PACIOLI 8
Innovations in the FADN

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The PACIOLI network explores the needs for and feasibility of projects on the innovation in farm accounting and its consequences for data gathering for policy analysis in FADNs. PACIOLI 8 has been organised in Hungary in November 2000. This workshop report presents the presented papers. In addition results of the workgroup sessions on the effects of CEEC agriculture on the FADN farm return are reported.

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Preface

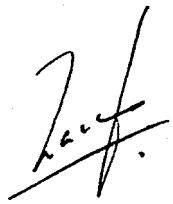
Better information systems and more administration by farmers are leading to more detailed agricultural and environmental policies. These policies and their ex-ante policy evaluations lead to higher demands on economic research and their monitoring systems.

It is in this environment that Farm Accountancy Data Networks operate. They are increasingly relied on by researchers and policy makers and they have to come up with innovations. To exchange experiences in this area the PACIOLI group organises a workshop every year. This small but open network has become a breeding place for ideas on innovations and projects.

This report is one of the more lasting results of the 8th workshop, held in November 2000 in Rackeve, Hungary. It was the first time that the seminar was organised in one of the EU's candidate countries.

We are indebted to the staff of our Hungarian colleagues at Akii, and especially to mr. Gabor Kovacs and mr. Szilárd Keszthelyi, for the local organisation. Thanks to their dedicated support PACIOLI 8 turned out to be a very succesful seminar. A follow-up in PACIOLI 9 (and 10) seems therefore to be secure.

The managing director,



Prof. Dr. L.C. Zachariasse

1. Introduction

1.1 About PACIOLI and this report

PACIOLI is an open network that resulted from an EU concerted action with the same name.

The objective of the network is to exchange experiences and promote projects on the innovation in farm accountancy and farm accountancy data networks, especially by implementing up to date information and communication technology.

Every year a workshop is organised with an interactive format where papers are presented and ideas discussed.

This report contains final versions of the papers and reports of the workshop discussion. They are presented in the original order of the workshop.

1.2 Programme PACIOLI 8

Sunday, 5 November 2000

19:00 A bus for transportation to the conference center leaves from Kossuth Lajos Tér

20:00 Arrival at the hotel

20:30 Informal drink

Monday, 6 November 2000

8:00 Breakfast

9:00 Welcome and introduction (by George Beers)

9:15 Beat Meier: A new farm typology and weighting system for the Swiss FADN
Hans Vrolijk: Towards dynamic growth in the financial economic simulation model
Discussion on consistent aggregation

10:45 Break

11:00 Workgroup session 1: What is a farm? (part 1)

12:00 Lunch

13:30 Candidate countries session
- Josef Hanibal: The Czech FADN since 1996
- Gabor Kovacs and Szilard Keszthelyi: The Hungarian FADN and the current projects
- Krista Kõiv and Jaanika Jalast: The situation in Estonia
- Anita Tangl: Hungarian FADN accounting system
- Jan Doeksen: Ten years experience in CEEC and the way ahead

15:30 Coffee break

16:00 Workgroup session 2: Changes needed in the Farm Return due to enlargement

17:15 Knut Samseth: The use of farm accounting and regression analyses in determining a value on small parcels of landed property

18:00 Dinner

19:30 Koen Boone: Fair value in agriculture; first implementation of IASC E65
Yves Plees: RICA projects in progress
Krijn Poppe: Experiences with Artis
Discussion on IT and organisational change

21:00 End

Tuesday, 7 November 2000

8:00 Breakfast

9:00 Guido Bonati: Internet based data-collection

9:45 Workgroup session 3: The 'Bono' exercise on visions for the future

11:00 Coffee break

11:15 Werner Kleinhanss and Vincent Chatellier: Modulation of the direct payments within Agenda 2000

12:00 Lunch

13:30 Excursion to two large farms operating as legal entities as successors of an old co-operative. In addition a cultural excursion

Wednesday, 8 November 2000

8:00 Breakfast

9:00 Bernard Del'homme: Diagnosis methods at farm level including environmental aspects; French experiences
Nicole Taragola and Dirk van Lierde: Adoption of environmental sound and high quality production strategies and financial performance of Belgian glasshouse holdings

10:15 Coffee break

10:30 Workgroup session 4: What's a farm? (part 2)

11:30 Hans-Hennig Sundermeier: Recent developments in farm management accounting

12:15 Lunch

13:00 Is there a need for PACIOLI 9?
Questions and answers session

Closing

14:00 Bus leaves for the airport

2. A new sample, farm typology and weighting system for the Swiss Farm Accountancy Data Network (FADN)

Beat Meier [1], FAT Swiss Farm Accountancy Data Network

2.1 Issue and summary

Within the scope of new Swiss agricultural policy, AP 2002, since 1999, the methodical basis for the Farm Accountancy Data Network of the FAT has been revised. According to the Ordinance on the Assessment of Sustainability in Agriculture (Classified Compilation of Swiss Federal Laws 919.118), among others, the analysis of the economic situation should be based on a sample of representative reference farms. Contrary to the test farms examined to date, the definition of what constitutes a reference farm is more extensive, e.g. part-time farms are also included. A novelty is that the results of individual farms are weighted in order to reflect the overall situation of agriculture as best possible. A new farm typology was developed and applied for the selection of farms, the weighting system and the presentation of results.

2.2 Universe and sample

According to the former Swiss Law on Agriculture, for the Farm Accountancy Data Network, the *test farms examined to date* were supposed to reflect the economic situation of efficiently managed farms which had been taken over at normal conditions. In concrete terms, among others, these test farms had to be full-time farms run by at least one person with professional training. The aim consisted in defining a sample of farms providing above average economic performance. Basically, the results were only valid for the test farms themselves. Either no rules applying to agriculture in general could be worked out, or then such were only possible with major reservations.

The *new sample of representative reference farms* should serve to portray agriculture in a global manner. The definition of the reference farms is illustrated in the following. The figures are rounded up or down and correspond to the situation in 1999.

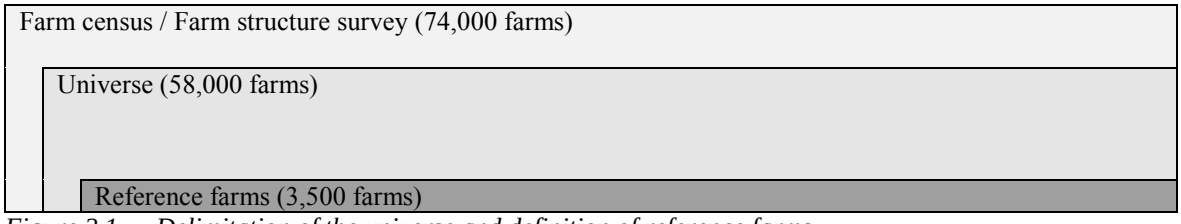


Figure 2.1 Delimitation of the universe and definition of reference farms

[1] Beat.meier@fat.admin.ch

The delimitation of the universe starts with the number of farms recorded by the Swiss Federal Statistical Office (SFSO) within the scope of its farm census or its annual farm structure survey.

The universe is formed by all those farms that could theoretically be recruited as reference farms. The universe no longer comprises all farms recorded by the census, because it would be unrealistic to expect very small farms to be able to supply accountancy data that would be of value for the analysis. Moreover, the farms not included in the universe hardly contribute to overall agricultural production and draw the major part of their income from nonagricultural sources. In order to be part of the universe, a farm must reach a minimum physical threshold, e.g. 10 ha of utilised agricultural area or farming activities involving at least six cows.

Especially in the year 1999, these threshold values served to determine 57,728 farms as forming the universe of reference farms. As compared to the overall census [1], the universe accounts for the following percentages:

- Number of farms 78%
- Utilised agricultural area 95%
- Open arable area 98%
- Special crops 93%
- Cows LU 98%
- Horses, sheep, goats LU 80%
- Pigs and poultry LU 97%

Despite the fact that over 20% of all farms were excluded, utilised agricultural area, livestock and consequently, agricultural production were very well accounted for.

The reference farms can be considered *a well-targeted non random sample* of the universe. In order to be able to make statistically representative statements, it would be necessary to draw a random sample. This would give every farm belonging to the universe the same probability to be included in the sample. However, because the Farm Accountancy Data Network places great requirements towards the closing of books, (among others, bookkeeping involving variable direct costing is demanded), a random sample is not considered to be feasible for the time being. Nevertheless, thanks to the well-targeted selection of farms and the weighting system described in the following, compared to the test farm results obtained to date, the informative value for agriculture as such can be improved considerably.

Approximately 6% of the farms belonging to the universe serve as reference farms for the Farm Accountancy Data Network.

2.3 New farm typology

In order to *select the farms* in a well-targeted manner, to establish a *weighting system* for the results of the individual farms and to *present the results* in a differentiated manner, a farm typology is required. The typology only describes the production orientation with re-

[1] Sources: SFSO data, agricultural farm structure survey 1999; Our own calculations.

gard to soil utilisation and animal husbandry. Additional criteria such as farm size, region, or ecological type of production were not taken into consideration in the definition of the type of farm.

To date, for the presentation of results, the Farm Accountancy Data Network relied on a typology as defined by what is known as the *Grüne Kommission* and is based on work carried out in the 1960s. This typology is based on physical farm characteristics as well as accountancy results not made available by the farm census, that is to say not available for the definition of the universe. These and other disadvantages led to the decision to develop an alternative typology.

Table 2.1 Definition of the new farm typology FAT99

Type of farm		LU/ UAA	OAA/ UAA	Sc/ UAA	CaLU/ LU	DC/ CaLU	SC/ CaLU	HSG/ LU	PP/ LU	Additional conditions
11	Arable crops	max. 1	over 70%	max. 10%						
12	Special crops	max. 1		over 10%						
21	Dairying		max. 25%	max. 10%	over 75%	over 25%	max. 25%			
22	Suckling cows		max. 25%	max. 10%	over 75%	max. 25%	over 25%			
23	Other cattle		max. 25%	max. 10%	over 75%					Not 21,22
31	Horses/sheep goats		max. 25%	max. 10%				over 50%		
41	Pigs/poultry		max. 25%	max. 10%					over 50%	
51	Combined dairying/ arable crops		over 40%		over 75%	over 25%	max. 25%			Not 11-41
52	Combined suckling cows				over 75%	max. 25%	over 25%			Not 11 -41
53	Combined Pigs/poultry								over 25%	Not 11-41
54	Combined others									Not 1 1 -53 1

All criteria listed in one line must be fulfilled simultaneously.
Abbreviations:

LU	Livestock units.
UAA	Utilised agricultural area in hectare.
LU/UAA	Livestock size per hectare UAA.
OAA/UAA	Share of open arable area as compared to UAA.
Sc/UAA	Share of special crops as compared to UAA.
CaLU/LU	Share of cattle LU as compared to overall livestock size.
DC/CaLU	Share of dairy cows (commercialised milk only) as compared to cattle livestock size.
SC/CaLU	Share of suckling cows as compared to cattle livestock size.
HSG/LU	Share of horses, sheep and goats LU as compared to overall livestock size.
PP/LU	Share of pigs and poultry LU as compared to overall livestock size.

The following requirements towards the new typology were defined in order to determine the behaviour spanning several years:

- stable classification of a farm, given unchanged utilisation of area and composition of livestock.
- new classification of a farm, in the case of area utilisation and livestock composition that have changed significantly.

In view of these requirements, adopting the *typology used in the EU* is out of question, in particular because the standard gross margins applied do not allow for a stable classification of the farms over the course of time. In times of much political change and given the increasing significance of direct payments, standard gross margins fluctuate considerably. Furthermore, most Swiss farms are classified in three groups of principal type of farming, which has proven to be insufficiently differentiated for our purposes.

The introduction of the new *farm typology FAT99* makes room for decisive improvements. The classification of the farms is based exclusively on physical criteria, namely land use and different categories of livestock units (LU). A differentiated and clear division is possible with a total of ten variables, that is to say eight ratios.

We distinguish seven specialised and four combined types of farms.

Farms specialised in plant production (11, 12) have a livestock size of less than one LU per hectare UAA. With the arable crop farms, the share of open arable areas exceeds 70% of the UAA; with the special crop farms, the share of corresponding crops (horticulture, permanent crops) amounts to more than 10%.

Farms specialised in animal husbandry (21 to 41) adhere to a restriction of a maximum of 25% of open arable area and a maximum of 10% of special crop surfaces. Over 25% of the cattle livestock of dairying farms are dairy cows which produce commercialised milk. Farms with suckling cows are delimited accordingly. In the remaining group referred to as 'Other cattle', basically, we group those dairy cow farms without a quota, that is to say specialised calf-fattening farms or rearing farms in mountain regions. With pigs/poultry farms, pig and poultry LU account for more than half of the livestock.

Farms that cannot be attributed to any of these seven specialised types of farms are considered to be combined farms (51 to 54). With a few additional conditions, combined farms can be delimited as farms putting focus on the production of dairying/arable crops, suckling cows and pigs/poultry.

The new typology FAT99 reaches the following goals:

- groups that are of importance for the presentation of results can be identified;
- it is possible to carry out an identical classification of farms supplying data for the Farm Accountancy Data Network and of farms surveyed within the scope of the farm census;
- specialised farms that are often subject to specific market conditions or political measures can be identified;
- combined farms with clear focus points can be delimited;
- over the course of time, the classification of farms corresponds to the requirement made above.

2.4 Weighting of the results

The new reference farms should help to illustrate the overall situation in agriculture, that is to say the situation in the somewhat more restrictively delimited universe. As the composition of the reference farms in the sample does not correspond precisely to the composition of the universe, systematic distortions of the results can take place. Among the reference farms, farms with less than 10 ha, e.g., are less frequent than in the universe. Such insufficient or excessive representation can be corrected by means of the weighting system. The distortions caused by the requirements made towards accountancy as well as the lack of a random sample still remain. However, the weighting system allows to adapt the average farm structure to the universe. In comparison to unweighted results, we are therefore able to achieve a massively improved informative value for agriculture as such.

Within the scope of the publication of Swiss accountancy results, the introduction of a weighting system is a novelty. In other European countries, this has been practised for quite some time already.

Definition of weighting factors per farm

The stratification of farms forming the universe and of the reference farms is based on the following criteria:

- 11 farm types according to FAT99;
- 5 size classes according to utilised agricultural area (less than 10 ha, 10-20 ha, 20-30 ha, 30-50 ha, more than 50 ha);
- 3 regions: plain, hill and mountain regions;

Consequently, 11*5*3= 165 strata were formed.

The weighting factor of the farms belonging to one stratum is based on the relation between the number of farms belonging to the universe and-the number of reference farms belonging to the stratum.

In order to restrict the influence of the individual farms on the weighted average, the maximum weighting factors allowed is 100 (in the provisional analysis carried out in March, the maximum is 300). This restriction of the maximum weighting factors is mainly relevant for farms with an utilised agricultural area of less than 10 ha. An aggregation of the strata as it is practised within the scope of the farm accountancy network of the EU, e.g., is not carried out. Table 2.2 shows that in certain strata, reference farms do not represent the farms in the universe.

If, for every stratum, the number of reference farms is multiplied by its weighting factor, the result consists in the number of farms represented. In 1999, this number amounted to 54,906 farms, which is somewhat less than the theoretical universe of 57,728 farms. Approx. 1,200 farms can not be represented, because the sample does not include farms from the relevant strata. An additional (approx.) 1,600 farms are also not represented, because less than 1% of the farms formed part of the sample. Consequently, the weighting factors of these reference farms was limited to 100. In the final analysis of the accounting data of 1999 carried out in August 2000, data from the census 1999 was available for the determination of the weighting factors.

Table 2.2 Determination of the weighting factors per farm, example: plain region in 1999

Region	Univers 1999 number of farms					Reference farms number of farms					Weighting factors 1999 per reference farm				
	size class according to UAA					size class according to UAA					size class according to UAA				
Type	<10	10-20	20-30	30-50	>=50	<10	10-20	20-30	30-50	>=50	<10	10-20	20-30	30-50	>=50
Plain region															
11	470	1,366	805	538	156	5	48	45	32	9	94	28	18	17	17
12	2,052	784	289	184	53	19	38	10	11	2	100	21	29	17	27
21	759	2,252	756	216	21	17	160	57	12	1	45	14	13	18	21
22	86	82	24	10	1	1	5	1	1	0	86	16	24	10	0
23	92	105	18	5	5	0	1	1	0	0	0	100	18	0	0
31	372	123	22	8	8	0	2	0	0	0	0	62	0	0	0
41	651	131	39	6	0	2	8	3	0	0	100	16	13	0	0
51	184	2,310	1,854	1,012	198	4	203	163	43	6	46	11	11	24	33
52	32	144	99	63	17	0	7	5	4	1	0	21	20	16	17
53	418	1,958	875	328	64	20	242	91	23	2	21	8	10	14	32
54	465	2,444	1,158	454	92	14	142	75	26	3	33	17	15	17	31

Types according to FAT99
11 Arable crops
12 Special crops
21 Dairying
22 Suckling cows
23 Other cattle
31 Horses/sheep/goats
41 Pigs/poultry
51 Combined dairying/arable crops
52 Combined suckling cows
53 Combined pigs/poultry
54 Combined others
Sources: Swiss Federal Statistical Office (SFSO), Agricultural farm structure survey FAT, FADN.

The approximately 55,000 farms represented reflect Swiss agriculture well. They accounted for more than 90% of utilised agricultural area and for more than 95% of the cows. Among other goals, a new plan concerning the selection of reference farms, which has been in force since 1999, also aims at increasing the number of farms represented even further in order to achieve an even better representation of the universe.

In order to calculate weighted results, the income of every farm, e.g., is multiplied by its weighting factor. To obtain the average weighted, the sum of the extrapolated incomes is divided by the sum of the weighting factors.

2.5 Effects of the new sample and the weighting system

The effects of the more extensive sample and the weighting system are exemplified by means of agricultural income (family farm income in the EU-FADN).

Effect of the sample

In terms of area size, the unweighted reference farms are almost as large as the test farms examined to date. However, because farms with significant secondary income are no longer excluded, the reference farms include a larger number of farms with combined forms of income and lower agricultural income. The unweighted agricultural income of the reference farms is approximately 11% lower than the income of the test farms examined to date (average of the years 1996-1998).

Effect of the weighting system

Thanks to the weighting system, especially the smaller farms that are less well represented in the sample are given greater significance. After weighting, average agricultural income is approximately 8% lower than without applying weighting factors (average of the years 1996-1998). On a whole, the more extensive sample and the weighing of the results of the individual farms leads to an agricultural income that is approximately 19% lower than agricultural income resulting from the analysis carried out to date.

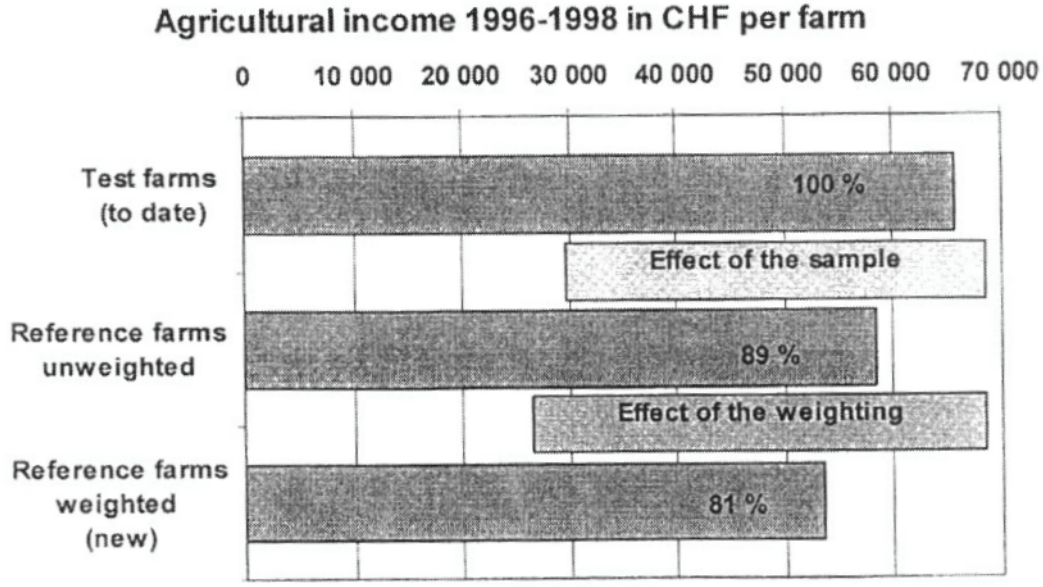


Figure 2.2 Agricultural income of the former test farms and the new reference farms with and without weighting

3. Towards dynamic growth in the Financial Economic Simulation model

Hennie van der Veen and Hans Vrolijk, Agricultural Economics Research Institute (LEI), The Hague

3.1 Introduction and problem definition

Decision making on agricultural issues requires reliable and valid data. In many countries a Farm Accountancy Data Network (FADN) with micro-economic data at farm level is used to collect, analyse and disseminate this kind of data. In the Netherlands, data are collected on about 1,500 agricultural and horticultural farms. The sample survey, to collect the data of the FADN, is designed to cover the population of farms between 16 and 800 Dutch Size Units (DSU). To improve the representativeness of the sample and the reliability of estimates, a stratitied sample is used. The stratification is based on DSU, acreage, type of farming, age of the farmer, and region (Van Dijk et al., 2000). Farms in the FADN represent farms in the population. Each farm has a weight that enables the aggregation of statistics of individual farms to farmtype or national level. In addition to the information required by the European Union, a large number of financial, technical, environmental and socio-economic data is gathered at the participating farms. 1,300 farms out of the total of 1,500 are willing to provide information about their non-farm income and their private spending.

Based on the FADN data, LEI has developed a Financial Economic Simulation model (FES), which can be used for policy evaluation. This model has some drawbacks, which are related to the representativeness of the simulation results. During the simulation period, firms can end their operation, which results in a decrease of total agricultural production capacity. This decrease is not offset by the start-up of new firms or by the growth of existing firms. This means that the total production capacity of the firms in the model decreases. In reality the number of firms also decreases, but the total production capacity (expressed in acres of agricultural land) decreases less. A related problem is the fact that the simulated cultivation scheme of the total agricultural sector will not be the same as the expected cultivation scheme. The goal of this paper is to analyse these problems and to define solutions to overcome these limitations.

Section 3.2 provides a description of the FES model. Section 3.3 will focus on the limitations of the current model. Section 3.4 tries to analyse the limitations of the current model on a more detailed level and defines alternatives to obviate the problems. This paper ends with a discussion about the suggested approach.

3.2 Description of FES

LEI has developed a Financial-Economic Simulation model (FES) [1], which is a useful tool for policy evaluation. For individual farms in the Dutch FADN the financial economic development is simulated for every year of the simulation period (usually 5 to 10 years). Starting from the commercial balance sheet, revenues and expenditures according to FADN, the model calculates the fiscal balance sheet, revenues and expenditures of the first year (see figure 3.3). To translate the individual farm outcomes to sector or national level, the weight factor is used. This factor indicates how many farms this farm represents.

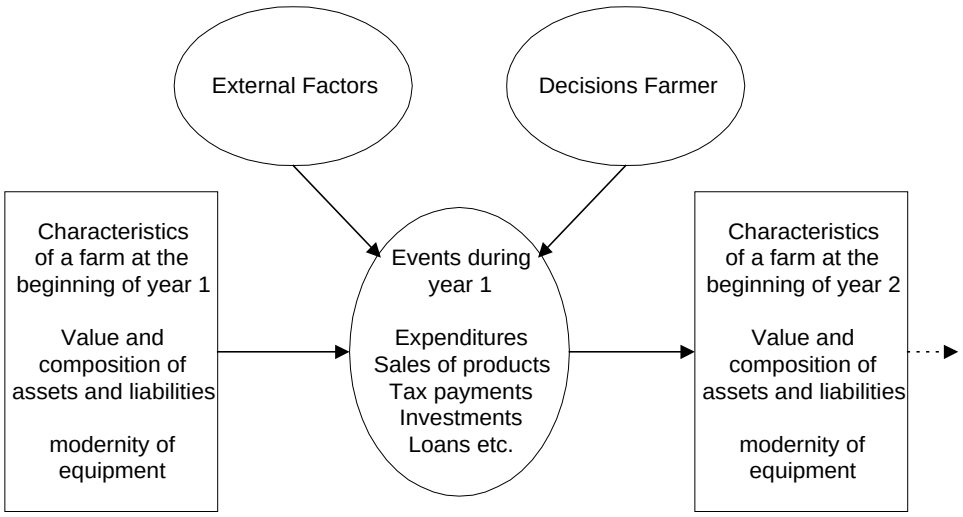


Figure 3.1 FES is a discrete-event simulation model

As figure 3.1 shows, many events happen in a year, which will now be described in more detail.

Revenues and costs

The revenues and expenditures are determined by adjusting the technical and economic results reported by the FADN for assumptions concerning the development of prices and productivity and other external circumstances like government intervention. The expected prices of products can be determined in various ways, like time-series analysis, expert views and demand-and-supply models. Prices are modelled as relative changes in revenues and not as absolute prices. These relative changes are determined for 50 revenue and 27 expenditure categories, and are the same for all firms. Firms that receive relatively high prices in the data of FADN will for the whole simulation period receive relatively high revenues. This implies that relative differences in the individual performance in relation to the average results remain preserved. However, in reality, most firms will not have a stable

[1] More information about this model can be found in Mulder (1995) and on the homepage of LEI (www.lei-wageningen.nl)

income and will do relatively better in one year and relatively worse in another year. This might depend on personal circumstances, weather conditions, etc. Besides paid expenditures, other costs like depreciation are calculated based on the value of the fixed assets.

Investment and financing

After calculating the operational cash flow in this way, investment options are offered to the farms. Relevant investment options can be originated from the model itself by ageing of the fixed assets (replacement investments). Other relevant investment options are not calculated in FES. It is however possible to determine them outside the FES model. For example, in many applications of the model the question is answered whether or not firms are able to finance certain environmental or animal welfare investments. The level of those investments is exogenously determined as follows:

- translating environmental governmental policy into standards for firm management per type of farming;
- comparing those standards per type of farming with the actual situation per firm; and
- determining which adaptations in the firm management should take place in terms of costs and investments; and
- determining the effects on returns of those possible changes (Hietbrink et al., 1999).

Investment options are compared with the available internal financial resources. If those are sufficient, investment takes place. Otherwise, the possibility of borrowing is considered. For this reason the behaviour of banks with respect to the financing of agricultural firms is modelled within FES. If cash flow, solvency and collateral are sufficient, financing and investment takes place. If relevant, the operational cash flow changes due to the investments made. For example, if an investment is made in an energy-saving option, then the costs of energy will decrease, while the costs of maintenance might increase.

Taxes

With the fiscal balance sheet, revenues and costs of the farm, non-farm revenues and the investments as input, the tax-claim is computed. The relevant parts of the Dutch tax system are for this reason incorporated in FES. After computing the tax bill, the year's end balances can be drawn up. On the basis of this balance and the modernity of the assets the viability prospects for the farm are calculated and the next year of the simulation period starts.

Stopping of farms

Besides the routine running in case the farm is doing well, the model incorporates specific behaviour in case of financial problems. If a farm is unable to meet the short-term financial obligations, arrangements are made to survive. Extension of payment is requested (possible every two years) and household spending will be cut (down to a predefined minimum level per household). In case this is not sufficient, an appeal to social security is made. In the model, a farm will go bankrupt if the social security loan exceeds $150,000. In addition to

bankruptcy, farms can stop within FES if the farmer becomes 65 and has no successor, or the successor is unable to finance the take-over. Next to that, information about stopping farms is essential, including mortality chances and voluntary emigration chances.

The different events are all influenced by external factors, e.g. prices of outputs, inputs, interest rates, etc. Figure 3.2 lists the sources of these external factors.

External Factor	Source
Prices products	Statistical data, partial equilibrium models, expert views
Prices inputs	Statistical data, expert views
Wages	Collective loan arrangements, expert views, statistical data
Interest rates	Statistical data, expert views
Taxes	Documents tax regulation, information from officials
Loan policy banks	Documents banks, information from bank employees
Other policy measures	Policy documents, information from officials

Figure 3.2 Overview of data sources of external factors

3.3 Limitations of FES

The main drawback of FES is the fact that growth and change in cultivation scheme are not incorporated in the model. The basic assumption of the model is continuation of the farm with unchanged structural characteristics (Mulder, 1994). The firm keeps the same size and cultivation scheme. This choice is a very justifiable point of view and leads to consistent results. However, it does raise many questions, especially in long term studies. Due to the fact that firms in the model can voluntary stop and stop because of emigration, bankruptcy and mortality, total production capacity represented in the model decreases. If the research results are expressed in percentages of firms, that might not be a great problem. However if estimations of totals are at stake, significant deviations from the expected totals can occur. Another problem arises from the fact that firms staying in the model do not change their cultivation scheme. The total agricultural cultivation scheme represented in the model at the end of the simulation horizon can deviate from the expected cultivation scheme. This means that the sample farms included in the model are not representative for the entire population with respect to the cultivation scheme.

3.4 Towards a solution

A clear limitation of the FES model is the absence of growth opportunities for individual farms. In this section we describe some ideas how to incorporate growth in order to facilitate a dynamic model. In analysing the problem, a number of elements are important.
These elements are:

1. attrition of farms: farms can end their business due to events like bankruptcy, mortality etc.;
2. the growth of farms: expansion of firms by offering growth opportunities to individual firms.

These elements will be further analysed in the subsequent sections.

Ad 1 Attrition of farms

The first relevant aspect is the attrition during the simulation period. The attrition in itself is not a problem. Bankruptcy, mortality and other reasons to end the operation of a firm are well-known events in practise. The farms that end their business in the model represent a number of farms in the population that would do the same.

The foregoing will be illustrated based on figure 3.3. Figure 3.3 displays the stratification scheme of the Dutch FADN sample with respect to one specific type of farming. The minimum size of farms to be included in the sample is 16 Dutch Size Units (DSU) and the maximum size equals 800. Within this range, for each type 4 size classes are distinguished. These are the basic cells of the sampling process. Within each cell a predefined number of farms are randomly selected. Due to the applied optimal allocation and stratification procedure [1] the sample percentage is higher in the cells with the larger farms. An essential element in making estimates of research variables is the weight of farms. The weight of a farm is calculated as the ratio between the number of farms in the population and the number of farms in the sample.

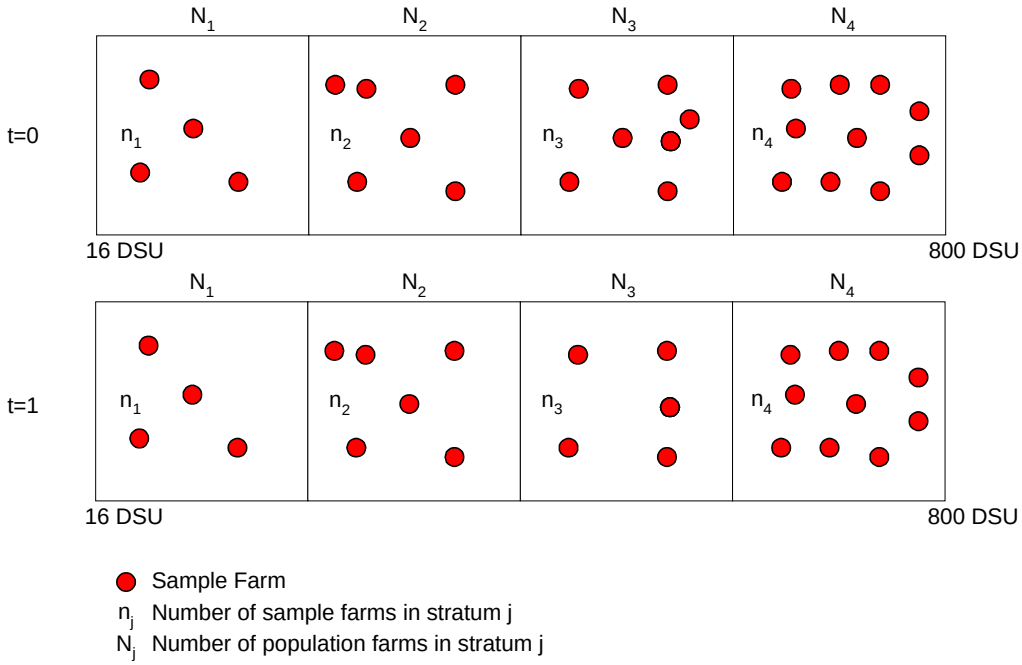


Figure 3.3 Attrition in the sample

[1] Optimal stratification and allocation aims at minimizing the variance of the estimators by selecting more farms from cells which are more heterogeneous.

For example, in figure 3.3 two farms in class size three have ended their operation at the beginning of t=1. The percentage of farms in the sample is the best possible estimate of the percentage of farms in the population that end their operation. This means that given the observed events the best possible prediction of the number of farms ending their operation in the population is:

$$attrition = (\frac{n_{3,t=0} - n_{3,t=1}}{n_{3,t=0}}) * N_{3,t=0}$$

$n_{3,t=i}$: number of sample farms in size class 3 in period i

$N_{3,t=i}$: number of population farms in size class 3 in period i

The expected number of farms in cell size three in the population in t=1 equals:

$$N_{3,t=1} = (1 - \frac{n_{3,t=0} - n_{3,t=1}}{n_{3,t=0}}) * N_{3,t=0}$$

The attrition can be reformulated as:

$$attrition = \frac{n_{3,t=0} - n_{3,t=1}}{n_{3,t=0}} * N_{3,t=0} = (n_{3,t=0} - n_{3,t=1}) * \frac{N_{3,t=0}}{n_{3,t=0}} = (n_{3,t=0} - n_{3,t=1}) * w_{3,t=0}$$

w3,t=i: weight of farms in size class 3

Therefore, the sum of the weights of the farms that end their operation is the best possible estimate of the number of farms that quit in the population. Despite the fact that this estimate will have a rather large confidence interval, attrition in itself is not a problem.

Ad 2 Growth of farms

The consequences of attrition do however cause some problems. When firms end their operation, other farms will have the opportunity to expand their business by acquiring additional property and production facilities (unless the zoning scheme of an area is changed and the former agricultural area is given another function, e.g. nature, industry, housing etc.). Not including these take-overs will result in a decrease of the production capacity. Including these growth opportunities is therefore essential in giving an accurate description of the events that will occur in the future.

Growth can be operationalised in two distinct ways. The growth can be modelled at a micro or macro level. Modelling growth at the micro level requires the ellicitation and modelling of investment knowledge and behaviour of individual farmers. Modelling growth at the macro level requires estimating growth trends based on the previous years. In our approach we will use a mixed approach. Growth opportunities are estimated at a macro

level, whether farms will be able to benefit from these growth opportunities will be modelled at the micro level.

Determination of growth opportunities

Based on the Farm Structure Survey (FSS) the growth of farms is calculated. The growth is operationalised in the acreage of farms. The period considered depends on the simulation horizon to be studied in FES. It is not assumed that all types of farms grow at the same rate. For example, bulb growers are expected to grow more than dairy farmers do. Bulb growers have had higher revenues in the last few years and dairy farmers have to deal with the costs of milk quotas. Therefore, different growth rates are calculated for different types of farming and different size classes. All farms in a certain cell will be provided with the same growth opportunity. However, not all firms will be able to finance the expansion. The percentage of firms that have sufficient financial means will differ between sectors and is dependent on the realised successfulness in the past and the expected successfulness in the future. The more successful the farm, the more internal means will be available and the more external means can be attracted. FADN data and a simulation of a single year with FES can be used to make an estimation of the percentage of firms that will have positive financial means or financial means that exceed a certain value. This percentage can be determined for each type of firm.

Since we now have an impression of the number of firms that might be able to finance the expansion, the growth rate can be recalculated. In that sense the growth of the total number of firms of one type is redistributed over a smaller number of firms. This implies an increase of the original growth rate.

Including growth opportunities in FES

This growth is subsequently incorporated in the FES model (figure 3.4). Growth requires investments in various (fixed) assets. The farms are provided with these investment

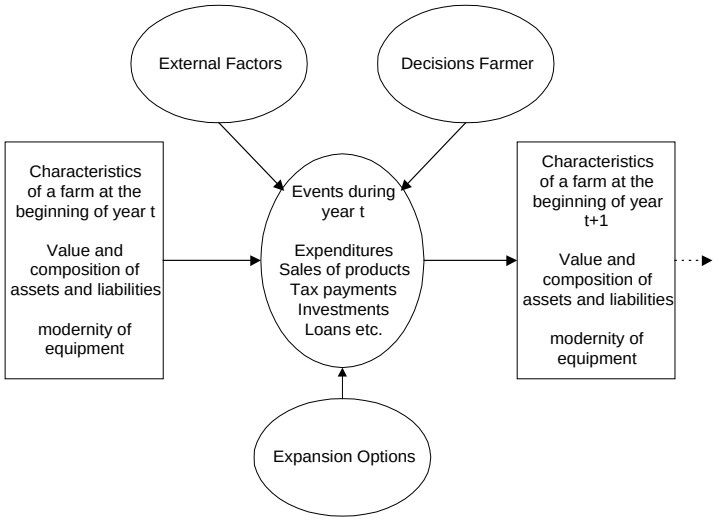


Figure 3.4 Incorporating growth in FES

options. These options are compared with the available financial resources (internal or external). If sufficient, the expansion will take place and the revenues and costs will increase accordingly. If the means are not sufficient, the farm will not expand.

Implementing dynamics in the FES model

FES makes use of weights in order to make estimations at sector or national levels. Until now the assumption is made that the weights remain the same over time. In evaluations of longer time periods this assumption might cause problems. In reality, farms can change in size over a range of years. To make the model more realistic, we proposed to include growth opportunities for farms in FES in the previous sections.

Including growth opportunities will affect the weight of farms. Figure 3.5 displays the structure of the sample and the population for a certain type of farming. The arrows represent the growth of farms during the simulation period.

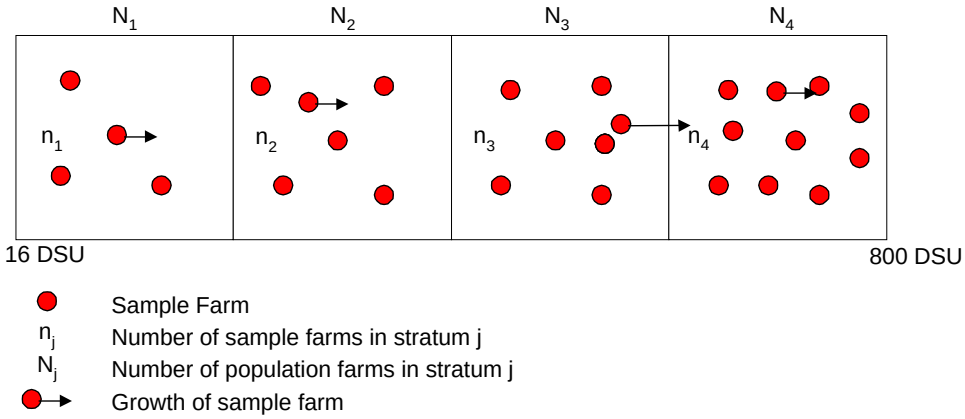


Figure 3.5 Growth of farms in the FADN sample

Due to the growth of farms, a farm can go beyond the upper limit of its cell. This will distort the number of sample farms (n) in a certain cell. On the other hand, the farms in the population will also grow by the originally calculated growth rate. The growth of farms in the population will also mean that the number of population farms (N) in each cell will change. The population size (N) and the sample size (n) are not required to grow at the same rate. In our approach we will adjust the estimation of N and the count of n. We will assume that the size borders of the classes will remain the same. For each year the number of farms in the population in a cell can be predicted, based on the structural changes of the FSS in the previous period. FES calculations provide a prediction of the number of sample farms in a certain cell. Based on the number of farms in the population and the sample the weight can be recalculated.

The estimated distribution of farms in the population over different types changes compared to the original distribution. The recalculated weights are based on this new dis-

tribution, which implies that expected changes in the national cultivation scheme will be better represented compared to the situation of constant weights.

3.5 Discussion

The growth rates of the population and sample farms depend on patterns in the past. Due to market and policy developments these patterns might not be valid for the future. Without any clear indications of these developments our approach is a good approximation for the simulation period. However, if these indications do exist, it is possible to make use of them by incorporating them in the model.

The approach discussed in this paper solves some of the problems mentioned in section 3.3. To solve the more fundamental problems, a different approach is necessary. These considerations have prompted LEI to start the development of a new microsimulation-model. The basic unit of analysis is the unit of decision-making, the individual firm. The primary goal of this new model is to include more behavioural components.

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Workgroup session 1: What is a farm - part one

Introduction

Farm accountancy tries to provide a true and fair view of the economic well being of an agricultural holding. Micro economic analysis, e.g. on CAP Reform, using micro economic data analysis the decision making of individual farmers, having a farm family/houshold and owning a farm.

In recent years it has become clear that the definition of a farm in not so clear cut. In the RICASTINGS report (page 100) a number of problems were identified by users and FADN managers: unclear definitions in renting in/out, different locations, joint exploitation, seperation from forestry, rural activities, outsourcing of animal rearing, crop associations and share cropping.

The visits that the FADN management committee pays yearly to a member state also revealed anecdotal examples of problems. In 1999 the committee visited France where an FADN holding had important touristic activities integrated in the business concept, that were however not accounted for in the FADN data. In 2000 the visit to Germany revealed an example of a father-son partnership where all the land was owned outside the partnership by one of the members and made available free of cost for use in the partnership. Thus the accounts of the partnership did not show cost of rent and neither the land on the balance sheet. Probably there are many more examples.

Task

In this first workgroup session we would like to create a large number of different examples from your experience/your countries where it is not so clear what 'the borders' of the agricultural holding are. In groups of 4 persons your are kindly requested to provide such examples (at least 4 per group), and for each example discuss the 'attributes' (mostly nouns) that play a role in trying to find the borders. We will use these examples (and nouns) in a later session to find solutions.

Example - 1 (based on text in introduction)

Workgroup session 1 - What is a farm

Number of working group: example
Description of example: Rural tourism
From country: France - Midi Pyrienees
Example: Several livestock farms provide also touristic services that are partly integrated in the agricultural activities: the farm house is used for bed and breakfast, one of the other buildings for housing tourists and there is a camping site. The farm decisions are influenced by this. It not only influences the labour availability, but also the farmer states that he keeps certain animals and at certain places to please the tourists. He also sells some of his products to the tourists. In addition he takes certain measures in his fields for environmental protection, that are, according to his own words, taken because the tourism enterprises in the region benefits from landscape management. However it is unclear what part of the data should go into the FADN accounts.

Attributes involved in discussion: tourism, landscape maintenance, on-farm shop, camping site, influence on farm decision making, labour availability.

Remarks: we would be in favour to include tourism activities in FADN.

Example - 2 (based on text in introduction)

Description of example: Fiscal Partnership
From country: Germany
Example: A father-son partnership where all the land is owned outside the partnership by one of the members (the father) and made available free of cost for use in the partnership. Thus the accounts of the partnership did not show cost of rent and neither the land on the balance sheet, that is based on the partnership as it is accounted for in tax accounting.

Attributes involved in discussion: partnership, legal structure, fiscal accounts, land ownership, land use.

Remarks: none.

Groups for workgroup session 1 (chair in italics)

1. *Nicole Taragola*
   Josef Hanibal
   Vincent Chatellier

2. Dirk van Lierde
   Jaanika Jalast
   Tommy Burke
   Hans Vrolijk

3. *Yves Plees*
   Krista Kõiv
   Werner Kleinhanss
   Koen Boone

4. Patrick van Driessche
   Szilárd Keszthelyi
   Guido Bonati
   Beat Meier

5. Gert Giversen
   Gabor Kovacs
   Susanna Perachino
   Anita Tangl

6. Bernard Del'homme
   Hans-Hennig Sundermeier
   Katalin Juhász
   Knut Samseth

Results

Work session 1, group 1

1. COMMERCIAL ACTIVITIES ON FARMS
   Examples: nursery, ornamental plants, wine, ...
   Buying and selling products of other producers
2. PARTNERSHIP - LEGAL STRUCTURE
   Example: integration in pig production during crists
3. FORESTRY
   Example: Czech Republic
   Mixed forestry - agriculture: if farmers get more income of forestry => is it still agriculture?

Work session 1, group 2

1. One Legal Unit - 2 farms
   E.g. pigs and arable
   Reason: Compile with environmental regulations
2. Two Legal Units - 1 farm
   E.g. One Family Unit - 3 Farms
   Father, mother and son
   Reason: taxation
   quota Reasons

Attributes involved:
- legal structure;
- partnership;
- quota regulation/production licenses;
- allocation;
- sampling frame.

Work session 1, group 3

1. Pigs producer selling fuel
2. Split mixed farm in 3 for fiscal reasons, but further nothing changed.

Keywords:
- subsidies;
- taxation;
- social security;
- hygienic standards.

Work session 1, group 4

CAP/FISCAL DISTORTION
- Splitting of farms to:
  - avoid superlevy fees in milk quotas;
  - get more grants and subsidies;
  - pay taxes or VAT as a small farm.

WHERE IS THE BORDERLINE?
- Food industry
- Non-food industry in the farm
- Para agriculture:
  - now plaughing;
  - B&B (bed and breakfast);
  - B&B (back to basics).

LIST OF ATTRIBUTES
- Seperability of overheads;
- Identification of para agriculture.

Work session 1, group 5

a. Small farms received tax reduction and subsidies because of limited income
   Attributes: rural development

b. Co-operative sales
   puchases

Formal agreement between individual farms during production cycle:
- consistency;
- efficiency;
- partnership;
- internal trade.

Work session 1, group 6

Examples for non-agricultural activities:
- machinery services for other farmers
  " " for communities
  " " for landscape maintenance

- direct sale - commercial activities (self prod./other)
  - market promotions
  - restaurants/cafes on farms

- renting rooms
  - for social events

- large farm: building activities

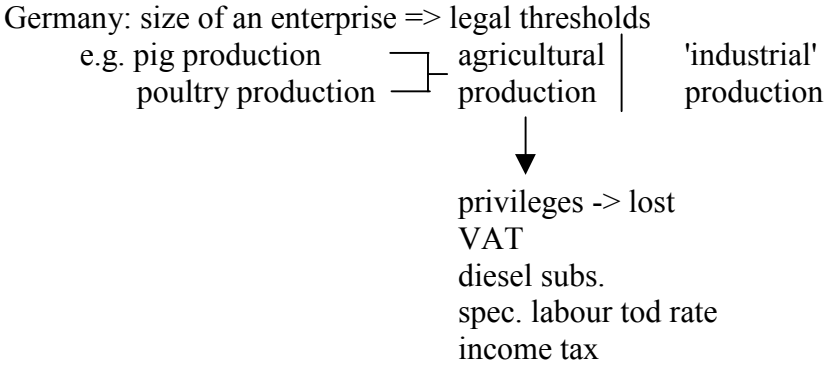
- services for old/sick people
  - psychiatric hospitals
  - homes for older people
  - homes for rehabilitation (alcohol)

- eco museum

Non farm income
- services: skiing teacher
  mountain guide

Boundery identification

E.g. machinery services:
- share of income outside the firm;
- share use of machinery;
- specifity of machinery; can it be used on farms?;
- share of financing (private/farm sources)
- machinery driver: farmer/payed work
- share of assets non-farm use
- share of work allocated non-farm activities



Therefor farms are split

4. FADN in the Czech Republic

Josef Hanibal, Research Institute of Agricultural Economics (Vuze), Prague

The implementation of FADN in the Czech Republic started in 1995. Since then the Research Institute of Agricultural Economics (RIAE) has been developing this system and collecting data from farm level on a regular bases. Results of FADN income survey are presented yearly as a part of the Report of the State of the Czech Agriculture and FADN database is used in many other analyses out for Ministry of Agriculture and for international projects as the only source of income and cost data in agriculture.

4.1 Farm sample

Two different types of farms operate in the Czech agriculture.

The legal entities - big farms with average size more than 1,000 ha and more than 100 employees, which were created by transformation of the state farms and co-operatives. This group involves about 3,000 entities (business companies and new co-operatives) and cultivates about 75% of agricultural land.

The physical entities - individual farmers are a new type of farms similar to family farms. There is about 30,000 such farms with average size 26 ha in the Czech agriculture.

The composition of the CZ FADN sample is shown by table 4.1.

Table 4.1 Structure of FADN CZ farm sample - survey 1999

	Number of respondents		Total agriculture land of sample (ha)		Average area of one subject (ha)		Share of total agricultural land CR (%)	
	1998	1999	1998	1999	1998	1999	1998	1999
Co operatives	226	265	372,740	429,449	1,423	1,639	30.18	38.07
Business companies	169	254	313,476	367,995	1,328	1,559	21.59	24.24
Physical entities (with double-entry accounting)	16	19	12,578	13,792	699	766	-	-
Legal entities total	411	538	698,794	811,236	1,354	1,572	25.59	30.26
Physical entities (single-entry accounting)	518	666	64,441	75,531	124	136	7.58	9.19
Of which: 5-50 ha	173	230	5,551	6,103	32	30	-	-
51-100 ha	153	199	10,862	11,611	71	73	-	-
101-300 ha	148	178	24,091	23,299	165	163	-	-
over 300 ha	44	59	23,937	34,517	544	651	-	-
Total	929	1,204	763,235	886,767	713	828	21.31	25.31

4.2 System of data collection

The Research Institute of Agricultural Economics is responsible for implementation of FADN and for data processing on national level.

The private accountancy offices and advisory companies collect data on farm level.

The software for data collecting and data controlling is distributed to accountancy offices by RIAE. Files with farm data are transmitted to RIAE by e-mail or on diskettes.

4.3 The results

The RIAE is administrating the FADN database. CZ FADN income survey provides data also about cost structure on enterprise level for main crops and livestock categories.

The basic results of the FADN survey are presented regularly as a part of the Report of the State of the Czech Agriculture, which is submitted to a government.

Report on costs of agricultural products is other output, which is regularly published too. The reports are sent to farmers involved in a network in printed form. The reports are presented and available on RIAE Internet web site too.

FADN database is used in many analyses for the Ministry of Agriculture and in international projects. The analyses are oriented on a comparison of economic and financial situation and efficiency of farms from different points of view (size of farm, type of farming, etc.).

Both traditional approach and a new EU methodology in data processing are used in these outputs. The traditional approach is based on economic indicators corresponding to the Czech accountancy procedures. A methodology of EU standard results processing has been introduced too with presentation of results according to the EU farm typology. Some modifications are still needed in these calculations, as CZ FADN is not fully harmonised with EU system.

The results of CZ FADN survey 1999 are shown in following tables.

4.4 Harmonisation of CZ FADN with EU legislation

The concept of CZ FADN is based partly on the methodology of the EU but at the same time it takes into account specific local conditions and differences in accountancy legislation and bookkeeping procedures as well as differences in character of the agricultural holdings. The scale and representativity of CZ FADN farm sample are not fully compatible to those used in the EU, as there are problems with financing of a network. CZ FADN requires development of the legislative and institutional bases, which are not introduced yet.

The harmonisation of CZ FADN is an objective of an ongoing PHARE project. Project activities are oriented on:

- proposal of a new farm return (questionnaire);
- development of a new system and software of data collection and processing based on Internet technology;

- proposal of a new selection plan and improvement of a representativity of farm sample;
- establishment of legislative and institutional background of CZ FADN;
- solving problems on methodology (differences in accounting, non agricultural activities, forestry, typology differences, economic size of farms doesn't conform to the big entities, etc.).

Table 4.2 Results of survey 1999 (methodology EU) - Summary results per 1 farm in 1,000 EUR

	Legal entities			Physical entities	Sample total
	co-operatives	business companies	total		
Sample farms	264	244	526	565	1,091
Economic size - ESU (Economic Size Unit)	431.02	397.86	406.84	28.07	210.63
Labour input - AWU (Annual Work Unit)	83.61	69.42	75.06	3.15	37.82
Unpaid labour input - FWU (Family Work Unit)	-	-	-	1.65	0.86
Paid labour input - AWU	83.61	69.42	75.06	1.50	36.96
Utilised agricultural area - ha UAA (Utilised Agriculture Area)	1,621	1,499	1,536	134	810
Total output	1,335.57	1,216.61	1,254	73.89	642.87
Output crop and crops products	670.24	546.66	604.20	48.49	316.41
Output livestock and animal products	602.49	611.18	590.45	22.33	296.26
Other output	62.82	58.76	59.34	3.07	30.19
Intermediate consumption	985.55	939.33	944.67	54.91	483.89
Specific costs	557.95	526.90	530.44	30.55	271.57
Farming overheads	427.56	412.42	414.22	24.32	212.31
Depreciation	145.14	133.46	137.17	9.60	71.13
External factors	364.57	320.17	336.39	10.46	167.61
- wages paid	310.76	264.93	282.67	6.14	139.46
- rent paid	16.63	16.38	16.27	2.85	9.32
- interest paid (less subs.)	37.17	38.85	37.44	1.49	18.82
Balance current subsidies and taxes	57.15	61.58	59.89	6.06	32.02
Balance subsidies and taxes on investment	-12.84	-7.27	-9.96	0.38	-4.59
Gross farm income	407.16	338.86	369.22	25.04	1,910.05
Farm net value added	262.02	205.39	232.05	15.44	119.87
Family farm income	-115.38	-122.05	-114.30	5.34	-52.33
Farm net value added/AWU	3.12	2.96	3.09	4.89	3.18
Family farm income/FWU	-	-	-	3.23	-
Total assets	2,241.43	2,032.96	2,093.83	152.06	1,088.24
Fixed assets	1,430.33	1,280.07	1,327.23	105.95	694.76
Current assets	792.58	726.82	744.58	46.11	382.86
Liabilities	1,295.65	919.95	1,093.19	41.46	548.54
Net worth	937.36	1,104.57	992.13	110.60	535.59

Table 4.3 Results of survey 1999 (methodology EU) - Results of legal entities according to economic size per 1 farm in 1,000 EUR

	Legal entities economic size class						
	very small		small		medium low	m. high	large	very large	
	I. a)	II. a)	III. a)	IV. a)	V. a) VI. a)	VII.	VIII.	IX.	X.
Sample farms						12	29	142	341
Economic size - ESU (Economic Size Unit)						27.87	76.50	178.88	543.71
Labour input - AWU (Annual Work Unit)						12.75	18.05	31.57	100.59
Unpaid labour input - FWU (Family Work Unit)						-	-	-	-
Paid labour input - AWU						12.75	18.05	31.57	100.59
Utilised agricultural area - ha UAA (Utilised Agriculture Area)						464	581	852	1947
Total output						169.69	252.17	489.37	1702.19
Output crop and crops products						39.21	86.90	237.55	824.02
Output livestock and animal products						54.30	148.21	237.22	796.92
Other output						76.16	17.04	14.58	81.23
Intermediate consumption						141.37	179.79	370.55	1281.73
Specific costs						53.91	82.75	206.2	722.61
Farming overheads						87.46	97.03	164.35	559.12
Depreciation						29.55	32.52	66.31	180.07
External factors						53.05	71.90	143.06	450.9
- wages paid						49.95	64.68	124.52	376.52
- rent paid						0.58	3.68	5.67	22.41
- interest paid (less subs.)						2.51	3.54	12.87	51.95
Balance current subsidies and taxes						43.59	44.69	37.58	71.40
Balance subsidies and taxes on investment						-1.82	-1.71	-1.57	-14.50
Gross farm income						71.90	117.07	156.40	491.86
Farm net value added						42.34	84.55	90.09	311.79
Family farm income						-12.53	10.90	-54.55	-153.61
Farm net value added/AWU						3.32	4.67	2.85	3.09
Family farm income/FWU						-	-	-	-
Total assets						298.81	525.27	930.63	2785.94
Fixed assets						192.38	352.44	594.04	1762.36
Current assets						109.38	169.88	320.17	996.62
Liabilities						281.95	280.79	625.93	1391.12
Net worth						14.30	241.18	301.66	1383.37

a) Figures are not published for insufficient number of respondents in group.

Table 4.4 Results of survey 1999 (methodology EU) - Results of physical entities according to economic size per 1 farm in 1,000 EUR

	Physical entities economic size class									
	very small		small		medium low		m. high	large	very large	
	I. a)	II. a)	III. a)	IV. a)	V. a)	VI. a)	VII.	VIII.	IX.	X.
Sample farms	19	43	53	54	85	54	161	64	26	6
Economic size - ESU (Economic Size Unit)	1.23	2.82	4.82	6.86	9.83	13.56	24.82	60.42	146.29	309.49
Labour input - AWU (Annual Work Unit)	0.84	0.91	1.30	1.46	1.74	2.00	2.81	5.66	14.35	22.50
Unpaid labour input - FWU (Family Work Unit)	0.84	0.91	1.25	1.35	1.60	1.76	1.96	2.16	1.81	1.50
Paid labour input - AWU	-	-	0.05	0,11	0.14	0.24	0.85	3.5	12.54	21.00
Utilised agricultural area - ha UAA (Utilised Agr. Area)	22	35	52	53	58	81	116	291	570	1,089
Total output	5.72	11.76	16.60	22.97	29.31	34.87	69.74	146.27	374.31	719.73
Output crop and crops products	2.96	6.53	8.85	13.25	16.32	23.94	40.27	104.31	249.21	592.55
Output livestock and animal products	1.96	4.42	6.86	7.97	11.54	9.65	26.54	35.26	115.05	96.84
Other output	0.80	0.80	0.91	1.74	1.41	1.30	2.96	6.67	10.07	30.33
Intermediate consumption	7.72	9.57	14.47	17.82	22.66	27.53	53.91	111.18	255.3	480.23
Specific costs	4.04	5.25	7.58	9.07	12.42	14.11	30.72	63.10	138.66	277.05
Farming overheads	3.68	4.34	6.89	8.77	10.26	13.42	23.16	48.10	116.63	203.15
Depreciation	0.91	1.66	2.07	2.60	3.62	4.20	9.05	22.33	50.23	61.19
External factors	0.35	0.49	0.63	1.05	1.54	2.04	6.80	24.46	73.51	163.21
- wages paid	0	0.02	0.11	0.38	0.52	0.69	3.32	14.06	50.51	101.30
- rent paid	0.35	0.22	0.35	0.63	0.69	1.02	2.46	6.58	13.39	42.70
- interest paid (less subs.)	-	0.22	0.16	0.05	0.33	0.33	1.02	3.84	9.60	19.18
Balance current subsidies and taxes	2.90	2.82	3.81	2.85	1.93	3.93	4.84	13.45	21.92	50.78
Balance subsidies and taxes on investment	-0.08	-0.13	-0.24	-0.24	-0.02	0.22	1.10	0.02	-1.35	16.16
Gross farm income	0.91	5.00	5.97	7.99	8.55	11.29	20.67	48.51	140.96	290.28
Farm net value added	-	3.34	3.90	5.39	4.92	7.05	11.62	26.18	90.72	229.06
Family arm income	-0.47	2.71	3.01	4.09	3.34	5.23	5.92	1.71	15.83	82.03
Farm net value added/ AWU	-	3.68	2.98	3.68	2.82	3.54	4.12	4.62	6.31	10,18
Family farm income/ FWU	-0.55	2.98	2.40	3.04	2.10	2.96	3.04	0.80	8.74	54.69
Total assets	227.37	37.28	56.01	56.26	74.28	81.76	151.97	263.21	659.06	799.83
Fixed assets	15.69	26.54	40.82	38.99	55.90	60.83	116.44	189.62	487.40	427.04
Current assets	211.68	10.73	15.19	17.27	18.35	20.92	35.53	73.59	171.65	372.79
Liabilities	3.62	3.76	5.50	3.01	11.56	10.46	40.27	85.66	255.41	431.44
Net worth	223.72	33.54	50.51	53.25	62.71	71.29	111.70	177.58	403.65	368.39

Table 4.5 Results of survey 1999 (methodology EU) - Results of legal entities according to type of farming per 1 farm in 1,000 EUR

	Legal entities							
	cereals a)	general field cropping	horti-culture	grazing livestock	grani-vores	mixed livestock holdings	field crops-grazing livestock combined	various crops & livestock comb.
Sample farms	113	5	28	8	15	200	151
Economic size - ESU (Economic Size Unit)	359.45	539.61	155.26	422.29	364.56	394.96	509.86
Labour input - AWU (Annual Work Unit)	52.23	66.60	48.53	36.43	87.03	79.71	94.00
Unpaid labour input - FWU (Family Work Unit)	-	-	-	-	-	-	-
Paid labour input - AWU	52.23	66.60	48.53	36.43	87.03	79.71	94.00
Utilised agricultural area - ha UAA (Utilised Agriculture Area)	1,447	574	1,134	311	1,386	1,595	1,732
Total output	987.84	1,222.92	519.62	1,677	1,446.8	1,318.96	1,495.68
Output crop and crops products	631.41	956.35	175.47	85.96	477.41	559.20	761.58
Output livestock and animal products	316.8	94.07	307.94	1,590.73	811.95	702.65	661.88
Other output	39.63	172.48	36.20	0.30	157.43	57.09	72.21
Intermediate consumption	739.02	765.26	433.24	1,314.12	1,087.63	978.88	1141.6
Specific costs	378.90	248.49	243.45	1,087.99	599.86	564.65	640.21
Farming overheads	360.11	516.77	189.78	226.1	487.76	414.22	501.38
Depreciation	106.86	110.73	76.28	86.93	151.42	149.18	160.33
External factors	260.11	284.11	206.50	221.14	381.76	354.33	403.46
- wages paid	209.05	223.13	186.96	173.18	342.95	301.82	338.5
- rent paid	20.42	14.55	3.07	3.23	11.95	12.64	21.61
- interest paid (less subs.)	30.63	46.41	16.46	44.72	26.84	39.85	43.34
Balance current subsidies and taxes	49.65	3.09	89.89	21.67	71.10	69.47	54.19
Balance subsidies and taxes on investment	-14.58	-8.63	-2.87	8.16	27.09	-5.67	-18.18
Gross farm income	298.47	460.75	176.28	384.58	430.25	409.54	408.27
Farm net value added	191.61	350.01	100	297.64	278.82	260.36	247.93
Family farm income	-83.08	57.26	-109.38	84.66	-75.80	-99.64	-173.73
Farm net value added/AWU	3.68	5.25	2.04	8.16	3.21	3.26	2.62
Family farm income/FWU	-	-	-	-	-	-	-
Total assets	1,640.41	1,304.73	1,044.28	2,173.4	2,371.99	2,199.31	2,516.14
Fixed assets	1,026.13	632.46	714.22	1,413.92	1,20.26	1,390.45	1,592.55
Current assets	590.97	625.35	316.69	756.62	733.29	789.59	898.36
Liabilities	948.68	978.46	580.04	742.20	815.47	1,162.39	1,250.57
Net worth	683.36	301.91	456.82	1,417.58	1,552.45	1,028.45	1,256.35

a) Figures are not published for insufficient number of respondents in group.

Table 4.6 Results of survey 1999 (methodology EU) - Results of physical entities according to type of farming per 1 farm in 1,000 EUR

	Physical entities							
	cereals	general field cropping	horti-culture	grazing livestock	grani-vores	mixed livestock holdings	field crops-grazing livestock combined	various crops & livestock comb.
Sample farms	115	187	10	86	12	6	114	32
Economic size - ESU (Economic Size Unit)	22.65	38.16	86.86	15.49	31.27	6.24	19.16	39.74
Labour input - AWU (Annual Work Unit)	1.77	3.34	10.10	3.19	2.75	3.33	3.24	4.5
Unpaid labour input - FWU (Family Work Unit)	1.15	1.67	1.9	1.87	1.75	1.5	1.87	2
Paid labour input - AWU	0.63	1.67	8.2	1.31	1	1.83	1.37	2.5
Utilised agricultural area - ha UAA (Utilised Agriculture Area)	124	167	101	95	58	191	126	146
Total output	49.59	84.58	203.79	61.11	134.26	49.87	65.09	105.17
Output crop and crops products	44.09	70.79	203.79	16.80	16.27	18.65	30.41	51.48
Output livestock and animal products	2.43	8.99	0	42.81	117.88	25.15	33.04	51.50
Other output	3.07	4.76	0	1.52	0.11	6.06	1.63	2.18
Intermediate consumption	35.09	59.83	128.67	50.89	94.43	53.77	51.09	85.19
Specific costs	17.57	33.76	62.80	26.23	74.56	31.66	28.34	53.72
Farming overheads	17.54	26.07	65.87	24.66	19.90	22.11	22.75	31.46
Depreciation	8.99	11.37	13.83	8.63	10.26	14.53	7.25	10.57
External factors	6.11	13.20	47.35	7.97	9.99	6.17	8.35	12.81
- wages paid	2.51	6.91	35.78	5.45	4.62	5.50	5.17	10.18
- rent paid	2.82	4.42	4.17	1.27	3.48	1.13	1.54	2.18
- interest paid (less subs.)	0.77	1.82	7.36	1.24	1.88	-0.47	1.66	0.44
Balance current subsidies and taxes	1.88	5.89	5.25	8.41	1.79	37.75	8.24	4.42
Balance subsidies and taxes on investment	-0.24	0.02	0.94	0.30	-0.88	32.49	0.44	-0.96
Gross farm income	16.38	30.61	80.40	18.62	41.62	33.87	22.25	24.38
Farm net value added	7.38	19.26	66.53	9.99	31.35	19.34	15.00	13.81
Family Farm Income	1.02	6.06	20.12	2.35	20.48	45.66	7.08	0.02
Farm net value added/AWU	4.15	5.75	6.58	3.12	11.40	5.81	4.64	3.07
Family farm income/FWU	0.88	3.62	10.60	1.24	11.70	30.44	3.79	0.02
Total assets	124.27	155.19	223.05	140.93	189.53	175.78	128.28	316.57
Fixed assets	102.27	112.95	142.12	102.13	155.38	119.18	87.62	127.15
Current assets	22.00	42.20	80.95	38.80	34.15	56.60	40.65	189.42
Liabilities	23.24	40.49	110.96	54.99	96.81	115.80	34.65	47.32
Net worth	101.02	114.69	112.09	85.93	92.72	59.97	93.63	269.25

5. Hungarian FADN and the current projects

Kovács Gcibor and Keszthelyi Szilárd, Research and Information Institute for Agricultural Economics; (Akii) Budapest.

5.1 Development of the Hungarian FADN

The objective of the development of the Hungarian FADN network is to create an information system based on such a representative farm management data collection as is in unison with both domestic users' and EU requirements.

In connection with the preparations for the accession of Hungary to the European Union, the Ministry of Agriculture and Regional Development (MARD) has commissioned the Research and Information Institute for Agricultural Economy (AKII) to establish an EU-conformable Hungarian FADN network as a part of a comprehensive agricultural information system.

The Legal Base of FADN is the ACT CXIV of 1997 on the development of agriculture:

> '*Aiming at a well-founded administration of agriculture and for meeting the requirements of the EU accession the Government will establish and operate a representative macroeconomic data base.*'

After preparations made in the framework of a bilateral German-Hungarian project, AKII organised a pilot farm data collection in 1996 in Fejér county. The further development is showed in figure 5.1.

The farms were selected by their business status, location in different agricultural region, size, and type of farming.

In every farm data collection is based on double entry book-keeping. If a farm is otherwise not obliged to keep double entry books, book-keeping agencies selected for this purpose take care of it.

Parallel to organisms and managing data collection, AKII carried out (and is still carrying out) methodological and development activities serving for the elimination of temporary solutions, which were necessary at the beginning, so that the Hungarian FADN network will be in complete accord with that of the European Union.

The EU harmonised General Agricultural Survey (complete registration of farms) carried out in Hungary in May 2000. The first representative sample will be available in 2001. In this year the network will cover the whole country, and it means AKII can provide the first Standard Results based on weighted data and EU definitions in 2002.

However, yearly reports have been published since 1997 (in English available for year 1998). The first part of these reports include income and profit analyses separately for the private farms and the economical organizations and a comparison of the two groups.

The second part comprises average data and indicators by farm sizes calculated on the basis of both SGM and UAA; farm type; dispersion of data.

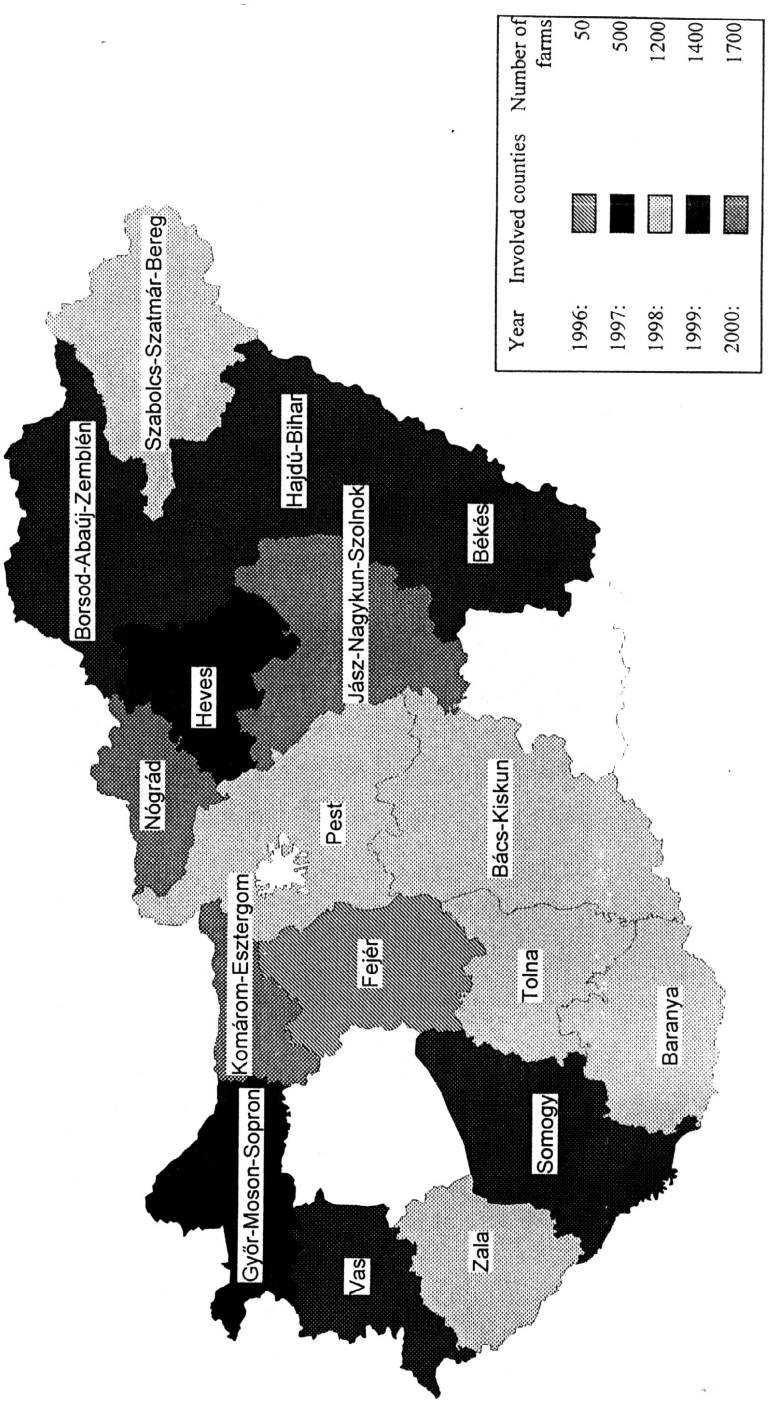


Figure 5.1 Quantitative development of Hungarian FADN

5.1.1 Organisational structure of the Hungarian FADN

The main stakeholders of the FADN are the Ministry of Agriculture and Regional Development (MARD), the farmers and the accounting offices. The MARD provides financing for the operation, and receives information (including the yearly report with results) for its policy making.

AKII provides instructions, consultation on request, data entry and plausibility software for the accounting offices, and receives data according to the structure of the farm return.

Accounting offices have to find and make contracts with the farm, according to the selection plan and receive invoices and other requested information from the farm (figure 5.2.)

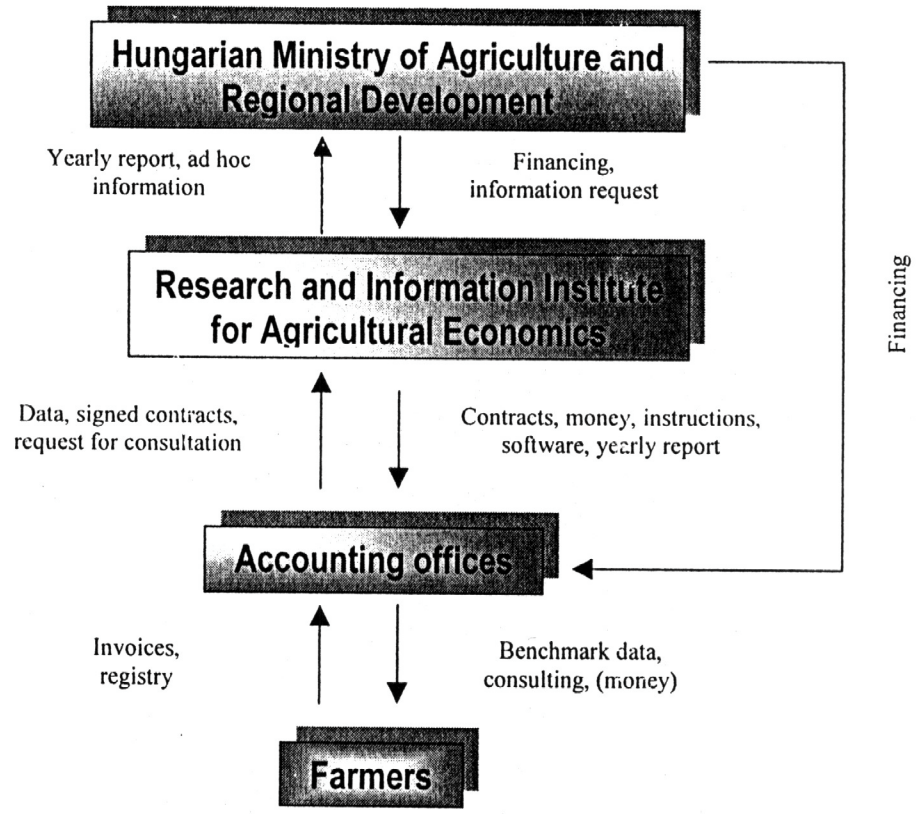


Figure 5.2 Organisational structure of the Hungarian FADN

5.1.2 Assumptions concerning the implementation of the Hungarin FADN

- It is very difficult to find research workers of an adequate quality because of the very strong attractiveness of the competitive sector.
- MARD has allocated the financial resources required for the establisment of the FADN network so far. It can only be hoped that this process will continue also in the

future. However, the delay in the allocation of the money required is a problem (in best it is always available in the second quarter, although the work has to start at the beginning of each year).

- Relations to the farmers involved must be improved in the future in order to win their confidence and make participation appealing for them.
- The support ott6gional chambers of agriculture, business federations and MARD offices is required - for an adequate (representative) selection of farms and their involvement in information supply. For this purpose AKII has to provide the above organisations with more information.

5.2 The role of the PHARE projects in the development of the FADN system

From among the projects implemented up to now is to point out the project of the year 1995 entitled 'Development of a Complex Agricultural Information System' (subproject: Development of the FADN in Hungary). Within the framework of this project a working group co-ordinated by M. Poppe has prepared a work paper (*The Hungarian FADN on the road to the EU: strategy 1998-2000*). This paper is used still now and will probably be used until the end of 2001 as a guideline for the development processes.

The objective of this strategy is to develop a client-oriented information system, which is integrated in the complex agricultural information system and provides the maximum benefit for the stakeholders. The basis of the strategic plan are the stakeholder analysis and the process model. In the stakeholder analysis the requirements, opportunities and possibilities of the relevant organisations and persons involved in the Hungarian FADN activities (users, data providers, budget) are analysed in order to help the Hungarian FADN to be accepted and be useful for the users.

The objective of the process model was to provide information on activities and on the structure of the activities to be implemented in the framework of FADN system. This provided great assistance in the establishment of the FADN organisational structure and in defining the responsibilities of the researcher. Both of the methods mentioned above have analysed the actual situation and the conditions required. The differences defined were and are also at present the most important elements of the innovation process.

In the strategic plan we distinguished two different groups of projects (activities):

- normal activities where the normal FADN is carried out and which become bigger and bigger during the project;
- system development projects, which serve as a basis to the growth mentioned above and which bring the FADN to EU standards. PHARE program provides help to these projects in the first place.

Since the establishment of the strategic plan the development process has been carried out with some delays in accordance with the instructions (normal activities have been completed, while the schedule of the of system development could not been followed in every detail.

The performance of the rest of tasks will be implemented in the next PHARE project entitled 'Development of Institutions Responsible for the Future Implementation of CAP-

Agricultural Statistics and Information Technics' (HU 9806-03-02) which started in October 2000.

These are as follows:

- *to improve and extend the network of agricultural holdings.*
  The project is expected to contribute to the expansion of the network over the whole country, based on a scientific method of stratification and sampling and in coinpliatice;
- *to improve the FADN methodology and data-set.*
  In view of the required supply of FADN data to the EC-DGVI it is important to adjust the dataset in accordance to the EU requirements. The project is expected to support the AKII in this respect;
- *to improve the output of the FADN system.*
  FADN based information can be used for several purposes. It is expected that the project will support AKII in improving the output via standard and specific reports and via FADN based policy analysis. Next to this project should result in a regular supply of the required data to the EU-FADN;
- *to improve the hardware and software system.*
  The hard and software currently used at AKII and the accounting offices need to be evaluated in view of the required expansion and improvement of the FADN. It is expected that recommendations will be formulated with respect to the development or purchase of new software and hardware in order to establish a modern data processing and communication infrastructure.

By summarising the experiences of PHARE projects we can state, that these projects have considerably contributed to the development of Hungarian FADN and provided assistance so as by the time of Hungary's EU accession - we hope that for this we do not have to wait long - the incorporation of the Hurigarian FADN into the EU-FADN will be carried out without any problems.

In most cases we managed to receive to get the assistance of competent experts with great experience on the actual issues. They did their best to help the Hungarian counterparts to join the international activities. The present occasion - together with the representatives of the candidate countries - proves the same and is a good example for the assistance of this kind.

6. The Hungarian FADN accounting system

Anita Vajna

6.1 The operation of the Hungarian FADN

The Hungarian FADN was established in 1995.

There were some research project about the Hungarian agricultural information system before 1995 (1). Those projects described the Hungarian situation and they determined the improvement of the Hungarian agricultural information system. The main problems were the undefined information requirements and the farmer's opposition to give the real details in that time.

The first data collection in the Hungarian FADN was in 1996. 42 farmers provided data. In the year 2000 1.620 farmers are registered in the FADN system. The main organizer of the Hungarian FADN is the Research and Information Institute for Agricultural Economics (RIIAE).

The operation model of the Hungarian FADN is the next (figure 6.1).

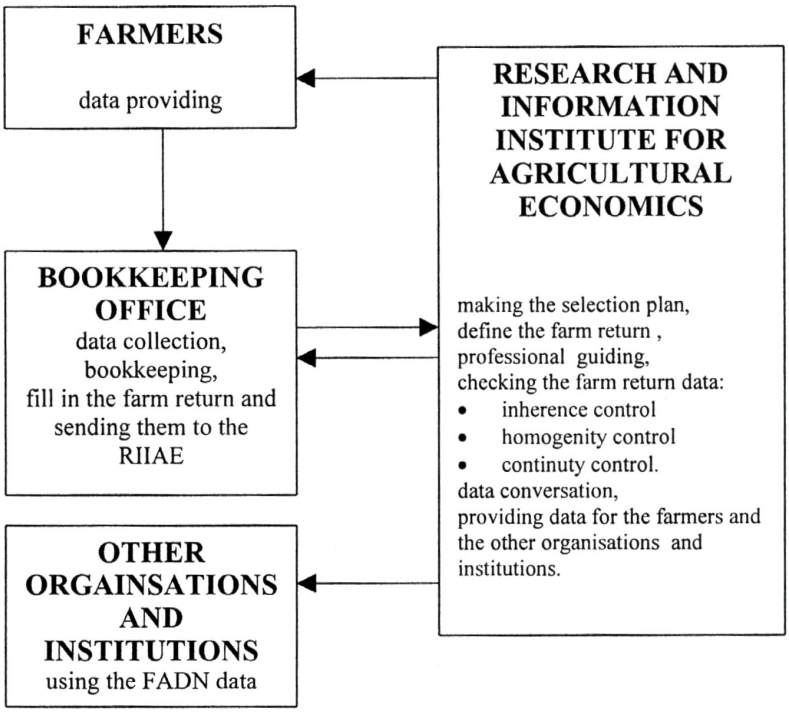


Figure 6.1 The operation model of the Hungarian FADN

My research is focused on the operation of the bookkeeping offices.
Their main work are the data collection and the data recording. To make effective work they have to pay attention to the following:

- to build up a very good contact with the farmers;
- to know exactly meaning and content of the farm return;
- to make a very solid work in the field of data recording.

The bookkeeping offices are collecting the farm return-data from the farmers. The 1,620 registered farmer's intellectual capacity is very different. And one of them is very opened to co-operate and the other one is very closed. If the bookkeeping offices do not make good contact with the farmers they do not really want to co-operate and to give the basic and real data (2).

The bookkeeping offices have to know the exactly meaning and content of the farm return. If they do not know the content of the farm return they will provide different information. In that case the aggregated data will be not correct.

The good data recording is the guarantee of the correct farm return data, too.

6.2 The actual Hungarian FADN bookkeeping system

Nowadays every bookkeeping offices has its own data collecting and recording system. It means that these offices do their work in different way. The basic method is same it is the double-entry bookkeeping. The next figure shoes how are the farm return filled in (figure 6.2).

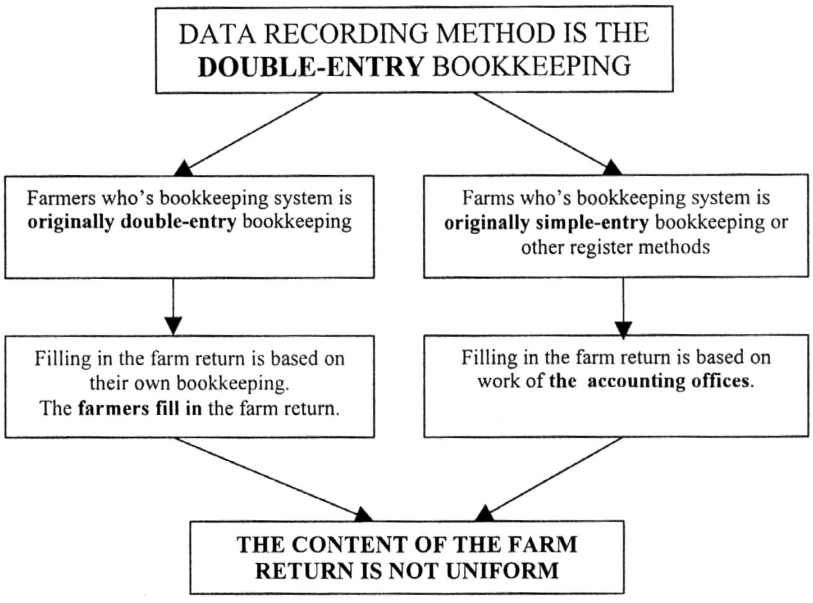


Figure 6.2 The origin of the farm return

To understand figure 6.2 I have to explain some Hungarian specialty. By the accounting low there are two bookkeeping system in Hungary. The simple-entry bookkeeping and the double-entry bookkeeping. The bookkeeping offices keep the books for that farmers who is originally obligated to record data by the simple-entry bookkeeping system. The farmers who's bookkeeping system is double-entry by low, they fill the farm return by oneself. So one bookkeeping office sends farm return from two sources. One is from their own work and one is from the farmer's bookkeeping system. The result of this method is that the content of the farm return is not uniform.

From 1,620 farmers 292 are obligated to keep their books by the double-entry bookkeeping. They provide the farm return by oneself (18% of the total sample). The other 1,328 farmer's farm return are made by the bookkeeping offices (82% of the sample).

There are also big differences in the work quality of the bookkeeping office's.

The enumerated factors could indicate many errors.

The method and the recording system of the Hungarian FADN build on the Hungarian accounting low. The content and the valuation of the assets and liabilities are based on the Hungarian rules. The incomes the costs and the expenditures are calculated by the Hungarian practice, too.

Summarizing the present Hungarian FAND bookkeeping system:

- 11 bookkeeping offices are working;
- the filling in the farm return are two different ways;
- the work quality of the bookkeeping offices is different;
- the bookkeeping system is based on the Hungarian accounting low;
- the content and the valuation of the data are coming form the Hungarian practice.

The present bookkeeping office's work is a good practice to get to know and to understand the FADN and in the future they can use these experiences.

6.3 Proposal for the future Hungarian FADN bookkeeping system

The FADN has typical data system. The structure of the data is special. The content and the meaning and the valuation of the records are non-series (3).

To take these specialties and the nowadays Hungarian FADN state into consideration, it can be stated that it is need to build up new bookkeeping system.

This new FADN bookkeeping system:

- determine the content of the data;
- determine the valuation of the data;
- can help the bookkeeping office's activity;
- can help in the standardization of the bookkeeping office's work;
- can help in the auditing of the bookkeeping office's work (in the evaluation, too).

I put a proposal for the Hungarian FADN bookkeeping system in my Ph.D. work. I determined the fields of the bookkeeping the content of the assets and liabilities the content of the incomes and expenditures.

The starting point of the work was the Hungarian practice because the labour in the bookkeeping offices are Hungarians. They know the regulations and the habit. If we would like to have a high quality work we have to fit in with them.

I made a bookkeeping policy specially for the FADN. I defined:

- the accounting year;
- the accounting principles;
- the valuation methods;
- the system of accounts;
- the analytical register;
- the rules of the inventory; and
- the accounting records.

The accounting year is between January 1 and December 31. There is no differ from the Hungarian rule.

The accounting principles help to interpret the economic transactions in the same way.

The valuation methods are one of the key point of the bookkeeping. There are big differences between the Hungarian and FADN valuation rules. For example the depreciation method. In Hungary it is not used and not known the depreciation method based on the replacement value. The farmgate price is also not known and the subsidies are calculated in a different way.

I described all of the accounts in the system of accounts. The system of the accounts is based on the Hungarian scheme of accounts (section of account) but the content of accounts adjust to the FADN system.

The analytical register is linked with the content of accounts.

The rules of the inventory includes the inventory date and the methods. The inventory especially important in case of new farmers (new data providers) and in case of stocks.

The bookkeeping offices collect the data quarterly. They ask the farmer about the events and collect the available accounting records. It means that in Hungary not every event is registered on the paper. In this case the farmers have to have a very good memory. This method can generate errors. To get rid of this mistakes I invented an 'Event diary' (table 6.1). It is very simple to use this Event diary for the farmers and to record the data in. It resembles to the common used yearly calendar but the content of the fields are related to the agricultural activities. The activities are recorded daily.

I recommended to collect the Event diary every month. This ensure that the farmers fill in it regularly and they do not have to remember for a long time back as the actual system works. The monthly collection is also better for the bookkeeping offices because their work could be continuous and they have time to check and correct the data.

The Event diary is useful for the farmers, too. They can see exactly all the events and they can plan their activity.

Table 6.1 The Event diary

12th of April 2000	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Wednesday						1	2
	3	4	5	6	7	8	9
	10	***11***	***12***	***13***	***14***	***15***	***16***
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

Actual informations: VAT confession and pay in.
Manuring.

Own remarks: Paying for tilling.

Event	Quantity unit	Quantity	Price unit	Value Ft/unit	Remarks Ft
Paying for the work for Árpád Kiss				20,000	
Artificial fertiliser purchase for maize	kg	500			NPK
Nutrient purchase for the piglets	kg				
Paying for tilling	ha	10			

Signature:

Comments to the content of columns

Short description of the event. Every line is for different event.	Unit relating to the event: Ft, kg, t, l, piece, m, km, m^2, m^3, ha, , etc.	Quantity related to the event.	Price unit if it is known. If the sum value is known it is not	The sum value of the event. If the price unit is known it is not needed to fill in. By own product the value is the farmgate price.	Remarks for the farmers or for the bookkeeping needed to fill in.	offices.

Data form

6.4 Summary

The present bookkeeping system differ from the EU FADN. On the basis of the Hungarian bookkeeping practice it is needed to develop a new system adjusting to the FADN requirements.

The new system can help with the standardization of the bookkeeping office's work. The results of this standardization are next:

- the FADN data will based on the real events of the farmers (Event diary);
- the data recording system will be the same;
- the content of the data will be uniform;
- the content of the data will be harmonized to the EU FADN data;
- the summarized data in the RIIEE will be uniform, too.

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Workgroup Session 2: Changes in the Farm Return for candidate countries

Introduction

It is clear from the previous presentations that the current FADN Farm Return would not yield to a true and fair view of the economic situation in candidate countries. In this session we will make a list of items that should be added to the Farm Return in order to describe the situation in candidate countries. We concentrate on the specific farm structure issues in these countries. This means that we will not discuss the list of products (e.g. more details on hops for the Czech Republic) or on the treatment of national subsidies that are not yet comparable to the EU system. The main items for discussion therefor seem to be:

- description of the legal status of the farm (co-operatives, limited companies, holding companies with limited companies etc.);
- description of the ownership situation of the farm (who are the owners of a limited company: the workers, land-owners not working in the farm etc.?);
- description of the arrangements for the use and ownership of the land;
- description of the labour input (numbers, quality, use of unemployment-benefits in case of an oversupply of labour etc.);
- etc. ???

Task

Each of the groups is asked:

- to discuss the list above and to make it as complete as possible: what would you like to know from the candidate countries FADNs on specific central european topics?
- to make a concrete proposal in the form of a table to be added to the RICA Farm Return on one or more of these topics. Take the topic your most familiar with, and not by definition the first one of the list.

Groups for workgroup session 2 (chair in italics)

1. *Dirk van Lierde*
   Yves Plees
   Josef Hanibal
   Guido Bonati

2. *Gert Giversen*
   Jaanika Jalast
   Anita Tangl
   Vincent Chatellier

3. *Werner Kleinhanss*
   Gabor Kovacs
   Beat Meier
   Hans-Hennig Sundermeier

4. *Patrick van Driessche*
   Susanna Perachino
   Bernard Del'homme
   Nicole Taragola

5. *Knut Samseth*
   Katalin Juhász
   Krista Kõiv
   Hans Vrolijk

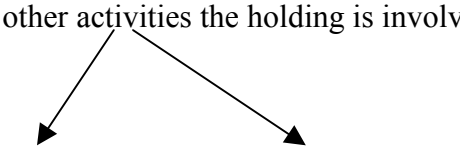
6. *Koen Boone*
   Szilárd Keszthelyi
   Tommy Burke
   Jan Doeksen

Results

Work session 2, group 1

What information do we want to know (add or adapt the Farm Return)
Will the information be used.
How can we collect the information

- In what other activities the holding is involved



  (not always products)

- Concerning subsidies: at least difference between national subsidies and EU subsidies.
- Way of payment:
  - wage;
  - advantage in products;
  - advantage in housing;
  - share in the profit.
- Clear distinction between management and executing persons.

Concrete proposal

Legal status
Code table with good definitions of a number of groups of legal status to be used by all member states.
Subcode table used by individual member states with more detailed information specific for the situation in the country (if available !)

Work session 2, group 2

Labour input

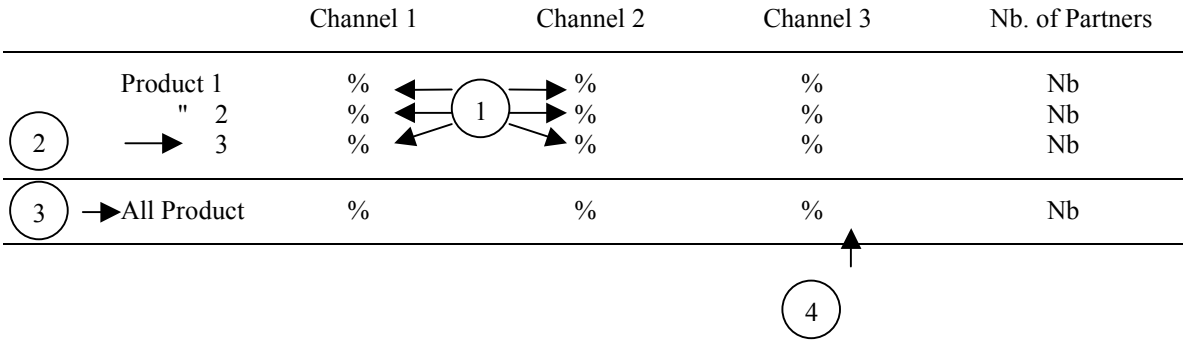
General information:
- age;
- education level;
- experience (date of enterance the amount of work (full/part time position in the farm (owner/worker).

Special information:
- wages for the labour;
- estimate of wages for famely;
- amount of wage payed to employees (without tax);
- information about home consumption (expressed in money terms).

Work session 2, group 3

Criteria - need for information:
1. the legal status;
2. property of the farm (share holders);
3. distribution of earnings by:
   - labour input;
   - land;
   - buildings;
   - other capital;
4. flow of goods and services between different holdings.

Sales by marketing channels



Work session 2, group 4

To be added in the list:
- Business type
  - 'pure' agricultural business;
  - agricultural business combined with other activities;
  - non-agricultural business ?;
- Machinary ownership ... .

Tables:
- no addition of tables:
  - use of existing tables allowing more flexibility;
  - additions/extension of attributes;
  - agricultural business ratio when no dissociation possible?

Work session 2, group 5

- Legal status:
  - other categories;
  - number of owners.

- In some areas:
  - more details.

- Black market:
  - impossible to solve !

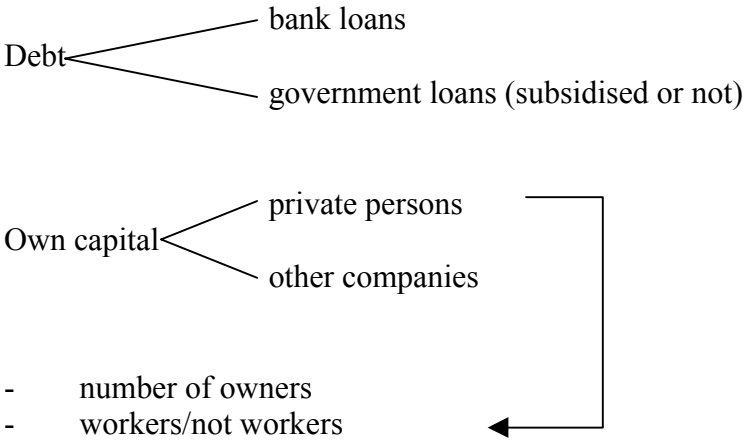
- Clarity of definitions

- Depreciation systems

Work session 2, group 6

1. Extra variables
   - structure/duration of loans;
   - financing;
   - size (more sizeclasses);
   - method of valuation of:
     - biological assets;
     - land.
   - method of depreciation.

2. Financing:



7. The use of farm accounting and regression analyses in determining a value on small parcels of landed property

Knut Samseth, Sølve Bærug and Agnar Hegrenes, Norwegian Agricultural Economics Research Institute (NILF), Oslo

Abstract

This paper develops a method for the valuation of small agricultural parcels. The method estimates the farmer's annual loss of income due to the minor reduction of farm acreage under consideration of the area's productivity, and the reduced output is measured by a model for 3 multiproduct agricultural industries. The model uses a flexible income function for the return to labour and land, and allows for the possibility of overcapacity with regard to farm acreage as an input factor. In addition, the model takes into consideration that farm accounts may contain faulty farm capital measurements, and that the quality of labour can vary with age of the farmer. In a selection of Norwegian holdings from the Account Statistics for Agriculture and Forestry from 1995-1997, an estimate shows that the marginal returns to land, on average for all productions, vary between NOK 6,500 and 17,000 per hectare in the various climate zones. The method can be applied to individual farm units, using only few and easily available farm data.

Keywords: Landed property, small parcels, valuation, compulsory purchase, multi output function

7.1 Introduction

Sometimes it is necessary to evaluate to what degree net income of a farm are affected by changes in the farm's total cultivated acreage, e.g., when considering the purchase or rent of additional land in order to increase the farm's production area, or when land needs to be sold for other purposes, such as road construction. Such transactions can be the result of either voluntary or compulsory purchases. Compulsory purchase can be applied in Norway when the parties involved cannot agree on the price, or when the transaction is clearly of general public interest (Law 1959-10-23 no. 03: Compulsory Purchase Act section 2).

In Norway, the expropriation value is based on the use value reduction for any agricultural enterprise run on the property. The decrease in an agricultural property's market value is only applied if this reduction is greater than the decrease in use value (Law 1984-04-06 no.17: Compensation for expropriation act section 4). However, this is in reality never the case in Norway due to the price regulation of agricultural real estate.

The expropriation compensation is determined by legal appraisal, which often is based on estimated residual earnings. These show the decline in net result and are calculated by subtracting the costs saved by not farming the expropriated land (variable costs).

The decline in annual net result is capitalised for an infinite period of time in order to arrive at the area's value.

The estimated residual earnings are often based on data from various sources, adapted to the conditions in each individual case. Such estimated residual earnings are sensitive with regard to whether or not one classifies a cost as variable. It is usually possible to utilise surplus capacity elsewhere on or off the farm in the case of reduced area, but it is nevertheless often difficult to specifically point out such possibilities. Furthermore, labour costs are often substantial, but it is difficult to evaluate the exact cost to be assigned to the labour input. This implies that the residual earning estimates have a significant degree of uncertainty. The expropriation compensation is often in the range of NOK 100,000 to 200,000 per hectare. The uncertainty regarding the valuation (of small parcels?) leads to variations of the legally determined compensations that are difficult to predict (Johansen, 1991). Amicable settlements are therewith difficult to achieve. In some cases, the estimated residual earnings even result in negative use values, which casts some doubt on the method itself.

It is thus of interest to evaluate other methods for estimating the returns to land. One method could be to use market values, but there are insufficient statistics to base such estimates upon. We are thus considering if the use of estimates from an econometric treatment of agricultural accounting statistics can contribute to reduce variations of the results of farmland valuations.

The data used is taken from the database of the Account Statistics for Agriculture and Forestry in Norway (NILF, 1996-1998). It consists of annual farm accounts of approximately 1,000 Norwegian farms, many of which participate in the survey for a number of years. In addition to the financial data in the accounts, other enterprise data and facts about the farm and farm family are included.

The objective of this paper is to construct a model that can be used to estimate the returns to land under specific conditions.

7.2 Some theory

In economic theory there is a distinction between short and long term. In the short term, the production facilities and the costs associated with these are given. There are thus a number of fixed costs. Other costs are variable, depending on the production volume. In the long term, however, one can choose the size of the production facilities, and all costs are thus considered variable. Many of the problems related to the use of estimated residual earnings are connected to the uncertainty regarding the determination of fixed and variable costs in each specific case.

In agriculture it is reasonable to assume that the use of certain inputs per hectare is independent of the total farmed acreage. For example, fertiliser application per hectare is determined by how the yield per hectare is affected by the input of fertiliser per hectare, and by the product and fertiliser prices. In practical terms, the optimal fertiliser application per hectare is the same for an area of 10 ha as for one of 50 ha, given that the area otherwise is of uniform character. This implies that a change in acreage leads to a proportional change in fertiliser input and corresponding costs. However, the relationship between input

and yield does vary between different areas due to differences in soil properties, climate, etc.

Such inputs that vary proportionally with the acreage are typical examples of factors considered variable in the short term. Other factors are associated with fixed assets such as farm buildings, machinery, etc. Such factors will not directly change in the case of a change in acreage, or a change would necessitate substantial costs. However, in the long term, i.e., in connection with investments, it is possible to change these costs as well. In reality, this possibility may lie far ahead in the future, depending greatly on the specific conditions on the individual farm.

Costs that really are fixed or only can be changed many years from now will not be affected by a change in acreage, and it is therewith not correct to subtract these when calculating net loss of income. However, it is often reasonable to assume that these costs can be changed in the long run. This applies to machinery, buildings and labour costs, especially for the farmer and permanent employees.

When using production income less some costs as a dependent variable (product), the marginal product for a factor would be the added value of the product, which is the excess of what is needed in order to cover the costs of unspecified inputs used at the same time (Norum, 1974, 10). The subtracted costs can also be designated as being more endogenous (dependent variable) than those factors we are estimating for (Griliches and Ringstad, 1971, 108-109).

7.3 Alternative methods for land value determination

As already mentioned, use value estimates are often based on estimated residual earnings, which in turn are based on 'engineered data', that do not always fit that well with 'real life' experience. Actual results are presented in the farm account statistics, available for a large number of Norwegian farms.

In this article we assess a method that bears some resemblance to estimated residual earnings, however, the estimate is based on farm accounts. Land value is most relevant in a future perspective. A basic condition for using account-based estimates is thus that the accounts can also be seen as an expression of future income and expenses.

In farm accounts, a number of different measures of profitability are used, and these are often determined by means of the residual method. This implies the subtraction of certain costs from the production income, resulting in a measure for what is the residual for some factors when other costs have been covered. For example, the gross margin is what remains to cover fixed costs, whereas net farm income is what remains to cover management and investment income plus the value of the manual labour of the farmer and farmer’s family when all other expenses have been covered.

Most farms in Norway are family-run enterprises. The same person/family is at the same time farm owner, farm manager and performs most of the farm labour. Thus, in this paper farm management will be treated as part of the general labour input. By subtracting the value of the family's labour input and the cost of other capital than land from the net farm income one arrives at an isolated value for the returns to land. To do so, the value of

family labour and the cost of invested capital must be determined. These two cost factors are, however, difficult to determine in reality.

The calculation of capital costs requires that one has a measure for the amount of capital and an expression for the cost of having tied-up capital. There are expressions for both of these in the accounts. There may be objections to the way we have determined these expressions, but with certain reservations we have used these estimates, as presented below.

It is in principle difficult to measure labour input for self-employed farmers, but we assume that the labour registrations are sufficient. The alternative value (opportunity costs) of the farm family's labour input, presumably varies significantly between persons within a family and between families. In the farm accounts, standard values are imputed for unpaid labour. We therefore assume that the costs used in the accounts can differ considerably from the actual labour costs.

For this reason we have not calculated labour costs. The measure of profitability we thus end up with is what is left to cover land and labour when all other costs have been covered, according to the principles used in the farm account survey.

We thus assume that:

$$Y = f(L,T)$$

where Y = residual income to cover land and labour, L= labour input and T= land (acreage).

We have also called the residual income (Y) 'land and labour income'. The challenge is then to formulate an *operational* definition of the different factors, determine any other factors to be included in the function, and decide upon the *functional form* before carrying out the actual estimation.

7.4 Factor inputs' uniformity

Farm accounts show a farm's results for a given year. They do not give any information on how the results would change if, e.g., the total farm acreage changed. However, if one has access to farm accounts from many farms of varying sizes, one can estimate how the financial results are effected by variations in one or several factors. When doing so, it is important to take into consideration a number of aspects, e.g., that the production capacity per hectare varies in the different parts of the country due to variations in soil type, climate, etc.

The fact that the input factors in such models are not uniform is generally a problem in economic theory. Numerous suggestions for how to accommodate for this by characterising and weighting the different factors have been presented. Weighting can include characteristics for factors such as fertility, site location, field size and shape, etc. (Ylätalo, 1991). In our models, we apply the first three of the mentioned characteristics, since this information is readily available from the database we have prepared. However, we do not rule out that the fourth characteristic, field shape, also is relevant.

7.5 A model for marginal rate of return

General model

It is difficult to measure income by means of accounts. Several cost elements, such as capital costs (depreciation, interest) and labour costs, are calculated costs. The allocation of costs over time and necessary adjustments for general and specific inflation has frequently been a topic for discussion. Accounts do not necessarily reflect the economically 'correct' cost, and this may lead to differences between historic and future costs, as mentioned above.

By using regression analysis we hope to find a correlation between changes in the land input (farm acreage) and labour and land income. The chosen functional form limits the interpretation of the estimates to a certain degree. In order to carry out the analysis, we must take the following questions into consideration:

- How should the dependent variable be measured?
- What are the independent variables and how should they be measured?
- Which functional correlation should we assume exists between the dependent variable and the independent variables?

For each of these questions there can be many different answers. Farm acreage is expressed in hectares. Within a single farm unit, some fields can be more productive than other fields. As a result, the marginal rate of return in our model is an estimate based on a farm's average land productivity. In order to express that farmland has varying productivity between farms, we weight the area *Td* by the yield *Ta* per hectare, so that the total land input in the production $Tf = Ta*Td$.

The yield *Ta* is expressed as its feed value, FEm (feed units milk). Grain yields are presumably measured more accurately than other crops (grass, feed crops, etc.), primarily since grain is sold on the market.

The farms in the survey represent the entire country, and crop-growing conditions vary significantly. The region of Jæren in south-western Norway has a climate almost like in Denmark. Eastern Norway also has a long growing season, e.g., Ås has 235 days with an average temperature of more than 5ºC. In some areas in Northern Norway the growing season can be as short as 116 days, as is the case in Kautokeino in the county of Finnmark (Gudem and Hovland, 1999, 9).

In the accounting data Norway is divided into eight regions, according to varying conditions for crop production. In the regression analysis, a variable for region, *Ri*, is included.

Labour input is expressed in hours, but productivity per hour presumably varies. This effect is partially taken into consideration by making adjustments for labour input by specific age groups (children, senior citizens). Productivity and alternative value can also vary between other persons or over time for one and the same person. For example, the value of labour can decrease with increasing age of a person. The farmer's age (S) is thus a factor assumed to describe some of the of the labourer's market value. The term S2 expresses that the market value possibly decreases with increasing age (Woldehanna et al., 2000).

Agricultural policies can also have substantial influence on the managerial decisions made by the individual farmer. One of the aims of agricultural policy is to counteract the effects of the natural conditions.

A farmer's welfare depends on his or her income level, but owning and operating his/her own farm may also be an important welfare-determining factor. These are hidden values for us. Therefore one cannot expect a high marginal rate of return to labour in the model for ordinary productions presented here.

The labour market is probably not so flexible that a farmer adapts to a national labour market, but rather relates to regional conditions. This is another reason for using the factor *Ri* in the regression.

Furthermore, we assume that the labour and real estate market function, so that negative values for labour and capital prices are illogical. We thus assume that the model gives positive prices for labour (P1) and farmland (P7).

The account survey includes data from different farming systems. The questions thus arise whether to make estimates for each farming system or for different systems simultanously, perhaps with a dummy variable for farming system. In the following estimates we have chosen to calculate several systems collectively, but have used a dummy variable for farming system, *Dg*.

Thus, the function can be expressed as:

$$Y = L(P_L; L_f, R_i, S) + T(P_T; T_d, T_a, R_i, D_g)$$

s.t.

$$P_L \geq 0 \text{ where } L = \{1,21,22,3i\} \text{ and } i = \{2,...,8\}$$

$$P_T \geq 0 \text{ where } T = \{7,\ 8g,\ 9i\} \text{ and } g = \{1,2\} \text{ and } i = \{2,...,8\}$$

where S and *Dg* are specifications on certain input factors and *P* is the prices for the respective input factors *L* and *T* and the regions *Ri.*

7.6 Measuring errors in the accounts

In the estimates we use data from individual farms. The annual results are dependent on a number of factors that cannot be controlled by the farmers, such as weather conditions. Another source of error is regarding the recognition of revenue of the accounts, e.g., in connection with the uncertainties regarding the valuation of stocks on hand. A three-year nominal average of each individual farm is used in order to reduce the error resulting from varying weather conditions and possible errors in the accounts due to capital valuation.

As already mentioned, there may be errors in connection with the subtracted capital costs due to the fact that we used accounts based on historic cost to make the estimates. This implies that the balance values *Qk* in the accounts are not market values and thus the capital costs are not correct.

One of the big advantages of using regression analysis is that it has methods for correcting errors in the data material. Young farmers invest more than older farmers. In addition, many farmers make investments shortly after buying or inheriting a farm, irre-

spective of their age. In times of inflation the balance values are measured in non-adjusted monetary units. In order to make corrections for errors in capital valuation, we use the factors age (*S*) and time period since the farm transfer - operating time (*Z*).

Taking these comments on sources of error into consideration, the function thus becomes:

$$Y = L(P_L; L_f, R_i, S) + K(P_K; Q_K, Z, S) + T(P_T; T_d, T_a, R_i, D_g) \text{ where } K = \{4,5,6\}$$

with the same restrictions as in the previous equation.

7.7 Functional form

Cobb-Douglas function is often used in similar estimations. If the data are transformed somewhat, the function can be estimated by the normal least squares method. The function requires constant return to scale. Even if the linearized model is flexible enough to allow a large variation in the shape of the regression, it still rules out many useful functional forms (Greene, 1993, 314). The need for estimates with flexible functional forms that also have non-linearity in their parameters implies that we use other functional forms.

There are different methods of approaching functional forms, such as Box-Cox transformations or generalizations of the Cobb-Douglas product function (Zellner and Revankar, 1969). When the input of land area increases while the other input factors remain the same, it is probable that this leads to diminishing returns to land. Recent studies in Norway suggest that there is economy of scale in certain productions (Løyland and Ringstad, 1999; Ringstad and Løyland, 1999).

The chosen functional form enables both a degressive and a progressive correlation between land and the dependent variable. For labour and capital we assume linearity relative to Y.

In order to adjust to possible economy of scale, an inverse exponential term is included in the model. This requires the scaling of the variables around their average values. The scaling ensures numeric values less than 1, enabling the use of this part of the function for expressing economy of scale for land.

Normally, the function should go through the origin. The data material rarely has observations near zero for input factors, thus necessitating a constant term *V* for all productions and *Pg* for production *Dg*.

The model specifications thus become:

$$Y = V + \sum_{g=1}^{2} P_g D_g$$
$$+ (P_1 + P_{21}S + P_{22}S^2 + \sum_{i=2}^{n=8} P_{3i}R_i) \cdot L$$
$$+ (P_4 + P_5 S + P_6 Z) \cdot Q$$
$$+ (P_7 + \sum_{g=1}^{2} P_{8g} D_g + \sum_{i=2}^{n=8} P_{9i} R_i) \cdot (e^{-aT} - 1 + bT - cT^2))$$

where P22 <0, a>0 and c>0.
The estimate's restrictions are now:

$P_1 \geq 0$

$P_7 \geq 0$

The rescaled marginal rate of return to land *Td*, labour *L*and of capital measurement error *Qk* thus becomes:

$$\frac{\partial Y}{\partial Qk} = Ym \cdot (P_4 + P_5 S + P_6 Z) / Qm$$
$$\frac{\partial Y}{\partial L} = Ym \cdot (P_1 + P_{21}S + P_{22}S^2 + \sum_{i=2}^{n=8} P_{3i}R_i) / Lm$$
$$\frac{\partial Y}{\partial Td} = Ym \cdot (P_7 + \sum_{i=1}^{2} P_{7gi} g_i + \sum_{i=2}^{n=8} P_{7i} R_i)(-ae^{-aT} + b - 2cT)(Ta / Tm)$$

where the average of the dependent and independent variables is indicated by the addition of m to the variable's name (*Ym, Qm, Lm, Tm*).

7.8 Land valuation

Deriving the function with regard to land results in an expression for the marginal rate of return to land, i.e.:

$$\frac{\partial Y}{\partial Td} = \frac{\partial Y}{\partial T} \cdot \frac{\partial T}{\partial Td} = y(P_T; T_a, T_d, R_i, D_g)$$

This is an annual rate of return, and when using farm accounts as a basis for estimating returns, the rate of return will be tied to historic data. We have used data from the years 1995-1997, but the estimates are in this case intended to be valid in 1999. In other words, the data are on average three years old relative to the year of valuation. Ideally, the results should be adjusted to current prices and conditions. Such an adjustment could possibly be made by means of an index for labour and capital income in agriculture, which

probably is the index that resembles the basis of the estimates most. Otherwise, the consumer price index could be used to simplify matters somewhat.

In order to determine the land value the annual rate of return must be capitalised. Land is usually considered a non-exhausting factor, and is thus capitalised infinitely.

As an example of how this can be done, we have used the consumer price index *C* for price level adjustment and a capitalisation rate *r*. The equation for calculating the use value B thus becomes

$$B = \frac{\partial Y}{\partial Td} * \frac{C_h}{C_{h-3}} * \frac{1}{r}$$

The choice of interest rate is not discussed in this article.

7.9 The data and statistical method

The data

The data is taken from the Survey of Account Statistics for Agriculture and Forestry ('Account Statistics') for the years 1995-1997 (NILF, 1996-1998). The productions studied were dairy, sheep and cereal farming. These are the major productions in Norway, and are thus highly representative for all land-based agricultural production. Only farms that had the same production throughout the mentioned period were included in the data.

The relative farm size distribution within the data is shown in table 7.1, and is compared to the Account Statistics and the Agricultural Statistics (SSB, 1997). Even though the Account Statistics include more than the three productions dealt with in this analysis, the same farm size classification is naturally used. Compared to the Agricultural Statistics, which is based on all Norwegian farms, our data includes a higher percentage of large farms. This is intentional, since the Account Statistics (as well as our data) are meant to represent professionally run farms, on which the income from agricultural production represents a relatively large share of the total household income. In spite of this, the farm accounts can show negative net farm income some years. In our data this mainly applies to cereal-growing farms.

Table 7.1 Relative farm size distribution for 1996 (in %)

Farm size	This study	Account statistics	Agricultural statistics
3.5-5 ha	1	2	27
5-10 ha	12	14	24
10-20 ha	51	47	30
> 20 ha	35	37	18

Source: Own calculations, Account Statistics for Agriculture and Forestry 1996, Agricultural Statistics 1996 (Statistics Norway - SSB).

The *regional classification (R1, R2 …, R8)* in the Account Statistics is a division of Norway into different climate and growing condition zones (NLI, 1981, p. 39-40). This classification presumably also gives a rough picture of the regional differences with regard to the labour marked. The regional distribution of farms by production is shown in table 7.2. The data includes a relatively large share of dairy farms.

A short presentation of the various data parameters is given in table 7.3. The calculated interest used to determine the returns to land and labour averaged 6.5% for the three years.

Table 7.2 Number of dairy, sheep and cereal farms in each region

Region	Milk	Sheep	Cereal	Total
Eastern Norway, Lowlands	36	0	49	85
Eastern Norway, other parts	64	19	33	116
Agder and Rogaland, Jaeren	11	0	0	11
Agder and Rogaland, other parts	36	3	0	39
Western Norway	69	15	0	84
Trøndelag, Lowlands	34	0	6	40
Trøndelag, other parts	61	7	0	68
Northern Norway	72	15	0	87
Total	383	59	88	530

Table 7.3 Presentation of the data parameters

	Unit	Mean	Standard deviation
Land and labour income	NOK	234,104	118,709
Labour	Hours	2,882	1,174
Age	Years	47	9
Operating time	Years	16	8
Capital excluding land	NOK	745,840	418,242
Yields	FEm a) / hectare	3,696	971
Acreage	Hectare	19	10

a) Feed units milk.

The covariation R (square root of R^2) between the factors Lf (labour) and T (acreage) is 0.13. That means that the value of one of the input factors, is almost not influenced by the other. However, covariation is significant between capital and labour, and between capital and acreage (0.51 and 0.53, respectively).

Statistical method

The results are estimated by means of numerical analysis. The statistical method used in our estimates is the ordinary least square method (OLS) in SAS procedures (SAS, 1993, 507-684). The numerical iterative method involves the testing of different values for the parameters a, b and c in order to minimise the model's residual sum of square errors uncorrected for degrees of freedom. The iterative method converges its trial by means of the rate of improvement.

7.10 Results of the regression

The parameter estimates of the function are shown in table 7.4.

The t-ratio values are generally low. This is not uncommon when estimating a function with several different production systems (Moore, 2000, p. 568). Multicollinearity leads to unreliable estimates. White's test for heteroscedastisity in all parameters shows signs of heteroscedastisity at a probability of 0.0033 with a Chi-squared distribution.

Our estimates regarding labour are low, with a low t-ratio. Some of this may be due to high and significant constant terms, both for the model in general and for each production type. Equivalent estimates based on only the family's labour input (hours) instead of all labour result in a more than twice as high constant term V, and lower estimates than in table 7.4.

The model's basic function does not indicate any economy of scale for land (acreage). The t-ratio of the a-estimate is low. This result could be explained by the fact that there are few scale advantages related to land as an input factor, especially in livestock production, since machinery and buildings are of greater importance. In Norway, it is probable that the capacity of the dairy barns often are not fully utilised.

7.11 Estimates of marginal rate of return

Table 7.5 shows the marginal rate of return on land in the different regions, based on regional average yields and farm sizes. The values for 'all productions' are weighted according to the relative share of each of the productions within each region. Farms in Norway are small, and we have therefore expressed farm acreage in decares, as is common in Norway, where 1 decare = 1,000 m^2 = 0.1 ha.

The use of 3 kinds of production in the model implies that some information is hidden in the 'production'. Sheep husbandry is partially based on off-farm resources, such as rough and mountain grazing land. However, in highly productive areas such as Jæren, the marginal returns to land are especially high due to high stocking rates.

The correction of the measuring error for capital, is negative (-0.0335) for the data's overall average. This means that if we had correct capital values the capital interest would had been reduced by 3.3 to 3.2%.

Table 7.4 Estimates of the function a)

Parameter	Estimate	T-ratio
Intercepts:		
V	0.4629	1.96
P_{v1}	-0.3487	-3.33
P_{v2}	-0.5727	-6.03
Labour:		
P_1	0.0738	0.30
P_{21}	0.0061	0.66
P_{22}	-0.0001	-0.73
P_{32}	0.0352	0.61
P_{33}	-0.1119	-0.65
P_{34}	-0.0461	-0.38
P_{35}	0.0197	0.25
P_{36}	-0.0293	-0.38
P_{37}	0.1962	1.88
P_{38}	0.1254	1.24
Capital:		
P_4	-0.0445	-0.39
P_5	-0.0019	-0.70
P_6	0.0015	1.00
Area:		
P_7	0.2113	0.94
P_{81}	0.0784	0.88
P_{82}	-0.0560	-0.91
P_{92}	-0.0061	-0.35
P_{93}	0.0605	0.79
P_{94}	0.0128	0.24
P_{95}	0.0282	0.70
P_{96}	-0.0111	-0.43
P_{97}	-0.0717	-0.87
P_{98}	0.0699	0.91
a	19.2941	0.43
b	3.8700	0.95
c	0.2134	0.89
Adj R-square	0.8238	

a) Subscripts: vg and 8g are production types where g=1 is sheep, g=2 is cereal, 3i and 9i is region i 2-8, 21 and 5 is age and 22 is age square, 6 is operating time, a, b and c coefficients related to the base function for area.

The marginal returns to labour were on average approximately NOK 17 per hour. The figure seems very low, even though we did expect a low value. Many farmers have off-farm work, and the distinction between actual farm labour and leisure time on the farm is not always very clear for some productions. This may contribute to the low marginal value on labour.

Table 7.5 Marginal rate of return on land by production, based on each region's average farm size NOK per 0.1 ha

Region	All productions	Milk	Sheep	Cereal
Eastern Norway, Lowlands	856	1,011	-	743
Eastern Norway, other parts	790	802	-	583
Agder and Rogaland, Jaeren	1,728	1,728	2,227	1,372
Agder and Rogaland, other parts	1,073	1,044	-	-
Western Norway	1,185	1,119	1,486	-
Trøndelag, Lowlands	836	872	1,214	-
Trøndelag, other parts	655	619	-	371
Northern Norway	972	928	1,187	-

The estimates for marginal labour are not average hourly wages since we have a constant term in the model. The marginal returns to labour are inversely proportional with the marginal returns to land when making comparisons between different regions.

Another question is whether family labour input with a corresponding adjustment of the dependent variable is a better measure than total labour input. Alternative estimates using only family labour input show that the model's values become clearly lower for marginal returns to land and labour than the values in table 7.5. The explanatory capacity of the model, adjusted R-square, is reduced to about 0.5. The constant term also becomes larger than in table 7.4.

7.12 Valuation

Table 7.6 shows the land values generated by the model when the annual returns are capitalised with an annual interest rate of 5%. This rate of interest is chosen to exemplify the method, but it is also close to the interest rate often used by the appraisal court. When converting from 1996 to 1999 we used the consumer price index for the two years.

Table 7.6 Values on land based on table 7.5. Rate of interest r = 0.05, consumer price index in 1999 = 102.3 and in 1996 = 95.3. Values as NOK per hectare

Region	All productions	Milk	Sheep	Cereal
Eastern Norway, Lowlands	183,810	216,977	-	159,442
Eastern Norway, other parts	169,566	172,163	-	125,157
Agder and Rogaland, Jaeren	371,015	371,015	478,050	294,536
Agder and Rogaland, other parts	230,271	224,235	-	-
Western Norway	254,353	240,304	318,979	-
Trøndelag, Lowlands	179,428	187,288	260,629	-
Trøndelag, other parts	140,674	132,986	-	79,624
Northern Norway	208,769	199,192	254,736	-

The values in table 7.6 range from NOK 79,000 to NOK 371,000 per hectare. The figures naturally show the same variations as the figures for annual returns in table 7.4. As mentioned, compensation payments are often in the order of NOK 100,000 to NOK 200,000 per hectare. Other than that, it is hard to judge whether or not the values are reasonable.

The model has a continuous function, so that there is no interval in the production which the model cannot account for. The model is only limited by the maximum and minimum values of the input factors.

The small change in total land leads to an insignificant or no change in the other input factors such as labour. The model should thus account for adjustments, being either loss or gain.

7.13 Summary and conclusion

Some times farmland needs to be sold for purposes, such as road construction. In such cases it is vital to have knowledge on how the financial results change due to the change in the farm's acreage.

This study develops a model for estimating the marginal returns to land. The parcel's fertility, expressed by its yield level, plays a major role in the model. Farm data are taken from the Account Statistics for Agriculture and Forestry from 1995-1997. The model includes 8 geographical regions and 3 different types of farming. The marginal returns to land, on average for all types of farming, vary between NOK 6,500 and NOK 17,000 per hectare in the various climate zones.

The study takes into consideration that many farms are not run optimally, and that they can have overcapacity regarding certain input factors. Several recent studies have indicated that there presently is overcapacity in Norwegian agriculture. We have associated the possibility for scale economy in agriculture to the model's land (acreage) factor, but did not receive any good estimates for this

Using economic theory and statistical methods it is possible to estimate the average value of a small parcel of farmland for any combination of the input factors land, capital and labour. The method can be used to estimate proper values in connection with compensation allotments.

The method can be applied using individual farm data, since it only requires few and easily available data from the farm. Model estimates for reduced returns to land require data on the farm's acreage, yields, productions and (geographical) location.

The model is based on farm accounts, but we have also included model specifications to account for measuring errors for capital costs. This has a significant influence on the model's results.

We have estimated functions that account for climate and soil type by means of yield results on each individual farm. These factors together give more reliable estimates of each farm's reduction in returns to land than the factor 'land' by itself.

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8. Fair value in agriculture - first implementation of IASC E65

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8.1 Introduction

The International Accounting Standard Committee (IASC) is working on an International Accounting Standard for Agriculture. The first version of an exposure draft (E65) was issued in 1997. The IASC plans to issue the new standard before the end of the year 2000. This paper is about the implementation of the Exposure Draft in the Dutch Farm Accountancy Data Network (FADN).

In the FADN of the Agricultural Economics Institute (LEI) financial and technical results of 1,500 Dutch farms are assembled. The LEI uses its own accounting standards for the determination of balance sheets and results. The accounting standards of the LEI have always had much influence on the methods used by the Dutch accountancy offices. The Harmonised Accounting Standard for Agriculture (GRAS), which was released by LEI and the Association of Agricultural Accountancy offices (VLB) some years ago, is based on the accounting standards of the LEI. Each year, the LEI calculates the prices of biological assets on balance sheet date. These prices are distributed and heavily used in practice.

This papers starts with a short introduction to Dutch agriculture. After that the IASC Exposure Draft on agriculture is described followed by practical problems which arise when using E65 (and especially fair value). When there is no marketprice available, fair value has to be estimated. In sections 8.5 to 8.7, the use of different methods for estimating fair value is described. The paper ends with a discussion and conclusion.

8.2 Dutch agriculture

Dutch farms are relatively large in comparison with farms in other EU member countries. Dairy farming is the most popular farm type in the Netherlands. 26% of the farms can be categorised as specialised dairy farming (LEI/CBS, 2000). Horticulture is also relatively important in the Netherlands. Although less than 20% of the farms are horticulture farms, their share in total agricultural production is nearly 40% (LEI, 2000). Some horticultural farms may be industrial like firms with more than 20 employees. Some firms are even considering an initial public offering at the Amsterdam Stock Exchange. Because for some farm types scale effects can only be completely realised at a very large size, it might be expected that farms will become more and more industrial like. At the moment however,

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nearly all farms are still family farms where most of the work is done by the members of the family. Because of the intensity and the high degree of specialisation of Dutch agriculture, many inputs (feed, piglets etc.) are not produced on the farm but are bought on the market.

Market information about prices of most agricultural products has always been available in the Netherlands. Prices are published in agricultural magazines, newspapers and recently some prices are also available on the Internet. For different reasons, market prices may cease be available in the future. First of all, products are more and more differentiated so 'the price' of a product does not exist anymore. The assembling of prices for niche products (for example biological products or special types of tulip bulbs) will be a lot more complex and expensive.

Furthermore some products are not publicly traded anymore. Where in the past products were traded at auctions that published the prices, products are now sold to one or a few large partners who have no interest in making their price publicly available. This lower market transparency can make it complex to find fair values for some products.

Because most Dutch farms are still family farms, they are not obliged to publicise their financial results. For tax purposes however, they are obliged to deliver a Balance Sheet and Profit and Loss Account based on fiscal principles. Each year, (fiscal) standards are developed for the valuation of most biological assets. These standards are based on the costs of the biological assets.

8.3 IASC Exposure draft 65: agriculture

Fair value for biological assets

The most important statement of E 65 is that all biological assets should be measured at fair value. Biological assets are defined as 'living animals and plants that are controlled by an enterprise as result of a past event'. Agriculture produce that has been harvested, is no longer included in the biological assets. Though the origin of the agricultural produce is a living animal or plant, it is no longer alive after harvest. Harvested products should be treated the same as other products where (part of the product) has a living origin. Therefore, harvested produce should be treated as all other inventories at the balance sheet and is thus valued at historical costs.

Fair value at point of harvest

E 65 considers the fair value at the point of harvest as the historical costs of the product from that point of time. This means the fair value of harvested produce should be determined at the point of harvest. At the balance sheet date, the price at the date of harvesting determines the price of the product. This means, however, that two farmers with exactly the same potatoes in their barn at balance sheet date, value their potatoes at different prices because of a different harvest date. Another drawback is that the result of the storing of agricultural products, which can be an important part of agricultural activity, is not shown in the result of the period. Because the harvest of most agricultural products is during a spe-

cific period in the year, and the consumption during nearly the whole year, the storing of the products is an integral part of agricultural activity. In general, the price at balance sheet date is higher than at harvest date to compensate for the cost of storing. When the product is valued at fair value at harvest date, a farm has the cost of storing the product but not the proceeds of the higher price at the balance sheet. This conflicts with the matching principle, which says that costs and revenues should be ascribed to the right year. However, when the potatoes would be valued at the price at the balance sheet date, this would conflict with the prudence principle which states that revenues should not be realised before they are really sold. Apparently in this case the IASC considers the prudence principle as more important than the matching principle.

At the Dutch FADN all assets are valued at replacement value (in a method of current cost accounting) so agriculture produce is also valued at fair value at balance sheet. Only the market price at balance sheet date has to be assembled. When the fair value at harvest date would determine the price, prices for every possible harvest date had to be assembled.

Market price and alternatives

E 65 dictates how fair value can be determined when there is no market price available (table 8.1). When there's no market price at the current location of the product, the market price in another location less transportation costs, identification costs etc., should be used. When there's no market price for the balance sheet date, the most recent price should be used. Problems with these derived market prices will be discussed in the next section. When there's no market price at all, the price of similar or related assets or sector benchmarks should be used (section 8.5).

When the product is not marketable in his current state because it is immature, there is no current marketprice for the product. In these cases, fair value can only be based on estimations of future marketprices. The future marketprices of the product itself and/or future marketprices of the products that are produced by the biological asset, could be used. In these cases Net Present Value or Net Realisable Value should be used (section 8.6). Net realisable value can only be used when the cash flows are in the near future (less than a year). Cash flows in following years should be discounted, so for products with long production cycles net present value should be used. When all above mentioned approaches are not possible, 'fair value' should be estimated by costs. This last method can only be used when estimations of future cash flows are very insecure and relatively little biological transformation has taken place since initial cost incurrence. In practice this means that the product is not valued at fair value anymore but at 'historical cost of production' (section 8.7).

Profit and loss account

The change in fair value of biological assets should be recognised in the net profit or loss as part of operating activities. A farm should disclose the change in value for each group of biological assets separately (in the Income statement or in the notes of the income state-

1.	Market price at the reporting date in its location.
2.	Market price at the reporting date in another location less costs to place the asset on the market.
3.	Most recent market price for that class of asset.
4.	Market price for similar or related assets.
5.	Sector benchmarks.
6.	Net present value of expected cash flows.
7.	Net realisable value (short production cycle).
8	Costs (little biological transformation or impact biological transformation is not material).

Figure 8.1 Determing fair value

ment). E 65 encourages the separate disclosure of the physical change and the price change. When at the opening Balance Sheet, the value of a product is P0 * Q0 and at the closing Balance Sheet, the value is P1 * Q1, the division is made as following:

- physical change: (Q1-Q0)*P1
- price change: (P1 –P0)*Q0

Intangible assets

When an active market exist for intangible assets used in agriculture activity, E 65 encourages farms to use fair value. In the Netherlands an active market exists for milk quota, so E 65 encourages farms to value all quotas at fair value. This means that the average specialised dairy farm in the Netherlands (with a quota of approximately 400,000 kilogram) will have intangible assets of about 1.6 million guilders (www.lei.wag-ur.nl, October 2000).

At the moment, only the quota that are bought are valued and they are depreciated in 14 years. Dutch Accountancy law prescribes that only intangible assets that are bought can be valued at the Balance Sheet. The average value of quota at the balance sheet is 200,000 guilders now. The total of the balance sheet will increase from 2.3 million to 3.7 million guilders and solvability will rise from 74 to 84.

Using fair value on the balance sheets influences also the results of the dairy farms. At the moment the bought quota are depreciated in 14 years, which lowers the income. When fair value is used, only the change in fair value influences the income. Since the price of quota is rather stable, the influence on the results of the change in value will be small. Because the (bought) quota are not depreciated anymore and assuming that on the average there will be no change in price, income rises with about 20,000 guilders per farm.

On the other hand, the 'cost' of the money that is invested in the farm will rise.

Because the value of net worth will rise with 1.4 million and assuming a cost of capital of 5%, the costs will rise with 0.05*1.4 million = 70,000 guilders. Because these 'costs' are not included in the Profit and Loss Account, they do not influence the income but they do influence cost of production calculations.

Land

There are no new accounting standards for agricultural land. IAS 16 allows agricultural land to be carried at cost or fair value. E 65 proposes that biological assets that are physically attached to land, should be recognised separately from the land.

8.4 Using fair value -market price

E 65 proposes to use market price at balance sheet date for biological assets. The price should be realised on an active market [1] near the location of the farm and at (or near) reporting date.

Contract price

Normally the market price is the best estimation of fair value. If, however, a contract price of an individual farm is available, this value should be used. The contract price is the price that will be realised for this (specific) biological asset. At the moment the contract is signed, the market price is not relevant anymore for this farmer.

From a theoretically point of view, it could be argued that the product should still be valued at market price and the contract should be valued at the difference between the contract price and the market price. Practically both solutions lead to the same joint valuation of contract and product. Because most of these contracts are not transferable, the contract should always be valued in combination with the amount of product that is available on his farm. The farmer will not receive any receipts when the product can not be delivered so there is also a risk of perish (of the product) for the value of the contract. For this reason, we would prefer the valuation of the product at contract price instead of the separate valuation of contract and product. For contracts which can be traded at an Exchange (future markets), both contract and products should be separately valued.

Representative market prices

It is important to determine the relevant market; this can sometimes be ambiguous. With living material, it can be hard to talk about homogeneous groups, as each individual item can have different characteristics. For many products, however, there are different prices for different quality classes. Each class can be regarded as a more or less homogeneous group with a market price.

Besides, not the individual products (milk cow) are valued but the group of products (the herd). Some individual product will be of a better quality than the average quality class that is used. However that is compensated by some other products with worse quality than the average quality class.

For some biological assets, there are marketprices, but these are not representative. Milk cows, for example, are sold on livestock markets. This results in a weekly-published price for milk cows. But are these cows the same as the cows held on dairy farms? Dairy farms may sell milk cows, but the bulk of the cows that are sold at markets, is usually on

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[1] E65 defines an active market as a market in which all the following conditions exist:
a the items within the market are homogeneous;
b willing buyers and sellers can normally be found at any time;
c prices are available to the public.

The Australian Accounting Standards Board demands furthermore that assets should be traded on a liquid market; that is a market with a minimum number of traders.

the lower end of the quality range as these farmers want to improve their cattle. Some farmers will sell top quality cows, but these cows will be sold directly to other farmers or on special auctions instead of the livestock market. As a result, the published price does not represent the fair value of the cattle of an average dairy farm. This is a common problem with bearers [1].

The published price could however be regarded as a benchmark. The valuation using benchmarks will be explained in section 8.5.

No market price at current location

If there is no market price at the reporting date in its location, the best estimation of fair value is formed by the market price at the reporting date in another location less costs to place the asset on the market. For example, a farm produces flower bulbs, which are only sold on export markets since there is no market for it in the Netherlands. To value these bulbs, the price on the export market less the extra costs, is the best estimation of fair value for these flower bulbs. The extra costs can include transportation costs, import taxes and agents costs. This price represents the current market situation.

No market price at current date

If there is no active market at all at reporting date, E 65 prescribes that the most recent market price will be the best approach to estimate the fair value. The most recent market price can only be used when the price is relatively stable during the period between the most recent market price and balance sheet date.

If the price of a product has a seasonal pattern, then the most recent price should be corrected by this pattern. If a product is just off-season, the price can differ significant from the price during season. The price of aubergines for example has a significant seasonal pattern. The price is high at the start of the season, then the price decreases to a low during the summer (DFL 1.20) and rises during the fall (DFL 2.50). On December 31st , the most recent market price of aubergines is the November price (about DFL 2.50 [2]). The November price is the last price from the old production cycle. The first of the new production cycle will be sold at DFL 6.70. It is clear that in this case the price of November should be corrected for seasonal fluctuations to get a reliable valuation on 31st of December. Very seasonal products as Christmas trees are also a good example. On December 31st the most recent market price of Christmas trees, is the price on December 24th. This price will not represent the actual value, as there is no market for those trees on the 31st. The fair value will be estimated in more reliable way by the net realisable value. In this case, the expected receipts of next year are used for the valuation of the trees.

For some products it might be better to use an average over some period of time instead of the most recent price, as the price fluctuates heavily from day to day. Some fresh vegetables (for example lettuce) can not be preserved after harvest, so the elasticity of the supply is nearly zero. It is well known that the elasticity of demand for basic food is rather

[1] Bearer biological assets are biological assets that bear agricultural produce for harvest. The biological assets themselves are not the primary agricultural produce, but rather, are self-regenerating.
[2] A three year average.

low ('people have to eat anyway'). This is the reason that the market price that is based on the equilibrium of supply and demand of that day, fluctuates from day to day. The price of today can be quite different from the price of tomorrow. For that reason the most recent market price can not be used as an estimator for the current or future market price. In this case, the average price over some period of time should be used (for example the average price of lettuce in January during the last five years).

Determine the amount at harvest and balance sheet date

In the E 65 the IASC proposes to determine the fair value of agricultural produce at date of harvest as from that moment it will be recognised as an inventory and measured at historical cost. For measuring the agricultural produce on date of harvest, it is essential to know the quantity at the date of harvest. For some products this may be complicated because quantity is only measured at the moment of sale.

The measurement of the quantity may not only be problematic at harvest date but also at balance sheet date. The quantities at the moment of harvest, balance sheet date and sale may differ because of evaporation and rotting. If the product is sold before balance sheet date, average percentages of evaporation and rotting could be used to make an estimation of the quantity at harvest date. If the product is not sold before balance sheet date however, only estimations of the quantity based on for example the number of lorries or m3 storage space can be used.

8.5 No marketprice available - using related assets and benchmarks

Some products can be sold at the market at the balance sheet date but there's no publicly available market price for this type of product. The product could be a special version of a standard product, which is intended for a small market. Because the demand of the customer is getting more and more diversified, these types of products become more familiar. For example with cutting flowers, there are tens of varieties of a special flower. In these cases sometimes the price of related assets can be used.

Use of related assets

One condition for the use of this method is that there is a strong correlation between the price of the standard product and the price of the related product. When this condition is satisfied, the price of the related assets can be calculated by multiplying the price of the standard product with a fixed factor. This factor should be based on the relation between the prices of the products in the past.

In the Netherlands for example, there is one dominant potato variety, named 'Bintje'. For this product, there is a quote at the Rotterdam exchange for products with a minimum size (greater than 50 mm). The prices of other varieties of potatoes have a strong relation with the price of Bintje. All these varieties of potatoes can be used for the same purpose (for example fries), so prices are correlated. There are, however, also some types of potatoes, for example organic potatoes, which are not a good substitute for Bintje. Although

there will be some relation between the prices of these products (if the price difference between the two is too large, the consumer will switch back to Bintje again), there will be far from perfect correlation. In this case, the price of Bintje can not be used.

Use of benchmarks

If there's no price of related asset available, sector benchmarks could be used. A good benchmark however will have some relation with the price of some other product(s). The benchmark for the price of a milk cow expressed per kg milk and % fat for example, will have some relation with the price of milk (or better with the gross margin on a kg milk). The use of 'old benchmarks' without correcting for price changes, can be dangerous.

If the benchmark is used by dealers however, and based on recent transactions, price changes will automatically be included in the level of the benchmark. These benchmarks can be reliable and there's not much difference with the method which uses the price of similar or related assets. In the benchmark however, not only the price of related assets but also the price of an end product (milk for a milk cow) may be used. In this last case, the benchmark is based on a kind of net present or net realisable calculation. This method is described in the next section.

Use of expert opinion

For some biological assets, the diversity is too high to have updated benchmarks for all products. In these cases the fair value can be obtained from an expert opinion. An expert opinion (in combination with benchmarks) could also be necessary when a biological asset has many varieties and various ages. For example tree cultivation products will be in a mature (and marketable) state for years with many varieties. For these products, experts are asked each year to make an estimation of the value of the different products.

8.6 No marketprice available - using net realisable value and net present value

If there is a market price of an agricultural produce, that does not mean that there is a market price of the biological asset. For example there is a price of full-grown pigs but there is no market for half-grown pigs. Many biological assets can not be valued at market price as there is no active market for immature biological assets. In these cases valuation could only be based on the future prices.

Net realisable value

For immature products with a short production cycle, net realisable value could be used. Current valuation is based on future receipts. For example a fattening pig of 60 kg has to be valued on the balance sheet. There are only (kg) prices of fattening pigs of 90 kg and piglets of 25 kg available. A very simple valuation method would be the use of the kg price of fattening pigs of 90 kg.

The kg price of piglets of 25 kg is however much higher than the price of a fattening pig of 90 kg thus just using one kg is not advanced enough. At a young age it costs more to gain a kg of weight than at an older age. Besides, the piglet price is also a market price so it should be valuable to use also this market information. The method could be improved by using formula (1):

Value = Pp + ((t1-t0)/(t2-t0)) * (Pf-Pp) (1)
Pp = Price of piglet
Pf = Expected price of fattening pig
t0 = Date at which the piglet was bought
t1 = Balance Sheet date
t2 = Date at which fattening pig is mature (+/- 90 kg)

This formula is based on the assumption that on the average the value of the fattening pig will grow proportionally during time. If the value will change disproportionally, the following formula could be used. This formula is based on the assumption that value will change proportionally with cost.

Value = Pp + (C1)/(C2) * (Pf-Pp) (2)
C1 = Total costs made from buying piglet until Balance Sheet date
C2 = Total costs made buying piglet to selling mature fattening pig

Because fixed costs will be more or less fixed during time, it is also possible to use only variable costs in formula 2.

Pf should not be based on the current price but on the expected price at the moment the fattening pig is sold. Sometimes the current price is the best estimator of the expected price. In this case the current price could be used. In most cases however, a better estimation can be made. Some prices have a seasonal pattern. Based on the average difference in the past between the price at balance sheet date and the price at the date that the pig is sold, a correction on the current price can be made to get a better estimator of the future price.

In some cases, the farmer has signed a selling contract in which a (fixed) selling price is agreed. This contract price should be used as the 'expected' selling price. In this case, the price is not the expected selling price but the selling price.

For other products, a future market exist. Fama and French (1987) and Boone (2000) proved that for the fattening pigs, the price at the future market is a better estimation for expected price than the current market price. In this case, the price at the future market for a contract with an expiration period that is more or less equal to the date at which the product is sold, could be used. When the quality of the product or the selling costs at the future market differs from the quality or selling costs of the product at the farm, corrections should be made.

Net present value

When the product is not sold in the near future, one should take account of the time value of money. Future cashflows should be discounted with an interest rate to get the present value of these cash flows. Although the theoretical concept of net present value (NPV) is clear, there are several practical problems associated with it. Many of these problems have to do with the fact that the NPV concept is derived from the Finance literature. Calculations in finance are based on cash flows and time value of money. In the Accountancy literature, calculations are based on costs and receipts. In general, the time value of money is not taken into account. The following problems occur when using NPV for the valuation of biological assets.

First of all, it may be difficult to get good estimations of future prices of costs and receipts. For some products, like trees that are used for wood production, cash flows will only be realised in 10 or 25 years. It is very difficult to estimate the wood price in the year 2025.

Secondly, there can be much discussion about the discount rate. There is no generally agreed method for calculating risk corrected discount rates. It's not too complicated to find the average interest rate at which farmers can borrow money but which rate should be used for the cost of own capital (equity)? Most farmers have a lower return on equity than the interest they have to pay on lendings. But because the risk of equity is higher than the risk of lendings, it should be incorrect to use a lower cost of equity. When the cash flows have to be discounted for more than 5 years in future, the level of the discount rate has a strong influence on the valuation. At the LEI, we use a discount rate for total capital that is equal to cost of capital of long term debt.

Third, it can be difficult to determine the costs that are used for this product. Not only cash inflows have to be discounted, but also cash outflows. Some cash outflows are used for several products so it can be complicated to allocate the cash flows over the products. Besides, which cash inflows (or costs) should be used for the calculation of net present value? Most fixed costs do not lead to cash outflows in the near future. Some costs (like the costs of own labour) do not lead to cash outflows anyway. More about this problem is described in the next section.

Fourth, when NPV is used for a profitable product, all future profits are allocated to the first year. We will illustrate this with an example. Product X has the following cash flows (at the end of each year):

Year	Cash flow (CF)	Production (P)
0	-10	5
1	20	10
2	20	10

The discount rate (r) = 5%

Cash flows that are already realised should be subtracted from the NPV calculation. These cash flows are already included in the cost and receipts of the profit and loss account of that year and should not be included in the value on the Balance Sheet. This leads to the following calculation:

Value (V) at the end of year 0 = - Cash flows this year + NPV0 (3)
V0 = - CF0 + CF0 + CF1/(1+r) + CF2/((1+r)^2)
= 10 - 10 + 20/1.05 + 20/(1.05)^2
= 27.18

This means that the product is valued at 27.18 on the Balance sheet of the end of year 0. This means that all profits that are going to be realised in the future years, are all distributed to year 0. This is in conflict with the matching principle.

We recommend therefore to distribute the profits over the years based on the production in each year.

V0 = - CF0 + (P0/(P0+P1+P2))*NPV0 (4)
= -10 + (1/5)*27.18
= 15.44

In general terms, formula (4) is described as following:

$$V_t = -\sum_{n=0}^{t} CF_n + ((\sum_{n=0}^{t} P_n)/(\sum_{i=0}^{T} P_i)) \cdot NPV_0 \quad (5)$$

t = time period
T = Total life asset

Profits year 0 = cash flows in year 0 + value at balance sheet
= -10 + 15.44
= 5.44

The same methodology as above, is used for the valuation in year 1.

Because future cash flows have to be discounted with one year less in year 1, this also leads to a 'profit' and thus a higher value in year 1. This advantage caused by the 'time value of money' in NPV calculations, is calculated in the following way:

TV(t)= NPV(t) – NPV(0) (6)

TV = Time value

When formula (6) is added to formula (5), this results in:

V1 = -CF0 - CF1 + ((P0+P1)/(P0+P1+P2))*NPV0 + r*[CF1/(1+r)+CF2/((1+r)^2)] (7)
= 10 - 20 + 16.31 + 1.86
= 8.17

Profit in year 1 = Cash flows in year 1 + change in value on balance sheet in year 1
= 20 + (8.17 - 15.44)
= 12.73

Because the production in year 1 is twice the production in year 0, the profit is twice the profit of year 0. Besides, there is the profit caused by the time value of money. In formulas:

Profit in year 1 = 2 * profit year 0 + time value of money
= 2 * 5.44 + 1.86
= 12.73

Profit in year 2 = Cash flows in year 2 + change in value on balance sheet in year 2
= 20 +(0 - 8.17)
= 11.83
= 2 * profits year 0 + time value of money
= 2*5.44 + 0.05(20/1.05)
= 11.83

When the NPV of a product is negative, the complete loss should be realised at the first balance sheet date. The prudunce principle states that a loss should always be realised at the moment that it is known.

8.7 No marketprice available - using costs

Biological products could be valued at costs when little biological transformation has taken place since initial cost incurrence or when the impact of biological transformation on price is not expected to be material. Although the method of valuation at cost of production is widely used, it is not without problems at agricultural farms.

First of all, it has to be decided which cost should be included in the calculation. At farms a great part of the cost does not lead to cash outflows. At most small farms, nearly all cost of labour are the labour of the manager(s) themselves. Should these costs be included in cost of production and at what price? At the LEI costs are included for own labour using the average hourly wages that is paid to educated workers. In some years however, the valuation at this cost of production will be higher than the market price. In this way profits are included in the profit and loss account that never will be realised.

When the costs of own labour are not included, there will be many differences in valuation between farms which only have paid labour and farms which only have own labour. The costs of paid labour is included in the cost of production but the costs of own labour is not. This problem could partly be solved by calculating average cost of production for all farms in a region. All farms could use this equal valuation. But this does not solve the problem of which costs to include in the cost of production calculations. Besides, for products that are only produced on a few (mixed) farms, it can be rather difficult to cal-

culate a reliable cost of production. A great deal of the costs is used for several products so it is difficult to distribute these costs over the products.

It could be decided to include only variable costs in the cost of production calculation. In this case, the difference in costs between the farms will be small and there is no discussion about the question which costs should be included. This method would however be in conflict with the matching principle. The fixed costs are distributed to the year but the corresponding rise in value is not. Farms which still have a lot of products on the farm would have a much lower income than farms who just sold all their products. For products where most costs (at balance sheet date) are variable costs, like autumn sown annual crops such as wheat, this problem would be less serious. Costs of land, and the labour and capital used for sowing, are still costs that are open to discussion.

Nearly all products that are valued using cost of production, could also be valued using net present value or net realisable value. The decision which method to use, will be a trade off between on the one hand the chance that the cost of production calculation will be quite different from the fair value and on the other hand the inaccuracy of the estimation of future market prices in NPV and NRV calculations. Products that are just bought and where little biological transformation has taken place could be valued at the cost of buying (plus maybe some small variable costs). Products where prices and produced quantities are relatively stable and considerable biological transformation has taken place, should be valued at NPV or NRV.

8.8 Conclusion and discussion

The valuation of biological assets at fair value results in a greater relevance, comparability and understandability of the financial results of agricultural firms.

The drawback of the use of fair value may be that the reliability of the results is reduced. We believe however, that in the Netherlands, the advantages are far more important than this small disadvantage. Although this paper shows that valuation at fair value is not without problems, it also discloses that for most products a reliable fair value can be determined. We realise however, that we are in an advanced position in the Netherlands with a well developed market information system. The implementation of E 65 in second and third world countries would be much more complicated because information about market prices is not always available. In the introduction of this paper two developments were mentioned that might lead to lower availability of market prices (lower market transparency because of concentration of companies and more co-operation in the chain and higher diversification of products). These developments may lead to a more complicated implementation of E 65 in the future.

LEI recently started a project where users of the financial statements (banks, farmers, agricultural advisors) are interviewed about the implementation of E 65. Two financial statements of the same farm are presented to them; one is based on the current valuation method of biological assets and in the other statement E 65 is implemented. The users are asked if they believe that the quality of the financial statements has improved by the implementation of E 65. The next step would be to investigate if new statements lead to better

decisions (behavioural research). In this way a cost/benefit analysis of the implementation of E 65 could be made.

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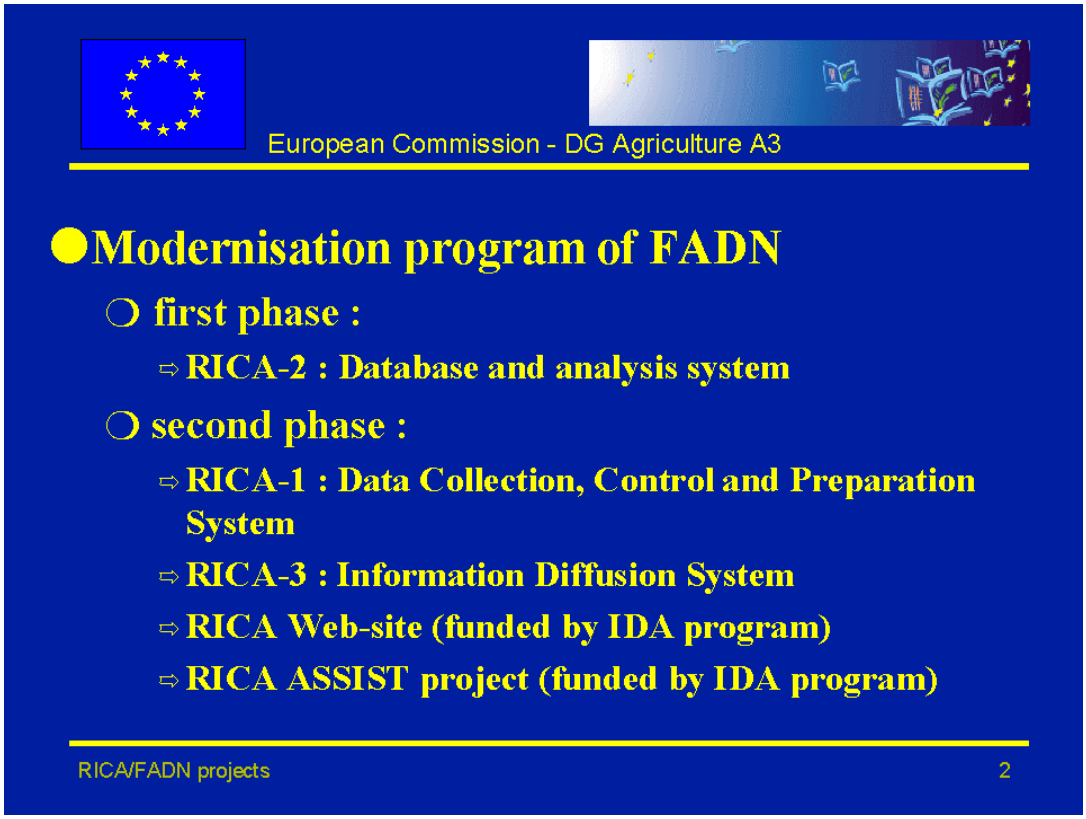
9. Presentation of modernisation projects; RICA/FADN projects

Yves Plees [1], European Commission - DG Agriculture A3, Brussels.



[1] European Commission - De Agriculture A3, Brussels.

RICA 1

European Commission - DG Agriculture A3

- **RICA 1 Data collection, control and preparation system**
  - **Complete redesign and development of the collection, control and preparation processes ("control program" included)**
  - **Contractor TietoEnator**
  - **High flexibility (New Farm Return), Internet technologies, Integration with RICA-2 and RICA-3, security and confidentiality, multilingual interface**

RICA 1: Objectives

European Commission - DG Agriculture A3

- **Permit earlier availability of data**
- **A more transparent process of data treatment**
- **Improve quality of data**

RICA 1: Approach

European Commission - DG Agriculture A3

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

RICA 1: Types of verification

European Commission - DG Agriculture A3

- Coherence and plausibility tests (XML-based)
- Homogeneity tests (SAS-based)
- Continuity tests (SAS-based)

The new homogeneity and continuity checks aim to prevent that outliers are only detected when the data are already in the data warehouse

RICA 1: Status and timing

European Commission - DG Agriculture A3

- Prototype is ready
- Final specifications of system are ready
- Development started in summer 2000
- Acceptance of basic system in spring 2001
- Access to Member States in summer / autumn 2001
- Target :basic system ready to be used from accounting year 2000 data onwards (coherence tests only)

RICA 1: Status and timing

European Commission - DG Agriculture A3

- Call for tender for further development was launched:
  - LOT 1 development of the advanced features of RICA 1
  - LOT 2 evaluation, revision and development of the test procedures of EU FADN
- Timetable:
  - call for tender has been published August 18th 2000, replies are due by October 16th
  - total time:2 years

RICA 2

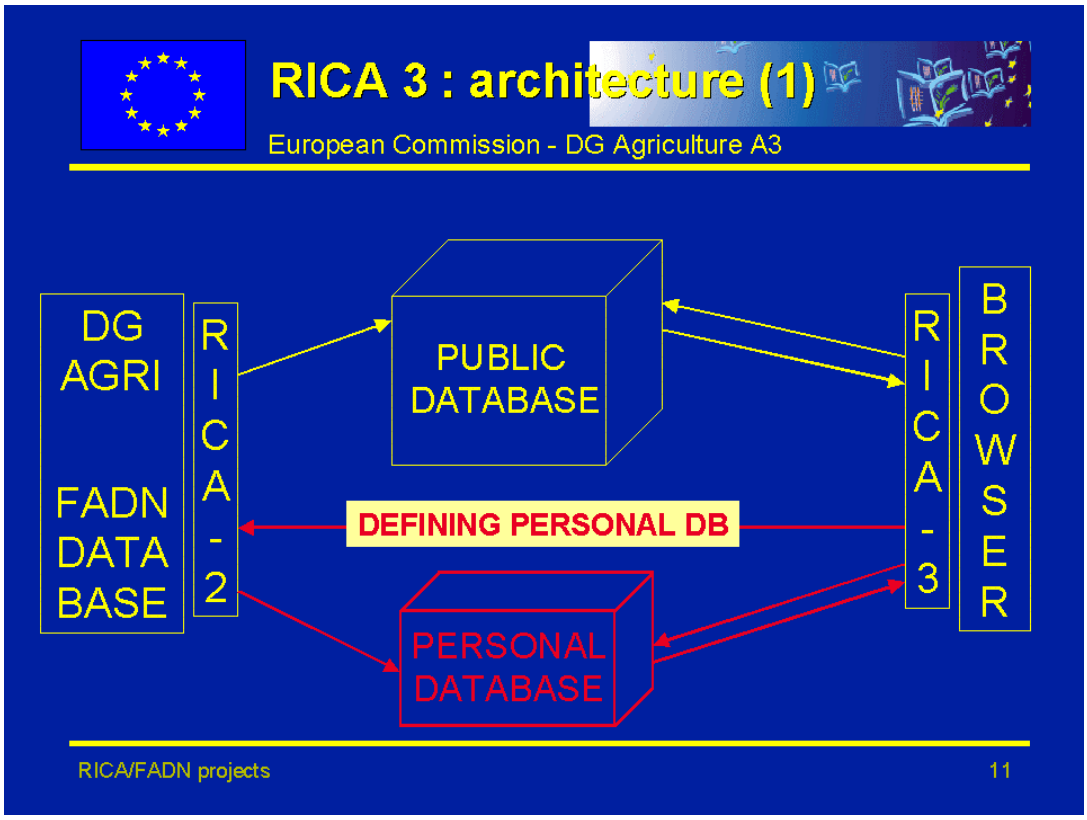
European Commission - DG Agriculture A3

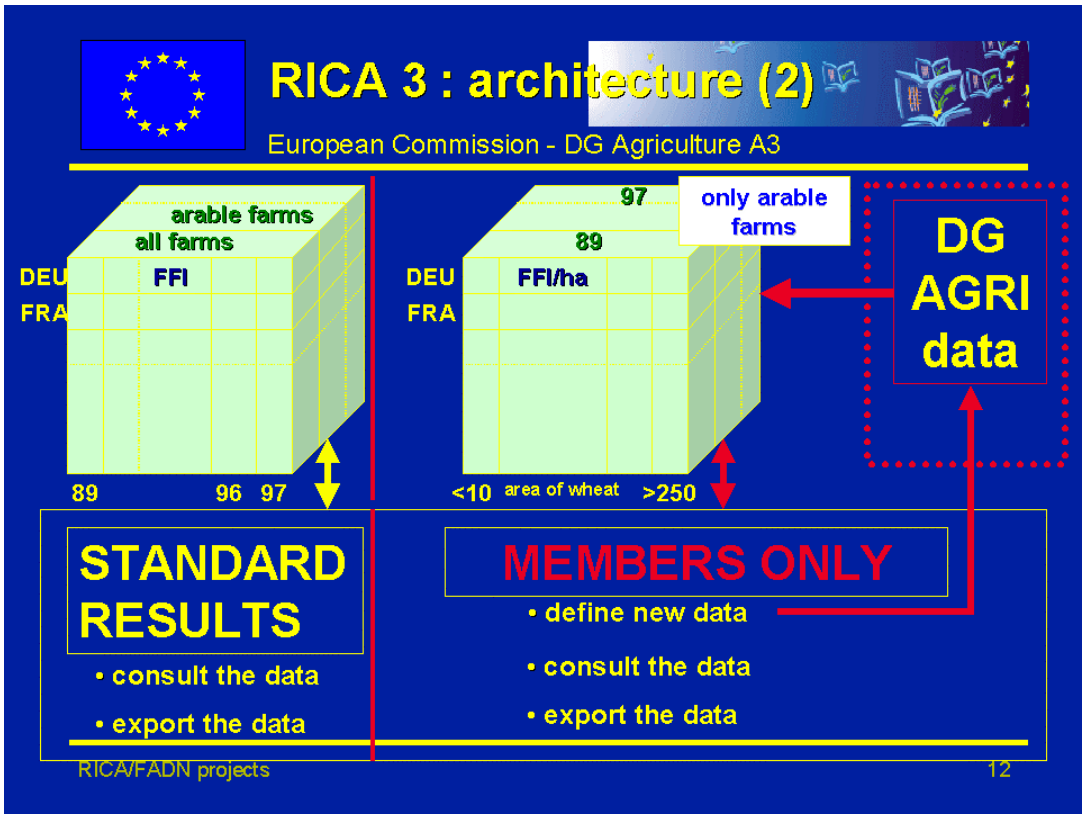
- **RICA-2 Database and analysis system**
  - Already operational
  - Contractor CSC
  - Evolution, Integration with RICA-1 and RICA-3

RICA 3

European Commission - DG Agriculture A3

- **RICA 3 Information Diffusion System**
  - Diffusion of EU-FADN aggregated results for 'Public' and 'Privileged' users (Liaison Agencies)
  - Contractor TietoEnator
  - Internet technologies
  - Integrated with RICA-1 and RICA-2
  - Development in progress
  - Available 'PUBLIC' : Beginning 2001
    'PRIVILEGED : Spring 2001


RICA 3 : architecture (1)
European Commission - DG Agriculture A3
DG AGRI
FADN DATA BASE
RICA-2
PUBLIC DATABASE
RICA-3
BROWSER
DEFINING PERSONAL DB
PERSONAL DATABASE
RICA/FADN projects
11


RICA 3 : architecture (2)
European Commission - DG Agriculture A3
arable farms
all farms
DEU
FRA
FFI
89
96
97
97
89
only arable farms
DEU
FRA
FFI/ha
<10
area of wheat
>250
DG AGRI data
STANDARD RESULTS
• consult the data
• export the data
MEMBERS ONLY
• define new data
• consult the data
• export the data
RICA/FADN projects
12

RICA 3 : public database

European Commission - DG Agriculture A3

Content

- aggregates (confidentiality) / averages
- (146) standard results (financial in €)
- 4 dimensions :
  - Year
  - Location (country / region)
  - Type of Farm (14 out of 17 principals)
  - Economic size (6 classes)
- Multilingual interface

RICA 3 : personal database

European Commission - DG Agriculture A3

Content definition

- Aggregates (confidentiality) / averages
- Select out of > 2 500 variables of FADN datab.
- Select existing classification variables out of 8 dimensions
- Create new analysis variables
- Create new classification variables
- Define a subset
- Define a constant sample

RICA 3 : confidentiality

European Commission - DG Agriculture A3

① To hide results if the sample < 15 farms

② To give the sample size only by ranges,

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

④ To sign a confidentiality agreement with Privileged users.

RICA-Website

European Commission - DG Agriculture A3

- Portal for RICA 1 and RICA 3
- Multilingual information on the FADN such as
  - Explication of methodology
  - Definition of variables
  - Description of standard results
- Provide possibility to Member States to publish information on national FADN and/or link their national web site
- Operational: http://europa.eu.int/comm/agriculture/rica/ (without links)

RICA-Assist

European Commission - DG Agriculture A3

- **Assist Member States to connect to future RICA 1 and RICA 3**
- **Evaluating the Liaison Agencies' current capacity to connect to RICA1 and RICA3 systems**
- **Providing recommendations and advise for securing effective connection**
  - ***confidential reports to MS end Autumn 2000***
  - ***discussions with MS on follow-up of recommendations early 2001***

10. Experiences with ARTIS

Krijn J. Poppe, Agricultural Economics Research Institute (LEI), The Hague

10.1 Introduction

At PACIOLI 7 we devoted quite some time to the new software for the Dutch FADN, called ARTIS: a paper was presented (Poppe, 2000) and we visited a local accounting office of the LEI to see the flexibility of the software and its use in the data collection software. Several participants at that time, as well as in the preparation of PACIOLI 8 expressed an interest in the latest experiences with the software and in further plans. This paper provides this update. For new kids on the block we start with a short introduction to the history of ARTIS. We then review the experiences of the last year and end with a look to the future.

10.2 The Making of ARTIS

In the early nineties the Dutch FADN concluded that its spaghetti software should be totally updated, and should meet new demands from users. These demands included flexibility: based on 'concept-free' data entry (as much as possible based on already existing electronic data) the recorded data should not be aggregated but be available at a detailed level for interpretation in different contexts (e.g. RICA, National accounts, different research topics etc.). Documentation should be available on line in the system for researchers and data collectors, and the central management should be able to adapt the recorded data and the accompanying procedures quickly.

These demands let to the development of a special data management system (ARTIS) in which data models can be stored, procedures for data gathering and data conversion can be specified, and data descriptions with instructions can be stored. Screens can be specified, based on the datamodel, and are activated on screen when they are needed.

In this system everybody works on a central database (client-server approach), which implies that changes in procedures ('software') and instructions are available directly for all data collectors, and data entered by them are directly accessible by researchers. Figure 10.1 provides some screen dumps from the system from the point of view of the data collectors. See Poppe (2000) for more explanation.

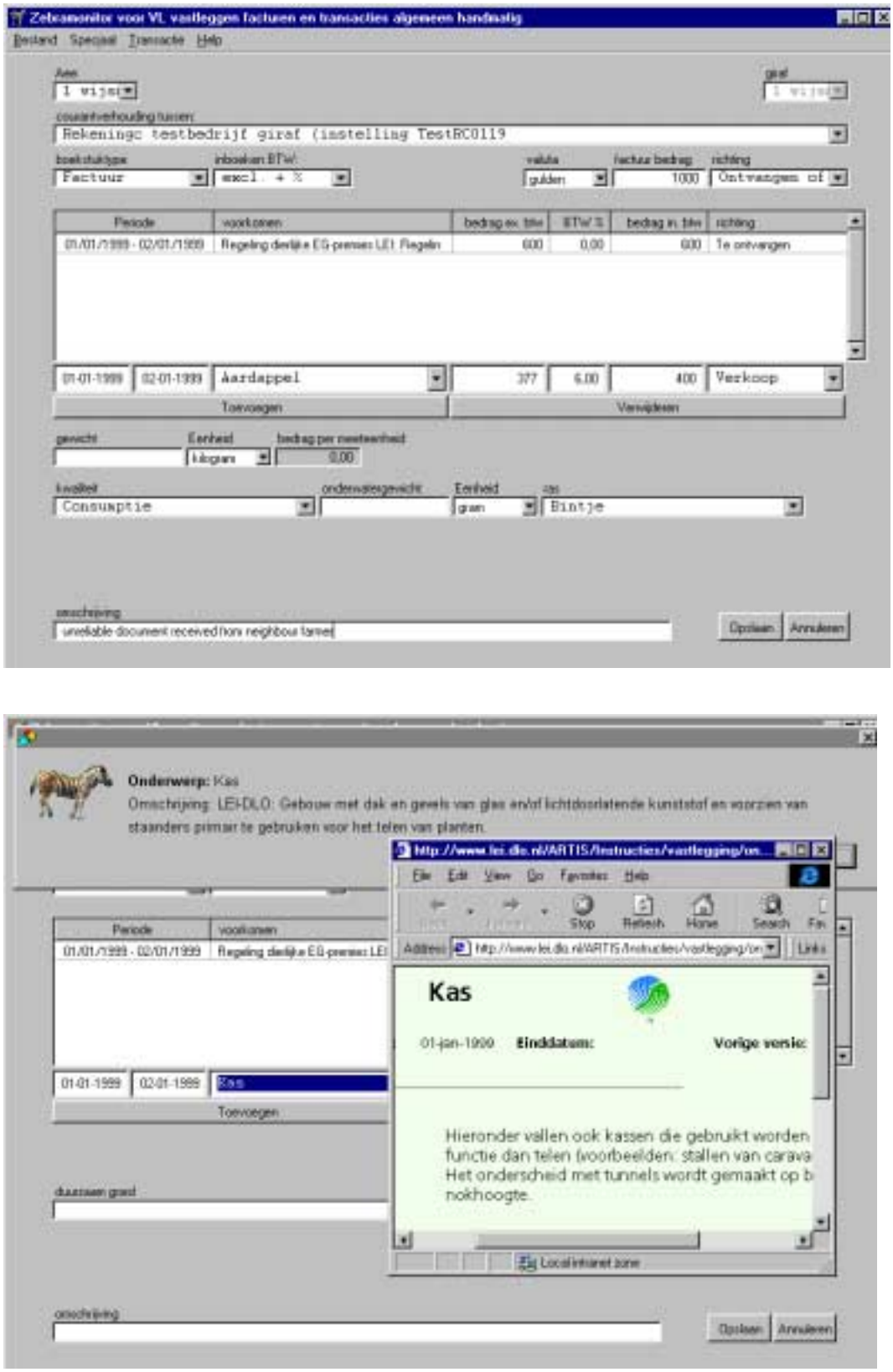


Figure 10.1 Demo GIRAF screens in ARTIS

10.3 Experiences in 2000

At PACIOLI 7 we were able to demonstrate the system at the moment of introduction to the first local accounting office. At that time we still had big performance problems as well as some work to do in specifying instructions. Actually we demonstrated two systems at once:

- ARTIS: the data management system in which a data model can be specified and procedures with their screens and instructions be build. It also includes a workflow component to provide to-do lists for the users;
- GIRAF: the application built in ARTIS for the data collectors to read the data that the FADN receives electronically from the banks and to enter data on the farmers' transactions taken from invoices.

Figure 10.2 provides some screen dumps from the view of the central unit that specifies data models and procedures in ARTIS.

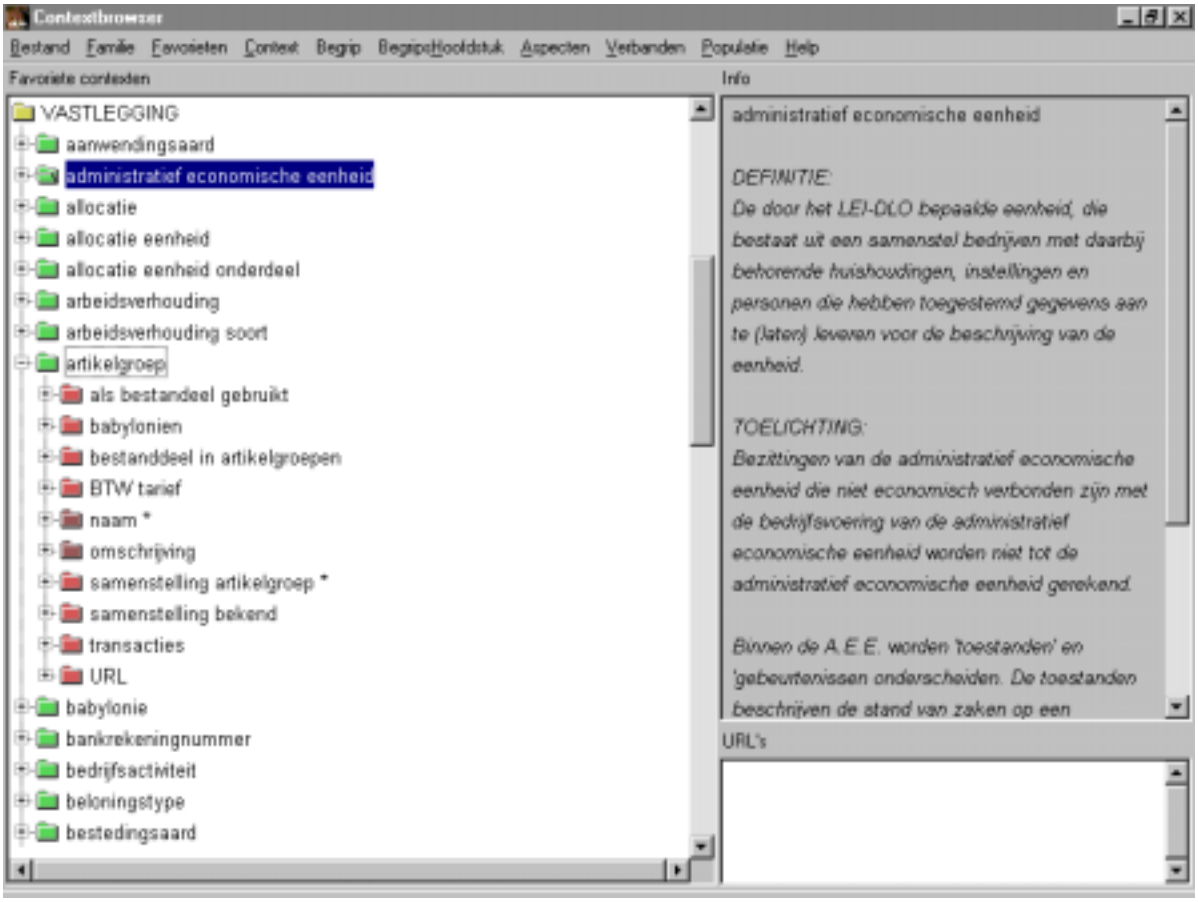


Figure 10.2 Screen dumps ARTIS

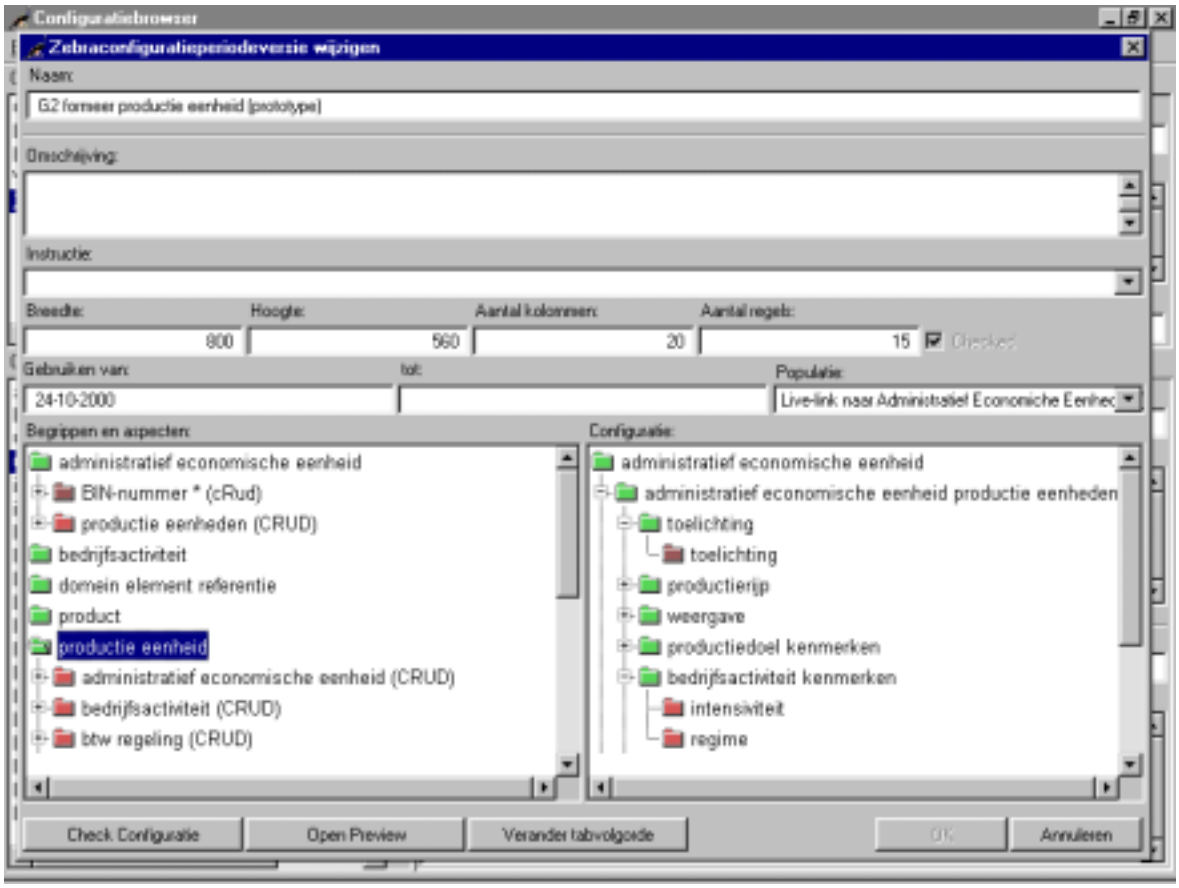


Figure 10.2 Screen dumps ARTIS (continue)

During 2000 we realised a number of further improvements:

- a big part of the performance problem was solved a fortnight after the PACIOLI 7 presentation. Further improvements have been made recently and from the point of view of the data collector it seems satisfactory at the moment. We are still working on some performance issues in the handling of big EDI data sets that we get from banks. This mainly to reduce work in evenings and weekends;
- the loss of performance in the local offices (using a telephone line) is small; the speed of refreshing screens triggered by data entry is nearly as quick as in the head office. It's fine tuning of servers that influences this. We are still working on Windows NT, without much scaling up in hardware;
- we have now more than 25 data collectors (50% of the total) working in the new system GIRAF. This could have even been higher, but some still have to finish the 1999/00 accounting year in the old system. We hope to train the last persons in January;
- we realised a software utility in ARTIS to check the data. It is an engine that every night (in the future with increased performance perhaps continuously) checks if the data entered are in line with the so called RIA rules for relevance ('has the fat content be gathered as being relevant for farms with at least 20 cows in the North of the

country ?'), integrity ('is the value entered for fat content between 3 and 5%?) and Actuality ('is the data for January already entered ?'). Every infringement of a rule leads to a reference in the To-do list of the data collector to which the farm with the mistake has been assigned. If he clicks on this item in the to do list, the system automatically provides the procedure (screen) with which the data item has been entered, or a cover-up procedure. This leads to a very sophisticated control system, at the moment the data collector is working on the farm (as he can also start the programme himself by hand);

- we started designing the procedures needed for registering inventories and allocations of costs. That will be finished early next year, and then the data collectors will be able to finish the farms on 2000;
- we have made a number of 'contexts' in which researchers use the facts collected by the data collectors to generate statements like the balance sheet, a transaction (cash flow) report and environmental reports. However in this respect much needs to be done.

Some of the reported progress has not been easy to realise. It's perhaps to early to make objective, final conclusions here. Nevertheless a number of topics should be reported, also to warn our colleagues that start with such process of major change:

- we had quite some difficulties in explaining the data model and adapting it from a theoretical data model to an implementation model. This was due to the fact of low experience with that activity in the central group carrying out the work. Communication in terms of the data model towards end users also proved difficult;
- in relation to the previous point, several data collectors found it difficult to accept new views and working methods. The fact that we would like to gather the names of companies that sell to and buy products from farmers (to do research on up- and downstream industries) needed much explanation - sometimes wrongly given in terms of the data model in stead of in terms of a strategic management decision. Similar situations came up with data that we decided not to gather anymore, because we think there is less interest (premiums for early and late delivery of sugarbeet) or because it can cheaper be calculated in stead of entered by data collectors (e.g. a fixed levy on the milk price for a marketing board). Data collectors which can think a bit more abstract or can easily accept other views seems to have less problems in learning the new system than those who can not. This seems not to be related with the years of experience;
- our project includes the total harmonisation of the work carried out in two separate departments (for horticulture and agriculture). Too long we neglected the organisational issues that results from bringing them into one system. We have now made clear that the two departments will in future only deal with the data entry, and all the central activities (specify procedures, instructions, help desk, data control) and management of the system will move to a central unit. This was needed to prevent unclear decision taking and unwelcome loyalties outside the project;
- the introduction of the system is always a risk, and the management's steering committee at a certain moment had to make clear that we were not going to maintain the old software for 2000, but that 'people had to jump' to the new system, even if it was

not totally finished. But working in the system was necessary to test it, to find and solve remaining administrative issues and to improve performance;
- testing and training of data collectors costs much time, and we had to reduce the number of holdings for 2000. We decided to cut as much holdings as needed in 2000, stating the introduction of the system as a more important objective than the number of holdings, and in order to make 2001 a normal year (with the normal number of holdings) as much as possible;

10.4 Plans for the future in the Dutch FADN

The project Accounting 2000 is now nearly finished. Concerning the software we have only a rather small number of things to do:
- next January we hope to provide a number of data collectors with a lap top and GSM connection, to support data collection in farm visits where we can not use the telephone line of the farmer. We waited with this possibility as long as possible, as this telecommunication market is still changing quickly in possibilities and price;
- we are working on a utility in ARTIS to export tables with a certain structure in XML. Currently all output is in simple files that can be imported in Excel or HTML. For some researchers and reports however it seems attractive to export the data structure from the data model of the report.

Using the ARTIS software, there is still a lot of work:
- much work has to be done on defining reports and especially the formulas to calculate derived variables (output tables for RICA, farmer reports, typology etc.);
- the control program has to be filled with control points, including those coming from the EU;
- we will start early 2001 to make an application for the FADN Fisheries, based on the data model we use in agriculture (including horticulture). It has been checked already that this data model is valid, but reference tables have to be changed (throwing out cows, including ships etc.).

10.5 Plans for use outside FADN and for commercialisation

We now have realised that the ARTIS concept is a strong concept that can be used for many purposes outside FADN. In effect ARTIS is an Information Induced Data Management System. In comparison with data management systems like Oracle or Sybase this new generation of data management has the following characteristics:
- context management: everybody can have his own view of the world, which makes it an excellent tool to manage data conversion. Don't standardise and harmonise but master the conversion process;
- self documentation: document data by data definitions and instructions and with the procedures that have been used to enter the data. Data and data dictionary are stored in the same level of the database which makes flexibility enormous;

- dynamic inheritance: a data item can be typed as e.g. a lorry in one context and an asset in another. This typing is dynamic (a lorry is typed as an asset if the value is higher than Euro 5,000.-, and the typing changes if the value is decreased on a certain date from € 5,100.- to € 4,500);
- information induction: the data values automatically determine work flow and screens.

This makes the data management system very attractive in situations with big data sets that change frequently in an unexpected way and where historic data have to be maintained (legacy problems) or data conversion is a big issue (like in the RICA).

Not only (agricultural) research institutes face such challenges, but also banks, insurance companies, the police, student administrations at universities etc. In all these cases ARTIS seems to have advantages above conventional relational data base management systems.

Within the LEI ARTIS has now been used for a few other applications. We use it for price statistics (to be able to integrate data with the FADN) and are about to use it for the annual farm structure survey data. We build a prototype and started the development of an application for our the financial management of the institute (time sheets, budgets, project planning).

We are starting to look to applications outside the institute. We made a very interesting prototype for an agency of the Ministry of Agriculture to enlarge the IACS system with a registration of individual plots per farm (also for the mineral accounting system). This prototype was seen as very impressive: data are entered in ARTIS, then exported to a GIS (Geographical Information System) in which extra data are added on a map, and those data are then automatically important in ARTIS for further calculations, that are once again presented in a GIS format. Unfortunately, in the end the Ministry decided to stay with Oracle, as their personnel was trained in Oracle.

Currently we are investigating the possibilities with our partners to establish a special company (for the moment under the code name ARTIS Technology N.V.) that is going to market the system. This will ask a further improvement and documentation of the software (also to undo some things which have been programmed especially for the FADN), including a version in English. A venture capitalist has an interest to finance this investment.

ARTIS as well as the data model for the Dutch FADN (as implemented in GIRAF) is in principle available for projects with other FADNs or accounting offices.

We had an interesting two day workshop with INEA in Rome to show ARTIS and to see if the data model that INEA is making, could be entered in ARTIS to generate the procedures and screens. That could be an attractive solution. For the moment INEA is focussing on its own data model, that is probably a bit different from the Dutch one, as data flows in Italian farming and INEA's view of it could differ. As the Dutch data model is in Dutch, it is hard to judge in how far this model could be beneficial in speeding up the creation of an Italian data model.

We also had an interesting visit from the Luxembourg FADN to exchange views and to discuss if it would be technically feasible to work with our GIRAF application (and some minor changes) in Luxembourg (we think the answer is positive and will pursue this option).

Which all leads to a commercial at the end: if other FADNs or accounting offices have a serious interest in using ARTIS or even the data model for the Dutch FADN, they are welcome for a 2-day visit to the Netherlands, or we can do a two day workshop in your country to show the software and its flexibility. The experience is that you need at least one day to get acquainted with this new generation of data management and to judge how useful it can be for your FADN.

References

Poppe, K.J., 'Software for the Dutch FADN as a tool for micro-economic research'. In: G. Beers et al., *PACIOLI 7 - Agenda 2000 and the FADN agenda*, The Hague, LEI, 2000.

11. Internet and the FADN - situation and ideas for improvement

Guido Bonati, INEA, Rome

Index of the presentation

- Trends in data collection
- Classification of web sites
- Portals
- Search engines
- RICA and FADN as keywords
- Examples of web sites
- Ideas for improvement

Basic assumption

- The Internet and the web were created to promote exchange of information within research centres.
- Today research as such is playing a minor role (5% of agricultural web sites in Italy).
- Still the Internet can become the unique medium for data collection and dissemination of results.
- The keyword is CONVERGENCE.

Data collection

- In Italy collection of farm data has changed from paper to the electronic format.
- Today 100% is on floppy-disk, e-mail, FTP.
- In the next years an effort will be made to test Internet-based data collection and control.
- Technology as such is not a problem.
- UMTS.

International sites

- International sites provide information on opportunities for research projects.
- Main European site is europa.eu.int (www.cordis.lu for research).
- Services provided: basic documentation, form, tenders, partner search, knowledge base.
- Other sites
  - FAO, IFAD.

Institutional sites

- Institutional sites are managed directly by each research centre in order to provide information on research results, papers, staff, meetings.

'Ad hoc' sites

- 'Ad hoc' sites are developed either to provide information on a specific project or to gather information, databases and links on specific issues by a number of partners that have relevant experience on it.
- examples:
  - LEADER Italy;
  - desertification.

The portal

- An agricultural portal is the gateway to all relevant agricultural information on agriculture.
- It normally contains a home page that will redirect the user to services available on other web sites, or to single modules within the system.

Figure 11.1 Agricultural portals

Figure 11.2 Agricultural portals

Figure 11.3 Agricultural portals

Search engine

- A search engine part of the portal is aimed at quick identification of pieces of information within the portal itself and on other sites on the Internet.

Search engine - list of sites

- A list of sites, classified according to their contents by human experts, in charge of building and maintaining an index.
- Similar sites have been developed in the case of Yahoo (www.yahoo.com), Agrisurf (www.agrisurf.com), Itagriweb (www.inea.it/links/index.cfm).

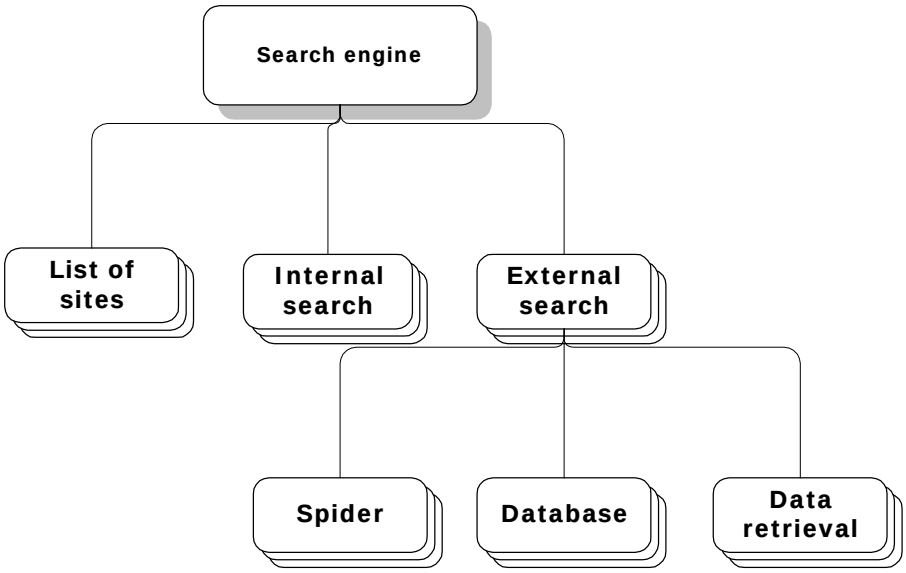


Figure 11.4 Architecture of a search engine

Search engine - internal

- The internal search service is used to look for all the information that is stored within the site.
- A similar service is available on the site of FAO.
- A search software is needed, as Verity.

Search engine - external

- Three main components are required:
  - a spider;
  - a database;
  - routines for data retrieval.

FADN as keyword for a search engine

Yahoo	266
Lycos	598
Google	795
Northern light	500
Altavista	1159
Excite	595 in 367
Hotbot	< 300
Go	77
MSNsearch	185
excite	133

Figure 11.5 www.rica.com

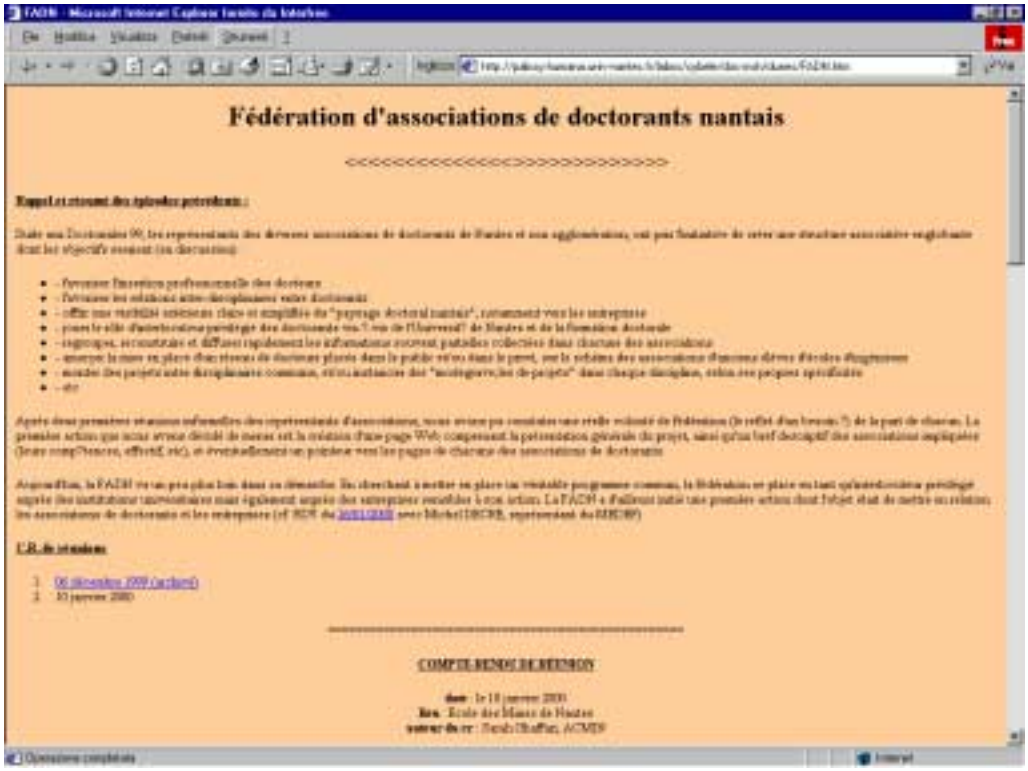


Figure 11.6 FADN as keyword

Figure 11.7 FADN as keyword

Figure 11.8 FADN as keyword

Figure 11.9 FADN as keyword

Figure 11.10 Official FADN sites

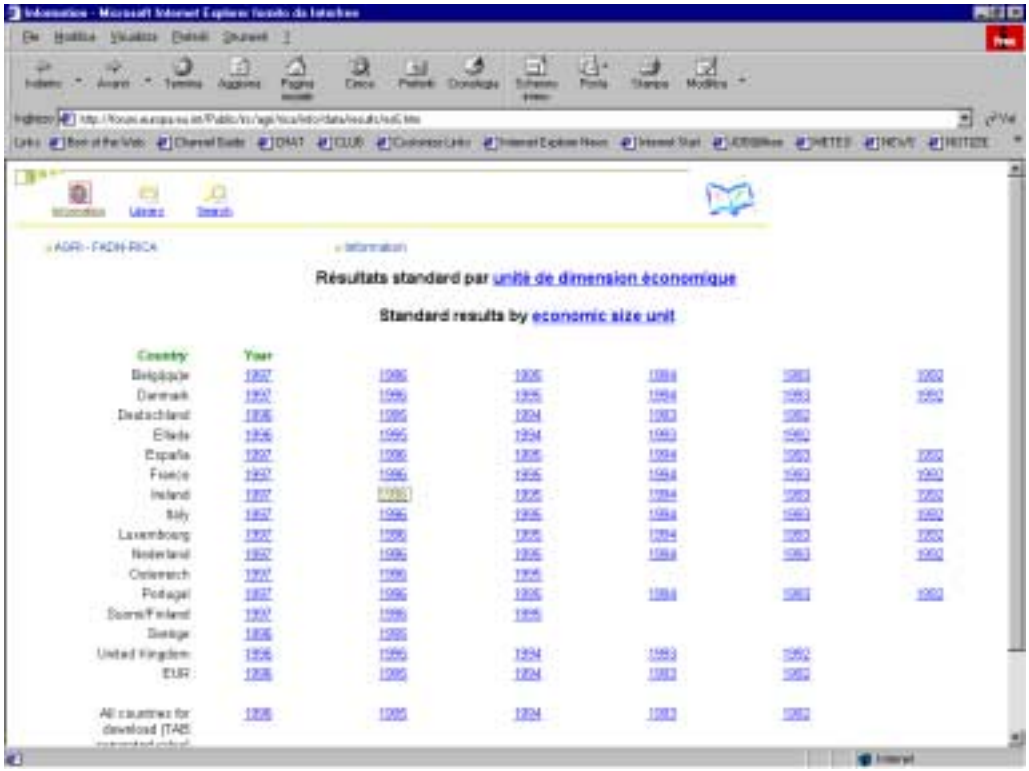


Figure 11.11 Official FADN site

Figure 11.12 Examples of FADN related sites

Figure 11.13 Examples of FADN related sites

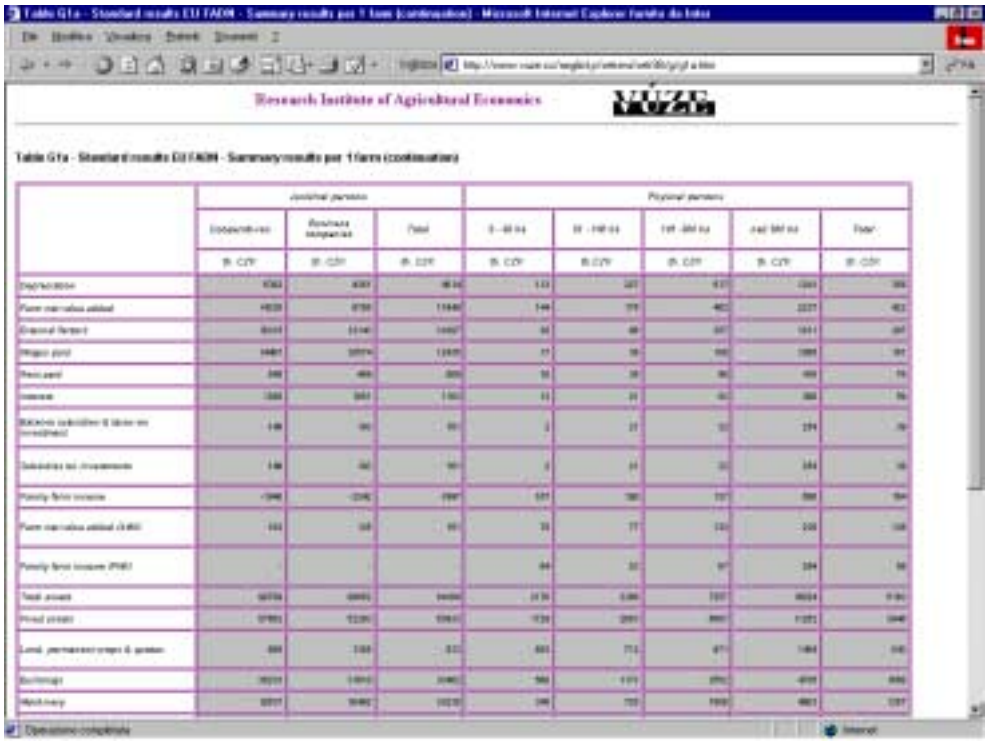


Figure 11.14 Examples of FADN related sites

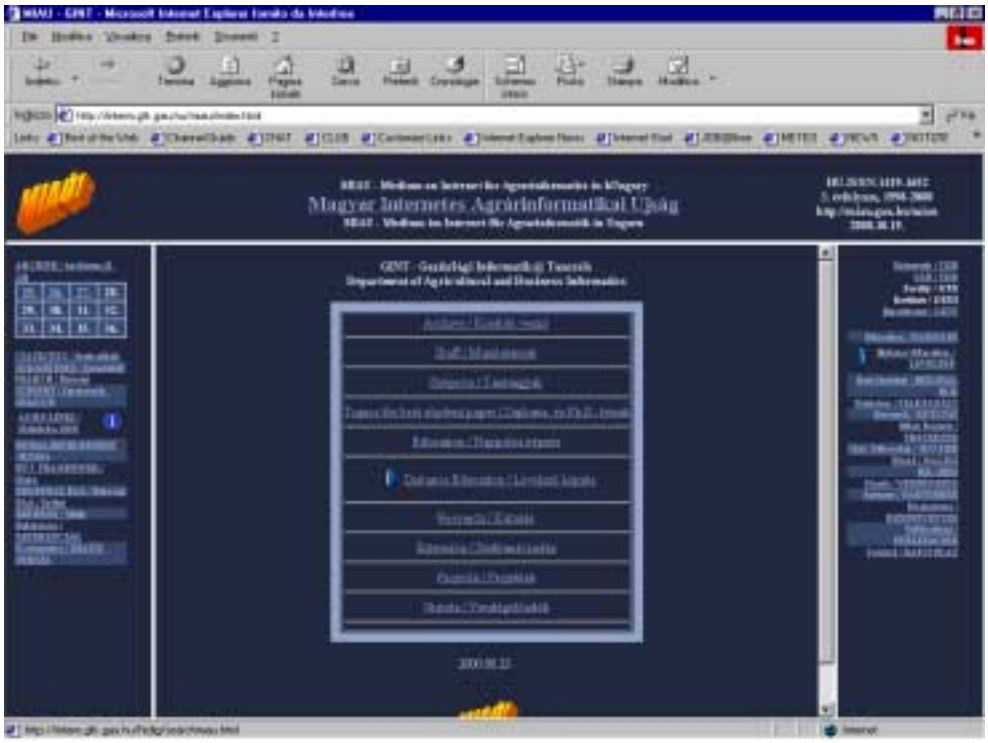


Figure 11.15 Examples of FADN related sites

Figure 11.16 Examples of FADN related sites

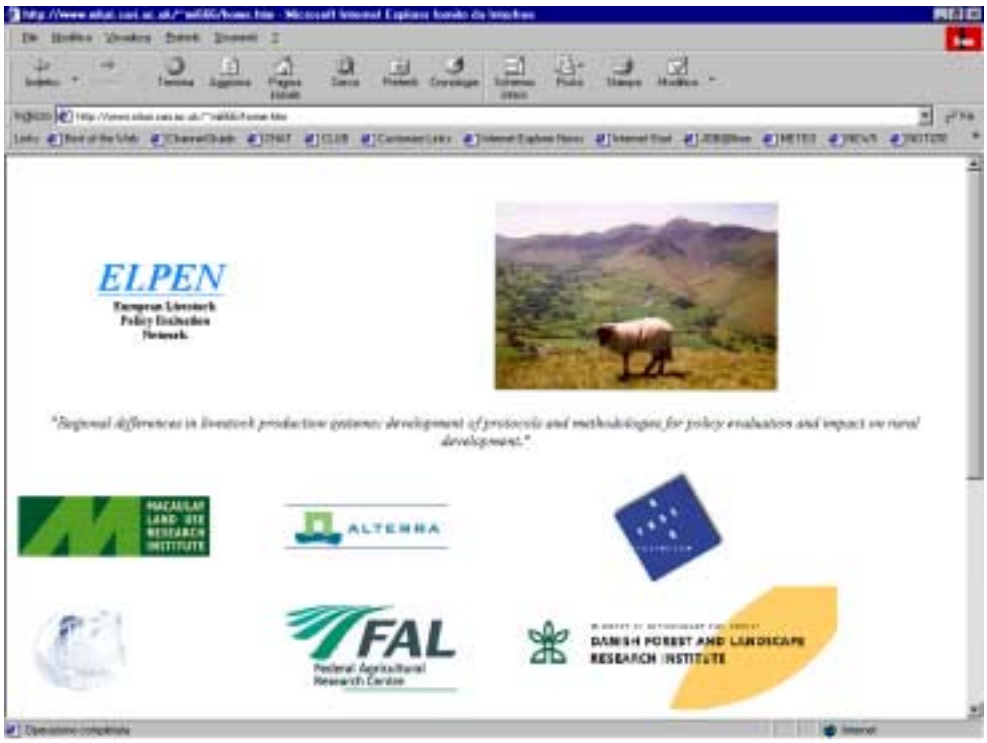


Figure 11.17 Examples of FADN related sites

Figure 11.18 Examples of FADN related sites

Figure 11.19 Examples of FADN related sites

Ideas for improvement

- The FADN has little visibility in the liaison agencies and in its national activities.
- No tools for dynamic tables (i.e. time series).
- No GIS application.
- XML.
- Little presentation of FADN applications.
- Need of a FADN home page with links to all FADN documents, experiences, applications, databases (within europa.eu.int?) ---> FADN *vortal*.

Workgroup session 3: The FADN goes commercial - an exercise in consensus thinking

Introduction

Internet technology and E-commerce are the talk of the town these days. It is impressive what can be done by a good application of internet technology. The investments needed are however very high. Companies try to make money by E-commerce. This is for the moment more succesfull in the business-to-business market than in the business-to-consumer market, where extremely high investments seems to be necessary to build a site with commercial success.

This technology raises the question to which extent the RICA (and PACIOLI ?) network invests in these new technologies, and how the investment can be paid back. From the paper by Guido Bonati we learned that some countries and the EU have invested in publishing aggregated data for free to the public. Investments to add more value to such sites or to use the technology for data gathering, are for the moment rare or even non-existent.

In this workgroup session we would like to explore the future, and do that in a bit an unconventional way.

The caps of De Bono

Discussing topics that are controversial leads often to yes/no disputes which are not very usefull. The Maltese/English thinker Edward de Bono, who studied the process of discussion, thinking and decision making in great detail, therefor invented a method (among many others in what he called 'Lateral thinking') to make such discussions more constructive.

In his book *I am right, you are wrong* De Bono replaced Western style thinking by his theory of 6 caps. In this technique all persons in the discussion involved - symbolicly - put a cap of the same colour on their head. A red cap stands for emotion and intuition. A white one for information, information that lacks and types of information. A blue one (at least to put on your head at the start and in the end) stands for the management of the thinking process, the order of the other caps, summary and conclusions. The black cap represents disadvantages, why solutions don't work, risks. The yellow one for advantages, why it works, positive things. And the green one stand for possibilities, new ideas, creative thinking.

By this technique competition between discussing persons and hidden or troubled emotions have a less negative impact on the discussion and its results. It takes politics and ego-ism from western thinking.

In this working group session we give this technique a try out.

Figure 11.20 Six Thinking Hats (overview)

Figure 11.20 Six Thinking Hats (overview)

Tasks

To test the technique of De Bono in our problem setting of making the Internet work for the FADN, we have formulated a very challenging proposition for each of the 5 working groups. The groups are asked to sit together and provide suggestions according to 'the cap that the chair persons asks you to wear'. Start with red for emotions and give your emotions to the topic. Follow up with the yellow one, the black one, the white one, the green one and the blue one (or another order if this is preferred by the chair). Write down the remarks on a flip over.

The propositions are choosen as much as possible as provocative, in order to get you involved and in the hope that there are strong opinions, so that we can test the De Bono method.

The challenging propositions are:

- group A: The FADN units (including DG-Agri) should pool their investment resources and develop internet software for data collection together;
- group B and C: The FADN units (including DG-Agri) should set up a common and exclusive website with e-commerce: it will market the FADN data to researchers (who could pay from their research budgets) and companies, as well as FADN-based research reports. The site will also show advertisements;
- group D and E: DG-Agri as well as some governments could easily contract the FADN-operation out to a commercial company that provides DG-Agri or the Ministry in time with a representative, error-free database and a number of basic analysis on request.

Groups for workgroup session 3 (chair in italics)

A. *Bernard Del'homme*
Nicole Taragola
Gert Giversen
Vincent Chatellier (r)
Hans Vrolijk

B. *Susanna Perachino (r)*
Patrick van Driessche
Hans-Hennig Sundermeier
Beat Meier
Guido Bonati

C. *Koen Boone*
Dirk van Lierde
Jaanika Jalast
Werner Kleinhanss
Josef Hanibal (r)

D. *Tommy Burke*
Yves Plees
Krista Kõiv
Szilárd Keszthelyi
Knut Samseth
Jan Doeksen (r)

(r) = Rapporteur.

Results

Workgroup session 3, group A

White
- Is our system for all farmers?
- Is it for national and European goals?
- What will bet he financial participation of NS?

Green
- Be more flexible and begin only with voluntear NS

Blue
- If we want, we can
- Be clear and push political willingness
- Begin with small countries

Conclusion
- First find budget to buy:
- A set of caps to the agricultural council and RICA committee and organized a work-shop with De Bono methods

Red
- In adivided world, unity is good
- Co-operation between MS is a good thing
- Positive feelings, but be careful (step by step)
- Negative
- It will take too much time

Yellow
- Easier to communicate
- Enlargement of expenses
- Data will be more homogenous
- Efficient way to use resources
- Less expenses possible after several years
- Improvement of speed, transparancy

- Technology is not a problem, it is in farmer of common job
- Co-operation does not mean homogeneity (keep our differences)

Black
- A long time is needed (100 years!)
- Differences are too important between collecting systems
- National level: we are the best
- Long time to discuss/not to develop the system
- Technical equipment levels (CEEC, Greece, ...)
- Political willingness not sufficient getting information doesn't need much money

Workgroup session 3, group B

Red
- *It is not our business*
- It should be tested
- Research has nothing to do with e-commerce
- Find out a leadership to manage
- Why should we pay?
- It is too complicated
- There's influence between free data and commercial interests
- Excensivity
- If paid by everybody → available for everybody

Black
- There's already a market
- Users pay attention to the quality more than usual
- Commerce demands profit
- *People who doesn't pay → not allowed to have access*
- Long business cycle (intermediate)
- Pay twice
- *Bad image* (of TV)

Yellow
- Bring some money
- *Promotion FADN and data*
- Few other sellers (no competition)
- Feed-back
- Demand ↔ supply
- *Higher estimation if data isn't free but paid*

Green
- Sell FADN research book on web
- Infrastructure → provide other data (collect other data)
- Expand to other continent the FADN

Blue

principle

policy affairs ≠ commercial affairs

- Orient all the work to the demand
- Pass the old-fashoned background → let's go on and try to test and verify if it's feasible

Work session 3, group C

Red
- Good idea
- Researchers are too poor to pay
- Intresting
- Negative, free access

White
- Conditions for acces (only governments?)
- Prices (differentiation)
- What type of advertisement
- Cost/benefit analysis

Black
- Harmonisation and co-operation problems
- Chance of a big loss (high investments)
- Farmers willing?
- Government stop paying
- Confidentiality

Yellow
- Money!
- Easier access to data
- More users so improvement of quality
- Advertisement of other research activities

Green
- Provide data for free
- Promote co-operation with other researchers
- Start for other e-commerce activities
- Sell research activities through the webside

Blue
- Start with experiment
- Small research activities and simple questions for data
- More adventory of experiences selling data on liaison agencies

Workgroup session 3, group D

Red: agree 3
disagree 3

White What do we want to know

- Who are users
- Target groups
- For what is the info used
- Who has right to access
- Which are the costs
- why contracting out
- Who guarantees integrity
- Who controles the data

Black Disadvantage

- No guarantee of quality
- Verification of the quality
- Is there a market, does it bring more than present situation
- Targets might be unrealistic
- Integrity of the data (farmers union)

Yellow Advantages

- Specifics of the contract must be clear
- Better quality of staff (CEEC)
- Gives another status to FADN
- Strict deadlines

Green Other possibilities

- Improve present weak points (SWOT)
- Better PR
- Better communication
- Make it attractive to use the data

Blue Focus points

- Data quality
- Regular evaluation
- Better discription methodology

- FURTHER ANALYSIS NEEDED !!

12. Modulation of direct payments within Agenda 2000: A Comparison between France and Germany

Vincent Chatellier [1] *and Werner Kleinhanss* [2]

10.1 Introduction

Since the reform of the Common Agricultural Policy (CAP) in May 1992 and of Agenda 2000 in March 1999, the level and type of support for European agriculture are the object of controversial debates. Each of these reforms contributes to a significant reinforcement of the role of taxpayers in the financing of agricultural policy (via the granting of direct payments to farmers) and to lower duties by the consumers (European Council, 1999).

Because of the contribution of the Member States to the Common budget, Germany and France played an important role in the phase of negotiation of Agenda 2000 (Perraud, 1997). The negotiations particularly related to the future amount of direct payments (level of compensation due to the reduction of guarantee prices), their conditions of granting (temporal decreasing scale, environmental cross compliance, modulation, etc.) and their modes of financing. Throughout this period, Germany being anxious to preserve its position as net-payer, showed itself rather favourable to the reinforcement of the principle of co-financing of agricultural policy. It firmly refused the Commission's proposal relating to the application of a degressive payment scheme beyond a threshold of € 100,000 per farm and it was opposed to by that of the French delegation which considered a temporal decreasing scale of direct payments.

Agenda 2000 will soon be implemented for arable crops, beef and veal (2000-2003) and from 2005 to 2008 for milk. Although being in line with the former policy it nevertheless presents a major inflection related to a stronger mobilisation of the subsidiary principle (Bontems et al., 1996). Member States thus can choose for modulation and cross compliance of direct payments (article 4 and 5 of the horizontal measures of CAP) being realised at national level at the same time respecting a common European legal framework. Contrary to Germany, the French government decided to introduce a scheme of modulation starting from the first application campaign of Agenda 2000. The budget retained will be mobilised at national level to co-finance 'Territorial Contracts of Farm' registered in the agricultural law of orientation.

In the context of both reforms of CAP, a comparative analysis of the development of direct payments from 1991 to 2008 between farms in France and Germany and of their modulation is assessed within this study. Based on data of the Farm Accountancy Data Network (FADN), this work includes the specification of simulation models for the assessment of Agenda 2000 and of the French scheme of modulation. This comparative

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[2] Institute of Farm Economics and Rural Studies at the Federal Agricultural Research Centre (FAL), Bundesallee 50 - 38116 Braunschweig - Germany.

analysis is all the more interesting as both countries defend different positions on the topic of modulation.

12.2 Method and data

The analysis of the evolution of direct payments for French and German farms and the impacts of the French device of modulation is carried out by projections based on the Farm Accountancy Data Network (FADN).

The first part of this study is based on individual farm data from the *European FADN* of 1991 and 1995. It presents an analysis of the *evolution of the amount of direct payments* and a projection until 2008. The year 1991 was used because it intervenes before the Mac Sharry reform whereas that of 1995 corresponds to its last implementation campaign. The values for 1991 and 1995 are mentioned in current ecus. Those of 2004 (without the reform of the Common Market Organisation (CMO) for milk) and of 2008 (with the reform of the CMO milk) are obtained by simulation on the basis of a situation of reference from 1995. This one integrates changes of direct payments for arable crops, beef, veal and milk within the framework of Agenda 2000 and an assumption of the distribution of national envelopes for the sectors of beef, veal and milk. Based on an identical method between the two countries the simulation is carried out assuming constant structures and productivity, without farm adaptations. This option needs a careful interpretation of the results because the structural development would induce an increase of direct payments per farm being much faster than that obtained by simple static simulations.

The second part of the study focuses on the assessment of modulation of direct payments of CAP. The *French scheme of modulation*, adopted by the decree of March 24, 2000, is applied in a comparable way for the French and German farms for the year 2004, i.e. after a projection of the reform for arable crops, beef and veal. Contrary to the analysis of the distribution of direct payments between 1991 and 2008, which is based on a homogeneous methodology, the assessment of the French modulation scheme is based on two simulation models worked out by each of the teams starting from the *national FADNs* of 1997/98. This might induce some biases in the comparison between the two countries, but the data used from national FADN was necessary due to requirements of specific variables related to employment. In Germany, farms entitled as 'Juristische Personen' (legal entities) are regarded as farms with Limited Responsibility (EARL) or Civil Companies (SCEA), those concerning the status of 'Personengesellschaften' (partnerships) are comparable with GAEC's.

The economic indicators used in this study are expressed in €, according to a common methodology. The term 'direct payments' corresponds to the total of subsidies related to the current operations of production. It gathers all compensatory payments of the CAP, direct payments co-financed by the State and the European Union and other payments coming from national, regional or local financing. Subsidies related to investments and early retirement are excluded. The term 'agricultural production' corresponds to the total value of sales (integrating intra-consumption and stock variations) and a deduction of the purchases of animals. The term 'Gross Farm Profit' (GFP) corresponds to the value of agricultural production after deduction of intermediate consumption's, tenant farming,

insurance, taxes, professional taxes and of labour costs (wages and employer's shares), adding subsidies and of the lump-sum refund from value-added tax, the insurance indemnities and the rebates. The term 'farm income' corresponds to the GFP minus equipment with depreciation and financial expenses etc. Social security contributions of the farmer are thus not withdrawn.

12.3 Developments of direct payments during CAP reforms

The successive reforms of CAP (1992 and Agenda 2000) create a significant shift in the mode of agricultural support. The following assessment is based on FADN data from the EU. It includes a statistical analysis of direct payments under conditions of the Mac Sharry reform and a projection of the impacts of Agenda 2000. This analysis is useful for the better understanding of the context in which the ongoing reflection fits in the modulation of compensatory payments.

12.3.1 Agriculture became strongly dependent from direct payments

Based on FADN data from 1991 and 1995, the amount of direct payments increased on the average of all farms from 2, € 600 to € 17,500 in Germany and from € 3,000 to € 15,700 in France (table 12.1). This strong progression is due to the changes of CAP by the Mac Sharry reform in 1992; it is also influenced by the reduction of farm numbers (-16% in Germany and -22% in France). This reform was based on a reduction of institutional prices for some agricultural products (-35% out of cereals and -15% out of beef and veal) compensated by direct payments. The latter are granted to farmers within a given budgetary framework (regional base areas, historical reference yields, ceilings at regional or individual level for beef premia, etc.), with the help of compliance rules going in the direction of a better control of volumes of production (fallow, livestock density).

In 1995, the average amount of direct payment per farm and AWU was rather comparable between both countries. Being more intensive in land use (especially in the dairy sector) and with higher subsidies given by national and regional funds (i.e. Bavaria), German farms have an amount of direct payments per hectare which is higher than in France (€ 339 against € 273). Direct payments equal to 17% of the production value, but the dependence of economic results with regard to direct support seems to be stronger in Germany. Directs payments represented the equivalent of 9% of GFP of the German average in 1991 while it reached 43% four years later (this proportion increased from 10% to 35% in France).

The simulation of the consequences of the Agenda 2000 for the year 2004 (complete reform for arable crops, beef and veal) and 2008 (final stage of the milk market reform) confirms a further importance of direct payments on the formation of income for the majority of European farmers, in particular those oriented to arable crop production, beef and dairy (Blanc et al., 2000). This increase is due to the principle of partial compensation of price reductions. Although it is less strong than in the course of the preceding reform, it is more related to the beef and dairy sector (Colson et al., 1999). In Germany, the average amount of direct payments per farm increases from € 17,500 in 1995 (either 43% of GFP),

to € 20,200 in 2004 (or 43% of GFP) to € 22,500 in 2008 (or 59% of GFP). In France, the direct payments of € 15,700 in 1995 (either 35% of GFP) increases to € 18,200 in 2004 (or 42% of GFP) and € 19,700 in 2008 (or 46% of GFP). On the assumption that the number of farms would decrease by 3% per year (this is rather equal to the change rate between 1992 and 1999), the average amount of direct payments per farm in 2008 would be around € 30,000 in Germany and € 26,000 in France.

Table 12.1 Development of direct payments between 1991 and 2008

	Germany				France			
	1991 a)	1995	2001	2008	1991	1995	2004	2008
Number of farms	365,300	308,300	-	-	549,000	429,600	-	-
Direct payment (DP)/per farm (€)	2,600	17,500	20,200	22,500	3,000	15,700	18,200	19,700
Direct payment/per worker (AWU) (€)	1,700	8,900	10,300	11,400	1,850	9,200	10,600	11,500
Direct payment/per ha UAA (€)	88	339	393	437	67	273	320	343
Share of DP on/agric. production (%)	4	17	21	25	4	17	21	23
Share of DP/GFP (%)	9	43	51	59	10	35	42	46

12.3.2 Agenda 2000 only slightly modifies the hierarchy of direct payments between farms

Due to its construction, direct payments are closely related to the type of production and the economic dimension of farms (Kroll, 1998). To analyse the level of concentration of direct payments in Germany and France, farms were classified according to their average amount of direct payments in 1995 in an increasing order. In Germany, 25% of the farms get 69% of direct payments; having a share on land use of 60%, 42% of Standard Gross Margins (SGM) and 37% of total agricultural employment (figure 12.1). This high level of concentration is strongly influenced by the large farms in the New Laender. In France, the farms of the first quartile gather 60% of direct payments, 50% of UAA, 38% of the SGM and 25% of agricultural employment.

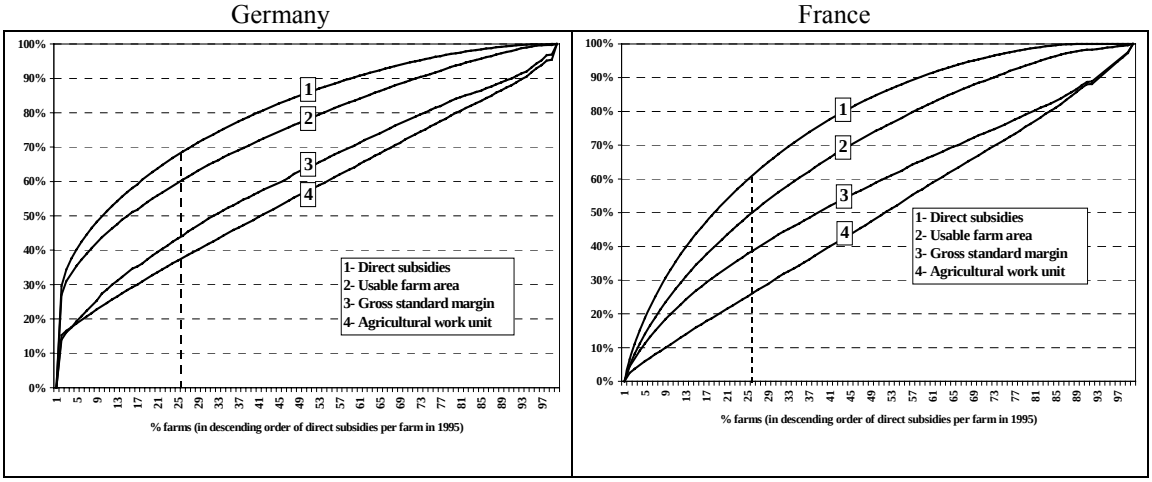

Figure 12.1 Distribution curve for direct payments, UAA, SGM and AWU (1995)

Static simulations based on FADN data show the consequences of Agenda on the concentration of direct payments within German and French agriculture (figure 12.2). German farms of the first quartile hold 65% of direct payments in 2004 and 61% of those versed in 2008; the share in French farms is 58% and 55%, respectively. This analysis shows that Agenda 2000 only slightly modifies the initial hierarchy of direct payments between farms. However, it underlines, that this growth is rather weak in arable farms (which represent a significant share of the first quartile) and rather strong in beef farms. Thus, the growth of direct payments is stronger in

those farms being classified in quartiles 2 and 3. In Germany and France, the distribution of direct payments between 1995 and 2008 will be influenced by two factors: structural change involves an increasing concentration of direct payments, whereas the application of Agenda measures (regionalisation of reference yields for arable crops, modulation and environmental conditionnality of the compensatory payments, etc.) goes more in the direction of a re-balancing.

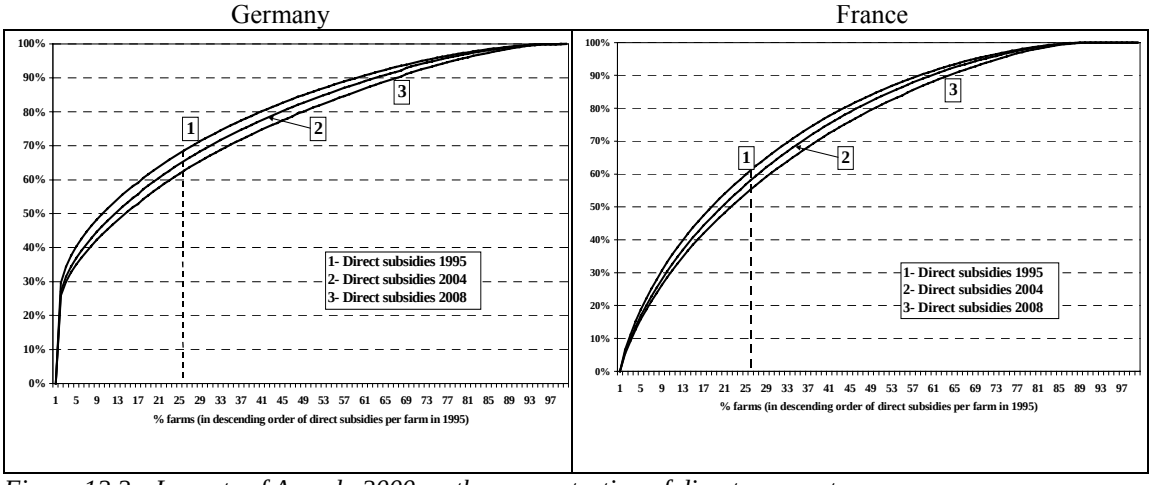

Figure 12.2 Impacts of Agenda 2000 on the concentration of direct payments

The distribution of German and French farms according to eight classes of direct payment (year 2004) makes it possible to clarify the strong deviation of direct support (table 12.2). In both countries, farms getting less than € 30,000 of direct payments have a high share on land use (48% of UAA in Germany and 59% in France) and employment (71% of AWU in Germany and 81% in France). Farms getting more than € 100,000 (beyond the Commission's proposal of a degressive payment scheme) represent 1.2% of the total of German farms. While getting 28.5% of direct payments, they have 15.8% of labour input, 14.6% of SGM and ensure 17% of the value of the production for only 8.4% of the GFP.

The very strong dependence of these farms regarding to direct payments and their high concentration in the New Laender are the two principal arguments developed by the German political leaders to reject the principle of the degressive payment scheme. The situation is different in France. Farms getting more than € 100,000 of direct payments represent only 0.5% of total labour input, 1.8% of SGM, 3.1% of direct payments and 1.7% of GFP.

Table 12.2 Distribution of farms by the level of direct payments (%)

%	Direct payment per farm in2004 (in €)								
	<5,000	5,000-10,000	10,000-20,000	20,000-30,000	30,000-40,000	40,000-50,000	50,000->100,000 60,000		total
					Germany				
Share of farm numbers	17.7	25.0	33.9	12.6	4.7	2.2	2.5	1.2	100
Share on lanour units	17.6	19.0	26.6	11.2	4.8	2.3	2.7	15.8	100
Share on UAA	4.4	12.3	24.0	13.5	7.1	4.1	6.1	28.5	100
Share on SGM	13.8	15.7	27.3	14.5	6.7	3.5	3.9	14.6	100
Share on production valu	14.3	15.4	26.4	13.5	6.2	3.3	3.9	17.0	100
Share on direct payments	2.1	9.4	23.8	15.2	8.0	4.9	8.2	28.5	100
Share on GEP	10.4	17.3	31.7	15.9	7.1	3.9	5.2	8.4	100
					France				
Share of farm numbers	21.3	18.1	26.7	16.0	7.2	4.5	5.7	0.5	100
Share on lanour units	1.6	7.4	21.3	21.5	13.6	10.9	20.4	3.1	100
Share on UAA	25.7	16.7	24.3	14.3	7.1	4.5	6.7	0.7	100
Share on SGM	22.3	11.9	20.4	15.2	9.0	7.2	12.3	1.8	100
Share on production valu	6.2	10.5	22.6	19.8	12.1	9.5	16.8	2.5	100
Share on direct payments	24.6	14.4	21.8	13.9	8.2	5.9	9.9	1.3	100
Share on GEP	20.7	13.2	21.0	15.4	9.3	7.0	11.7	1.7	100

This strong deviation is mainly due to the variations of farm size and the structure of agricultural production. To assess impacts of Agenda 2000, farm types are grouped according to the common nomenclature of the orientations of production [1]. *Arable farms*

[1] OTEX n°11 + 12: 'Arable crops'; OTEX n°41 + 43: 'Beef and dairy'; OTEX n°42: 'Beef meat'; OTEX n°44+60+71+72+81+82: 'Mixed-farms'; 'Others'.

represent 16% of farms in Germany and 23% in France (table 12.3). They have on average 83 and 84 ha of UAA, respectively, an amount of direct payments in 2004 of € 32,900 and € 31,100 and a GFP of € 46,300 and € 45,800. In Germany, the amount of direct payments per farms represents less than one fifth of the value of production for 40% of arable cropping farms (these proportions are 20 and 32% in France, respectively). These variations are also influenced by the regional reference yields as the base for the calculation of direct payments and by the mode of production (with or without irrigation in France).

Beef and dairy farms represent 40% of all farms in Germany and 24% in France. The average amount of direct payments per farm is rather close between the two countries in 2004 (€ 12,900 and € 12,400, respectively) and in 2008 (€ 16,900 and € 16,800, respectively). On a hectare base the amount of direct payments is higher in Germany, which might be due to the larger share of silage maize.

If, at the end of the reform, dairy farms remain less dependent on direct payments than arable farms, this is not the case for the subgroup identified as OTEX n°43 (milk, breeding and meat; 8,300 units in Germany and 18,600 units in France), for which the average amount of direct payments reaches € 20,000 in 2004 and € 24,000 in 2008.

Table 12.3 Characteristics of different farming types in 1995 and direct payments in 2004: Comparison between Germany and France

		Arable farms	Beef and milk	Beef meat	Mixed farms	Others	All farms
				Germany			
Number of farms		49,900	122,400	4,100	95,300	36,700	308,300
Standard gross margin	€ 1,000	49	34	21	53	57	45
UAA	ha	83	37	44	69	13	52
Share of arable crops in UAA	%	79	33	42	69	65	61
GFP 2004	€	46,300	37,800	28,600	40,500	35,200	39,600
Direct payments in 2004/farm	€	32,900	12,900	28,400	28,300	5,200	20,200
Direct payments in 2004/labour unit	€	18,200	7,800	18,300	12,400	2,200	10,300
Direct payments in 2004/UAA	€/ha	400	350	650	410	400	390
Direct payments in 2004/GFP	%	71	35	99	70	15	51
				France			
Number of farms		100,900	102,00	45,200	100,300	81,200	429,600
Standard gross margin	€ 1,000	55	34	27	47	69	48
UAA	ha	84	52	65	64	18	57
Share of arable crops in UAA	%	86	34	14	50	25	53
GFP 2004	€	45,800	38,900	28,400	42,500	55,400	43,400
Direct payments in 2004/farm	€	31,100	12,400	2,400	20,700	3,100	15,700
Direct payments in 2004/labour unit	€	21,00	800	17,800	12,200	1,300	9,200
Direct payments in 2004/UAA	€/ha	370	235	370	320	170	270
Direct payments in 2004/GFP	%	68	31	84	49	6	35

Farms of the type *beef meat* are not numerous in Germany (4,100 units), because beef and veal fattening is mainly realised in farms classified under 'Dairy & milk' and 'Mixed'. In France, the 45,200 farms specialised on beef and veal production are characterised by a low level of remuneration (€ 28,400 of GFP is 62% of the average amount of arable farms) and a strong dependence from direct payments (84% of the GFP in 2004). A high share of them is located in less favourable zones (Limousin, Midi-Pyrenees, Burgundy); they are getting significant amounts of direct payments by co-financed programs at national level (premia for the maintenance of the systems of extensive breeding, compensatory allowances for less favoured areas, etc.).

Mixed farms are particularly well represented in both countries (31% of farms in Germany and 23% in France). The comparison between France and Germany highlights a level of direct payments of approximately € 12,000 per agricultural worker. The weight of direct payments related to GFP is weaker in France (49%) than in Germany (70%), because of the low level of economic performance of some large farms in the New Laender. The remaining farms (*Others*) are very little concerned by the modifications made within the framework of Agenda 2000. Directed towards horticultural production, market-gardening, wine, poultry or pigs, these farms are characterised by a strong mobilisation of hired labour and by an economic size often higher than that observed in the other sectors of production.

12.4 Impacts of modulation

The comparative analysis of the distribution of direct payments and its evolution over the period 1991-2008 was a necessary stage to better understand the socio-economic context of the European debate on modulation and the divergent position between France and Germany.

12.4.1 Different positions with regard to modulation

The agreement of Berlin did neither take into account the proposal of the European Commission of a degressive payment scheme beyond a threshold of € 100,000 per farm (Fuentes, 1999), nor that of the French delegation proposing a time decrease of direct payments (Butault, 1999). The debates which took place during the process of negotiation of Agenda 2000 however resulted in authorising a mechanism of modulation within the framework of subsidiary. Article 4 of the horizontal measures (n°1259/99) opens the possibility to the Member States of implementing a device of modulation, while the budget savings will be available at the national level to co-finance actions favourable to rural development and environmental programs. The modulation, whose impact is limited to 20% of the maximum amount of direct payments of individual farms, can be carried out according to three criteria: the amount of direct payments, employment and economic prosperity (measured by the SGM).

The *French government* decided, in accordance with article 4, a scheme of modulation starting from the marketing year 1999-2000 (Chart 12.1). The modulation does not affect those payments, even partially financed at national level (compensatory allowances

for less favoured areas, agri-environmental payments, payments for climatic accidents, local payments, etc.), which represent 12% of total payments given directly to French agriculture. It is implemented to re-orientate a part of direct payments (€ 160 million, respectively 2% of the total) towards the financing of 'Territorial Contracts of Farm' (CTE) instituted by the new law of agricultural orientation. The saved budget is used to co-finance the program for which half of the budget has to be added from national funds.

The French scheme of modulation, which was published in the decree n°2000-280 of March 24, 2000 and the circular of April 3, 2000, lies within the scope of article 4 of the horizontal measurements of Agenda 2000. It determines a modulation factor for each farm based on three criteria: the total amount of direct payments of the CAP, farm size (measured by standard gross margin - MBS -) and employment. For the presentation of the scheme it will be distinguished as follows: a) framework of modulation at farm level, b) method of calculating the reduction factor for direct payments.

Framework of modulation at farm level

The reduction of payments does not apply to farms for which the total amount of direct payments of CAP (MTAD) is, for the preceding calendar year, lower than a contractual threshold fixed the Minister for Agriculture and Fishing (SFAD). This threshold differs according to the legal status of farms: it is € 30,000 for individual farms, for farms with Limited Responsibility (EARL) and Civil Companies (SCEA); in the case of Agricultural Co-operatives (GAEC) it is € 30,000 multiplied by the number of associates. The same individual, acting as head of farm on a purely principal basis or secondary basis, can be taken into account for the calculation of this threshold for only one farm.

Among the farms, whose total amount of direct payments of CAP is higher than this threshold, those having a MBS of reference (MBSREF) lower than a minimal threshold (MBSMIN) fixed each year per ministerial decree (€ 50,000 for the first application campaign), are not subjected to modulation. The MBS of reference corresponds to the total MBS of the farm divided by the number of associates of capital in the case of GAEC and to the total MBS for the other types of farms.

Method of calculating the reduction factor for direct payments

For farms concerned by modulation (MTAD>SFAD and MBSREF>MBSMIN), a reduction factor of direct payments (TRAD) is determined. In accordance with the horizontal measures, the reduction of direct payments is restricted to 20%. The calculation method of the reduction factor uses two elements not yet mentioned: a maximum threshold of MBS (MBSMAX) fixed each year per ministerial decree (€ 150,000 for the first application campaign); an amount representing the cost relating to labour (CRMO). The latter is composed as follows: a) the cost of the gross salaries declared, including the social security costs covered by the employer (reaching a maximum amount of € 22,500 per hired worker); b) a flat-rate amount of € 7,500 for the heads of farms on a purely secondary basis, and not-paid family workers (articles L321-5 and 1106-1 of the rural code). For farms having a MBS of reference (MBSREF) lower than the maximum threshold of MBS (MBSMAX), the modulation factor is calculated in the following way:

$$TRAD = \frac{0.03 * (MTAD - SFAD) + 0.25 * \frac{(MBSREF - MBSMIN)}{(MBSMAX - MBSMIN)} * (MTAD - SFAD - CRMO)}{MTAD}$$

Example 1: For an individual farm, having 1 AWU, € 60,000 of direct payments and € 100,000 of MBS of reference, the modulation factor is 7.75% (either a loss of € 4 650).

Example 2: For a GAEC, having two associates and one hired worker (at annual total costs of € 20,000), € 100,000 of direct payments and € 320 000 of total MBS (either 160,000 of MBS of reference). The modulation factor is 6.2% (or a loss of € 6,200).

Chart 12.1 The French modulation scheme of direct payments of CAP

The ministerial decree of March 24, 2000, follows the above mentioned criteria of horizontal measures (Chatellier, 2000). It is the result of several months of reflection during which various alternative scenarios were discussed. The first official proposal was made at the time of the Higher Council of Orientation in July 1999. The final version of the decree took into account proposals of all agricultural professional organisations as well as the principles of modulation defined in Agenda 2000, i.e. employment (in particular salaried workers), the integration of the criterion of SGM and the specific treatment of some crops historically strongly subsidised (tobacco, starch potatoes).

Opposed to the Commission's proposal of a degressive payment scheme, which led to a stronger punishment of the German agricultural sector than that of other Member States, the *German government* did not wish to apply, within the framework of subsidiary, the principle of modulation. If the internal debate on modulation were not so controversial, the German authorities would have to make a choice for at least two reasons: coexistence - within German agriculture - of small sized family farms (localised particularly in the South) and of large-sized companies (localised mainly in the New Laender). Due to the political weight of the Laender it is more difficult than in France to establish a national program of redistribution of subsidies which is independent from the regional origin of saved funds.

During the phase of negotiation of Agenda 2000, several studies were carried out in Germany, to evaluate the impact of the application of such or such a device of levelling off or decreasing the scale of the direct payments. Some of them tried to highlight the economic consequences of the introduction of degressive payments according to farm size (Kirschke et al., 1998) while others focused more on the adaptation of structures and the legal status of farms (Hemme et al., 1998). In a clearly marked way, the political leaders of the New Laender wished, if a device of modulation was applied, that this should be based on the amount of direct payments per agricultural workers and not on the amount per farm. This proposal, which aimed at the particular structure of farms of these zones, is inspired to some extent by the former system entitled 'Anpassungshilfe' which envisaged a decreasing scale of subsidies according to labour input.

The proposal of the Ministry of Agriculture of Saxony, based on a ceiling of direct payments per agricultural worker unit, retained some attention at that time. The evaluation of the consequences of this device (Kleinhanss et al., 1998) stressed that beef and dairy farms were, whatever their location and size, very little concerned with the two thresholds considered (€ 25,600 and € 35,800 per worker). On the other hand, farms specialised in arable crops appeared more sensitive as well in the areas of the East as in the West. The reduction of their gross margin, evaluated with only 1% for the high threshold, rose between 7% and 12% in the case of the low threshold.

12.4.2 Consequences of the French scheme of modulation

The French device of modulation (annex 12.1) is assessed, for the year 2004, in a comparable way for French and German farms (table 12.4). According to these simulations, it potentially affects 59,300 farms in France with a total reduction of direct payments of € 160 million (either 2.1% of the total). Farms concerned record an average loss of direct payments of 4.9%; that is a level of penalisation lower than the authorised maximum

threshold of 20% (the share is less than 2% for 47% of affected farms and between 10 and 20% for 9% of them). In Germany, the same device of modulation would result in penalising 15,700 farms and a reduction of direct payments of € 100 million (either 2.5% of the direct payments of CAP 2004). The average reduction is 5.3% for all affected farms; this one is lower than 2% for half of them and higher than 10% in 11% of the cases.

In France, the farms affected by modulation gather 14% of AWU, 34% of UAA and 43% of direct payments. They are very dependent on subsidies (140% of ‚economic result' against 55% for the remaining farms), and the amount of direct payments is reduced by 2 € 670. Due to a larger economic dimension, their level of GFP per family agricultural worker remains, after modulation, definitely higher than that of the other farms (€ 53,100 against € 29,400). In Germany, the 15,700 farms potentially concerned undergo an average retreat of direct payments of € 6,320 (-5.3%). By representing 5.4% of the whole of the farms of the country, these units hold 41% of UAA and 47% of the direct payments.

Differences between the *legal status* of farms arise from their different treatment within the modulation scheme as well as by their main orientation of production and size. From the total of farms in France 78% are individual farms, 12% remain to GAEC's and 10% to legal entities (table 12.4). Either 12% of individual farms and GAEC's as well as 35% of the legal entities are affected by modulation. In Germany a substantially larger proportion is omitted to private farms (96%), while the proportion of partnerships (2.8%) and legal entities (1%) is substantially lower. Contrary to France a substantially smaller part of the private farms would be affected by modulation (4%), while the proportion for partnerships (29%) is substantially higher. From the legal entities almost the total (98%) would be affected by modulation.

Farms concerned by modulation have a substantially larger size and higher transfer payments compared to the remaining farms. In *France*, farms concerned by modulation manage approximately the threefold of land than the others. Direct payments of affected GAEC's amount to the 3.5-fold, in individual farms to the 4.5-fold and in the legal entities to the 5.3-fold of the remaining farms in the same group. In the farms concerned the direct payments are reduced by around 5% in individual farms and legal entities. In GAEC's the premium shortening is clearly lower (3%). From this follows that in the majority of these enterprises only the proportional element of the modulation scheme comes into effect, while the progressive element has no significant impact, because the Standard Gross Margin is split-up by the number of partners.

In *Germany*, the size of individual farms and partnerships being affected by modulation is the 4.5-fold and the 5.5-fold respectively. In contrast to France the legal entities indicate a very large size, whereby the companies concerned manage more than the double of the other. Regarding direct payments the differences between enterprises concerned and not-concerned - also compared with France - are still more pronounced. The private farms concerned receive (without modulation) the 6.5-fold of direct payments, for partnerships it is 8-fold and for legal entities it is 18-fold. Premium reductions in the operations concerned amount to 4-5% in individual farms and legal entities. Partnerships would have to expect stronger premium shortages (10%). This might be attributed to the fact that a majority of these enterprises is aligned to arable crops and by the low labour input.

Table 12.4 Impact of the French scheme of modulation depending on the legal status of farms (average per farm)

		Single farms			Co-operatives/GAEC			EARL/SCEA			Total		
		without	with	total	without	with	total	without	with	total	without	with	total
							Germany						
Total number of farms		226,800	19,800	277,600	5,700	2,300	8,000	50	2,650	2,700	272,600	15,700	288,300
UAA	ha	34	157	39	72	400	164	650	1,550	1,530	36	428	57
Direct payment (DP) in 2004	€	7,590	49,050	9,190	14,000	114,070	42,300	21,210	413,400	403,100	7,680	120,100	13,800
Impact of modulation	€	0	-2,400	-90	0	-11,800	-3,300	0	-17,600	-17,100	0	-6,320	-340
Share of modulation on DP	%	0	-4.8	-1.0	0	-9.9	-7.9	0	-4.3	-4.2	0	-5.3	-2.5
							France						
Total number of farms		275,500	38,700	314,200	43,100	6,000	49,100	27,800	14,600	42,300	346,300	59,300	405,600
UAA	ha	43	132	54	89	238	107	49	158	87	50	149	64
Direct payment (DP) in 2004	€	10,700	48,400	15,400	24,100	86,300	31,600	10,700	57,200	26,700	12,400	54,300	18,500
Impact of modulation	€	0	-2,500	-300	0	-2,670	-320	0	-3,110	-1,070	0	-2,670	-390
Share of modulation on DP	%	0	-5.2	-2.0	0	-3.1	-1.0	0	-5.4	-4.0	0	-4.9	-2.1

The impact of modulation between *farming types* is also important, due to the different level of direct payments, orientation of production, size and labour input. Figure 12.3 shows the results for *France* referring to OTEX (figure 12.3). The share of arable farms, mixed farms, dairy farms and 'others' is around 20 to 25%, each. Sixtysix percent of arable farms and 20% of mixed farms will be affected by modulation, in the other groups only a small proportion is allotted. Eightyfour percent of the premium reductions at sector level will be allotted to arable farms and 12% to mixed farms. Dairy and beef producers would be more concerned after the final introduction of the milk market reform in 2007/08.

Due to the lack of data on OTEX in the national farm accounting network we were obliged to use the national classification scheme for *Germany* (figure 12.4). Concerning cropping farms the result is similar to France: 64% of all operations concerned by the modulation and 80% of the entire premium savings remain to this group. About 90% of the premium reductions remain to farms of the new Laender. Although about 50% of all farms are dairy and beef farms, only 25% of farms concerned by modulation are allotted to this group and the proportion of the entire premium shortening amounts to only 15%. Mixed farms and pig and poultry farms are not much affected. The bulk of the premium shortening remains to farms of the new Laender.

The *regional impact* of modulation is the reflection of agricultural specialisation and the relative weight of large farms. In France, the share of farms concerned with modulation is particularly strong in regions oriented to the production of cereals, oilseeds and protein crops (69% in Ile-de-France, 47% in the Centre, 45% in Picardy, etc.) (figure 12.5). In the areas of the South (vineyards), the West (dairy, pigs and poultry) and the Centre (production of beef and veal on the basis of extensive systems), the share of farms concerned is lower than 10%. In Germany, about half of the 13,400 farms of the New Laender are affected by modulation; this proportion is only 3.3% in the 274,900 farms of the other regions. With 4.6% of the total farms and 40.6% of the direct payments, the farms of the

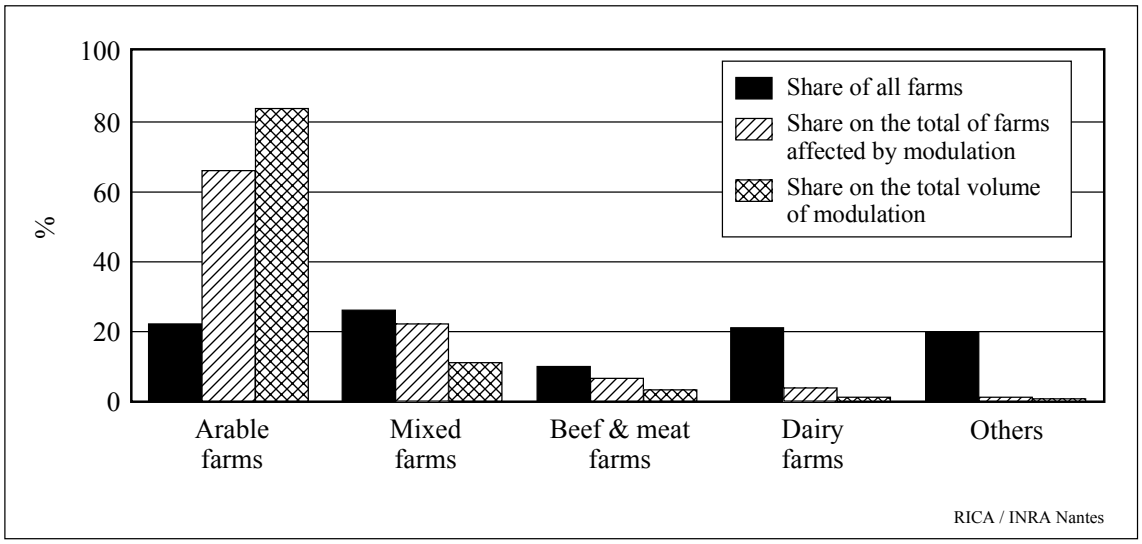

Figure 12.3 Impacts of modualtion in France by farming types (OTEX)

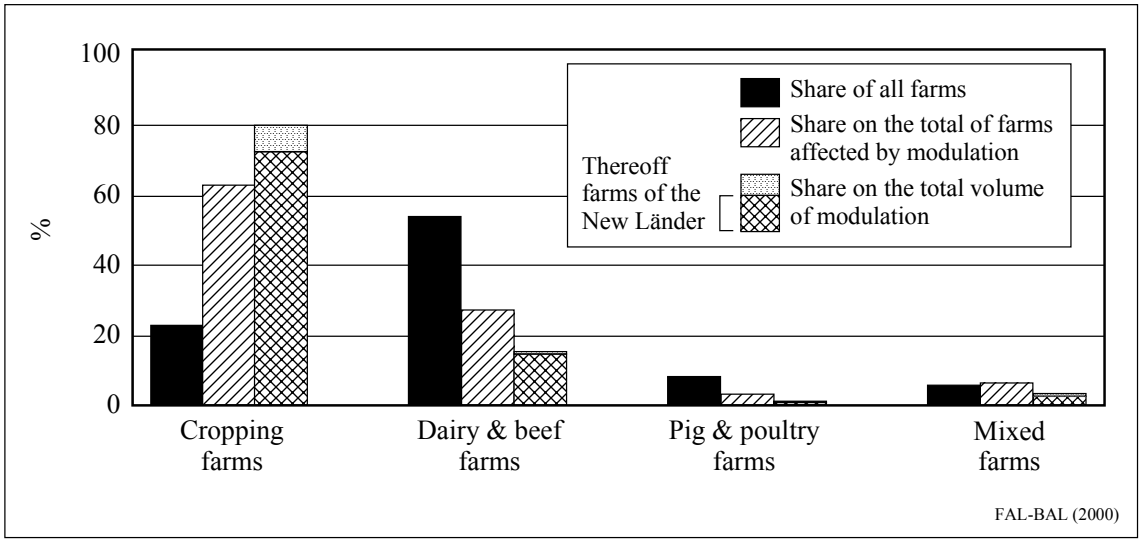

Figure 12.4 Impacts of modulation in Germany by farming types (national classification scheme)

new Laender contribute with 91.1% to the budgetary saving related to modulation. 60% of these savings remain to the 3,100 arable farms located in the New Laender. These units, which have a surface of 620 ha and € 183,500 of direct payments, undergo an average reduction of 10.5% of direct payments.

Aiming at the partial reorientation of direct payments towards the remuneration of positive externalities, modulation does not allow the realisation of budgetary savings. The analysis of regional re-balancings could be truly committed only in a few years, once programs (via in particular to 'Territorial Contracts of Farm') are established. It should take into account the progressive adaptation of farms due to changing economic conditions, in

particular regarding the organisation of work and the transformation of the legal status of farms.

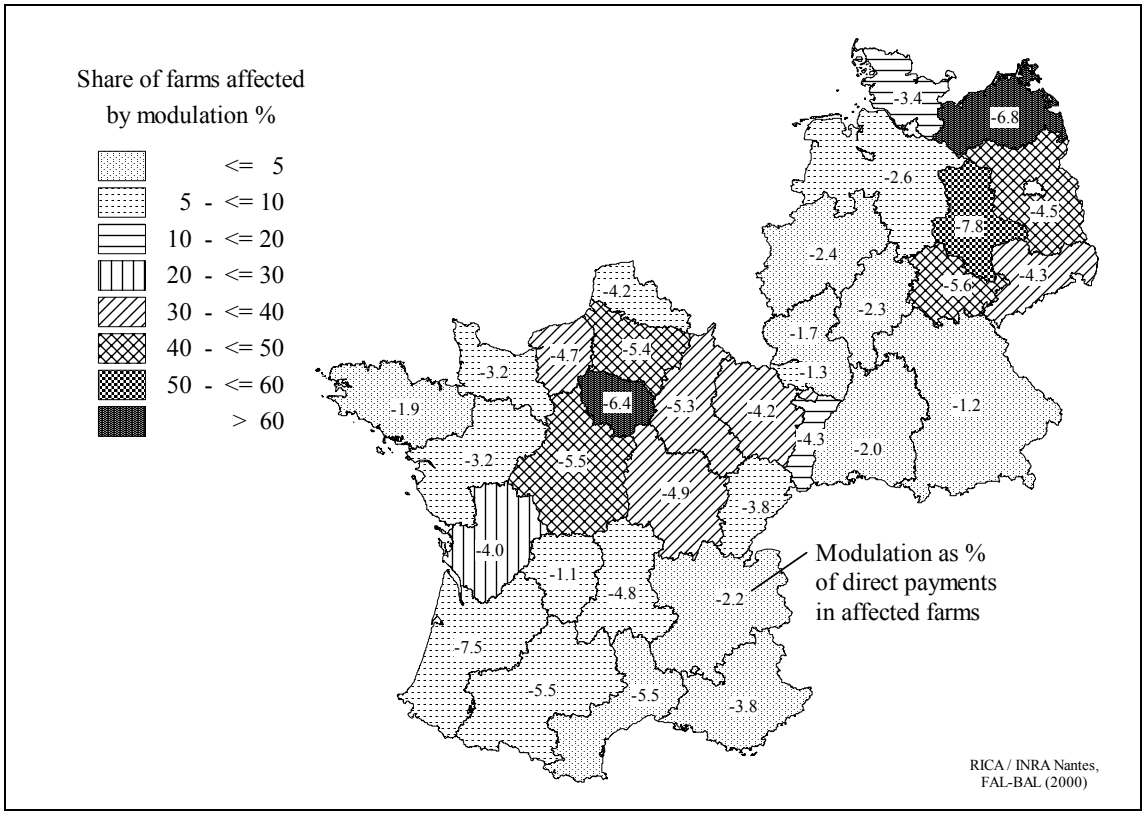

Figure 12.5 Regional impacts of the French scheme of modulation

12.5 Conclusion

The negotiations on the agricultural policy measures of Agenda 2000 highlighted divergent positions between Member States regarding the level and type of direct payments. Some frictions related in particular to the mode of financing (more or less based on the principle of subsidiary or co-financed programs, etc.), to the level of compensating the reductions of institutional prices, to the conditions of granting of direct payments (modulation and cross compliance) and to the implementation of degressive payment schemes. France and Germany played a significant role in these debates, but did not share the same vision. France, from which improved the 'budgetary rate of return' since 1992, was officially in favour of the principle of modulation and the temporal decrease of direct payments. Germany, defending an opposite position on these subjects, carried out the idea of an increased co-financing of agricultural policy.

The comparative analysis over the period 1991-2008 shows that direct payments became essential in the formation of income, especially for those farms directed to arable crops and beef production. The reform of Agenda 2000 does not basically modify the ini-

tial hierarchy of the amount of direct payments per farms, even if the increase is more in favour of the animal sector.

The French scheme of modulation is in coherence with the framework of subsidiary (decree of March 24, 2000). Under conditions of the year 2004 it affects 15% of farms and 2.1% of the direct payments will become available for the program 'Territorial Contracts of Farms'. In Germany, a modulation scheme would be applicable with more difficulties because of the heterogeneity of agricultural structures between the East and the West. On the assumption that the French scheme would be introduced, 15,700 German farms would be potentially affected and direct payments would be reduced by 2.5% (thereof 91% remaining to farms of the New Laender). Regarding the subsidiary principle of modulation, the question raises, if the competitive position of the main European regions of production will be affected, too. The examination of this question has to consider other elements, i.e. the effects of alternative regionalisation plans and other subsidiaries (national envelopes, environmental conditions of compensatory payments).

Modulation is a tool of agricultural policy among many others, influencing the structural development and contributing to a balanced territorial distribution of agricultural production. From the viewpoint of future negotiations within WTO and EU enlargement, the question of the way of agricultural supports becomes more important. Beyond the actions of the Member States lying within the scope of subsidiary, the question raises of transferring a larger share of the EU budget towards programs for rural development, which is the second pillar of CAP.

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Annex 12.1 The French modulation scheme (decree of March 24, 2000)

The French scheme of modulation, which was published in the decree n°2000-280 of March 24, 2000 and the circular of April 3, 2000, lies within the scope of article 4 of the horizontal measures of Agenda 2000. It determines a modulation factor for each farm based on three criteria: the total amount of direct payments of the CAP, farm size (measured by standard gross margin - MBS -) and employment. For the presentation of the scheme it will be distinguished as follows: a) framework of modulation at farm level, b) method of calculating the reduction factor for direct payments.

Framework of modulation at farm level

The reduction of payments does not apply to farms for which the total amount of direct payments of CAP (MTAD) is, for the preceding calendar year, lower than a contractual threshold fixed by the Minister for Agriculture and Fishery (SFAD). This threshold differs according to the legal status of farms: it is € 30,000 for individual farms, for farms with Limited Responsibility (EARL) and Civil Companies (SCEA); in the case of Agricultural Co-operatives (GAEC) it is € 30,000 multiplied by the number of associates. The same individual, acting as head of exploitation on a purely principal basis or secondary basis, can be taken into account for the calculation of this threshold for only one exploitation.

Among the farms, whose total amount of direct payments of CAP is higher than this threshold, those having a MBS of reference (MBSREF) lower than a minimal threshold (MBSMIN) fixed each year per ministerial decree (€ 50,000 for the first application campaign), are not subjected to modulation. The MBS of reference corresponds to the total MBS of the exploitation divided by the number of associates of capital in the case of GAEC and to the total MBS for the other types of farms.

Method of calculating the reduction factor for direct payments

For farms concerned by modulation (MTAD>SFAD and MBSREF>MBSMIN), a reduction factor of direct payments (TRAD) is determined. In accordance with the horizontal measures, the reduction of direct payments is restricted to 20%. The calculation method of the reduction factor uses two elements not yet mentioned: a maximum threshold of MBS (MBSMAX) fixed each year per ministerial decree (€ 150,000 for the first application campaign); an amount representing the cost relating to labour (CRMO). The latter is composed as follows: a) the cost of the gross salaries declared, including the social security costs covered by the employer (reaching a maximum amount of € 22,500 per hired worker); b) a flat-rate amount of € 7,500 for the heads of farms on a purely secondary basis, and not-paid family workers (articles L321-5 and 1106-1 of the rural code). For exploitations having a MBS of reference (MBSREF) lower than the maximum threshold of MBS (MBSMAX), the modulation factor is calculated in the following way:

$$TRAD = \frac{0.03 * (MTAD - SFAD) + 0.25 * \frac{(MBSREF - }{(MBSMAX - } * (MTAD - SFAD - }{MTAD}$$

Example 1: For an individual farm, having 1 AWU, € 60,000 of direct payments and € 100,000 of MBS of reference, the modulation factor is 7.75% (either a loss of € 4,650).

Example 2: For a GAEC, having two associates and one hired worker (at annual total costs of € 20,000), € 100,000 of direct payments and € 320,000 of total MBS (either 160,000 of MBS of reference) the modulation factor is 6.2% (or a loss of € 6,200).

13. Agro-environmental diagnosis at farm level: French experiences

Bernard Del'homme [1] and Marilys Pradel [2], Enita de Bordeaux

13.1 Introduction

Since more than ten years, environmental issues grow up everywhere in our life, on a world point of view as on a local one. On general aspects as on specialised ones, agriculture is concerned by such changes and for years now National and Common agricultural policies have taken into account this dimension in their orientation. Integrating environmental issues means defining a lot of concepts that agriculture has to deal with and taking policy measures. We are not here debating around this general dimension, but trying to see what is done at micro-economic level (this means at farm level) for enlarging a farm management diagnosis with environmental issues. Therefore, after some definitions on the main aspects of a farm agro-environmental diagnosis, we will present several methods used in France.

13.2 What is a farm agro-environmental diagnosis ?

A first question when we want to understand what can be done at farm level when integrating environmental issues is to define what environment means. Two sciences used in farm diagnosis have an answer: Economy and Ecology. Thereafter, it is useful to define what is the meaning and the main goals of a farm agro-environmental diagnosis.

13.2.1 Environment: economic approach

In economy, environment is a word currently used. If we try to apply this concept in management activities at farm level, we can give two main definitions:

- environment: external assets and constraints that a farm has to deal with;
- environment: place of mutual influences and exchanges between a farm and outside.

In economy, environment is defined with economic and social functions. It has influences on farm activities in the way it gives opportunities or restrictions. But the content itself of environment is not clear. It's a place or a set of assets influencing farm activities.

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In France, most of management diagnosis methods use these definitions. In agriculture, especially one method deals clearly with environment in an economic sense: it is called 'farm global approach' and has been set up by a research team during the 70's [1].

13.2.2 Environment: ecological approach

From an ecological point of view, environment also has definitions:
- environment: medium of physical, chemical, biological and social factors defining the frame in which an organism lives;
- environment: set of qualities of a biophysical medium used by an activity and transformed by an other.

In this way of thinking, environment is more considered as a physical medium. In the agricultural field, this natural medium can be soil, air, water, landscape for example.

Of course if we consider these two approaches of environment, we don't take into account exactly the same notions. Environment thought during the last years is mostly the ecological point of view. This is the reason why we will focus on this approach.

13.3 A farm agro-environmental diagnosis

Introducing environmental issues in farm management diagnosis still means that we are in an advising field. Three main ideas have to be underlined in order to better understand what we mean by such a diagnosis.

13.3.1 Diagnosis meaning

As any diagnosis; a farm environmental diagnosis should provide three levels of knowledge:
- presentation of indicators used;
- explanations of indicators level;
- evaluation of indictors.

For this last level; a judgement has to be done. References are often required in order to pass judgement. This clearly means that a diagnosis should not only be the description of a situation; but has to give an evaluation. That is why the diagnosis method has to be oriented in this way.

13.3.2 Indicators meaning

In order to make a diagnosis, we need information on which we can present, explain and judge the farm situation towards environment. Such information is named indicator, this

[1] Bonnevuale, J-R., R. Jussiau, E. Marshall, 1989. Approche globale de l'exploitation agricole - Comprendre le fonctionnement de l'exploitation agricole: une méthode pour la formation et le développement. INRAP, Dijon, 329 pages.

means a quantification and simplification of a complex phenomenon in order to communicate on it [1].

Main qualities of such indicators should be:

- clearness (understandable);
- easy to get (measurement);
- relevance (based on scientific rules);
- representativeness.

Based on the diagnosis goals, indicators will often be collected through a specific survey at farm level, then they can be integrated in a database process.

Concerning environment, indicators can be collected at several levels.

13.3.3 Scales of environmental diagnosis

An environmental diagnosis based on indicators in agriculture can be applied on different scales, defining the observation level and indicators concerned:

- below the farm level (plot level, herd level);
- at farm level itself;
- over the farm level (natural or administrative area, basin, valley, …).

Each environmental diagnosis method has it's own scale. A complete environmental diagnosis often requires a combination of these different scales. The scale can also be determined by the goals of a diagnosis.

13.3.4 Main goals of an environmental diagnosis

Two main goals are today identified which request an environmental diagnosis:

- *farm management*
  As each diagnosis domain at farm level (production, finance, marketing, …), an environmental diagnosis has to give to the farmer an evaluation of it's farm situation, in order to provide him advises. Diagnosis is clearly made to improve management level in the farm, this means improving the decision process. Improving agricultural practices towards environmental respect, or combine economic approach and ecological one are often goals attempted;
- *agricultural policy*
  As environment is more and more integrated in the agricultural policy, farmers have to give more and more results on their practices towards environment to get subsidies. Several measures depend on the ability for the farm to provide such diagnosis. And it will be more and more needed in the future.

In France, since 1999, a new national agricultural orientation law recognises officially 'multifunctionality' in agriculture. This means that a farm has not only a role in

[1] Mitchell.

production, but also in land set up, in development of employment, in protection of environment.

In order to set up this evolution, a new type of contract has been created (Contrat territorial d'exploitation, C.T.E., or farm land contract). It allows a farmer to get subsidies for 5 years if he is able to provide a project in which he shows that he will improve environmental and territorial issues and economic aspects of his farm. An environmental diagnosis is required in this C.T.E.

Once we have defined a farm agro-environmental diagnosis and its goals, it is possible to look for main diagnosis methods used in France, in order to have an overview on what is done in this field.

13.4 Which methods exist in France ?

If environment is a quite recent idea in the agricultural field, some methods exist for several years which deal with this approach. That's why we will divide this part in 2 chapters: old methods and actual ones.

13.4.1 Old methods

13.4.1.1 Energetic analysis

Author: National energy agency
Birthday: 1970's
Objectives: - energy flow measurement at farm level;
- advises on production system efficiency towards natural resources.
Principles: Quantification of the energy consumption from 2 sources: renewable ones (wood, sun, water) and fossil ones (oil, coke, …).
Indicators: - energy balance sheet;
- energetic productivity;
- energetic efficiency.

Mainly based on the energy, this method was one of the first environmental diagnosis at farm level. It was justified by the oil crisis during the 70's. It has been less and less used during the 80's, due to the decrease of oil prices.

Its disadvantages come from difficulties to measure energy flows, this means that surveys made on the farm must be detailed and take time (around 5 days per farm). Human work is not taken into account in the measurement. At last, only energy is evaluated, and not all environmental aspects.

13.4.1.2 DEXEL (breeding farm diagnosis)

Author: Ministry of agriculture and professionals
Birthday: 1990's

Objectives: Advises on farm cattle buildings and agricultural practices according to legislation.
Principles: Farm survey to determine risk practices and risk areas towards environment (mainly water nitrogen pollution).
Indicators: - based on buildings characteristics,
- based on agronomic practices,
- based on agronomic criteria on the farm.

Born during the beginning of the 90's, this method was supposed to answer to nitrogen problems in cattle breeding areas. Based on national legislation, it is a method often used in all the country. In 2 or 3 days, a diagnosis is made in a report with graphs, tables and comments on the farm practices and characteristics towards buildings legislation, manure uses and agronomic risks due to these aspects.

If this method shows clearly environmental risks at farm level, it is quite only based on water nitrogen pollution and concerns only breeding farms.

Because environmental problems have grown, new methods focused on different aspects of this domain appeared.

13.4.2 Actual methods

We have chosen to present here the 3 main methods we can find these last years in France.

13.4.2.1 AGRO ECO

Author: National research institute in agriculture (INRA)
Birthday: 1990's
Objectives: Advises on integrated production practices on plots.
Principles: - farm sustainability evaluation with agro-ecological indicators;
- 2 types of indicators: method indicators, impact indicators;
- evaluation of cultural techniques and crop systems towards environment.
Indicators: - method: crop rotation indicator
- impact: 10 indicators (pesticides, nitrogen, phosphorus, irrigation, energy, organic material, soil work, soil cover, ecological structure).

Each indicator is evaluated by a note, which scale is based on disposal knowledge on this indicator.

Two main results are given: one report at farm level showing strong and weak points on farm cultural practices, one report at plot level in order to give further information for decision at this level.

This method is quite flexible and simple, and can be useful for improving crop practices. Its main disadvantage is that it is based on plot measurement, so this method is not really relevant for a whole farm diagnosis. And as it is based on plot level, breeding farms are not well evaluated with such a method.

13.4.2.2 SOLAGRO

Author: Non governmental agency
Birthday: 1990's
Objectives:
- evaluation of environment at farm level;
- advises for farmers for production systems improvements;
- availability for all types of farms.

Principles: 2 parts in the diagnosis:
- one based on 16 agronomic indicators (on soil, water, landscape)
- one based on a qualitative approach of farm agronomic practices and their effect on environment.

Indicators: 16 based on:
- nitrogen balance sheet and nitrogen risk;
- phosphorus and potassium balance sheet;
- crop protection system;
- physical and biological soil diversity;
- biological diversity;
- resources management.

Those indicators are often combined with an energetic analysis and a global synthesis of farm activities.

Results can be presented with tables or graphs like following ...

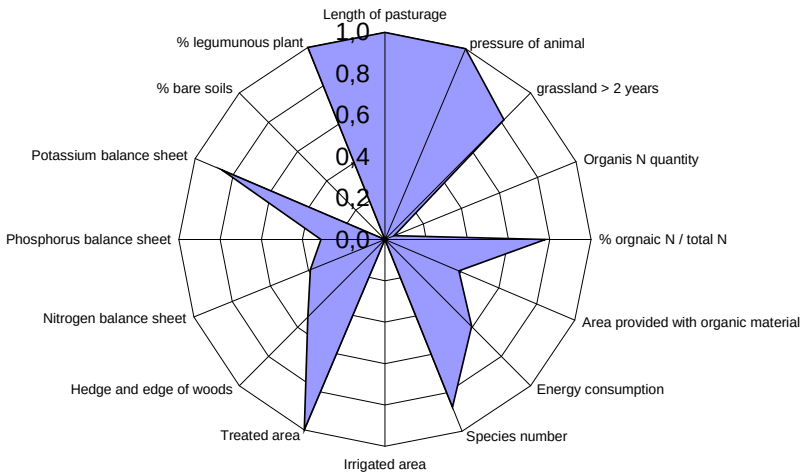

Figure 13.1 Graphic representation for a winery

Solagro method is a simple method, easy to lead, which provides results useful for farm management as for policy decisions. A software has been developed (DIALECTE) in order to compute the indicators collected and their reports. It's mainly relevant for combined farms, and less for specialised ones. It requires good knowledge on environmental issues.

13.4.2.3 IDEA

Author: Ministry of agriculture
Birthday: 1990's
Objectives:
- evaluation of agricultural systems towards sustainability;
- methodology for agricultural teaching.

Principles: 3 independant scales of sustainability, based on 37 indicators:
- agro-ecological sustainability (17 indicators),
- socio-land sustainability (14 indicators).
- economic sustainability (6 indicators).

each scale provides a note (scoring) which is gathered finally for one evaluation.

Indicators:

Agro-ecological scale:
- vegetal and animal diversity;
- area organisation;
- agricultural practices.

Socio-land sale:
- food and land quality;
- employment and services;
- ethic and human development.

Economic scale:
- viability;
- independence;
- transmissibility;
- efficiency.

Results are given with tables like the following ones.

Idea method results for a winery

	Indicators	Mode of determination		Value
A1	Animal diversity	Par espèce présene Par race supplémentaire	0 0	Max 15
A2	Annual and temporary crop diversity	Par espèce cultivée Si plus de 6 variétés Présence de légumineuses	0 0 0	Max 15
A3	Perennial crop diversity	Prairies permanentes <10% SAU Prairies permanentes >10% SAU Arboriculture /viticulture par espèce Si plus de 6 cépages Cultures ou prairies associés (enherbement)	0 6 2 2 3	13 sur 15
A4	Valorisation of regional breeds in their original area and / or rare species crops	Par race régionale dans sa région d'origine Par variété, race ou espèce rare et/ou menacée	0 0	0 sur 5
		DIVERSITE		13 sur 33

	Indicateurs	Modalités de détermination		Valeur
A5	Rotation	Aucune culture supérieure à 50% SAU Si présence significative d'une culture en mixité intra parcellaire	0 0	0 sur 10
A6	Plots size	Aucune 'unité spatiale de même culture' de dimension supérieure à 6 ha Si dimension moyenne ≤ 8 ha	6 2	8 sur 8

A7	Ecological regulation zone	Par % SAU Point(s) d'eau, zone humide Prairies permanentes sur zones inondables, ripisylve Pelouse sèche > ½ ha Aménagement anti-érosif (ex: vigne ou verger enherbés, bandes enherbées, terrasses...) Parcours non mécanisables, alpages	7 0 0 0 3 2	12 sur 12
A8	Actions for natural patrimony	Si respect d'un cahier des charges	2	2 sur 2
A9	Chargement	Chargement	0	0 sur 5
A10	Grassland area management	Forêt ou verger pâturés Fauche + pâture Prairie permanente > 30 % de la SAU Surface maïs ensilage % SFP	1 0 0 0	1 sur 3
		ORGANISATION DE L'ESPACE		23 sur 34

	Indicateurs	Modalités de détermination		Valeur
A11	Fertilization	Bilan apparent N (kg/ha) Présence de cultures pièges à N P minéral > 40 U/ ha SAU /an K minéral > 40 U/ ha SAU /an	8 0 0 0	8 sur 12
A12	Treatment of manures and winery wastes	Utilisation de lisier Utilisation de fumier Utilisation de compost Lagunage, oxygénation des lisiers, litières biomaîtrisée Redevance pollution et/ou rejets directs d'effluents dans le milieu naturel	0 0 0 0 0	0 sur 4
A13	Pesticides	Pression Polluante Réglage du pulvérisateur par organisme agrée Dispositif de récupération et de traitement des fonds de cuve Lutte biologique Utilisation de produits de classe 7 Utilisation de produits de classe 6 Désherbage prairies naturelles Bandes enherbées le long des cours d'eau et des fossés	1 1 1 0 0 -3 0 2	2 sur 12
A14	Animal well-being	Tous les pâturages protégés (ombre, abris, abreuvoirs…) Production plein air ou semi plein air Zéro-paturage ou atelier en claustration Atelier ou pratiques hors normes	0 0 0 0	0 sur 3
A15	Soils protection	Technique de Non-labour (3 options) Sols nus < 30% Brûlage des pailles	1 2 0	3 sur 3
A16	Irrigation	Pas d'irrigation ou goutte à goutte Irrigation (3 options)	3 0	3 sur 3
A17	Energetic dependance	Equivalent Fioul Hectare (4 options) Séchage en crib ou séchage en grange solaire ou autre dispositif de récupération de chaleur Eolienne, biocarburant, bio gaz...	3 0 0	3 sur 3
		PRATIQUES AGRICOLES		19 sur 33

Synthesis:

Agro-ecological indicators scale:

DIVERSITY	13 sur 33	55 sur 100
LANDSCAPE ORGANISATION	23 sur 34	
AGRICULTURAL PRACTICES	19 sur 33	

IDEA is the most recent diagnosis method integrating environmental aspects. Created by teachers, researchers and professionals from the Ministry of Agriculture, this method is a global one, including other fields than the environmental one. It is available for all types of farms, and it is quick and simple to implement it. Of course, it should be completed with more analytic approaches in order to get a real and complete diagnosis at farm

level. As it is a new method, some points are able to evolve during the next years, especially scoring problems (weight of each scale in the final note, compensation between different indicators) and references for a better judgement of the farm situation.

13.5 Conclusion

As environmental issues are now more and more important in the farm activities, management diagnosis methods must take into account this approach. Beside economic diagnosis methods, or with them, environmental diagnosis methods have to be developed during the next years, in order to provide either diagnosis results for farm managing or for policy assessments. For several years, such methods have been created in France, and some are becoming more and more often used with the new agricultural policy. This evolution shows clearly that farm managing has now to deal with several aspects outside the farm, related with society and environment.

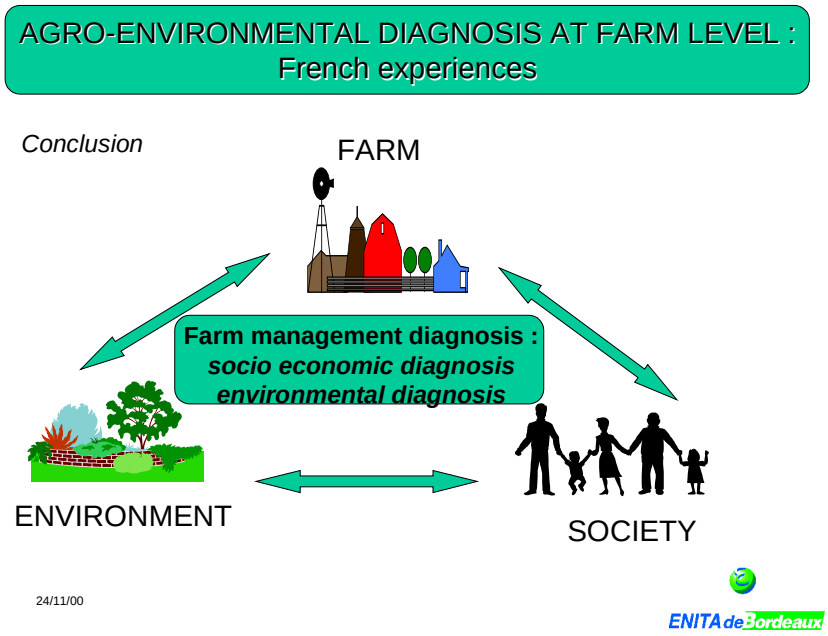

Figure 13.2 Agro-environmental diagnosis at farm level: French experiences

For farm managers and policy makers, this evolution means to be able to make farm diagnosis including these dimensions. It could also mean years of work for getting relevant diagnosis methods and relevant databases.

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14. Adoption of environmental sound and high quality production strategies and financial performance of Belgian glasshouse holdings

Nicole Taragola [1], Guido Van Huylenbroeck [2] and Dirk Van Lierde [1]

14.1 Introduction

In PACIOLI 4 a number of actions were identified for improvement of farm accounting and FADNs. Important issues were the collection of data on high quality agricultural products, environmental impact of production strategies, the creation of econometric models to supply policy-relevant conclusions on the basis of micro-economic FADN data and the improvement of cost effectiveness of FADNs. Interviews with the stakeholders of European FADNs in the RICASTINGS project indicated that the cost efficiency of the FADN can be improved if more use is made of the data (De Bont, 1998).

In PACIOLI 6 the advantages of the use of the FADN for modelling relations between management and firm results were presented (Taragola, 1998). As the Belgian FADN is a 'type Y' FADN a whole set of indicators on firm structure, characteristics of the firm manager and the financial performance of the firm are already available (Van Lierde and Taragola, 1996; Van Lierde and Taragola, 2000). As the marginal cost for collecting additional data is relatively low, the Belgian FADN seems to be an appropriate instrument for this kind of research.

In the current paper on the basis of FADN data and additional data collected at glasshouse holdings statistical models are estimated in order to supply policy-relevant conclusions with respect to the adoption of environmental sound and high quality production strategies by Belgian glasshouse growers.

14.2 Importance of the adoption of environmental sound and high quality management strategies by Belgian glasshouse growers

Environmental sound and high quality production increasingly seems to be a requisite for survival of the Belgian glasshouse horticulture. As Belgian glasshouse growers are not able to produce bulk products at the cost price level of southern competitors, they will take advantage of changing their strategy from a cost price strategy to a differentiation strategy. Also the relocation of the glasshouses in the Netherlands from the traditional production areas to new locations will result in a higher competition on the export markets. Moreover multiple store businesses increasingly place demands not only on the product itself but also

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on the production process. Consequently the adoption of environmental sound and high quality production strategies are an important challenge to Belgian glasshouse growers (Taragola et al., 1998; Van Lierde et al., 1998, 1999).

The aim of the current research is to analyse the influence of personal characteristics of the firm manager and characteristics of the firm on the adoption of environmental sound and high quality production strategies. Also the impact of these strategies on financial performance is examined.

14.3 Theoretical framework

14.3.1 Adoption of 'pro-active' or 'innovative' strategies

According to strategic management theory firms have to choose for a competitive strategy in order to obtain a favourable position in their competitive environment. Many researchers have associated business strategies with performance, distinguishing between strategies with high and low performance. Strategies resulting in high performance are defined as activities leading to success in the industry. It is found that such strategies include emphasis on product quality, product and service innovations, use of new technologies, and so on (Robinson et al., 1988; Kotey et al., 1997). Because high performing strategies involve initiative-taking, they are often referred to as 'pro-active' or 'innovative' strategies. Firms which perform below average tend to copy others in the sector. Such strategies characterised by low initiative and innovation are often referred to as 'reactive strategies' (Kotey et al., 1997; Steiner et al., 1986).

14.3.2 Determinants of adoption of 'pro-active' strategies

Strategic management theory states that three basic factors influence the managers' choice of strategy: external variables, firm characteristics and personal characteristics of the manager. In the case of glasshouse horticulture the competitive environment in which holdings operate, stimulates the firms towards the adoption of environmental sound and high quality production strategies, as these two aspects are becoming more important for consumers.

The manager characteristics can be divided into biographical characteristics such as age, education, and so on, and social characteristics such as personal values, attitudes and objectives. Instruments for measuring the social characteristics of managers of S.M.E.'s (small and medium enterprises) in general, or of farms and glasshouse holdings more specifically were developed by several researchers (Alleblas, 1987; Bamberger et al., 1990; Gasson et al., 1993).

According to the diffusion theory of Rogers (1995) earlier adopters of innovative strategies (and innovations in general) are not different from later adopters in age. However earlier adopters have more years of formal education than later adopters. Also participation in seminars will have a positive influence on the adoption of 'pro-active' strategies. According to research results in the field of 'objectives, behaviour and decision making', expressive and intrinsic objectives can be important in explaining behaviour of the firm manager. Expressive objectives consist of ambition, achievement, self develop-

ment, ... and are positively associated with adoption of 'proactive strategies'. Firm managers placing high value on intrinsic objectives such as working with plants, being independent or 'their own boss' are not likely to adopt 'proactive strategies' (Gasson et al., 1993).

Among the firm characteristics business size, objectives and sector can be important to explain adoption of 'proactive strategies'. Rogers (1995) states that earlier adopters have larger units than later adopters. According to S.M.E. research (Bamberger et al.,1990) the business objectives 'creativity and innovation' and 'growth' will have a positive influence on the adoption of 'proactive' strategies whereas 'stabilisation' will have a negative influence. As different sectors are acting in a different competitive environment and have a different social value system sector differences are likely to appear. Especially in the sector of glasshouse vegetables the new segmentation policy of the Belgian auctions after the tomato crisis in 1995 stimulated the vegetable producers towards high quality production. But, also in the sector of ornamental plants recently some initiatives were launched by inter-professional associations in co-operation with the government (Project Azalea Quality, Flemish Environmental Project Horticulture).

14.4 Data collection

The data of the research are obtained from a representative sample of 148 glasshouse holdings belonging to the FADN (Farm Accountancy Data Network) of the Centre of Agricultural Economics for at least five years. The sample consists of 89 holdings specialised in production of ornamental plants and 59 specialised vegetable producers. An advantage of this approach is the availability of indicators on financial performance over a longer time period, of indicators on firm structure and of information on biographical characteristics of the firm manager. Data on objectives and management were obtained from personal interviews performed during the first half of 1999 using a pre-tested questionnaire. Respondents were asked to rate the importance they attach to several issues on five-point Likert-type scales.

A first step in the analysis consisted of reducing the data on personal and business objectives to a limited number of principal components, reflecting the main objectives of managers. In the presented analysis these principal components are introduced as independent variables. The influence of personal and firm characteristics on the adoption of environmental sound production strategies is analysed by means of multiple regression analysis. Cluster analysis is used to classify the respondents into homogeneous groups with respect to quality management. By means of multiple discriminant analysis the ability of the different predictors to discriminate among the different clusters is examined.

14.5 Environmental management

14.5.1 Determinants of adoption of environmental sound production strategies

In table 14.1 the relation between the intention about future investments in environmental sound practices and the personal and firm characteristics is analysed by means of multiple regression analysis. The dependent variable is the score on the five points Likert scale. The results reveal no significant effect of age, education level, personal objectives of the firm manager and firm type. However a significant positive regression coefficient is obtained for 'participation in seminars' (measured as the number of seminars attended between January 1998 and January 1999), 'economic dimension' (measured in 'standard gross margin '80") and the business objectives 'creativity and innovation' and 'growth'.

A second regression analysis, which is also reported in table 14.1, describes the relation of personal characteristics of the firm manager and firm characteristics with the intention to reduce the use of pollutants (also measured on a five points Likert-type scale). The empirical data reveal that no significant effect of the firm characteristics can be observed. 'Participation in seminars' seems again to have a significant positive effect. In contrast to the theoretical expectations a higher education level has a significant negative influence on the plans to reduce the use of pollutants. This can of course mean that these managers are more aware of the economic effect of such a reduction.

In 1998 the Belgian sector of ornamental plants took the initiative to found V.M.S. (Vlaams Milieuproject Sierteelt - Flemish Environmental Project Horticulture). V.M.S. encourages the environmentally aware production of ornamental plants and is associated to the Dutch M.P.S (Milieuproject Sierteelt - Floriculture Environmental Project), which is an international accredited environmental standard based on registration. The participating growers record application of crop protection agents, fertilisers, energy and forms of waste separation. The recorded data are compared to specific standards per crop group. In the sample 12 of the 89 glasshouse growers specialised in production of ornamental plants are member of V.M.S. The logistic regression presented in table 14.1 analyses the influence of personal characteristics of the firm manager and firm characteristics on V.M.S. membership (yes/no). It follows that only a significant effect of 'age' and 'expressive objectives' can be observed. The effect of 'age' and 'expressive objectives' on the probability of being a member of V.M.S. is positive. The average age of the V.M.S. members in the sample amounts to 49 years, whereas non V.M.S. members have an average age of 45 years.

The empirical data reveal that the influence of personal and firm characteristics depends on the character of the management decision. Strategic environmental management (investments) is highly influenced by business characteristics (size, 'growth-oriented') whereas personal characteristics seem to be more important at the tactical management level for decisions such as reduction of the use of pollutants.

Table 14.1 Relation between personal and firm characteristics with future environmental sound investments, plans to reduce the use of pollutants and 'V.M.S.' membership

	environmental sound investments (scale 1-5)		Plans to reduce the use of pollutants (scale 1-5)		Membership 'v.m.s.' (yes/no) (ornamental plants)	
Personal characteristics firm manager coefficient	Standardised regression	Probability (p) coefficient	Standardised regression	Probability (p)	Estimate (standard error)	Probability (p)
- age	0.08	0.40	-0.13	0.19	0.19 (0.10)	0.07
- education:						
level 2 (dummy)	-0.03	0.69	-0.23	0.01	-5.95 (60.56)	0.92
level 3 (dummy)	0.00	0.99	-0.21	0.03	-0.03 (1.53)	0.99
level 4 (dummy)	0.14	0.15	-0.17	0.13	1.70 (2.04)	0.40
level 5 (dummy)	-0.01	0.95	-0.15	0.09	-4.27 (84.83)	0.96
- participation in seminars (number)	0.25	0.00	0.18	0.07	0.10 (0.12)	0.42
- personal goals (factor scores)						
expressive goals	0.03	0.65	0.10	0.19	2.01 (0.89)	0.02
intrinsic goals	0.01	0.88	-0.09	0.18	-1.16 (0.77)	0.13
Firm characteristics						
- economic dimension (S.G.M.)	0.15	0.05	0.13	0.18	0.00 (0.00)	0.50
- firm type type vegetables (dummy)	0.12	0.12	0.10	0.26	-	-
- business goals (factor scores)						
creativity and innovation	0.26	0.00	0.02	0.79	0.89 (0.82)	0.28
growth	0.21	0.01	-0.09	0.31	0.64 (0.62)	0.30
stabilisation	0.02	0.79	-0.01	0.95	0.23 (0.54)	0.67
	R^2 = 0.32 R^2adj. = 0.25 Sig. F = 0.0000		R^2 = 0.24 R^2adj. = 0.17 Sig. F = 0.0003		-2Log LL = 24.56; x^2 = 33.10 p = 0.00 Member prediciton rate = 66.7% Non member pred.rate = 97.4%	

14.5.2 Financial performance and adoption of environmental sound production strategies

According to Rogers (1995) socio-economic status and innovativeness appear to go hand in hand. The empirical data reveal that the scores on environmental management are positively related to the average available income earned by the entrepreneur during the period 1993-1997. A significant positive correlation could be observed among the financial performance and the score on 'future environmental sound investments' (r=0.16;p=0.05). Also the score on 'plans to reduce the use of pollutants' was positively associated to the average available income earned by the entrepreneur (r=0.18; p=0.03). The firm managers who are member of the 'V.M.S.' earned an average available income of 2,908,000 BEF during the period 1993-1997, whereas this income amounted to 1,325,000 BEF for non-members. A t-test revealed that this difference was statistically significant (p = 0.01).

The question arises if innovators innovate because they have a higher income, or do they have a higher income because they innovate ? However according to the author the answer to this cause-and-effect question can not be answered solely on the basis of cross-sectional data.

14.6 Quality management

14.6.1 Classification of the growers in 'quality groups'

With the aim to classify the glasshouse growers into relatively homogeneous groups of strategic quality management a cluster analysis (method of Ward) was performed. The results indicate that respondents can be clustered into three groups. Differences among the groups were statistically tested by means of ANOVA analysis of variance and the post hoc Duncan procedure.

In table 14.2 the self-reported ratings on the strategic and tactical quality management items of the three 'quality groups' are presented. Strategic quality management is measured by the following items: quality/quantity strategy, concrete plans to improve quality in the future and efforts to control the factors which are influencing the quality of the products.

Table 14.2 Quality management and financial performance according to 'quality group' membership

	Group 1 (n = 64)	Group 2 (n = 38)	Group 3 (n = 46)	F, p; Duncan
Strategic management (scale 1-5)				
- Quality/quantity strategy	4.39	3.97	3.59	F=12.75; p=0.00; 1vs.2.3; 2 vs.1,3
- Concrete plans to improve quality in the future	4.39	1.18	3.26	F=262.21; p=0.00; 1vs.2.3; 2 vs.1,3
- Efforts to control quality factors	4.69	4.03	3.98	F=11.81; p=0.00; 1vs.2.3; 2 vs. 1
Tactical management (scale 1-5)				
- Quality control	4.98	4.79	4.43	F=15.25; p=0.00; 1vs.3; 2 vs.3
- Internal assessment of quality	4.84	4.55	4.20	F=10.87; p=0.00; 1 vs.3; 2 vs.3
- External assessment of quality	4.64	4.29	3.09	F=37.96; p=0.00; 1 vs.3; 2 vs.3
Performance (average accounting years 1993-1997)				
- Available income of the entrepreneur (1,000 BEF)	2,096	1,398	997	F=5,15; p=0,01; 1 vs. 3
- Available income of the entrepreneur (in % of the sector average)	131	92	64	F=4,72; p=0,01; 1 vs. 3

Tactical management is measured by the items: quality control of the production, internal assessment of quality (comparing the quality of the products with those of the

preceding years) and external assessment of quality (comparing the quality of the products with those of the other producers). Group 1 is consisting of 64 glasshouse growers who attach an extremely high value on strategic and tactical quality management. Compared to group 1 the 38 growers belonging to group 2 have a lower average score on strategic and tactical quality management. Typically for this group is that there are no concrete plans to improve the quality of the products in the future. During the interviews it became clear that the managers of this group were convinced that the quality of their products was already optimal. Group 3 is consisting of 46 growers with the lowest average score on strategic and tactical quality management and 'moderate' concrete plans to improve product quality in the future.

14.6.2 'Quality group' membership and FADN indicators on product quality

Many management studies focus on either process or content issues, but not on both of these areas. The use of FADN data allows to study the association between 'quality group' membership and indicators on product quality. However due to the heterogeneous cultivation plans of the glasshouse growers (differences in crops and planting periods), this is not a simple task. Because of a lack of data on quantity and size of the ornamental plants, allowing to judge quality on the basis of prices obtained by the grower, the association could not be examined for growers of ornamental plants. Consequently only for growers specialised in production of glasshouse vegetables, the association between reported behaviour and real behaviour was investigated.

From the 64 glasshouse growers of group 1, 34 are specialised in production of glasshouse vegetables. These growers can be defined as 'high quality' growers, with high scores on strategic as well as tactical management issues, and concrete plans to improve quality in the future. Almost all the specialised growers with substrate culture of tomatoes belong to this group.

The composition of group 1 is as follows:

- 14 growers specialised in substrate culture of tomatoes;
- 2 growers specialised in soil culture of tomatoes;
- 4 growers specialised in production of lettuce;
- 2 growers specialised in production of sweet pepper;
- 2 growers specialised in production of lamb's lettuce;
- 1 grower specialised in production of beans;
- 1 growers specialised in production of eggplant;
- 4 growers with production of early cucumbers and late tomatoes;
- 3 growers with production of lettuce (winter) and tomatoes (summer);
- 1 grower with production of sweet pepper and tomatoes.

Thirty-three of the 34 growers belonging to group 1 are selling their products at the auction. One grower sells his products directly to a distribution chain on contractual basis.

Group 2 is consisting of 38 growers with a lower average score on strategic and tactical management. The growers belonging to this group do not have any concrete plans to improve quality in the future. Ten of these growers are producing glasshouse vegetables. One can notice that this group does not include any of the specialised growers of tomatoes.

Group 2 is composed as follows:
- 4 growers specialised in production of lettuce;
- 1 grower specialised in production of sweet pepper;
- 1 growers specialised in production of cucumber;
- 1 growers with production of lettuce and tomatoes;
- 2 growers with production of lettuce and celery.

Seven of the 10 growers of group 2 sell their products at the auction. The other 3 growers sell them to wholesale dealers.

The growers of group 3 do have the lowest average score on strategic and tactical quality management and 'moderate' plans to improve product quality in the future. From the 46 growers, 16 are specialised in production of glasshouse vegetables.

The composition of group 3 is as follows:
- 2 growers specialised in substrate culture of tomatoes;
- 3 growers specialised in soil culture of tomatoes;
- 1 grower specialised in production of cucumber;
- 1 grower specialised in production of endive;
- 5 growers specialised in production of lettuce;
- 1 grower specialised in production of sweet pepper;
- 2 growers with production of lettuce (winter) and tomatoes (summer).

Eight of the 16 growers are selling their products at the auction. The other half is selling their products to wholesale dealers or at home (partly).

Comparing prices obtained by the growers of the different groups is very difficult because of the heterogeneous cultivation plans. Even two growers with the same quality can obtain different average prices for the same vegetable because of differences in selling periods.

However it is clear that quality management is given more attention by growers specialised in tomato production. One can assume that the new segmentation policy of the Belgian auctions after the tomato crisis in 1995 stimulated the tomato growers towards high quality production. Another fact that has been established is that more production has been lost by the growers of group 3 because of diseases or condemnation at the auction. One can notice that 'high quality' growers are mainly selling their products at the auction, whereas wholesale dealers are more important in the groups with a lower score on quality management.

14.6.3 Determinants of 'quality group' membership

The influence of personal and firm characteristics on 'quality group' membership is analysed by means of 'multiple group' discriminant analysis. For this purpose the sample is divided into two parts. One part of the sample (the analysis sample), is used for estimation of the discriminant function. The other part (the holdout or validation sample) has been reserved for validating the discriminant function. Two thirds of the observations serve as the analysis sample, and the other third is used for validation. The distribution of the number

of cases in the analysis and validation samples is equal to the distribution in the total sample.

In table 14.3, the results of the discriminant analysis are presented. The probability of the univariate F ratios indicates that when the predictors are considered individually, 'participation in seminars' and the importance of 'expressive objectives' significantly contribute to the differentiation between the groups. Concerning the firm characteristics a significant effect of 'economic dimension' and 'firm type' is observed. Also the business objective 'creativity and innovation' seems to influence group membership. Two discriminant functions are estimated. The eigenvalue associated with the first function is 0.49, and this function accounts for 76.4% of the explained variance. The second function has an eigenvalue of 0.15 and accounts for 23.6% of the explained variance. The value of Wilks's is 0.58. This gives a chi-square of 48.98 with 26 degrees of freedom, which is significant (p=0.004). Thus, the two functions together significantly discriminate among the three groups. The interpretation of the results is aided by an examination of the standardized discriminant function coefficients and the structure matrix of pooled within-groups correlations between the discriminating variables and the canonical discriminant functions. Variables with correlation coefficients which are larger for function 1 than for function 2 are shown with asterisks, and vice versa. The correlation coefficients indicate large coefficients for 'participation in seminars', 'expressive goals', 'economic dimension', 'type vegetables' and 'creativity and innovation' on function 1; whereas function 2 has relatively larger coefficients for 'age' (negative) and 'education level 5'. Function 1 tends to separate group 1 (highest value) and group 2 and 3 (lowest value). Function 2 separates group 3 (highest value) from group 2 (lowest value).

The results reveal that membership of group 1 is positively associated with 'participation in seminars', 'expressive objectives', 'creativity and innovation', 'economic dimension' and 'vegetable production'. Among the groups with a lower score on 'quality management' (groups 2 and 3) plans to improve quality in the future are negatively associated with 'age' and positively associated with 'education level'. The classification results based on the analysis sample indicate that 59.6% of the cases are correctly classified. When the classification analysis is conducted on the independent holdout sample a hit ratio of 58.8% is obtained. By chance alone one would expect a hit ratio of one third or 33.3% (given three groups of equal size).

14.6.4 'Quality group' membership and financial performance

In table 14.2 the financial performance, measured as the average available income of the entrepreneur and the available income of the entrepreneur in percentage of the sector average during the period 1993 to 1997 is reported. On the average the growers of group 1 obtain a higher income than those of group 2 who, at their turn, earn more than the growers of group 3. The results of the Duncan procedure reveal that the difference is only significant at the 0.05 level for groups 1 and 3.

Table 14.3 Influence of personal and firm characteristics on 'quality group' membership (three group discriminant analysis)

	Univariate f-ratio		Standardised canonical discriminant function coefficients		Structure matrix correlation coefficient	
	f-ratio	probability	function 1	function 2	function 1	function 2
Personal characteristics firm manager						
- age	2.12	0.13	0.24	-0.30	-0.04	-0.53 *
- education level						
education level 2	0.10	0.91	-0.01	0.34	-0.00	0.11 *
education level 3	0.01	0.99	0.11	0.21	-0.00	-0.03 *
education level 4	0.23	0.79	0.10	0.26	-0.08	0.11 *
education level 5	1.98	0.14	0.13	0.80	-0.02	0.52 *
- participation in seminars	12.80	0.00	0.65	0.01	0.73 *	-0.04
- personal goals						
expressive goals	6.87	0.00	0.50	0.21	0.54 *	0.07
intrinsic goals	0.48	0.62	-0.18	0.25	-0.10	0.19 *
Firm characteristics						
- economic dimension (S.G.M.)	4.15	0.02	0.22	-0.26	0.42 *	-0.04
- firm type						
type vegetables	3.19	0.05	0.29	0.01	0.37 *	0.03
- business goals						
creativity and innovation	2.35	0.10	-0.01	-0.39	0.28 *	-0.26
growth	0.68	0.51	-0.20	0.35	0.14	0.18 *
stabilisation	2.17	0.12	0.36	0.40	0.25	0.31 *

14.7 Conclusion

The results of the research reveal that the general theoretical framework used in literature for explaining the adoption of 'pro-active' or 'innovative' strategies, is also useful for the case of adoption of environmental sound and high quality production strategies by Belgian glasshouse growers. The empirical data reveal that growth-oriented and greater businesses are more likely to invest in environmental sound practices. Personal characteristics of the firm manager, such as 'expressive objectives' (ambition, achievement, self development, ...) and 'participation in seminars' seem to have a positive impact on tactical environmental management decisions. As indicated by the theory of Rogers (1995) the impact of age was not clear.

Adoption of high quality production strategies is highly influenced by personal characteristics ('participation in seminars', 'expressive objectives') as well as business characteristics ('size', 'vegetable sector', 'creativity and innovation'). A positive association among financial performance and the adoption of environmental sound and high quality production strategies was found.

In the current research the measurement of the adoption of environmental sound and high quality management strategies is based on self reporting by the firm manager. Because of the heterogeneous cultivation plans of the glasshouse holdings, analysis of the correspondence between reported and real behaviour of the managers is difficult, especially for growers of ornamental plants. Analysis of the association of 'quality group' membership of growers with glasshouse vegetable production with FADN data revealed that quality management is given high attention by growers specialised in substrate culture of tomatoes. Another fact that has been established is that more growers of the 'high quality' group are selling their products at the auction whereas wholesale dealers are more important in the group with a lower score on quality management.

Future research is needed to analyse the correspondence among reported and real environmental management and the relationship with financial performance. In the case of future investments in environmental sound practices and plans to reduce the use of pollutants in the future this will only be possible by longitudinal research methods and collection of additional environmental data such as the use of pesticides. At the moment we started gathering data on the use of pesticides for glasshouse vegetables, allowing to test the association between reported and real environmental management in the future (Van Lierde and Taragola, 1999).

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Workgroup session 4: What is a farm - part 2

Introduction

In workgroup session 1 we have created a large number of examples where the definition of a holding is unclear. In this session we would like to find solutions for these unclear situations. We will do this in three ways:

a. by looking for criteria for each of the cases (case-based reasoning);
b. by looking for criteria in general from the user's point of view;
c. by leaving the decision to the user by only describing what is happening on the farms in the data model.

Tasks

Included is a list of 10 cases created out of work session 1.

Group 1 is asked to read the cases 1 to 5. Then imagine that you are on the help desk of RICA in Brussels and are asked to give an immediate answer to the question what sould be in the accounts of the Farm Return and what not. Give also an explanation of your decision ('Do ..., because ...').

Group 2 is asked to do the same as group 1, for the cases 6 to 10.

Group 3 is asked to read all the cases quickly. Then imagine that you are a policy maker/analyst in DG Agri in Brussels on Agenda 2000 and have to make a report on the direct payments and quota in dairy farming. Try to find criteria that could be used to in the Farm Return and by the help desk to take the descisions on what should be in the accounts.

Group 4 is asked to do the same as group 3, but for a policy maker in a national ministry who is responsible for rural development in a less favoured area.

Group 5 is asked to make a data model that describes the holdings in the FADN with respect to the attributes that seem to be important. Suggestions for entity types and attributes can be found in the cases. Include at least entity types or attributes for Holding, Owner(ship), Legal form, (non-)agricultural activities, settlement/location.

Cases to be used in workgroup session 4

1. Trading activities
   a farm is buying products like ornamental plants, tree nursery products and wine from other farms, to sell them without further processing. Should such activities be included in the financial accounts?
   Attributes: commercial trading activity

2. Legal partnership to share risks
   Danish farms producing pigs form a legal partnership to share risks in pig crises. Does such legal partnership change the definition of a farm?
   Attributes: legal structure, partnership

3. Forestry activities
   Farms in several countries (Finland, Austria, Sweden, Czech Republic) have a mixed forestry/farming operation. Are farms still an agricultural holding if most of their income comes from forestry?
   Attributes: forestry

4. One legal unit - 2 farms
   Two farms, e.g. with arable production and pigs, merge on paper into one legal entity to comply with environmental regulations. In case this is only a legal construction, and desicion making is separated between the two farms, should we then have one or two farms in the FADN?
   Attributes: Legal structure, partnership, quota rights, production licences, allocation to entity, sampling frame

5. Two legal units - 1 farm: Fiscal/CAP distortion
   One family farm can be split for tax reasons or to receive quota or premiums into two or three legal units. An example is the Italian dairy farm split into a 'farm' with the cows in the hands of the farmer and a 'farm' owning the buildings and the land in the hands of the mother and son. Another example is the German pig and poultry farm split into two holdings in order to avoid to becoming so large that it is classified as industrial, and thus loosing attractive options in VAT and income tax regulations. Are these one or two farms in the FADN?
   Attributes: Legal structure, partnership, quota rights, production licences, allocation to entity, sampling frame, social security, taxation, subsidies, hygienic standards, rural development.

6. Non-agricultural/non-food activities
   Some farms have important non-agricultural activities. An example is the Estonian pig farm selling fuel. Or the Hungarian farm making plastic and the construction activities of co-operatives (former Brigades) in the German Neue Bundeslander. Are these farms part of the FADN and how should costs be allocated to farming and non-farming?

7. Para-agriculture
   Some farms carry out activities that are linked to the farm, by using the resources of the farm of providing services that need a farm a s a basis. Examples from Switzerland are snow ploughing, B&B (Bed and Breakfast), B2B (Back to Basics, programs with manual work for high level Novartis managers). Or the French Eco-museum. Should these activities be included in the FADN and if no, how should costs be separated (e.g. share of income outside, share of use of machinery, specifity of machinery - can it be used in agriculture, share of financing, is the machinery driver the farmer or a paid worker, share of assets non-farm use, share of work allocated to non-farm activities??
   Attributes: separability of overheads, identification of para-agriculture

8. Co-operatives
   Some co-operatives not only provide services to farmers, but have in addition also their own farm activities. Part of the profits of co-operatives is paid out to members, and are in their accounts recorded as income or costs. Is it consistent to include such farms in the FADN?

9. Food-industry
   Several farms have food producing activities. Cheese is a classic example, but especially in candidate countries, many farms are integrated with slaughterhouses, processing plant etc. Should such activities be separated, and how?

10. Production integration agreements
    In some production chains (like pigs) farms enter into formal agreements with other farms and/or industry. This raises questions on how to account for such partnerships and how to value internal trade (not always on farm gate prices)?

Groups for workgroup session 4 (chair in italics)

1. *Patrick van Driessche*
   Jaanika Jalast
   Gabor Kovacs
   Tommy Burke

2. *Katalin Juhász*
   Dirk van Lierde
   Krista Kõiv
   Knut Samseth

3. *Yves Plees*
   Josef Hanibal
   Gert Giversen
   Werner Kleinhanss

4. *Vincent Chatellier*
   Nicole Taragola
   Szilárd Keszthelyi
   Susanna Perachino

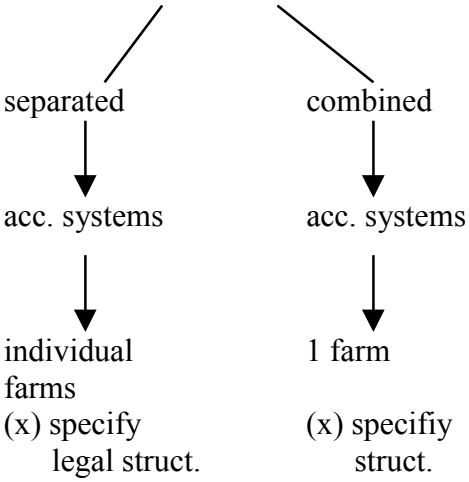
5. *Beat Meier*
   Koen Boone
   Hans-Hennig Sundermeier
   Hans Vrolijk

Results

Workgroup session 4, group 1

1. N
- shop not farming
- criteria: farming/non farming activity

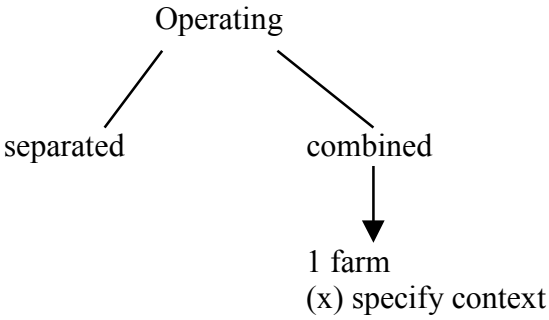
2. N Operations



3. N Most income non farming
Debate open

4. 2 farms idem case 2

5. 1 farm



→ key questions in a decission tree giving answers

Workgroup session 4, group 2

6. agricultural turnover > 50% total FADN
   - if activity not related to agriculture do not take it into acount
   - allocate the costs and only take the income of the non-agricultural activities because: farms are part of the agricultural sector

7. part of the farm
   product of this activities are in table R (codes will be provided)
   because: activity is part of the farm activitiy

8. yes, if an important part of the agricultural production in the memberstate is produced on co-operations
   because: see 6

9. this is an important item, but this requires an adaption of the Farm Return.
   So for the moment don't take it into account.
   because: farm return is not adapted for the moment

10. When there is a formal agreement (not 1 farm or holding) the entities should be considered as individual entities and transfers and interal trade should be valuated.
    How to do so? See PACIOLI 8 paper Koen Boone

    because: this forms are individual entities with different assets, capital, structure and individual management.

Workgroup session 4, group 3

Difficult discussion

- Look at:
  - type and share of activity
  - legal situation → accounting systems
  - needs for analysis

- in reality:
  - lack of information while doing the analysis: e.g. which holdings should be takes together/apart

Workgroup session 4, group 4

Policy maker/National Ministry/Rural Development

1. Trading activities
   - do the farmers buy some products that they just buy (without transformation) => we need this information
   - FADN do not have to select too many farms like this one

2. Legal partnership to share risk
   - this changes the situation
   - FADN is not adapted to deals with integration between farmers

   => short list of partnership of the farms

3. Forestry activities (very important)
   - we need information about the diversifications
   - part of the output, input (variable cut)
   - area (agricultural/forestry)

4. one legal - 2 farms
   - we have to separate the two farms

5. two legal units - 1 farm (CAP distortion)
   - we have to take just of farm because the economic reality is just for one

6. non agricultural/non food activities
   - we have try not to select the FADN that kind of farms because the boarder is not clear

=> In Hungary the non food activitys is separable

Conclusions
We will present you the resulting cases during PACIOLI 9

Workgroup session 4, group 5

See figure 14.1.

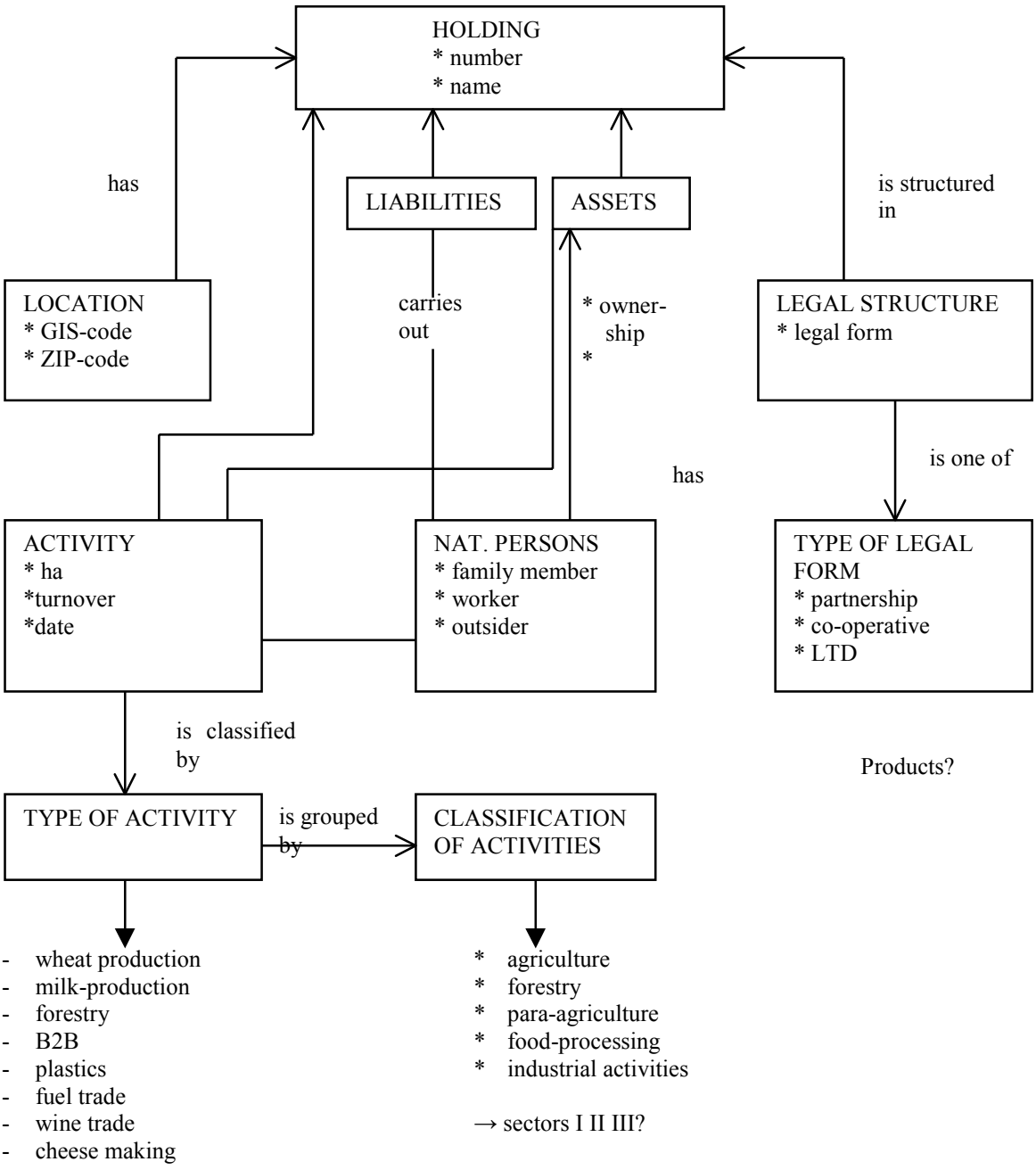


Figure 14.1 Example data model by Krijn Poppe, Hans-Hennig Sundermeier, Koen Boone and Beat Meier

15. Closing session

In an open discussion the participants concluded that the workshop was very usefull and successfull. It was suggested to organise a PACIOLI 9 which would make a PACIOLI 10 workshop unavoidable.

Potential topics for PACIOLI 9

* Farm accounting: how supports Brussels the farmers decision making.
* Follow-up/progress topics PACIOLI 8.
* Sampling, weighting and estimation.
* Influence of quality of accounting data on decision making.
* General analysis of accounting: cash flow, stability, sustainability.
* Agri-environmental indicators.
* Valuation of intangibles.
* Tools in day-to-day work (quick and dirty vs advanced software systems).
* Criteria for routine decision aids e.g. on investments (average or marginal costs).
* Create FADN vortal in work group sessions on laptop, to make detailed documents available.
* Internet technology in data collecting.
* Use of FADN data in accession process.
* Application of replacement value methods and theoretical work.
* Company and benchmarking FADN systems.
* Meditterean FADNs.
* Social security rights on balance sheets.

Contributions to FADN vortal

* To bonati@inea.it (and will be hosted by the Commission).

Annex 1 Participants list PACIOLI 8

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