eastern countries have particularities comparing other countries which complicate FADN implementation.

Taking into account historical reasons in new member states big diversity in farm sizes can be found. There are lot of farms qualified in size class of largest farms but in other side huge number of very small holdings. Trying to fulfil requirement of coverage of 90% of agricultural production and use of utilised agricultural area, big part of farms will be out of field of observation for FADN. (for example in Estonia only 24% of farms covers 87% of total Standard Gross Margin and 84% of UAA).

The proportion of family farms comparing to legal entities in the field of observation in some new MS seems to be much lower than in old MS. Having big differences in the population in farm sizes and legal forms might cause problems in weighting of results and drawing of conclusions. The notion of 'professional' farm is not easy to define in countries where most of farms are so small (in Bulgaria and Croatia, 75% of farms are not considered as professional).

Starting implementing of FADN system in new MS usually can be taken into account that European basic rules (typology based on Standard Gross Margin calculations etc) for agricultural statistics are not used and data what can be found could turn out to be irrelevant. In most of cases the basis for FADN (the size and structure of population) is not very reliable because the latest Agricultural Census has been conducted already long time ago. For example when starting implementation of FADN in Estonia in 1997 the latest Agricultural Census was carried out in 1939 and the number of farms (not talking about farm sizes and types of farming) was not known. It means that lot of work improving methodology of agricultural statistics (calculation of SGM/SO coefficients, introduction of typology etc) could be done at the same time with implementing FADN in the MS.

The SGM-based typology seems not always relevant for new Member States because of rapid changes in agriculture. SGM coefficients calculated on basis of data pre-accession years when the level of subsidies was several times lesser gives disfigured structure of the population and it might have influence on weighting of results. And farm types defined in European methodology are not always adapted for the actual situation of farms.

In many cases accountancy or any other monitoring system at farm level do not exist at farm level and it makes data collection for FADN very complicated. For example in Bulgaria the solution for data collection in farms without accountancy was making 8 farm visits during the current accounting year for registering all occasions and transactions at farm. Such solution is too much time and resources consuming.

Changes from centralised economy to market oriented economy play a role as well. It takes time for farmers to get used to totally new basis for business and policies. Due to old system lack of initiative and critical point of view on data quality could be a problem implementing FADN with totally different approach. In some cases antagonism for new approach is quite visible among researchers used to be successful in 'old fashioned' economic analyses not appropriate for FADN (Estonia, Bulgaria).

A new FADN relies on several specific knowledge fields

Starting implement the FADN system in new MS extensive knowledge and abilities on different fields will be necessary:

- Agricultural statistics based on European methodology (typology based on farm sizes and type of farming, sampling, weighting system, standard results, et cetera);
- Farm management and accountancy (general accountancy, receipts and costs, farm income, economic and financial farm diagnosis, et cetera);
- IT solutions and special tools for data collection, data control, data processing (results at farm level, collective results), data exchange, data storage, data security;
- Economic Farm analyses at individual and collective level, knowledge in working with assemblage of data.

In many cases, all those fields of knowledge to gather rely on different institutions (ministry of agriculture, Research institute in agricultural economics, Faculty of agronomy, National statistical office, extension services towards farmers, et cetera). Sometimes, the knowledge which already exist is not dedicated to economic and financial farm management, but more on technical purposes in agricultural field (yields, sizes, structural aspects on farms, et cetera). What is obvious is that no one institution has already a good understanding of FADN, its characteristics and goals.

If an FADN in a new country has to take into account the country's history and the different fields of competences requested, it also has to rely on people.

10.2 Human resources: Key point for FADN

A new FADN has to rely on strong organisation

The European methodology for FADN is clear and well defined. And all aforementioned fields of knowledge are well known at European level. They mainly have to be transmitted to the new Member State. The Liaison Agency (LA) of new Member States should be clearly nominated as early stage of implementation of FADN as possible. It makes easier to concentrate on building up strong organisation and not waste too much time on administrative questions. As a new FADN requires cooperation between several institutions, choices have to be done as soon as possible to clarify (even by agreements) goals, tasks and responsibilities of each participant to the network.

It is not easy to define which institution is the best for FADN management in each country. Ministry of agriculture (extension service), Faculty of agronomy, Research institute or Statistical office can be chosen as Liaison agency. More than the institution, what is important is people.

Whatever is the institution chosen, the organisation of FADN should collocate for collaboration people from LA, national FADN Management Committee and ministry of Agriculture. This means that the LA should involve a team of several people full time for such a job. And we only speak here of people on the top of the FADN organisation, not all people working on FADN in the country. This need of FADN management team is very difficult to explain to policy makers. They often see an FADN as a tool, no more, and do not understand easily why a full time team is requested. Providing those resources (with their financial consequences) is therefore sometimes difficult, and explains main problems encountered in the first years of FADN.

Table 10.1	Comparisons between FADN Organisations		
Country	**Liaison agency**	**Sample size**	**Full time people LA**
Estonia	Research Institute (RERC)	500	5
Bulgaria	Ministry of Agriculture	2,000	4
Czech Republic	Research Institute (VUZE)	1,304	4
Croatia	Extension service	1,338	4
Source : MA-BDH-2009.			

FADN management team has to be motivated for working. The willingness is as most important as the knowledge. FADN has to be considered as a priority for this team during the first years.

According to our experience in new MS where LA is based on research centres better results can be found comparing to MS where the network is based mainly on Extension Service (Estonia, Czech Republic/Bulgaria, Croatia). It could be explained with the fact that Extension Service has good competence for organising data collection at farm level, but not so much experience to build up organisation according to global overview and posed goals for such a network.

In MS without obligatory accountancy, the data collection becomes the key point, although in an FADN it is not the only task to solve. It often explains the choice of extension service as LA, because extension service is more relevant for this data collection wok. But it also makes data collection human and financial capacious and at least at the beginning of implementation takes too big part of all tasks needed to be under whole attention. However, it is useful to increase the quality of the work by using the 'pilot project' approach, because of course without any data, no FADN is possible.

A new FADN requires good managers

An other difficulty is to find people able to manage all those knowledge fields together in a few years. This is not so easy, and often requires an external support.

To make possible sustainable performance of FADN alongside finding capable specialists for every field of knowledge the management team should be created assembling some people able to have an overview and global understanding of all those fields. The appointed liaison agency needs to be supported for getting as fast as possible the global knowledge of FADN.

Very important is to find a good manager for managing all technical tasks and relationships around this network. The manager should have general overview to be able make estimation of number of people needed to cover all tasks, prepare budget for financing all planned activities and having a vision for developments in coming years. And obviously be able to manage human resources from different institutions and fields of knowledge.

If human resources are the key point of an FADN, some other conditions may also play a role.

10.3 Other conditions influencing FADN

FADN success also relies on other local conditions

Accountancy at farm level as a basic tool for data collection is requested and is the only way for sustainable FADN (legal basis making accountancy obligatory could make data collection much easier). But meanwhile the European FADN data collection system is not easy to link with accountancy approach, because of different methodological aspects in several cases (depreciation calculations, grouping of grazing animals by age categories, recording of subsidies etc). This makes data analyses made at farm level and explaining of differences very difficult to understand. A better link between EU methodology and accountancy would probably increase the understanding in new countries between FADN and accountancy at farm level (which also has other advantages, for farm management advises or fiscal reasons).

In many cases it could be useful to use external companies for solving some parts (Data collection, IT solutions, et cetera) of whole complex needed to be solved at FADN implementation stage. Using services from external companies is important to be sure that FADN management team is able to explain in details what is

needed avoiding possible problems and alteration afterwards and being dependant if some changes have to be implemented. The price of those services could turn out to be very high.

Some negative competition between potential organisations for becoming LA and procrastinating with decision makes difficulties to concentrate on other important decisions. In many cases the decision makers do not have good perception of the needs for FADN (in terms of people needed to be involved, finances, difficulties in convincing farmers to participate in the network and getting data at quality level acceptable for FADN etc) and at superficial approach could arise opinion that FADN system is easy to install and keep operational.

It is very important to stand behind the sustainable and sufficient financial resources which are necessary to install FADN. Finding and hiring good specialists and people involved in FADN implementation and development is closely related to financing opportunities. It gives certainty to plan long-run and costly activities like IT solutions, special software for data collection and data processing, et cetera.

A new FADN needs time to become relevant: at least 5 years

To find appropriate to FADN needs people, get experienced in combination of different fields of knowledge could take time for the FADN management team.

A yearly planning is needed for going on with FADN. Installing such a time schedule takes several years, because it involves several institutions which often are not used to cooperate.

FADN is a process, which has to grow from nothing to full size and to make this process easier the pilot project method could be one of opportunities. It is better to use the pilot project method as a several years process to get more experienced. Growing the sample size year by year to full size the experiences recruiting new farms, quality level of collected data and ability and proficiency working with big amount of data will increase at the same time. The method of pilot project has been used for example in Estonia, Bulgaria and Croatia.

For being acceptable, the effort requested by FADN has to prove that several uses of FADN data beside European requirements are possible. Surveys on regional data on specific types of farms, on effects of policy measures can be analysed using FADN database. Advertising of different possibilities of FADN data use has to be done and showed in the MS, but it takes time and only after several years it could become obvious.

Countries developing FADN from nothing could have interest to share their experiences trough a specific network gathering them time to times for workshops.

Installing an FADN is a huge process. In many cases, such a process is difficult to explain easily, due to the variety of tasks to achieve, from data collection to data analysis. Depending the past of new countries involved in installing an FADN, some guidelines can be given. Knowing different tasks that FADN requires is obviously needed, and gathers different fields of knowledge, that nobody is able to gather in one people. Therefore, cooperation between several people is obligatory. But it is not sufficient. To get this cooperation, an FADN management team is really a key point. Such a team has to be clearly involved, supported and financed for several years before getting good results.

FADN is an investment for a new country. It relies mainly on human resources involved in the network. And it takes time. Therefore, it has to be prepared as soon as possible when EU perspective is clear. And of course, this understanding of installing an FADN has to be supported by technical assistance.

11 Changes of Lithuanian family farms during 2003-2007

Arvydas Kuodys and Rima Daunyte[1]

This paper gives an overview of Lithuanian agriculture development after the EU accession, and a comparison of some variables before and after this date. An analysis of dairy farms is also provided.

11.1 Structure of the farms

During 5 years of EU menbership, the number of farms substantially decreased in Lithuania. Structure of the farms also slightly changed, farming results considerably improved. Agricultural Census was held just before the EU accession (in 2003) and it showed that there were 272 thousand farms in Lithuania. Average family farm size was 8 ha. Only 30 thousand of all farms exceeded 2 European size unit (ESU) - Lithuanian FADN threshold. The largest part (63.6 per cent) of these farms had economic size of 2-4 ESU. Farms with economic size above 100 ESU amounted to less than one per cent. Mixed farm types prevailed among family farms: field crops - grazing livestock combined made up 23 per cent, mixed cropping and mixed livestock, mainly grazing livestock - 16 per cent each. Farming types of specialist cereals, general field cropping and specialist dairying were also important and amounted to 13, 11, 10 per cent respectively. The rest types were rather insignificant.

The EU accession in 2004 gave the new impact and opportunities to the Lithuanian farmers. Market conditions, and structural support of the EU had significant effects on structural changes and the development of the Lithuanian agricultural sector. New investment and rural development projects were launched. However, mainly larger farmers grabbed it. All these factors led to a rather fast reduction of small farms (about 10 thousand per year) and increase of economic size of farms.

However, many small self-subsistent family farms still exist in Lithuania. They appeared about 20 years ago after decision to increase self - support of rural inhabitants, reduce their dependence from large state farms, and carry out household activities. The laws enabled each rural family to receive 2-3 ha UAA free of charge. Later they had possibilities to privatise this land.

Table 11.1 Structure of Lithuanian commercial family farms, FSS 2007

Types of farming	Economic size, ESU							
	2-<4	4-<8	8-<16	16-<40	40-<100	>=100	Total	%
Specialist field crops (13, 14)	3,440	2,300	1,650	1,480	610	200	9,680	24.8
Horticulture, permanent crops (20, 32, 34)	310	260	160	50	10	0	790	2.1
Specialist dairying (41)	4,810	2,270	1,120	440	70	0	8,710	22.3
Other grazing livestock (42, 43, 44)	1,720	740	260	60	10	0	2,790	7.1
Mixed cropping (60)	2,610	790	220	70	20	10	3,720	9.5
Mixed livestock, mainly grazing (71)	3,760	910	180	30	0	0	4,880	12.5
Field crops-grazing livestock (81)	4,440	2,000	870	360	80	10	7,760	19.9
The other types (50, 72, 82)	490	100	50	40	20	0	700	1.8
Total	21,580	9,370	4,510	2,530	820	220	39,030	
%	55.2	24	11.6	6.5	2.1	0.6		

According to FSS 2007, there were 230 thousand farms; average farm size became 12.6 ha. Based on FSS 2007, we may draw conclusion that farms with cattle prevailed in the country (farm types 41, 42, 43, 71, 81). The main reasons were agro-climatic and had to doe with local heritage traditions as well as rather poor soil, rainy summers and favourable conditions to grow fodder crops.

[1] Lithuanian Institute of Agrarian Economics.

The average Lithuanian commercial farm size is considerably lower than the average in the EU-15 or EU-25. In 2003 FNVA amounted to 20 per cent of the EU-15 level, while in 2007 - it increased by 2.6 times till 57 per cent of the EU-25. Most economic indicators were strongly improved after the EU accession.

After the EU accession subsidies significantly increased, compared to previous years, what led to steady growth of Farm Net Income. Farm modernising required own fund in addition to subsidies, therefore, not only total assets increased but liabilities too. Farms became less solvent (ratio of liabilities to assets).

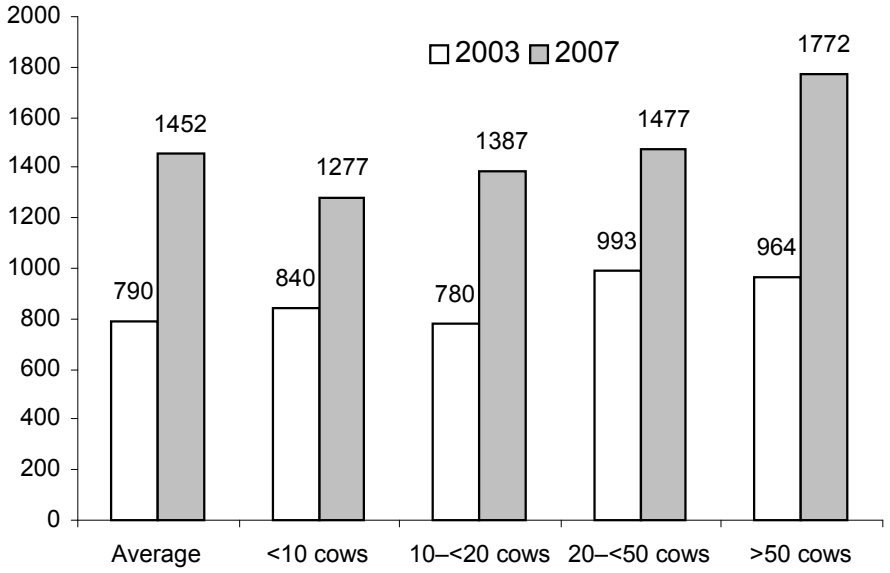
Table 11.2 Economic indicators of farms, Euro

	Lithuania		EU-25	Comparison, %	
Indicators	**2003**	**2007**	**2006**	**LT 2007 to LT 2003**	**LT 2007 to EU-2006**
Economic size, ESU	6.1	8.2	33.2	134	25
Total output (TO)	17,654	26,994	63,110	153	43
Total inputs (TI)	13,494	19,211	55,382	142	35
Subsidies on production	1,567	7,153	11,849	4.6 times	60
Subsidies on investment	469	1,345	124	2.9 times	10.8 times
Gross Farm Income	8,475	20,360	38,351	2.4 times	53
FNVA	6,441	16,766	29,482	2.6 times	57
FNI	6,196	16,280	19,701	2.6 times	83
FNVA/AWU	3,270	8,965	18,199	2.7 times	49
FNI/FWU	3,561	9,807	15,888	2.8 times	62
Total assets	43,572	82,506	309,026	189	27
Total liabilities	2,589	12,316	45,062	4.8 times	27
Net worth	40,983	70,190	263,964	171	27
Productivity ratio TO/TI	1.31	1.41	1.14	108	124
Subsidies for production on FNI, %	25	44	60	176	73
Solvency (ratio of liabilities to assets), %	5.9	14.9	14.6	2.5 times	102

11.2 Dairy farms

We would like to take the dairy farms and illustrate changes of Lithuanian agriculture. Dairy sector is a very important to the country. In 2007 dairy farms made up 22 per cent of total Lithuanian commercial farms. Export of milk products amounted to 18 per cent of total export of food and agricultural products. Milk made up almost 25 per cent in the structure of total output of family farms and 58 per cent in the dairy farms. Only cereals had higher percentage in the total output.

Figure 11.1 **Yields of dairy farms per cow, Euro**



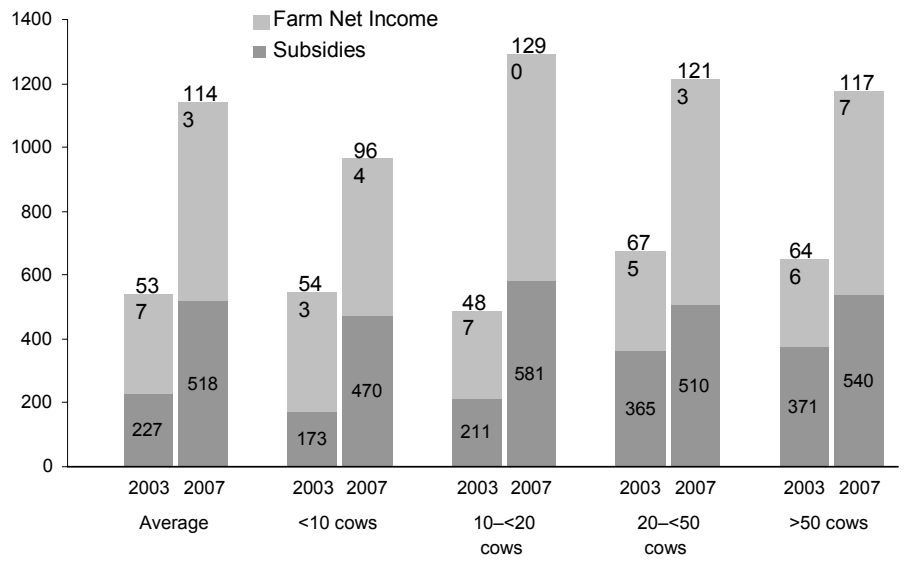
From 2003 to 2007 yields in dairy farms increased by 85 per cent, while the average per country was 69 per cent. In 2003 dairy farms received €261 per 1 ha UAA, respectively, the average per country was €282 (8 per cent more). In 2007 the situation totally changed - yields from dairy farms were more than twice as high, compared to 2003, and amounted to €539, while the average per country was €467, 13 per cent less than in dairy farms.

In 2007 the highest yields per dairy cow were in the farms with more than 50 cows. It amounted to €1,772. The lowest yields (less by 28 per cent) were in the farms with less than 10 dairy cows. During a 5-year-period the best augmentation (by 84 per cent) was achieved in the farms with more than 50 dairy cows, the lowest one (by 49 per cent) - in the farms with 20-50 dairy cows.

Home produced feeding stuffs (76 per cent of all feeds) prevailed in the Lithuanian farms; therefore, live-stock costs were considerably lower compared to many EU countries. In 2006 in the EU the average part of such feeding stuffs made up 29 per cent, while, in Malta, the Netherlands and Slovenia it was only 3 per cent. Similar to Lithuanian share of home produced feeding stuffs was in Luxemburg, Latvia, Czech Republic. In Lithuania share of purchased feeding stuffs substantially increased in the larger dairy farms. Purchased feeding stuffs were three times as large in the farms with more than 50 cows compared to the farms with less than 10 cows.

In 2006 the FNI per dairy cow was €1,143 in the Lithuanian dairy farm group. This indicator was higher only in Finland (€1,204), Spain (€1,244), Italy (€1,478) and Austria (€1,816), however, Lithuania exceeded the EU average - €832. The largest subsidies per dairy cow were received by Finnish (€1,989), the lowest - by Spanish and Italian dairy farms (€257 and €336 respectively). Lithuanian subsidies per 1 dairy cow were €704. It was 26 per cent higher than the EU average.

Figure 11.2 Farm Net Income and subsidies per dairy cow, Euro



In 2007 share of subsidies in FNI in dairy farms was by 24 per cent lower, FNI without subsidies (total output minus total input) was larger by 2.5 per cent compared to the average in Lithuania.

FNI per 1 dairy cow increased from €537 to €1,143 in the Lithuanian dairy farms during this 5-year-period. In 2003 this indicator was the worst in the group of farms with 10-20 cows. However, in this period improvement was the most efficient in this group and in 2007 this indicator became the best - €1,290, however, it was by 25 per cent lower (€964) in the group of farms with less than 10 cows.

In the course of 2003-2007 share of subsidies in FNI increased from 32 to 49 per cent in the group of farms with less than 10 dairy cows, while, in the farms with more than 50 dairy cows the share reduced from 57 to 46 per cent.

During 2003-2007 subsidies for production increased from €2.2 to €5.25 thousand in the Lithuanian dairy farms, however, it was by €0.8 thousand less than in 2005. In 2007 direct area payments amounted to 42 per cent of total subsidies for production, subsidies for livestock - 29 per cent, compensatory payments for LFA - 10 per cent, ecological production. - 6 per cent.

11.3 Conclusions

The EU accession had a positive impact on the Lithuanian agricultural sector. Each year the number of small farms decreased by 10 per cent, investments increased, economic indicators ameliorated. The Lithuanian dairy sector, the main agricultural sector in the country, distinctly illustrates these changes. Until 2008 milk prices and profits were growing, which stimulated increased milk production. The EU support system was also favourable - in addition to direct payments, dairy farms received significant subsidies on investments. Number of dairy farms increased by 3 times as large during 2003-2007.

Lithuanian dairy farms were a little smaller compared to the average farms in Lithuania. Economic size of them was the lowest among the EU appropriate farms. Dairy farms amounted to 22 per cent of the total Lithuanian commercial farms. Among 10 EU member states, entered the EU at the same time, similar share of dairy farms was in Slovenia, the higher share - only in Latvia (24 per cent).

FNI grew quicker in the Lithuanian dairy farms compared to the average. Share of subsidies in FNI increased more in the farms with lower number of dairy cows than in the larger ones.

Subsidies for production increased almost by 2.4 times as large. Direct area payments amounted to 42 per cent of total subsidies for production, subsidies for livestock - 29 per cent, compensatory payments for LFA - 27 per cent.

12 Standardised method for credit rating of agricultural holdings - an alternative utilisation of FADN data

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Abstract
The global financial crisis establishes new obstacles, requirements and challenges to the agricultural producers. In such circumstances it is especially important for farmers to base their investment and financial decisions on well-founded methods using multiple information sources.

Due to the relatively limited profit generating capacity of agricultural holdings and the higher risks attached to agricultural production, it is very important for the donor financial institutions to thoroughly examine the viability of the given investment.

In Hungary during the reviewing of the credit applications the assessment of financial plans has only minor importance as banks tend to avoid granting loans on business grounds and rather favour loans secured by mortgages or other means. However, if for the assessment of financial plans there were a well-worked out, reliable tool available that could make the reviewing of loan application much easier. Assuring higher security for loans would not only increase the amount of credits granted but in the long run could reduce the interest rates as well.

In this paper we intend to introduce a concept, based on FADN data, that will make the assessment of the validity of the financial plans possible. The core of the method is the selection of very similar FADN holdings and whether the farms' income will secure the redemption of the required loan will be assessed from the data of these holdings

Keywords: financial plans, coherence test, validity test, ADSCR indicator

12.1 Introduction

Financial planning is an integral part of the corporate planning system both at strategic or at operational levels. With its help it is possible to maintain the financial balance of the enterprise and it also forms the basis of the investment and the asset management policy.

Firms work out financial plans for two main reasons:

- For the operational running of the firm including the constant monitoring of liquidity in order to be able to fulfil the obligation of paying the bills on time;
- For the preparation of investment decisions. As with the previous point, in this case it is necessary to check the financial sustainability of the firms. On the other hand there is a need to calculate the return on the investment. These financial plans are most of the time prepared for the financing institutions (paying agency, investor or bank).

An important element of the credit granting procedure is the assessment of the validity of the financial plans. The bank must judge whether or not the planned balance sheet and profit and loss statement figures are realistic.

The essence of the assessment of the financial plan is to avoid the granting of credits on the basis of incorrect data. By applying a professional assessment tool it would force the farmers to prepare their financial plans taking into account the realities of Hungarian agriculture.

Assessing the loan applications in this way has mid- and long term-effects, too. The higher security of credit granting might decrease the needed amount of coverage and that way farms could draw on additional amounts of capital. In the longer term, the reduced risks of credit granting may have a favourable effect on the interest rates that could also increase the amount of loans.

12.2 Methodology for the assessment of financial plans

Here we present the methodology of the assessment of the financial plans prepared according to Hungarian accounting principles. It is necessary as the national accounting rules also follow this method. On the other hand, Hungarian farmers in their credit applications in most of the cases apply the same rules, too. Later on we will return to the possible utilisation of EU FADN data and their constraints. The first step is the generation of necessary inputs for the assessment. Besides the data for the assessment of the financial plan the, farm structure of the applicant is needed in order to identify and select the most similar FADN holdings. The assessment is made in three steps for all years of the financial plan (Figure 12.1).

12.2.1 Coherence test

In the first step the coherence and the integrity of the financial plan should be checked. For this the following relationships should be checked:

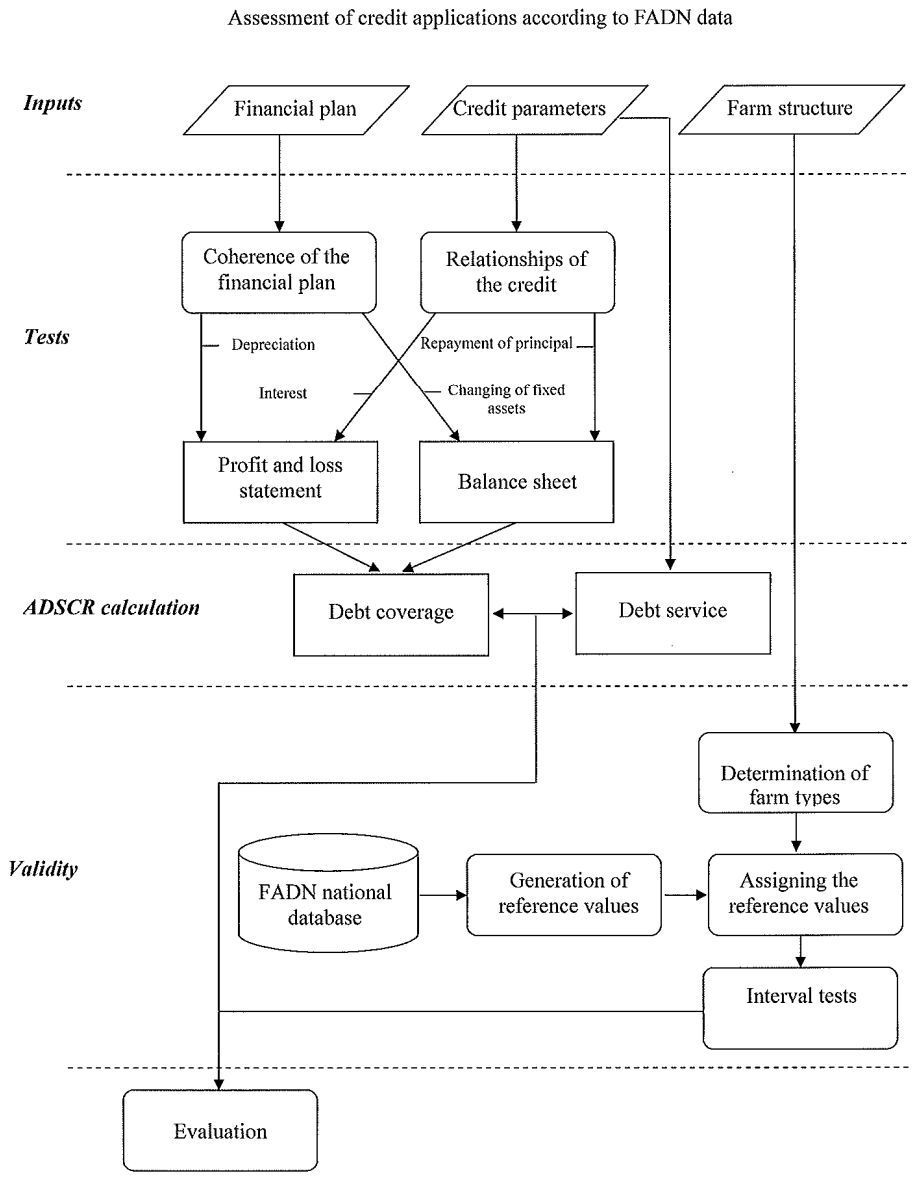
- The increment of invested assets should be in proportion with the amount of investments;
- Depreciation should grow in relation to the time of capitalisation in a time-proportionate manner;
- Carrying forward the result of the year: Profits generated in the given year shall accumulate in the equity;
- The parameters of the credit in the profit and loss statement and in the balance sheet.

The last test is more complex and consists of several steps. According to the parameters of the required credit (interest rate, duration, grace period) it needs to be checked whether, among financial costs, interest was recorded every year and that among obligations it is possible to detect the yearly diminishing amount of the loan.

12.2. 2 ADSCR indicator

In the second step it is necessary to determine on the basis of the financial plan whether the farms is able to fulfil its financial obligations related to the credit. For this purpose we use the ADSCR (Average Debt Service Coverage Ratio) calculation method that includes the methodology of determination of the indirect cash-flow. The core of the method is the matching of the financial obligations of the credit to the sources of repayment year by year.

Figure 12.1 Assessment of credit applications according to FADN data



As the Hungarian FADN is based on double-entry accounting (each and every economic transaction will be accounted not only at the corporate farms but also at the individual farms) we found the indirect cash-flow method the most suitable to determine available sources for redemption.

According to the generally accepted accounting rules, farms using double-entry accounting will compulsory apply the principle of accruals. In this sense they will account incomes and costs at the time of their occurrence. Results calculated on the basis of the accrual principle will not be the actually realised result. Instead of simply collecting the items with money exchanges, the basis of the calculation is the result (before or after taxes) derived from the profit and loss statement. This has to be corrected with those items that although influence the magnitude of the result do not generate actual money exchange. This way, items reducing the result should be added while items increasing the result should be deducted in order to arrive at the net change of the financial assets[1].

[1] Rózsa, Attila - Darabos, Éva - Bács, Zoltán: The international and Hungarian regulations of the composition of the cash-flow statement Agricultural Economics, Rural Development and Agricultural Informatics conference brochure, 2005 (A cash flow-kimutatás összeállításának nemzetközi és magyar szabályozása, Agrárgazdaság, vidékfejlesztés, agrárinformatika konferencia kiadványa 2005).

The calculated debt coverage should be divided by the debt service. If the result of division exceeds the internationally accepted value of 1.2 than we can assume that the farm will be able to fulfil its financial obligations connected to the credit.

12.2.3 Validity test

The next and the most important part of the assessment is the validity test. During this test we compare the reference data derived from the FADN database with the data of the examined farm and in this way we can judge whether the values in the financial plan are achievable.

The first step of this test is the generation of reference values. Unlike with the EU FADN system, in Hungary the application of a different stratification method is reasonable. The logic behind it is that stratifying according to legal form (individual farms, corporate farms) will give more homogenous groups of farms. The reason for this is the different structure of capital, land use and remuneration system of corporate farms compared to the individual farms. This way it is extremely important to make two groups of farms according to legal form before a financial comparison is made. Naturally, farm type and size are also important factors in the stratification.

Specific (irrespective of the size of farms) reference values of groups of farms can now be generated. The reference database will include data of more than one year; this way securing the consideration of climatic and market extremities. The calculation and comparison of the following reference values are considered to be reasonable.

- Production value/ESU;[1]
- Direct payments/ESU;
- Intermediate consumption/ESU;
- Profit before taxes/ESU;
- Return on total output.

Two intervals should be determined for these indicators. The first, wider interval will be used to filter out the extreme, outlying values. The second, narrower interval is aimed at identifying the weak points of the financial plan. The first interval is calculated as the average of the three upper and three lower extreme values of the similar farms. The second interval is determined as the 10^{th} and the 90^{th} percentile of the values of similar farms.

The test should be performed for all the years of the duration period. The question may arise as to how we can determine the validity of values referring to the future in the financial plan. For that we will use the MICROSIM prognostic model developed by our institute.

The MICROSIM model is based on FADN data and makes forecasts about the expected future state of the profit and loss statement of each FADN farm. It uses as inputs several macroeconomic indicators, the expected future values of costs and commodity prices as well as the expected changes of the support system. Formerly we used this model for forecasting farms' earnings and for making impact assessments on political decisions. In this context it is capable of determining the future values of the intervals.

By conducting the abovelisted tests every year we can get a clear picture of the weak points of the financial plan and of those elements that may cause problems regarding the repayment of the credit.

We will demonstrate the functioning of the system on a summarised example. If a farm plans to draw on credit for such an investment which in the given economic environment cannot be realised or with only very high risks then the system will check it as it follows: the farm's costs will increase due to higher depreciation and interest costs. In the financial plan, in order to compensate for the extra costs, the production value (turnover) will be raised. If the production value per unit will be much higher than the average of the similar FADN farms, the system will indicate that the turnover is not feasible and in that way the redemption of the credit may entail high risks.

Consequently, the essence of the aboveillustrated system is not to allow farmers to underpin their application with unrealistic figures. In this way the risks of credit repayment can be assessed. By assigning probabilities to the credit applications, credit conditions - including interest rates and collaterals - may be differentiated.

[1] European Size Unit.

The system is able to assess individual farms without double-entry accounting, too. They will provide detailed financial data according to a well defined instruction of completion.

12.3 Future developments

In the abovedescribed method the basis of the validity test is the European Union's farm typology. This procedure, in our opinion, is not the best solution for calculating the reference numbers. We suggest using statistical matching for finding similar FADN farms as it would give better results compared to the conventional stratification method, thanks to the opportunity to also use other variables in the farm selection process. One of the important variables could be the labour force as it would give the opportunity to differentiate between farms according to the applied production technology in a given farm type. The drawback of the method is the need for individual FADN farm data as the selection of similar farms is made on an individual basis. FADN's strict data handling policy would certainly limit the application of the method.

The assessment by all means should be complemented by sensitivity analyses. The basis for the sensitivity analysis may be the ADSCR indicator. It has to be determined year by year to what extent may incomes decrease or costs increase without putting stress on the repayment of the credit. This examination can also be extended to the interest rates. It is possible to calculate the critical interest rate at which the farm is still capable to repay the credit.

This model should be made available for farmers through the internet. It could be a fine tool for checking their development ideas and also could serve the purpose of raising the agricultural producers' financial intelligence.

12.4 Discussion

The above method was worked out for the Hungarian FADN system. Applying it with the utilisation of EU FADN farm data brings up several problems. Of these the most important is the calculation of cash-flow. As the EU FADN system at the calculation of the results does not take into account taxation (in the case of companies the corporate tax), the determination of the precise debt coverage is much more difficult. Later on by using Hungarian data we intend to study its concrete effects.

In the framework of international application it is an additional problem that banks in different countries, in line with their national accounting standards, may require different financial plans which could affect the methodology of calculating the coverage of debts.

For the assessment of fairly new production technological developments, the lack of sufficient reference data may be another problem. For example, if we would try to evaluate a six metre tall Dutch-type greenhouse development project, according to the present data it is most likely that the system would assess it unfeasible. Therefore the professional knowledge of a human operator may not be excluded as new technological developments need individual consideration. However, even in these cases the system is able to test the coherence of the financial plan and to calculate the ADSCR indicator.

We have developed a financial-analytical model which is capable of assessing the weak points of the agricultural financial plans. By using FADN farms' data as reference we can assure the sorting out of credit application forms containing unfeasible, unrealistic development ideas.

In Hungary during the reviewing of the credit applications the assessment of financial plans has only minor importance as banks are tend to avoid granting loans on business grounds and rather favour loans secured by mortgage or other means. However, if for the assessment of financial plans there would be a well-worked out, reliable tool available that could make the reviewing of credit applications much easier. Assessing the loan applications in this way also has mid- and long-term effects. The higher security of credit granting might reduce the needed amount of coverage and in that way farms could draw on additional amounts of capital. In the longer term reduced risks of credit granting may have a favourable effect on the interest rates that could also increase the amount of loans.

13 Income effects of tax relief in Norwegian agriculture

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13.1 Introduction

This paper deals with taxation in Norway, especially in the agricultural sector. It includes a brief history and tries to show how the authorities have tried to alter taxation rules instead of paying subsidies to maintain income level in agriculture. As taxation rules are complicated and have been altered many times during the centuries, this presentation will be far from complete.

Tax

A tax has been defined as a levy imposed by the State on income, property, et cetera. It is a payment that is not connected to some direct service or goods VAT (value-added tax) is not a topic in this paper.

13.2 Taxation in Norway - a brief history

The first tax in Norway was introduced at least a thousand years ago. It was called leidang, and was a military tax for the coastal districts, a duty to provide ships, men and provisions to the king. Later on the inland districts also had to pay tax, and the king and his escort should be given food and accommodation for a given period.

About 1660 a matrikkel, a register of all real property, was prepared. Similar lists had been prepared earlier, mainly as a method to set the rent for land, but the values had become useless because of several changes in the society. The number of products that could be used as payment was about 150, and the price of each could be felt unfair. All real estate was valuated during the decade after 1660. The farms were given a tax value after their production potential. The tax paid on the basis of the Matrikkel, was a mix of property tax and income tax.

In 1792 inheritance tax was introduced. A hundred years later ordinary income tax was introduced. At first it was a tax to the municipality, and ten years later also to the State. Not everybody had to pay tax. Those who had a very small income, paid no tax as this way to get money to the common costs of the society, had to be fair. Only people who earned more than they and their family needed for a living, had to pay tax.

There is also a tax on net wealth in Norway. This was introduced even later.

After World War II Norway developed a quite high income tax. Those who had high income, paid very high tax on the marginal incomes (progressive taxation). There was almost no difference in tax level for different sources of income. Self-employed persons except farmers and fishermen paid a little more of social security contribution than others.

New model for income tax in 1992

For the taxation year 1992 a new model was introduced. (The model was modified in 2005-2006.) The tax became less progressive, and the incomes were classified in different types. The idea was to tax labour income and capital income differently.

Personal income is the basis for social security contribution in proportion to income and progressive top tax on high income. Personal income is the sum of wages, pensions and the income from businesses after a calculated share to the capital. The share is optional and can vary between 0% and a maximum that has been changing a bit from one year to another. The maximum level was 5.2% in 2008. On one hand the tax will be reduced by choosing maximum interest for the capital. On the other hand, personal income is the basis of sickness benefit and future pensions. What to choose can be dependent on the age of the person and former income.

The social security contribution is 7.8% for employees, farmers and fishermen and 10.7% for personal income from other businesses. The start level for calculating top tax is NOK420,000 (2008) or about EUR50,000. There are two steps: 9% tax up to NOK682,500 and 12% on higher income.

Common income is the total net income from all sources. It is the sum of net income from business, wages, pensions, interest and other income after deduction of paid interest and other specified deductions such as high costs in connection with travelling to work and payment for kindergarten or other care for young children. Tax on common income is 28%. (A small part of the Northern Norway has a little less.)

Other tax

Real property tax was earlier allowed only in towns, but is now introduced in one of four municipalities. The local authorities can decide both if they want this kind of tax and the tax level to some extent. The tax used to be for developed areas only, but since 2007 it has a broader base. It is made exceptions for agricultural land and necessary buildings for agriculture. Farm houses (dwellings) can be taxed.

Tax on net wealth: The tax is about 1% of the net value of all assets over NOK350,000. The value should be the trade value of the assets less all depts, but there are many exceptions: Real estate should be valued conservatively, and regulations say that houses (and flats) and holiday cabins shall not be valuated to more than 30% of market price. Real estate in agriculture shall not be valuated to more than 80% of market price. Real estate in forestry is valuated after potential to give income in the future. For practical reasons machinery and equipment get the same value as in the tax account. The value of shares are from 2008 just a little lower than market price. Bank accounts, other claims and liabilities have nominal value. The political parties disagree on this tax. The parties on the 'right wing' planned to reduce or abolish it, but the present government wants to get more tax from rich people and has kept the tax.

13.3 Subsidies in Norwegian agriculture

The level of subsidies in Norwegian agriculture has been high and has to be reduced or changed according to international agreements (for instance in the WTO). The Norwegian authorities find it difficult just to cut subsidies and have tried to find ways to compensate the cut in income to the farmers in different ways. The first was to alter the subsidies by decoupling grants from produced quantities and stimulate eco-friendly products and production methods and the production of common goods. Another measure is to differentiate the taxation by giving special deductions to agriculture.

Norwegian Agricultural policy

The main document with objectives and guidelines for Norwegian agricultural policy is Report to Storting no. 19 (1999-2000) (St.meld. nr. 19 (1999-2000). Norway has had two general elections and three changes in government since the report was prepared. The government declarations issued by each new government have confirmed the 1999 agricultural white paper as the basis for the agricultural policies (Knutsen, 2007).

Objectives

The Report to the Storting no. 19 (1999-2000) states that farmers have to be secured the potential for income and living standards corresponding to the remainder of the population, but underlines that farmers are self-employed and responsible for their adaption to external constraints and therewith for their income. Agricultural income should be secured by reduced costs and a production in balance with domestic demand. Furthermore, the farmers should pay more attention to consumer concerns like high-quality products and safe food. Environmental considerations are important in order to reduce negative environmental impact of agricultural productions and to securing plant and animal health.

The government is going to contribute to production of public goods like food security, rural settlement and to maintain cultural landscapes. Recognising that the production of public goods can not be ensured by the

market, the report justifies an active agricultural policy aimed at maintaining farming activities throughout the entire country (Knutsen 2007).

13.4 Tax relief for farmers

Norway has always had a high taxation level. In contrast to many other countries, Norway has had nearly the same tax structure for all kind of businesses, farmers were no exception. A special tax allowance for agriculture was proposed in Report to the Storting no. 19 (1999-2000). In 2000 a new flat-rate allowance on income especially designed for farmers was introduced. This was a compensation for reduced prices of agricultural products. The agricultural allowance has increased frequently since 2000 (Table 13.1). Tax and agricultural allowance has become a part of income policy in the agricultural sector in Norway.

Table 13.1	Potential agricultural allowance from 2000 to 2008, NOK[1]								
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Basic deduction	18,000	36,000	36,000	36,000	36,000	36,000	36,000	45,000	54,200
Percent deduction	-	-	9	19	19	19	19	32	32
Max deduction	18,000	36,000	47,500	61,500	61,500	61,500	71,500	142,000	142,000
Needed net income	18,000	36,000	163,800	170,200	170,200	170,200	228,800	348,100	328,600

The agricultural allowance can be deducted only from the farmer's net income from agriculture and is calculated per holding. It is possible for the spouses to share the tax allowance if they share the net income. For farmers organised in companies each partner has the possibility to get the allowance related to his share of the net income. The tax reduction is 28 per cent of the agricultural allowance. Table 13.1 shows the composition of the agricultural allowance and the development from 2000 to 2008. The table also shows the amount of net income needed to achieve maximum tax allowance.

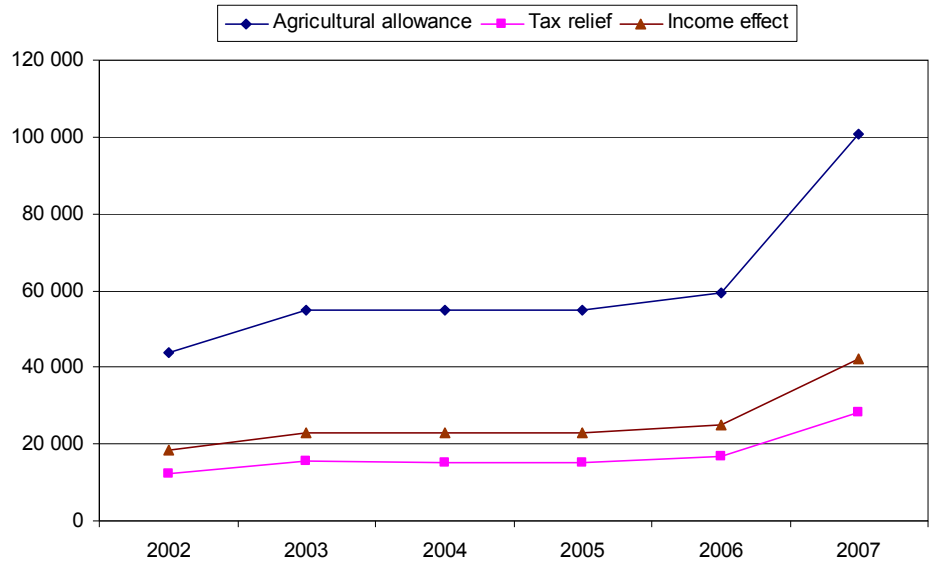
In 2007, a major change in potential tax reduction for the Norwegian farmers was implemented. The maximum agricultural allowance was nearly doubled from NOK71,500 to NOK142,000. Maximum tax reduction for 2007 was 28 per cent of NOK142,000 accordingly NOK39,700. To reach this amount of tax reduction the net income from agriculture had to be NOK348,100 or more. It is possible to include income from agriculture, horticulture and fur farming. It is also possible to include income from wood-based biofuels, but forestry is not included. Sickness benefit from the same businesses can be included. The farmer has to live on the farm but it is not necessary to be the owner of the farm.

In the annual Norwegian farm business survey all the results related to income and income trends are unaffected by changes in taxation rules. Potential tax reduction related to agricultural allowance has no effect on the ordinary results in the survey. Since taxation has become an important part of the income formation process for Norwegian farmers, NILF has registered agricultural allowance for all the participating holdings in the survey since 2002. For 2007, NILF published results from the survey with and without income effect of agricultural allowance. On average the agricultural allowance for all the farms in the survey was NOK100,700. The average farmer's allowance in the survey increased with NOK41,300 from 2006 to 2007. The potential increase was NOK70,500 and the exploitation ratio from the last change was 59 per cent. On average the exploitation ratio of the farmer's allowance for 2007 was 71 per cent, and the average tax reduction per holding was NOK28,200. About 70 per cent of the holdings in the survey did not reach the maximum allowance, and 5 per cent of the farmers did not get any tax reduction at all because they had no net income from agriculture.

To calculate the income effect the authorities throughout negotiations with the farmer's unions have decided to use a marginal tax rate of 33 per cent. I.e. that the average income effect for all the holdings in the survey was NOK28,200 : 0.67 = 42,100.

[1] €1 is about NOK8. The maximum deduction in 2008 is estimated to be €17,750 per holding.

Figure 13.1 **Development of agricultural allowance, tax relief and income effect per holding in average for all holdings in Farm Business Survey 2002-2007, NOK**



Type of farming

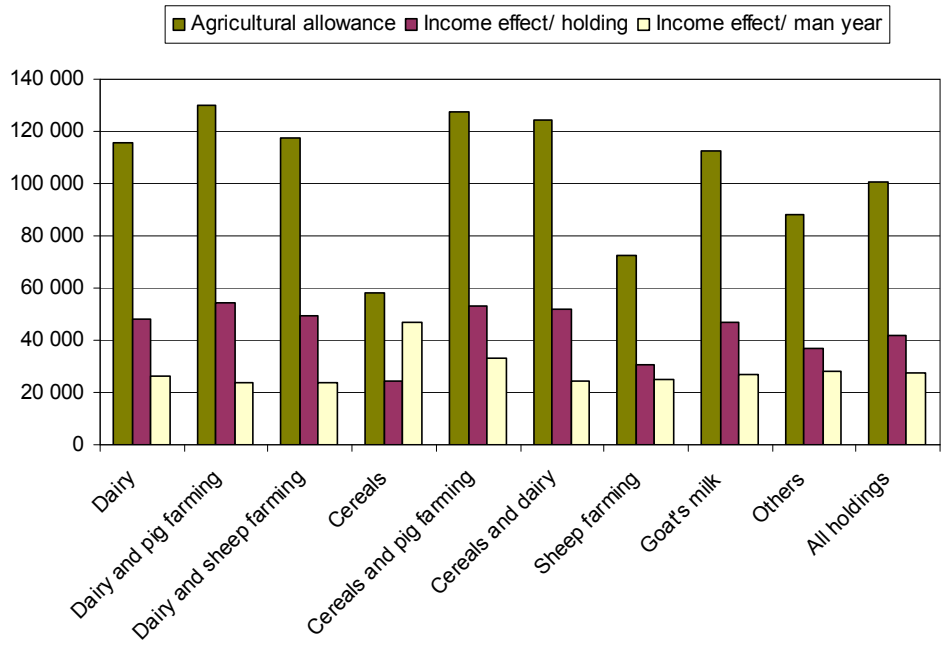
Table 13.2 indicates quite large difference in average agricultural allowance per holding between the nine types of farming presented. Dairy farms and dairy farms combined with other productions will usually achieve higher net farm income than farms with cereal production and sheep holding. Grain producers and sheep farmers have the lowest average net farm income among the presented types of farming in the survey. This results in lower average tax allowance and lower average tax reduction per holding.

Table 13.2 **Farmer's allowance according to type of farming. 2007**

Type of farming	Number of holdings	With maximum allowance	With no allowance	Agricultural allowance NOK
Dairy	365	135	3	115,600
Dairy and pork farming	31	21	0	130,300
Dairy and sheep farming	48	18	0	117,600
Cereals	94	9	20	57,900
Cereals and pig farming	39	28	1	127,800
Cereals and dairy	22	12	0	124,500
Sheep farming	95	8	6	72,700
Goat's milk	21	5	0	112,700
Others	187	38	15	88,300
All holdings	902	274	45	100,700

The highest percentage of holdings with maximum allowance is related to big units producing milk and pork.

Figure 13.2 **Benefit from tax relief in different types of farming. 2007**



If one compare the income effect per man-year for different productions, the results change a lot (Figure 13.2). Because the tax relief is given per holding, a labour-extensive production like grain production has the highest income effect per man-year. On average the grain producers have only about 900 working hours a year. However, 21 per cent of the grain producers had no net farm income and therefore no income effect from tax relief. Among sheep farmers 6 per cent were without net farm income. Among the most labour intensive productions, like dairy and dairy combined with other productions, the agricultural allowance is much higher. The income effect per holding is up to maximum on average for livestock farmers. Because of large labour input in dairy farming the income effect per man-year is lower than for grain producers.

The average farm in the survey had NOK100,700 in farmer's allowance. Five per cent had no net farm income and no effect of the tax allowance while 30 per cent reached the maximum level with NOK142,000 in agricultural allowance. From 2006 to 2007 the demand for net income from agricultural sector to reach the maximum allowance raised from NOK228,800 to NOK348,100 which meant that the share of holdings with maximum allowance sank from 51 per cent to 30 per cent. The new design of the allowance was meant to stimulate professional farming at the expense of part time farming and hobby farming.

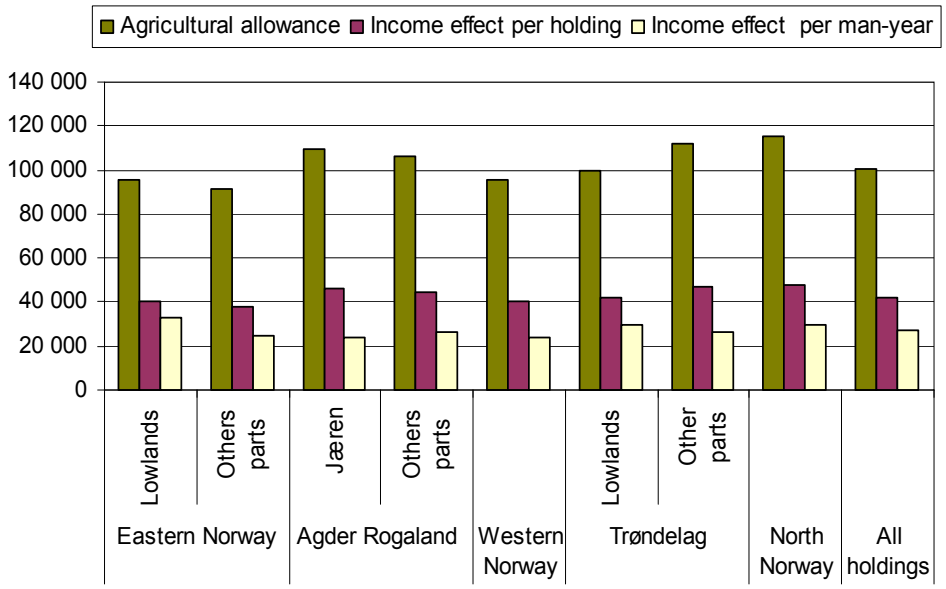
Regions

Farmer's allowance according to regions is presented in Table 13.3. The differences between regions are smaller than for type of farming. Northern-Norway has the highest farmer's allowance per holding. The greatest number of holdings without allowance is located to Eastern Norway. Many farms with grain production explain the high number of holdings with no net income in the eastern lowlands, while many sheep farms is the main reason for lack of net farm income in other regions.

Table 13.3	Farmer's allowance according to regions				
Region		**Number of holdings**	**Number of holdings with max allowance**	**Number of holdings with-out allowance**	**Agricultural allowance NOK**
Eastern Norway	Lowlands	190	63	18	95 800
	Others parts	160	35	11	91 300
Agder Rogaland	Jæren	49	24	0	109 800
	Others parts	82	22	1	106 000
Western Norway		168	35	10	95 900
Trøndelag	Lowlands	68	21	3	99 500
	Other parts	70	28	1	112 200
North Norway		115	46	1	115 000
All holdings		902	274	45	100 700

In Jæren nearly 50 per cent of the holdings reached maximum allowance, but only 21 per cent of the holdings in Western Norway reached the same level on the net income from agriculture. Differences in scale of production explain the difference between the two regions in the share of holdings with maximum farmer's allowance.

Figure 13.3 **Benefit from tax relief in different regions. 2007**



The income effect per man-year is highest in the lowlands in Eastern Norway. This is related to few working hours per holding. The lowest income effect per man-year is found in Jæren and Western Norway. This is caused by many working hours per unit in Jæren and by low net income in Western Norway.

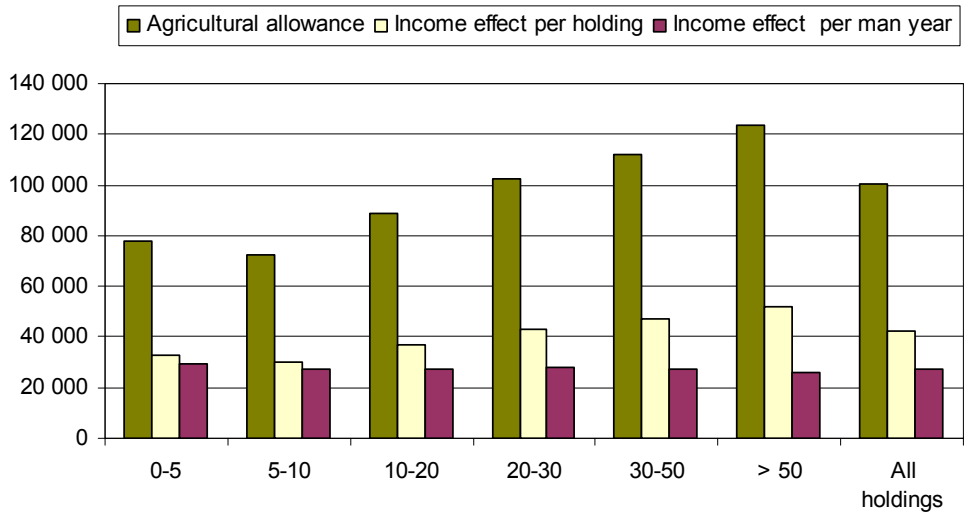
Farm size

Agricultural allowance related to farm size is presented in Table 13.4.

Table 13.4	Farmer's allowance according to farm size (hectares)			
Farm size hectares	**Number of holdings**	**Number of holdings with max allowance**	**Number of holdings without allowance**	**Agricultural allowance**
0-5	20	3	2	77,700
5-10	54	3	4	72,500
10-20	269	44	19	88,700
20-30	233	68	9	102,600
30-50	237	104	8	112,200
> 50	89	52	3	123,800
All holdings	902	274	45	100,700

As expected the amount of the farmer's allowance per holding increases with the size of the farm. The exception is in the group with the smallest farms when area (hectares) is used for size classification. This group contains holdings with a few hectares and a large economic size, like pig and chicken farming, and some small farms with area based production like sheep farming.

Figure 13.4 **Regional distribution of income effects from agricultural allowance, 2007**



The income effect per man-year is nearly the same for all the size groups. Increasing scale of production raises the average net income, but also labour input. These interactions neutralise the effect of each other and results in the same level of income effect for all the size groups.

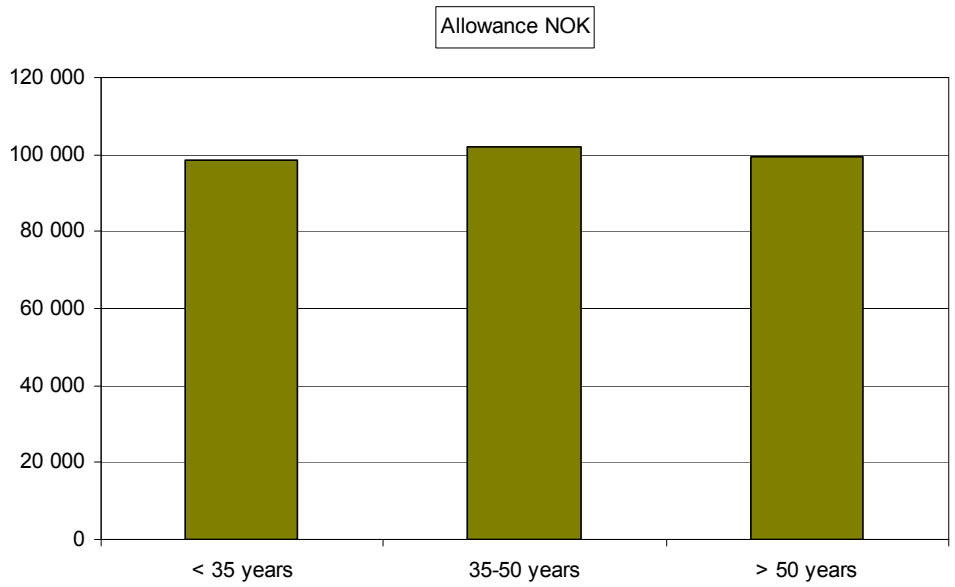
There are a number of holdings with no net income in all size groups. Income effect per man-year is nearly the same in all size groups. This indicates that the tax scheme has an equal effect on income per man-year in all productions, regions and size groups. The politicians therefore find the agricultural allowance to be a very interesting alternative to ordinary support.

On average, the tax reduction of the farmer's allowance was NOK28,200 per holding in the Farm Business Survey. The income effect per holding was calculated to NOK42,100, assuming a marginal tax rate of 33 per cent. The increased allowance from 2006 to 2007 increased the tax reduction with NOK17,300 (70 per cent). The average income effect per man-year was calculated to NOK27,200 for all the holdings in the Farm Business Survey.

Age

Some of the arguments against using tax relief as an income support measure in the agricultural policy have been that this measure does not benefit young and newly established farmers with large investments and large depreciations and thereby low net income. Tax relief is dependent on taxable income before income reduction, and many young farmers are automatically falling outside this kind of measures. The results from the sample in this survey from 2007 show small variance among the three age groups (Figure 13.5).

Figure 13.5 **Average agricultural allowance age groups. 2007**



Among the youngest farmers 38 per cent achieved maximum allowance, the middle aged 33 per cent and the oldest 26 per cent.

Other aspects

The exploitation ratio of the agricultural allowance varies among different groups. Farmers with low net income from agriculture and entitled to many other deductions combined with low net income from other sectors will have low benefit from agricultural allowance (Andersen, 2008). This investigation does not include such effects because we do not have access to that kind of information.

The allowance influences the farmers' adaption to the tax system. The personal income which is forming the basis of social welfare, therefore it is important to achieve an adequate level of the personal income. The farmers are recommended to make use of the allowance at least to the basic deduction level instead of for example exploiting maximum rate of depreciations which reduce the net income from agriculture. The effect of the agricultural allowance is thereby overestimated.

A nation's support to farmers via various tax mechanisms is currently not regulated by the WTO, and therewith not subject to reduction commitments (Knutsen, 2007). This is an argument to continue developing measures based on tax relief. Tax relief sounds better and is more popular among politicians than different kind of support and it is also accepted among political surroundings which normally fight against public support to agriculture.

13.5 Conclusions

Agricultural allowance has become an important part of agricultural policy in Norway. The income effect per holding from tax relief is calculated to NOK42,100 per holding which is about 15% of average net income per holding.

Taxation measures are more popular among politicians than traditional support to farmers. The agricultural allowance is supported also from political surroundings which normally are against agricultural support.

The results of the survey show small differences between regions, type of production and size groups in income effects per man year. Although the tax relief per holding in NOK is higher for some groups than others, the farmers unions are satisfied with the profile of the distribution.

The farmers' adaption to the tax system may lead us to overestimate the effect of the agricultural allowance. Tax relief is dependent of a level for the net income from the sector. Low total net income can cause disappearance of other allowances in the taxation system.

References

Andersen, F., *Skatt og merverdiavgift i jordbruket*. NILF-report no. 2008-6. Oslo: Norwegian Agricultural Economics Institute, 2008.

Driftsgranskingar i jord-skogbruk, *Account results in agriculture and forestry 2007*. Oslo: Norwegian Agricultural Economics Institute, 2008.

Knutsen, H. (eds.), *Norwegian Agriculture - Status and trends 2007*. Oslo: Norwegian Agricultural Economics Institute, 2007.

The Norwegian ministry of Agriculture, *Om norsk landbruk og matproduksjon (On Norwegian agriculture and food production),* St. meld, nr. 19, 1999-2000.

14 Farm size, farm land transfers and economic performance - an application to Swiss FADN data

Beat Meier
Bemepro

Farm size, farm land transfers and economic performance – an application to Swiss FADN-data

17th PACIOLI workshop
Ettenhausen (Switzerland), 7 - 10 June, 2009

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Background and overview

1 Introdction
2 Farm size and economic perfomance
3 Changes in farm size and their effects
4 Conclusions

- Framing project: „Farm land transfers and structural change in agriculture“:
  - Project goals: Describing main processes of farm land transfers, identifying determining factors, analysing economic impacts, modeling development of farm size structure: trends and possible future alternatives
  - 3 partners: Christian Flury and Gianluca Giuliani (Flury&Giuliani Gmbh), Beat Meier (bemepro)
  - Data sources: Farm census, AGIS (Farm information system for administration); FADN (economic issues, land tenure effects, long term analysis)
- Pacioli-presentation: Farm size, farm land transfers and economic performance – an application to Swiss FADN-data
  - Data: unweighted results, farmer=owner, specialized farms excluded (permanent crops, horticulture, pigs an poultry)
  - Economic results by farm size
  - Effects of changes in size on economic results

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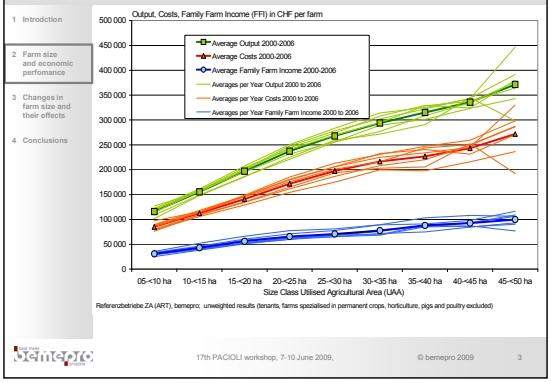
Output, costs and income increase with farm size



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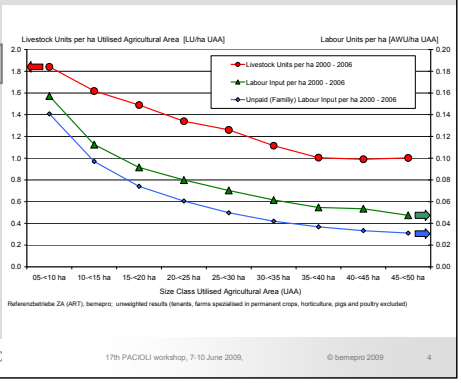
Lifestock and labour intensity decrease with farm size



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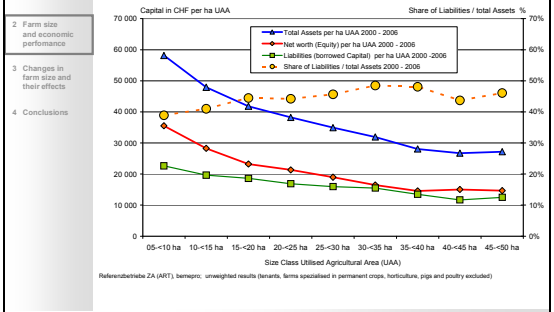
Capital intensity decreases with farm size



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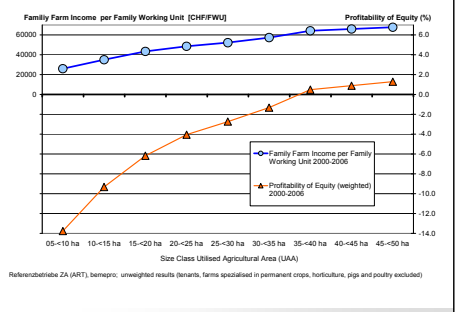
Profitability of labour and capital increase with farm size



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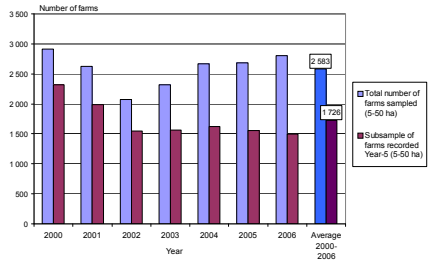
Effects of changes in farm size: data sets



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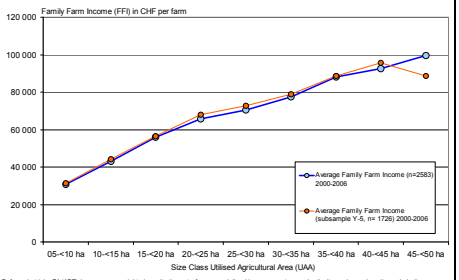
Influence of methods: Family Farm Income for sample and subsample



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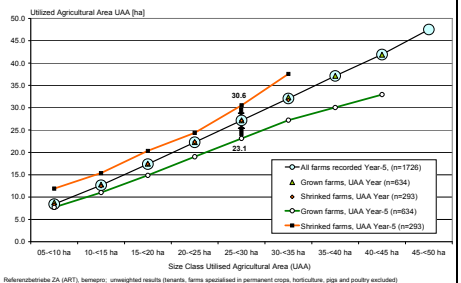
Farms growing, shrinking or constantly sized



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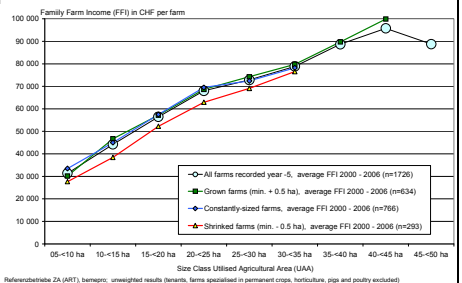
Family Farm Income changes with farm size



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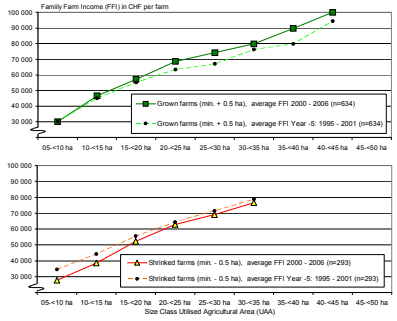
Growing farms improve, shrinking farms decrease income

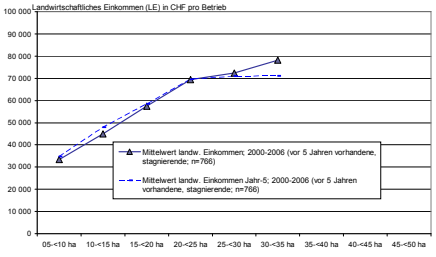


Referenzbetriebe ZA (ART), bemepro; unweighted results (tenants, farms spezialised in permanent crops, horticulture, pigs and poultry excluded)

Conclusions

- Methods
  - In rotating panels, intertemporal analysis on the level of the sampled units depend on the replacement rate; to make such analysis possible, sample design must probably include these requirements.
  - Economic effects of changes in farm size need an observation period longer than 2 years.
- Results
  - Farm size in hectares determines economic indicators; bigger farms produce an earn less per hectare but show better results in relation to labour and capital inputs.
  - In the period 2000 to 2006,
    - growing farms (in hectares) produce the improved results of the size class that they reach,
    - shrinking farms loose in terms of proftability and show results under the average of the size class they reach.
    - Simplified: growing farms produce more with the former cost structure while shrinking farms produce less without cutting costs accordingly.

FFI constantly sized farms



15 From farm-level variables to indicators of sustainability - The example of the North China Plain (NCP)

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15.1 Introduction

The aim of this paper is to develop specific indicators for measuring the sustainability of agriculture on farm level in the North China Plain (NCP). The concept of sustainability is multi-faceted and complex; therefore this work focuses exclusively on the most dominant issues - concerning the sustainability of farming - in the NCP. The NCP is one of China's most important agricultural areas, which produces large shares of the country's grains. The issues threatening the sustainability of farming in the NCP are environmental degradation (i.e. over use of inputs and depletion of natural resources) and continuous pressure on the land resulting from a still growing population. Due to the agricultural importance of the NCP it is essential for the country's food security that the sustainability of farming in this area can be ensured.

Indicators are one way to measure sustainability methodically. They represent a way to facilitate and enable information transfer to a wide audience. In order to ensure the functionality of indicators, their development has to be based on defined selection criteria. Furthermore, the development process should be embedded in a systematic framework. This work presents the development of indicators of sustainability of agriculture in the NCP in a stepwise approach. The indicator development is based on an own data set from a survey in July 2008.

The first part describes the study area and the specific problems which sustainable agriculture in the NCP is facing. Then the methodological background and systematic framework for indicator selection are explained. In this part the data set is described and definitions for sustainability and indicator selection are developed. Based on these definitions the following part demonstrates the process of selecting indicators for sustainability of farming in the specific setting of the NCP. Then the values from the data set for the selected indicators are displayed and briefly analysed. In the final part the selection process is analysed and further research recommendations as well as suggestions for further development of these specific indicators is provided.

15.2 Threats to Agricultural Sustainability in the NCP

The North China Plain covers seven provinces and is one of China's most important agricultural regions, it is regarded as 'China's granary' (Piotrowski and Jia, 2006). It is dominated by small-scale farm households which grow mostly wheat, maize, peanuts and cotton; summer maize - winter wheat represents the most common crop rotation.

Table 15.1 Sown area and production of major crops in the NCP, 2006

	Sown area (1,000 ha)	Wheat (m tons)	Maize (m tons)	Peanuts (m tons)	Cotton (m tons)
PR China	157,020.6	104,464	145,485	14,666	6,746
NCP provinces	60,288.2	77,286	51,307	10,142	3,382
Share to whole PR China	38.4%	74.0%	35.3%	69.2%	50.1%

Source: China Agriculture Press, 2007

China feeds 21% of the Earth's total population with only 10% of the world's arable land and only one quarter of the average world water resources per capita (OECD, 2005). However, China also uses 30% of the world's

total N fertilisers (JU et al., 2004). This production intensity indicates that the sharp rise in agricultural production might have a downside: environmental degradation. In the past 50 years the use of agricultural inputs like fertilisers, pesticides, machinery and improved seeds increased noticeably. Furthermore arable land areas were expanded and irrigation facilities were installed on a large scale. These advances made China's agriculture grow more rapidly than that of the USA or the world as a whole between 1949 and 1999 (Shi and Cheng, 2004). In the past 25 years the average staple crop productivity in China has doubled - which outnumbered the 25% growth of the population during the same period (Binder et al., 2007). However, the continuous pressure on the land due to a still rising population remains, as compared to the global average, China only has around 35% of arable land per capita (Zhen and Zoebisch, 2006). Even though the agricultural production levels have risen in the past, China is still facing the growth of its population. Therefore it is an essential question how the Chinese population will be fed. Further, Zhen and Zoebisch (2006) estimated that the Chinese agricultural production will lag behind the population growth. The NCP, as one of China's biggest staple crop producing areas, has to carry on feeding the growing Chinese population.

A study revealed that the N efficiency of the prevailing crop rotations in the NCP is often below 30% (Kopsch et al., 2006). This means that up to 70% of the applied N cannot be used by crops and considerable amounts of N are lost or deposited. This indicates that farming in the NCP suffers from over-fertilisation. Over-fertilisation leads to leaching of nitrogen (N) and thus contaminations of air and water resources. Further, HU and CAO (2008) revealed that the use of chemical fertilisers in the NCP, even with lower levels than the current farming practice, had negative impacts on soil biodiversity, soil health and nutrient cycles. These findings indicate that the current fertilisation practices have severe negative environmental impacts and thus threaten the sustainability of agriculture in the NCP.

In China, 81% of the water resources are in the country's Southern parts, whereas 64% of the arable land lies in the Northern parts. As a result the present situation in the NCP is dramatic: it holds a considerable share of China's arable land - with a high need of water, but only 6% of China's surface water (Varis and Vakkilainen, 2001). Therefore irrigated arable land in the NCP relies on groundwater, which causes groundwater levels to drop up to 1m annually and even led to land subsiding (Binder et al., 2007). Considering that the estimated increase of annual groundwater use for irrigation is already 6.42% - the future situation is tense as the gap between water supply and demand will widen (Zhen and Routray, 2002). Already nowadays' high water consumption levels led to water shortages in many places of the NCP. Agriculture represents a major reason for declining groundwater levels, which is a dilemma as the farmers in the NCP endanger their own future existence. Consequently water scarcity severely threatens the sustainability of agriculture in the NCP.

Ground and surface water pollution from agriculture is a major problem in the NCP and affects people's living and health via the intake or contact with polluted water (Li et al., 2001). A significant positive relationship between the amount of N fertilisation and the N content in groundwater exists in the NCP. Hence a study on water quality showed that 16 out of 20 wells contained N levels exceeding the maximum allowable limit for nitrate in drinking water (Zhen et al., 2005). Another study in the NCP revealed that about 45% of over 600 groundwater samples exceeded WHO and European limits for nitrate in drinking water (Zhang et al., 2004). In addition, high amounts of applied pesticides also led to contaminations of groundwater resources. This poses a threat to human health and thus to sustainability of agriculture in the NCP.

Most farmers in the NCP use cheap and freely available pesticides. In order to increase effectiveness, high dosages are applied: the average application rates are two to three times higher than the recommended dosage (Zhen et al., 2005). The high application rates combined with inappropriate handling have negative effects on the farmers' health. Moreover, the concentration of pesticide residues in drinking water is high. A study revealed that the EU limits for pesticide residues in drinking water were exceeded in the NCP (GUO, 1995). Moreover, about 24% of total cropland is already polluted by pesticides (Zhen and Zoebisch, 2006).

Barning (2008) and Ju et al. (2004) revealed that the level of education of farmers is low and that knowledge transfer systems are deficient - leading many farmers to unconsidered use of environmental resources or pollution. Optimised or modified management strategies can potentially reduce the environmental burden of farming in the NCP (Ju et al., 2006). Hereby extension services can play a vital role by supporting the knowledge transfer to the farmers. Therefore Mack et al. (2005) promote that simple and effective support decision methods should be developed and taught to farmers in order to increase environmental awareness.

15.3 Methodology

This part provides the methodological background and systematic framework for the development of indicators for sustainability in the NCP. The data set on which the indicator selection process is based is introduced and definitions for sustainability and indicator selection are developed in separated parts.

15.3.1 Definition of Sustainability

The concept of sustainability is highly discussed and many definitions exist. The aspects of sustainability are multi-faceted and complex. In this work sustainability is generally referring to the 3 basic dimensions of sustainable agriculture (Zhen et al., 2005). The 3 dimensions are: ecological soundness (i.e. preservation and improvement on the natural environment), economic viability (i.e. maintenance of yields and productivity) and social acceptability (i.e. self-reliance, equality and improved quality of life). More specifically, the concept of Zhen and Zoebisch (2006) is followed, where agricultural sustainability in the NCP is defined as 'the farming practices that grow crops at a profit while minimising negative impact on the environment. Moreover, sustainable agriculture should also emphasise the ability of the system to continue into the future.' This concept encompasses five dimensions of agricultural sustainability in the NCP, based on the specific setting and situation described in the previous part:

- crop intensification, respecting the land's carrying capacity;
- a rational use of inputs;
- profitable and stable production;
- strengthened institutional support;
- improved conservation knowledge and technologies.

The development of indicators of sustainability is based on these definitions and concepts. In order to evaluate the sustainability of a household, each of the 5 dimensions has to be assessed.

15.3.2 The Data Set

The data set originates from a household survey in the NCP. In July 2008, data were collected from 64 randomly-sampled farm-households in 4 randomly-sampled villages in Quzhou County, Hebei province. The structured interviews focused on quantitative data about the operations of farm-households, but also included qualitative questions regarding the perception of environmental quality and its changes in the villages. The main topics of the questionnaire were:

- Household characteristics;
- Farm resources;
- Farm production data;
- Further training and information transfer;
- Household balance, subsidies and credit.

Besides the questionnaire, 205 soil samples from the fields of the interviewed farmers were taken and analysed. Furthermore, GPS data of those fields as well as the farm-houses were taken.

Up to 455 variables were collected from each farm-household. In this work a variable is defined as one characteristic of an interviewed farm household. All variables have been converted into a numeric form, by i.e. using codes. These variables form the data set from which the indicators for sustainability will be developed.

15.3.3 Definition of Indicators

Indicators are an evaluation method, in this case for the sustainability of farming in the NCP. Indicators for sustainability describe single quantities to reflect a more complex attribute; typically expressed in physical, economic, biological or chemical data. Each single indicator might only represent an economic or environmental indicator, but the entity of those indicators represents sustainability according to the above definition. An indica-

tor is applied because it represents a variable which supplies information on other variables which are difficult to access and which can be used as a benchmark to take a decision (Van der Werf and Petit, 2002). Mitchell et al. (1995) define indicators as 'alternative measures that are used to identify the status of a concern when for technical or financial reasons the concern cannot be measured directly'. In other words, indicators facilitate and enable information transfer to a wide audience.

Two approaches for indicator development can be distinguished: data-driven and theory-driven (Niemeijer, 2002). In the data-driven approach, the availability of data is the central criterion for indicator development. A theory-driven approach concentrates on selecting the best possible indicators from a theoretical point of view. This work follows the data-driven approach, as the indicators are selected from an already existing data set.

Van der Werf and Petit (2002) further differentiate between means-based and effect-based indicators. Means-based indicators refer to the production practice, whereas effect-based indicators refer to the effect the production practices have. Van der Werf and Petit (2002) prefer effect-based indicators, 'as the link with the objective is more direct and the choice of means or practice is left to the farmer.' Means-based indicators do not allow a direct and actual evaluation of the environmental impact, but they are collectable with less efforts and costs than effect-based ones. Since the data set for this work was collected by questionnaire focusing on the farming practices, the indicators will be mainly means-based.

The list of possible indicators for sustainability is long. Hence the selection of indicators is necessary, because 'a long list runs the risk of information overload (…), while a short list runs the risk that something important is left out' (Perman et al., 2003). However, to select the appropriate indicator is problematic, as subjectivity and arbitrariness can influence the selection process. In order to increase the degree of objectivity in the selection process, the OECD (2002) developed the following criteria:

- policy relevance and utility for users (referring to i.e. representativeness, interpretability, comparability or responsiveness);
- analytical soundness (referring to i.e. technical and scientific terminology, international standards and validity or ability to link with models and forecasting systems);
- measurability (referring to i.e. availability, documentation or regular updating).

Even if these OECD criteria are followed, the indicator selection process still represents a trade-off between simplicity and complexity and might still include a certain degree of subjectivity and arbitrariness. In order to measure the sustainability of farming in the NCP comprehensively, local, regional and global environmental impacts should be considered. However, the construction of an all-embracing index for sustainability is not intended in this work. The focus rather lies on the most urgent site-specific measures to indicate changes in sustainability of the farms in the NCP.

In this work, following the concept of the 5 dimensions of agricultural sustainability in the NCP, for each dimension one indicator will be selected. In order not to over-represent individual variables, one variable can be included in only one of the indicators.

15.4 Selection of Indicators for Sustainable Agriculture in the NCP

This part explains the selection of one indicator for sustainability of agriculture for each of the five dimensions of sustainability in the NCP, according to the concept of Zhen and Zoebisch (2006). Each indicator will be assessed according to the criteria for indicator selection which were defined in 15.3.3. Finally, the values from the own data set for the selected indicators are displayed and analysed.

15.4.1 Crop Intensification

As described above, the production of grains needs to be increased in order to keep up with the continuously growing population. Simultaneously, the land's carrying capacity and thus the environmental impacts of agriculture in the NCP have to be considered. The main food grains produced in the NCP are wheat and maize. However, winter wheat requires large amounts of irrigation during the dry winter months and consequently puts

stress on the water resources (Binder et al., 2007). Therefore it is questionable if the cultivation of winter-wheat is sustainable.

Taking this in consideration, the variable 'Yield of Maize' has been selected as the indicator measuring crop intensification (respecting the land's carrying capacity) in the NCP. However, in order to measure intensification the yield has to be compared to previous years.

The variable 'Yield of Maize', and thus the indicator, is effect-based, as the yield represents an outcome of the farmer's practice. The impact of this variable is solely local on farm-level as it represents the output of one farm. The yield of a crop like maize is comparable with international data. It is one of the standard characteristic figures when farms are surveyed and thus linkable to models. Furthermore it is measurable or documented, as data is available in statistical offices or by questioning farmers. It falls in the dimension of 'Economic viability' as it measures the output of a farm. Table 15.2 shows that the variable 'Yield of Maize' meets the criteria for indicator selection which were defined in 15.3.3.

Table 15.2 Indicator for Crop Intensification

Name of variable	Yield of Maize	
Scale	Kg/ha/year	
Means- or effect based?	Effect-based	
Dimension of agricultural sustainability	Economic viability	
Local, regional or global impact?	Local	
Policy relevance and utility for users	+	Comparable and representative
Analytical soundness	+	Internationally valid, linkable to models
Measurability	+	Available and documented

Source: Own data.

15.4.2 A rational Use of Inputs

As described above, over-use of fertilisers, especially nitrogen is common in the NCP and has negative environmental impacts. Current practices pollute soil and water resources; the over-use of fertilisers also represents a cost to the farmers which is not necessary. Therefore the current fertilisation practices are not sustainable and application levels should be reduced. Since not all farmers are over-fertilising nitrogen, a reference value for this indicator would be useful. In order to demonstrate the changes over time a comparison to previous years could be made.

The nitrogen content in the soil directly reveals the effects of over-fertilisation on the environment - in this case the soil, but taking and testing soil samples requires efforts and is costly. Therefore the variable 'Soil N content' would not be in accordance with the criteria of measurability. That is why the variable 'Applied N' has been selected as the indicator for rational use of input; it represents the use of an input which the farmer practices and it is, thus, means-based. 'Applied N' measures the annual amount of applied nitrogen fertilisation per crop. The impact of this variable is regional, as already an excess of 100kg of applied nitrogen per ha could be regarded as a baseline for nitrate leaching into the ground or surface water on a regional scale (Schleef and Kleinhanß, 1994). JU et al. (2006) detected nitrogen surpluses exceeding 100kg per ha in the NCP.

Also 'Applied N' is one of the standard characteristic figures when farms are surveyed and it is thus linkable to models. Furthermore it is straightforwardly measurable or documented, as data is available in statistical offices or by questioning farmers. The applied nitrogen per ha is comparable with international data. This indicator is in the dimension of 'Ecological soundness', because it is linked to the application of an input which is often over used in the NCP and thus creates negative environmental impacts. Table 15.3 shows that the variable 'Applied N' meets the criteria for indicator selection which were defined in 15.3.3.

Table 15.3 Indicator for rational use of inputs		
Name of variable	Applied N	
Scale	Kg/ha/Year	
Means- or effect based?	Means-based	
Dimension of Agricultural Sustainability	Ecological Soundness	
Local, regional or global impact?	Regional	
Policy Relevance and Utility for Users	+	Comparable and representative
Analytical Soundness	+	Internationally valid, linkable to models
Measurability	+	Available and documented
Source: Own data.		

In the case of maize, the indicator for crop intensification and the one for rational use of inputs allow for the calculation of the nitrogen efficiency ratio. This ratio is internationally widely used and thus comparable to international thresholds. Furthermore this ratio reveals if and to what degree maize is over-fertilised.

15.4.3 Profitable and stable production

In order to ensure the sustainability of agriculture, the earnings from agriculture must be high enough for the households to continue farming. The own data shows that off-farm work is becoming increasingly important for the farm households and might surpass farming as the main income source. The survey showed that 76.6% of the households have off-farm income, which generates 44.5% of the total farm households' income. Off-farm income might threaten sustainability in two ways: firstly farm household might neglect their land and secondly the motivation to apply sustainable practices might decrease as the financial dependency on the land is reduced. Therefore agricultural production in the NCP has to be profitable and stable, as reduced land use in the NCP threatens China's food security and consequently China's agricultural sustainability.

To measure yields could indicate whether the production is stable, but it would not reveal if it is economically feasible. Total farm income does not reveal information about the importance of farming for each household. Therefore the ratio between the variables 'Farm and Off-farm Income' has been selected as the indicator for profitable and stable production as it represents the importance of farming for each household. It can be assumed that agricultural production is profitable if the share of farm income is high, only in extreme circumstances when total household income is very low, this ratio might not be useful. In order to survey if agricultural production is stable, the ratio can be compared with data from previous years. To determine scientifically a threshold for the ratio between 'Farm and Off-farm Income' would be useful when measuring the sustainability of agriculture in the NCP.

The indicator for profitable and stable production is effect-based, as it represents the economic outcome of the farmer's practices. The impact of the indicator is local as it is limited to the farmer's household. The data for the indicator is straightforwardly measurable, as data is available in statistical offices or by questioning farmers. It can also be compared internationally or be included in models or forecasting systems. Furthermore the indicator is responsive as it can capture every change in the income situation. This indicator lies in the dimension of 'Economic viability' as it measures the importance of the income from farming activities. Table 15.4 shows that the ratio of 'Farm and Off-farm Income' meets the criteria for indicator selection which were defined in 15.3.3.

Table 15.4	Indicator for Profitable and Stable Production	
Name of variable	Ratio of farm and off-farm income	
Scale	%	
Means- or effect based?	Effect-based	
Dimension of agricultural sustainability	Economic viability	
Local, regional or global impact?	Local	
Policy relevance and utility for users	+	Comparable and responsive
Analytical soundness	+	Linkable to models and forecasting systems
Measurability	+	Available and documented
Source: own data.		

15.4.4 Strengthened Institutional Support

As described above, knowledge transfer systems are deficient and education levels between farmers in the NCP are low. According to the own survey, 85.9% of the farmers did not receive any agricultural training. Consequently it is important to increase the education and, hence, environmental awareness of farmers in the NCP in order to motivate farmers to take sustainable actions - governmental institutions play a vital role in this context. One of the most direct ways of institutional support in the agricultural sector is the extension service. Therefore the variable 'Number of Extension Visits in the Last 36 Months' has been selected as an indicator for strengthened institutional support. In order to survey whether institutional support was strengthened, data should be compared with previous years. It should be noted, however, that visits from extension officers do not lead directly to sustainable farming practices, as e.g. farmers might be impervious to advice or the quality of the extension service might be varying. Nevertheless, the visits from the extension service represent an institutional support in the farming sector in the NCP.

The indicator for strengthened institutional support is not effect- nor means-based, as it represents an external impact on the farm. The impact of this variable is solely local on farm-level as other farms in the same region might have been visited in another frequency. The data for the indicator is straightforwardly measurable, as data is available by questioning farmers or governmental institutions. It can potentially also be compared internationally or be included in models or forecasting systems. Furthermore the indicator is responsive as it can capture changes in the extension services and representative as it evaluates a direct measure of institutional support in the farming sector. This indicator is in the dimension of 'Social acceptability' because it is linked to the improvements of the farmers' knowledge and skills.

Table 15.5 shows that the variable of 'Number of Extension Visits in the Last 36 Months' meets the criteria for indicator selection which were defined in 15.3.3.

Table 15.5	Indicator for strengthened institutional support	
Name of variable	Number of extension visits in the last 36 months	
Scale	Number in last 36 months	
Means- or effect based?	-	
Dimension of agricultural sustainability	Social Acceptability	
Local, regional or global impact?	Local	
Policy relevance and utility for users	+	Comparable, responsive and representative
Analytical soundness	+	Linkable to models and forecasting systems
Measurability	+	Available and documented
Source: Own data.		

15.4.5 Improved Conservation Knowledge and Technologies

As described above, water scarcity represents a major threat for the sustainability of farming in the NCP. Various management and technological measures are available which can potentially reduce total water use of agriculture, i.e. plastic film, changed crop rotation and modified irrigation methods or schemes. As shown in 15.4.4

also knowledge transfer can lead to higher environmental awareness and, thus, the application of sustainable practices. However, the effect of these technological or management measures, as well as the effect of knowledge transfer, will be expressed by changes in total water consumption. Therefore the variable 'Annual Water use per ha' has been selected as an indicator for improved conservation knowledge and technologies. In order to survey whether conservation knowledge and technologies were improved, data should be compared with previous years. The indicator includes data from all crops, as water conservation should be measured in an approach regarding all agricultural activities.

The indicator is means-based as it represents the use of inputs of the farmer. The impact of this variable is regional, but water is diverted through canals from the China's Southern parts to the Northern agricultural regions and then used for irrigation - so one might argue that the impact is global. The data for the indicator is straightforwardly measurable, as data is available by questioning farmers or governmental institutions. It is one of the standard characteristic figures when farms are surveyed and it is thus linkable to models or forecasting systems and internationally comparable. Furthermore the indicator is responsive as it can capture changes in the water use. This indicator lies in the dimension of 'Ecological soundness' as it measures the use of a scarce resource. Table 15.6 shows that the variable of 'Annual Water Use per ha' meets the criteria for indicator selection which were defined in 15.3.3.

Table 15.6 Indicator for Improved Conservation Knowledge and Technologies

Name of variable	Annual water use per ha	
Scale	Liter/ha/year	
Means- or effect based?	Means-based	
Dimension of agricultural Sustainability	Ecological Soundness	
Local, regional or global impact?	Regional/global	
Policy relevance and utility for users	+	Comparable and responsive
Analytical soundness	+	Linkable to models and forecasting systems
Measurability	+	Available and documented
Source: Own data.		

15.4.6 Indicator Values from the Data Set

Based on data from the survey in the Hebei province (see: 15.3.2) the values for the 5 selected indicators for sustainability are displayed. In order to provide an exemplary overview over the data set and to briefly analyse the selected indicators, the minimum, maximum and mean values as well as the variance is presented in Table 15.7. It should be noted that this part does not provide a comprehensive analysis or measurement of sustainability of farming in the NCP, as no threshold level, reference value or other basis of valuation of the indicators has been defined.

Table 15.7 Minimum, maximum and mean values and variances for the selected indicators according to the data set

Name of Indicator	Min	Max	Mean	Variance
Crop Intensification	1,500.00 kg/ha/year	10,500.00 kg/ha/year	7,108.70 kg/ha/year	1,390.71 kg/ha/year
A rational use of inputs a)	0.00 kg/ha/Year	855.00 kg/ha/year	218.25 kg/ha/year	123.30 kg/ha/year
Profitable and stable production (%)	0.0	100	58.90	30.69
Strengthened institutional support	0	9	0.14	0.28
Improved conservation knowledge and technologies	0.00 liter/ha/year	12,600,000.00 liter/ha/year	2,900,948.64 liter/ha/year	1,381,455.96 liter/ha/year

a) Data for the Indicator 'A rational use of inputs' does not contain all households from the survey.
Source: Own data.

Table 15.7 shows that the difference between minimum and maximum values for all 5 indicators is large. For example, some farms do not irrigate at all and just rely on precipitation, whereas others irrigate intensively; some households have no income from farming (only self-subsistence farming), whereas others have no off-farm income. These indicator values have implications for measuring the sustainability: it indicates that the combination of these indicators and the data set might produce results which vary strongly, when estimating the sustainability of agriculture in the NCP on farm level. Individual farms might perform positively in some of the 5 dimensions of sustainability; while performing negatively in others. The variance of all indicator values is large. Since each indicator has positive and negative performances, it is important to survey how an individual household performs in all 5 dimensions of sustainability. In order to classify a household as 'sustainable' according to the definition, the household has to perform positively in all 5 dimensions of sustainability.

15.5 Conclusions

This work presented the process of developing indicators for sustainability from farm-level variables in the NCP. For each of the five dimensions of the concept of agricultural sustainability in the NCP an indicator was developed which met the defined criteria for indicator selection. The analysis of the selected indicators shows that their impact is mostly local or regional. The described process is highly site-specific and might not be directly transferable to other settings. If these indicators for sustainability of farming in the NCP were intended to be transferred to evaluate another setting, they would have to be tested first in a well-known agro-eco-system, where the significance of the indicators can be evaluated.

The data set shows a large variance for each selected indicator. Households might perform positively in some indicators, while performing negatively in others. Therefore it is important to estimate the performance of each indicator for each household individually.

Many of the selected indicators are effect-based, which do not allow for direct and actual evaluation of environmental impacts. This is partly due to the data-driven approach for indicator development, as the data set contained mostly effect-based variables. Within a theory-driven approach, indicator development could focus more on selecting means-based indicators.

This work could be extended by measuring the sustainability of agriculture in the NCP. In order to do so, this work could define reference values or threshold levels. The definition of the reference values or threshold levels should be discussed interdisciplinary with experts and stakeholders from the local, national and international level. Certainly theses values and threshold levels have to be based on scientific and systematic criteria. The establishment of reference values and threshold levels would facilitate the process of measuring sustainability.

Furthermore, this work could be extended by including more than one indicator for each dimension of sustainability. However, the aggregation of several indicators into an index (i.e. a function of indicators) for sustainability bears risks for subjectivity, arbitrariness and ambiguity.

The indicator development was integrated into a scientific framework: the selected indicators cover the three basic dimensions of sustainable agriculture as well as the five specific dimensions of the concept of agricultural sustainability in the NCP. This concept forms the systematic framework for the indicator selection process.

References

Barning, R., *Economic evaluation of nitrogen application in the North China Plain*. Dissertation. Department of Analysis, Planning and Organisation of Agricultural Production, University of Hohenheim, Stuttgart, 2008.

Binder, J., S. Graeff, W. Claupein, M. Liu, M. Dai and P. Wang, 'An empirical evaluation of yield performance and water saving strategies in a winter wheat - summer maize double cropping system in the North China Plain. In: *Pflanzenbauwissenschaften* 11 (2007) 1, pp.1-11.

China Agriculture Press, *China Agriculture Yearbook 2007*. China Agriculture Press, Beijing, 2007.

Guo, Z., *Wirtschaftliche Beurteilung des Winterweizen- und Körnermaisanbaus im Raum Peking unter Berücksichtigung von Umweltwirkungen*. (In German). Verlag Ulrich E. Grauer, Stuttgart, 1995.

Hu, C. and Z.H. Cao, 'Nematode community structure under compost and chemical fertiliser management practice, in the North China Plain'. In: *Experimental Agriculture* 44 (2008), pp. 485-496, 2008.

Ju, X., X. Liu, F. Zhang and M. Roelcke, 'Nitrogen fertilisation, soil nitrate accumulation and policy recommendations in several agricultural regions of China'. In: *Ambio* 33 (2004) 6, pp. 300-305.

Ju, X.T., C.L. Kou, F.S. Zhang and P. Christie, 'Nitrogen balance and groundwater nitrate contamination: Comparison among three intensive cropping systems'. In: *Environmental Pollution* 143 (2006) pp. 117-125.

Kopsch, J., X. Liu, C. He, J. Shen, J. Franzaring, A. Fangmeier and F. Zhang, *Reactive nitrogen species and nitrogen deposition in the North China Plain*. Paper presented at the Workshop on Agricultural Air Quality, Washington DC, June 5-8, 2006.

Li, B., Y. Bai, K. Hu, Y. Huang and D. Chen, 'Spatial variability and distribution of nitrate content of shallow groundwater in Huang-Huai-Hai Plain'. In: *Engineering Science* 3 (2001) 4, pp.42-45. (in Chinese).

Mack, U.D., K.H. Feger, Y. Gong and K. Stahr, 'Soil water balance and nitrate leaching in winter wheat - summer maize double-cropping systems with different irrigation and N-fertilization in the North China Plain. In: *Journal of Plant Nutrition and Soil Sciences* 168 (2005) pp. 454-460.

Mitchell, G., A. May and A. Mcdonald, 'PICABEU: A methodological framework for the development of indicators of sustainable development'. In: *International Journal of Sustainable Development and World Ecology* 2 (1995) pp. 104-123.

Niemeijer, D., 'Developing indicators for environmental policy: data-driven and theory-driven approaches examined by example'. In: *Environmental Economics and Policy Studies* 5 (2002) pp. 167-178.

OECD (Organisation for Economic Co-operation and Development), *Aggregated environmental indices -review of methodologies in use*. OECD Working Group on Environmental Information and Outlooks, Paris, 2002.

OECD (Organisation for Economic Co-operation and Development), *Agricultural policy reform in China*. OECD Policy Brief, October, 2005.

Perman, R., M. Common, J. Mcgilvray and Y. Ma, *Natural resource and environmental economics*. Pearson Education, Addison Wesley, Harlow, 2003.

Piotrowski, S. and X. Jia, *Land property, tenure security and credit access: a historical perspective of change processes in China*. Discussion Paper Nr. 01/2006. Department of Agricultural Development Theory and Policy, University of Hohenheim, 2006.

Schleef, K.H. and W. Kleinhanß, *Mineral balance in agriculture in the EU*. Institute of Farm Economics, Federal Agricultural Research Centre, Braunschweig, 1994.

Shi, Y. and X. Cheng, 'The three transformations of Chinese agriculture: Two past, one present'. In: Tso, T.C. and H. Kang (eds.), *Dare to dream vision of 2050 agriculture in China*. China Agricultural University Press, Beijing, 2004.

Van der Werf, H. and J. Petit, 'Evaluation of the environmental impact of agriculture at the farm level: a comparison and analysis of 12 indicator-based methods'. In: *Agriculture, Ecosystems and Environment* 93 (2002) pp. 131-145.

Varis, O. and P. Vakkilainen, China's 8 challenges to water resource management in the first quarter of the 21st century. In: *Geomorphology* 41 (2001) pp. 93-104.

Zhang, W., S. Wu, H. Ji and H, Kolbe, 'Estimation of agricultural non-point source pollution in China and alleviating strategies. Estimation in the early 21st century'. In: *Scientia Agricultura Sinica* 37 (2004) pp. 1008-1017 (in Chinese).

Zhen, L. and J.K. Routray, 'Groundwater resource use practices and implications for sustainable agricultural development in the North China Plain: A case study in Ningjin County of Shandong Province, PR China'. In: *Water Resources Development* 18 (2002) 4, pp.581-293.

Zhen, L., J.K. Routray, M. Zoebisch, G. Chen, G. Xie and S. Cheng, 'Three dimensions of sustainability of farming practices in the North China Plain. A case study from Ningjin County of Shandong Province, PR China'. In: *Agriculture, Ecosystems and Environment* 105 (2005) pp.507-522.

Zhen, L. and M. Zoebisch, *Resource use and agricultural sustainability: risks and consequences of intensive cropping in China*. Appendix nr. 86 of the Journal of Agriculture and Rural Development in the Tropics and Subtropics. Kassel University Press, Kassel, 2006.

16 Sustainable dairy production: Dairy cafe

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Sustainable dairy production: Dairy cafe

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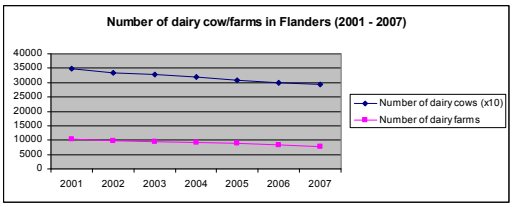
Contents

- Introduction
- Objective
- What is a dairy cafe?
- What is a monitoring tool for farm sustainability?
- Construction of the monitoring tool for farm sustainability
- Which indicators?
- Ecological cafe
- Social cafe
- Economical café

Introduction

- Belgian dairy
  - *Flemish dairy*
    - 7.752 dairy farms (2007)
    - 294.319 dairy cows (2007)
    - Milk production: 1.842 million litres
  - *Walloon dairy*
    - 5.563 dairy farms (2007)
    - 229.313 dairy cows (2007)
    - Milk production: 1.169 million litres

Introduction



Introduction

- Collaboration between Division for Agricultural Policy Analysis (AMS) and Institute for Agricultural and Fisheries Research (ILVO)
  - *AMS:*
    - Identification of interested farmers
    - Data for the calculation of the indicators
  - *ILVO:*
    - Method
    - Additional research activities

Objective

- Translate accountancy data into meaningful information for the farmer
- Appropriate way to communicate?
- Motivate farmers and support them in their farm management
- Measure sustainability
  - *Check if the concept is applicable for other sectors (e.g. pig production)*

What is a dairy cafe?

- 2 discussion groups with dairy farmers
  - *Per province*
- Debate about sustainability
  - *Farmers receive the calculated indicators of their own farm and those of the other farmers*
    - Calculated with the accountancy data
    - Gathered through an additional survey
  - *Comparison of results*
  - *Exchange of experiences*
  - *Learning from each other*
  - *Searching explanations for certain figures*

What is a dairy cafe?

- Participants meet each other five times
  - *Getting acquainted*
  - *Ecological cafe*
  - *Social cafe*
  - *Economical cafe*
  - *Final meeting*
- Interview on attitude with respect to sustainability
  - *Before an after the dairy cafes*
  - *Did the farmers' visions change?*

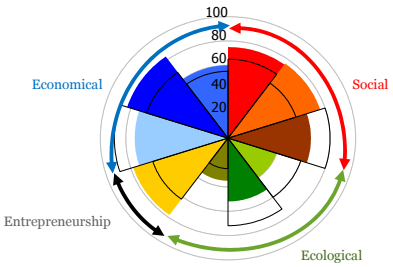
Program

- Each time a full day
- Agenda
  - *Discussion of indicators*
    - Mutual discussion
    - Expert
    - Measures to improve efficiency
  - *Guided tour on the farm*

What is a monitoring tool for farm sustainability?

- Graphical representation of indicators
  - *Farm: (weighted) average of related indicator scores*
  - *Group average*
- Indicator is a score between 0 and 100
  - *100 = 10% best enterprises*
  - *0 = 10% worst enterprises*

Construction monitoring tool for farm sustainability 11



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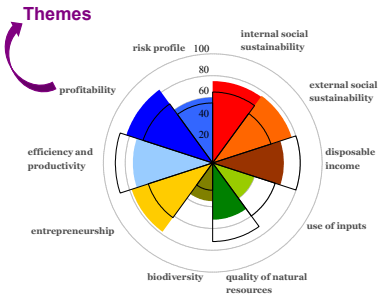

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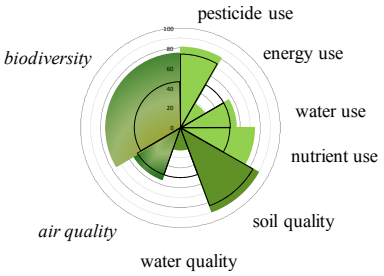

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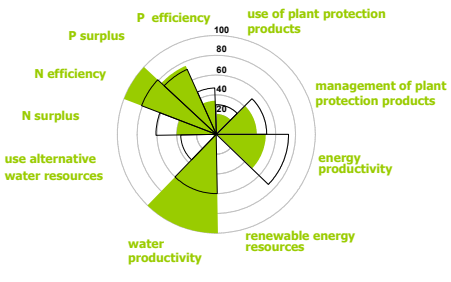


Use of inputs

Construction monitoring tool for farm sustainability

- Visual business assessment
  - *The bigger the better*
- Relation between economical, ecological and social indicators
- Strengths and weaknesses become visible

Which indicators are used?

- Ecological sustainability
  - *Energy*
  - *Water*
  - *Nutrients*
  - *Plant production*
  - *Soil quality*
  - *Water quality*
  - *Air quality*
  - *Biodiversity*
- Social sustainability
  - *Animal welfare and health care*
  - *Landscape conservation*
  - *Farmer's pride*
- Economical sustainability
  - *Profitability*
  - *Productivity*
  - *Risk profile*
- Entrepreneurship

Ecological cafe

- Water
  - *Water efficiency (l milk/m³)*
  - *Alternative water use (%)*
- Energy
  - *Energy efficiency (100l milk/MJ)*
    - Direct efficiency (including contracting)
    - Indirect efficiency is not considered
  - *Renewable energy resources*
    - Not considered
- Nutrients
  - *N/P- surplus (%)*
  - *N/P- efficiency (per ha)*

Ecological cafe

- Plant protection
- Soil quality
- Water quality
- Air quality
- Biodiversity
  - *These five indicators were not calculated because of missing data and/or lack of representativeness*

Ecological cafe

	Average	Min.	Max.
N- surplus (kg N /ha)	187	124	229
N- efficiency (%)	30	18	44
P- surplus (kg P/ha)	10	-4	33
P- efficiency (%)	65	34	119
Energy efficiency (l/100MJ)	98	63	144
Water efficiency (l/m³)	217	164	358
Alternative water use (%)	13	0	90

Social cafe

- Internal social sustainability
  - *Farmer's pride*
    - How satisfied or pride to be a farmer?
    - Pride that originates from the broader environment of the person
    - Survey

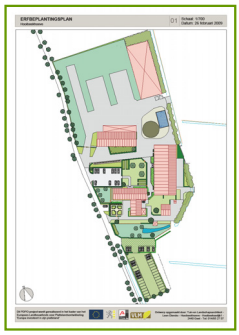
Social café

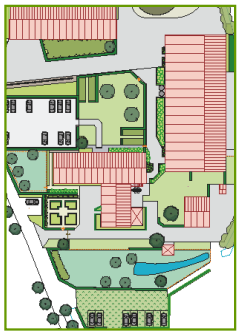
Results Farmer's Pride East Flanders		% of the group	Impact	Type component
1	Autonomy	100	+	Individual
2	Product prices	75	-	External
3	Image of agriculture	63	N	External
4	Producing food	63	N	Social
5	Visual attractiveness of the enterprise	63	N	Social
6	Balance work-family-spare time	63	N	Social
7	Dependence on subsidies	63	-	External
8	Entrepreneurship	50	+	Individual
9	Craftsmanship	38	+	Individual
10	Relationship with nature	38	+	Individual
11	Governmental action	38	-	External
12	Family atmosphere in the company	38	N	Social
13	Meaningful nature of the work	38	N	Individual
14	Part of the tradition of farmers	25	+	Individual
15	Respect from the sector	25	-	External
16	Distance between consumer and farmer	25	-	Social
17	Part of mainstream society	0	+	Social

Social cafe

- External social sustainability
  - *Landscape conservation*
    - Courtyard planting
      - *Landscape function*
      - *Ecological function*
      - *Ethical function*
    - Landscape plan (on lots)
      - *Landscape diversity*
      - *Increase nature value*
    - Should fit into farm management
  - *Animal welfare and health care*
    - Not calculated because data are not part of the accountancy, but should be considered by the veterinary on the farm

Example plan





Economical cafe

- Productivity and efficiency
  - *Labour productivity*
  - *Capital productivity*
  - *Land productivity*
- Profitability
  - *Profitability labour*
  - *Profitability equity capital*
  - *Profitability total assets*

Conclusion

- Not evident to find all data or the most suited data
- Need to make the link with economical aspects
- Is simulation possible?

17 Survey on economic results of farms in Italy: Sample design and sampling strategy based on the new typology

Concetta Cardillo and Laura Esposito[1]

17.1 Introduction

The RICA-REA survey results from two different surveys, the FADN (Farm Accountancy Data Network) and the REA (FER - Farms Economic Results), which are based on different Regulations, different samples and different methods, and which have different objectives to pursue, but led in a conjoint way.

Data are collected according to FADN methodology for the bigger farms (RICA) and using the REA questionnaire for small farms and for big farms (with more than 4 ESU-European Size Unit) that prefer to answer with the paper questionnaire. Units are sampled using a stratified random sample design to satisfy EU regulations indeed the European Commission provides guidelines to define the instructions and recommendations for the design of selection plans to improve the harmonisation among member states.

The definition of the sample to be used in the 2010 FADN survey is a joint effort of INEA and ISTAT and the sample must include a sufficiently large number of holdings to allow for estimation of the main accountancy variables at the national level and to analyse the technical and economical behaviour of households, distinguished by type of farming, economic size classes and Region.

In this paper we would illustrate the first results obtained to define the 2010 selection plan based on FSS 2007 and classified according to the new typology with Standard Outputs 2004.

In particular, after a brief introduction and a description of the two different surveys, the most important regulations on the new typology classification and on the rules to define selection plan for the survey are presented. Our attention is mainly focused on the aspects that concern the definition of the field of survey, the sample design and the stratification procedures, to try to show some first result and to verify the quality of the models used.

17.2 EU regulations on new typology and selection plan

The Regulation (EC) 1242/2008 of December 2008 establishes a new Community typology for agricultural holdings that applies from FADN 2010 and FSS 2010. It implies a revision of the definition of the field of survey (it is requested to specify a minimum threshold of economic size) and also of the selection plans. New typology is based on the region, type of farming and economic class of Standard Output of the farm and represent an appropriate and homogenous classification of agricultural holdings. The use of the standard outputs instead of the standard gross margin represent the real innovation compared to the previous regulations, indeed the type of farming and the economic size of the holding should be determined on the basis of an economic criterion remaining always positive. Therefore the Commission has considered it is appropriate to use the standard output established by product and based on average values over a reference period of five years and regularly updated to take account of economic trends. The type of farming of a holding is determined by the relative contribution of the standard output of the different characteristics of this holding to the total standard output of this one. Depending on the amount of detail required, the types of farming shall be divided into: general types of farming; principal types of farming; particular types of farming. In addition the Regulation (EC) 1242/2008 introduces a

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new class on the importance of other gainful activities directly related to the holding in according to the increasing value that those activities have in the holding revenues.

The Council Regulation No 79/65/EEC of 15 June 1965 setting up a network for the collection of accountancy data on the incomes and business operations of agricultural holdings in the European Economic Community. In particular FADN field of survey is defined in this regulation and in the Regulation No 1859/82 as the agricultural holdings having an economic size equal to or greater than a minimum threshold of economic size. The regulation establish that the plan for the selection of returning holdings must ensure the representativeness of the returning holdings as a whole and it shall include:

- particulars of the statistical reference sources;
- the procedures for stratifying the field of survey in accordance with the Community typology of holdings, taking account, where appropriate, of additional national criteria;
- the procedures for determining the selection rate chosen for each stratum;
- the procedures for the selection of returning holdings;
- the procedures for the possible later updating of the selection plan;
- the probable period of validity of the selecting plan.

For the REA survey most important rules are established in the Council Regulation (EC) No 2223/96 of 25 June 1996 on the European system of national and regional accounts in the Community - (ESA95).

17.3 The FADN-FER survey

The Business Survey on Agriculture (RICA-REA or FADN-FER survey) is a survey on economic performances of Italian agricultural holdings. Responsible of RICA-REA survey are the Italian National Statistical Office (ISTAT) and Italian National Institute of Agricultural Economics (INEA), in particular ISTAT is responsible for methodological issues and INEA is responsible for farms data collection, for the methodology of FADN data survey also and for the production and the exploitation of the accounting network data for the analysis of the agricultural politics. Parts of the survey network are also Regions and Autonomous Provinces. Data are collected according to FADN (Farm Accountancy Data Network) methodology for the bigger farms (RICA) and using the REA (Farms Economic Results) questionnaire for small farms. Observation field for REA survey are farms having less than 4 ESU (European Size Unit) with at least one hectare of Utilised Agricultural Area (UAA) or a turnover of more than €2,066. Observation field for RICA survey are professional farms having more than 4 ESU (European Size Unit). Units are sampled using a stratified random sample design to satisfy both FADN and ESA '95 regulations. Sample design variables are location, economic activity and ESU. For 2009 accounting year the data are collected on a sample of around 23,000 farms. To comply with National Accounts needs main structural variables are observed on each unit as well as economic variables (costs and revenues structure, labour cost, contributions, changes in inventories, reuses -non marketed goods-). For the survey on economic performances of agricultural holdings the Italian institutional steps are:

- 1995: ESA 95;
- 1997: Working group Istat-Inea-Regions to design a national survey on economic performances of agricultural holdings (REA);
- 2002: Memoranding of understanding (multilateral agreement among Istat, Inea, Regions and Autonomous Provinces);
- 2007: New memoranding of understanding (multilateral agreement among Istat, Inea, Mipaaf, Regions and Autonomous Provinces).

17.4 Selection plan and Sample design

The European Commission provides guidelines to define the instructions and recommendations for the design of selection plans.

The selection plan of FADN defines the number of farms to be selected by region, type of farming and economic size classes and specifies the rules applied for selecting the holdings. According to Commission Regulation n. 1859/82 every year each Member State have to prepare a selection plan for returning holdings, to ensure the representativeness of the field of survey. The definition of the field of surveys is based on the 2000 Agricultural Census updated by the 2007-2005-2003 FSS and other important agricultural survey collected by ISTAT.

In particular, to establish the threshold of economic size classes and ensure the coverage in terms of number of holdings, utilised agricultural area, Standard output and number of livestock units, as requested from EU regulations, we calculated, all the inverse cumulative percentage of these elements and the results are shown in Table 17.1, using the FSS 2007 classified according to the new typology and the SO 2004.

Table 17.1 **Number of farms, hectares, standard output and livestock per size class**

Class	Lower limit (in €)	Upper limit (in €)	Number of holdings	Inverse cumulative (%)	Utilised agricultural area (ha)	Inverse cumulative (%)	Total standard output	Inverse cumulative (%)	Number of livestock units (LU)	Inverse cumulative (%)
1		2,000	562,792	100.0	550,516	100.0	534,151,351	100.0	7,489	100.0
2	2,000	4,000	357,337	69.2	633,033	95.7	1,033,796,348	98.7	26,260	99.9
3	4,000	8,000	322,021	49.6	1,007,581	90.8	1,832,505,010	96.3	69,440	99.6
4	8,000	15,000	201,003	32.0	1,136,057	82.9	2,187,668,915	91.9	130,988	98.9
5	15,000	25,000	121,007	21.0	1,153,947	74.0	2,346,468,629	86.7	238,933	97.5
6	25,000	50,000	115,515	14.3	1,736,297	65.0	4,081,975,702	81.1	584,925	94.9
7	50,000	100,000	77,781	8.0	1,981,130	51.4	5,353,303,858	71.4	955,705	88.7
8	100,000	250,000	45,952	3.7	2,142,271	35.9	6,958,602,923	58.6	1,492,683	78.4
9	250,000	500,000	13,473	1.2	1,148,887	19.2	4,675,924,433	42.1	1,201,082	62.4
10	500,000	750,000	4,102	0.5	488,915	10.2	2,475,805,974	30.9	723,887	49.6
11	750,000	1,000,000	1,291	0.3	197,439	6.4	1,110,916,848	25.0	388,641	41.8
12	1,000,000	1,500,000	1,582	0.2	222,427	4.9	1,910,899,895	22.4	663,786	37.6
13	1,500,000	3,000,000	1,276	0.1	228,771	3.1	2,682,840,547	17.8	973,752	30.5
14	3,000,000		770	0.0	172,507	1.3	4,808,408,910	11.5	1,873,921	20.1

Source: FSS 2007.

On the basis on these results we should say that a threshold of €4,000 could ensure all the coverage requested by the Commission regulations, indeed it permit the coverage of almost 50% of the holdings and more than 90% of the UAA and especially more than 96% of the total Standard Output, those are more than the limits fixed by the guidelines[1].

The sample size is determined on the basis of the coefficients of variation for the strategic variables selected, by applying Bethel's procedure for optimal allocation of units and by ensuring a minimum number of farms in each cell. In particular for our first attempt we established this threshold in 10 units per cell.

To defining a correct sampling strategy we could encounter different problems, most of them are essentially due to the heterogeneity of Italian agriculture across regions, for instance a large share of small size farms in some regions, or a high specialisation of some regions or the presence of some types of farming is only significant for few regions. It is therefore necessary to define sampling plans specific by region, to give an answer for new information needs and improve the quality and reliability of farm accountancy information. It is also possible to reach the objective of small areas estimates by using the same sample and to analyse data for rural development policies.

[1] For further information you could see on the documents RI/CC 1519, or 1524 and others from European Commission and related to this issue.

17.5 Stratification

Stratification variables that we used are: region (location), economic type of farming (activity), economic size of standard output.

We used the 21 Italian regions (19 regions and 2 autonomous provinces), 8 classes of standard output and the particular type of farming.

In particular we grouped the original 14 classes of standard output as shown in Table 17.2 and in according to the suggestions from the DG-AGRI guidelines.

Table 17.2 Clustering size classes

Class 1	I	less than €2,000
	II	€2,000 - €4,000
Class 2	III	€4,000 - €8,000
Class 3	IV	€8,000 - €15,000
	V	€15,000 - €25,000
Class 4	VI	€25,000 - €50,000
Class 5	VII	€50,000 - €100,000
Class 6	VIII	€100,000 - €250,000
	IX	€250,000 - €500,000
Class 7	X	€500,000 - €750,000
	XI	€750,000 - €1,000,000
Class 8	XII	€1,000,000 - €1,500,000
	XIII	€1,500,000 - €3,000,000
	XIV	equal or more than €3,000,000

The type of farming of a holding is the production system of a holding which is characterised by the relative contribution of different enterprises to the holding's total Standard Output, in particular the classification proposed by the regulation has three levels of types of farming:

- 9 general types, including a type for non-classifiable holdings;
- 21 principal types;
- 62 particular types.

In our first attempt we used two different level, in the first one we utilised the 9 general type of farming, in the second proposal we used the particular types of farming, but taking into account the differences among regional situations. In every region indeed the typology classes are the result of aggregations of some type of farming. The aggregation depends on the coverage of the standard output generated from the single typology on the overall standard output in the region. The criteria used is that the coverage has to be at least 5%, for typology under this threshold we aggregate the similar type farming.

For some region many types of farming are grouped in few groups, for example in the Alto Adige Province there are only 5 groups and just type of farming 361 Specialist fruit (other than citrus, tropical fruits and nuts) and 450 Specialist dairying, have to be considered individually because they represent respectively 52.8% and 21.1% of the total Standard Output of the region, all the other types of farming could be grouped in only 3 other groups. In other cases the analysis of the regional distribution of the standard output by regions led to distinguish many different groups of type of farming. For example in Sicily region there are 13 groups of type of farming that have to be taking into account, for instance the type 163 Specialist field vegetables, that represent alone the 7.4% of the standard output, or the 362 Specialist citrus fruit, that represent 7.9% of the Standard Output.

Table 17.3	Coefficients of variations for national and regional domains	
Variables	**National domain (%)**	**Regional domain (%)**
Intermediate consumptions	3	6
non marketed goods - self consumption	3	10
Labour cost	3	12
standard output	3	5
Basic price production	3	12

17.6 First results

As first attempt we used two different approaches of stratification, the first one is based on an approach that utilise, the general type of farming and with mathematical algorithms could establish an optimum number of strata (at the moment almost 500 strata), the second one is based on the aggregation of type of farming determined region by region (it contains almost 1,200 strata). The result of these two proposals are shown in Table 17.4.

Table 17.4	Comparison of methods of stratification			
Regions	**Regional aggregation**		**Optimum Stratification**	
	universe	**sample**	**universe**	**sample**
Italy	1,539,325	17,279	1,539,325	9,735
Piemonte	74,070	945	74,070	667
Valle d'Aosta	3,910	240	3,910	153
Lombardia	24,410	657	24,410	361
Veneto	135,717	997	135,717	634
Friuli	21,774	747	21,774	293
Liguria	21,581	744	21,581	835
Emilia Romagna	73,219	1,157	73,219	840
Toscana	72,636	866	72,636	558
Umbria	34,384	859	34,384	333
Marche	40,578	977	40,578	675
Lazio	97,729	1,287	97,729	648
Abruzzo	55,853	934	55,853	523
Molise	23,026	570	23,026	373
Campania	146,580	984	146,580	356
Puglia	229,834	1,018	229,834	364
Basilicata	52,360	696	52,360	473
Calabria	112,776	614	112,776	259
Sicilia	223,220	1,217	223,220	381
Sardegna	56,517	854	56,517	476
Bolzano	18,264	394	18,264	259
Trento	2,.887	522	2,887	274

The two approaches have different aims, the one based on optimum number of strata try to optimise sample numerosity with minimising it and ensuring the precision of strategic variables considered. It allows a random selection of the farms but increase the possibility of missing or wrong answers. The second approach aims to represent parts of the regional field of survey that coincide with single type of farming or single economic size classes, it allows to satisfy national and regional needs of agricultural programming and to represent the specific features of the territory. However this approach increases considerably the numerosity of the sample and doesn't permit to reach an optimum number of strata. At the moment we are trying to integrate the approaches

proposed with optimising the regional stratification, in the attempt to reduce the numerosity of the sample but in satisfying the regional specificity also.
Furthermore, with a view to utilise the RICA-REA survey for additional purposes than the institutional ones, afterwards the selection random of the farms, we will proceed to the estimate the confidence level of the sample to reach the territorial partition that will allows the application of rural development measures established for 2007-2013 period.

Indeed among the objectives of the Council regulation for rural development there are: to make available a set of indicators in response to these policies and/or relevant to the particular issues-problems rural area faces today and to improve the quality of life in rural areas and the diversification of economic activity.

References

Ballin, M., P.D. Falorsi, G. Scepi and P. Vicard, *New tools for planning business sampling surveys*. Proceeding of the international seminar on new techniques and technologies for statistics, Sorrento (Italy) 4-6 November 1998, pp. 49-53.

Bethel, J., 'Sample allocation in multivariate surveys'. In: *Survey Methodology* 15 (1989) pp. 47-57.

Cicchitelli, G., A. Herzel and G.E. Montanari G.E., *Il Campionamento Statistico*, Il Mulino, Bologna, 1997.

Council Regulation (EC) No. 1242/2008 of December 2008 on a new Community typology for agricultural holdings.

Council Regulation (EC) No. 2223/96 of 25 June 1996 on the European system of national and regional accounts in the Community - (ESA95).

Council Regulation No. 1859/82.

Council Regulation No. 79/65/EEC of 15 June 1965.

Di Zio, M. and O. Luzi, 'Combining Methodologies in a Data Editing Procedure: an Experiment on the survey of balance sheets of agricultural firms'. In: *Statistica Applicata*, 14 (2002) 1, pp. 59-80.

Estevao, V., Hidiroglou and C.E. Särndal, 'Methodological principles for a generalised estimation system at Statistics Canada'. In: *Journal of Official Statistics* 11 (1995) 2, pp.181-204.

Fellegi, I.P. and T.D. Holt, 'A systematic approach to edit and imputation'. In: *Journal of the American Statistical Association* 71 (1976) pp. 17-35.

Hidiroglou, M.A., 'The costruction of self-representing stratum of large units in survey design. In: *The American Statistician 40* (1996), pp. 27-31.

ISTAT, Farm Structure Survey 2007 National Methodological Report, 2008.

ISTAT, Manuale di tecniche di indagine, note e relazioni, 1989.

ISTAT, Indagine sui risultati economici delle aziende agricole RICA-REA. Anni 2002-2003-2004. Istruzioni per la rilevazione delle variabili REA.

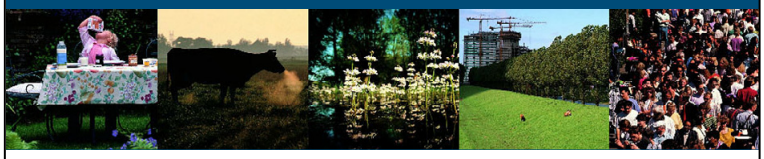
Latouche, M. and J.M. Berthelot, 'Use of score functions to prioritise and limit recontacts in editing business surveys'. In: Journal of Official Statistics 8 (1992) 3, part II.

18 Sampling in the FADN: consequences and limitations

Dr. Hans C.J. Vrolijk
LEI Wageningen UR

Sampling in the FADN: consequences and limitations

Pacioli 17
Ettenhausen, June 7-10, 2009
Dr. Hans C.J. Vrolijk (LEI)



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Overview

Questions in sampling research

- Sampling or not?
- What is the population of interest?
- Stratification or no stratification?
- Sample size based on statistical or practical arguments?
- Optimal or proportional allocation?
- Random or non-random sampling?

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Sampling or not? Value of samples

- Better quality control in data collection
- Detailed information available
- Lower costs
- Reduction of administrative burden
- Enables estimates for whole population

What is the population of interest?

Stratification or no stratification?

- Main reasons for stratification
  - More reliable estimates
  - To be sure to have enough observations
- Representativity?; poorly defined concept
  - General, unjustified claim
  - Absence of selective forces
  - Mirror or miniature population
  - Typical or ideal case
  - Heterogeneity of the population
  - Vague description of formal sampling procedure

Statistical or practical sample size?

- Sample size based on historical, practical criteria
- Apparent relation with population size
- Sampling theory: sample size (almost) independent of population size.
- No criteria on precision of estimates

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Optimal or proportional allocation?

- Skewed distribution
- Increases the reliability of estimates
- Complicates the sample design
- Complicates design based estimation techniques
- Increases the chance on 'wrong' use of data
- Optimal can be sub-optimal for another application

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Random or non-random sampling?

- Design based estimation techniques require random sample
- Inclusion of subjective judgment creates unknown demarcation of population
- Non-response a reason for non-random?
- Sampling procedure determines methodological soundness of analysis / research
- Design based vs. model based estimation techniques

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Conclusions and recommendations

- FADN sample of great importance
- Be aware of theoretical and practical limitations
- Harmonization of structure is not enough
- Common understanding is essential for harmonization
- Develop a methodological note

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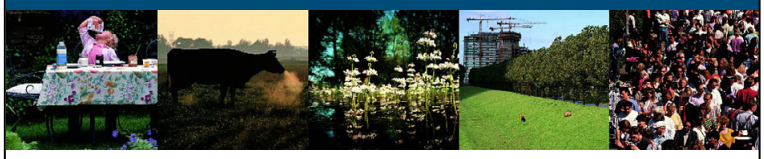
Discussion and conclusions



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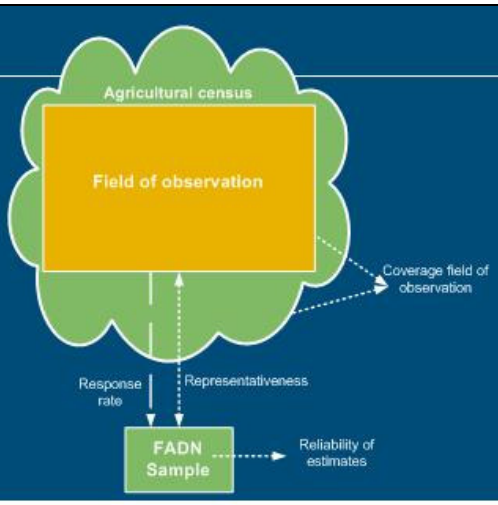

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19 Selection and sample size in Danish agricultural account statistics

By Dorte Hækkerup, Statistics Denmark

19.1 Background

The Danish FADN unit has recently been moved from University of Copenhagen to Statistics Denmark mainly because of a government decision of gathering all official statistics in Denmark. This relocation has given some advantages; one is that Statistics Denmark has a Section of Survey and Methods, which can support on statistic methods. In co-operation with staff from Section of Survey and Methods, we have started a project on improving the sample used for FADN and national statistic. A disadvantage of the relocation is a longer distance to the researchers, who use data.

19.2 Population and sample

The Danish population is almost 50,000 farms. 80% of the farms have a known accountant to Statistics Denmark, which means it is possible for Statistics Denmark to get their economic account. We do not have direct contact with the farmers, we get accounts directly from the accountants. Almost all agricultural economic accounts are made in an accounting system called Ø90, developed by the Danish Advisory Service. These accounts are transferred to our accounting system electronic by weekly transmissions during spring and summertime. We receive about 1,900 accounts through these weekly data transmissions. Besides that we get accounts from private bookkeepers, which mostly are from horticultural enterprises. Accounts from private bookkeepers are also transferred to our accounting system electronic by upload of excel files.

The sample is about 2,200 farms, and at national level we have a threshold of 8 ESU or 10 hectares of arable land. To cover Danish agriculture we use four samples for national statistics:

- Agriculture - conventional - full time;
- Agriculture - conventional - part time;
- Horticulture - conventional;
- Organic (both agriculture and horticulture).

Reasons for having these 4 samples are that we over-represent the number of organic farms and horticulture. Furthermore national statistics are shown for full and part time farms apart, because Denmark has a large number of part time farms, actually 59% of agricultural farms are classified as part time farms. If the numbers of hours, used for on the farm work, are below 1,665, then the farm is classified as a part time farm. Similarly full time farms use more than 1,665 working hours.

Variables in strata are: type of farm, economic size, age of farmer, agricultural area in hectares and region. We have a Danish type, which in some points are more detailed than types used for FADN selection. But the most important difference are fur breeding animal, which for some reason are not a part of the population for FADN statistics. Fur farming is the third largest type of animal farming in Denmark after pigs and milk production measured as production value (the production value of fur farming is 9% of livestock products).

19.3 Working on sample size

For the 2010 selection plan we would like to make some new sample sizes. Calculations of coefficients of variation based on Neumann allocation has just begun in co-operation with staff from Section of Survey and Methods.

As a beginning calculations are made on the 2007 sample for conventional full time farms and three target variables are chosen: Net profit of agriculture, Working capital investment and Ratio of dept.

Table 19.1 Coefficients of variation for conventional full time farms in the 2007 sample

Target variable	Net profit, agriculture	Working capital investment	Ratio of dept
Original	-286.91	7.16	1.80
Net profit, agriculture	-254.64	6.66	1.63
Working capital investment	-309.19	5.86	1.75
Ratio of dept	-342.26	7.55	1.19

In Table 19.1 the row with original are the coefficients of variation based on the 2007 sample. On the diagonal are the best possible, if we only look at this the single variable. For example we can see how much it cost on the other two target variables, if we for example chose to use the optimal sample of Net profit, then the coefficient of variation for Working capital investment raise from optimum at 5.86 to 6.66 and from 1.19 to 1.63 for Ratio of dept. Coefficient of variation for Net profit and Working capital investment is variation in relation to unit (Danish kr). Coefficient of variation (CV) is calculated as:

$$CV = \frac{\sqrt{V(\bar{X})}}{\bar{X}}$$

Using the formula of design effect:

$$\text{Design effect} = \left(\frac{CV(after\ optimization)}{CV\ (before\ optimization)}\right)$$

It is shown, that it is possible to reduce the sample size by 21% if Net profit is the only target variable. Further calculations and reviews will be necessary to decide how the sample design for 2010 will look like.

19.4 Further work on sample design

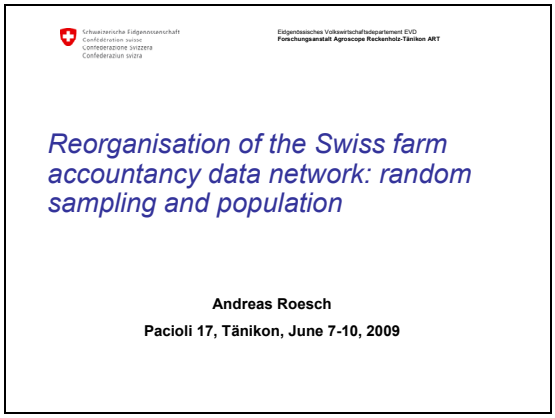
Finding a limit, from which it is desirable to select all farms because they are so large and their standard gross margin represent a large part of the standard gross margin of strata they belongs to, is also a theme for further work on the sample design.

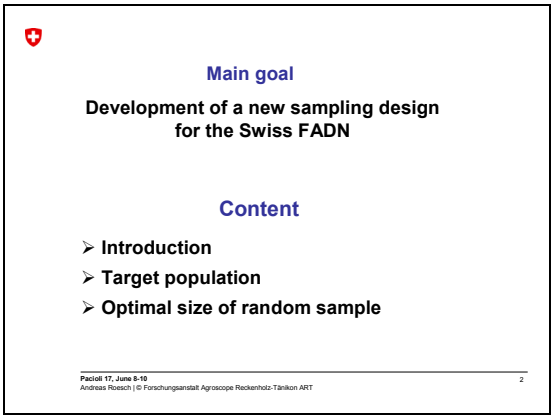
Furthermore the Danish selection is based on a kind of panel sample, where we select as many repeats as possible (around 80%). A weakness of this method is that farms in progress in a given strata are underrepresented compared to farms which has kept the same strata or has declined to a lower strata. Therefore some work on representativeness in the sample is needed.

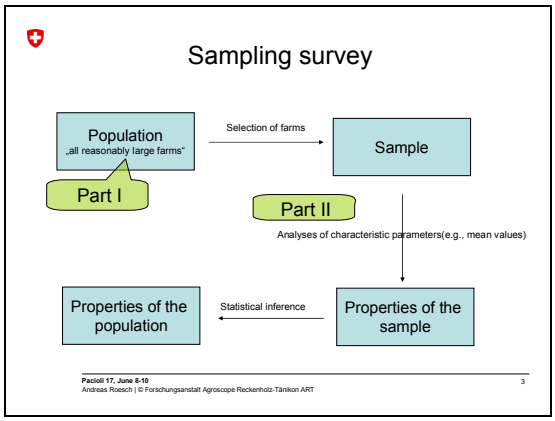
Until now we have a substitute for each farm in the sample. Substitutes will in principle be activated if selected farms sign off. Reasons for sign off can be if the farm has been sold, rented out or similar. Maybe there shouldn't be taken substitutes for these farms, because the area still are in the population, but on another farm. Whatever we shall continue the practice used so far or do it same other way are the third and last theme for further work on sample design.

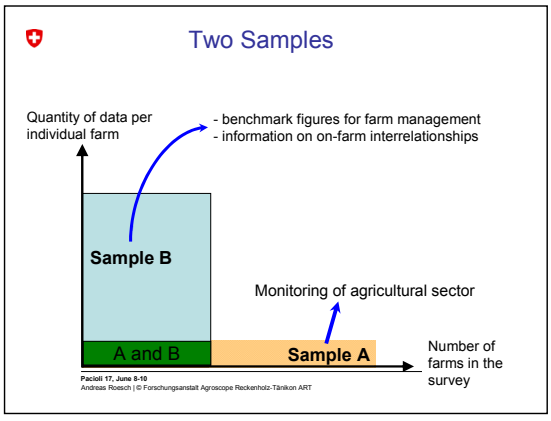
20 Reorganisation of the Swiss farm accountancy data network: random sampling and population

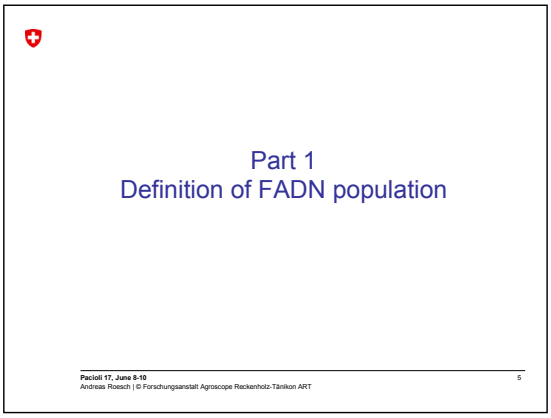
Andreas Roesch
Tänikon ART

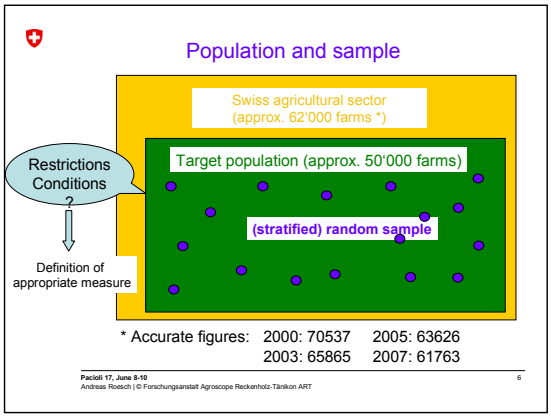












Criteria for target populations (exclusion of „small“ farms)

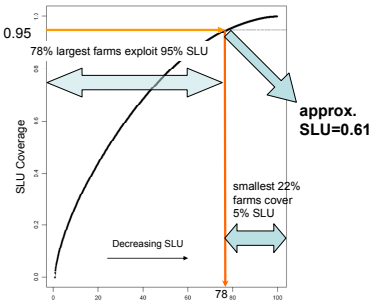
Physical measures	Monetary measures
11 independent measures for livestock and agricultural areas (CH FADN since 1999)	Standard gross margin (SGM) (EU until 2009)
Standard labour unit (SLU)	Standard output (stand. physical output x stand. price) (EU as from 2010)

this talk

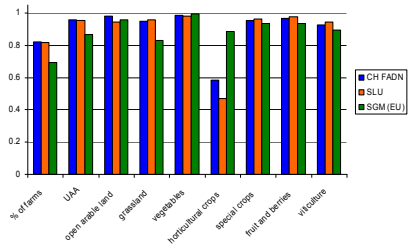
Standard labour unit (SLU) – why?

- Approach for the total workload of farm businesses
- SLU plays a major role for
  - direct payments (from 0.25 SLU)
  - Investment credits (from 0.75 SLU)
  - payments for structural improvement
  - Application of rural land right and tenancy legislation
- GB classifies farm businesses by using full-time equivalents

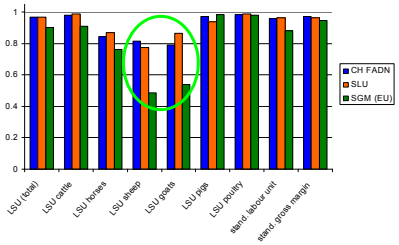
SLU - Coverage



Coverage of target population (2007)

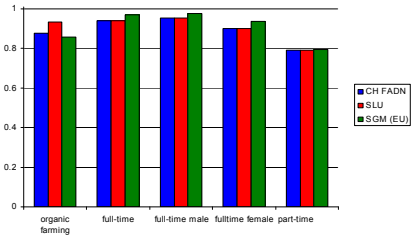


Coverage of target population (2007)



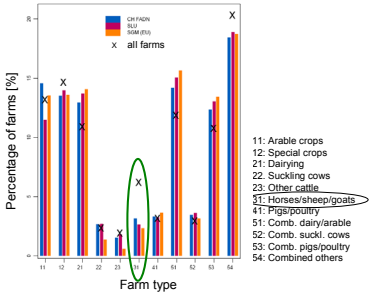
=> Critical coverage for sheep and goats

Coverage of target population (2007)



=> good coverage of full-time farmers

Percentage of farm types, plain region (2007)



Part II
Optimal size of the random sample

Random sampling - why?

- ✓ The Swiss Federal Statistical Office (FSO) states that only a **random sample** is a **statistically sound** method
- ✓ Estimation of the accuracy (confidence intervals)
- ✓ Consequences of low response rates can be analyzed

Constraints

(I, II: for each individual stratum)

(I) *The width of the confidence interval of standard gross margin (SGM)* is „reasonably" small (e.g., 0.18 * $\overline{SGM}$).
-> Sample size constrained by survey costs.

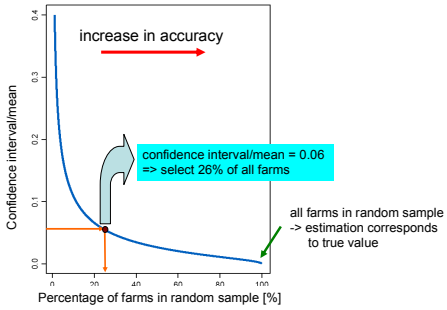
(II) The required response rate meeting condition (I) does not exceed 30%.

(III) Minimization of standard error of Swiss $\overline{SGM}$ (based on Neyman-Tschuprov optimal allocation)

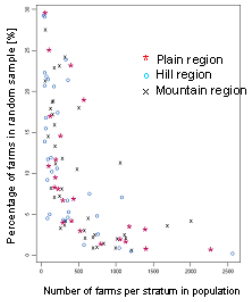
$\overline{SGM}$ = expected value of standard gross margin

Confidence interval (SGM) vs size of random sample

(2007 census data)



Percentage of farms in random sample (per stratum)



Number of farms per stratum in random sample
Plain region, 2007

	<=20ha	>20ha	sampling fraction
11	12	104	(1.6%, 5.9%)
12	160	109	(6.6%, 17.5%)
21	38	51	(2.1%, 4.3%)
22	15	28	(3.6%, 15.8%)
23	27	NA	(8.5%, NA)
31	24	18	(4.8%, 26.9%)
41	55	14	(8.9%,16.1%)
51	27	136	(2.6%, 6.0%)
52	17	23	(4.8%, 5.3%)
53	81	141	(5.3%, 10.6%)
54	61	135	(2.9%, 6.6%)

11: Arable crops
12: Special crops
21: Dairying
22. Suckling cows
23: Other cattle
31: Horses/sheep/goats
41: Pigs/poultry
51: Comb. dairy/arable
52: Comb. suckl. cows
53: Comb. pigs/poultry
54: Combined others

total: 1276 farms (5.8%)

Number of farms per stratum in random sample
Plain region, 2007

farm type	number	sampl. frac.
11	102	(4.1%)
12	400	(13.1%)
21	89	(3.0%)
22	41	(7.0%)
23	59	(15.1%)
31	41	(7.2%)
41	47	(6.7%)
51	141	(4.3%)
52	33	(4.2%)
53	189	(6.6%)
54	177	(4.3%)

11: Arable crops
12: Special crops
21: Dairying
22. Suckling cows
23: Other cattle
31: Horses/sheep/goats
41: Pigs/poultry
51: Comb. dairy/arable
52: Comb. suckl. cows
53: Comb. pigs/poultry
54: Combined others

total: 1319 farms (6.0%)

Weighting

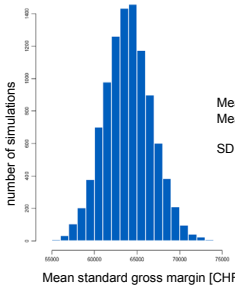
Method: Inverse of sample fraction

$$f_h = \frac{N_h}{n_h}$$

f_h: inverse sampling fraction
(average weight of a sample farm)
N_h: total number of farms in stratum *h*
n_h: number of farms in realized random sample

Distribution of simulated mean SGM

(Arable crops, UAA < 20ha, hill region)



10000 simulations

Mean (simulated) = 63965 CHF
Mean (true value) = 63953 CHF

SD = 2778 CHF

Conclusions

- The Standard Labour Unit (SLU) provides a promising framework for setting the minimum farm size limit
- Random sample allows the quantification of uncertainties (confidence intervals)
- Accuracy constraints require the reduction of the number of strata
- Wide confidence intervals for many variables even for „relatively“ large random samples.

Discussion/ Outlook

- Minimum farm size via SLU – is this reasonable – other suggestions?
- Modification of stratification?
  Other stratification variables?
- Constraints for sample size. Are they reasonable? Should other (key) figures be included?

21 The use of EAA in Swedish SO-calculations

Ann-Marie Karlsson
Statistics Division
Swedish Board of Agriculture

The use of EAA in Swedish SO-calculations

- Calibration with EAA
- Subsidies
- Share of Other Gainful activities

JORDBRUKS VERKET

2009-08-04

Ann-Marie Karlsson
Statistics Division
Swedish Board of Agriculture

The use of EU typology in Sweden

- EU-typology (SO/SGM)
  - Defining the population, stratifying the sample, and present results of FADN.
  - Defining the FSS-population
- Swedish typology (Standard labour)
  - Used to present type of farm
  - Used for sampling, or presenting type of farm
  - Updates type o farm in the business-register
  - Ad-hoc projects

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2009-08-04

Why calibrate with EAA

- Same general principles
- Extended use of SO-values in other statistical reports
- Posibilities to make reports that are coherent with EAA for NUTS-3 level, type of farms and size

JORDBRUKS VERKET

2006-08-17

Rye 2.01.01.03. For 2005

Totalvalue EAA 243 000 000 SEK

A	B	C	D	E	F	G
NUTS 3	Area (ha)	Yield/ hectar	Total yield 1000 kg	Value EAA 1000 SEK	Average price	SO
01 Stockholm	240	3 926	942	1 665	1,77	6 925
03 Uppsala	1 527	6 160	9 406	16 621	1,77	10 865
04 Södermanl	920	5 400	4 968	8 779	1,77	9 524
05 Östergötlar	2 763	5 770	15 942	28 171	1,77	10 177
09 Gotland	637	4 000	2 548	4 503	1,77	7 055
12 Skåne	11 705	6 030	70 581	124 722	1,77	10 635
14 V. Götalan	3 523	4 790	16 875	29 819	1,77	8 448
18 Örebro	1 417	5 460	7 736	13 670	1,77	9 630
Other NUTS	xx	xx	8 517	15 050	1,77	
SE	24 715	5564	137 515	243 000	1,77	9 832
			BxC	Cali-brated EAA	E/D	C*F

1 665 = 942 / 137 515 * 243 000

NUTS 2	Standard output/hektar		
	Q	price	SO
SE01_2	5 686	1,77	10 029
SE06_9	4 124	1,77	7 274
SE07_8	2 800	1,77	4 939

JORDBRUKS VERKET

2006-08-17

What did we actually do?

- A (complicated ?) way of using the work made on prices for EAA to calculate average prices not absolute prices in SO:s
- Quality check of EAA

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2006-08-17

Some results for FSS2007

Summary of population

	SO class					
type	5	6	7	8+9	10-14	Totalt
15		1 158	737	342	6	2 243
15+16	2 153					2 153
45			1 327	4 867	377	6 571
46+48	4 585	4 371	1 967	696	11	11 630
51				559	148	707
other	639	2 214	1 618	1 815	266	6 552
Totalt	7 377	7 743	5 649	8 279	808	29 856

Share of SO:s

	SO class					
type	5	6	7	8+9	10-14	Total
15	1,3	1,3	1,6	1,7	0,1	6,0
45			3,2	32	8,9	44,1
46+48	2,7	4,7	4,1	3,3	0,2	15,0
51				4,5	4,3	8,8
other	0,3	2,3	3,7	11,4	7,6	25,3
Totalt	4,3	8,3	12,6	52,9	21,1	99,2

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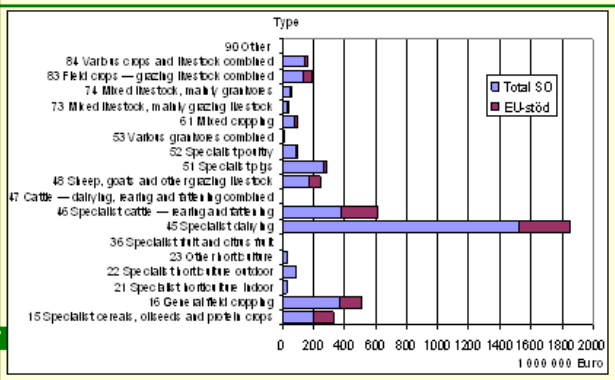
2009-08-17

Total SO and EU-subsidies per farmtype (FSS2005)



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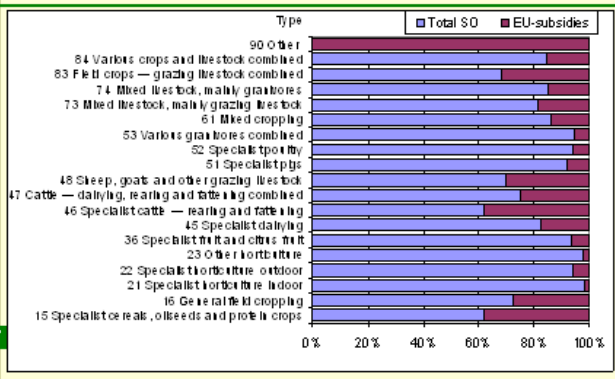
2009-08-17

Share of SO and EU-subsidies per farmtype (FSS 2005)



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2009-08-17

Share of other gainful activities

- Variables used per holding
  - Standard output (SO)
  - Total output from other gainful activities related to the holding (TOGA)
  - Subsidies

$$\text{Share of Other gainful activities} = \frac{\text{TOGA}}{\text{SO+TOGA+Subsidies}}$$

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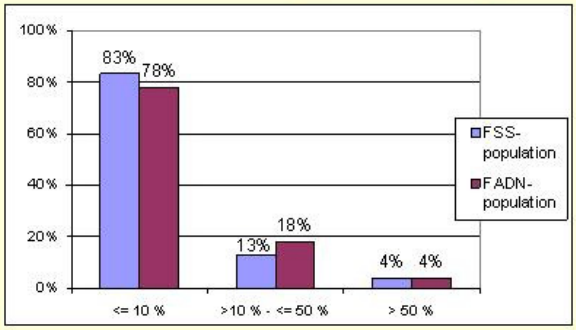
2009-09-28

Share of other gainful activities (FSS 2005)



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2009-09-28

Share of other gainful activities - Conclusion

Other Gainful activities are most important for

- Younger farmers compared to older farmers
- Larger farms compared to small farms
- Farmers in the south of Sweden compared to farmers in the north of Sweden
- In general most important for types of farming that is resource demanding.
- The results are consistent with results from EAA

For Swedish purposes it might be difficult to use the classification of Other Gainful activities since the share of holdings in the two upper classes is low.

JORDBRUKS VERKET

2009-09-28

Thank you for your attention

Questions?

JORDBRUKS VERKET

2009-08-17

22 Innovations in the Italian FADN/RICA survey system approach: the new soft ware GAIA and its implications on the Italian agricultural accounting system

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www.inea.it

22.1 Introduction

The last decade has been characterised by important changes in farm management system. Different market and structural dynamics, such as the enhancement of farm multifunctionality, have determined the demand for new skills of farmers and the need for improvements in managerial activities. In many cases, these improvements have found an obstacle in the lack of software or tools able to address the farm management towards an efficient path. For this reason, nowadays, it is important to discuss about the possibility to innovate farm management and one of the most important issues is the accounting system. Having an efficient accounting system is very important both to improve and control the farm running (micro-economic level) and to collect important information about the whole agricultural system (macro-economic level). In fact, the innovation in farm accounting system has relevant consequences for data gathering through FADN/RICA (both on European and national level).

The purpose of this paper is to illustrate the innovation in the Italian survey system introduced with a new software, named GAIA (Gestione Aziendale delle Imprese Agricole, 'Farm Management in Agricultural Enterprises'), developed by the National Institute of Agricultural Economics (INEA). A presentation of this software was made at the 16th Pacioli Workshop in 2008, introducing the overall structure and the general scheme. Here, further descriptions and considerations will be illustrated. However, considering that Italian FADN/RICA has started using GAIA in 2009 (for accounting year 2008), no microeconomic data processing is available now.

Since GAIA has been developed as an accounting tool for agricultural holdings business (not only for FADN/RICA survey), it is characterised by a relatively higher methodological complexity than other tools used only of data collection in FADN samples. GAIA has replaced the previous software CONTINEA adding innovations to the methodology and according to the National accounting rules and the International recommendations (including IAS 41). The final objectives of this software are the analysis of farm business administration (balance sheet, economic indicators, economic and financial analysis and so on) and the analysis of the single farm process through the allocation of common and general costs to different production processes. The allocation of these costs is a crucial issue in the agricultural accounting. A rich literature explaining the different ways to make the attribution using allocation keys is available. An important research project named FACEPA1 (Farm Accounting Cost Estimation and Policy Analysis of European Agriculture) is still in progress and it will provide an important contribution to the analysis of cost accounting in the European structure surveys. The final results could be very interesting to refine the analytical farm accounting.

[1] FACEPA receives funding from the European Community's Seventh Framework Programme [FP7/2007-2013] under grant agreement no. 212292. Project coordinator: Professor Yves Surry, Swedish University of Agricultural Sciences, Uppsala, Sweden.

One of the characteristic of the Italian survey system is the integration of agricultural holding and territorial data bases. With GAIA the integration will be possible by means of geo referenciation which could allow further analysis on important aspects of agriculture such as environment, rural development, district economies and so on.

The document is structured as follows. First the main features and structure of GAIA are described, together with its adoption and implementation. Moreover, GAIA as a methodology is presented in the third paragraph together with its main innovative elements, such as the management of data on labour and off-farm activities. A section is dedicated to the coherence of the Italian methodology with the International Accounting Standards. Finally, the role of INEA in the European research project FACEPA is described.

22.2 How GAIA has been introduced and implemented

Since the late 80s INEA developed a software working under DOS, called CONTINEA, aiming at supplying a decision support tool to farmers and to collect farm accountancy data. CONTINEA was at the same time a tool to process farm reports, to calculate the EU farm type, and to create regional databases. Since the 90s, within CONTINEA, the software package PEGASO (Pacchetto di Economia e Gestione Aziendale per Strutture Operative) had allowed to organise data collection and processing of the FADN survey even further. Until 2007 INEA had released yearly updates of the software, to adapt to changes in the CAP reform and fiscal norms on VAT.

However as technology improved, the need for a software working in Windows environment to support FADN/RICA data collection raised. Furthermore INEA perceived the need to have a more complex decision support tool to fulfil new needs of agricultural entrepreneurs.

As many IT products, its development went through progressive stages. First a demo version of the actual GAIA was implemented, then a selected group of data collectors had trailed the software on a sub-sample of RICA farms, and at last, a final version of the software have been launched. In 2009 GAIA has reached a level of automatism in data registration that allows data collectors to register structural technical and accounting data. Beginning from the accounting year 2008, INEA had relied on a complete use of GAIA for data collection and reporting,

The first version of GAIA was highly business-oriented and included detailed data on suppliers and customers of the farms, information on bank account and so on. The current version have been developed in a less sofisticated way, however maintaining a good methodological consistency. In fact, adjustments to the new accounting system introduced by the EU Directive IV and adjustments to IASB (International Accounting System Board) are key issues in the Italian modernisation process.

The firm concept in the Italian methodology has integrated the off-farm activities, the direct selling and services to thirds already since 2002; with the adoption of GAIA the Italian FADN has moved a step further, by reaching a high level of detail.

In GAIA some functions are similar to typical business consultant work, such as the assistance in attribution of costs to Income Statement and Balance Sheet. In fact the software does it automatically and most of data entering does not require specific knowledge of the user on double-entry bookkeeping, thanks to the automation of many record registrations. However, GAIA does not allow printing out invoices or stocks register or sales ledger; for that farmers rely on other specific software.

Farm economic and financial analysis is also possible with GAIA, as it includes elements that allow the calculation of financial ratios and economic indicators (i.e. Gross and Operating Margin). The combination of technical information with assets management is an innovation in the Italian farm accountancy system.

To sum up, GAIA has been first developed as accounting tools for agricultural holdings and not directly for FADN/RICA survey. Up to now, GAIA is a software, a support system, and a methodology, as described in the following sections.

22.2.1 GAIA as Information-Technology tool

GAIA, as software, is implemented continuously not only from Information-Technology (IT) experts, but also thanks to the regular feedback from data collectors and regional survey coordinators.

Some innovative elements of the software are merely technical and related to Information-Technology issues. Beside the introduction of multiple-window user interface and the compatibility with Windows operating environment, the software is built up according to the most common navigation system, i.e. navigation tree, whereas earlier only hierarchy menus were possible. GAIA consists of horizontal and vertical menu bar (tree menu), search tools, and data entry is possible not only with keyboard, but also with mouse clicks.

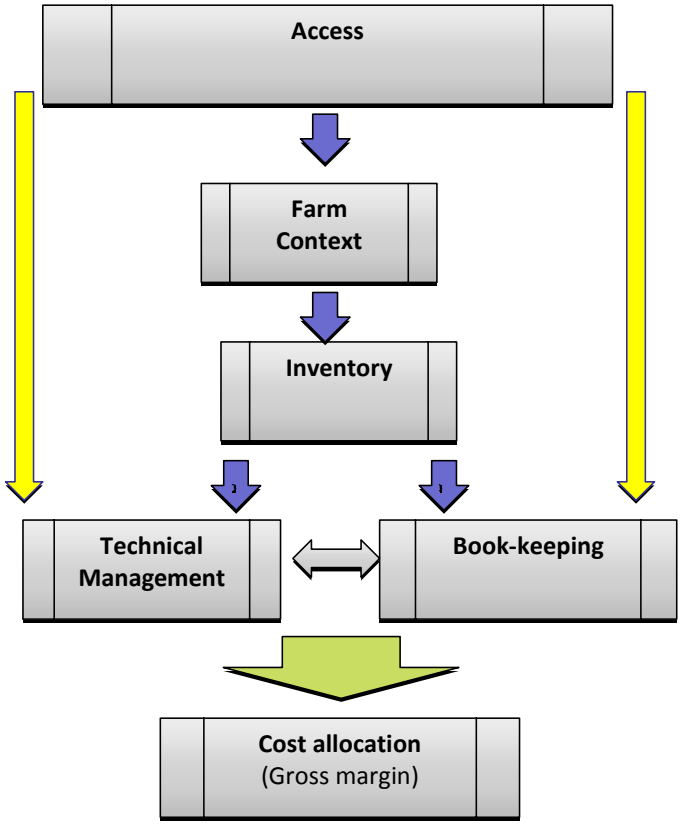
For each of the windows that compose the opening stocks and the technical management, it is possible to process a report summarising the records entered. A more sophisticated report can be processed on the accounting records and the bookkeeping windows, and it is called 'Control report'. In fact this allows the data collector to print out the document and save the file (as pdf, doc, txt), thus send it to the farmer. This is possible at any time of farm data registration, in order to keep track of all registrations accomplished.

The previous software, programmed in DOS, you had one user profile only, whereas more levels of users are possible in GAIA, thus according to the degree of data control and users themselves management (user profile management). The administrator, as the regional data assembling coordinators, may have the ability to upload archives from each data collector and launch tests to make inter-farms controls, whereas data collector can only make control on one farm at the time (archive management and farm test).

Data is entered according to the following logic sequence (Figure 22.1):

1. farm context, with general data on the farm is entered (full address, farm holder, and soon);
2. opening stocks (buildings, machinery, land, breeding livestock, labour force, certifications, agricultural products, debts and credits at the beginning of the year);
3. technical management of land, permanent crops, labour, breeding and fattening livestock;
4. accountancy management includes double-entry registration of receipts (sales and purchases), Government and European subsidies and aids, other financial accounts (loans, interest payments);
5. closing procedures: allocation of operational costs (calculation of gross margins), allocation of structural and investment costs (for permanent crops ad unrealised crop produce, i.e. durum wheat), allocation of extra ordinary maintenance, VAT.

Figure 22.1 **GAIA operational sequence**



The logic of data entering behind the software follows closely the reasoning of data collectors while assembling data on farms accounts. Data collectors begin entering data on the opening stocks, thus defining the farms assets and availability of technical means at the farm. After that, they associate a technical management to the stocks, by registering crop production, use of technical means, and developments occurred at livestock. The technical management may be considered as the most flexible and innovative element since it allows keeping track of decisions made by the farmer throughout the year. Particular attention is addressed to the livestock management that allows registering data on the change of heads category (from heifer calf to dairy cow, to cull dairy cows), data on animals that are not in property of the holder, data on the use of manure and so on. The registration of the receipts (sales and purchases) is strictly connected to the technical management. For instance, whenever the purchase of a livestock head is registered, automatically the animal category in the livestock management window is updated. The same happens for losses in heads of livestock (death or sale).

When data collectors enter information on purchases of technical means, they can either describe its use (i.e. fertiliser for tomato) or they can aggregate and allocate to the operation at the end of data entering (closing operations).

The sequence of data entering ends with some closing operations, such as the allocation of costs to processes (realised/accomplished productions), but also allocation of costs to extraordinary maintenance (i.e. land investment, rebuilt of buildings) and also allocation of costs to unrealised crops (i.e. first investments in permanent crops or winter cereals, whose harvest will be realised in the next accounting year).

GAIA gives the whole overview of farm events characterising the enterprise management, either they are technical, economic, financial, commercial and administrative ones. The following table gives an overview of the number of different possible data registrations:

Table 22.1 The quantity of information in the new software GAIA

	n.
Survey farms in 2008 (FADN sample)	11,674
Book entries or accounting entries	30
Accounting records	80
Types of records	280
Types of machineries and farm plants	300
Types of buildings and manufactured products	70
Crop species	380
Crop varieties	6,800
Animal species	60
Types of non-animal products	54
Types of animal products	35
Types of technical means of production	110
Types of government subsidies	30

The complexity of the software structure can be simplified in case the farm has not any livestock heads, any permanent crops, any off-farm activities, or any hired work. In fact, data collectors can unselect windows, modifying the software behaviour at their best disposal, i.e. when farms that have low production diversification. For instance, unselecting permanent crops, the software updates the navigation tree excluding windows dealing with permanent crops.

22.2.2 GAIA as support system

GAIA supports data collectors through a website (www.gaiainea.it), where users can register. For all users it is possible to download documents on data assembling, covering both methodological and technical issues. For example a document called 'Register to data assemble' was written to guide data collectors in data entry and variable definitions and classification. The document is structured alike to the navigation tree of the software, in this way data collectors and regional coordinators share a common methodological reference. The registered

users, i.e. regional survey coordinators, data collector or general users, can enter the pages for registered users and download the last version of the software tool. Registered users receive an e-mail informing about updates available at the website. External interested user, farmers or stakeholders, willing to install the software, can fill in a form to request the CD.

In the website there is also a forum where methodological issues are discussed, and users can signal malfunctioning of the software itself, but also can send suggestions and comments on improvement needs. Furthermore, you can read about solved problems on functioning or the answers from the Technical Scientific Committee (TSC) and be informed on the developments of the software.

Next to a general overview on the software, on the website RICA/FADN-related events and news on training courses are posted, as well as documents presented on the topic. This effort in interactivity aims improving communication on the issues related to the survey and to supply both technical and methodological support to data collectors. INEA attempts to stimulate overall interaction between regional data collectors and GAIA developers and the TSC.

Figure 22.2 Website page for registered users

Together with the software development, a User's Guide has been written, where all the variables are defined, examples of data entering are shown and some methodological support is given. Moreover, a case study has been developed to help in learning how to register data in GAIA. In fact, an example of farm was detailed described so that by practicing data entering on that farm, data collectors would learn the logic and connection among different parts of the software. The case study has been used for the training courses to data collectors and as reference for learning.

22.2.3 GAIA as methodology

GAIA has been developed to be user-friendly enough to be used easily also by non-experts; however, it keeps methodological rigor (double-entry bookkeeping, coherence with other book balances), technical ease-of-use and integrate technical and accounting information one another.

GAIA has been first developed as accounting tool rather than a tool for FADN/RICA purposes; thus, as methodology GAIA aims at reaching multiple objectives, which are:

a. broadening the information platforms of the Italian farm accountancy network;
b. updating the data collection information system;
c. making data comparable between agricultural and non-agricultural holdings;
d. promoting book keeping in the agricultural sector to enhance entrepreneurship;

e. integrating farmers information needs with agricultural statistics;
f. meeting the ease-of-use with accounting norms requirements;
g. making data assembling efficient;
h. having useful tools for agricultural holding management;
i. conforming to methods of civil balancing and to IV Directive and to IAS 4;
j. adopting a complete double-entry accounting system integrated with the traditional economic statement.

GAIA target group is various. It attains data collectors that get information from the farms and register data in an organised manner, farmers as tool to farm management, firm consultant in farm management and last, but not least, the academic and research world.

22.3 Innovative elements of the new software GAIA

GAIA introduces two kinds of innovative elements in the Italian farm survey system. One of them is merely technical and related to the IT developments, while the other one is methodological (for instance, the possibility to enter data applying the book keeping by double entry).

Most of these innovations take into account the changes in agricultural structure observed during the last decades. In fact, with respect to the past, today agriculture is more characterised by a multifunctional nature. As a consequence, all the European agricultural policies stress on the role played by agriculture in the economy, environment, society and conservation of countryside. These changes have led to transformations in farm management, so further elements should be taken into account in the agricultural survey. GAIA has been designed to investigate also these new aspects.

For the first time in Italy, GAIA introduces useful elements that satisfy important information needs coming from policy makers and from agricultural economics researchers. In fact, GAIA has multiple aims. At one hand, GAIA is a sophisticated tool used from farmers or data collectors to gather the information of the farms. But it is also an instrument used by technical services in their consulting activity. The adoption of the book-keeping by double entry and the new Balance Sheet schemes make possible the comparisons of the farm economic results, not only within the agricultural sector, but also between agriculture and other sectors. With respect to the old software, GAIA requires an improvement of the accounting knowledge of the final users.

To satisfy the needs coming from agricultural research, GAIA has increased the quantity and quality of data in the survey collecting and making available further data in the following fields:
- labour (family and hired labour);
- off-farm activities;
- analysis of farm processes and results.

All the data will be available by means of a Datawarehouse (DWH), designed and implemented during 2008-2009 and updated at the end of each accounting year in order to make available to end users and researchers all the information collected with GAIA. The DWH will permit to make data browsing at different levels (regional and national) without the assistance of experts and to elaborate specific reports depending on particular information needs and inquires. In this way all users will have an easy access to the survey results and to different kinds of reports.

The DWH scheme is organised in different levels of analysis concerning farms as a whole, but also structural and economic aspects. In particular, the final reports may represent: i) general analysis; ii) specific analysis; iii) time-series; iv) farm comparisons and v) regional analysis.

The contents of the reports depend on users' profile and his informative needs. Therefore, two kinds of users an be distinguished: i) standard users which can enter in the DWH online (reports predetermined), and ii) advanced users which can get data from the whole national data base (they can elaborate more complete reports).

22.3.1 Labour (hired and family labour)

Labour is one of the most important inputs in agricultural production. There are two categories of farm labour: hired labour and unpaid labour. The cost of the first category includes wages, salaries, benefits and other associated costs while family labour is included in the second category. Despite the importance of these costs, FADN does not consider the remuneration paid to farmer and his family as a farm expense. This is an important concern, especially considering that in the European context (characterised by the presence of a large number of small farms) the farmer's family is in many cases the major (on only) constituent of the workforce.

Use and intensity of labour are influenced by the farm dynamics. Furthermore agricultural labour depends on needs of rural families that in some countries (including Italy) manage the greatest part of farms. Statistical data and different studies have highlighted important changes in the structure of agricultural work at different levels. In general, agriculture has witnessed an increasing of off-farm activities and part-time work. In particular, it seems that a positive relation between part-time work and age of workers exists, together with a diffusion of part-time in the smaller holdings. Differently from the past GAIA takes into account these changes assembling additional information on all the components of farmer family, whether working at the farm or not. The aim is to consider and give evidence of the existence of other income sources and the role of every member in the farm management. With this regard this regard, an analysis made by AgraCeas (2007) in all the European MS (27) highlights that as far as farm accounting survey concerns the information coverage on household members other than the farmer and spouse is poor.

For every family component, GAIA requires for personal data, gender, role within the farm, role outside the farm, education, income level, number of hours worked inside and outside the farm, relationship with other family components and farm holder, country of origin (for seasonal workers), contract type, et cetera. Information is required for all the kind of workers: seasonal, wage-earned, temporary, and so on. Also in case of companies, GAIA requires the indication of the role of every member, if they are paid for full-time work or unpaid and part-time.

Keeping recors on these kinds of information, GAIA would analyse in a better way the multi-activity of agricultural workers, together with their demographic characterisation (age, labour turnover, and so on) with the aim to fill a crucial gap in the FADN/RICA record procedures. As previously stated, the multifunctional role played by the agricultural sector makes necessary to dispose of a new kind of information that can be used to verify the pluriactivity of agricultural workers, the ageing in the farms, the presence of components that can guarantee the labour turnover over the time.

As for the other variable costs, the hours worked must also be allocated among the production processes in order to have a measure of the average labour cost for every process.

The availability of information about family labour makes possible its evaluation using some form of opportunity costing, that assign a value considering the best alternative use of hired labour. The scientific literature recommends the estimation of the opportunity cost method in order to have further information about the farm efficiency of resources.

22.3.2 Off-farm activities (Other Gainful activities)

Off-farm activities include gainful activities directly related to agricultural holdings (including all activities other than farm work) that have an economic impact on holdings themselves. Those activities use either resources of the holding (area, buildings, machinery, agricultural products, et cetera) or the products of the holdings. In order to avoid the abandon of the agricultural activities and to sustain farm income farms have diversified their activities. Agriculture is often the most important economic activity in rural areas and often Rural Development and agricultural policies are designed together. As a consequence, agricultural surveys can not disregard this link in collecting the information about off-farm activities.

FADN/RICA regulations offer different possibilities to include off-farm activities in the farm accounting; however, as Delame (2009) underlines, there are differences among the Member States because the farm structure is not the same and because there are different interpretations of the Farm Return at European level. In the European accounting system some Member States adopt thresholds to decide when 'Other Gainful Activities' should be included in FADN/RICA or not. When the income exceeds an upper limit, the receipts and costs of the

other activities are excluded, while, if the income is below the limit, the receipts and costs are included in the survey. In Italy, records on off-farm income have been included in FADN/RICA survey from 1998.

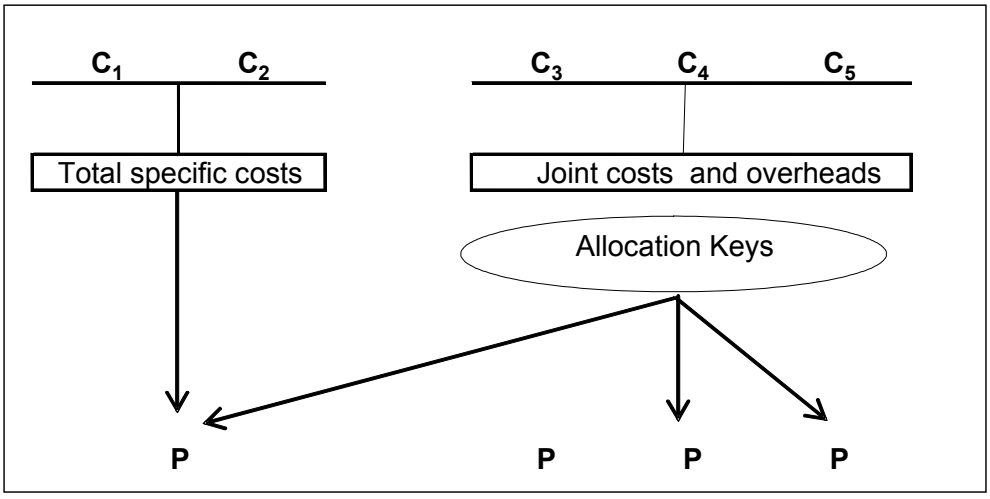
The way by which off-farm activities are included or excluded depends on several reasons. In general, the technical feasibility of specifying receipts and costs by activity is rather low because many cost items are not allocated in a specific manner, but cover various activities. Usually, farmers are not willing to carry out a division of the costs.

With GAIA it will be possible to have an accurate survey of technical and accounting management of the other gainful activities. In fact, at the start of every accounting entry, the software allows the classification of the single operation under 'agriculture' or 'other off-farm activities'. This option allows having a separate accountancy system for agricultural activities and for other activities, normally due to taxation purposes and other legal reasons. As a consequence, the Italian FADN/RICA keeps separate receipts on an high number of off-farm activities. A complete set of variables and typology of activities have been introduced especially for agro-touristic activities. The level of detail is high, even though GAIA does not calculate the gross margin or the cost allocation. The INEA-reclassified Balance Sheet summarises all the records of the book. Besides touristic activities, it is possible to collect information on services to thirds, recreational activities, educational farms, environmental services and so on.

22.3.3 Analysis of farm processes and results

Once the registrations of an accounting year are completed, GAIA allows analysing farm processes (Gross Margins) for the different production processes or enterprises. The allocation of costs is one of the main weak issues in accounting procedures and it is an essential operation in the calculation of farm margins (especially labour and machinery). There are different kinds of costs: specific costs are directly imputed to the farm enterprises, while joint costs and overheads must be allocated using allocation key procedures (Marongiu et al., 2008). In GAIA data collectors make themselves the attribution of the variable costs to the single enterprises.

Figure 22.3 **Allocation of joint costs and overhead costs**



On farm management analysis, GAIA draws up different documents: a Balance Sheet that follows the Civil Law and the IV European Directive, a reclassified Balance Sheet (INEA) and sectorial Balance Sheets for every production process. Moreover, GAIA permits to calculate income indicators for economic analysis (ROE, ROI, ROS, et cetera), for financial analysis and productive analysis (Net Value Added/Annual Work Units, Net Value Added/UAA, et cetera). In this way FADN/RICA will provide useful information to the users and comparable data to other investigations from other important institutes (ISTAT, ISMEA, CRA and so on).

Unlike the past software and methodology, GAIA permits to create the farm Balance Sheet at any moment of data registration and not only at the closure of accounting year.

22.4 GAIA and IAS 41: coherence between the National and International accounting rules

In spite of the importance of accounting, the agricultural sector has a low level of bookkeeping and accounting practice. This lack can became a problem when accounting information is used to improve farm management or as a base for policymakers in their decision-making procedures. In Europe, FADN developed general procedures and guidelines for farm accounting, however without a comprehensive and harmonised accounting standard for agriculture among European MS. Moreover, in some MS, as Italy, farm survey system has a double goal, being used to collect data for EU FADN purposes and also for national needs. As a consequence, Italy applies both common rules and specific rules to meet other requirements.

A first attempt to the harmonisation process comes from the introduction of the International Accounting Standard for Agriculture (IAS 41) by the International Accounting Standard Board (IASB). IAS 41 was introduced in 2001: it prescribes the accounting treatment, financial statement presentation and disclosures related to agricultural activity. Following IAS 41, the agricultural activity is defined as 'the management of the biological transformation of biological assets (living plants and animals) into agricultural produce (harvested product of the enterprise's biological assets) [...] Biological transformation comprises the processes of growth, degeneration, production and procreation that cause qualitative and quantitative changes in a biological asset'.[1]

IAS 41 formulates three essential characteristics that identify an agricultural activity:

1. Capability to change: living animals and plants are capable of biological transformation;
2. Management of change: management facilitates the biological transformation, improving the necessary conditions for the process. As a consequence, harvesting from unmanaged resources (such as ocean fishing or deforestation) is not an agricultural activity;
3. Measurement of change: the change in quality or quantity is measured and monitored.

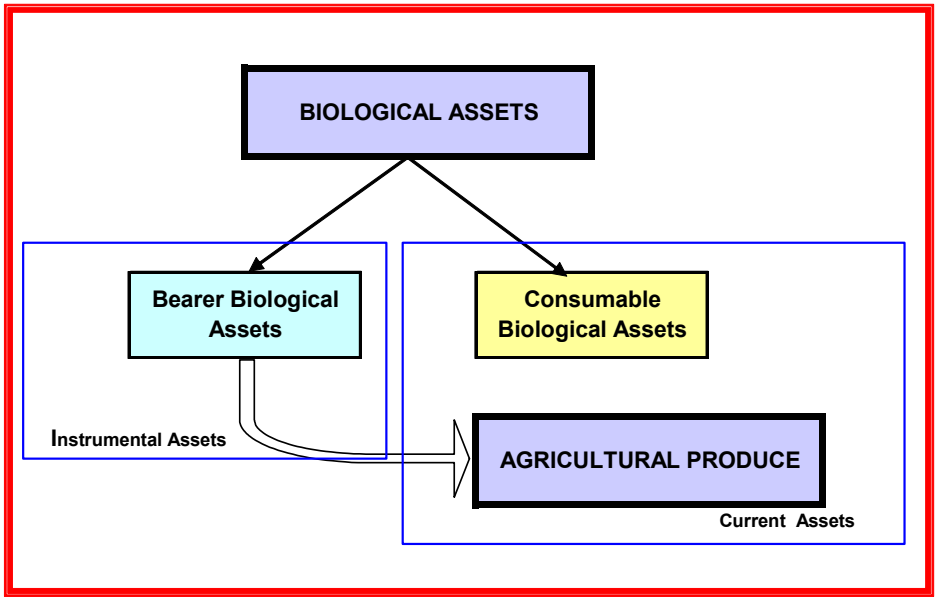
   Following the IAS 41 definitions, biological assets can be:

   I. consumable biological assets if they can be harvested and consumed as agricultural produce or sold as biological assets (livestock for meat, livestock held for sale, fish in farms, crops such as maize and wheat, et cetera);
   II. bearer biological assets that are used to obtain derived agricultural products (livestock producing milk, grapevines, orchards, etc) destined for the market, consumption or transformation.

Figure 22.4 summarises how bearer biological assets could be considered as instrumental assets used for the farm activity, while consumable biological assets and farm produce could be considered as current assets, thus allocated in the market. These international accounting standards have been introduced in the new software GAIA.

[1] IASC does not take into account the land use as a fundamental requirement of agricultural activity. Moreover, in IAS 41, the assets that are not affected by a biological growth process are considered separately and included in other IAS: Agricultural land (IAS 16 and IAS 40), Intangible Assets (IAS 38), Government Grants (IAS 20).

Figure 22.4 **Biological assets in IAS 41**



One application of the international standards in GAIA concerns the distinction between breeding and fattening animals. Following the IAS 41 definition, breeding animals can be considered as bearer biological assets, while fattening animals are consumable biological assets. Breeding animals are considered as instrumental assets (tangible) and in as much as multiyear cost, they are imputed on the basis of their cost and depreciated on the basis of their residual use. According to the law, the depreciation of the tangible assets must be systematic and not increased or decreased on the basis of economic convenience. Considering this, the depreciation of breeding animals is made in compliance with predetermined depreciation plan and calculating constant depreciation quotas. The plan takes into account both the depreciable value and the productive career of the animals.

The depreciable value is represented by the difference between the initial value of the animal and its residual value at the end of the productive career (estimated value) or on replacement value (conforming to the EU FADN requirement and also to the IAS 41).

The productive career is estimated taking into account of different characteristics: species, category, productive attitude, environmental and sanitary aspects, economical factors, et cetera.

Another application of IAS 41 concerns the evaluation of the forest area of farms. GAIA makes two different accounting transactions for arboriculture and forestry. The evaluation of forestry is made keeping the distinction between land and trees. Trees are evaluated considering the fair value.

The use of the fair value is an important implication consequent to the adoption of IAS 41, where all types of biological assets and agricultural produce should be measured on initial and consecutive recognition at their fair value less estimated point-of-sale costs. Gains or losses on initial recognition are included in profit or loss for the period in which they arise. This constitutes a breach with the principle of original cost, being an application of current cost accounting.

The table below shows the method used by IAS 41 to define this value.

Table 22.2	Definition of the value for biological assets and agricultural produce according to IAS 41
Market price (net price)	
Transport costs	
Other costs to get assets to a market	
= Fair Value	
Point-of-sale costs	
Commissions to brokers and dealers	
Levies by regulatory agencies and commodity exchanges	
Transfer taxes and duties	
= Valuation for biological assets and agricultural produce	

The fair value of an asset is based on its present location and condition and this evaluation procedure has important consequences on the final results. Fair value accounting provides more transparency than historical cost accounting, based on the amount of money paid to acquire the asset. This last criterion does not reflect the nature of farming, because the quantity of assets on the farm does not depend only on the amount at a certain moment, but also on other processes (birth, growth, death). So, the fair value approach reflects the effect of biological transformation in the best way.

Moreover, the historical cost approach can raise problems during times of high inflation. In this case, if the profit is used to pay taxes and private expenses, the company would not have enough resources to buy the same fixed assets again because inflation would make them more expensive. So, historical cost is not objective and not very informative under this point of view.

The market price on an active market,[1] if available, is the best evidence of fair value and should be used as the basis for measurement. Otherwise the estimation is made using other kinds of information: the most recent market transaction prices, the market prices for similar assets or sector benchmarks (for example, the value of a cow expressed per kilogram of meat). If these prices are not available, the valuation is made considering the present value of the net cash flows that the assets would generate if they were used in the farm. Otherwise, the original costs are used.

In limited circumstances, cost is an indicator of fair value. If there has been little biological transformation or the impact of biological transformation on the asset price is low, cost can be used to approximate fair value. For example: the first few years of an asset such a forest with long-term production cycle.

With regard to the evaluation of assets at their fair value, GAIA differentiates the evaluation methods according to assets as follows:

1. livestock is valued at prices prevailing at the end of the accounting period;
2. land is valued on the basis of market price for non-rented land with similar characteristics;
3. depreciable fixed assets are valued at replacement cost at the end of the accounting period.

The use of current cost accounting in GAIA permits inter-business comparisons: the cost of two companies that have the same asset, bought at different times (so with different historical costs) will be calculated in the same way. In the calculation of current costs, problems can arise for assets which change only seldom or never or for old assets that have been a technical breakthrough.

With respect to subsidies, contrarily to IAS 41, Italian FADN/RICA considers subsidies fully earned once these have been granted.

[1] An active market is a market where the items traded are homogeneous; willing buyers and sellers can normally be found at any time; prices are available to the public.

22.5 INEA and FACEPA research project

INEA is involved in the EU research project called FACEPA (Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture) within the European Community's Seventh Framework Programme. The project lasts three years and is divided into nine work packages and involves nine Member States. The main purpose of the project is to estimate costs of production using existing FADN/RICA databases at the European and national Member States. The project intends to address the usefulness of the present FADN data systems to measure production costs of agricultural commodities and to study the feasibility of developing a general cost of production model for EU agriculture (mathematical and econometric programming models). This model will be tested and implemented in an EU context, on large scale (for several agricultural commodities and in a large number of Member States) in order to evaluate the consequences of agricultural policy measures.

The project includes several activities. INEA has conducted a literature review on production costs in agriculture and on cost definition. There are different kinds of costs and different ways to measure them. The difficulties to allocate common costs and overheads have been highlighted also in GAIA, especially in the definition of the sectorial Balance Sheets for every enterprise. Considering that the direct collection of enterprise-level information is difficult and requires costly farm surveys, an alternative tool may be the individuation of appropriate allocation keys or the use of other techniques to estimate the unit cost of production.

Furthermore, INEA is involved in the analysis of farm performance and efficiency using FADN/RICA data. There are many contributions in the literature about the application of parametric and non-parametric method to assess farm efficiency. With GAIA it will be possible to regress efficiency index with a large set of explanatory variables including the characteristic of farmer's family or the specialisation (presence of other gainful activities).

INEA coordinates WP6 on 'Modelling farm technologies', whose aim is to develop, apply and verify the use of mathematical programming models to estimate cost function and its use to evaluate the impact of the new CAP reform on farm production and farm economic behaviour.

22.6 Conclusions

Important changes in the Italian FADN survey have been introduced with a new accounting instrument, named GAIA. GAIA it is not only a software, but a new methodology to collect farm information. It has been developed in a more user-friendly interface, including interactive data entering and complying with the common accounting schemes. In Italy, this new farm survey system is designed not only for FADN/RICA purposes, but also for other goals (economic research, farm management, and so on). Consequently, GAIA is addressed to data collectors for their traditional task but also other users (farmers, business services, et cetera) to improve the efficiency of agricultural statistics and to evaluate specific aspects of agriculture. For instance, labour can be treated as simple accounting record but also to investigate other characteristics of the farm. The different cost structure among different labour activities, the hours for every Economic Size Unit or the subsidies for labour typology (inside or outside the farm) could give further information about structural and financial aspects of the farm.

Unlike the past, GAIA appears to be more suitable to analyse the new European agricultural context and its increasing complexity. Much effort has been addressed to making GAIA an innovative tool for many purposes. As every innovation problems may raise, because adopting a new software means accepting technical and methodological changes. The large amount of information required have apparently complicated the work of data collectors, especially those traditionally involved in the gathering process for FADN/RICA may not be willing to follow new procedures. The introduction of new accounting concepts (especially the book keeping by double entry) has improved the survey quality, but also required the learning of specific knowledge.

References and websites

AgraCeas, *Feasibility study on the implementation of Income of Agricultural Household Sector (IAHS) statistics.* Eurostat, Luxembourg, 2007.

Arzeni, A., C. de Vivo, A. Giampaolo and A. Scardera, *Metodologie di rilevazione e analisi dei fabbisogni di lavoro agricolo attraverso la Rete Contabile RICA, Paper presented at the XLIV Sidea Congress, Produzioni agroalimentari tra rintracciabilità e sicurezza: analisi economiche e politiche di intervento*. November 8th -10th, Taormina, Italy, 2007.

Barkaszi, L., S. Kesztghelyi, E.K. Csatari, C. Pesti and G. Suga, *FADN Accountancy framework and cost definitions*. Deliverable no. D1.1.1, FACEPA project, 2009.

Bodini, A., 'FADN data collection and processing in Italy: the renewal process'. In: *Pacioli 16-Changing agricultural markets: Consequences for FADN*, LEI Editor, pp. 22-31, 2009.

Delame, N., *Evaluation and comparability of EU and Member country FADN database*. D 2.1 FACEPA Project, 2009.

EC DG Agriculture, *Definition of variables used in FADN Standard Results*. Community Committee for the FADN, RI/CC 1256 rev.4. 2006.

Elad, 'Fair Value accounting in the agricultural sector: some implication for the international accounting harmonisation'. In: *European Accounting Review* 13 (2004) 4, pp. 621-641.

Hill, B., *Farm incomes, Wealth and agricultural policy (third edition).* Avebury, Aldershot, 2000.

Hill, B., *Using the Wye Group Handbook to develop EU statistcs on the incomes of agricultural households*. Wye Group Meeting, York 8-9 April, 2008.

INEA, *Le metodologie INEA per la rilevazione, trattamento ed archiviazione dei dati della*. RICA, Working Paper, 2009.

Marongiu, S., L. Cesaro, M. G. Capelli, F. Arfini and M. Donati, *Cost of production: definition and concepts*. Deliverable no. D 1.1.2, 2008.

Seroglia, G. and G. Bonati, 'Farms and databases: the Italian case, in European Farms and the growing of data'. In: *Poppe and Povellato Editors*, pp.107-116, 2002.

www.gaia.inea.it

Acknowledgments

The authors are collectively responsible for the overall framework of the paper. Antonella Bodini has written paragraph 2, while Sonia Marongiu the remaining paragraphs. Introduction and conclusions are a joint effort.

Special thanks to Dr. Antonio Giampaolo and GAIA staff for providing useful materials and suggestions.

23 Datawarehouse

Boris Tacquenier
Flemisch Government

Pacioli 17 Datawarehouse

Boris Tacquenier
Flemisch Government

Landbouw en Visserij 1

Introduction

- Division for Agricultural Policy Analysis
- Main task: Advise policy makers of the Department of Agriculture and Fisheries
  - *Unit Data collection:*
    - FADN: Landbouw-MonitoringsNetwerk (LMN)
  - *Unit Reporting:*
    - Standard reporting (yearly) and answering of ad hoc questions (small analysis)
  - *Unit Analysis:*
    - Policy analysis and studies (small projects)

Landbouw en Visserij 2

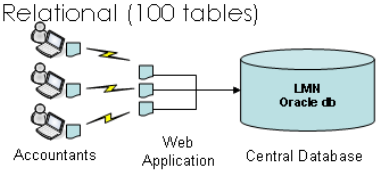
Collection of the data: decentralized

- 31 accountants in 5 provinces
- 757 farms (agriculture and horticulture)
- Accountancy software (Ceres)
- Geographical distribution of sample

Landbouw en Visserij 3

Centralized database

- WebAccess: upload of individual farm accountancy data one by one
- Central database
- Semi-transactional
- Relational (100 tables)



Landbouw en Visserij 4

Accountancy software

- One software package for all types of farm holdings
- FADN data to transmit to Europe
- More detail on:
  - *Other gainful activities:*
    - tourism, handcraft, processing of farm products, contractual work
  - *Environmental aspects:*
    - NPK of fertilizers, active components of pesticides, use of water, use of energy, nutrient flows
  - *Horticultural holdings*

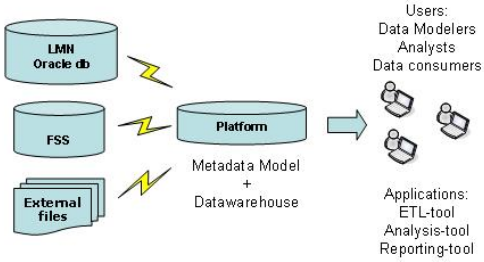
Landbouw en Visserij 5

Reporting on the data

- Centralized FADN data
  +
- External data sources
  +
- Needs reporting and analysis
  =
- Hey, why not buy a proper tool to build up a datawarehouse to feed our needs?

Landbouw en Visserij 6

Datawarehouse platform

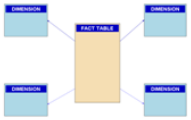


Datawarehouse definition

- Data 'collection'
  - *Subject oriented: e.g. evironmental data, farm income, etc,...*
  - *Integrated: e.g. FADN, FSS, scientifical*
  - *High quality: data cleaning needed, integrity must be preserved*
  - *Time dependant*
  - *Aggregated data*
  - *Denormalized data*
  - *Non volatile: no updates of the source data*
  - *Not needed to be actual*

The datawarehouse design

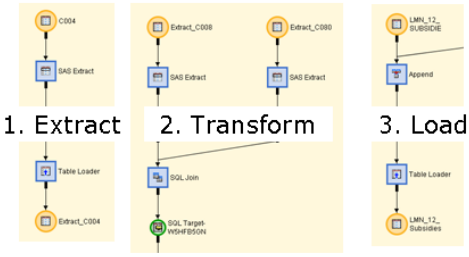
- Multidimensional modeling
  - *Star schema*
    - Fact table:
      - e.g. *Farm income*
    - Dimension tables:
      - *Time*
      - *Economic size*
      - *Geographical dimension*
      - *Typology*
  - *Relational model*
  - *Flat table*



Build the datawarehouse

- Extract:
  - *Extract from different sources*
  - *Enrichment of the data*
- Cleaning:
  - *Data quality control on the FADN*
  - *Validation rules on integrity*
- Transform
- Load:
  - *Into the datawarehouse*

ETL-tool



Use of the datawarehouse

- Reporting on tables
  - *Build reports*
  - *Ad hoc queries*
- Analytical processing on cubes
  - *Drill down*
    - E.g. analysis through the levels of a dimension
    - Standard drill up aggregation = sum
  - *Slicing*
    - E.g. farm income in 2006 for pig farming in the different regions

Example: Farm income in Flanders

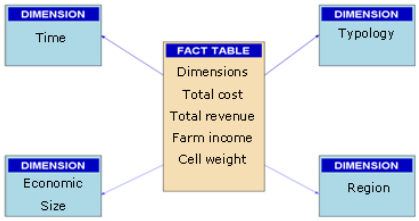
- Stratification of the sample data (FADN) and the field of observation (FSS)
  - *5 agricultural regions*
  - *3 types Economic size*
  - *18 types of holdings*
  - *Agriculture: 5*3*8 = 120 cells (base)*
  - *Horticulture: 3*10 = 30 cells (base)*

Farm income in Flanders

- Each cell of the field of observation has a number of holdings (cell weight)
- Weight coefficients for the sample are calculated
  - *Each farm holding of the sample has a coefficient = the number of farm holdings which it represents in the field of survey*

Farm income in Flanders: the cube

- ROLAP: Star schema dimensions = Stratification dimensions + time dimension



Problem: weighing of the facts

- MOLAP cube:
  - *Calculate the facts for each combination of the levels in 'summary tables'*
    - Year*Type*Size*Region (8*3*5=120 records/year)
    - + Year*Size*Region (3*5=15 records/year)
    - + Year*Type*Region (8*5=40 records/year)
    - + Year*Type*Size (8*3=24 records/year)
    - + Year*Region (5 records/year)
    - + Year*Type (8 records/year)
    - + Year*Size (3 records/year)
    - + Year (1 record/year)
  - *More storage space needed ('Fact table' expands)*
  - *Higher performance when querying then using 'flat table' with the same data*

Problem: reporting one fact

- HOLAP: Hybrid of ROLAP and MOLAP
- Extra dimension: Financial parameter
  - *Levels:*
    - 1 income
    - 2 total cost, total revenue
    - 3 structural and operational cost, revenu from animals, crops and other
    - 4...
- Facts: The dimensions and a value in euros

Benefits

- User doesn't have to understand the meaning or use of the weighing variables
- Quick analysing through slicing or drill through
- Building standard reports
- Data modelers can easily build new cubes, with for instance other typology classification

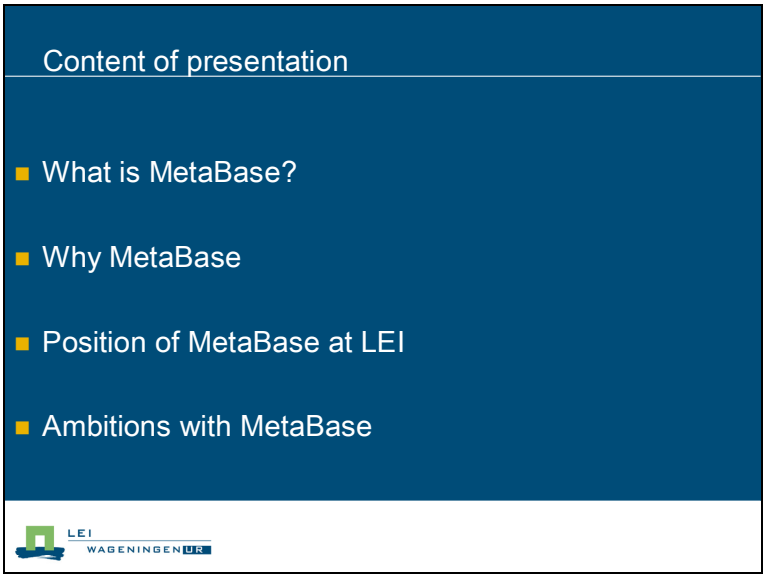
Conclusions

- Get the maximum out of your data
- Make your data user friendly
- Automate part of your processes

- = Build a datawarehouse

24 MetaBase: A new concept for data handling and use of meta information

David Verhoog
LEI Wageningen UR



What is MetaBase (1)

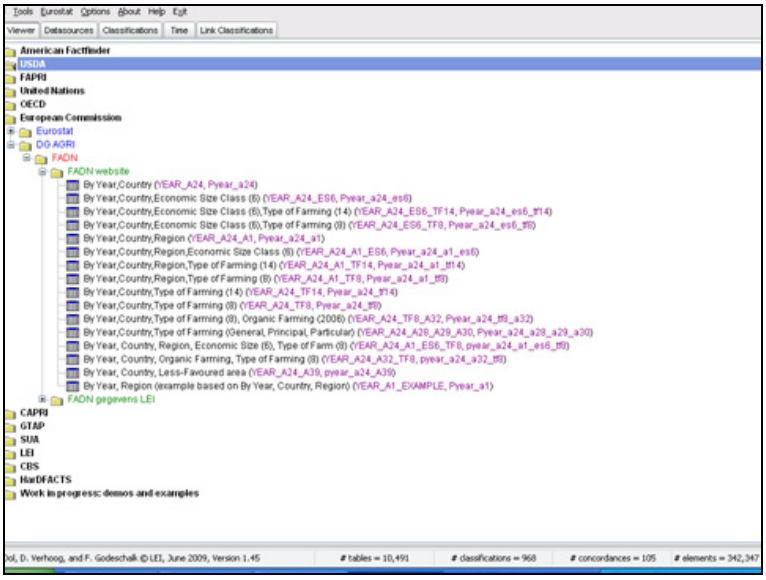
- A first attempt to address the following topics:
  - Store data from many sources: what's available and how to use it/get it in a way we can use
  - combining data sources to new ones
  - checking data and filling gaps, making projections (scientific database vs. statistical office database)
  - storing knowledge on data
  - making data usage for models and research easier
  - create a system that can compare model results from different models

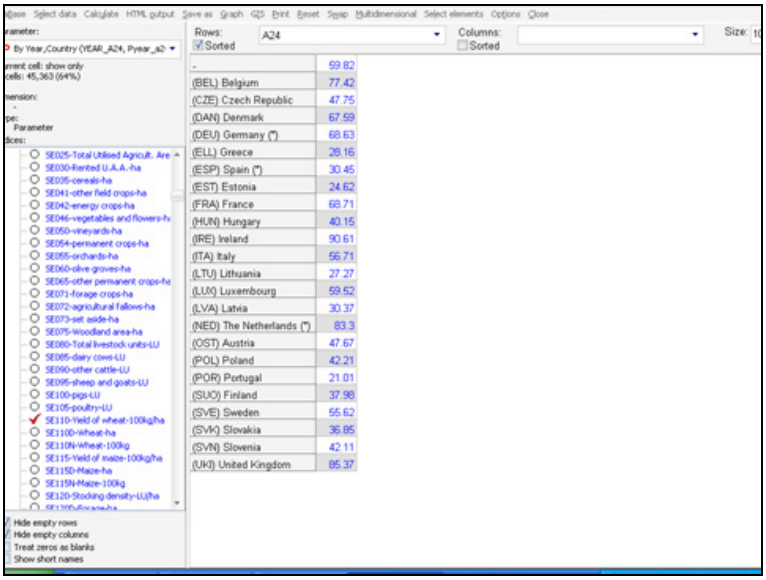
What is MetaBase (2)

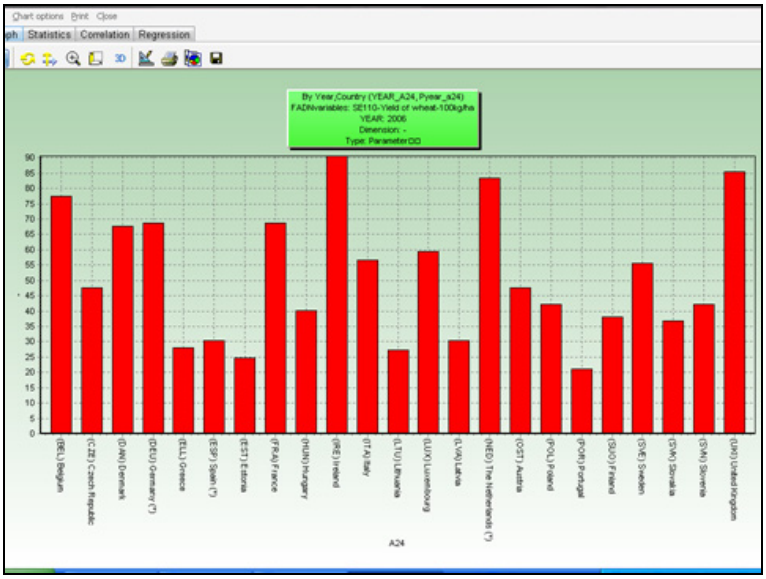
- Special characteristics of MetaBase:
  - Doesn't contain the actual data, but just a path to the data
  - Is much smaller than regular databases
  - Data locally stored/converted in gdx (compressed zipped binary)
- MetaBase contains:
  - Classifications (e.g. products, countries)
  - Concordances (e.g. link between different product classifications, help for merging/combining data from different sources)
  - Meta information (e.g. source, dimension)
  - Special software: DataExplorer GUI (multi-dimensional data viewer, GIS, graphs, statistics, export to excel, etc.)

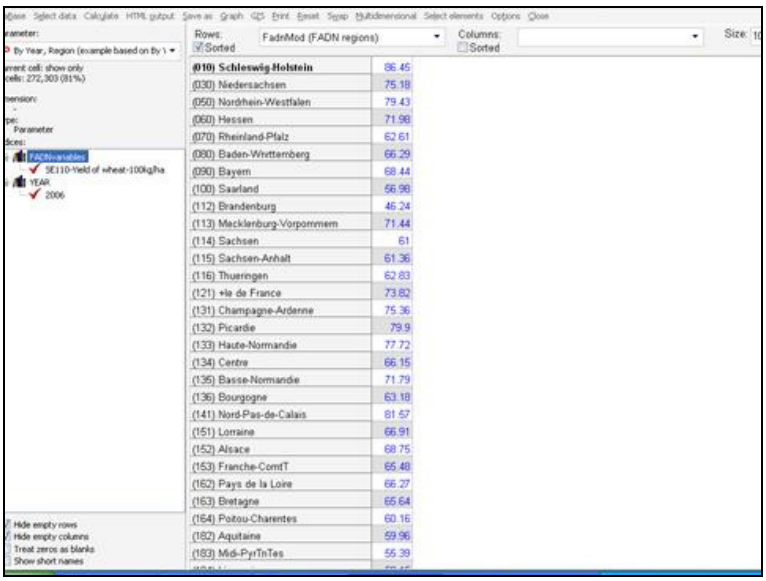
Why MetaBase?

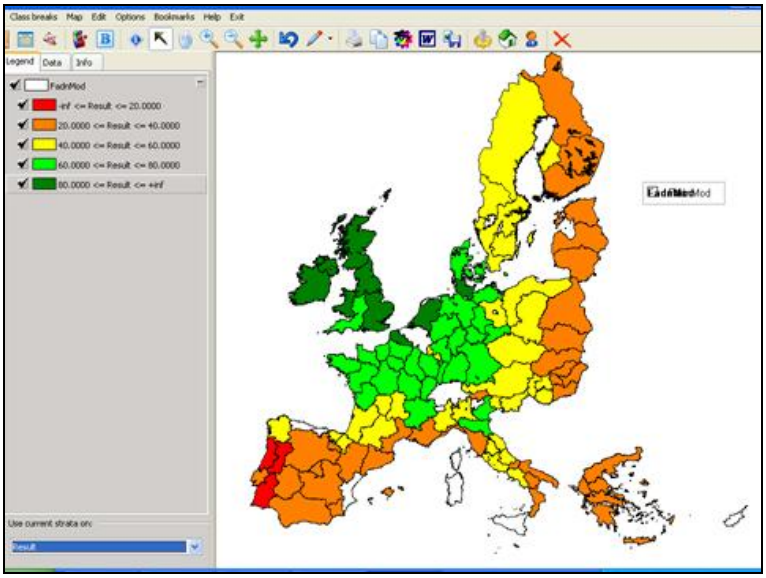
- Data accessibility (easier, quicker)
- One unique interface for all data
- Additional functionalities:
  - Search function, more dimensional tables, graphs, GIS
  - Model results (scenario's) analyzing
- Reusing data (avoiding double work):
  - Aggregates available in the database
  - Connecting data with the help of classifications
  - Documenting procedures and data (Metadata)
  - Sharing and embedding your on datasets

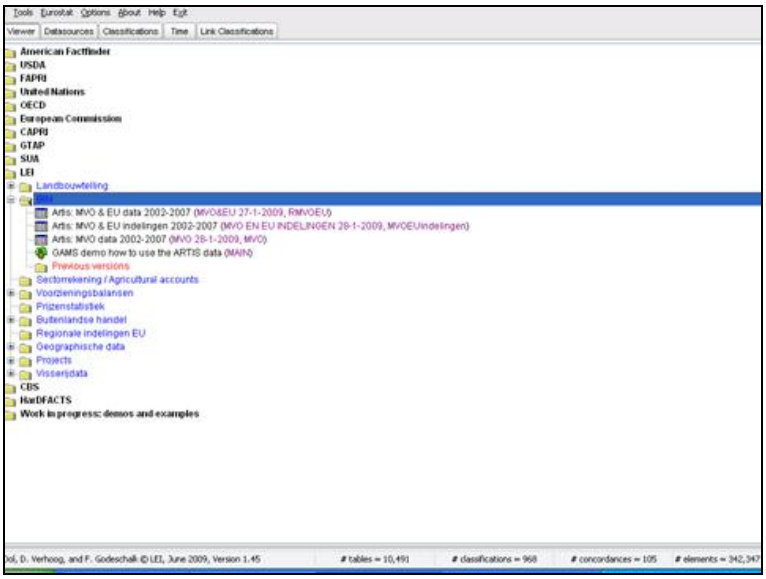

Tools Eurostat Options About Help Exit
Viewer Datasources Classifications Time Link Classifications
American Factfinder
USDA
FAPRI
United Nations
OECD
European Commission
Eurostat
DG AGRI
FADN
FADN website
By Year,Country (YEAR_A24, Pyear_a24)
By Year,Country,Economic Size Class (6) (YEAR_A24_ES6, Pyear_a24_es6)
By Year,Country,Economic Size Class (6),Type of Farming (14) (YEAR_A24_ES6_TF14, Pyear_a24_es6_tf14)
By Year,Country,Economic Size Class (6),Type of Farming (8) (YEAR_A24_ES6_TF8, Pyear_a24_es6_tf8)
By Year,Country,Region (YEAR_A24_A1, Pyear_a24_a1)
By Year,Country,Region,Economic Size Class (6) (YEAR_A24_A1_ES6, Pyear_a24_a1_es6)
By Year,Country,Region,Type of Farming (14) (YEAR_A24_A1_TF14, Pyear_a24_a1_tf14)
By Year,Country,Region,Type of Farming (8) (YEAR_A24_A1_TF8, Pyear_a24_a1_tf8)
By Year,Country,Type of Farming (14) (YEAR_A24_TF14, Pyear_a24_tf14)
By Year,Country,Type of Farming (8) (YEAR_A24_TF8, Pyear_a24_tf8)
By Year,Country,Type of Farming (8), Organic Farming (2006) (YEAR_A24_TF8_A32, Pyear_a24_tf8_a32)
By Year,Country,Type of Farming (General, Principal, Particular) (YEAR_A24_A28_A29_A30, Pyear_a24_a28_a29_a30)
By Year, Country, Region, Economic Size (6), Type of Farm (8) (YEAR_A24_A1_ES6_TF8, pyear_a24_a1_es6_tf8)
By Year, Country, Organic Farming, Type of Farming (8) (YEAR_A24_A32_TF8, pyear_a24_a32_tf8)
By Year, Country, Less-Favoured area (YEAR_A24_A39, pyear_a24_A39)
By Year, Region (example based on By Year, Country, Region) (YEAR_A1_EXAMPLE, Pyear_a1)
FADN gegevens LEI
CAPRI
GTAP
SUA
LEI
CBS
HarDFACTS
Work in progress: demos and examples
tables = 10,491
classifications = 968
concordances = 105
elements = 342,347


Rows:
A24
Sorted
Columns:
Sorted
(BEL) Belgium 77.42
(CZE) Czech Republic 47.75
(DAN) Denmark 67.59
(DEU) Germany (*) 68.63
(ELL) Greece 28.16
(ESP) Spain (*) 30.45
(EST) Estonia 24.62
(FRA) France 68.71
(HUN) Hungary 40.15
(IRE) Ireland 90.61
(ITA) Italy 56.71
(LTU) Lithuania 27.27
(LUX) Luxembourg 59.52
(LVA) Latvia 30.37
(NED) The Netherlands (*) 83.3
(OST) Austria 47.67
(POL) Poland 42.21
(POR) Portugal 21.01
(SUO) Finland 37.98
(SVE) Sweden 55.62
(SVK) Slovakia 36.85
(SVN) Slovenia 42.11
(UKI) United Kingdom 85.37
Hide empty rows
Hide empty columns
Treat zeros as blanks
Show short names


Statistics Correlation Regression
By Year,Country (YEAR_A24, Pyear_a24)
FADNvariables: SE110-Yield of wheat-100kg/ha
YEAR: 2006
Dimension: -
Type: ParameterDO
A24


Rows:
FadnMod (FADN regions)
Columns:
Sorted
Size:
(010) Schleswig-Holstein 86.45
(030) Niedersachsen 75.18
(050) Nordrhein-Westfalen 79.43
(060) Hessen 71.98
(070) Rheinland-Pfalz 62.61
(080) Baden-Wrttemberg 66.29
(090) Bayern 68.44
(100) Saarland 66.98
(112) Brandenburg 46.24
(113) Mecklenburg-Vorpommern 71.44
(114) Sachsen 61
(115) Sachsen-Anhalt 61.36
(116) Thueringen 62.83
(121) +le de France 73.82
(131) Champagne-Ardenne 75.36
(132) Picardie 79.9
(133) Haute-Normandie 77.72
(134) Centre 66.15
(135) Basse-Normandie 71.79
(136) Bourgogne 63.18
(141) Nord-Pas-de-Calais 81.57
(151) Lorraine 66.91
(152) Alsace 68.75
(153) Franche-ComtT 65.48
(162) Pays de la Loire 66.27
(163) Bretagne 65.64
(164) Poitou-Charentes 60.16
(182) Aquitaine 59.96
(183) Midi-PyrTnTes 55.39
Hide empty rows
Hide empty columns
Treat zeros as blanks
Show short names

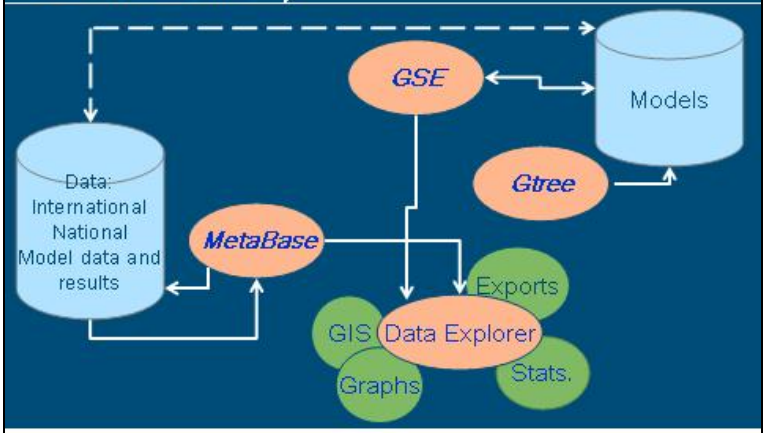

Legend
Data
Info
FadnMod
-inf <= Result <= 20.0000
20.0000 <= Result <= 40.0000
40.0000 <= Result <= 60.0000
60.0000 <= Result <= 80.0000
80.0000 <= Result <= +inf
Use current strata on:
Result


Viewer
Datasources
Classifications
Time
Link Classifications
American Factfinder
USDA
FAPRI
United Nations
OECD
European Commission
CAPRI
GTAP
SUA
LEI
Landbouwtelling
Arts: MVO & EU data 2002-2007 (MVO&EU 27-1-2009, RMVOEU)
Arts: MVO & EU indelingen 2002-2007 (MVO EN EU INDELINGEN 29-1-2009, MVOEUindelingen)
Arts: MVO data 2002-2007 (MVO 28-1-2009, MVO)
GAMS demo how to use the ARTIS data (MAIN)
Previous versions
Sectorrekening / Agricultural accounts
Voorzieningsbalansen
Prijzenstatistiek
Buitenlandse handel
Regionale indelingen EU
Geographische data
Projects
Visserijdata
CBS
HarDFACTS
Work in progress: demos and examples

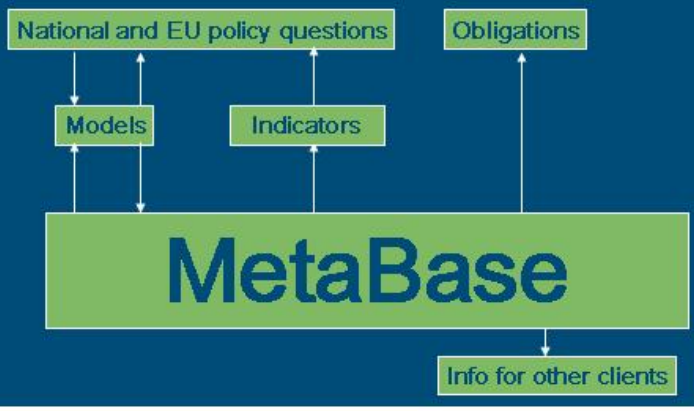
Position of MetaBase at LEI

- Supporting the ISO goal for data (General)
- Supporting modeling and research
  - International databases (Eurostat, FAO, OECD, FADN)
  - National databases
    - Agricultural Senses from 1975 onward
    - Selected information from Dutch FADN
  - Model databases and model results (comparing scenarios from own and other models)
  - Databases/spreadsheets of specific projects

LEI Software family



Positioning of MetaBase in research



Ambitions with MetaBase

- One unique source of information for research at LEI:
  - ISO for data (adding metadata to the data, version control)
  - No discussion on the data used, pure discussion on results
  - Better use of experts (data, software, models, statistics)
  - Statistical analysis (outlier detection, missing values)
- More broader use of the MetaBase concept:
  - Distribution in the Commission (research for JRC-IPTS)
  - Development of web based MetaBase
- Making the data in MetaBase complete and consistent:
  - Creating own classifications for linking and comparing data from different sources
  - Own procedures (e.g. in GAMS reading gdx)

LEI WAGENINGEN UR

Thank you for your attention!

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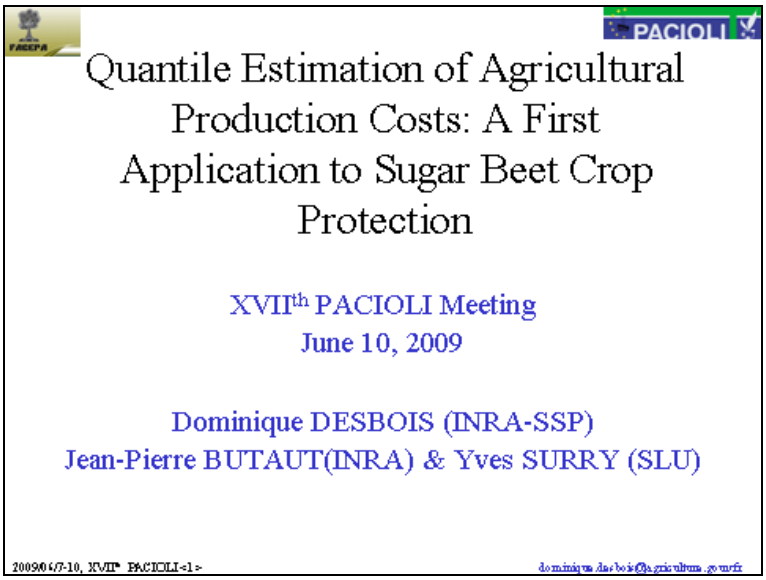
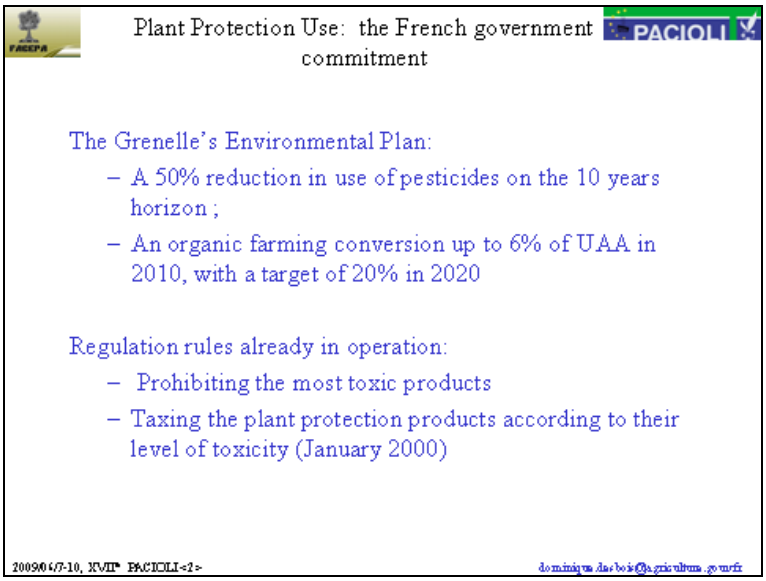
25 Quantile Estimation of Agricultural Production Costs: A First Application to Sugar Beet Crop Protection

Dominique Desbois (INRA-SSP), Jean-Pierre Butaut (INRA) and Yves Surry (SLU)





Towards cropping systems sparing in pesticides ?

- Reducing pesticides, the three ways:
  - Extending the crop rotation practices (cereals/oil crops/protein crops)
  - Eliminating inefficiencies in conventional agriculture
  - Enhancing scientific knowledge and technical innovation in agronomics

A better understanding of the farmer behaviour & rationality in plant protection is needed in order to design more efficient incentives

dominique.desbois@agriculture.gouv.fr

The plant protection expenses reveal the intrinsic heterogeneity of farmer behaviour

Analysis of Variance					
Dep. Var :	Plant protection cost				
Source	Type III Sum of Squares	DoF	Mean Squares	F	Prob>F
Model	208788000	43	4739255,81	3,914	0,0000
Constant	18503116	1	18503116,00	15,281	0,0001
NBRT	40295966	1	40295966,00	33,278	0,0000
OTEXE	19700184	2	9850092,00	8,135	0,0004
REGIO	70495160	18	3916397,78	3,234	0,0000
OTEXE*REGIO	73346896	22	3333949,82	2,753	0,0001
Error	251865846	208	1210893,49		
Total	965607746	252			
Corrected total	455653847	251			
RSquare	44,7%				
Adjusted RSquare	33,3%				

Plant protection cost variability can be partially explained by the number of treatments & the combination of regional and type of farming factors with interaction but more information is needed in order to build a better proxy of the plant protection behaviour

Data : French FADN 2006 & Cropping Practices Survey 2006

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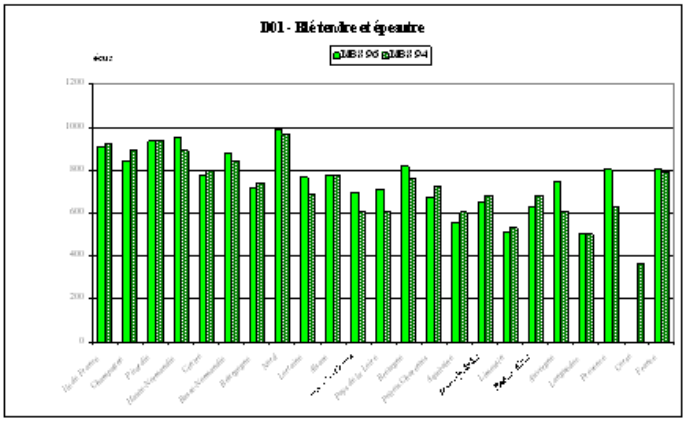
Input Costs can be allocated to each product by econometric estimation at the NUTS II level on the basis of FADNs: French average gross margin estimates for soft wheat



However, even at the NUTS II level, the variable costs are very heterogeneous among farmers from the same region

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Input Cost Estimation in General Cropping: OLS

Homoscedasticity assumption (White test)

$$x_{if} = \sum_k \beta_{ik} y_{kf} + u_{if} \qquad where \quad u_{if} \overset{iid}{\equiv} N(0, \sigma_i)$$

Ho	Homscedasticity: the residual variance is equal for each farm holding			
	Sum of Squares	Chi-Square	Test decision	
	N*R**2	95% Quantile		
Fertlizers	260.3	79.1	Heteroscedasticity	
Plant Protection	460.0	79.1	Heteroscedasticity	
Seeds	474.3	101.9	Heteroscedasticity	
Fuels	190.1	79.1	Heteroscedasticity	
Work per third	142.4	31.4	Heteroscedasticity	

Even in the most homogeneous French counties (NUTS III level) such as Meuse, classical econometric models of cost allocation suffer from a strong heterogeneity in residuals

Source : Meuse Accounting Database (2003)

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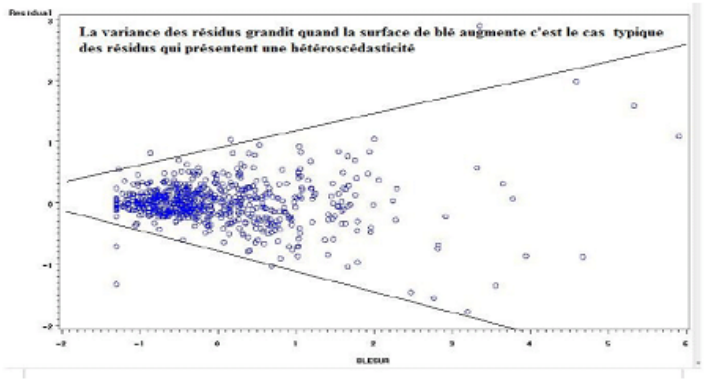
Cost Estimation in General Cropping: OLS : Graphical evidence for Heteroscedasticity



The Residual variance increases with the soft wheat areas

Source : Meuse Accounting Database (2003)

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Cost Estimation in General Cropping:

the Quantile Regression Method provides an intrinsic treatment of heteroscedasticity by solving the following minimisation problem for each quantile Tau according to the MAD (Mean Absolute Deviation) criterion

$$\min_{\beta \in R^p} \Big[\sum_{i \in \{i: y_i \geq x_i'\beta\}} \tau |y_i - x_i'\beta| + \sum_{i \in \{i: y_i < x_i'\beta\}} (1-\tau) |y_i - x_i'\beta| \Big]$$

A numerical solution is provided by the simplex algorithm solving this linear program.

This algorithm is implemented in the experimental SAS procedure named QUANTREG.

An empirical standard error of estimates is provided by a re-sampling procedure (bootstrap).

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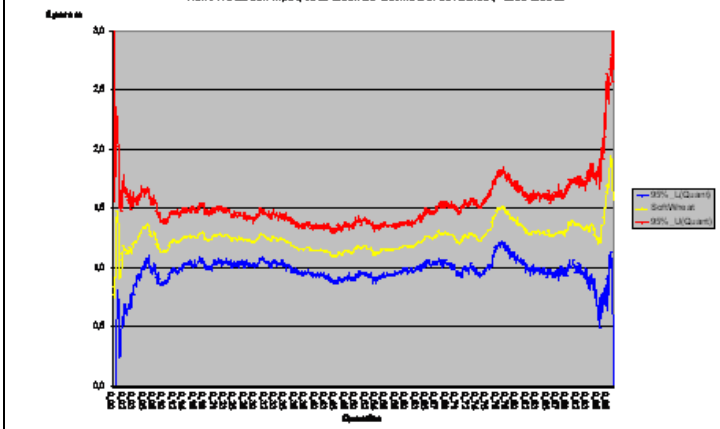
Area-based Quantile Estimates: the procedure provides estimates of plant protection unit costs per are of soft wheat, in Meuse with confidence interval for each percentile of plant protection input



On the basis of those estimates, the levels of plant protection unit cost per are among soft wheat Meuse producers seems to be the same, except for the highest quantiles

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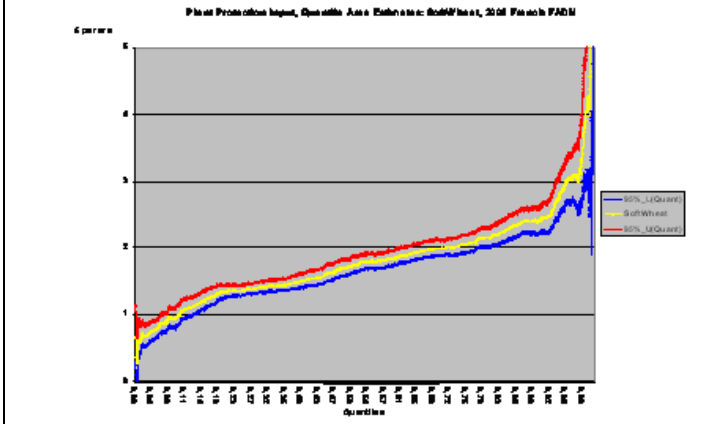
Area-based Quantile Estimates: soft wheat, France



Plant protection cost among soft wheat French general cropping producers: note that the level of estimates seems to increase along the quantile axis

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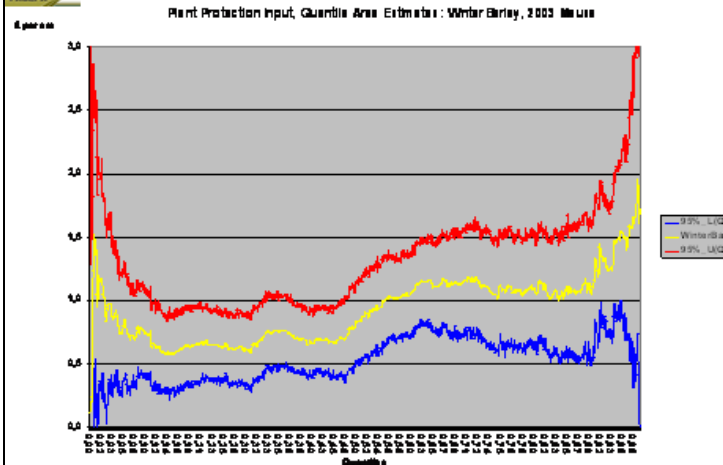
Area-based Quantile Estimates: winter barley, Meuse



The variability of estimates is greater than in the case of soft wheat and there is graphical evidence for two distinct levels of plant protection costs

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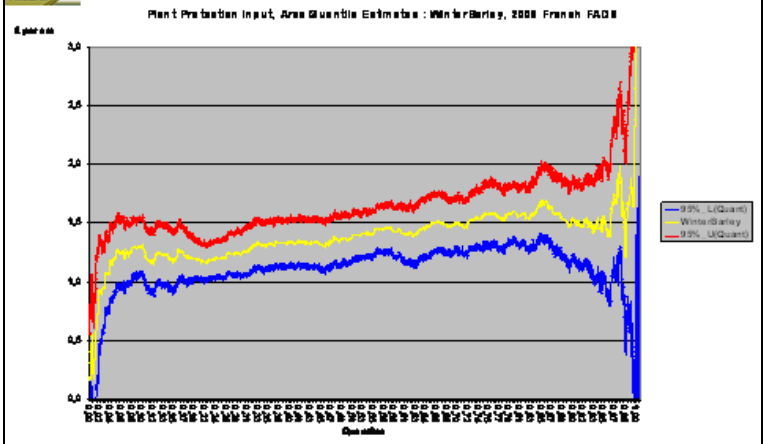
Area-based Quantile Estimates: winter barley, France



The level and variability of plant protection costs seems to increase (similar to soft wheat) with a slope change for extreme quantiles

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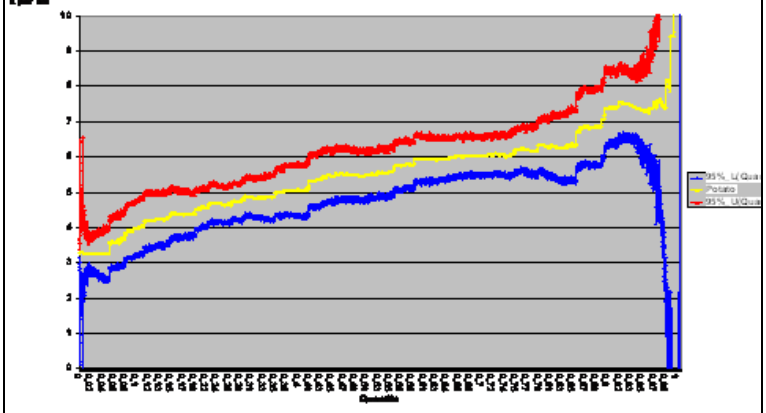
Area-based Quantile Estimates: Potato, France



The level is much more higher than for the cereals, consistently with technical sources of estimates. Level and variance of the estimates are not constant but regional estimates can be better because potato producers are mainly located in the North of France

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Area-based Quantile Estimates: correlation with observed costs, Meuse

	ESTIMATED	L1(Q3)	L1(Q2)	L1(Q1)
OBSERVED	wheatPhyto	0.74913	0.89040	0.88812
	Prob	<.0001	<.0001	<.0001
	wbarleyPhyto	0.82078	0.88770	0.87431
	Prob	<.0001	<.0001	<.0001
	sbarleyPhyto	0.92734	0.93733	0.90436
	Prob	<.0001	<.0001	<.0001
	ComPhyto	0.94573	0.93489	0.61310
	Prob	<.0001	<.0001	<.0001

The levels of correlation between quantile estimates and observed costs are quite good, on the basis of the Meuse Accounting Database. Other regional analyses are necessary for assessment purpose.

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Area-based Quantile Estimates: main general crops, France

Plant Protection Input Estimates 2006 French FADN (general cropping)

Areas	95% LI(Q1)	Q1	95% UI(Q1)	95% LI(Q2)	Q2	95% UI(Q2)	95% LI(Q3)	Q3	95% UI(Q3)	95% LI(OLS)	OLS	95% UI(OLS)
swheat	1,258	1,364	1,470	1,580	1,708	1,836	1,089	1,753	2,201	1,512	1,723	1,935
hwheat	0,569	0,804	1,040	1,136	1,380	1,624	1,370	1,034	2,136	1,125	1,385	1,449
sbarl	0,093	0,409	0,725	0,547	0,909	1,271	0,357	1,557	1,311	0,485	0,733	0,981
wbarl	1,021	1,194	1,367	1,122	1,360	1,599	1,256	1,148	1,897	1,131	1,333	1,536
maize	0,686	0,750	0,814	0,798	0,890	0,982	1,043	2,175	1,236	0,859	0,940	1,041
other	-0,360	0,224	0,799	0,705	1,161	1,617	1,514	6,079	2,766	0,932	1,395	1,615
potato	4,039	4,651	5,262	4,634	5,465	6,296	5,338	2,958	6,770	5,115	5,432	5,724
sbeet	2,087	2,534	3,021	2,231	2,723	3,216	2,405	1,805	3,499	2,102	2,545	2,937
peas	0,924	1,344	1,763	0,605	1,110	1,615	1,228	0,539	2,302	1,193	1,322	1,914
sunflow	0,491	0,729	0,967	0,331	0,555	0,779	0,244	1,494	0,834	0,308	0,553	0,797
rape	1,190	1,411	1,632	1,232	1,491	1,749	1,200	0,835	1,779	1,316	1,511	1,705
oil crop	-0,347	-0,168	0,010	-0,352	-0,060	0,232	-0,179	2,248	0,249	-0,288	-0,107	0,074
ohcrop	0,535	0,857	1,179	0,391	1,365	2,339	0,976	0,353	3,520	1,207	1,604	2,002
fodder crop	0,088	0,197	0,295	0,150	0,278	0,405	0,221	0,000	0,536	0,185	0,302	0,412

not significantly different from zero

The levels of Q2 estimates are quite coherent with those of OLS estimates and negative coefficients occurring for marginal crops (see other oil crops) are not significantly different from zero.

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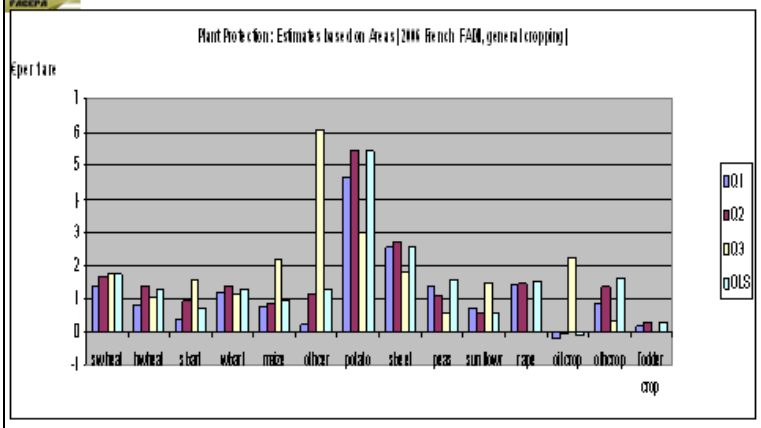
Area-based Quantile Estimates: main general crops, France



The levels of Q2 estimates are quite coherent with those of OLS estimates

The negative coefficients are not significantly different from zero : see other oil crops

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Product-based Quantile Estimates: main general crops, France

Plant Protection Input Estimates 2006 French FADN (general cropping)

Products	95% LI(Q1)	Q1	95% UI(Q1)	95% LI(Q2)	Q2	95% UI(Q2)	95% LI(Q3)	Q3	95% UI(Q3)	95% LI(OLS)	OLS	95% UI(OLS)
swheat	0,177	0,177	0,193	0,228	0,241	0,255	0,200	0,251	0,302	0,213	0,239	0,265
hwheat	0,128	0,128	0,155	0,144	0,175	0,206	0,208	0,244	0,282	0,159	0,183	0,205
sbarl	0,111	0,111	0,156	0,089	0,134	0,179	0,079	0,139	0,199	0,085	0,104	0,143
wbarl	0,202	0,202	0,248	0,211	0,252	0,293	0,213	0,265	0,318	0,208	0,232	0,270
maize	0,049	0,049	0,057	0,061	0,069	0,078	0,051	0,054	0,116	0,060	0,062	0,073
other	0,084	0,084	0,110	0,072	0,111	0,150	0,113	0,176	0,230	0,089	0,120	0,140
potato	0,050	0,050	0,065	0,048	0,062	0,076	0,060	0,054	0,120	0,060	0,063	0,068
sbeet	0,095	0,095	0,110	0,059	0,079	0,100	0,045	0,075	0,105	0,063	0,089	0,115
peas	0,032	0,032	0,136	-0,046	0,038	0,122	-0,053	0,051	0,234	-0,016	0,026	0,123
sunflour	0,174	0,174	0,228	0,111	0,166	0,219	0,085	0,145	0,208	0,098	0,149	0,202
rape	0,172	0,172	0,209	0,117	0,154	0,192	0,168	0,208	0,248	0,163	0,193	0,223
oil crop	-0,001	-0,001	0,143	-0,083	0,002	0,087	-0,176	0,028	0,232	-0,118	0,002	0,074
ohcrop	0,065	0,065	0,091	0,044	0,071	0,097	0,077	0,095	0,130	0,052	0,081	0,109

not significantly different from zero

The levels of Q2 estimates are quite consistent with those of OLS estimates

The negative coefficients are not significantly different from zero : see peas & other oil crops

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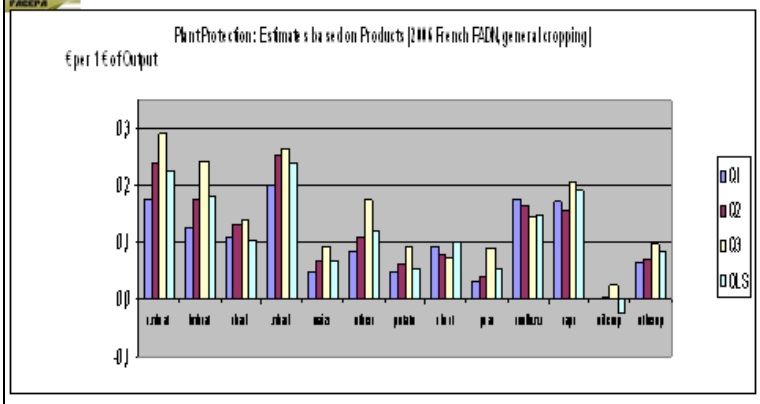
Product-based Quantile Estimates: main general crops, France



The levels of Q2 estimates are quite coherent with those of OLS estimates

Some coefficients are not significantly different from zero : see other oil crops.

It is necessary to split oil crops between rape and sunflower

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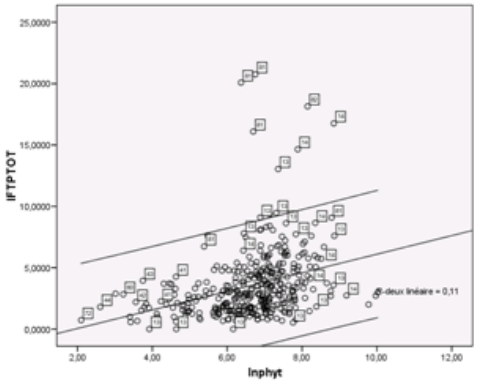
The TFI (Treatment Frequency Index): the heteroscedastic link with the plant protection input costs



Data : French FADN 2006 & Cropping Practices Survey 2006, displaying Types of Farming

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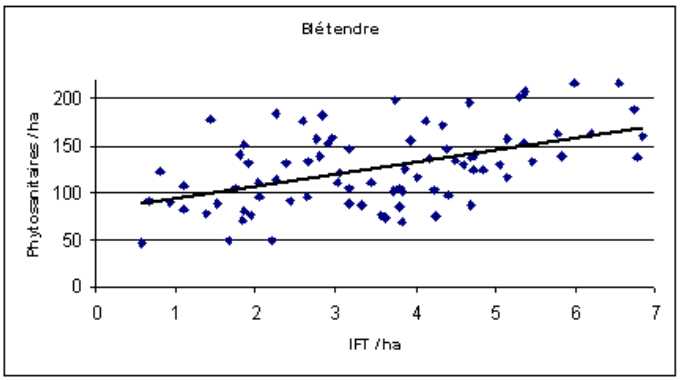
TFI : ...but a better linear relationship between plant protection costs & the TFI per ha for soft wheat



Source : Jean-Pierre Butault (French FADN Workshop 2009), French FADN 2006 & Cropping Practices Survey 2006

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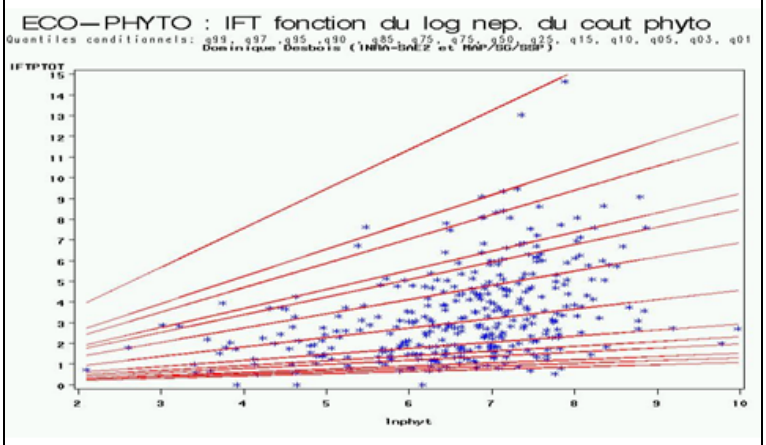
The TFI as a function of the plant protection cost: fitting the intrinsic heterogeneity of farm holdings with regards to the plant protection input costs



Data : French FADN 2006 & Cropping Practices Survey 2006

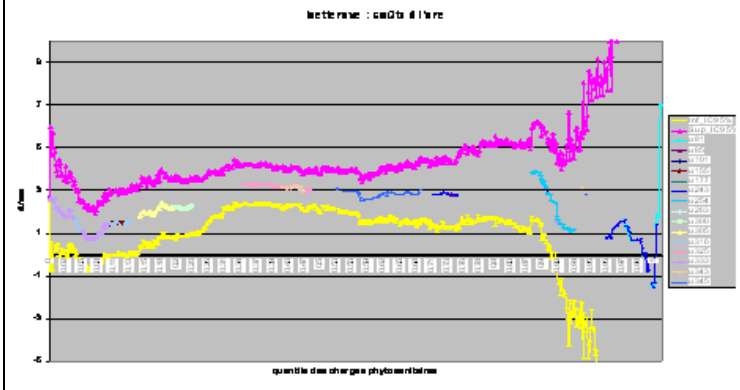
TFI: ...allowing to derive a « value » of the TFI point for each commodity in order to design incentive measures in favour of pesticide reduction

AGR.AREA	TFI	PPcost/ha	FTI value
SoftWheat	4,0	133	33
HardWheat	3,0	112	37
Barley	3,1	100	33
Corn	2,0	88	44
Potato	16,9	489	29
SugarBeet	4,5	251	56
Peas	4,6	216	47
SunFlower	2,3	87	38
Rape	6,2	203	33

Hence, ... the need for cost allocation estimates by products that can be refined getting more information about the farmer behaviour and the production system used in order to proceed simulations based on quantiles estimates of protection plant costs.

Source : Jean-Pierre Butault, French FADN Workshop 2009,French FADN 2006 & Cropping Practices Survey 2006

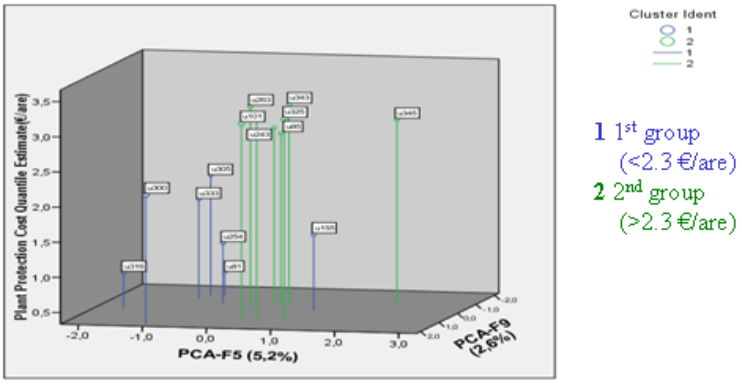
Sugar Beet : ...pesticide costs per are from Cropping Practice Survey



Pesticide costs per are along with quantiles of pesticide input value for 15 sugar beet plots issued from the Cropping Practice Survey.

Source : quantile regression, French FADN 2006 & Cropping Practices Survey 2006

Sugar Beet : … 2 groups of Plots



1 1st group (<2.3 €/are)
2 2nd group (>2.3 €/are)

The projection of cluster analysis results along the 5th and 9th PCA-components shows that the differences between the 2 groups are correlated with the Treatment Frequency Indexes and some other crop surfaces and products (maize, potato)

Source : PCA, French FADN 2006 & Cropping Practices Survey 2006

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Sugar Beet : … The meta-model of the 15 Plot Models

Quantile	Soft Wheat	Hard Wheat	Spring Barley	Winter Barley	Maize	Other Cereals	Potato	Sugar Beet	Peas	Sun Flower	Rape	Other Oil Crops	Other Crops	Fodder
0,03	0,54		0,55				4,94	1,74	2,86		1,75			0,11
0,06	0,97		0,71	1,34	0,40			0,84	2,33		1,06			
0,11	1,09	0,23	0,30					1,41	1,51	1,19	1,20			
0,15	1,16		0,18				5,59	2,03			1,52			0,14
0,21	1,40		0,61				5,05	2,17			1,24			
0,39	1,39		0,98	1,08				3,20						0,43
0,43	1,47		0,93	1,19				3,20	0,17		1,69		0,39	0,43
0,43	1,47		0,93	1,19				3,20			1,69			0,43
0,43	1,47			1,19			7,05	3,20				-0,07		
0,56	1,64			1,42				2,93	-0,19		1,72		1,79	0,50
0,73	1,75							2,82			2,46			
0,74	1,74			1,10		0,64		2,79			2,58		2,29	0,42
0,90	2,34		1,63					3,13					2,83	0,40
0,94	2,93		2,40	1,18	1,40			1,19			1,37			0,32
0,98	2,91					1,78		0,66	5,14					1,33

Each of those models can be used for the farm holdings that show a similar crop allocation of its agricultural area used. Negative coefficients will be eliminated by a constrained estimation.

Source : PCA, French FADN 2006 & Cropping Practices Survey 2006

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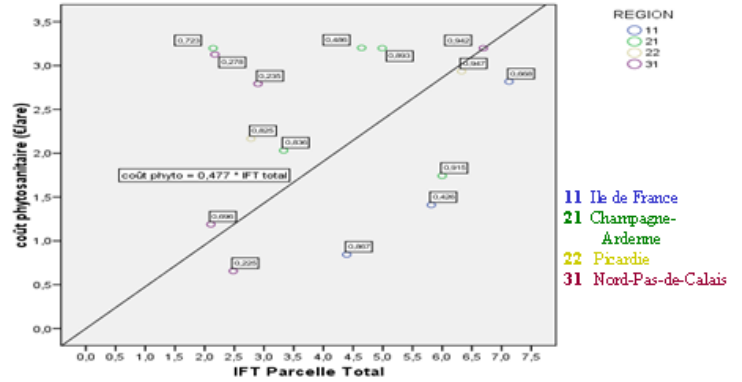
Sugar Beet : … Pesticide Costs & the Total Frequency Treatment Index



11 Ile de France
21 Champagne-Ardenne
22 Picardie
31 Nord-Pas-de-Calais

The central estimate values the total TFI point at 48 € per ha. Alternative models can be used by region depending on the quantile of pesticide input value and the crop allocation of agricultural area used

Source : TFI Projection, French FADN 2006 & Cropping Practices Survey 2006

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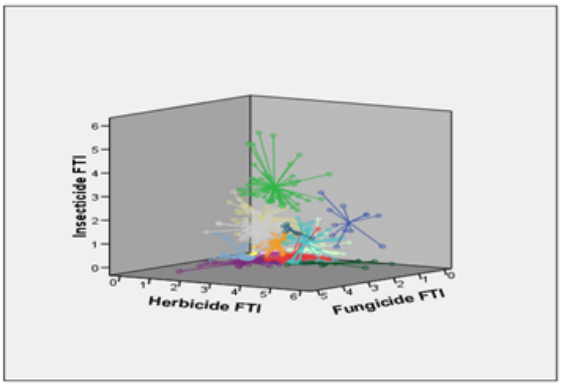
Sugar Beet : ... Crop Practice Survey & the FADN



This 3D plot displays the 3-Component FTI Typology of the sugar beet plots based on the K-Means clustering algorithm with the 15 Cropping Practice Survey & FADN plots as barycenters.

Source : TFI Projection, French FADN 2006 & Cropping Practices Survey 2006

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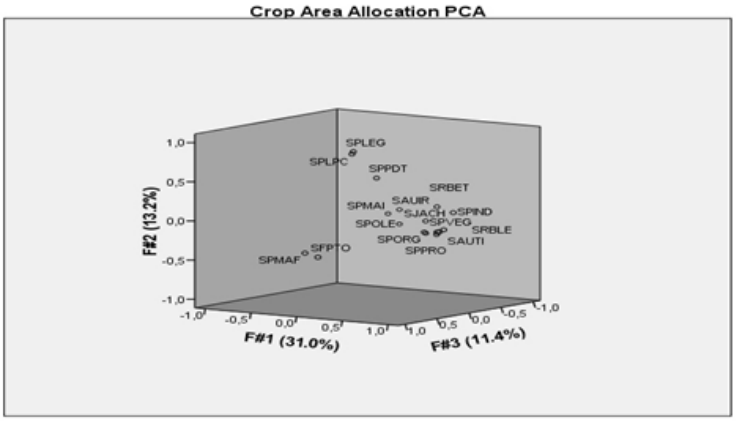
Sugar Beet : ... Crop Practice Survey & the FADN



This 3D plot displays the main dimensions of a Principal Component Analysis (PCA) based on the crop allocation of the sugar beet farm holdings belonging to the French FADN (2006)

Source : TFI Projection, French FADN 2006 & Cropping Practices Survey 2006

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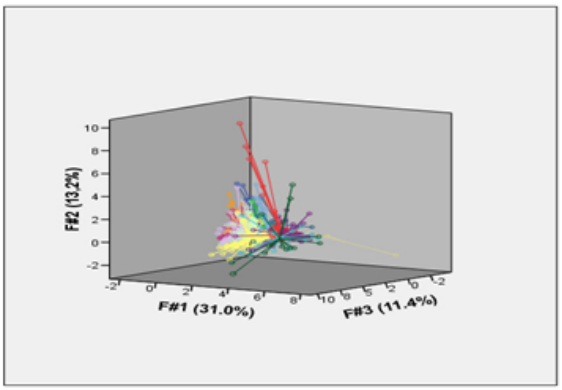
Sugar Beet : ... Crop Practice Survey & the FADN



This 3D plot displays the Crop Area Allocation Typology of the sugar beet farm holdings based on the K-Means clustering algorithm with the 15 Cropping Practice Survey & FADN farms as barycenters.

Source : TFI Projection, French FADN 2006 & Cropping Practices Survey 2006

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Sugar Beet : ...FTI unit value for the FADN population concerned by each model

				FTI unit value €/ha			
Model	plot id	phyto quantile	%in Population	Total FTI	Herbicide FTI	Insecticide FTI	Fungicide FTI
1	u243	0,668	4,6%	39,53	22,89	6,66	9,98
2	u155	0,426	3,4%	24,24	8,51	12,40	3,33
3	u316	0,867	0,3%	19,19	6,52	5,68	6,99
4	u325	0,893	3,7%	64,08	25,21	0,00	38,87
5	u263	0,723	7,2%	149,22	69,64	0,00	79,58
6	u305	0,836	5,3%	60,97	42,66	0,00	18,31
7	u333	0,915	1,5%	29,02	16,77	4,03	8,22
8	u177	0,486	9,1%	68,94	24,40	17,82	26,73
9	u300	0,825	5,3%	77,91	21,86	0,00	56,06
10	u345	0,947	1,3%	46,37	30,25	0,00	16,12
11	u85	0,235	27,2%	96,34	54,35	8,75	33,24
12	u101	0,278	13,8%	143,91	77,66	0,00	66,25
13	u343	0,942	1,3%	47,78	25,89	7,61	14,28
14	u254	0,696	5,1%	56,47	56,47	0,00	0,00
15	u81	0,225	10,9%	26,44	16,09	0,00	10,35

This table displays the FTI unit value for the total FTI index and each of its components for the FADN population concerned by each of the 15 Quantile Estimation Models.

Source : TFI Projection, French FADN 2006 & Cropping Practices Survey 2006

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Research Planning in Quantile Estimation of Agricultural Production Cost

- Using other regional farm accounting database to extend validation process for the quantile estimates (the French general cropping probe but also from other EU countries).
- Using the product output values instead of the product cropped area to estimate the quantile cost allocation coefficients.
- Using other criteria from the Cropping Practices Survey in order to analyse the differences among the quantile models we proposed
- Extending the analysis to other case studies: work is in progress for fertilizers, seeds, energy, but there are other applications encompassed such as cattle feeding & land cost.

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References

- Chapelle-Barry Catherine (2008) « Enquête sur les pratiques culturales en 2006 », *Agreste Chiffres et Données*, Série Agriculture n°200, août, 137 p.
- Butault, Jean-Pierre. & alii (2009), *Eco-Phyto R&D (Volet 1) Tome VI : Analyse ex-ante de scénarios de rupture dans l'utilisation des pesticides*, mai, INRA, 73 p. (to be published).
- Koenker, Roger et Bassett, Gilbert (1978)."Regression Quantiles.", *Econometrica*. January, 46:1, pp. 33–50.
- Koenker, Roger et Hallock, F., Kevin (2001)."Quantile Regression", Journal of Economic Perspectives, Fall, Vol. 15:4, pp. 143–156.
- Koenker, Roger (2005). *Quantile Regression*, Series: Econometric Society Monographs (n°38), Cambridge University Press, 366 p.
- Paillotin Guy (2008) Chantier 15 « agriculture écologique et productive ». *Rapport final du Président du Comité opérationnel « Ecophyto 2018 »*, Grenelle de l'Environnement, MEDAD, 5 juin 2008.

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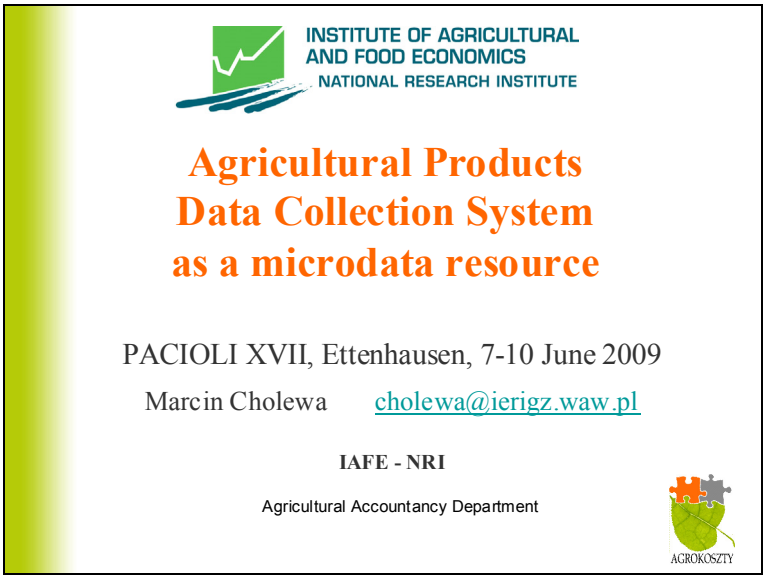
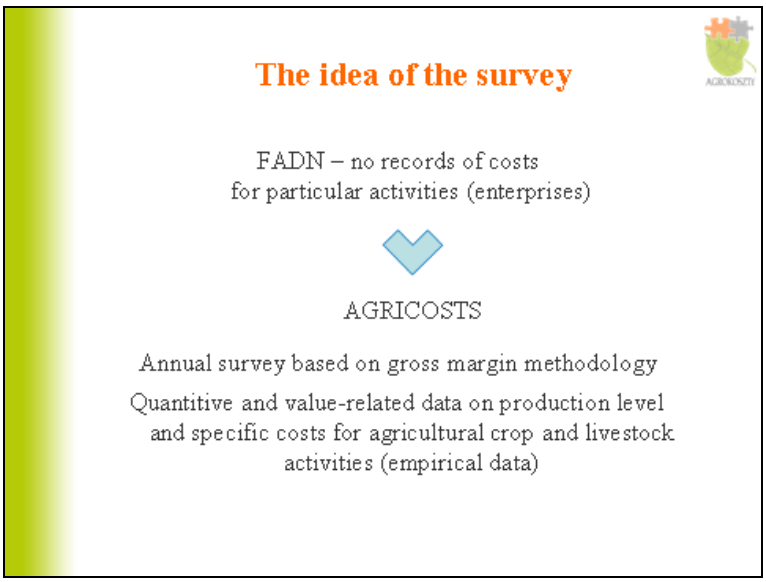
26 Agricultural Products Data Collection System as a microdata resource

Marcin Cholewa
IAFE- NRI





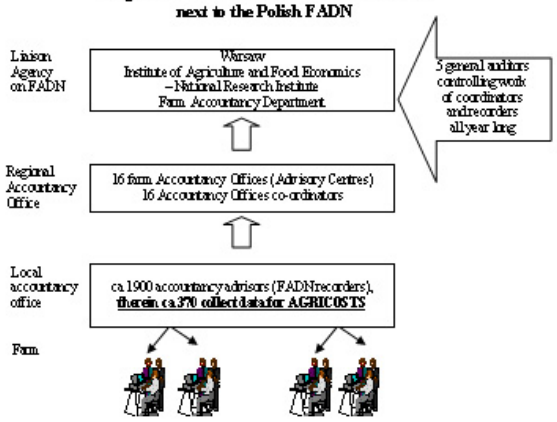
Products of AGRICOSTS system:

- database on particular crop and livestock production activities contains data on:
  - production level ► yields, product prices,
  - specific costs,
  - unpaid and paid labour input.
- comparative costs and income reports generated for each enterprise.

AGRICOSTS objects of research:

- farms with traditional production methods,
- farms with organic production methods (certificated).

Organizational structure of the AGRICOSTS next to the Polish FADN



AGRICOST
- background information

- System started in 2002 – pilot study
- Full implementation in 2004
- Sample selected from Polish FADN holdings
- Not obligatory
- No financial reward for farmers
- 900-1200 individual reports generated each year as a feedback
- 330-430 recorders involved each year
- Individual contracts with every recorder and coordinator

Premises of selecting the activities for the survey

- Agricultural importance of the activity
- CSO data on concentration of the crop or animal production in the voivodships
- Attendance of holdings in Polish FADN sample
- Size of production at the holding
- Recipients' interest - demand
- Real data on „most important" activities every 2-3 years at conventional farms

Crop and livestock activities under surveys – conventional farms

year 2009
winter triticale
spring barley
potatoes for starch
sugar beets
dairy cows
cattle for fattening

year 2008
winter wheat
spring wheat
winter rye
oats
grain maize
winter rapeseed
edible potatoes
pigs for fattening

year 2007
spring barley
potatoes for starch
sugar beets
strawberries in the open
tobacco
herbs (e.g. peppermint)
seed grass
suckler cows
breeding sows
ewes
sheep for fattening

year 2006
winter wheat
winter rye
winter triticale
buckwheat
winter rapeseed
dairy cows
laying hens
table chickens
cattle for fattening

year 2005
spring wheat
summer cereal mix
oats
grain maize
sugar beets
edible potatoes
field bean
sweet lupin
pigs for fattening

year 2004
spring barley
potatoes for starch

year 2003
spring wheat
winter rye
winter rapeseed
dairy cows

year 2002
winter wheat
sugar beets

Crop and livestock activities under surveys – organic farms

year 2009
winter wheat
winter triticale
winter rye
oats
edible potatoes
dairy cows
pigs for fattening
cattle for fattening

year 2008
winter wheat
winter triticale
buckwheat
oats
edible potatoes
strawberries
dairy cows
breeding sows
pigs for fattening
sheep for fattening

year 2007
winter wheat
winter triticale
buckwheat
oats
edible potatoes
strawberries
dairy cows
breeding sows
pigs for fattening
sheep for fattening

year 2006
winter wheat
winter rye
winter triticale
buckwheat
oats
edible potatoes
strawberries
dairy cows
pigs for fattening

year 2005
winter wheat
winter rye
strawberries
edible potatoes

Data collection
– role of the accountancy advisors at the local offices


Search for the particular enterprises among holdings that participate in the Polish FADN


Encourage farmers to participate – critical point!!!


Record data – separate accountancy books


Input collected „raw" data to the IT system and first stage of testing

- Only recorder can make any data corrections

Data collection
– role of the accountancy coordinators


Data testing and aggregation before transmission to the IAFE-NRI; two-stage testing process


Possible explanations of over- or undertrespassing the particular parameter limits
→ generating „errors" reports


Train the recorders

Data collection – IAFE level

➢ Update the limits for individual activities in the software


Data processing and their analyses (i.a. unit specific costs of fertilizers)

➢ Test results analzying – descriptive statistics


questioning (sending back) accountancy coordinators about detached observations (if earlier not explained),

✓ approval


Generating the individual reports for production activity

➢ Organizational issues

- Trainings
- Controlling books at holdings countrywide

Methodology

- Methodological assumptions compliant with methodology of gross margin due to UE standards
- Farming overheads – empirical or estimated data provided by Polish FADN system
- Subsidies directly linked to surveyed activity
  - compensatory payments, sugar payments
  - area payments excluded)
- Fodder area in livestock production – forage as a non-marketable product, valued according to specific costs incurred

Calculation of income from production activity

GROSS OUTPUT

-

TOTAL COSTS

Specific – seeds, fertilizers, feeding stuffs….
Farming overheads
General input linked to production
Depreciation
Total of external factors

=

Income without subsidies from production activity

+

Subsidies

=

Income from production activity

Specific costs structure of crop production

- **Seeds / seedlings**
  - on farm produced
  - purchased
- **Fertilisers in total**
  - nitrogenous (N)
  - phosphatic (P_2O_5)
  - potassic (K_2O)
  - multicomponent
  - microelement
  - other
- **Organic fertilizers purchased**
- **Crop protection**
  - seed coatants
  - herbicides
  - fungicides
  - insecticide
  - other
- **Growth regulators**
- **Other specific costs**
  - plantation insurance
  - specialist costs
    - specialist expenditures
    - hire of services
    - hire of labour

Total farming overheads structure

General inputs linked to production
- **heating fuel and electricity**
- **motor fuels**
- **upkeep - repairs, conservations (buildings, machinery)**
- **machinery hire**
- **insurance (farm, property)**
- **others**

Taxes

Depreciation
- **buildings**
- **machinery & equipment**
- **means of transport**

Total of external factors
- **contract work**
- **rent paid**
- **interest paid**

Use of AGRICOSTS database

- Possibility of presenting the results for individual line of production,
- Possibility of presenting the results using criteria of grouping (e.g. size of production, gross margin, region of farming, specific costs, labour input etc.),
- Ability to preparation short- and mid-term forecasts for the family farming products concerning the output and economic results in the specific production and pricing environment,
- Reports for production activity as a advisory tool for farmers

Use of AGRICOST database

- Priceless information for farmers to assess effectiveness of production lines and use the information to be more competitive,
- One of the data resource for SGM calculations
- Resource of variable limits
- Fulfill demand of researchers – level of data details

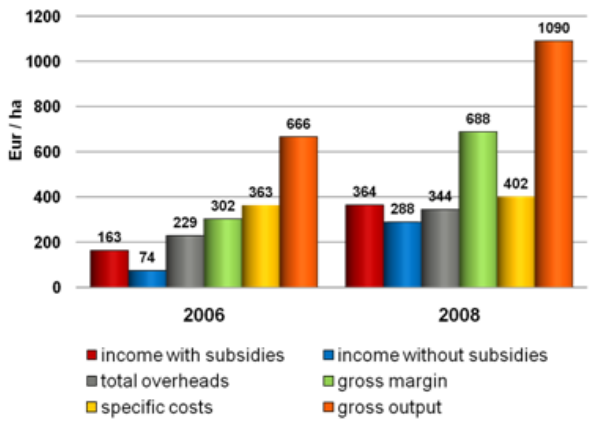
Advantages

- Possibility of covering all identified activities
- Empirical data – not estimated or modeled
- Complementary to Polish FADN
- Comparability of obtained results due to uniform methodology
- High level of data details
- Survey reflects the influence of changes in the means of production prices for the current enterprises income situation
- Universal IT system

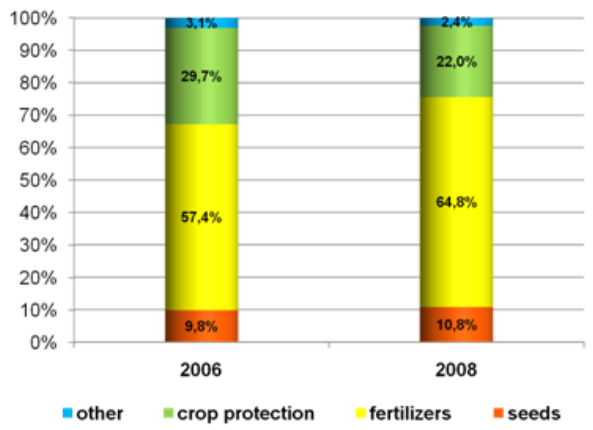
Disadvantages

- Not representative – purposly sampled
- Relatively small sample – limited budget
- Manual recording and not fully user friendly IT system
- No data validation at farm level
- Slight delay due to manual recording and processing the data

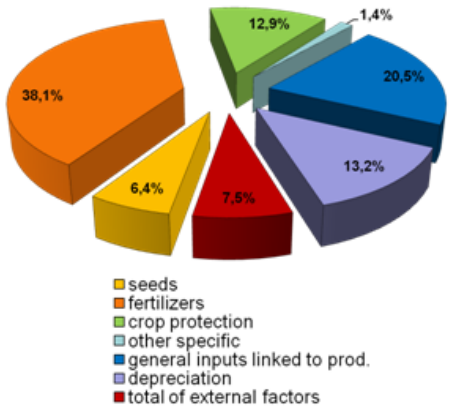
Production, costs and incomes for rape in 2006 and 2008 at repetitious holdings (empirical data)



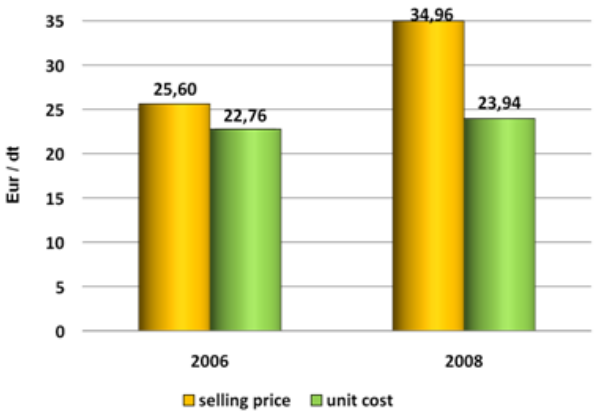
Specific costs structure for rape in 2006 and 2008



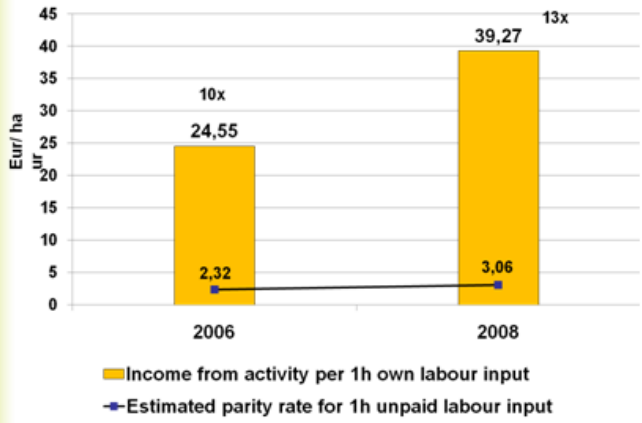
Total cost structure for rape production in 2008 (empirical data)



Rapeseeds' selling price and unit cost



Coverage of unpaid labour input incurred in rape production in 2006 and 2008



Thank you for your attention

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27 Workgroup Session 1

'Strategic Management: SWOTs and KSFs'

27.1 Introduction

Farms, agriculture markets and agricultural policy are developing fast. Technological developments are transforming working processes and business models. In this workshop we are going to work on how these long term developments might influence FADN. They might lead to new opportunities like the assembling of new data and a much broader group of users because of new technology. On the other hand they might lead to the move of FADN from the one institute to the other like happened in Denmark or the tendering of FADN, like in the UK.

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 cannot learn anything or cannot contribute anything, just leave for a better place.

At the beginning of this Open Space we put 5 questions on a flip chart in different places. Everybody was free to walk around and to participate in the discussions that were the most interesting for them.

We were using the SWOT analysis to identify the current position of FADN. Separate flip charts were available for the following issues:

- Strong points of the current FADN;
- Opportunities in the environment of the FADN;
- Weak points of the current FADN;
- Threats in the environment of FADN.

The first two issues focussed on FADN internally. The last two focussed on what is happening in the surroundings of FADN (political/technological developments, et cetera). A last flip chart was available for the Critical Success Factors of FADN. What factors decide in the end if an FADN will be a success or not?

In this workshop we focused on the current situation. In the third workshop on Wednesday we concentrated on how this analysis leads to concrete action points.

27.2 Outcome

Strong points current FADN

- Only harmonised source of micro economic data on EU level.
- Essential input data for models.
- Diversity of farms of member states agriculture:
  - gives insight in distribution;
  - different effects of policy measures on different farms.
- Possibility to connect different types of data (economic, structural data, family household, in future environmental) and possibility to use every variable in the database for distribution analysis.
- Used in many research projects and very relevant data for policy making and evaluation (for example CAP).
- Long time series.

- Feed back to farmers.
- Voluntary participation (no obliged administrative burden).
- Source of the family households data.
- Independence (not lobbied) of the system.
- Annual data.
- New variables can be added easily: 'cheaper' in comparison with starting new survey for each new demand.

Weak points current FADN

- No full coverage (products, farm types) and weaknesses in representativity.
- Missing variables/information:
  - not enough structural/physical data;
  - cost of production;
  - off farm income/taxes.
- Complicated database.
- Delay in data (year T-2), too late publication.
- EU-weighting scheme not representative.
- FADN-regions sometimes do not match with NUTS -> a problem to link with other data sources.
- Commission does not pay for all costs of assembling.
- Slow adaptation to new requirements.
- Difficult to access individual data (difficulties for international comparisons, quality checks).
- In practice methodologies not completely harmonised between countries.
- Fragmentation tools/software/approaches.
- What is the farmer's incentive/interest to participate?
- Non-official statistical source (non Eurostat and no statistical regulation).
- Voluntary participation.
- Accounting standards/indicators are different between FADN & private accounting offices.
- Accuracy of the estimates (large confidence intervals).

Opportunities environment FADN

- Electronic assembling of data.
- Use internet for providing data to users.
- Interest from policy makers in following data:
  - environmental data;
  - off farm income;
  - family/social;
  - cost of production;
  - contract farming.
- New clients from private sector.
- Use by farmers as a management tool.
- Coupling/Linking data bases (for example through geographical coordinates) with support data, environmental data.
- Increasing need of data for policy evaluation.
- To assemble information already existing in National FADN's on EU-level.
- Assemble a basic set of data on yearly basis and additional data on pluri-annual basis.

Threats environment FADN

- Financial crisis/budget cuts.
- Decoupled CAP (less government intervention).

- Interest in subjects that are not yet part of FADN (environment, life cycle analyses, public goods).
- Competitor data bases (e.g. accountancy offices, consultants to farmers, producers of farm management software, processors, tax data).
- Farms get more diversified (more variety of products, production methods).
- Difficult to persuade farmers to participate (e.g. very big farms, farms with large percentage of OGA).
- More diversified types of organisation (not only family farms).
- No separate ministry of agriculture anymore.
- Integrate agricultural statistics in business statistics so no FADN needed anymore.
- Relaxing Tax laws for bookkeeping (makes tax data a less useful data source).
- Some member states do not use FADN for national purposes.
- Data 'overload' - e.g. collecting data that is no longer required or starting to collect data without sufficient justification.
- Growing differences between FADN in individual member states (national level) and EU level, e.g. differences in methodology, typology.
- can be added easily: 'cheaper' in comparison with starting new survey for each new demand.

Critical Success Factors FADN

- EU level: Methodological harmonisation.
- Reliability of data.
- Representation of population (all farm types, size classes).
- User friendly database (complexity).
- Easy access (also to individual data).
- Possibility to link FADN to other databases (confidentiality).
- IACS/soil/georeferencing/other statistics.
- Adaption of FADN in time (changes in CAP).
- IT management.
- Interest of important stakeholders (Farmers, ministry of Agriculture, et cetera).

28 Workgroup Session 2

'Other activities of farmers that contribute to income'

28.1 Introduction

The main purpose of FADNs is to monitor income of farms. Farmers do however not only earn income from the sale of agricultural products. A large group of farmers has off farm income. The farmer or his wife might have a job outside the farm, they might have income from capital (savings, shares) or social contributions. Next to this Other Gainful Activities (OGA) like tourism and small shops at the farm are growing in importance. Not only is the percentage of output from OGA increasing but they have also increased interest from policy makers. OGA's could add to the income of the farmers but could also have several other positive consequences like a closer connection of citizens with agriculture and production of public goods. A third group of income for farmers are entrepreneurial activities that are not related to the farm. Despite this growing interest, most national FADN's have only limited information about these other activities in their FADN and on European or worldwide level hardly any information is available.

Before deciding how to implement this kind of information in FADN, it is important to know what kind of information we do want to know about these kind of activities. Group A identified the information that we would like to assemble for the three kinds of income sources:

- Off farm income;
- Other Gainful Activities using agricultural assets;
- Other entrepreneurial activities by the farmer.

Although the difference between the three identified income sources is clear in broad lines, we do need a very detailed split to reach comparable results on international level. One commonly agreed criteria for including an activity as an OGA is that agricultural assets are used. This does not solve all problems however.

Group B started with making a list of activities that are treated in the countries of the members of the group as an OGA. Based on this list, the members tried to find common criteria why an activity is included as an OGA on the one hand and off farm income or other entrepreneurial income on the other hand.

Some might argue that FADN is not the right source for assembling this kind of information. Group C worked on alternative sources for this kind of information next to FADN. If policy makers do have their information from other sources FADN is not bothered anymore. Alternative sources/ways to assemble this kind of information needed to be identified and a list advantages and disadvantages of these sources in comparison with FADN was to be made.

If we do include information about these other income sources, it is important how to include them. The EU-FADN and most national FADN's are developed for a farm that only produces agricultural products. Very high values of other activities might strongly influence the averages of all farms and might demand much assembling capacity.

The following decisions have to be made:

- Exclude farms with a high percentage (or high absolute value) of Other Gainful Activities and/or other entrepreneurial activities;
- Separate costs/outputs of OGA and/or entrepreneurial activities from agricultural costs and outputs;
- Group D listed the advantages and disadvantages of these several options. If useful a distinction to type of costs could be made.

In most FADN's farmers participate voluntarily. In return for their participation, farmers receive a benchmark report that compares their farm with comparable farms. While the farm return in most countries only makes a split of outputs and costs that are relevant for farmers, most costs and outputs of OGA are grouped together in one item. Technical indicators of OGA are not assembled at all. Because of the diversity of OGAs, only a very limited number of farms with a particular activity might be included in FADN. All these aspects make the provi-

sion of a benchmark report not possible or useful. Group E tried to identify ways to motivate these firms to participate in FADN.

Group composition

Group A

Boris	Tacquenier (chair)
Marju	Aamisepp (reporter)
Dorte	Hækkerup
Nathalie	Delame
Hans-Hennig	Sundermeier
Szilárd	Keszthelyi
Antonella	Bodini
Mediha	Halimi

Group B

Sophie	Hélaine (chair)
David	Culver (reporter)
Bernard	Del'Homme
Constanze	Hofacker
Csaba	Pesti
Concetta	Cardillo
Dabiqaj	Belgin
Mary	Ahearn

Group C

Torbjørn	Haukås (chair)
Marcin	Cholewa (reporter)
Joost	D'hooghe
Werner	Kleinhanss
Sonia	Marongiu
Rima	Daunyte
Hans	Vrolijk
M. Lovisa	Reinsson

Group D

Andrew	Woodend (chair)
Alexander	Bartovic (reporter)
Yannick	Kühl
Valda	Bratka
Arvydas	Kuodys
David	Verhoog
Andreas	Roesch
Shingo	Kimura

Group E

Dominique	Desbois (chair)
Eva	Øvren (reporter)
Henrik	Bolding Pedersen
Aleksandra	Martinovska Stojceska
Ann-Marie	Karlsson
Beat	Meier
Dierk	Schmid

28.2 Outcome

Group A

- Off farm
  - who (household component)
  - type of activity (employed vs non employed; pension or social transfers income from capital)
  - amount of time/labour
  - income/revenue

- OGA/agricultural assets
  - type of asset
  - type of activity
  - type of client
  - asset allocation (hours, days, …)
  - income/revenue

- Other entrepreneurial activities by farmer
  - labour input
  - income
  - type of activity

- Questions
  - Classification suitable? (redundancy, unclarity, …)
  - What is a farm? (problems related to legal constructions where several farmers involved)

Group B

Other gainful activities

- Service to other farmers (custom work)
- Forestry
- Agri-tourism (leisure, education, hunting, fishing, aquaculture)
- Value added, on farm processing
- Wind power (land rental & electricity)
- Biogas (electricity)
- Camp sites
- Farm cafes
- Christmas trees, forest products
- Bead & Breakfast
- Recreation
- Direct farm sales
- Farm vacation
- Using buildings for storage

Grouping criteria

- Use assets of farm
- If only labour do not include
- If separate accounts does this mean that it is not an OGA anymore?
- Does size of operation matter?
- Should processing of product not produced on farm be part of OGA?
- Is duration of activity important? (temporary parking place)

Group C

	Advantage	**Disadvantage**
Tax declarations	- good for off farm income - relevance	- not available in every country - not good for OGA - definitions - Product sold on black market - depends too much on taxation system
Specific surveys (additional to FADN or not)	- input can be separated	- respond rate - costs
Census/FSS	- using existing infrastructure	- administrative burden - rough data

Group C (continued)

IACS database	- using existing infrastructure	- difficult to ask some questions - rough data - no direct linkage
HBS (household budget survey)	- comparison between agriculture rural and non agricultural	- number of farms included is limited
Agr. household survey		- administrative burden

Group D

	Advantage	**Disadvantage**
Exclusion of 'OGA farm'	- focus on 'pure agriculture' - less costly -> less administration - higher response rate - higher accuracy - policy making	- loosing representativity (Hans) - partial understanding -> need of complete picture - pillar II info -> development - exclusion of sector - hard to define cut-off exclusion
Splitting 'OGA cost'	- better/more reliable cost of production figures - better management information - comparability across Member States/region - more quality check available - more research possible (broaden intellectual community)	- methodology - difficult to obtain - farmer's cooperation - costly/administrative burden - difficult to implement -> consistently across EU - more complex - willingness to cooperate

Group E

How to encourage?

- Depends of
  - kind of activity
  - Share of activity
  - Small or large farm
  - Can depend where the survey is based on the farm or the household
  - The policy purpose

- Not the biggest problem, but how to use them
- Focus groups
- Benefit of tax
- Subsidies

29 Workgroup Session 3

'Strategic action points'

29.1 Introduction

In this workshop we worked on the Strategic Management of FADN again. We used the results of the workshop on Monday that focussed on the current situation and developments. In this workshop we focussed on concrete action plans. How can we respond to opportunities and threats keeping in mind our strong and weak points and the critical success factors?

- Group A was confronting the Strong points with the Opportunities and brainstormed about the action points that are needed, keeping the Critical Success Factors in mind.
- Group B was confronting the Strong points with the Threats and brainstormed the action points that are needed keeping the Critical Success Factors in mind.
- Group C was confronting the Weak points with the Opportunities and brainstormed the action points that are needed keeping the Critical Success Factors in mind.
- Group D was confronting the Weak points with the Threats and brainstormed the action points that are needed keeping the Critical Success Factors in mind.
- Group E took all results into account and concentrated on the most important and urgent action point from the EU-FADN perspective.

Group composition

Group A

Dierk	Schmid (chair)
Sonia	Marongiu (reporter)
Boris	Tacquenier
Dorte	Hækkerup
David	Culver
Werner	Kleinhanss
Valda	Bratka
Eva	Øvren

Group B

Rima	Daunyte (chair)
Szilárd	Keszthelyi (reporter)
Marju	Aamisepp
Constanze	Hofacker
Concetta	Cardillo
David	Verhoog
Andrew	Woodend
Aleksandra	MartinovskaStojceska

Group C

Nathalie	Delame (chair)
Dabiqaj	Belgin (reporter)
Hans-Hennig	Sundermeier
Hans	Vrolijk
Marcin	Cholewa
Andreas	Roesch
Shingo	Kimura
Henrik Bolding	Pedersen

Group D

Antonella	Bodini (chair)
Joost	D'hooghe (reporter)
Mediha	Halimi
Sophie	Hélaine
M. Lovisa	Reinsson
Yannick	Kühl
Dominique	Desbois

Group E

Csaba	Pesti (chair)
Arvydas	Kuodys (reporter)
Alexander	Bartovic
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29.2 Outcome

Group A

- New variables: FADN could be a flexible instrument that gives the possibility to add new variables to meet different requirements.
- Flexible software for data collection that gives possibility to add variables.
- Increase the sensibility of farmers about the importance of surveys.
- Training course for data collectors; expert to explain to the farmers all the results of the research.
- Discussions between policy makers and national responsible for FADN (also to know what policy makers want + adapt FADN survey structure to political changes).

Group B

- FADN needs to be more flexible e.g. - collection of environmental data and other relevant data (agricultural and non-agricultural). Greater coverage might reduce risk of cuts, and be more important with decoupled CAP e.g. importance of Rural Development. Also helps if ministry develops wide portfolios.
- Working more in collaboration with competitors -> this might improve data from big farms - scope for focus groups with bigger farms.
- Greater interaction between EU Commission and data providers will help decide what to do about different organisations of farms, e.g. corporate firms.
- Data overload - can be avoided if FADN continually reviewed so that unnecessary data not collected - more interaction with EU will help.

Group C

- Improvement of IT technologies to show the FADN data in easy and nice way.
- Communication with stake holders and provide useful analysis (more clients than government and EU).
- Provide opportunity to access to individual data in a secure way (trust centre).
- Establish platform to exchange information and discuss among broad FADN community (harmonise data definition et cetera).
- New name for enlarged concept of FADN (for example Rural Household Network?
- Development of model to estimate production cost (FACIPA).
- Development of software to check the validity of representative ness of the data.

Group D

MS point of view

- Interest of important stakeholders
  - delay in data and publication
  - slow adaption to requirements
  - little interest in non-FADN subjects
  - competitors in data collection and processing (non-official and official)

⇒ MOTIVATE

- Actions
  - lobbying
  - promoting complementary national surveys
  - enhancing IT tools (one common software for all Member States?)

- Methods
  - weighting scheme
  - NUTS vs FADN regions
  - not full coverage
  - harmonisation missing

⇒
  - categorisation
  - go NUTS
  - geo-referencing
  - use national weights at EU level
  - workshops and visits data collectors, farmers, MS

- publish forecast and results
- to enhance interest of non-FADN actors

MORE FINANCIAL RESOURCES!! (effectively and efficiently used)
- EU?
- motivated stakeholders?

Group E

Three points two minor one major:
- Harmonised and transparent methodology (solve for example some weighting issues).
- Accessibility of data both for researchers and more common users.
- Strategic decision making is needed because farming and policy is changing. Remember that FADN is connected to CAP. To make a strategic decisions a strategic discussion is needed. It is therefore important to find an arena for strategic discussion.

What is needed in 15 years time? In what way can FADN meet this needs? How do we find out what to do? What is important? Who are the stakeholders, how do we find their views?

Suggested content for the strategy discussion 'How should FADN develop'?
- Environment.
- Other gainful activities.
- Stick to agriculture.
- Farm or family as object.
- Restrict to accounts income and costs or go further.
- How big can FADN be?
- Harmonisation with accounts.

Suggestions for ways of discussion:
- tenders;
- feasibility studies;
- task force;
- voluntary actions;
- pilot studies;
- discuss advantages disadvantages what is feasible who is in favour?

But most important to find arenas to discuss with stakeholders what is interesting in 10 to 15 years.

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