PACIOLI 14
Changes in farming and the effects on FADNs

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The Agricultural Economics Research Institute (LEI) is active in a wide array of research which can be classified into various domains. This report reflects research within the following domain:

☐   Statutory and service tasks
☐   Business development and competitive position
☐   Natural resources and the environment
☐   Land and economics
☐   Chains
☐   Policy
☐   Institutions, people and perceptions
☑   Models and data

II

The PACIOLI Network explores the need for and feasibility of innovation in farm accounting and its consequences for data gathering for policy analysis in Farm Accountancy Data Networks (FADNs). PACIOLI 14 was held in Vught, near 's Hertogenbosch, The Netherlands, in October 2006. The theme of the workshop focused on changes in farming and its consequences for FADNs.

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Preface

Due to globalisation and related changes in agricultural policy, farmers change their business practices. Such innovations can lead to improvements in income for specific farmers and to higher levels of welfare in society. For Farm Accountancy Data Networks (FADNs), such developments imply new challenges to come up with relevant data.

To exchange experiences in this domain the PACIOLI network yearly organises a workshop. In 2006 the group met in Vught, a community near 's Hertogenbosch, in the south of the Netherlands. This report contains the papers or presentations from the PACIOLI 14 workshop as well as the reports from the work group discussions.

As on previous occasions, Krijn Poppe took the initiative for this meeting, and he chaired the three-day workshop. Koen Boone helped to design the programme and plan the work group discussions. Colinda Teeuwen-Vogelaar took care of all the organisation and logistics of the workshop, including the organisation of the local excursion to an organic dairy farm with a health and a nature conservation enterprise. Once again Helga Jansen-van der Kooij took care of the text processing for the publication.

We are happy that a large group of colleagues came to the workshop and contributed to the programme. Over the last years the PACIOLI network has been extended to EU-accession countries, associated countries like Norway and Switzerland, as well as to international organisations like OECD and North American countries. The network finds this globalization very useful, as heterogeneity supports innovation. We expect that 2007 will bring the 15th edition of the PACIOLI network, sometime, somewhere. Check our website www.pacioli.org for upcoming details.

Dr J.C. Blom
Director General LEI B.V.

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1. Introduction

Innovative ideas face many hurdles to become successful implementations. This is also true in farm accounting and in Farm Accountancy Data Networks (FADNs). Therefore it makes sense to bring together the 'change agents', the persons that have a personal drive to change the content of their work and their organisations. For farm accounting and policy supporting FADNs it is appropriate to do this in an international context: this creates possibilities to learn from each other. By bringing FADN managers and data users in micro economic research together, feedback is fostered.

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

Pacioli was originally a Concerted Action in the EU's Third Framework Programme for Research and Technical Development (AIR3-CT94-2456). After completion of the contract with the PACIOLI-4 workshop, the partners decided to keep the network alive at their own costs.

1.1   Theme of PACIOLI 14

Many farms and farming systems have seen important changes in recent years: new agricultural policies, more emphasis on direct payments, changes in labour markets, increase in farm size, and new businesses. In many countries taxation and accounting requirements tend to treat farms more and more in the same way as other small and medium enterprises. All these developments influence accounting and farm accountancy data networks. This has been the topic of the 14th Pacioli workshop, that was organised in Vught, The Netherlands.

1.2   PACIOLI 14 programme

Sunday, 1 October 2006

20.00   Opening drink

Monday, 2 October 2006

09.00   Welcome, introduction workshop program (Krijn Poppe)

Session I: Towards Global Networks of Data exchange
09.45   'Observations on farm structure in Europe'
(Krijn Poppe, LEI)

10.15	'Creation of a network to carry out distribution analysis' (Catherine Moreddu, OECD)
10.45	'Global Dairy Farmer, Trend Monitor and Outlook' (Co Daatselaar, LEI)
11.15	Break
11.30	Workgroup session 1 'Towards global networks of data exchange; what steps to take?'
13.00	Lunch
	Session II: Volatility
14.15	'The persistence in Canada of low farm income and farm family income using longitudinal micro data' (Katrin Nagelschmitz, Agriculture and Agri-Food Canada)
14.45	'Volatility of incomes' (Hans Vrolijk, LEI)
15.15	'Short-term savings of farm households: What do we know?' (Ashok Mishra, ERS/USDA)
15.45	Break
	Session III: Ideal FADN
16.00	'Plans for building up the Croatian FADN' (Zaklina Jurisic, Ministry of Agriculture, Forestry and Water Management)
16.30	'External data' (Koen Boone, LEI)
17.00	Snack
17.15-	
18.45	Workgroup session 2 'How to develop an ideal FADN'
19.30	Dinner

Tuesday, 3 October 2006

	Session IV: Rural development
09.00	'TAPAS-project. Improvement of FADN concerning rural development' (Fredrik von Unge, Statistics Sweden)
09.30	'How to develop FADN in a rural actor database' (Dineke van Zwieten, Ministry of Agriculture, Nature and Food Quality)
10.00	Break
10.15	Workshop session 3 'How to develop FADN in a rural actor database'
	Session V: Distribution of FADN data
11.45	'Microlab' (Hans Vrolijk, LEI)
12.30	Lunch
13.45	Excursion

Excursion programme
13.45   Departure for Organic, Health care and nature conservation Dairyfarm
         'De Kerkhoeve'
15.45   Departure for the fortified city of Heusden
16.15   Free wandering around
17.00   Guided tour inclusive visit of 'Standard Mill'
19.30   Dinner
22.00   Departure for Vught (arrival ± 22.30 h)

Wednesday, 4 October 2006
         Session VI: Typology
09.00   'Farm typlogies and FADN data; use typologies on FADN data to integrate
         environmental, nature and rural development issues'
         (Erling Andersen, Danish Centre for Forest, Landscape and Planning)
09.30   'EU typology'
         (Koen Boone, LEI)
10.00   Plenary discussion on typology
10.30   Break

         Session VII: Use of FADN data
10.45   'The use of FADN in the study on the use of plant protection products and
         nutrients in horticulture in Flanders'
         (Dirk van Lierde, ILVO)
11.15   'Taxation and transfer restrictions in agriculture in Norway'
         (Finn Andersen, NILF)
11.45   Closing/follow-up
         Questions and answers, wrapping up, need for PACIOLI 15?
12.15   Lunch
13.15   Departure

2. Observations on farm structure in Europe

Krijn J. Poppe, Hans Vrolijk, Karel van Bommel, Hennie van der Veen [1]

Abstract [2]

At the start of the century agriculture in Europe can be characterised as experiencing a period of structural adjustment to the globalisation of food chains and new agricultural policies. This influences the farm structure that can be measured in the number of farms, farm size, specialisation and concentration. This paper disusses the current structure of agriculture in the EU 25, with a focus on changes over the last 20 years for the EU 15 or EU 12. Special attention is asked for, and given to the definition of the farm and typologies for farm households. In some countries we seem to experience a 'disappearing middle', at least in the contribution to production.

2.1 Background

Farm structure is once again a subject for study. The transition of Central and Eastern Europe from a command economy to a market economy and also the (anticipated) effects of globalisation and the changing agricultural policies for Europe as a whole contribute to that relevance.

The number of farms is decreasing, leading to a concentration in production. This is in line with what one would expect in a mature industry. To keep production factors (and especially labour) in the sector, labour productivity has to increase. The innovations to make this possible lead often not only to increased production per person, but also to increases in physical size of the farm. Farms mainly disappear at the moment the generations change and youngsters are voting with their feet for a job elsewhere. In that process small and mid sized farms are always at risk. However recently it has been suggested that in some countries we move to a bi-polar model where small farms are continued for residential purposes, production is concentrated on (very) large farms, and mid-sized farms disappear quicker as ever.

This paper presents observations on recent trends in Europe, where farming is characterised by strong structural adjustment. We look especially for evidence on the hypothesis of the upcoming bi-polar model. The structure of this paper is as follows. Next section discusses the literature and sets out our (conventional economic) way of interpreting changes in the farm structure. This is then illustrated with European data in the sections of efficiency of scale, specialisation and concentration. In addition we analyse the data in search for evidence for the bi-polar model. That is followed-up by three sections

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[1] Wageningen UR - Agricultural Economics Research Institute LEI, The Hague.
[2] Paper originally prepared for and presented at the IAAE congress in Brisbane (Australia), August 2006.

that document recent trends that support the bi-polar hypothesis. We end with conclusions on our findings and suggestions for the research agenda.

2.2 Literature

As often in economics one can approach farm structure from a macro or a micro point of view. Farm structure suggests a macro view, but the structure is the result of many micro decisions.

The standard macro explanation starts at the demand side for food, fibre and flowers. The demand for food is rather stable when the population is stable and is not experiencing large increases in income from the poverty level upwards. Both are true for the developed world nowadays. Demand can increase due to higher incomes, and then especially for more luxurious goods (like more convenience or flowers). But in a developed economy, the relative spending on food declines and is often stable in real absolute terms, as the increase in income is spend on newer goods and services like cars, houses, holidays or - nowadays - telecom.

The new industries, with increasing demand for their products, can pay more for production factors like capital and labour and they will attract them from the declining industries like agriculture. Typically profits and pay are therefore higher in newer industries like insurance or ICT. This induces innovation in declining industries like agriculture (Hayami and Ruttan, 1970): to keep up with the economy at large labour productivity has to be raised and innovations are introduced that - in this case - essentially lead to more production per man. Governments often play an important role through research and extension in that innovation process.

Williard Cochrane (1979) classically described this process as a treadmill: 'to sum up, the aggressive innovative farmer is on a treadmill with regard to the adoption of new and improved technologies on his farm. As he rushes to adopt a new and improved technology when it first becomes available, he at first reaps a gain. But, as others after him run to adopt the technology, the treadmill speeds up and grind out an increased supply of the product. The increased supply of the product drives the price of the product down to where the early adopter and all his fellow adopters are back in a no-profit situation. Farm technological advance in a free market situation forces the participants to run on a treadmill'.

Many of those innovations are not size-neutral and not meant to be so: to raise labour productivity, efficiency of scale is sought. As total demand is more or less stable, this all means that labour has sooner or later to leave the sector. Spectacular examples of this happened for instance in farming in industrialising Western Europe in the 1960s, when paid labour more or less disappeared in many farms. In the 1980s father-son partnerships in the Netherlands (and elsewhere) became much more short-lived as investments needed to enlarge the farm in the period that both could be active, were too expensive. Family farms in North-west Europe are now often one-man operations, highly mechanised and automated. Although there are exceptions, especially in horticulture.

Relative prices, technological change, economies of size and demographic variables are therefore some of the variables that explain the number, type and size (together the

farm structure) of the farms. They also explain the dynamics in the structure, but then policy variables, sunk cost (Balmann, 2006), farm debt, local labour markets, local land markets (including options for future capital gains), path dependency and the institutional framework (including tax and social security law) are also important (see e.g. Eastwood et al., 2004).

Cochrane's treadmill brings us already the perspective of the individual farmer. As less labour is needed in a declining industry, and economies of scale are important, the number of farms has to decline over time. That rises the question what exactly triggers the timing of the exit of farms. Financial efficiency (Schunk, 2001) seems to be the most important driver. Like in other professions, farmers differ in their skills (see Poppe and Van Meijl, 2006 for an overview of the Dutch micro economic research on performance and innovation). Farmers with superior results can pay high prices for land and quota to expand their operation. The often already available fixed assets and labour leads to high marginal bidding prices. For 80% of the farmers the land and quota are therefore too expensive. But it means that their existing farm represents quite some value. Farmers live poor, die rich as they say. This also implies that farmers do not always have to leave their farm if they experience inferior results. They can stay on to accumulate capital gains, unless they are too indebted. This is especially attractive if the rewards for labour outside agriculture are rather low, due to lack of regional employment for unskilled work and low (non-agricultural) skills of farmers. Transaction costs in changing jobs (if it implies moving house) can be high and opportunity costs of labour low, which leads to the impression of 'sticky' labour markets.

This all is the explanation that bankruptancies in farming are exceptional (although they do occur in some crises) and farms mainly disappear at the moment the generations change and youngsters are voting with their feet for a job elsewhere. In that process small and mid sized farms are always at risk.

This standard view of structural change is very much that of western agriculture. Comparison to other sectors (Mann and Mante, 2004) and the work of Jo Swinnen (e.g. Swinnen, 2006) on Transition countries show that under certain circumstances (relative prices in factor markets, institutional arrangements especially in land markets) quite different paths of structural change are possible.

2.3 Farm size: efficiency of scale

2.3.1 The current structure of agriculture in the EU 25

The 25 countries of the European Union (EU 25) have nearly 10 million agricultural holdings (figure 2.1). Incoming member states Bulgaria and especially Romania will add another five million. Largest numbers of farms are found in Poland and Italy (each about two million), followed by Spain (more than one million).

The 'real number' of farms is probably even a bit higher, as Eurostat instructions order that the smallest farms do not have to be surveyed - as long as this group holds less than 1% of national agricultural activity. We come back to definition issues later.

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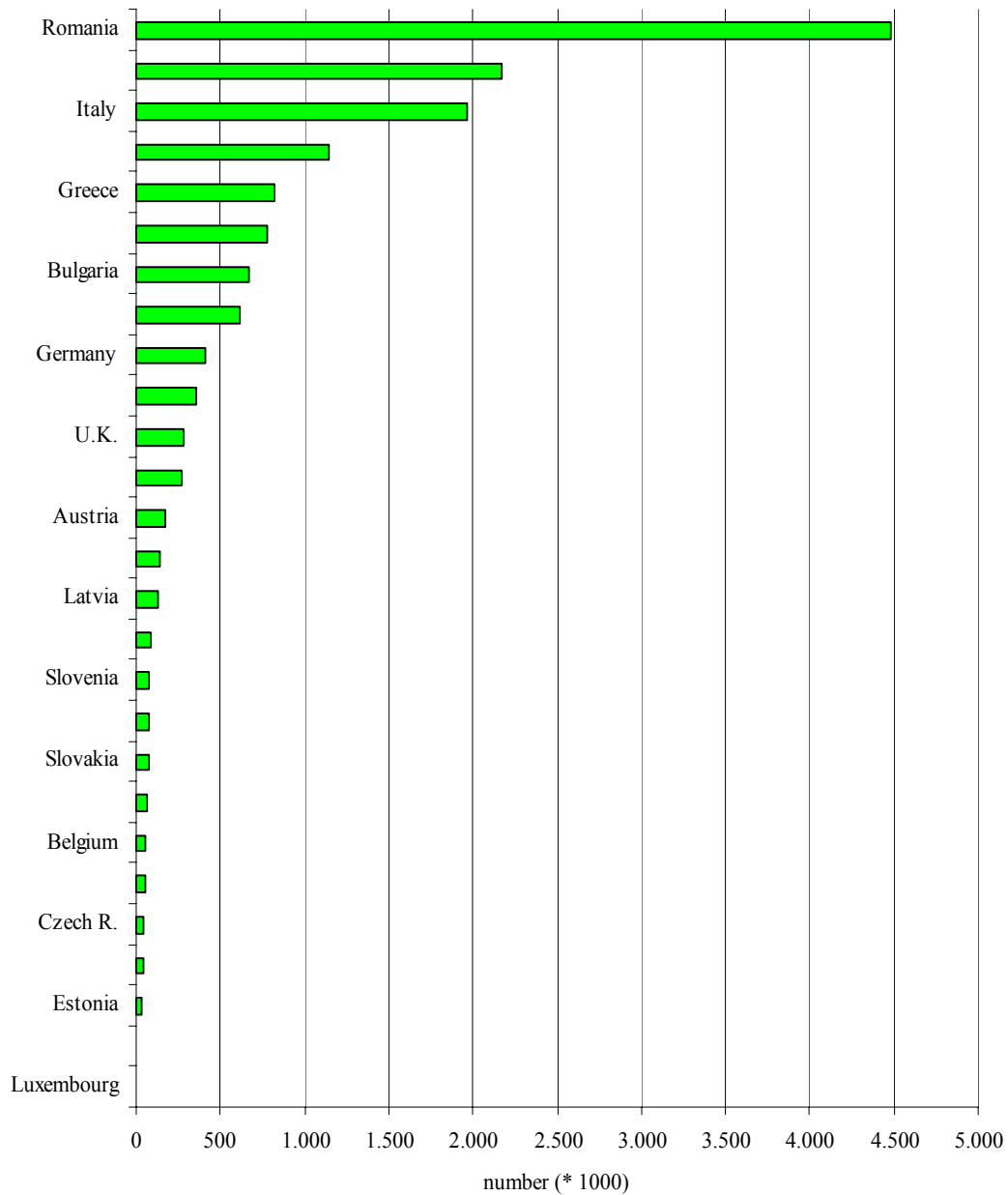
Figure 2.1   Number of farms per European Union country (including future members), 2003
Source: Eurostat.

2.3.2   Changes over the last 15 years

In line with standard economic theory, the number of agricultural holdings declines (figure 2.2). Each day the EU15 looses nearly 500 farms. In the EU12 the number of farms declined from nearly eight million in 1990 to just under six million in 2003.

The rate of decline is about 2% per year. There are some small differences between countries (figure 2.3). In the UK the number of farms recently increased, at least in the statistics. In England and Wales, the statistics are since 2003 based on an administrative register, without applying any thresholds, which means that a large number of minor holdings previously (up to 2000) not covered, are now included (Eurostat, 2004). The introduction of the Common Agricultural Policy in Spain and Portugal in the late 1980s seems not to have lead to extreme percentages of closing farms.
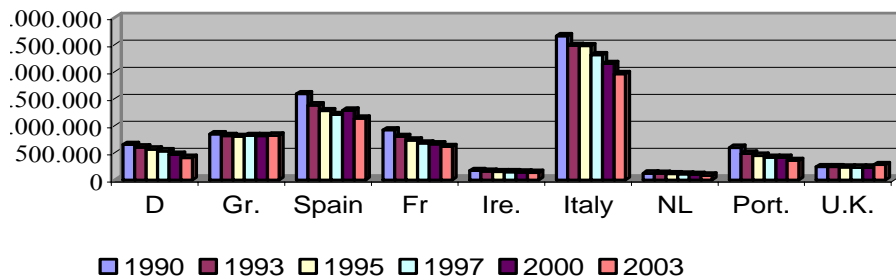
Figure 2.2   Trend in the number of farms for selected EU countries (Germany, Greece, Spain, France, Ireland, Italy, Netherlands, Portugal, United Kingdom)
Source: Eurostat.

The rate of decline clearly varies over the years. It was quite high (2.5%) in the first years of this century. These were booming years in the economy at large, providing jobs for farmers' children (the potential successors), and leading to extra demand for non-agricultural land use (from building zones to nature development). In addition some farm sectors had a severe time: the large decline in numbers in Denmark and the Netherlands was also influenced by the closing of loss-making pig farms - that in the Netherlands also
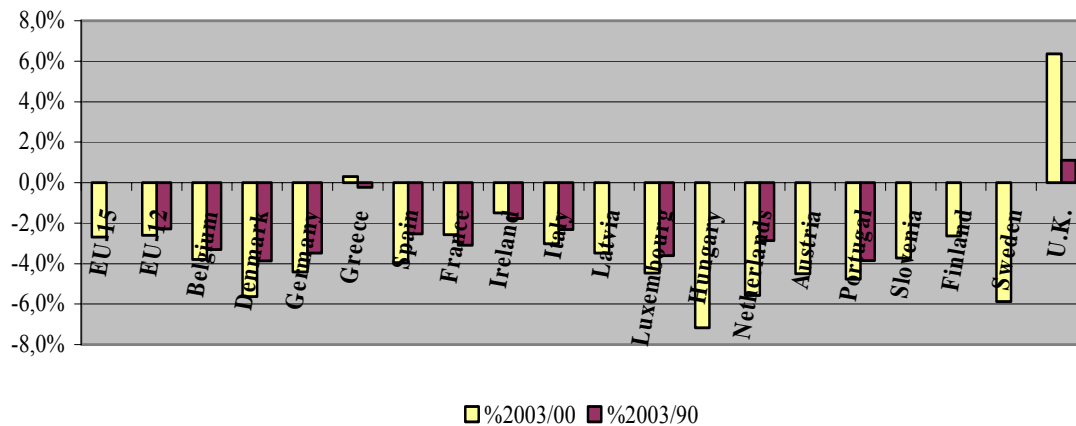
Figure 2.3   Yearly change (%) in the number of farms for EU countries
Source: Eurostat.

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suffered from classical swine fever. In the second half of the 1990s the decline in the number of farms was smaller, but perhaps most striking is that the percentage change is rather stable and that developments between countries are quite similar.

The effect of non-agricultural developments on the trend in the number of farms is also clear if the changes in the rate of decline are broken down to the characteristics of regions: the yearly decline is lowest in the most rural areas (-1.9% over the period 1990-2000 in EU12), higher in the urban areas (-2.2%) and highest (-2.5%) in the intermediate areas: that are the areas of the urban sprawl, where agricultural land disappears and opportunities for a non-farm activities have lower cost of change than in a purely rural area (table 2.1).

Table 2.1   Change in the number of farms, EU15, 1990-2000 (%)

| | Number of farms in 2000 | | | | Development number of farms 1990-2000 (% per annum.) | | | |
	share in total number (%)			total number (* 1,000)	most rural regions	interme-diate rural regions	most urban regions	national average
	most rural regions	interme-diate rural regions	most urban regions					
Belgium	6	15	79	62	-3.5	-3.2	-3.1	-3.2
Denmark	67	27	6	58	-3.3	-3.5	-2.4	-3.3
West Germany	23	43	34	442	-3.3	-3.5	-3.7	-3.5
Spain	42	47	11	1,287	-1.4	-2.7	-2.0	-2.1
France	57	39	4	664	-3.2	-3.3	-3.5	-3.2
Italy	18	53	29	2,154	-1.6	-2.3	-2.1	-2.1
Netherlands	0	23	77	102	.	-1.7	-2.1	-2.0
UK	20	25	54	233	-1.0	-0.3	-0.2	-0.4
EU12	39	41	20	6,379	-1.9	-2.5	-2.2	-2.2
EU15	41	40	19	6,771	.	.	.	.

Source: Berkhout et al. (2006).

2.3.3   Efficiency of scale: a case study in Dutch dairy

The structural development and the decline in the number of farms will be with us for a long time, even in a situation of a stable economic environment (including agricultural policy). This is best shown with an example of a much specialised farm type, like the dairy sector in the Netherlands.

Figure 2.4 shows the development of herd size in the Netherlands on specialised dairy farms. Three indicators are used (1) the number of dairy cows on the average specialised dairy farm ('the normal average number of cows per farm'), (2) the number of dairy cows per median farm ('the normal median number of cows') and (3) the mid-aggregate point (Lund, 2005, quoting Britton, 1950 and Lund and Price, 1998). The latter conveys the median herd size from the 'perspective of the cow', 50% of the cows are on

farms with more dairy cows and 50% of the cows are on farms with smaller herds.[3] The figure shows a strong development in the size of the herd of dairy cows for all three indicators. In the last five years the development in the mid-aggregate point is slightly steeper than in the other two indicators. The higher level indicates that the number of cows on the average farm underestimates the number of cows in large herds: 50% of the cows are not in herds smaller than 66 cows, but smaller than 74 cows, a difference of more than 10%.
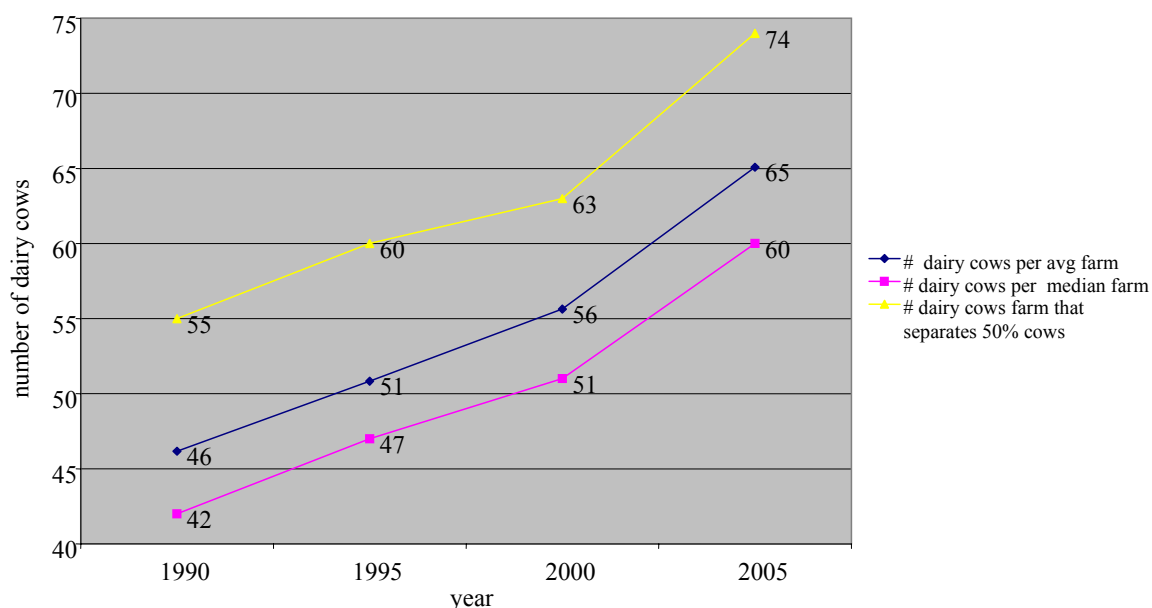
Figure 2.4   Development of herd size of dairy cows on specialised dairy farms in the Netherlands (1990-2005) with three indicators
Source: Dutch agricultural census.

Dairy farming is such a professionalized activity these days that nearly no farms exist with less than 20 cows. The 25,000 farms active in the Netherlands in this industry are under a constant pressure to increase their labour productivity and thereby their income by mechanisation and automation. As farm labour (and sometimes potential successors) has been laid of in the past, mechanisation also means increase in scale. That demands investments that can only be paid by the best 20% who have a high margin (Poppe and Van Meijl, 2006). Those who don't grow see their relative position decline and the farm

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[3] 'It is somewhat akin to the median in that it is based on a ranking of the separate units (e.g. holdings) by size. However instead of focusing on the size of that unit which lies in the middle of the distribution (or more precisely, at which the cumulative percentage frequency distribution reaches 50%), it focuses on the size of the unit at which the cumulative sum of the variable under examination (e.g. area) reaches 50% of the total sum of the variable' (Lund, 2005). On a Lorenz curve the median is the 50% point on the X-ax, the mid-aggregate point is the 50% on the Y-ax.

becomes too small for succession. Sometimes a change in farm system (e.g. moving into more intensive production (horticulture, pigs and poultry), or into multi-functional farming can save the future of the farm - or at least for a generation. But often children vote with their feet and take a job elsewhere.

Often the income development (cash flows without a need to invest) and wealth is high enough to delay the exit of the industry until retirement. This is supported by the high value of the assets (like land and milk quota) that are in high demand by investing farms, as they can recoup those investments with existing overcapacity of machines and labour. Dairy farms therefore don't have the asset goodwill, but 'badwill': asset stripping releases values hidden in the uncompetitive small farm (Poppe and Luijt, 2004).
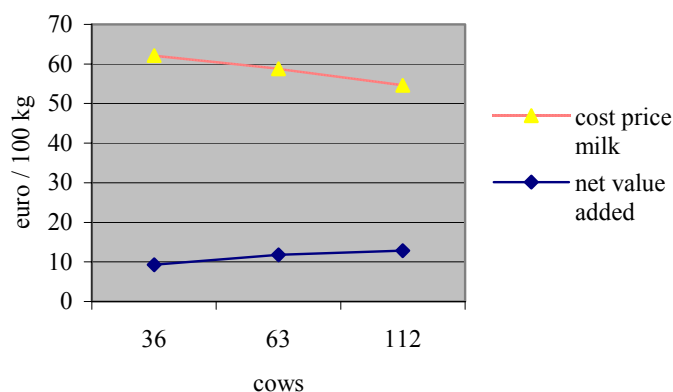
Figure 2.5   Efficiency of scale in Dutch dairy farming: cost price of milk and net value added per 100 kg milk
Source: FADN (2004).

Such processes will continue. Figure 2.5 shows the efficiency of scale in Dutch dairy farming. At the moment only farms with more than at least 100 cows (more than 900,000 kg milk on 70 ha or more) provide a net value added that is high enough for a normal (market) remuneration of labour and capital. It the optimal structure of the sector would be with farms of 1 million kg of milk, about 12,000 farms would be sufficient, which means that the optimal structure of the sector would have roughly 50% less farms. As demographic developments are rather slow, it will take many years before this is realised, and due to further technological progress (and liberalisation in agricultural policies), the viable number will then already be much lower.

Compared to other EU countries the structure of the dairy farms is lagging behind (Jager and Van Everdingen, 2006). In the UK, Denmark and Italy a much larger percentage of the cows is milked on farms with more than 100 cows (figure 2.6).

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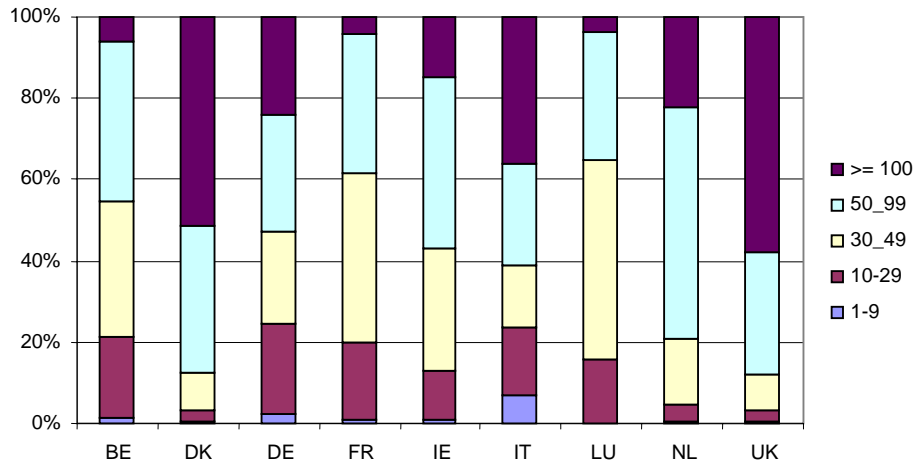
Figure 2.6   Distribution of the number of cows to herd size per farm, 2003
Source: Eurostat, recalculated and quoted in Jager and Van Everdingen (2006).

2.3.4   On the definition of the farm

All the data mentioned above are based on the EUROSTAT definition of a farm: *a single unit both technically and economically, which has single management and which produces agricultural products. Other supplementary (non-agricultural) products and services may also be provided by the holding.*

There are two types of critique possible on this definition and data. The first one is that it is relatively broad. The definition includes for instance many pensioners who depend for their income on other sources. But also an airport that has some agricultural land around its landing strips - sometimes idle and cashing set aside premiums. More serious, it also includes some farmers who are still a farmer in juridical terms (as this registration keeps them entitled to e.g. subsidies or tax breaks), but in reality have their farm cultivated by others. And in some countries like Hungary the census includes many private plots, mainly used for home consumption - some observers see here a political influence and put the number of 'real' farms much lower than nearly one million.

The second critique is that in some cases the definition is not very well applied or only applied in an administrative-juridical system. For instance in the Netherlands it is not uncommon that a farmer owns more than one holding (on different locations, sometimes with a different juridical structures that do not count as 'single management') where in reality these holdings are under one management and share resources. The term *'has single management'* has become problematic: some holdings have several juridical management structures and some farmers manage more than one operation in a more or less integrated way.

A 'farm' is therefore nowadays a complex notion. Figure 2.7 describes -as an entity relation diagram (Chen, 1976) - the traditional way of looking to a farm. Figure 2.8 shows the model that fits better to modern reality (see Poppe et al., 2004 for more details, explanation and an application to the Netherlands).

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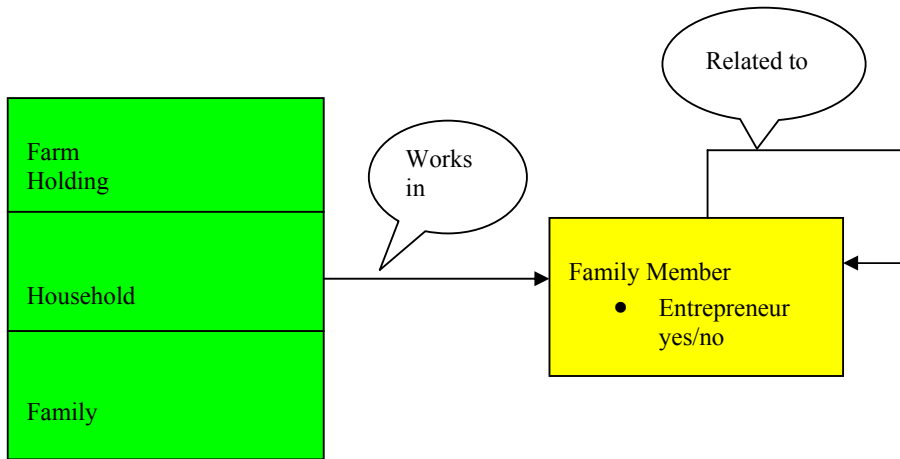
Figure 2.7   Data model to describe traditional NW European dairy farms
Source: PACIOLI 12 (2004).
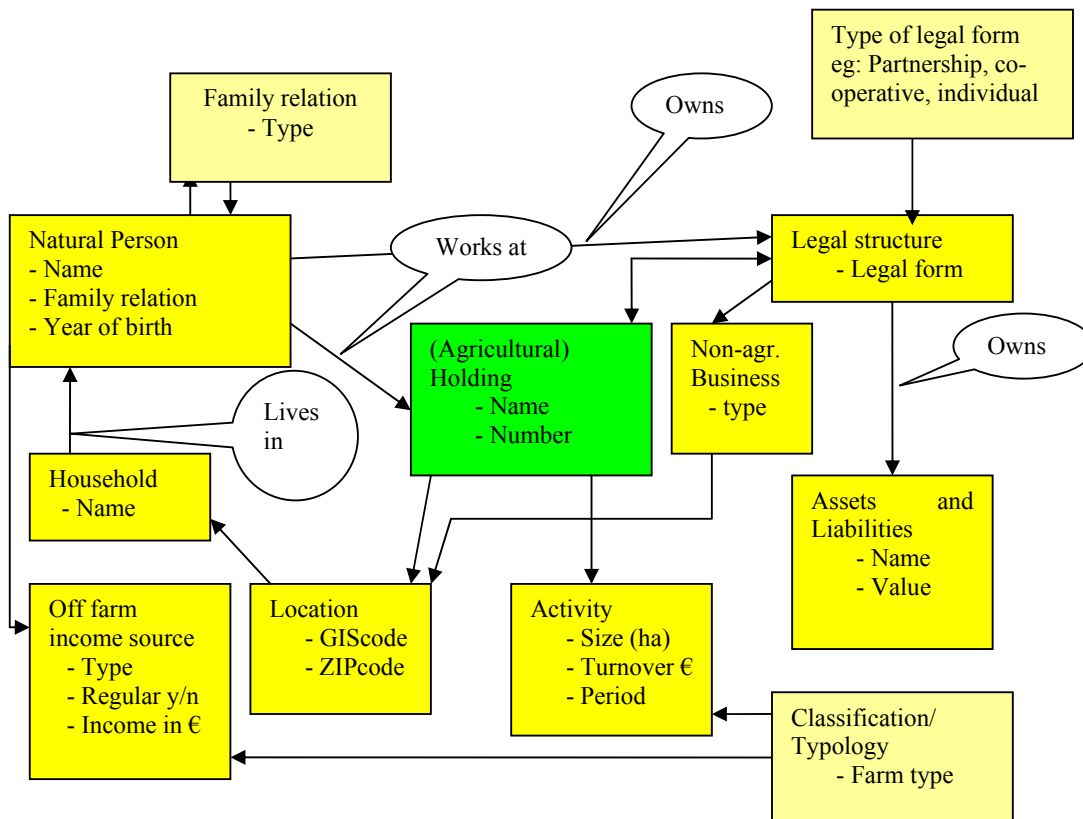
Figure 2.8   Reference data model for the modern farm - farm household complex (changes over time not explicitly modelled in)
Source: PACIOLI 12 (2004).

The notion of a commercial farm is defined in the FADN: *a commercial farm is defined as a farm which is large enough to provide a main activity for the farmer and a level of income sufficient to support his or her family. In order to be classified as commercial, a farm must exceed a minimum economic size.*

In practice the threshold to separate commercial farms from the other holdings is that commercial farms should at least cover 90% of production in a country. Also here this threshold is sometimes influenced by political preferences or national views on 'what a farm is'. In total the FADN represents between 3 and 3.5 million farms as being commercial, out of the nearly 10 million in the agricultural census.
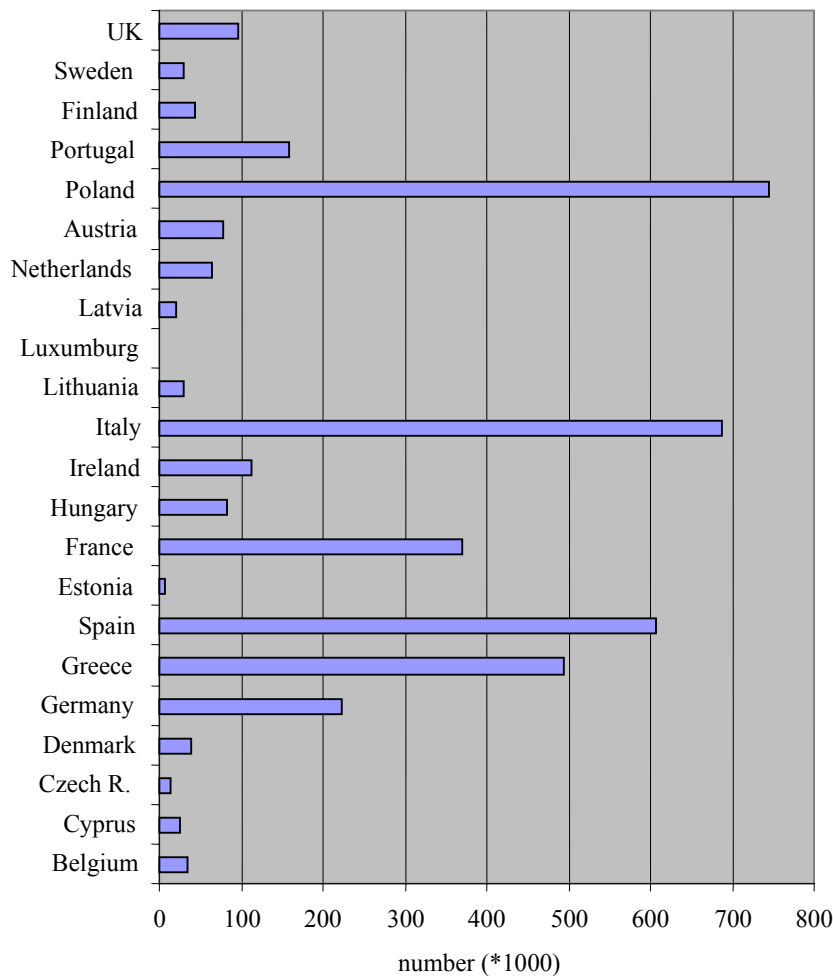
Figure 2.9   Number of 'commercial' farms covered by the Farm Accountancy Data Network (2004) per EU member state (for some member states information is not availalble yet)
Source: European Commission, standard results FADN.

Comparing figure 2.9 with figure 2.1 shows that in some countries only a small fraction of farms are considered to be commercial. In Hungary only 83,000 farms (1 out of 10 in stead of the more normal 1 out of 3) are classified as 'commercial'.

2.4 Farm structure: specialization

Efficiency of scale is one cornerstone of economics, specialisation is another. When farms are better integrated in the market and face lower transaction costs in trading, they will specialise in those activities that they can do best. This is even the case as a farm has an absolute low cost price for all of its products: he will have a comparative advantage in one of those products. The effect of specialisation is clearly noted when a country joins the common agricultural market and faces heavier competition (and sometimes different relative prices). Many small farms are also of a mixed character, and this group also disappears faster than others.

Spain and Portugal illustrate the trend to specialisation: in 1987, just after accession, 72% of the Portuguese farms had a mixed character. This dropped via 55% in 1990 to 38% at the moment. Seen the relatively high numbers of mixed farms in the new member states, strong specialisation might be expected there in the coming years.

Specialisation is high in some countries like the Netherlands, Ireland and the UK. Especially in Ireland this is also due to geography and climate: the country is mainly specialised in dairy and beef. In the UK and the Netherlands much more products are produced in large quantities, and here also the market forces seem to determine the degree of specialisation.

Looking to a specific farm type like dairy farming (figure 2.10) shows that specialisation is on the increase nearly everywhere. Dairy farming asks specific long term investments and in many countries the degree of specialisation is now 75% or more. In the Netherlands now 95% of the cows are on specialised farms, indicating that for this type of production the mixed farm is part of the romantic past. Due to the quota system over the last 20 years only in France the specialisation decreased, as farmers could not easily expand their dairy enterprise and invested in sheep, beef, cereals or other production.

Specialisation not only brings efficiencies of scale, but also larger financial risks. At first sight (and in line with e.g. Allan and Lueck in their Nature of the farm, 2002) there is no evidence that such risks influence the specialisation or farm size. The drawbacks of larger risks can be solved by using contracts, financial markets (e.g. future markets, derivates, risk-bearing guarantee and venture capital) and more know how and advice (tax planning, risk-management). To give an example: in 1990 about 5% of Dutch pigs as well as poultry farms used contracts, in 2002 the shares were 15 and 9%. This trend is seen in other - light CAP regulated markets - too (table 2.3). Farms with contracts are often (but not always) the larger farms (OECD, 2006) which means that a larger part of production is under contact than the share of farms suggest (see also Boehle, 1999).

It should be noted that the agricultural typology used in the EU to classify farm holdings to type has some drawbacks. First of all it classifies farms, not households - we

Table 2.2   Percentage mixed farms in the European Union

	1990	1995	2000	2003
Belgium	23.6	20.9	20.6	19.7
Denmark	26.0	24.3	21.6	20.1
Germany			27.0	20.8
Finland		15.2	8.6	11.6
France	23.8	21.9	20.3	19.1
Greece	21.4	17.1	15.8	14.7
Ireland	2.9	3.2	3.1	2.7
Italy	19.5	17.0	14.5	12.0
Luxembourg	18.0	16.7	16.7	15.9
Netherlands	11.8	10.4	10.3	9.8
Austria		17.4	14.3	13.1
Portugal	55.0	46.9	39.9	38.5
Spain	18.6	16.6	14.0	13.3
UK	9.2	8.4	7.5	6.2
Sweden		21.4	19.1	13.2
Cyprus				10.8
Estonia				62.2
Hungary			50.7	45.7
Latvia			52.7	55.7
Lithuania				66.9
Malta				28.8
Poland				43.1
Slovenia			38.9	56.5
Slovakia			56.6	58.8
Czech Republic			32.9	

Source: Eurostat.
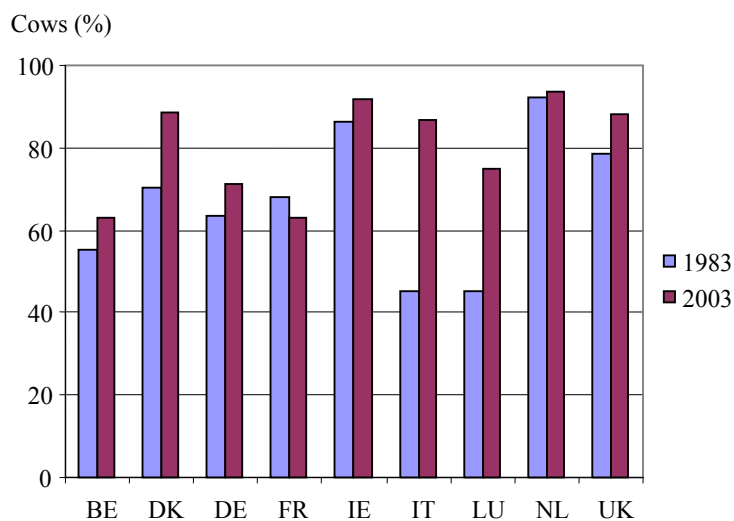
Figure 2.10   Percentage of cows on specialised farms (type 41) in 1983 and 2003 for different EU member states
Source: Eurostat.

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Table 2.3   Farms with production contracts (% of all farms)

Country	Beef: calves and heifers		Pigs		Poultry	
	1990	2002	1990	2002	1990	2002
Belgium	9.8	10.4	7.7	15.7	18.6	11.7
Germany a)	3.9	2.5	1.3	2.2	3.6	5.1
Spain	0.2	n.a.	2.3	11.1	13.1	25.4
France	4.2	10.3	5.8	18.9	6.7	17.7
Italy	0.1	0.6	0.1	1.9	0.1	9.3
Netherlands	6.6	34.8	4.9	15.5	5.2	9.4
UK	1.4	1.2	4.5	30.8	11.2	30.6

a) Germany: 1995 in stead of 1990.
Source: OECD, 2006.

come back to this later. Second it classifies production structures, not output. So a farm that grows cereals to feed its pigs and only sells pigs is classified on its production structure of cereals and pigs as a mixed farm, not based on its sales as a pig farm.

At the moment the agricultural typology is under review. This became necessary as it is based on gross value added by commodity; hence some types of farming now become smaller as the historical single farm payment can not easily be allocated to commodities in a survey. In case some commodities are reformed in the CAP and others not, this also influences the type of a farm.

2.5   Farm size: concentration

2.5.1   Concentration

An increase in the average scale of farms means that the farm production is concentrated in fewer hands. But fewer and larger farms not necessarily mean that the concentration increases. The relative concentration can be stable. That is essentially what Butault et al (2006) found for France. They tested Gilbrat's Law that states that growth rates are independent from size. Butault et al. found that when controlled for age, education and some other variables, small farms tend to growth even a little bit faster than the average farm. Our own research (Poppe and Luijt, 2004) however suggests that agriculture here has one disadvantage compared to other sectors: there are so much economic barriers to entry (also due to high average prices for land and quota due to their high marginal value for existing farms) that start-ups are very uncommon. Your parents have to be in the business to be able to become a farmer.

Interesting is that for more specialised products relative concentration is clearly happening. In his study for the OECD Frank Bunte (OECD, 2006) calculated C4 ratios for the Netherlands, showing the market share for the four biggest growers. For some horticultural specialties these C4 ratios are high and higher than ever (table 2.4).

Table 2.4   *Market share of the top 4 producers (C_4) in the Netherlands (%)*

Product	1980	2003
Dairy	0.1	0.2
Potatoes, ware	1.6	1.4
Poultry	7.4	4.9
Eggs	6.5	6.6
Tomatoes	1.1	6.5
Lettuce	5.8	33.5
Carrots - washed and bunched	11.3	23.4
Winter carrots	6.8	38.5

Source: OECD (2006).

       The concentration of agricultural production is also analysed in figure 2.11. It displays the percentage of production capacity (sum of esu - European size units) of the 10% largest farms. The values are estimated based on FADN data. This means that the presented values are likely to be an underestimation because in some countries there are some problems in including very large farms (e.g. in wine or horticulture) in the FADN system. Furthermore, because of the sampling character of the FADN system the presented values are estimates with a confidence interval. Despite these limitations, the figure clearly
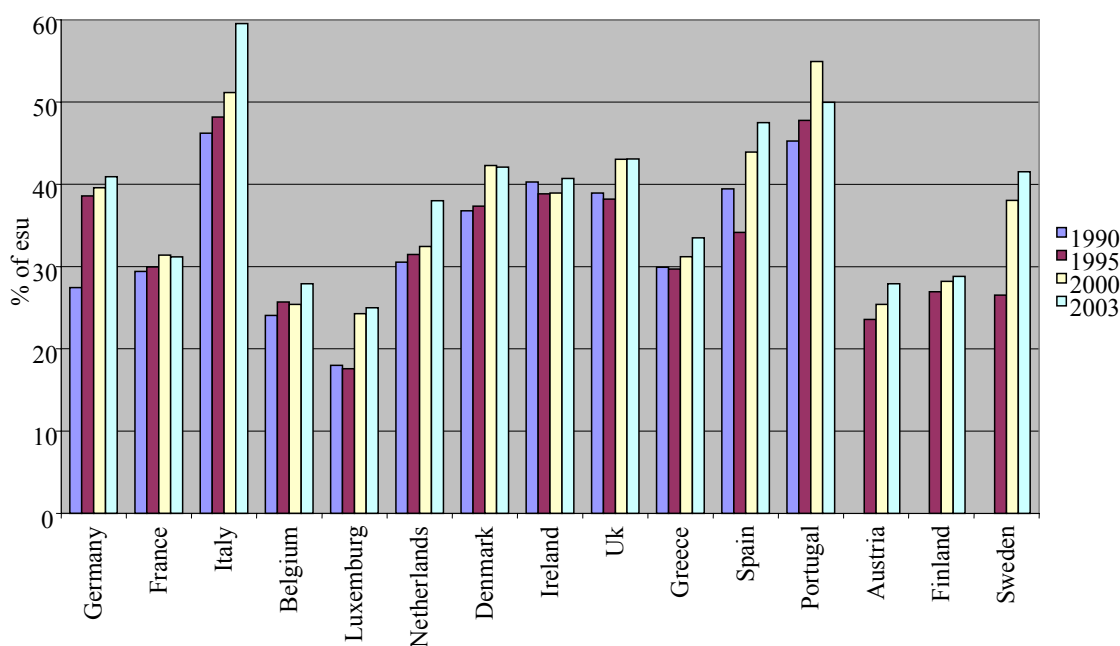
Figure 2.11   Share of esu of 10% largest farms
Source: FADN-CCE-DG Agri; adaption LEI.

shows the increase in share of production of the largest farms in almost all countries. Italy shows the highest value with almost 60% of production concentrated in 10% of the commercial farms. In Belgium, Luxemburg, Finland and Austria the value is lower than 30%.

2.5.2   Going bi-polar: the disappearing middle?

The increase in farm size means that the small and medium sized farms are under pressure. Where small farmers are often already aware that they are the last generation on the farm as a successor is lacking, especially the middle farms feel threatened. This feeling is nothing new - the Dutch Young Farmers NAJK called already in the early eighties for a policy to save the medium sized farm (NAJK, 1983).

New anecdotes and facts reinforce the idea that there is a disappearing middle. After the CAP reform in the 1990s in the Netherlands several farmers in their mid-life with a medium sized farm choose a second carreer option outside farming; where small farms had already a part-time character and large farms continued to grow.

For total Dutch agriculture figure 2.12 investigates the statistics on this. It shows that the group of small farms loose their share in production even quicker than its share in the number of farms. The opposite is true for the large and very large farms: the contribution to total production increases faster than the share in the number of farms. In that sense there is a 'disappearing middle': although the group of medium sized farms increase in number, their contribution to the production decreases. The share of the small farms even declines stronger.
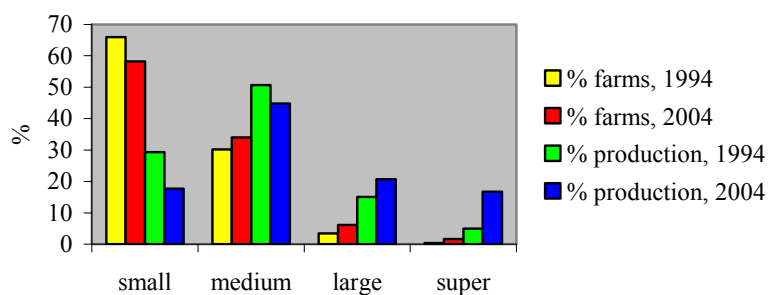
Figure 2.12   Share (%) of size classes in the number of farms and in the production, the Netherlands 1994 and 2004

The concept of the disappearing middle is stronger in the statistics of some other countries. Figure 2.12 for instance shows the trends in Poland, where small holdings continue to exist as a residential farm or as a smallholder-part time or even subsistence farm (Sadowski et al., 2005). Middle sized farms however seem to be too big for a part time residential farm and too small to be commercially viable.
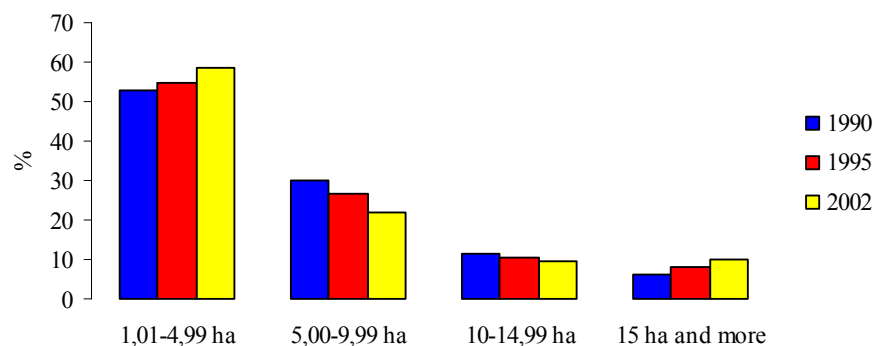
Figure 2.13   Share (%) of size classes in the number of private farms Poland, 1990, 1995 and 2002
Source: Sadowski et al. (2005).

That these developments differ between countries is shown with the Hungarian data in table 2.5, where no such trend can be seen. This suggests that developments are very much influenced by local institutions, labour markets, tax policies, land markets etcetera, more than by agricultural prices.

Table 2.5   Distribution (in %) of the number of farms by size class, Hungary

Size class (ha)	1981	1991	2000	2003
Smaller than 10	99.8	98.2	94.0	93.4
10 - 50 ha	0.1	1.6	4.8	5.0
50 - 100 ha	0.0	0.2	0.6	0.8
100 ha and more	0.1	0.1	0.7	0.8
Total	100	100	100	100

Source: Sadowski et al. (2005), based on Hungarian Statistical Yearbooks from KSH. The size class 100 ha and more manage 67.5% of production in 2003, the two smallest size classes 11.5 respectively 13.9%.

The bi-polar model has been tested for this paper based on EU12 data on FADN data from 1990 to 2003. The results for the EU12 are in line with the results presented for the Netherlands. The group of small farms looses its share in production (percentage of esu) much faster than its share in number of farms. The largest size group (> 100 esu) increases its share in number of farms and shows a strong increase in the share of production. The middle groups show a rather stable share in number of farms but a decreasing share of production (figure 2.14).
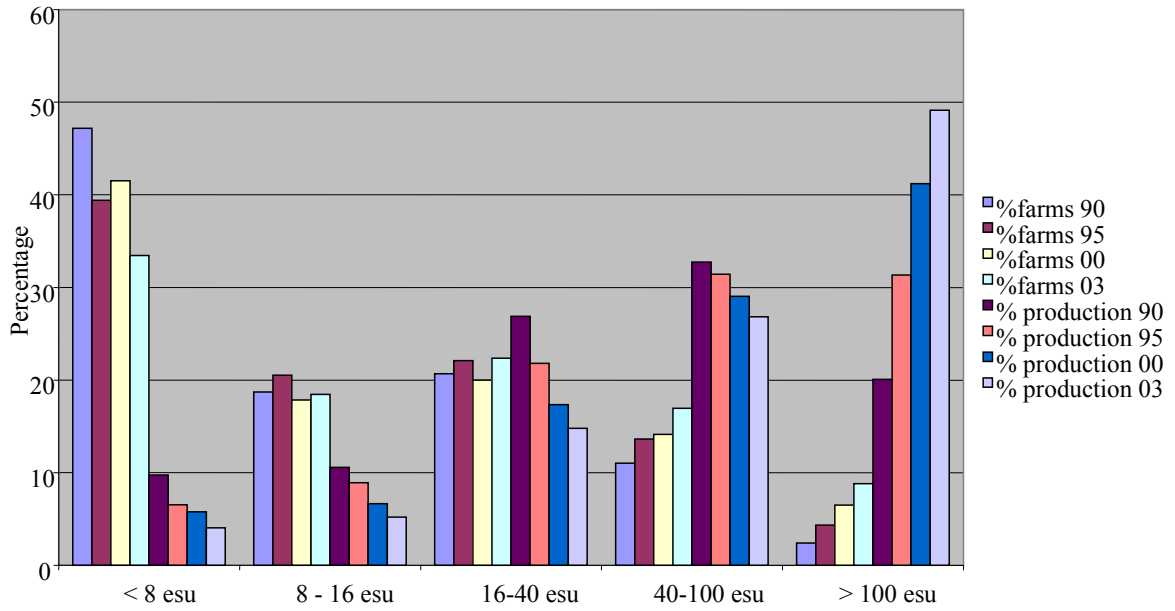
Figure 2.14   Share of size classes in number of farms and production capacity, EU12 total
Source: FADN-CCE-DG Agri; adaptation LEI.

Distribution of subsidies on fieldcrop farms
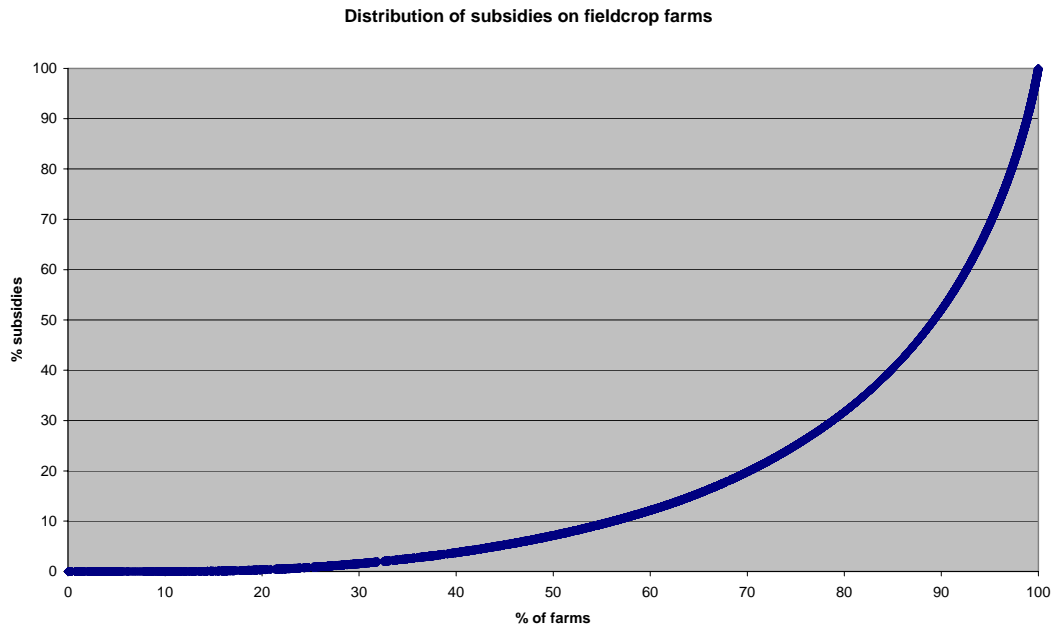
Figure 2.15   Distribution of crop subsidies (2000)
Source: FADN-CCE-DG Agri; adaptation LEI.

2.5.3   Concentration of subsidies

The concentration of production also means that subsidies are heavily skewed. This was always the case with price support, but for the public at large it now becomes clear as also direct payments (coupled or not) are heavily concentrated. Some farmers cash high amounts of subsidies and take a large part of the available budget. Figure 2.15 shows the distribution of crop related subsidies in the European Union in the year 2000. There is a clear uneven distribution of subsidies among farms, 20% of the farms receive 70% of the subsidies (right side of the figure). Several European countries now publish these data (often with names of recipients) and in the long run this situation will become harder to defend.

2.6   Household strategies

2.6.1   Structure and non-farm income

The increasing farm size (leading to farmers owning different holdings or portions in it, figure 2.16) as well as the existence of part time farms, makes it attractive to study households and household strategies.

Census results from 2000 indicate that in the EU15 about a quarter of the farmers have their major activities outside farming. These are thus part-time farms. Especially

	BE	DK	DE	GR	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EU-15
☐ No	82%	59%	54%	75%	68%	75%	56%	74%	83%	79%	63%	70%	57%	37%	64%	70%
■ Subsidiary	4%	7%	6%	2%	4%	6%	14%	1%	5%	8%	13%	2%	17%	20%	12%	4%
■ Major	14%	34%	39%	22%	28%	19%	30%	25%	12%	13%	24%	28%	26%	43%	24%	26%
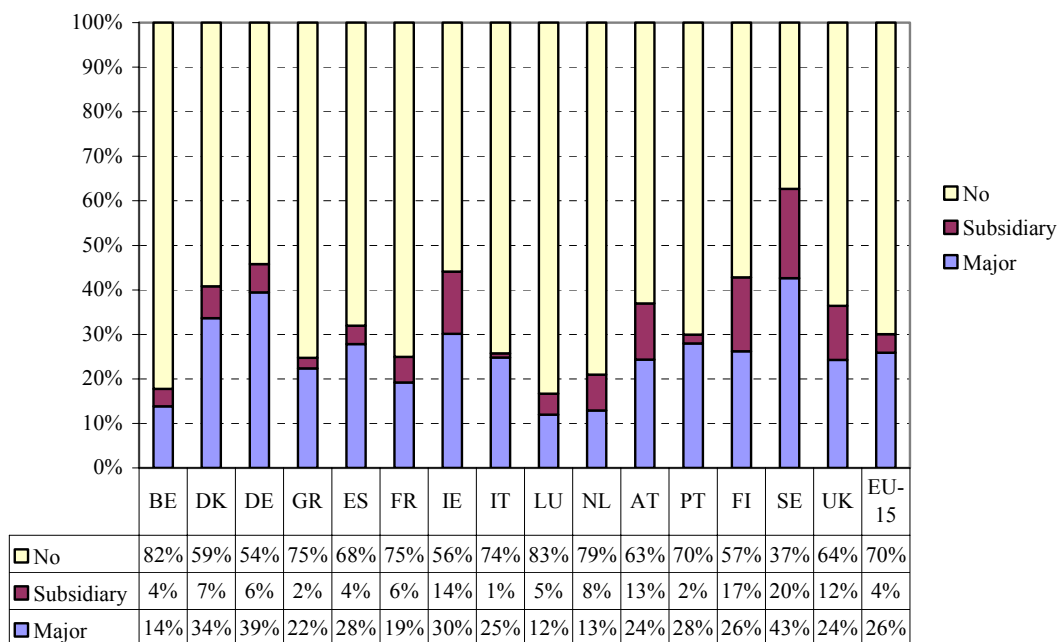
Figure 2.16   Other gainful activity of the sole holder (Census 2000)
Source: Hyvönen (2004).

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small farms are often run part time. On another 4% of the farms a minor 'other gainful activity' exists, meaning that on 70% of the farms other activities played no role. There are marked differences between the member states. In the Benelux (Belgium, Netherlands, Luxembourg) for instance farmers are specialised in farming with not often another gainful activity. This could reflect high market integration (leading to specialisation), but also reflects the local labour market (quite good, not much kidden unemployment on the farm) and tax and social security laws (not much incentives to be a farmer). On the other hand in Finland and Sweden there are quite natural activities in forestry in winter time. Be aware that these data are for the sole owner only, and do not tell anything on income source (if any) of the partner of the holder.

The effects of farm structure on the income composition have been clearly shown for the Swiss and Finnish cases, and comparable data exists for some other countries (like the Netherlands, Germany, Denmark, Sweden, Norway, and Ireland). Figure 2.17 shows that in Switzerland cash flows in farm households are coming not only from farming, but also from non-farm sources. Farm households that concentrate on farming have the highest investments per household. But also when non-farm income is relevant, investments are high (although, not shown in the figure, the investments in non-farm assets as houses tend to be higher). Investments are in those cases higher than the net operating household cash flow (that is the total cash flow minus private expenses), and on part-time farms even higher than the farm cash flow. In other words in some farms farm investments are clearly cross-subsidised ('sponsored') by non-farm income.
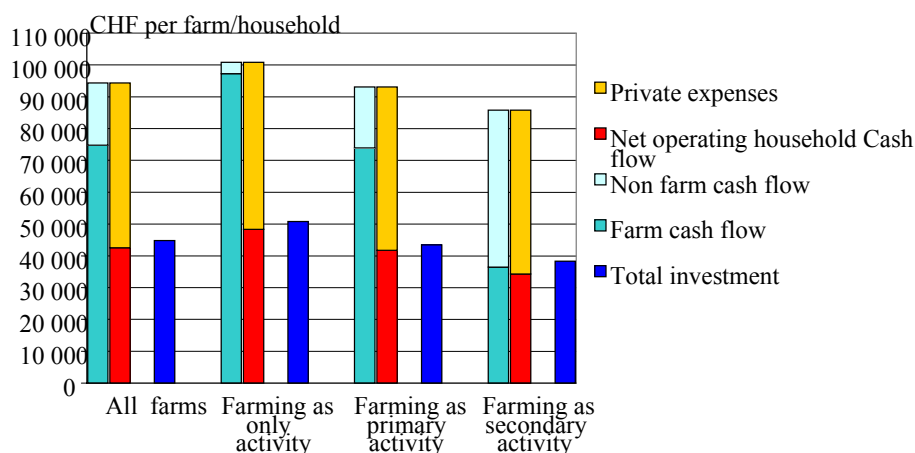
Figure 2.17   Financial indicators by farm type in Switzerland
Source: FAT, Tanikon, quoted from Vrolijk et al. (2004).

Figure 2.18 shows for Finland (using tax data) that small farms have of course a lower income from farming than large farms, but that their overall income is higher (Puurunen, 2005). This is what one might expect: it provides an incentive for persons (at least in the next generation) to leave agriculture and join other sectors (and in this case to stay on the land with some kind of residential farming).
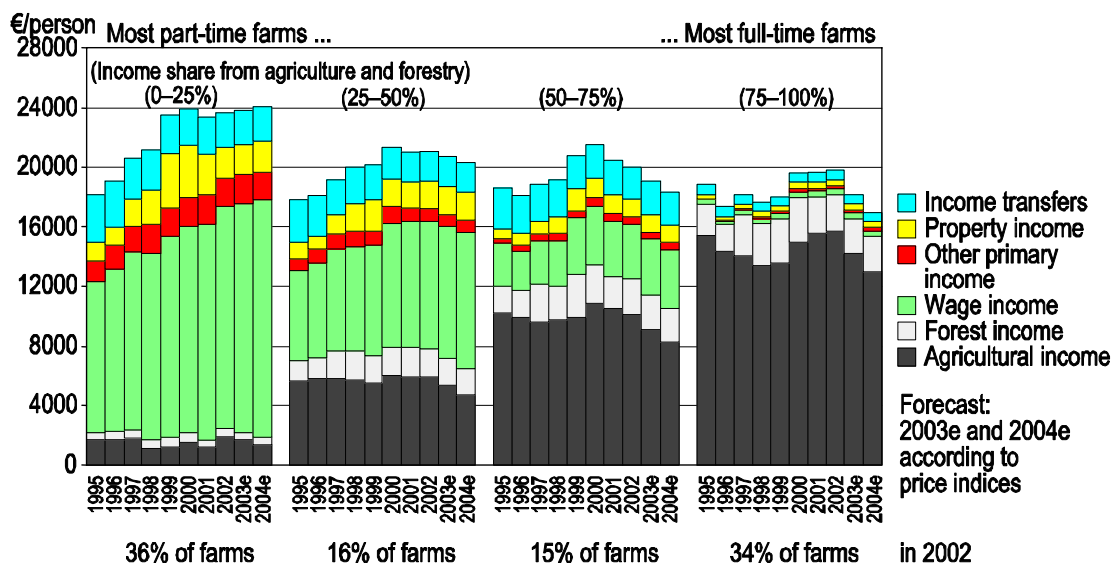
Figure 2.18 *Total income of farmer and spouse (€/person) according to the income share of agriculture and forestry in 1995-2004e (in the level of 2001). On the most part-time farms the income share of agriculture and forestry is under 25% and on the most full-time farms over 75% of the total income of farmer and spouse*

Source: MTT, Helsinki, quoted from Puurunen (2005).

2.6.2 New typologies

These developments ask for a new kind of typology that can supplement the existing agricultural typology (discussed above). USDA-ERS developed an agricultural household typology for the USA that Van Bommel and Van der Veen (2006) applied in a modified and extended form for the Netherlands. They used the following indicators to characterize the strategy of the Dutch dairy farms using the FADN 2003:

- enlarger: The farm is larger than 200 European Size Units (ESU). That is about 110 milk cows;
- environmental farmer: At least € 10,000 of environmental subsidies received or organic farm;
- rural entrepreneur: At least one third of the total revenues are generated from: recreation, electricity production, on-farm dairy processing (like cheese), domestic selling of products [4] and the agricultural contracting business;
- life style farmer: Smaller than 100 ESU and the income from labour, renting out of privately owned assets and revenue of liquidities (including savings and stock, calculated as 5% of the average value in the year 2003) of at least € 25,000;

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[4] With the on farm dairy processing and domestic selling, 50% has been incorporated in the rural entrepreneurial income. The assumption is made that they can get a price for their products which is twice as high as the price with normal selling.

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- out-phaser: The most senior entrepreneur is over 55 years of age and the age difference between the senior and the youngest entrepreneur is no more than 20 years.

As not all farms could be classified into one of these five groups, they added two extraclasses:
- small scale farmers: farms smaller than 100 esu having no clear strategy;
- medium scale farmers: farms between 100 and 200 esu having no clear strategy.

Table 2.6 shows that this typology leads to quite different types (clusters) of farms, as might be expected. Highest subsidies (per farm) are received by Environmental farmers (also as compensation for nature conservation contracts) and to Enlargers (due to size). The number of observations in the FADN on rural entrepreneurs is too low to report here on this group.

Table 2.6   Typology of Dutch dairy farms categorized by strategy, 2004 (monetary values in 1,000 Euro)

	Size (ESU)	Ha	Cows	Milking quota (* 1,000 kg)	Farm income	Off farm income	Subsidy
Out-phaser	90	34.9	51.0	348.0	41.6	7.9	7.1
Lifestyle	63	21.3	34.0	258.1	14.5	31.7	6.2
Small scale farmer	70	27.2	39.6	283.9	19.4	7.7	6.1
Environmental farmer	159	68.9	86.1	596.8	74.8	11.1	33.3
Medium sized farmer	137	48.9	76.2	560.2	46.7	12.3	12.1
Enlarger	246	85.3	135.9	1,042.4	90.9	12.2	22.5
Total	119	43.3	66.2	487.4	40.0	11.7	11.2

Source: Dutch FADN, quoted from Van Bommel and Van der Veen (2006).

Van Bommel and Van der Veen used the Microwave Simulation Model (Wolfert et al., 2005) to simulate the effects of the CAP Mid Term Review. Essentially this model projects income, cash flows, investments and in the end the viability and continuity of the holding. Results in table 2.7 show that especially the Small scale farmers and the Out-phasers will disappear in the years to come. Life-stylers are rather immune for the effects of the Mid-Term Review and will continue.

Table 2.8 shows that by 2010 Environmental farmers and Enlargers will have the highest labour productivity, partly also due to a relatively high leverage (being indebted more than any other farm type).

This analyses shows that for ex-ante and ex-post impact analysis (or cost benefit analysis) of agricultural and environmental policy, the development of typologies that reflect differences in household strategies make sense.

Table 2.7   Number of observations in FADN simulation and (estimated) population in 2004 and 2010

	2004		2010		Decrease 2003-2010 (%)
	observations 2003	population 2003	observations 2010	population 2010	
Out-phaser	22	3,229	17	2,314	28
Lifestyler	11	1,398	11	1,398	0
Environmental	18	601	14	550	8
Small scale farmer	36	6,079	25	4,192	31
Medium sized farmer	55	9,110	45	7,272	20
Enlarger	21	2,022	19	1,852	8
Total	166	22,891	133	17,847	22

Source: Dutch FADN, calculations with the MICROWAVE FES-model, quoted from Van Bommel and Van der Veen (2006).

Table 2.8   Financial characteristics of the different farms types in 2010

	Solvency	Modernity a)	Net investment (* 1,000)	Capital productivity (exu/1 mln. Euro)	Labour productivity (esu/labour unit)
Out-phaser	91	33	39.6	55.6	53.7
Lifestyler	92	44	21.8	51.1	43.0
Environmental farmer	77	36	46.4	57.0	103.8
Small-scale farms	83	28	56.8	52.6	54.8
Medium-sized farms	83	33	75.2	55.6	93.4
Enlarger	79	33	126.0	52.4	108.1
Total	84	33	68.5	54.1	76.7

a) Book value asset in percentage of replacement value, a low number indicating older machinery and buildings.
Source: Dutch FADN, calculations with the MICROWAVE FES-model, quoted from Van Bommel and Van der Veen (2006).

Globalising food chains

Where the USDA-ERS typology stresses household strategies at the local level, including farm size, there is probably also a need to develop a typology on how farms operate in the food chain. The modern food economy is characterised by a number of trends (OECD, 2006; Kinsey, 2001; Boehlje, 1999; Ménard et al., 2005):
- consumer preferences have an increasingly profound impact on food industry: Income development, Population growth, Food consumption, shifts in food consumption;
- there are major changes in technologies, including information technology and genetic modification;

- as a result direct linkages between supply chain actors increase and chains develop into networks (net-chains). The 'invisible hand' of the spot market is replaced by the 'visible hand' of contractual arrangements, with the effect for outsiders like government and researchers that the chain becomes less visible (transparent) (OECD, 2006).

This means that farms differ in their, forward and backward, integration in the food chain, their use of contracts etc. Let me take just one example on which some of my colleagues just published the first results of survey: (s)emigration. The Netherlands has a long tradition of emigration by farmers who want to exploit their management and entrepreneurial skills in other countries. This still goes on, but recently we noted that some farmers now operate in more than one country: besides their Dutch farm, they hold pigs in Spain, milk cows in Eastern Germany or grow roses in Kenya. This phenomenon of foreign direct investment was labelled semigration (Meulenkamp et al., 2006). In depth interviews learned that two different explanations hold here. Dutch dairy and arable farmers that also operate abroad have a strategy to increase the size of their farm that they can not realise easily in the Netherlands due to high land and quota prices. So they sell some of these assets (especially quota) and reinvest abroad to realise the size they are looking for. But mainly due to tax reasons they hold on their Dutch farm for several years. Selling it would lead to realised fiscal profits and a tax bill, as they stop their farm. They prefer to prevent this cash out flow and invest it abroad. In addition the structure of the banking industry might play a minor role as access to the specialised Rabobank in the Netherlands based on Dutch assets is relatively easy. In the long run these farmers probably abandon the Dutch part of their business, and semigration becomes emigration.

Horticultural holdings however could for a very long time choose for the best of both worlds: they often transfer part of their production to e.g. Spain or Kenya to make use of lower production costs (labour, climate). More difficult, high value activities stay behind in the Netherlands, close to the (international) markets. Horticulture resembles in this respect other globalising industries.

2.7 Conclusions and research agenda

In agriculture structural change is business as usual. In this paper we have shown that European agriculture is characterised by trends like increasing farm size and specialisation. This leads to concentration. Although this is (not yet) visible in the big products, it is in specialties. Taking these trends together, structural change is prominent in Europe (see also Hill, 2006). These trends can be explained by the standard economic theory.

In some countries we also seem to experience a 'disappearing middle', at least in contribution to production. But much more research is needed on this phenomenon, especially to explain it in a context of local labour markets, land market, taxes etcetera.

Labelling everybody with some land or animals as a farmer seems to be an outdated concept. Modern farms are economically and juridical organised in a much more complex way; that makes the one-holding/one-location/one-household a stylized fact of the past. Residential farming households with some land or cattle have different, non-agricultural

strategies. Taking them into consideration in agricultural policies without monitoring their non-farm income leads to an exaggeration of the farm income problem - as has been argued by many authors before (among others: Hill, 2000; Moreddu et al., 2004; Poppe, 2002; IWG, 2005).

This situation calls for more work on data gathering and research in this area of multiple income sources and household strategies. It also calls for new typologies, as different groups will react different to policy changes. Typologies make the communication of such effects easier. Based on trends in the 'new food economy' and Dutch work on semigration we speculate that the same is true in chain integration for large scale farms.

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3. Development of a network of OECD member countries to undertake distributional analysis

Catherine Moreddu [5]

Background

- The OECD analyses policy issues, in particular it evaluates current policies and policy reform wrt to their objectives and to reform principles (including equity)

- Policies (policy reform) have distributional impacts, some have distributional objectives

- Increasing interest for these issues: increasing heterogeneity in farm households, payments more visible, targeting, etc.

- Need for disaggregated (micro-level) data

- Many government-related institutes are engaged in this type of work

Recent examples

- Income study: distribution of support and impact on the distribution of income

- Decoupling: FADN used to estimate the impact of different types of payments on farmers' production decisions (risk aversion)

- Agricultural policy and trade reform: potential effects at global, national and household levels

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[5] OECD, Agriculture Directorate.

Lessons

- It is crucial for OECD countries to be able to analyse distributional issues

- Access to micro-level data is not easy, institutionally and technically

- Regular analysis at micro-level is beyond OECD's resource constraints

- National research institutes would be better placed:
  - Access to data
  - Technical expertise
  - Country knowledge

Network

First phase: 2007-08

- OECD (Secretariat and delegates) to suggest the type of policy issues, which will determine:
  - the scope and data needs: OECD countries, farm or rural households?
  - experts and institutes with adequate access to data and expertise, and interested in collaboration
- OECD role: organiser, synthesis reports
- Network expert meetings to identify:
  - priority research issues
  - Data availability
  - Analytical approach
  - Time table

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Initial thoughts on objectives

- Identify data availability: Comparing definitions and availability of data concerning the economic and financial status of farm households in OECD Member countries

- Undertake research based on those data, *e.g.*
  - distributional consequences of agricultural and trade policy reform
  - linkages between the diversification of income sources and the rural economy
  - PSE indicators by farm size, type and region

- Allow flexibility in analytical approaches: no "one size fits all"

Your views are welcome on:

- Attractivity for partners

- Feasibility

- Institutional setting: role for the OECD, relationships with existing networks, incentives

- Issues that could be covered

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Other business (1)

- OECD Conference: Assessing the feasibility of micro-data access, Luxembourg, 26-27 October 2006

  – Applications of micro-data: examples of analysis
  – Micro-data access in practice: examples
  – OECD questionnaire
  – OECD feasibility study (5 options)
  – Action plan

Other business (2)

- Meeting of the IWG-AGRI Task Force on statistics for rural development and agricultural household income, Paris, OECD, 27 June 2006

  – Future of the Handbook on rural households' livelihood and well-being:
    - publication by UNECE in 2007, pamphlets, CD-Rom
    - developments to include developing countries by FAO with World Bank
  – Future of the Task Force
  – Information and booklet available at: www.unece.org/stats/rural

4. Global dairy farmers: trend monitor and outlook

Co Daatselaar [6]

Contents

- What is Global Dairy Farmers (GDF)?
- Products of GDF
- GDF Trend Monitor and Outlook

Global Dairy Farmers GDF

- Group of dairy farmers from some major milk producing regions in the world
- Create a platform to gather and exchange knowledge on various topics, related to international dairy farming
- Create connections with institutes, involved in dairy farming → Global Network of Institutes (GNI)
- Create connections with entrepreneurs in other sectors → Global Network of Entrepreneurs (GNE)

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[6] LEI, The Hague.

Products of GDF

- Basic structure relying on conferences
  - Support from studies and (strategy) cases
  - Communication: website, e-mail, Newsletter

- Connections with European Dairy Farmers, Dairy Innovators Forum (AU), Dutch networks and more

- GDF Trend Monitor and Outlook
  - First 'tangible' product

GDF Trend Monitor and Outlook: monitoring

- Monitoring
  - Necessary to create a base for the outlook
  - Necessity to make data/figures comparable
  - Positioning of member farms
    - Comparing with each other
    - Comparing with region averages
    - Comparing with special groups in region (e.g. 10% or 30% largest, best economic performance)
  - Starting with 6 to 8 main milk producing regions
    - EC, USA, Australia, New Zealand, Brazil, Argentina, Eastern Europe

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GDF Trend Monitor and Outlook: monitoring

	P7991M	compared to	volger	koploper
Year of analysis	2004			
Country	NL		NL	NL
Ha cultivated land	45.11		56.66	78.33
Average number of dairy cows	68.5		89.5	132.3
Total milk production	593621		687747	1105136
Replacement value buildings final balance sheet	141.86		66.19	66.10
Modernity buildings final balance sheet	63%		40%	44%
Replacement value machinery final balance sheet	38.55		39.76	40.13
Modernity machinery final balance sheet	58%		48%	52%

Net operating results / Family farm income

Strong compared to 'volger'　Strong compared to 'koploper'
Weak compared to 'volger'　Weak compared to 'koploper'

Values in € per 100 kg of milk

Total output	36.47
- Costs animal and crop assets	9.13
= Gross margin	27.34
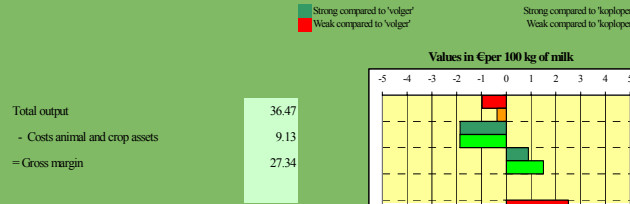
GDF Trend Monitor and Outlook: data

- Data from GDF-members (cases) and farmers out of other networks
- Data from regions
  - Some European countries (FADN)
  - USA (e.g. Wisconsin-region, Texas/California)
  - Australia (North Victoria: irrigated, South Victoria)
  - New Zealand (Northern Island)
- Averages of whole region and averages of special groups within region
- Most recent year(s)
  - 2 or 3 years give better view of trends

GDF Trend Monitor and Outlook: outlook

- Actualisation to current moment
- Ask GDF-members for their strategies and expectations
- Inventarisation of trends and developments
  - Innovations from GDF-members or others
  - Various policies
- Construction of Outlook

GDF Trend Monitor and Outlook: outlook
Development of own capital for different strategies
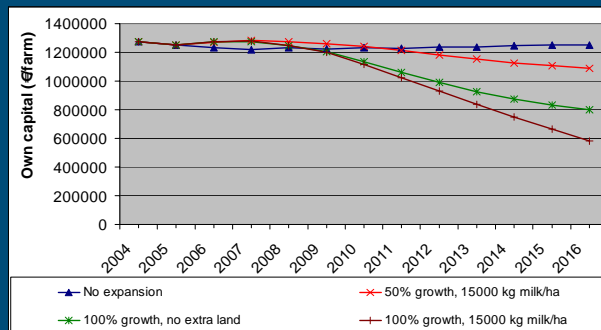
Towards global networks of data exchange with you(r help)

© Wageningen UR

More information

- www.globaldairyfarmers.com
- www.agrocenter.nl
- www3.lei.wur.nl/LEI_WebTools/ (at the moment only Dutch)

- Co Daatselaar: co.daatselaar@wur.nl / +31 (0)320 293544
- Bram Prins: bram.prins@wur.nl / +31 (0)50 3023931

- Some tools Agrocenter uses within the concept of Interactive Strategic Management:
  - Strategic Management Report: Personal report that guides the entrepreneur through the ISM process.
  - Strategic Management Tool: calculates competences, internal and external factors through strategies.
  - www3.lei.wur.nl/LEI_WebTools/ (on this moment only Dutch)
  - Face-IT: Positioning farms
  - Game Simulation Dairy and Game Simulation Arable

5. Is low income persistent among Canadian farm families? A longitudinal profile, 1983 to 2004

Katrin Nagelschmitz[7]

Abstract

The persistence of farm financial losses and low family income for individual farm families over time in Canada is studied. This study uses Statistics Canada's Longitudinal Administrative Databank (LAD), a micro data set of income tax data for the period of 1982 to 2004. Persistence is measured in two ways: (a) The number of consecutive years a family finds itself in that financial situation and (b) the number of years during a ten-year. The findings indicate that the persistence of negative NFI has increased over time, while the persistence of low family income among farm families has decreased. Both trends are similar to those of annual indicators. The result suggests that net farming income may not be an appropriate indicator of the financial well-being of farm families over the longer term. Persistence of chronic low family income is largely independent of farm size. The differences in family characteristics between chronic low income families and other farm families generally mirror those among non-farm families. Chronic low income farm families receive on average a smaller percentage of their income from social program payments compared to non-farm families.

Keywords: net farming income, persistence of low income, farm family income

5.1   Introduction

The annual farm income situation is well documented in Canada. Annual cross-sectional data of farm and non-farm income is obtained from taxfiler administrative data, and Statistics Canada's Farm Financial Survey provides balance sheet data. However, longitudinal data sources are more limited. This study uses Statistics Canada's Longitudinal Administrative Databank (LAD), a micro data set of income tax data for the period of 1982 to 2004. The purpose of this paper is to shed light on the persistence of negative NFI and low family income of farm families over multiple years. The questions are (1) to which degree negative NFI persists and low family income over multiple years; (2) whether farm size affects the persistence of low family income; (3) whether persistence has increased or decreased over time, and (4) what are the characteristics of farm families with chronic low family income. Persistence is measured in two ways: (a) the number of consecutive years a family experiences negative NFI and low income family and (b) the number of years during a ten-year period a family finds itself in that financial situation.

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Some characteristics of farm families with multiple years of low income are compared to other farm families and to non-farm families with multiple years of low family income.

Following background information, data and methodology (section 0), the annual incidence of negative NFI and low family income are provided (section 0). Results on the persistence of negative NFI and low family are presented in section 0. The characteristics of farm families with multiple years of low family income are compared in section 0. A summary concludes.

Farm families

In general terms, a farm family differs from a non-farm family in that total family income is determined in part by the income (or losses) generated by resources allocated to a farm business. Assuming that for modeling purposes families and households are alike, the general household model assumes that household members maximize their consumption and leisure given their finite initial endowment of time, wealth, and other household characteristics. In the farm household model, the constraints are modified to include agricultural production functions, and the household decides on farm output and input, including demand for farm labour (Huffman, 2004). The model can differ depending on whether farm production is determined first, or simultaneously with non-farm labour allocation (OECD, 2001).

Farm families may be defined either narrowly or broadly. The broad definition of a farm family includes all families that report any farm income, whereas the narrow definition requires farm income to be the main source of income (Abraham et al., 2005; OECD, 2003).[8] This paper uses the broad definition of farm families so that the results can be more easily compared to the most commonly published Canadian statistics on farm family income. Often in farm analysis, the sample is limited to farms with a minimum level of gross farming income (GFI), for example of $10,000. In this paper no minimum limit is set other than GFI greater than zero. However, farms are divided and compared by GFI as a measure of farm size.

5.1.1   Non-farm income and employment

Non-farm income presently generates a significant share of total family income among farm families in Canada, and non-farm income has helped to reduce poverty levels among farm families (in the US; Gardner, 2000). Studies have shown that off-farm labour decisions are affected by farm characteristics such as farm size, the seasonality of farm work, and the proximity of the farm to non-farm employment opportunities (Goodwin and Mishra, 2004; Phimister and Roberts, 2002). Demographic factors such as education, age, household size, and the number of children in the family are also of importance (Gould and Saupe, 1989, Goodwin and Mishra, 2004). Even though non-farm employment is a means to enhance and stabilize family income, Goodwin and Mishra (2004) found little

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[8] Abraham et al. (2005) show that the average income of farm families broadly defined is higher than the average income of the group of farm families who derive more than 50% of their total income from net farming income.

correlation between self-assessed risk preferences and off-farm labour supply.[9] Non-cash benefits provided by the employer are a factor in the off-farm labour decision (Jensen and Salant, 1985). The affect is possibly not as important in Canada as in the U.S., because Canada has a public health care system that covers all Canadian residents. In the data used in this analysis non-farm income does not include non-taxable non-cash benefits provided by employers. On larger farms, non-farm employment income is more likely to come mainly from the spouse (ERS/USDA, 2004), and one study of the spouses of farm operators, 80% indicated that the non-farm employment was their career choice (ERS/USDA, 2006).

The income data of this analysis does not take into account any possible differences in hours worked, neither the hours allocated to generate farm income (and losses) nor those allocated to non-farm income. Also not measured is the amount of on-farm production that generates income-in-kind for the farm family or household production of goods and services for the family, such as food preparation, clothing, repairs, and child and elder care. Time allocated to these activities might be reduced when non-farm employment increases. These limitations of the analysis might cause an overestimation of the increase in economic well-being of the farm family. On the other side of the farm household ledger, the inseparability of some farm expenses and household use of farm assets may underestimate farm household income.

The basic one-year farm household model does not describe completely the decision of families to continue farming or to leave the sector (OECD 2001), because the long-term expectations for the farm business impact on current year decision. Farm losses may be rational also once all benefits of farming are included. Empirical work indicates that a negative relationship exists between non-farm employment and farming efficiency (Smith, 2002; Goodwin and Mishra, 2004). Increases in non-farm employment also appear to decrease farm consolidation (Atwood et al., 2002) and the probability to exit the sector (Kimhi and Bollman, 1999). In this analysis only those families are observed who have not exited the sector observed during any of the 10-year periods.

5.1.2   Low family income

Individuals fall into low income due to a variety of circumstances such as the loss of a job, birth of a child, family breakdown (Finnie, 2000). In Canada, there are two distinct groups of low income families in the general population. For about half of the population low income is only a temporary experience, while the remaining low income families find themselves low income for many years (Finnie, 2000).[10] Low income is not equated with poverty, because poverty is a much more complex concept. Low income indicators are limited to measuring the extent to which some Canadians are less well-off than others based solely on cash income. This is especially prudent in the context of this paper because wealth and resources employed in home production are not included in the analysis.

This paper focuses on the persistence of low income of farm families using the 'simple count' method. However, there are further indicators of low income dynamics.

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[9] The study focused on the off-farm labour supply by the farm operator only (Goodwin and Mishra, 2004).

[10] Low income rates generally fell in Canada between 1993 and 2000, as did the persistence of low income (Statistics Canada, 2006b).

Declines in the economic situation of low income families due to further drops in their incomes may be missed by the low income rate, but will be registered when measuring 'low income intensity'. The 'low income intensity' measure multiplies the low income rate with the ratio of the average gap between the low income threshold and the income of low income families. Farm families have less low income intensity than non-farm families (Heisz, 2001). 'Income inequality', measured with indicators that are consistent with the Lorenz curve, has decreased among Canadian farm families between 1986 and 1995 (AAFC, 2000).[11] The trend of the 'disappearing middle', that is observed among the general population, did not occur among farm families. Instead, the income gap between farm and non-farm families has decreased significantly (AAFC, 2000). Other indicators include 'hazard rates' (the probability of entering or leaving low income), 'survival rates' (the probability of remaining in or out of low income), and 'occurrence dependence' (the degree to which entry into poverty or current poverty status is related to an individual's past low income record) (Finnie, 2000). An analysis using these indicators is left for further research.

5.2   Data and methodology

Data

The dataset used in this study is the Longitudinal Administrative Databank (LAD). The LAD is described in the appendix. Two characteristics set the LAD apart from Canadian household data set. The first is the number of available years of the longitudinal observations. About one third of observations are in the sample for the whole 1982 to 2004 period. The second significant feature of the LAD is the size of the sample. In 2003, the LAD consisted of over 4 million observations, or 20% of the Canadian population. The LAD includes income from all sources, an advantage of this administrative data set over survey data. Of note for farming (and other business income) is the fact that depreciation is included as an expense in deriving net income.

Unit of Observations

The unit of observation is the farm family.[12] Farm families are those families in which at least one member reports GFI greater than zero in their income tax return.[13] A limitation of

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[11] The level of income inequality varies among various groups of Canadian farm families. Comparing farms by AAFC farm typology (see above), small and very small farms have the lowest level of family income inequality, while low income farms has the greatest degree of inequality (Mitura et al., 2005). This contrasts with differences in inequality of net income of the farm business.

[12] See appendix for definitions of 'family' and 'household'.

[13] In cases in which more than one individual in the family qualifies the family as a farm, the individual with the highest GFI is selected as representative of the family; if GFI is equal it is the oldest family member reporting GFIObservations with GFI equal to NFI are excluded from the group of farm families, because they are likely faulty records. For a portion of observations, more than one family is associated with one farm. However, the large majority of farms (93%) are operated by one or more persons who live in the same household (Bollman, 2005).

the data results from the fact that families drawing income from incorporated farms are not identifiable as farm families because they report their income from the farm business as wages and dividends instead of NFI. Farm incorporation is disproportionately more frequent among larger farms and more profitable farms.[14]

The farm family observations are selected in 10-year groups or 'cohorts', whereby the key individual must show GFI in all 10 years in order for the family to be included in the cohort as a farm family. The first cohort is 1983 to 1992 and the last one 1995 to 2004, Within each cohort, the most recent year, which referred to as the 'base year', is key to the selection. The number of farm families in the sample range from 41,705 to 42,505 across the cohorts. The sample of the non-farm families in the 1995 to 2004 cohort is 4,164,365. Applying the 20% sampling rate of the LAD, the resulting number of farm families of 208,525 to 212,525 is slightly lower than that of cross-sectional data, because entrants and exciters during a cohort period are not identified as farm families.

The farm families are divided into groups based on GFI, which is used as the measure of farm size (table 5.1). The groups are adjusted for inflation using the consumer price index (CPI). The farm size is based on GFI in the 'base year'. The farm size groups are similar to those of the AAFC farm typology (see appendix for details of the AAFC typology). Between 1983 and 2003, the share of very small and micro-sized farms has increased in Canada while that of medium-sized farms has decreased. Over half of all farm families (54%) reported less than $50,000 in GFI in 2003, this compares to 37% in 1983. The share of large farms also decreased slightly from 10 to 8%, while the share of very large farms increased, from 3 to 4%.

Table 5.1   Distribution of farm families by farm size in GFI

	Farm size (2003 dollars)	Distribution (in %)				
		1983	1987	1993	1997	2003
Micro	Less than 10,000	10	11	18	17	22
Very small	10,000 to 49,999	27	28	31	31	32
Small	50,000 to 99,999	20	20	19	17	15
Medium	100,000 to 249,999	30	29	24	23	19
Large	250,000 to 499,999	10	9	7	9	8
Very large	500,000 and more	3	3	2	3	4
All		100	100	100	100	100

Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

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[14] Analysis by the author of annual Taxfiler data of unincorporated and incorporated farms indicates this relationship.

5.2.1   Indicators

LIM (Low Income Measure)

This profile uses the Low Income Measure (LIM).[15] The LIM is defined as half (50%) of median family income in Canada, adjusted for family size and composition (the LIM and two other Canadian low income indicators are described in more detail in the appendix). The use of weights for family size takes account of the fact that some costs, most particularly those related to shelter, decrease per family member as family size increases. The LIM can be calculated for market income, before-tax income and after-tax income. This study uses before-tax income, because before-tax income is common for farm income analysis in Canada. The before-tax income measure tends to create a larger number of families with income below the cut-off than the after-tax low income measures, because the 'progressive' tax system narrows the distribution of after-tax income. In 2003, the LIM (before-tax) threshold was CAN$14,650, which is also the income threshold for a individual. For a family with two adults and two children less than 16 years the threshold income was CAN$ 29,300. The median income of a family of two adults and two children in 2003 was CAN$ 75,500.[16] The median LAD income of a farm family of the same size was $64,400. The LIM has risen steadily since a decline in the mid-nineties, in real terms.

Negative NFI (Net Farming Income)

The indicator for poor farm business performance is negative NFI.[17] NFI is comprised of all farm business revenues including government program payments less all expenses of the farm business, following the rules established by Canadian income tax legislation and regulations.[18] Negative NFI has been chosen because it is a clear and very strong indicator of poor farm performance. NFI in these data is lower than in other data sources because it is reported for the calculation of income taxes and Canadian tax laws allow farm losses to be deducted from other taxable income, up to a limit.[19]

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[15] The LIM is convenient for international comparisons, because being a relative income measure it does not require adjustments for exchange rates and purchasing power parity.

[16] This actual median differs from that implied by the LIM, because the LIM is calculated from family size-adjusted income and not directly from families of this size.

[17] NFI is not profit in the economic sense, since part of it represent remuneration to operators' labour and management as well as the cost of capital invested by the farm family.

[18] Farm businesses are allowed to report income on a cash basis and use special provisions to smooth income across years.

[19] If the farm is the chief source of income, full losses from farming may be deducted from other income. If farming is not the chief source of income up to $8,750 in losses may be deducted from other income. To report any loss, the farm must have a reasonable expectation of profit. Eligible losses may also be carried backward up to three years and carried forward up to 10 years. Individuals operating a farm without reasonable expectation of profit cannot claim farm losses.

While average farm income increases with farm size, the variability of net farm income within each farm size group is similar across farm sizes when comparing farm income according to AAFC farm typology classification[20] (Mitura et al., 2005).

5.3 Annual prevalence of negative NFI and low family income

The annual prevalence of negative NFI has increased between 1983 and 2003 (table 5.2). However, this change has not been uniform across farm sizes. The prevalence of negative NFI has increased most among small and medium-sized farms, from 24 to 36% and from 14 to 22%, respectively. Among large and very large farms the share has declined, except from 1997 to 2003. One factor for this increase in 2003 might be the impact on beef farms of the occurrence of Bovine Spongiform Encephalopathy (BSE) in Canada, which resulted in an almost complete loss of the international export market for Canadian cattle and calves in 2003.

Table 5.2   Prevalence of negative NFI and low family income by farm size

	Negative NFI (in %)					Low family income (in %)				
	1983	1987	1993	1997	2003	1983	1987	1993	1997	2003
Micro	78	74	69	66	69	16	18	12	11	13
Very small	50	48	48	48	52	27	24	16	15	15
Small	24	23	27	30	36	30	26	19	19	19
Medium	14	12	15	16	22	26	23	16	17	16
Large	12	9	10	11	16	24	21	13	14	14
Very large	17	11	11	11	17	24	20	11	12	17
All	32	31	36	36	44	26	23	16	15	15

Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

The annual prevalence of low income among farm families has declined from 26% in 1993 to 15% in 2003. Therefore, low farm family income does not follow the trend of negative net farming income. Across farm sizes, the prevalence of low family income varies only slightly and without trend. However overall, the trend is strictly downward, for all farm sizes, except for the change for larger farms from 1997 to 2003, possibly partly due to BSE.

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[20] See appendix for details of the AAFC farm typology. The exception is the group of retirement farms (likely mostly due to the methodology). Also, the degree of NFI inequality varies among farm types. Beef and grain and oilseed farms exhibited more income variability than the other farms types, especially than dairy farms.

5.4   Persitence of negative nfi and low family income

Consecutive years of negative NFI and low family income

One measure of persistence is the share of farm families with consecutive years of negative farm income previous to the base year. Table 5.3 shows the share of farm families who experienced negative NFI and low family income in 2003, and also in consecutive previous years. Of the 44% of farm families who reported negative NFI in 2003, 71% had negative NFI also in 2002. Almost one third of all farm families (29%) reported 10 consecutive years of negative NFI. This contrasts with the persistence of low family income. In addition to the much lower prevalence in 2003, 15% compared to 44%, the persistence was also lower. Of the families with low family income in 2003, 58% had been in the same financial position in 2002 and 12% had experienced low family income in all ten years.

Table 5.3   Persistence of negative NFI and low family income families by number of consecutive years, 1995-2003

	Negative NFI (in %)	Low family income (in %)
Prevalence in 2003 (in %)	*44*	*15*
2003	100	100
2002	71	58
2001	56	41
2000	49	30
1999	43	24
1998	39	20
1997	35	16
1996	32	14
1995	29	12

Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

A comparison of the trend of persistence over time shows that among the increasing number of farms with negative NFI income, there has been little change in the persistence over consecutive years, when comparing the periods 1993 to 1984, 1988 to 1997 and 1997-2003. By contrast, the persistence of low family income has decreased significantly for any number of consecutive years, in addition to the decline in the persistence of low family income.

5.4.1   Number of years of negative NFI/low family income during ten year periods

Next the requirement for consecutive years of negative NFI or low family income is relaxed. Instead, the number of years during a ten-year period is observed. For the purpose of this paper, five or more years of negative NFI or low family income out of ten years is considered 'chronic'.

Table 5.4   Persistence of negative NFI and low family income between 1994 and 2003, by farm size a)

	Negative NFI (in %)				Low family income (in %)			
	0 years	1 or 2 years	3 or 4 years (chronic)	5 to 10 years	0 years	1 or 2 years	3 to 4 years (chronic)	5 to 10 years
Micro	10	13	11	66	67	15	7	11
Very small	19	18	13	49	60	17	9	14
Small	32	24	13	31	52	19	12	18
Medium	48	24	11	18	50	22	12	16
Large	56	24	9	11	50	22	13	15
Very large	53	25	10	11	46	23	15	16
All	29	20	12	40	57	19	10	15

a) Percentages does not sum to 100% due to rounding error.
Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

Almost 30% of farm families did not report negative NFI in any of the ten years between 1994 and 2003 (table 5.4). However, another 40% reported for five or more years negative NFI, e.g. they experienced chronic negative NFI. At the same time, a majority of farm families experienced no year of low family income, while 15% of farm families lived in chronic low family income. Across farm sizes, negative NFI appears to be inversely related to farm size. The differences in the persistence of negative NFI are much more pronounced that those of low family income. Between 1994 and 2003, 66% of micro farms and almost half of very small farms had chronic negative NFI. This compares to 11% of families with chronic negative NFI among large and very large farms. During the same period, the share of families with chronic low family income was lower among micro and very small farms than among large and very large farms, 11 and 14% compared to 15 and 16%. It should be noted that a majority of families with large and very large farms experienced no year of negative NFI. This occurred even though one or two years of negative NFI could be years of farm business start-up or years of large investments. However, Similarly, almost a quarter (23%) of families with micro farms and a more than a third (37%) of families with very small farms reported at most one or two years of negative NFI.

The incidence of chronic negative NFI has increased from 35 to 40%, comparing the 1984 to 1993 cohort with the 1994 to 2003 cohort (table 5.5). This trend is determined by the increasing share of farms with chronic negative NFI among the small and medium-sized farms, 26 to 31% and 14 to 18% respectively, and by the increasing number of micro and very small farms among all farms, which have the highest share of NFI. There was no obvious change in the persistence of chronic negative NFI among large and very large farms, ranging from 9 to 11% of families. At the same time as the share of chronic negative NFI has increased for all farm sizes except the very large farms. The share of families with chronic low family income has declined from 21 to 15%. The share of farms with any year of low family income out of the 10-year period that defines each cohort has decreased from 54 to 43%.

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Table 5.5   *Share of farms with chronic negative NFI and chronic low family income by farm size for different 10 year cohorts*

	Chronic negative NFI			Chronic low family income		
	1984 to 1993	1989 to 1998	1994 to 2003	1984 to 1993	1989 to 1998	1994 to 2003
Micro	65	67	66	17	12	11
Very small	47	52	49	21	15	14
Small	26	31	31	25	20	18
Medium	14	16	18	23	20	16
Large	8	11	11	19	16	15
Very large	11	9	11	17	14	16
All	35	38	40	17	12	11

Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

In summary, comparing the persistence of negative NFI and low family income to their annual prevalence, we observe the following. The significant increase in the annual prevalence of negative NFI is caused by the increase in the share of smaller operations among Canadian farms combined with an increase in the annual prevalence of negative NFI among smaller and medium-sized farms. At the same time, there has been only a small increase in the persistence of negative NFI among smaller farms and no increase among larger farms. Low family income has decreased both in terms of annual prevalence and persistence. This trend has occurred for all farm sizes. Nonetheless, there remains a share of farm families which experience chronic low income.

5.5   Chronic low family income

This section focuses on those farm families who experienced 'chronic' low family income, i.e. five or more years of low family income between 1995 and 2004. Any reference to 'low income' or 'low family income' from hereon should be read to mean 'chronic low family income'. Of all farm families who farmed between 1995 and 2004, 15% had chronic low family income compared to 12% of non-farm families. This percentage among farm families is slightly higher than that for the 1994 to 2003 cohort.

5.5.1   Farm size

The distribution of families with chronic low income does not vary significantly across farm sizes (table 5.6). The prevalence of chronic low income is slightly lower among the smallest size, 13% compared to between 15 and 18% for the other farm size groups. The overall impact is that farm families with chronic low family income have a slightly lower share of chronic negative NFI, 39% compared to 42%. The relationship between chronic low income and chronic negative net income varies across farm sizes. Among larger farms, the share of families with many years of negative NFI is higher for the chronic low income

group. For instance, among very large farms, 17% (3% divided by 18%) of families with chronic low income also had chronic negative NFI, compared to 11% (9% divided by 82%) among other families in that farm size group. And among micro to medium-sized farms no difference is observed. In the group of micro and very small farms half of all families had chronic negative NFI but not chronic low income.

Table 5.6   Distribution of farm families by farm size and years of negative NFI, 1995-2004 a)

Years of negative NFI	Farm size	Chronic low income farm families (in %)				Other farm families (in %)				All
		0	1 to 4	5 and more	all	0	1 to 4	5 and more	all	
Micro & very small	Less than $50,000	2	4	7	13	13	24	50	87	100
Small & medium	$50,000 to $250,000	6	7	4	17	33	29	21	83	100
Large	$250,000 to $500,000	6	6	3	15	48	28	9	85	100
Very large	$500,000 and over	7	8	3	18	44	29	9	82	100
All		4	6	6	15	24	26	36	86	100

a) Percentages does not sum to 100% due to rounding error.
Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

5.5.2   Median income and income sources

Median income in 2004 of farm families with chronic low income was slightly higher than that of non-farm families.[21] In 2004, median income of chronic low income farm families was $22,500 compared to $15,300 for non-farm families, due to fewer single person families among farm families. Median income for other families was slightly lower for farm families than non-farm families, $56,000 compared to $58,900.

Between chronic low income farm families and other farm families, there is little difference in the relative contribution of earned income to total family income[22] (table 5.7). Combining NFI with other earned income, the shares are 66 and 64%, respectively. Other farm families have on average a greater share of non-farm earned income. This supports the notion that, on average, increased non-farm income is related to reduced poverty among farm families. In addition, the share of pension, rental and investment income is significantly smaller among low income farm families, 12% compared to 28%. A possible reason is the share of older people with sufficient income who farm mostly on a small scale (see below). Not surprisingly, the share of government transfers is larger for chronic low income farm families than other farm families, 18% compared to 4%.[23] Among farm

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[21] The non-farm population includes families that did not farm for the full ten years and families operating incorporated farms.
[22] This is the average of the 2004 income sources of all families in the group.
[23] Agricultural program payments are included in NFI.

families, there are generally no significant differences of average income composition across farm size groups or years of negative NFI, except for a significantly largest share of pension and investment income in the smallest farm size group due the much greater share of older families in that farm size group.

Table 5.7   Average contribution to total family income by income source, 1995-2004 a)

	NFI	Other income earned	Pension	Rental	Investment	Government transfers	Other
Farm families							
Chronic low income	42	24	7	1	4	18	5
Other	31	33	18	1	9	4	5
Non-farm families							
Chronic Low income	0	34	12	1	2	48	4
Other	0	68	17	1	3	9	2

a) Percentages does not add to 100% due to rounding.
Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

Comparing farm families to non-farm families, the average contribution of earned income (including NFI) represents on average 64 and 68%, respectively. However, there is a striking difference among chronic low income families between farm families and non-farm families in the contribution of government transfers to family income. The shares are 18 and 48%, respectively.

5.5.3   Family size and age

(In the sample, the share of young families is much smaller among farm families than non-farm families. The difference is due to the selection criteria that requires a family to have had GFI in all years since 1995 to be classified a farm family, grouping recent farm entrants with the non-farm families.)

Among chronic low income farm families there is a greater share of single person families and of large families than among other farm families, 18% compared to 10%, and 11% compared to 4%, respectively (table 5.8). The difference is similar among non-farm families. A significantly smaller share of older families is found among chronic low income farm families compared to other farm families, 29% compared to 41%. This is not observed among non-farm families. Also, the increased share of young families is found among chronic low income farm families than other farm families. This is similar for non-farm families.

Table 5.8   Distribution of farm families and non-farm families by family size and by age, 1995-2004 a)

	Family size (in %)				Age (in %)		
	single	2 adults	2 to 5 persons	more than 5 persons	less than 35 yrs	35 to 60 yrs	over 60 yrs
Farm families							
All	11	40	44	5	3	58	39
Chronic Low income	18	26	45	11	4	67	29
Other	10	42	44	4	3	57	41
Non-farm families							
All	23	28	47	2	28	50	22
Chronic Low income	37	13	45	5	25	53	22
Other	21	30	48	2	29	49	22

*) Percentages does not add to 100% due to rounding.
Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

5.5.4   Degree of Metropolitan Influence

A Canada a significant share of farm families live in close proximity to urban centres. Statistics Canada has developed a methodology to classify municipalities as urban areas, called *Census Metropolitan Areas* (CMA) and *Census Agglomerations* (CA), and the remaining rural areas as *Metropolitan Influenced Zones (MIZ)* according to the degree to which they are nonetheless influenced by CMAs or CAs. The classification of MIZ is based on commuter flows (see Appendix for details). In Canada, one quarter of farm families live in CMAs/CAs. This compares to 81% of non-farm families (table 5.9).

Table 5.9   Distribution of farm families and non-farm families by degree of metropolitan influence, 1995-2004 (in %) a)

	CA/MA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	All
Farm families						
All	28	16	25	23	9	100
Chronic Low income	17	16	30	26	11	100
Other	30	16	24	22	9	100
Non-farm families						
All	81	5	7	6	1	100
Chronic Low income	77	4	9	8	2	100
Other	81	5	7	6	1	100

a) Percentages does not add to 100% due to rounding.
Source: Statistics Canada, Longitudinal Administrative Databank (LAD).

Chronic low income farm families are more likely to live outside of CMAs/CAs. 83% of chronic low income farm families live outside of CMAs/CAs compared to 70% of other farm families. Median income for chronic low income families tends to be similar across regions while median income for other families decreases with decreasing influence of metropolitan centers. This holds true for farm and non-farm families.

5.6   Summary

This longitudinal analysis of negative NFI and low family income indicates that a relatively small share of farm families had chronic low family income, i.e. low income five or more years out of ten. Chronic low family income is largely independent of farm size. Since 1983, the persistence of low family income has declined. At the same time, the persistence of negative NFI has increased. Negative NFI is more persistent among families with smaller farms. Nonetheless, a significant share of small farms are consistently profitable and a small share of large farms are consistently unprofitable. The implication is that NFI is not a good indicator of the economic well-being of farm families, neither for any given year nor for longer periods. Those families which do experience chronic low family income differ from other farm families in that they tend to be single person families or large families and tend to live outside of areas adjacent to metropolitan centers. The differences between chronic low income and other farm families generally mirror those among non-farm families, apart from a smaller share of old families among chronic low income farm families. Also, chronic low income farm families receive on average a smaller percentage of their income from social program payments compared to non-farm families. The result suggests that net farming income may not be an appropriate indicator of the financial well-being of farm families over the longer term.

This is a first exploration of the LAD for the analysis of low income among farm families. Given the size of the data set and the number of years for which data is available, further research is feasible into the dynamics of family income and the socio-economic family characteristics affecting farm family income in comparison to rural and urban families.

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5.8   Appendix

5.8.1   LAD (Longitudinal Administrative Databank)

(The description is based largely on the *LAD Dictionary* (SAADD, Statistics Canada))

The LAD is a longitudinal 20% is a subset of the T1 Family File (T1FF) is a yearly cross-sectional file of all tax filers and their families. The T1FF includes 100% of individuals who filed an individual tax return (T1) or were Canada Child Tax Benefit (CCTB) recipients. From these records are determined non-filing spouses, partners and children. When complete, the sample is approximately 96% of the population and is left unweighted, unadjusted (see Statistics Canada *Annual Estimates for Census Families and Individuals (T1 Family File)*). The LAD begins with the year 1982 and observations remain included in the data set for every year they file income tax returns. Thirty-two percent of observations are included in every year since 1982. The remaining observations are roughly evenly distributed by the number of years that they are included. To aggregate the data from individual tax filers to the taxfiler's family, the LAD uses the 'census family' definition to identify who is a member of the taxfiler's family. Single taxfilers constitute also a family aggregate.

Definition of families and households

The 'census family' is defined as a married or common-law couple and the children, if any, of either or both spouses; or, a lone parent of any marital status with at least one child living in the same dwelling and that child or those children. Children are included as long as they live in the dwelling and do not have their own spouse or child living in the dwelling. The 'census family' is defined narrower than the 'economic family', which also includes also other family members such as nieces and nephews. A 'household' is broader than a family because it is defined as a person or group of persons who occupy the same dwelling. A household may consist of one or more families or a group of unrelated persons.

5.8.2   Low Income Measures in use in Canada

(The descriptions are based largely on Giles (2004) and Statistics Canada (2006a))

All three of the measures described below use income to define low income families. The reason is mainly data availability. Alternative approaches could be those based on expenditures, assets or even demographic characteristics such as age and family status (Giles, 2004). The importance of the methodology is illustrated with the different shares of low income families in among all Canada families.

LIM

The LIM is defined as half (50%) of median adjusted family income, where 'adjusted' indicates that family income is weighted for family size and composition. The rationale for this adjustment is the fact that some costs, most particularly those related to shelter, decrease per family member as family size increases. The LIM is not adjusted for regional difference.

     To calculate the LIM, the 'adjusted size' of each family is determined first. The LIM scale is very similar to the square root of family size, but also take the age of family members into account. The first person is counted as 1.0 and the second person is counted as 0.4, regardless of age. Additional adults count as 0.4 and additional children count as 0.3 (where a child is defined as being under age 16). Next, 'adjusted family income' is calculated for each family by dividing family income by their 'adjusted family size'. Then the median of the national 'adjusted family income' is calculated. Fifty percent of this median is the LIM. It is also the LIM threshold for a family of one person. The LIM thresholds for of family of other size are equal to this value multiplied by their 'adjusted family size'.

     The LIM can be calculated for market income, before-tax income and after-tax income. All government social transfers to individuals are included in before-tax income. The before-tax income measure tends to create a larger number of families with income below the cut-off than the after-tax low income measures, because the 'progressive' tax system narrows the distribution of after-tax income. Also, year-to-year instability of

earnings is to a significant degree offset through the tax and transfer system, especially among low income families (Morisette and Ostrovsky, 2005).

LICO

In addition to the LIM, Statistics Canada publishes the LICO (low income cut-off). The LICO are by far Statistics Canada's most established and widely recognized approach to estimating low-income in Canada. The LICO is an estimate of the income threshold at which families are expected to spend 20 percentage points more than the average family of their size and in their type of area of residence on food, shelter and clothing. The LICO takes into account regional differences in incomes and prices (e.g. rural/urban). Statistics Canada constructs LICO cut-offs for seven family sizes and five different types of area of residence for a total of 35 family groups.

Market basket measure (MBM)

Human Resources Development Canada collaborated with the provincial and territorial ministries of social services to develop a 'market basket measure' (MBM). The approach is to cost out a basket of necessary goods and services including food, shelter, clothing and transportation, and a multiplier to cover other essentials for a standard of living between subsistence and social inclusion, i.e. covering the cost of resources necessary to take part in the life of the community. This basket was determined for a family of two adults and two children. It the price of the basket is established for 48 different areas of residence across Canada. The results would define levels of income needed to cover the cost of the basket. The MBM is available for 2000.

5.8.3 Influence of metropolitan areas - Census Metropolitan Area and Census Agglomeration Influenced Zones (MIZ)

Statistics Canada has developed a methodology called *Census Metropolitan Area and Census Agglomeration Influenced Zones (MIZ)* to classify municipalities outside of metropolitan areas (CMAs and CAs). The classification is based on the degree to which an area is nonetheless influenced by CMAs or CAs. Specifically, the methodology of MIZ is based on the degree of influence of any metropolitan centre is based on commuter flows. This is in contrast to the urban/rural dichotomy, being defined largely by on population density and population threshold. The concept provides a more detailed geographic classification system for the large portion of Canada that lies outside of metropolitan areas, comprising 22% of Canada's population and 96% of the land area (Rambeau and Todd, 2000).

Table5.10   *Census Metropolitan Area and Census Agglomeration Influenced Zones*

Acronym	Name	Definition
CMA/CA	census metropolitan area (CMA) or a census agglomeration (CA)	CMA/CA is an area consisting of one or more adjacent municipalities situated around a major urban core. To form a CMA, the urban core must have a population of at least 100,000. To form a CA, the urban core must have a population of at least 10,000.
MIZ	Census Metropolitan Area and Census Agglomeration Influenced Zones	Category assigned to a municipality not included in a CMA or CA
Strong MIZ		more than 30% of the municipality's residents commute to work in any CMA or CA
Moderate MIZ		from 5 to 30% of the municipality's residents commute to work in any CMA or CA
Weak MIZ		from 0 to 5% of the municipality's residents commute to work in any CMA or CA
No MIZ		fewer than 40 or none of the municipality's residents commute to work in any CMA or CA

Source: Rambeau and Todd (2000).

5.8.4   AAFC Farm typology

The farm typology classification system was developed by Agriculture and Agri-Food Canada (AAFC) in 1998 in order to understand better the diversity of Canada's farm sector.

Table 5.11   *AAFC Typology*

Order	NAME	Definition
	Non-Business focused farms:	
(1)	Retirement	The oldest operator is 60 years of age or older and receives pension income; and no children are involved in the day-to-day operation of the farm
(2)	Lifestyle	Gross revenues of $10,000 to $49,999 and with total family off-farm income of $50,000 or more
(3)	Low income	Farms with revenues of $10,000 to $99,999 and with total family income less than $35,000
	Business focused farms:	
(4)	Very small	$ 10,000 to $49,999
(5)	Small	$ 50,000 to $99,999
(6)	Medium-sized	$100,000 to $249,999
(7)	Large	$ 250,000 to $499,999
(8)	Very large	$ 500,000 and over

Source: Mitura et al. (2005).

Farms are categorized into distinct groups using factors such as age of the operator, financial situation and farm size. The farm typology is an important part of policy development, because the needs of farms and farm households vary systematically according to these characteristics. Farms are selected and classified in the order listed below (table 5.11).

6. Income stability in Dutch agriculture: analysing volatility of farm incomes with FADN data

Dr. Hans C.J. Vrolijk [24]

Overview

- Objective
- Approach to the problem
- Pig farming in the Netherlands
- Factors affecting fluctuations in incomes
- Results
- Conclusions

Objective

to illustrate the usefulness of FADN data

in analyzing volatility of farm incomes

and persistence of low incomes in agriculture

- Development of farm incomes
- What are the underlying differences between farms
- Fluctuations at farm level

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[24] Agricultural Economics Research Institute (LEI).

Approach to the problem

- Dutch FADN data

- Data from1990 – 2003

- Specialized specialized pig farms
  - pig farms: 403 farms and 1632 observations

- Income indicator - family farm income
  - Income from normal agricultural activities

PIG BREEDING AND FATTENING

10,000 farms with pigs
11 million pigs (16 million before)
More specialised
Regional concentration

Specialised breeding farms: 1,600
Specialised fattening pig farms: 1,300
Integrated pig farms: 1,100

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Pig farming

Veevoederfabrieken
Arbeidsplaatsen
- 14 - 49
- 50 - 99
- 100 - 199
- 200 - 499
- 500 - 523

Varkensslachterijen
Capaciteit
- 100 - 500.000
- 500 - 750.000
- 750.000 - 1.000.000
- > 1.000.000

Varkenshouderij
NGE/km2
- 0 - 10
- 11 - 20
- 21 - 50
- 51 - 100
- >100
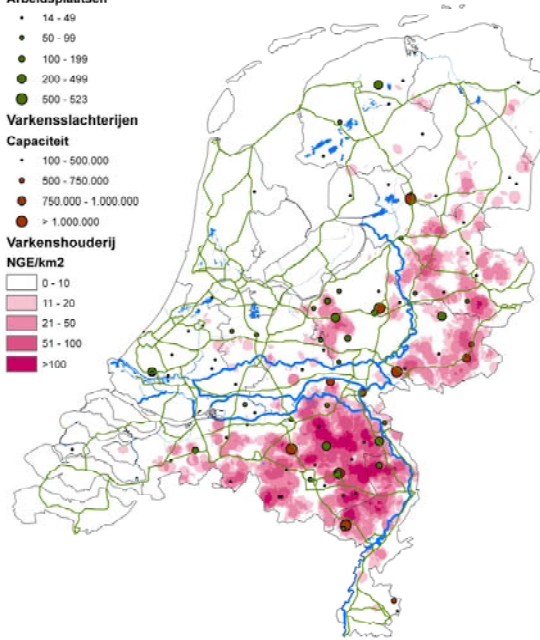
Factors affecting farm income fluctuations

- **Productivity gains**
  - Higher level of yields per ha, animal as well as labor unit

- **Yields**
  - Climatic conditions, animal diseases, crop diseases etc.

- **Prices of outputs**
  - Pig price cycle

- **Prices of inputs**
  - Impact strongly depending on sector

Output prices (pigs)

Evolution of farm incomes

Large differences between farms (pigs)
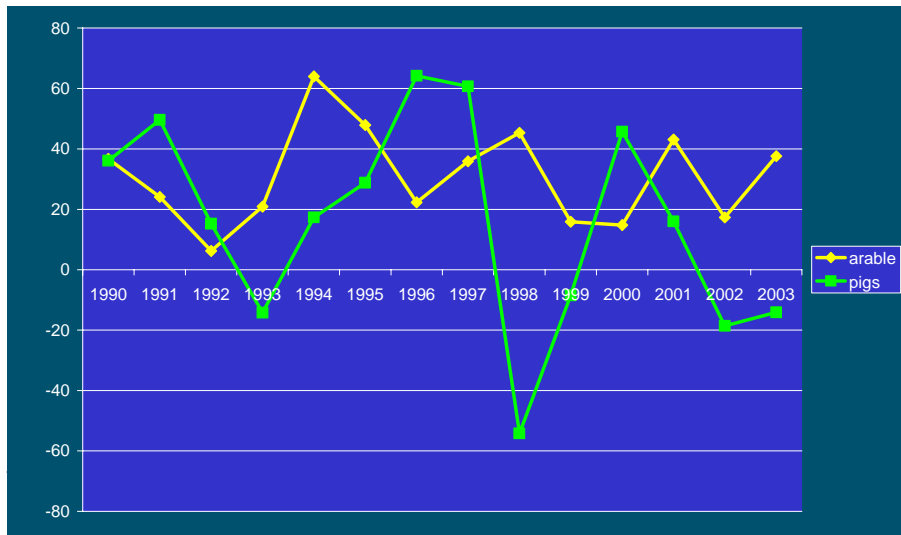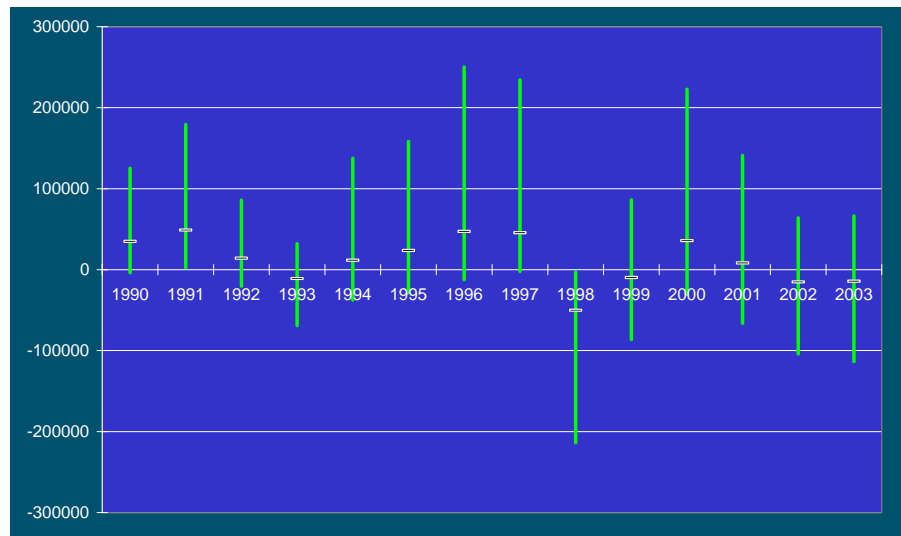

Volatility at farm level

- Do farmers move up and down collectively according to the trend?

- Average yearly change of pig farms 60 kEuro.

- Correlation with size of farm (pig 0.72)

- Fluctuations at farm level significant higher than at sectoral level

Stability of farm income distribution (pigs)

			Year t Lowest quintile				Highest quintile
			1	2	3	4	5
Year t-1	Lowest quintile	1	**46.9**	19.4	7.7	15.8	10.2
		2	22.3	**38.5**	20.7	10.6	7.8
		3	7.2	25.6	**45.9**	12.2	9.1
		4	9.1	12.6	22.2	**37.9**	18.2
	Highest quintile	5	10.5	6.7	10.0	21.8	**51.0**

■ 46.9 % of farms in lowest quintile are still in lowest quintile in the next year, e.g. 44.1 improve relative position

■ 51.0 % of farms stay in best performing quintile

Persistence of low income group (pigs)

		Maximum quintile				
		1	2	3	4	5
Minimal quintile	1	0.78	4.69	9.77	14.06	18.75
	2		0.39	16.41	5.08	11.33
	3			1.56	3.91	8.98
	4				0.39	5.08
	5					2.34

■ 0.78% belong to the lowest income group in all periods

■ 2.34% belong to best performing farms in all periods

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Summary and conclusions

- Several factors affect incomes in agriculture

- Market response increases fluctuations

- Strong fluctuations in average and median incomes; averages 'hide' fluctuations at farm level

- Large changes in farm income and relative income position at farm level

- FADN extremely useful data source in analyzing incomes

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7. Short-term savings of farm households: what do we know?

Ashok K. Mishra [25] and Hung-Hao Chang

Background

- **Why Study Farm Savings**
  - Saving and investment are important components of the risk management puzzle.
  - Contributes to analysis of alternative farm safety net proposals and future relevance and structure of federal farm programs.
  - Examine the effectiveness of retirement planning by farm business owners.
  - Estimates the agricultural impact of proposed changes in tax laws (estate taxes, capital gains, etc.).

Background

- Newbery and Stiglitz point out
  - Savings is one of the ways farmers can mitigate risk and uncertainty associated with farm income.

- **Why Households Save**
  - **Precautionary Motives**
    - Uncertainty in current and future income (Carroll, Skinner, Sandmo).
      » This is very true for farm households
    - Health reasons (Kotlikoff)
      » Interruptions in income due to illness or accidents
      » medical expenses

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[25] Economic Research Service, USDA.

Background

- **Bequest Motives**
  - Pass farm on to children.
  - Retirement place/investment.
  - Money for education for children and grandchildren.

- **Retirement/Old Age**
  - This motive has been studied by Skinner and many other economists for the general population
  - Spence and Mapp, Hamaker and Patrick (Selected farmers in Indiana).

Objective

- Analyze the effect of U.S. farm, operator, household, and other demographic characteristics on the farm household's decision to save.
  - First, identify who saves?
  - Second, estimate how much is saved?
    - data at the farm-level nationwide
    - savings (amount saved), a stock measure, is the amount of money in saving accounts. It is not net worth.
    - uses a larger sample than previously reported
    - comprising farms of different economic sizes and regions of the United States.

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Previous work

- Concentrated on general population and retired Americans.
- Little research on self-employed, especially farm households in the US.
- Klein, Fisher, and Liviatan found that self-employed saved more than households in the professional and service classes.
- All of these studies have used panel or cross-sectional data.

Previous work

- Farm families hold both farm and nonfarm assets.
- Farm families hold fixed and liquid assets
- Off-farm assets comprised of savings, retirement accounts, stocks, bonds, and other investments.
  - Off-farm assets comprised 31 percent ($198,219) of total farm household assets.

Model

- **Farm household maximizes its life-time utility subject to budget and production constraints.**
- Factors influencing savings fall into three major categories:
  - *Socioeconomic and demographic characteristics*
    - Age, education, and size of household
  - *Financial Characteristics*
    - Assets or wealth, loans/debt, disposable income (Friedman, Noda, Paxson, and Wolpin)
  - *Regional Characteristics*
    - Location of farms, specialization (grains, livestock)

Estimation Procedure

- Double-Hurdle model technique.
- Double-Hurdle model assumes that farm households make two decisions in an effort to maximize their utility.
  - whether or not to save *(participation decision)*

$$y_{i1}^* = w_i'\alpha + v_i$$

  - how much to save *(saving decision)*

$$y_{i2}^* = x_i'\beta + \mu_i$$

Data

– 2003 Agricultural Resource Management Survey (ARMS).

– As a special research initiative on savings and investment of farm households, the 2003 ARMS queried farm households on their saving and investment behavior.

– ARMS is a national farm-level data survey of approximately 20,000 farm households.

Data

- **Farmers were queried:**
  - Does your household save on a regular basis? (e.g. out of farm sales or paycheck for off-farm work).
  - Thereafter farmers were asked about monies in various savings accounts for farm households.
- **Savings accounts include:**
  - Cash, checking, savings and money market accounts
  - Certificates of deposits, savings bonds, and government securities
- **Determinants to save (participation) and savings level are assumed to be the same (following Blaylock and Blisard)**.

Descriptive Data

- 55 percent of farm households report saving on regular basis.
- Average household savings was $40,231(stock)
- Average age is 56 years (farm operator) and 53 years for spouses.
- Average family size was 3.0.
- About 78% of farms were full-owned and more than half of farm operators worked part-time off the farm.
- However, only 27% of spouses worked full-time off the farm.
- About 44 percent of the farms were located in the South and 37 percent in the Midwest.

Results

- Double-Hurdle estimates indicate that some independent variables have significantly different impacts on the participation decision and amount of savings.

- *Decision to save.*
  - Family size, level of education of operator and spouse, and full-ownership of the farm have a positive impact on savings.
  - Non-farm net worth has a positive impact on the decision to save.

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Results

- *Decision to save (cont.).*
- Off-farm work by operator and spouse have an impact on decision to save.
  - Households with spouses working full-time off the farm are less likely to save
  - Operators and spouses working part-time off the farm are also less likely to save.
    - In most cases where operator and spouses work off the farm, most of the savings is done through tax-deferred retirement savings accounts (TDRAs), or 401K savings. Could be fringe benefit associated with off-farm work.
    - Investment in TDRAs decreases taxable income and provides a source of income in retirement.
- Farm households located in the Northeast, Midwest, and South regions of the US are more likely to save compared to farms located in Western US.
- Farms families specializing in livestock are less likely to save.

Results

- *Amount saved*
  - An additional member in the household decreases amount saved by 0.05%
  - An additional year of operator education increases savings by 0.33%. Consistent with Venti and Wise and Collins and Wyckoff.
  - An additional year of schooling for spouses decreases amount saved by 0.35%
    - Perhaps these spouses have off-farm jobs that include fringe benefits, such as 401K and TDRAs that force savings and decrease taxes.
  - A 1% increase in non-farm wealth increases amount saved by 0.44%. Whereas a 1% increase in farm wealth increases amount saved by 0.11%.
  - Farm size and amount saved are negatively correlated. A 1% increase in sales decreases amount saved by 0.01%.

Results

- Operators who work less than half-time off the farm increase saving amounts by 0.04% and
  - spouses working less than half-time off the farm decrease saving amount by 0.05%
- Farm households located in the Midwest and South regions increase savings by:
  - 0.18% in the Midwest
  - 0.20% Southern region
  - compared to farms located in the Western region.
- Farms specializing in livestock and grains save less, by 0.14% and 0.04%, respectively than all other farms.

Summary and Conclusions

- Farm families, like many other families in America, save on a regular basis and have diversified portfolios.
- Decision to save—important factors are:
  - educational level of the operator and spouse,
  - family size, farm organization, non-farm wealth,
  - work pattern of operator and spouses (farm and off-farm),
  - regional location of the farm household, and commodity specialization.
- Amount saved (saving level)—important factors are:
  - educational level of the operator and spouse, family size, farm size,
  - farm and non-farm wealth,
  - part-time off-farm work by operator and spouse
  - regional location of the farm household
  - commodity specialization.

8. The FADN in the Republic of Croatia and accession to the European Union

Zaklina Jurisic [26]

CONTENT

- FADN situation
- Farm structure survey
- Planned activities

GOVERNMENT OF THE REPUBLIC OF CROATIA
NEGOTIATING TEAM FOR THE ACCESSION OF THE REPUBLIC OF CROATIA TO THE EUROPEAN UNION
CHAPTER 11 – FADN

SITUATION

- FADN not established
- Act on Agriculture – legal basis for setting up FADN
- Obligation for keeping accounts – just for companies and farmers which are VAT/income tax payers

GOVERNMENT OF THE REPUBLIC OF CROATIA
NEGOTIATING TEAM FOR THE ACCESSION OF THE REPUBLIC OF CROATIA TO THE EUROPEAN UNION
CHAPTER 11 – FADN

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[26] MAFWM, Agricultural Policy and EU Directorate.

FARM STRUCTURE SURVEY (1)

- 2003 – full coverage; "Census of agriculture"
  - questionnaire in line with Council Regulation 571/88 and related amendments
  - →Business entities (legal persons and craftsmen)
  - →Households with agricultural production
    - $>=1000$ m^2 of UAA
    - aromatic and medicinal plants or greenhouses
    - 1 head (cattle, pigs, sheep, goats, horses)
    - >10 (poultry, rabbits, bee-hives / together)

Growing availability of electronic data on farm level:

Consequences for FADN

Koen Boone

Pacioli 14, 1-4 October

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Some headlines from the newspapers

- 11 Nov. 2005: Alfa accountants present financial results for farms with rabbits
- 4 May 2006: Hendrix UTD (producer of feed) presents results of farms with milk goats with split of 20% best performing farms
- March 2006: Agrovision (producer of Management support systems) presents results of pig farms in 2005 (based on 900 farms)

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Content

- Trends in data availability

- Other databases with micro data of farms

- Standardisation

- Consequences for FADN

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Trends

- A growing need for data of the farm
  - For management farm
  - Partners in the food production chain
    - Food safety
    - Quality management
    - Labels (organic, animal welfare)
    - Production planning
  - Government (environment, diseases, cross compliance, permits)
- Growing availability of data in electronic format

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Trends

- Growing (technological) possibilities to exchange data
  - Internet
  - XML (format free data exchange)
  - XBRL
  - Electronic identification
- Growing number of publications on results of groups of farms

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Electronic databases of micro data: MSS

- Increasing number of farms have MSS (especially in some farm types)
- Some MSS producer are close to monopoly for particular farm types
- Nearly all have possibility for uploading data via internet for benchmarking
- Data are included in databases and used for analysis on large group of farms
- E-mail with advice for using specific pesticide because of weather forecast in combination with outbreak of disease in the neighbourhood

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9. Growing availability of electronic data on farm level: consequences for FADN

Koen Boone [27]

Some headlines from the newspapers

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Content

- Trends in data availability
- Other databases with micro data of farms
- Standardisation
- Consequences for FADN

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[27] LEI, Agricultural Economics Research Institute, The Hague.

Trends

- A growing need for data of the farm
  - For management farm
  - Partners in the food production chain
    - Food safety
    - Quality management
    - Labels (organic, animal welfare)
    - Production planning
  - Government (environment, diseases, cross compliance, permits)
- Growing availability of data in electronic format

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Trends

- Growing (technological) possibilities to exchange data
  - Internet
  - XML (format free data exchange)
  - XBRL
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Electronic databases of micro data: MSS

- Increasing number of farms have MSS (especially in some farm types)
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Management support systems

- MSS is filled with data that is already available in electronic format (bank, process (like feed and climate) computers, Identification and registration of animals)
- MSS coupled with accounting software
- MSS can be used to fulfil administrative demands from government, certification organisations and buyers
- Database of all farms can be used by processing industry for
  - planning of products that will be delivered to factory
  - Quality management, food safety, certification

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Accounting offices

- Growing data assembling in electronic format and therefore cheap to assemble extra data
- Assemble more than financial data
  - Management reports
  - Fill forms for government, buyers etc.
- Looking for ways to add value (instead of price competition on administrative work)
  - Advice
  - Benchmarking
- Internetbookkeeping (real time data, most data entry done by farmer)

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Suppliers and buyers

- Have already a lot data available of products bought or delivered
- Deliver MSS for free if data is uploaded
  - Way to get feedback of performance products (feed industry)
  - Assemble data of production process (use of pesticides)
  - Way to improve performance of farmers

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Government

- Census/survey
- Data about subsidies/permits/penalties
- Identification and registration of animals
- Certification organisations (organic farming)
- Environmental data
  - manure balance
  - use of pesticides

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Group of farms

- Study groups (benchmarking)
- Farmers that sell their products together
- Groups of farmers that
  - sell products at home
  - offer recreation/tourism facilities
  - Multi-marketing
- Website with hundreds of farmers

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Standardisation of data

- XML, XBXML
  - Danish government accepts only receipt in electronic format (18 million per year)
- XBRL
  - Data delivery for Chamber of Commerce, Central Statistical Office and tax authority
- EDI-circle
  - Co-operation of 5 accounting offices, 5 feed producers, IT company and LEI
  - Fixed format for receipts of feed producers
  - Included in database with access of farmer, accounting office, LEI and …. others

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Consequences for FADN

- Consequences for users of Micro-economic data (for example researchers)
  - More data available (total number of farms instead of sample)
  - Up to date data and of better quality
  - Use of FADN next to other data sources
  - New possibilities for targeted (time, type of farmer) knowledge transfer
- Consequences for FADN managers

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Consequences for FADN managers (1)

- More data assembling by coupling databases (lower costs, better quality and timeliness)
  - Involvement in standardisation issues and coupling of databases
  - Scanning of data that is available in electronic format
  - Co-operation with other data owners
    - Accounting offices
    - MSS producers
    - Government/tax authority
    - Suppliers/buyers of agricultural products

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Consequences for FADN managers (2)

- More competition
  - Coupling of data
  - Representativity
  - Quality
  - Timeliness
  - Contacts with farmers (reputation)
  - Independent/privacy
- Other ways to convince farmers to participate
  - Benchmark report is not unique anymore

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Consequences for FADN managers (3)

- Multiple use of FADN data
  - Accountants
  - Government (forms for subsidies, permits, regulation)
  - Banks
  - Advisors
  - Management of farm (tools)
  - Suppliers/buyers
  - Certification organisations

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Data managers?

- Assemble all kind of data on farms
- Give compensation and/or administrative services to farmers
- Integrate data into one database
- Work on commercial base
- Data available for everybody who pays

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Summary

Growing availability of Micro data will have large consequences for FADN managers and users of farm data

Unsure:

When?

How?

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10. TAPAS 2004: Improvement of FADN concerning rural development

Fredrik von Unge [28]

Objectives of the project

Statistics Sweden
Statistiska centralbyrån

- To review the importance of complementary activities, and to study these activities in FADN

- To find methods to improve quality of FADN data regarding complementary activities

- To find methods for calculating the income of the households connected to FADN farms

2

Data sources 1(2)

Statistics Sweden
Statistiska centralbyrån

- JEU (Swedish FADN)
  - EU Farm Return
  - JEU data for national purposes, mainly about forestry and entrepreneurial activities.

- Additional data collected within the study
  - Farmers in JEU 2003 that had indicated *contractual work* and / or *other agricultural activities* were asked to specify those activities

3

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[28] Statistics Sweden.

Data sources 2(2)

- Rural development part of FSS 2003
  - other gainful activities directly related to the holding

- Income and Taxation register (IoT)
  - Income from employment
  - Income from business
  - Income from capital
  - Taxes
  - Pension contributions
  - Social security charges

Statistics Sweden

Statistiska centralbyrån

4

Merging registers by civic registration number

Statistics Sweden

Statistiska centralbyrån

JEU/FADN

Name	Id nr	Category
Karl Karlsson	19650803	Main holder
Carla Karlsson	N/A	Spouse of holder 1
Erik Eriksson	N/A	Holder 2

IoT

Name	Id nr	Category
Karl Karlsson	19700803	Household 1: Person 1
Carla Karlsson	19720506	Household 1: Spouse of person 1
Anna Karlsson	20010106	Household 1:Child
Erik Eriksson	19650406	Household 2:Person 2
Erika Eriksson	19641206	Household 2: Spouce of person 1

FSS and farm register

Name	Id nr	Category
Karl Karlsson	19650803	Main holder
Carla Karlsson	19720506	Holder 2
Erik Eriksson	20010106	Holder 3

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Different kinds of activities in the FADN sample

SCB

Statistics Sweden

Statistiska centralbyrån

| Agricultural activities | Contractual activities (FADN code 177 | Other activites FADN-codes 179,181,182 |

| Agricultural activities included in FADN | Forestry | Other activities excluded from the holding |

Total activities In FADN-farms
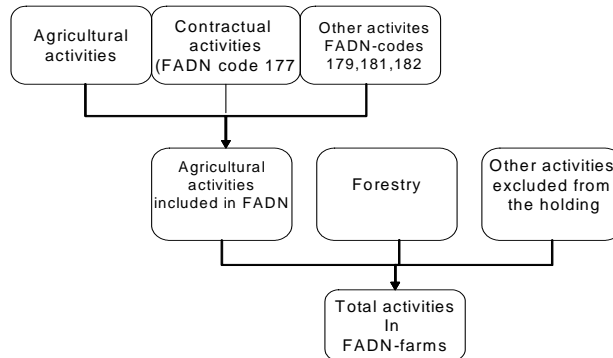
6

Complementary activities in JEU Receipts and costs

SCB

Statistics Sweden

Statistiska centralbyrån

| **Agricultural activities SEK** Receipts: 1 066 300 | **Contractual activities SEK** Receipts 77 400 | **Other activites SEK** Receipts 36 400 |

Agriculture SEK
Receipts	1 180 200
Costs	1 090 800
Result	89 400

Forestry SEK
Receipts	56 600
Costs	33 100
Result	23 500

Other SEK
Receipts	41 300
Costs	25 500
Result	15 700

Total SEK
Receipts	1 278 100
Costs	1 149 400
Result	128 700

7

Complementary activities in JEU Labor input

| Agricultural work
Hours 2 810 | Contractual work
Hours 100 | Other work
Hours 80 |

| Agriculture
Hours 3 000 | Forestry
Hours 130 | Other excluded
Hours 60 |

| Total
Hours 3 190 |
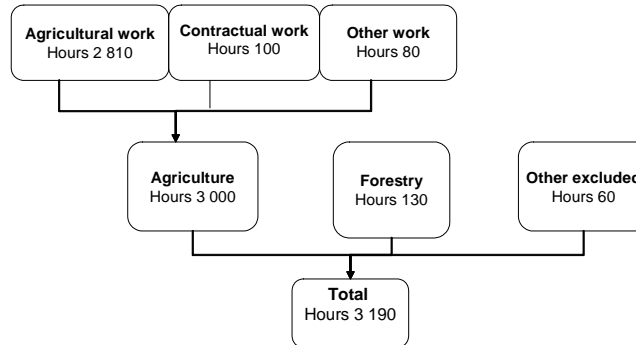
8

Merge between JEU and FSS

- ~20% of the JEU sample had also indicated other gainful activities in FSS

- Contractual work the most common activity in FSS

- Most farmers have answered consistently in the both surveys

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Merge between JEU and IoT - Definition of household

- Married / cohabiting with children under the age of 30
- Single men
- Single women

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Merge between JEU and IoT - Income on household level

	Business	Employ-ment	Capital	Tax free positive transfers	Negative transfers	Income after transfers
FADN-population	126 900	196 200	4 200	13 100	108 500	231 500
FADN-estimates for the FADN-population	134 000	197 700	3 700	13 000	111 000	237 800

Incomes and transfers per household per household for the total FADN-population and estimates for the FADN-sample, 2003, SEK

11

Merge between JEU and IoT
- Income on holder level

	Business	Employ-ment	Capital	Positive transfers	Negative transfers	Income after transfers
FADN-population	103 100	77 900	2 100	1 100	63 500	120 900
FADN-estimates for the FADN-population	105 100	66 100	2 800	700	60 100	114 700

Incomes and transfers per main holder for the total FADN-population from the FSS and estimates for the FADN-sample, 2003 , SEK

12

Some conclusions

- ~75% of Swedish farmers have forest land

- 15% - 25% of the Swedish farmers have complementary activities

- Most common complementary activity (except forestry) is contractual work

- The most important complementary *income* is however from employment

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Some conclusions

- Good possibilities of merging FADN with FSS and IoT

- Low response rates for the complementary questions in JEU 2003

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11. Ideal sampling design in FADN - and approaches to real life

Beat Meier [29]

Questions:

- Field of Survey: How to balance what is desirable and what is realistic?
  - Lower threshold: How do the data requirements fit to the desired coverage?
  - Groups with low or no response: How much transparency or believing in an ideal world?

  Transparency means excluding some groups from the field of survey.

- Time to realise a new sample: How to take time into account?
  - Processes from a ->b?
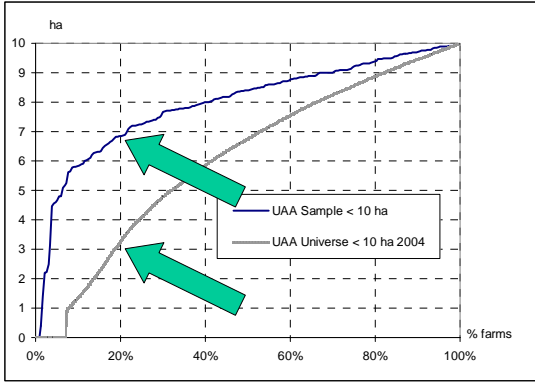 - How to avoid the realisation of a sample that reflects a situation 5 years ago?

  Forecast the number of farms per cell in the universe 2010

© bemepro 2005   2

Threshold for small farms

- What is needed? What is affordable? How much freedom vs. international comparability?

Source: Agroscope, Swiss FADN, adaptation bemepro

© bemepro 2005   3

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[29] Bemepro, Winterthur, Switzerland.

Random or not random?

- Is this the right question?
  - What can quota-samplers learn from bad random samples?
  - What can random-samplers learn from good quota samples?

- Has sampling the right attention when allocating ressources?
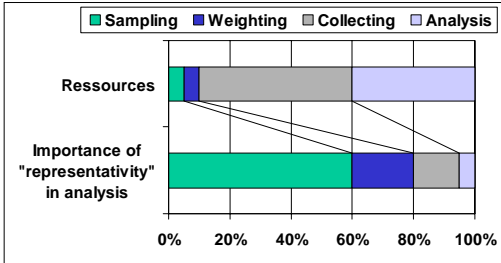
purely illustrative, no empirical background by bemepro

- Is there a need for „best practices"?
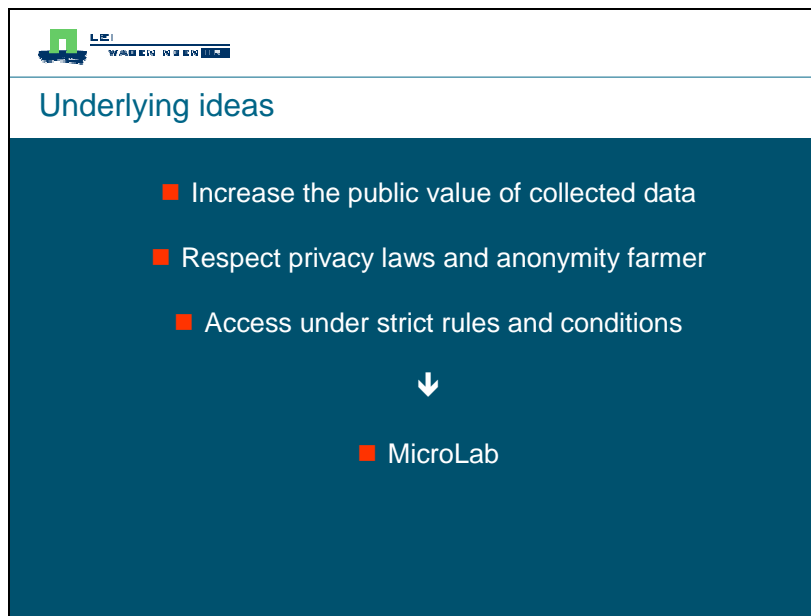
12. Microlab: access to individual FADN data for research purposes

Dr. Hans C.J. Vrolijk [30]

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[30] Agricultural Economics Research Institute (LEI).

Conditions for access

- Scientific research purpose

- Not linking of data to other sources

- Data can only be used for project for which permission is granted

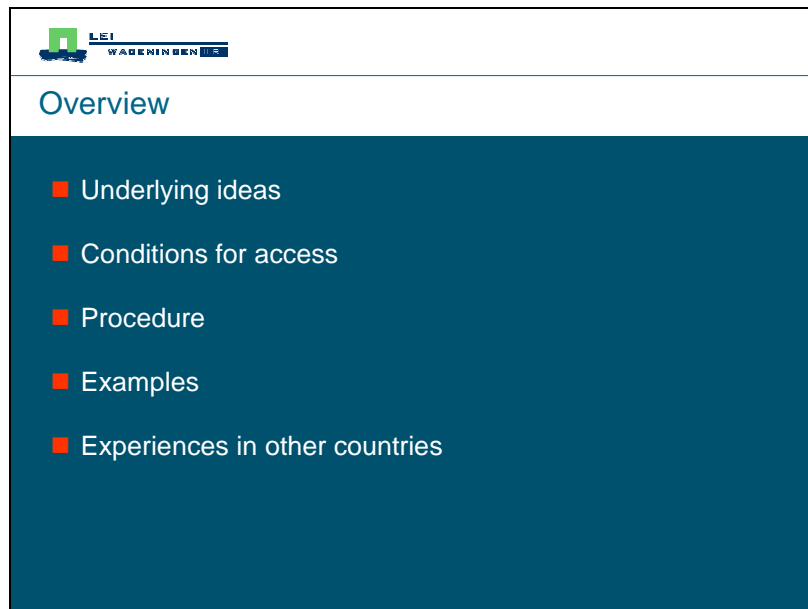- No publication of results based on less than 10 observations

- Publication of results of study

- Check of report before publication

Procedure

- Request for data use
- Submission of research proposal
  - Research goal
  - Method of research
  - Which data to be used
  - How will the results be disseminated
- Approval of proposal
- Sending and signing of contract for data use
- Access to information
- Submission of draft paper
- Checking of paper (privacy regulations, correctness of use)

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Financial conditions

- Request and submission of proposal for free

- Actual costs of data extraction will be invoiced

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Examples

- Investment patterns in Dutch greenhouse horticulture

- Weather derivatives

- Agricultural contracting

- Bio-economic model of 'bruinrot' in the Dutch potato chain

- Costs of forest management in a rural area

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Microlab in practice

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Experiences in other countries????

- FADN liaison office point of view??

- Researchers point of view??

Final remarks

- Access for research purposes with maximum security for anonymity and privacy of farmers
- Positive experiences, but some grumbling
- Substantial demand for it
- Second location in the near future

13. New policy objectives - new farm typologies?

Erling Andersen[31] [32*], Berien Elbersen[33], Frans Godeschalk[34], David Verhoog[3]

Abstract

A farm typology is a strong tool for assessing the effects of agricultural policies and changes in farming structures. However, the EU farm typology currently used in the European Union (EU) was created at a time when agricultural policy was narrowly targeted towards economic and production issues. Assessing changes in policy goals and related effects on agricultural markets, income but also on environment and rural development requires a new or an adapted farm typology as a basis. This paper presents the outcome of almost a decade of work to create such an adapted typology using Farm Accountancy Data Network (FADN) statistics as a main source. The resulting state of the art of this typology work is presented in this paper. The adapted typology is presented including characteristic attributes to specific farm types in order to illustrate the relevance of the typology for environmental impact assessment. It is concluded that the currently used typology needs adaptations and that the suggested typology dimensions could be used as a basis for creating a more environmentally relevant typology that is better suited for integrated policy impact assessment.

Keywords: farm typology, agricultural policy, integrated impact assessment

13.1 Introduction

Already at the beginning of the Pacioli initiative it was recognised that there was a need for a revised EU typology of farms as one of the recommendations was to: 'Create a new farm typology that is less complex, guarantees comparability and takes into account new developments like environmental issues, rural development etcetera' (PACIOLI, undated). The Farm Accountancy Data Network (FADN) for the European Union was set up in 1965 when the goals of the agricultural policy were more narrowly targeted at economic and production issues (Regulation 79/65/EEC). The EU farm typology that is used to sample, analyse and present the data stems in its current version from 1985 (Decision 85/377/EEC), which again is from a period before the goals of the agricultural policy were broadened to

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[33] Alterra, Wageningen, P.O. Box 47, NL 6700 AA Wageningen, The Netherlands.
[34] Agricultural Economics Research Institute (LEI), P.O. Box 29703, NL-2502 LS The Hague, The Netherlands.

include environmental and rural development issues. Consequently, the logic behind the currently used EU farm typology is, in correspondence with the original goals of the agricultural policy, strictly economic and production orientated. To some degree the EU farm typology also reflects the land use on the farms, though this is translated into economic values based on regional standards and not expressed in hectares. Apart from this, the environmental relevance of the typology can be assumed to be limited. In this paper we present the adapted farm typology that we have developed over the last decade and that is currently being implemented in the Integrated Project SEAMLESS.[35] This typology has been developed specifically to reflect the broadened goals of the agricultural policy and to bridge economic and environmental assessments using the FADN data.

The presented typology is based on work carried out during the last decade exploring the use of alternative typologies with a stronger environmental scope. Firstly, the concept was developed only for grazing livestock farms, for which a typology was developed in the project European Livestock Policy Evaluation Network (ELPEN) (Andersen et al., 2004a, 2004b).[36] Secondly the concept was widened to cover all farm types, but specifically aiming to identify farms managing High Nature Value (HNV) farmland in a project for the European Environmental Agency (Andersen et al., 2003; EEA/UNEP, 2004). Thirdly, the typology was refined further for the IRENA (Indicator Reporting on the integration of ENvironmental concerns into Agricultural policy) operation to show trends in intensity of farming (EEA, 2005 and 2006). In a nearly finished project the typology has been tested as a tool for assessment of the environmental and landscape consequences of the implementation of large scale biomass production for bio energy in EU25 (Elbersen et al., 2006 (forthcoming)). The latest progress in the farm typology development is as mentioned above within the framework of the Integrated Project SEAMLESS (EU 6th Framework programme, Priority Global Change and Ecosystems contract no. 010036-2).

Although the selection of the typology dimensions and their thresholds in all the above mentioned projects was influenced by the specific project goals, it was always the aim to create a typology that was comparable across sectors at an EU wide level to be used as a basis for integrated impact assessment of changes in policies and farming. It was also the overall aim of all projects to categorize farms in groups which are relatively homogeneous from an environmental perspective and land use pattern and land use intensity was regarded as the key grouping characteristics.

In the typology work there were always two main challenges: Firstly, to create a typology that was complicated enough to provide a good basis for assessing the diversity of farming in terms of environmental externalities and market and income share, but simple enough to disclose the most important farm types at a regional level within the relatively small FADN sample of farms (FADN only allows the use of data for groups of farms with at least 15 sample farms). Secondly, to create this typology within the limitations of the FADN data source in terms of variables available. There is a very wide range of variables available per farm in the FADN data base, but most of them have a strong cost or economic orientation. Most environmentally orientated variable, like the

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[35] See www.seamless-ip.org

[36] See http://www.macaulay.ac.uk/elpen/index1.htm

amount of fertilisers used per hectare (in kg N/ha), cannot be directly derived and proxy indicators like the costs of inputs per hectare need to be used instead.

13.2 The SEAMLESS farm typology

The state of the art in our typology work is the farm typology that is currently being implemented in the SEAMLESS project. This typology is based on a combination of three different dimensions, a size dimension, a specialisation and land use dimension and an intensity dimension. The different discriminating variables and the specific threshold values are based on earlier work and include consultations with Member State experts as well as statistical analysis. In SEAMLESS further consultations with experts have been used to further improve the typology and to use it as the basis for linking environmental and economic modelling both on the input and the output side of the model chains applied in this project to do the integrated impact assessments. In the following paragraphs the different dimensions are described.

The size dimension

In SEAMLESS and in the previous projects several methods for differentiating farms according to size have been discussed: Total number of hectares, herd size in livestock units or heads, output in tonnes or in Euros, output in real figures or calculated standards. In the ELPEN project the size dimension was defined according to the number of livestock units per farm but this was changed in the later projects as the typology should facilitate assessments across all different sectors. It was therefore decided to use the economic output as a basis for this dimension of the typology. Furthermore, to facilitate the link to the existing definitions already implemented in the agricultural statistics it was decided to base this dimension on the calculated standard gross margins (SGM), which can be used to determine the economic size of farms. In the FADN data standard sets based on either 10 or 6 size classes are used, in SEAMLESS these classes are regrouped into 3 for simplification and, more technically, to be able to generate data at the regional level without violating the disclosure rules of FADN (see table 13.1). It might be argued that the

Table 13.1   The size dimension and definitions

Size dimension	Definition
Small scale	< 16 European size units (ESU) a)
Medium scale	=> 16 ESU and < 40 ESU
Large scale	=> 40 ESU

a) European Size Units: The economic size of farms is expressed in terms of European Size Units (ESU). The value of one ESU is defined as a fixed amount of Euro of Farm Gross Margin. Over time the amount of Euro per ESU has changed to reflect inflation. In 2003 1 ESU corresponded to 1,200 €.

calculated SGMs do not reflect the diversity in output of the farms as this is blurred by using the same standard values for all farms within a region in the calculations. However, in the SEAMLESS typology this aspect is taken into account through the intensity dimension as becomes clear in the next section.

The intensity dimension

Also the intensity of farming can be measured in different ways: Level of inputs, level of outputs or yields. Firstly, to allow comparison across different agricultural sectors it was decided to use economic values instead of for example yields in tonnes of wheat or milk. Secondly, and again to facilitate comparisons across sectors, it was decided to base the dimension on output instead of inputs. On the input side there is a big difference between for example arable systems, where the input intensity is linked to specific land management and use of fertilisers and crop protection, and livestock systems, where the intensity is linked to stocking density and feeding strategies. The total output is defined as the total of output of crops and crop products, livestock and livestock products and other output in monetary terms. In contrast to the SGM used to define the size types, this is based on the real figures per farm. To define the types the output is related to the agricultural area and expressed as output in Euros per ha. It should be mentioned that with the typology it is not possible to establish a causal link between the level of intensity and the impact on the environment. The intensity dimension should therefore not be interpreted as an impact indicator, but rather as a means to categorise farm according to environmental pressure. The selection of the specific threshold values between the categories could therefore also be arbitrary to some degree. To reach three different intensity levels we aimed to have threshold values around 75% below average and 50% above average total output per hectare in 2003 for whole EU15 (see table 13.2). When applying the typology to other years than 2003 the threshold values are adjusted for the specific years according to producer price indices for total agricultural production in EU15 to take into account the change in prices over time.

Table 13.2   The intensity dimension and definitions

Intensity dimension	Definition
Low intensity	Output per ha < 500 € (2003)
Medium intensity	Output per ha => 500 € and < 3,000 €
High intensity	Output per ha => 3,000 €

The specialisation and land use dimension

As for the size dimension we have decided to base the specialisation information on the currently used EU farm typology to facilitate the linkages both to external SEAMLESS

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Table 13.3   Specialisation and land use dimensions and definitions

Specialisation/land use dimension	Specialisation definition	Land use dimension definition
Arable/Cereal	1+6	(Utilised agricultural area (UAA) > 0 or Livestock units (LU)/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and < 12.5% Fallow) and >= 50% Cereals
Arable/Fallow	1+6	(UAA > 0 or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and >= 12.5% Fallow)
Arable/Others	1+6	Not cereal, fallow or specialised
Arable/Specialised crops	1+6	(UAA > 0 or LU/ha <5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and < 12.5% Fallow) and < 50% Cereals and >=25% of arable land in specialised crops
Beef and mixed cattle/ Land independent	4.2+4.3	UUA = 0 or LU/ha => 5
Beef and mixed cattle/ Others	4.2+4.3	Not land independent, permanent grass or temporary grass
Beef and mixed cattle/ Permanent grass	4.2+4.3	(UAA > 0 or LU/ha <5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and < 50% Temporary grass)
Beef and mixed cattle/ Temporary grass	4.2+4.3	(UAA > 0 or LU/ha <5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and >= 50% Temporary grass)
Dairy cattle/Land independent	4.1	UUA = 0 or LU/ha => 5
Dairy cattle/Others	4.1	Not land independent, permanent grass or temporary grass
Dairy cattle/Permanent grass	4.1	(UAA > 0 or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and < 50% Temporary grass)
Dairy cattle/ Temporary grass	4.1	(UAA > 0 or LU/ha <5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and >= 50% Temporary grass)
Horticulture	2	All
Mixed farms	7	All
Mixed livestock	8	All
Permanent crops	3	All
Pigs/Land independent	5.1	UUA = 0 or LU/ha => 5
Pigs/Others	5.1	Not land independent
Poultry and mixed pigs/ poultry	5.2	All
Sheep and goats/ Land independent	4.4	UUA = 0 or LU/ha => 5
Sheep and goats/Others	4.4	Not land independent

work and to enhance the integration of modelling within SEAMLESS, where one of the model components is the CAPRI model[37] that has been developed to analyse the EU farm types. In the currently used EU typology specialisation is detailed in four hierarchical levels depending on the degree of specialisation or on specific agricultural activities. In SEAMLESS we have chosen to include information from only the two highest levels of the EU typology and the level used differs per farm type. This again was a decision taken to keep the total number of farm types manageable and at the same time aiming to include the heterogeneity of farming across the territory of the EU. However, from an environmental point of view it is a weakness that the specialisation types can be very heterogeneous regarding land use. We have therefore decided to split five of the nine specialisation types further according to land use. Note that the remaining four types are not divided further mainly because the FADN sample includes relatively few farms of these types. Also, in the combined specialisation/land use dimension only the relevant land use types have been applied to the specific specialisation types - the grassland issue is only relevant on farms with grazing livestock etcetera. The 21 farm types in the specialisation/land use dimension of the typology are shown in table 13.3.

13.3 Results: SEAMLESS farm types and their main attributes

Potentially 189 different farm types could occur based on the suggested farm typology - three sizes times three intensities times 21 specialisation/land uses. Almost all (175) actually occur in EU15 in 2003, but they are of course not equally important. In table 13.4 the 10 most important farm types in terms of land use share are shown for the whole EU15. The most important farm type is Large scale-medium intensity-arable/cereal managing 12% of the agricultural area in EU15. But, as also can be seen, the average size of these farms is quite large, and consequently less than 3% of the farm population are of this type. The second most important farm type in terms of land use manages almost 6% of the farmland area and is Large scale-medium intensity-mixed farms. On the top ten list of farm types, the first six are held by large scale farms indicating that there is a strong relationship between area size and economic size. Seven of the farm types on the list are medium intensity and no high intensity farm types are present. A variety of specialisation/land use types are among the ten most important farm types in terms of area managed. However, beef cattle, pigs, poultry, mixed livestock, horticulture and permanent crop farm types are not listed. In total the ten most important farm types manage 40% of the agricultural area and cover 13% of the farms, 18% of the livestock units and 21% of the output. More information on the distribution of farm types across EU15 can be found in Andersen et al. (2006).

Though not the only relevant dimension, the intensity dimension is the one that most clearly distinguishes environmentally different farms. As an example the tables 13.5 and 13.6 show some differences in intensity attributes for these farm types. In table 13.5, High intensity cereal farms produce 113% more wheat and 75% more barley per hectare thanlow

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[37] See http://www.agp.uni-bonn.de/agpo/rsrch/capri/capri_e.htm

Table 13.4   *Share of farms, area, livestock units (LU) and output for the 10 most important farm types in EU15 measured by share of agricultural area*

Size	Intensity	Specialisation/land use	Share of farms %	Share of area %	Share of LU %	Share of output %
Large	Medium	Arable/Cereal	2.7	11.6	1.6	5,9
Large	Medium	Mixed farms	1.7	5.7	5.0	3,8
Large	Medium	Dairy cattle/Permanent grass	1.8	4.0	4.9	3,2
Large	Medium	Dairy cattle/Others	2.1	3.8	4.1	3,4
Large	Low	Sheep and goats/Others	0.2	2.9	0.9	0,2
Large	Medium	Arable/Others	0.7	2.6	0.5	1,3
Medium	Low	Sheep and goats/Others	0.5	2.4	0.9	0,2
Medium	Medium	Arable/Cereal	2.2	2.4	0.2	1,2
Large	Medium	Arable/Fallow	0.5	2.3	0.2	1,0
Large	Low	Arable/Fallow	0.3	2.2	0.1	0,3
Total top ten			12.7	39.9	18.4	20.5

Source: EU-FADN - DG AGRI G-3, SEAMLESS adaptation.

intensity farms. But, to do so they spend 153% more on fertilisers and 500% more on crop protection. What this means in real input use per hectare cannot be determined exactly as this information is not available from FADN, but it does make clear that the input use on these farms must be significantly higher overall and per hectare.

Table 13.5   *Selected characteristics of arable/cereal farms according to intensity*

	Wheat Yield kilo/ha	Barley yield kilo/ha	Fertiliser use Euro/ha	Crop protection use Euro/ha	Set aside and Fallow/UAA %
Low-intensity	3,343	3,123	64	30	7
Medium-intensity	6,697	5,337	113	107	6
High-intensity	7,141	5,470	162	180	5

Source: FADN-CCE-2003 DG Agriculture/A-3; SEAMLESS adaptation.

As can be seen from table 13.6, High intensity dairy cattle/permanent grassland farms produce 88% more milk per cow than low intensity farms. But, to do so they spend 560% more on fertilisers and 1,800% more on crop protection. At the same time the stocking density is 400% higher on the high intensity farms. On top of this the low intensity farms have a much higher share of the land in rough grazing, which from an environmental point of view is the most valuable type of grassland.

These few results have been selected to show the clear differences between farm types that can be distinguished by the suggested adapted typology. The results show that farms that cannot be distinguished by the currently used EU farm typology can indeed be

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very different in environmental performance. More results on environmental performance of different farm types can be found in (Andersen et al., in print).

Table 13.6   Selected characteristics of dairy cattle/permanent grassland farms according to intensity

	Stocking density LU/ha	Fertiliser use Euro/ha	Crop protection use Euro/ha	Milk yield kilo/LU	Permanent grass/UAA %	Rough grass/ UAA %
Low-intensity	0.5	15	1	3,815	50	39
Medium-intensity	1.4	74	13	5,667	74	5
High-intensity	2.5	99	19	7,176	77	1

Source: FADN-CCE-2003 DG Agriculture/A-3; SEAMLESS adaptation.

13.4   Conclusions

Achieving sustainability in farming has become a major item on the EU agricultural policy agenda, and there is an overall shift towards policies supporting sustainable rural development. Sustainability in farming must be achieved alongside new targets in related but different policy fields. We can now observe a gradual change from a procedural policy approach ('prescribed actions') to an ambient policy approach ('achievement of environmental quality targets'). Implementation of policies through mechanisms such as the Water Framework Directive, Natura 2000, the Birds and Habitats Directives, the Nitrates Directive, and agri-environmental standards require integrated impact assessments. Also the implementation of sustainability objectives in the Rural Development Regulation (RDR) (1750/99), in the so-called second pillar measures, require new assessment approaches to measure the multiple policy objectives at the farm level. A multi-dimensional farm typology is a useful base for this integrated assessment enabling assessments at an EU wide basis taking both economic and environmental factors into account.

Based on the work on FADN based farm typologies we conclude that the adapted typology suggested in this paper by adding information on intensity of farming and land use is a good suggestion for a typology that can be used for such integrated impact assessment of policy changes and changes in farm structures. The suggested typology does discriminate farm types that perform distinctly different in relation to environmentally relevant farming practices and can therefore assumed to exert different pressures on the environment. It should be kept in mind that what can be assessed is the pressure of farming on the environment, not the actual state of the environment. This however can be assessed in the models developed in the SEAMLESS project aimed at modelling the integrated impacts of farming on both markets and environment using the farm information classified according to the typology dimensions presented in this paper as main input. The results of these modelling efforts will further show the potential of the typology presented here.

Whether the suggested typology can also be used for broader rural development and social issues is still to be tested. There might be links between for example intensity of

farming and the age of farmers, but the links are by no means causal. This issue we also hope to explore further in the SEAMLESS project.

It might also be important to distinguish between the uses of the farm typology for on the one hand stratification of sampling and weighting of results and on the other hand dissemination of results. The current EU typology has proven to be an efficient tool for the sampling and weighting of farm data. One reason for this is that it is relatively simple to establish if a given farm belongs to a specific EU farm type. This would for example not be the case for the suggested intensity dimension of our typology, where detailed information is needed before the farm can be typified. This is clearly a negative aspect in relation to the collection of data. On the other hand the suggested adapted typology would be a valuable addition to the current typology in connection to dissemination of results. This would establish a standard for which environmentally relevant issues could be better presented in regional, national as well as EU wide standard results. The suggested typology could for example be implemented in the standard results available from DG Agriculture.[38]

The above points, the need for environmental relevance and the need for standard results accordingly, are the most important issues for which the suggested adapted farm typology has clear advantages compared to the currently used EU typology. To add to this, some other points in relation to the use of the typology and FADN in general should be mentioned: Firstly, the present detailed subdivision of farms in the presently used EU farm typology according to the most detailed sectoral division is too detailed for integrated analyses at the regional level. In many regions we will not be able to disclose the farm types because they will not be represented by the minimum disclosable number of 15 sample farms. Secondly, the presented adapted typology is the result of a pragmatic approach building on the data and variables that are currently available in FADN. The intensity dimension has therefore only been based on input costs per hectare but the environmental pressures and real environmental impacts can be better assessed if additional data on real input use are also collected. Thirdly, it should be mentioned that the present FADN sample is not sufficiently representing all environmentally relevant farms as it excludes the smaller farms. However, an important share of the farming population of the New Member States is not reaching the economic size threshold for entering in the FADN sample. The same applies for the more environmentally beneficial farms especially located in High Nature Value farming areas in the whole EU. Finally, it should be mentioned that in most cases it is not sufficient to carry out integrated assessments at the level of agricultural regions. Therefore FADN data need to be disaggregated to a finer spatial scale - another prime goal of the SEAMLESS project.

13.5   Acknowledgement

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[38] See http://ec.europa.eu/agriculture/rica/dwh/index_en.cfm

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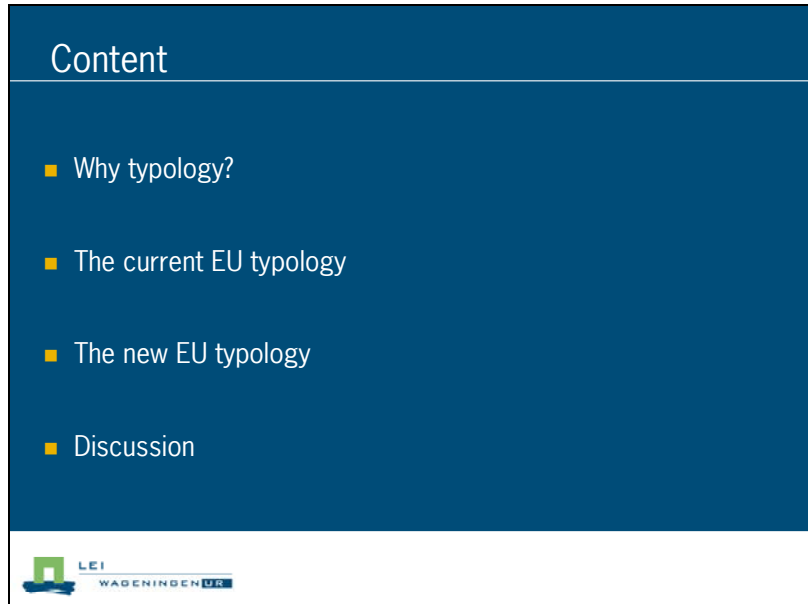
13.7   Appendices

Table 13.7   Definition of the FADN specialisation types used for the specialisation/land use dimension in table 13.3

Specialisation type	EU-code	Definition
Arable systems	1 + 6	> 2/3 of SGM from arable or (> 1/3 of SGM from arable and/or permanent crops and/or horticulture)
Dairy cattle	4.1	> 2/3 of SGM from dairy cattle
Beef and Mixed cattle	4.2 and 4.3	> 2/3 of SGM from cattle and < 2/3 of SGM from dairy cattle
Sheep, Goats and mixed grazing livestock	4.4	> 2/3 of SGM from grazing livestock and < 2/3 of SGM from cattle
Pigs	5.1	> 2/3 of SGM from pigs
Poultry and mixed Pigs/poultry	5.2	> 2/3 of SGM from pigs and poultry and < 2/3 of SGM from pigs
Mixed farms	7	All other farms
Mixed livestock	8	> 1/3 and < 2/3 of SGM from pigs and poultry and/or > 1/3 and < 2/3 of SGM from cattle
Permanent crops	3	> 2/3 of SGM from permanent crops
Horticulture	2	> 2/3 of SGM from horticultural crops

14. A new EU typology of farms [39]
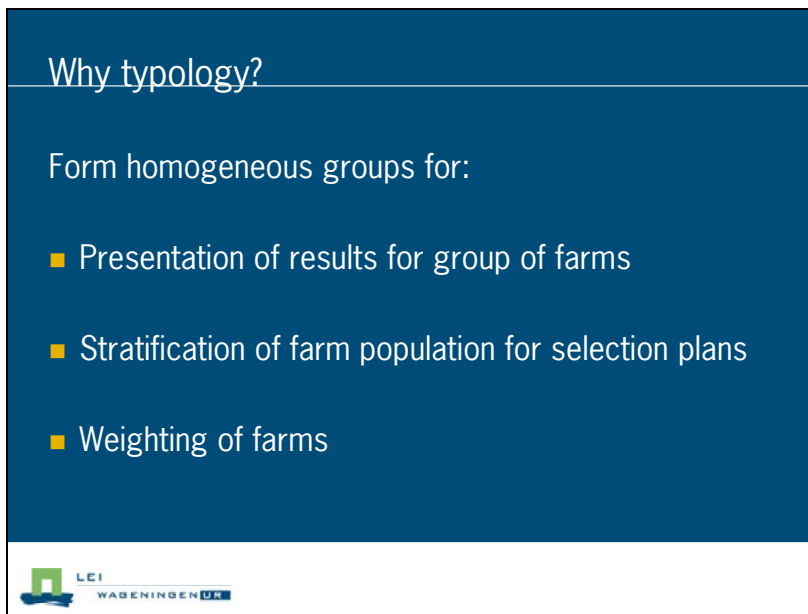
Koen Boone [40]

Content

- Why typology?

- The current EU typology

- The new EU typology

- Discussion

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Why typology?

Form homogeneous groups for:

- Presentation of results for group of farms

- Stratification of farm population for selection plans

- Weighting of farms

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[39] Based on papers of Yves Plees and Alberto D'Avino.
[40] Agricultural Economics Research Institute (LEI).

Old typology

- Based on Standard Gross Margin per product
  - Standard: Average of three years
  - Gross Margin: Output minus (part of) variable costs (direct costs: mainly inputs used)
  - Product: 70 different type of animals and plants
- SGM per product base for:
  - Size of farm (European Size Unit: (Total SGM/1200)
  - Type of farm: If more than 2/3 of SGM from one product than specialised (9 head types, 70 sub sub types)

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Old typology

- Used for FADN and FSS (population for selection of FADN farms)
- Split into three categories
  - Region
  - Economic size
  - Farm type
  (No discussion about this)

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Problems with old typology

- No SGM's for multifunctional agricultural (non-agricultural activities at the farm)

- Decoupling of support
  - Current SGM calculation includes product subsidies in output
  - SGM without subsidies may be very low or even negative

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New EU typology - process

- Several working group meeting with representatives from FADN management committee and Farm Structure Survey management committee
- EC writes proposals that are commented by working group
- Tomorrow (5 October) 'final' proposal is discussed

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New EU-typology

- Only based on economic size of activities
- Standard output instead of standard Margin
- Include non agricultural activities
- A less detailed split of farm types
- Abolish fodder coefficient
- No ESU but just Euros output
- Still some questions

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Standard Gross Margin to Standard output

- No negative values after decoupling
- Less complicated so less methodological and practical problems and easier to harmonise between countries
- Less complicated to calculate so lower costs
- Less complicated so more user friendly
- More coherence with typologies outside EU and outside agriculture

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Standard output (2)

- But …. less strong relation with economic potential (income capacity)
- Margins are calculated anyway for other purposes (models etc.)
- Negative SGM values after decoupling only temporary problem
- Can not be used for non-agricultural activities
- Relatively small influence on division of farms into farm types in general but large changes for intensive livestock farms (4 times higher) in comparison with arable farms (equal) -> consequences for sample of farms in FADN

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Standard output (3)

Calculated:
- Without subsidies
- "in the same way as for Gross Margin"

How to treat internal transactions on the farm?
For example calves, heifers, milk cows
- Value at end of year minus value at the beginning
Or
- Value at end of year

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Non-agricultural activities

Question in FSS/Census:
% output non agricultural activities in total output
- 5 categories: 0, 0-25%, 25-50%, 50-75%, >75%

Definition:
- Processing/packaging of agricultural products
- Activities using agricultural means of production
- Use the same (nation specific) list of non agricultural activities as in Economic Agricultural Account (EAA)
- Per farm type: subtype for % non agricultural activities

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Other changes in typology

- Less detailed split of farm types
  - Farm types that include hardly any farms in EU-25
  - Some new farm types included (fur animals, mushrooms etc.)
- Abolish fodder coefficient: always include fodder area
  - Old typology: only include fodder area's if more fodder is available than grazing livestock can eat
  - Now: only output relevant so always include fodder
- Euros instead of ESU
  - No correction for price changes anymore
  - Total ESU is not equal to total volume anymore

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Remaining questions

- Should decoupled payments be included in calculation of economic size?
- Should non agricultural activities be included in calculation of economic size?
- Should the number of economic size classes be maintained?
- Are firms with >75% output of non-agricultural activities still farms?

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Summary

- From standard gross margin to standard output

- Include non agricultural activities based on % in output

- Still some open ends

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15. The use of FADN in the study on the use of plant protection products and nutrients in horticulture in Flanders

Ir. Dirk Van Lierde, Ir. Anneleen Vandenberghe, ing. Anne-Marieke Cools[41]

Abstract

The Flemish Government asked the Instituut voor Landbouw- en Visserijonderzoek (ILVO) to conduct a research on the use of plant protection products and nutrients on Flemish horticultural holdings. Different sources of data were examined but finally it seemed that a research based on the own data of the accountancy data network (FADN) was the best solution. The data were extrapolated to the population of horticultural holdings in Flanders. A disadvantage was that data of different production years had to be used as the data were not available in a database, so the results of preceding studies had to be used. Today new software is used in the FADN and the data are available in a database. It is possible now to do this kind of research for each year. However this will never become a routine task, it takes a lot of knowledge and expertise to judge the reliability of the data. In addition to this research the POCER indicator was applied on the data of the plant protection products and a POCER score was calculated. This score gives an idea of the impact on the environment and is very useful for policy makers, extension services and farmers.

Keywords: environment, POCER indicator, vegetables, ornamental plants, fruit

15.1 Introduction

In recent years more and more attention is paid to the relation between agriculture and environment. One of the points of particular interest is the use of plant protection products and nutrients. The Flemish Government asked the Instituut voor Landbouw- en Visserijonderzoek (ILVO, Institute for Agricultural and Fisheries Research) to conduct a scientific research on the use of plant protection products and nutrients on Flemish horticultural holdings.

First of all was examined what data sources were available on the use of plant protection products and nutrients for Flanders. It appeared that there was very little reliable information available and that collecting this data by means of a survey would be very expensive and would take a lot of time. That is why we investigated the possibility to use the farm accounting data network (FADN) to collect the necessary information. This was already done for some other studies in the past.

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In this research there was also a possibility to estimate the impact on the environment of the plant protection products that were used. For this purpose, and in collaboration with the university of Ghent, the POCER scores (Pesticide Occupational and Environmental Risk) were calculated for every active substance that was used.

As there is a multiplicity of crops and production techniques in horticulture the population was divided into four great groups: production of vegetables under glass, production of vegetables in open air, production of ornamental plants and fruit production.

In this article the research is explained. First of all the results on the data sources is commented. Then the methodology that was used to explore the FADN data is explained. Then the results are given for each of the four groups of crops and finally the data for Flanders are given.

15.1.1 Search for data sources

The first thing that was done in this study was a search for data sources. As already mentioned there was little reliable information available on the use of plant protection products and nutrients in horticulture. A possible data source was the study SEQ (Sum of Spread Equivalents) by the university of Ghent (Steurbaut et al., 2002). In the study of the university of Ghent the use of plant protection products was determined on the base of the sales figures of plant protection products in Belgium. These figures were split up into the use of products for the different agricultural and horticultural sectors using some theoretical distributing code. This method had however some important disadvantages. The first disadvantage was the use of plant protection products is not the same as the sales figures. There are import and export and stock differences between the years. Further more the sales figures for Belgium are split up into the data for Flanders and Wallonia using the areas of the crops. This method takes not into account the regional differences in the use of products. Finally the use of products for Flanders is split up into the use of products used for the different crops and crop groups using theoretical distributing code. The distributing code was recently adapted on the base of research of the ILVO, nevertheless one can conclude that these data are only a rough estimation of the real quantities of products used in Flemish horticulture.

A second data source was the data of the 'Vlaams Milieuplan Sierteelt' (VMS, Flemish Environmental Plan for the ornamental production). The VMS controls if the management of the ornamental producers that are member of the VMS is environmental friendly. For this purpose the producers give the quantities of plant protection products, nutrients, energy and so on to the VMS. The VMS computes an environmental score for each holding; this is done in collaboration with the 'Milieu Project Sierteelt' (MPS Environmental project ornamental production) in the Netherlands. The data concerning the use of plant protection products and nutrients are calculated for each holding, these results are confidential and nothing of this all is published. These data are very reliable but the disadvantage is that the number of holdings is limited, and that the holdings are not representative as their goal is to obtain certain environmental standards.

A third possible source was the data that are collected by the auctions and the producers of frozen vegetables. The horticultural producers have to supply data on their use of plant protection products to the auctions and producers of frozen vegetables. A lot of

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information is collected but unfortunately these data are not available for research purposes because they are confidential.

A fourth possibility was to use the data that were collected by Phytophar, the organisation of the producers of plant protection products (A. Demeyere and R. de Turck, 2002). Phytophar pays a company to set u pan inquiry into the use of plant protection products in agriculture and horticulture. Each year only a restricted number of crops are studied, the more these inquiries are focused on agricultural crops and the number of data available for horticultural crops is very limited. These inquiries are very expensive, so the number of inquiries is rather limited.

As for the use of nutrients there are only a limited number of data sources available. Only the VMS has data on the use of nutrients in ornamental crops. But the holdings in the VMS are not representative for the horticultural sector as the aim of these holdings is to reduce the use of nutrients. Other data sources are the 'Mestbank' and the Soil Service of Belgium. These institutions focus on agricultural crops and the data they have no separate data per crop or crop group.

After the examination of different data sources on the use of plant protection products and nutrients in horticulture the conclusion was that none of this data sources could provide the necessary information. Another data source was found in the horticultural accountancy data network. In the accountancy not only financial data are collected but for every purchase the quantities are also collected for every product. Data on purchased quantities of plant protection products and nutrients are available for every product and nutrient. In order to control the data in the accountancy the use of plant protection products and nutrients is split up for every crop. Horticultural accountancy can be a good source to obtain data on the use of plant protection products and nutrients. The more the FADN can be considered as a representative survey for the Flemish horticultural sector. A practical problem was that in the actual accountancy system the detailed information was only available on paper and was not stored in a database, so the data are not easy to use in a research. A method was developed to introduce the data in a database, to control the data and to extrapolate them to the population.

15.2 The use of plant protection products

15.2.1   Method

To make the accounting data more accessible software was developed that allowed the accountants to introduce more detailed information in the computer. For the plant protection products they could introduce for every crop the area and the quantities of every commercial product that was used for the crop. As a lot of commercial products contain the same active substances the quantities of commercial product were transformed into the quantities of active substances that were in it. A database with for every commercial product the active substances that were in it, and the concentration of the active substances was used. In this way one obtained the quantities of all active substances that were used so the same active substances that were present in different commercial products could be summed. For every crop and every active substance used on that crop the use of active

substance per hectare was calculated, this permitted to detect aberrant data. If aberrant data were detected the accountant had to contact the farmer in order to verify the data on the use of crop protection products. This has the advantage that there is an extra control on the data of the accountancy.

To extrapolate the use of active substances to the population of horticultural holdings the use of active substance per hectare was multiplied with the area of the studied crop in Flanders. This method was already used in some studies that were done in the past for the 'Fonds voor de Grondstoffen' (Fund for the raw materials). These studies were supervised by a board of experts in plant protection. This supervision guaranteed a high quality of accountancy data (J. Flossie and D. Van Lierde, 2000; J. Flossie and D. Van Lierde, 2001; A. Van den Bossche and D. Van Lierde, 2002a; A. Van den Bossche and D. Van Lierde, 2002b, A. Van den Bossche and D. Van Lierde, 2003).

In addition to the estimation of the quantities of plant protection products used in Flemish horticulture the ILVO team decided to add a point of research in estimating the environmental impact of the use of these products. In collaboration with professor Steurbaut the university of Ghent the data on the active substances were transformed in a POCER score. The POCER indicator, or Pesticide OCcupational and Environmental Risk, is an indicator that measures the risk of the use of active substances on some components of the environment such as: the person that applies the product, the person that works on the field after the application, the bystander, the persistence, groundwater, water organisms, birds, earthworms, bees and useful arthropods. A high risk is translated with a code 1, a negligible risk gets the value 0. Using the quantities of active substances used in the different sub sectors a POCER value can be calculated for the whole sub sector. This gives the advantage that the environmental impact can be measured and compared. In this study a comparison between the sub sectors. In the future, when this kind of study is repeated, it will be possible to observe the evolution of the impact on the environment of the use of plant protection products. This can put at the disposal of the government, extension officers and farmers an instrument to judge the environmental results of the sector.

15.2.2   Production of vegetables in greenhouses

The area of vegetables in greenhouses in Flanders is about 1,100 ha. On the basis of the accountancy data the use of plant protection products on vegetables in greenhouses was determined. As indicated in table 15.1 especially fungicides and products for soil disinfection, these two product groups represent 94% of the total use of active substances. For the products for soil disinfection the use of methylbromide was very important. This product was in 1999 still allowed for soil disinfectation, at the moment is forbidden to use methylbromide. As there are few alternatives for methylbromide there is a switch to production on substrate to avoid problems with soil fungi.

Table 15.2 gives the ten most important active substances that are used in the production of vegetables in greenhouses. One can see that methylbromide almost represents 50% of the total quantities used. When the ten most important active substances

Table 15.1   Overview of plant protection products on vegetables in greenhouses in 1999

Type	Average use (kg/ha)	Total use (kg)
Fungicides	40.73	44,086
Herbicides	1.37	1,482
Insecticides	3.07	3,329
Growth regulators	1.76	1,905
Acaricides	0.70	754
Soil disinfection products	70.35	76,155
Total	118.00	127,710

are classified on the basis of their impact on the environment (POCER value) one can see that methylbromide and dichloorpropene are responsible for a large part of the POCER environmental score. At the moment methylbromide is forbidden, and this means that the POCER value has significantly decreased.

In figure 15.1 the POCER-value is indicated for the acaricides, de soil disinfection products, the growth regulators, the herbicides, the fungicides and the insecticides. For each of these groups of active substances the impact on useful arthropods, bees, earthworms, birds, water organisms, groundwater and persistence are indicated. One can see that the soil disinfectants have a large impact on the environment, especially on the useful arthropods, the earthworms and the groundwater. As the use of methylbromide is forbidden and as the area of production on substrate has increased the impact of the soil disinfectants decreased. The fungicides still have an important impact on the environment, but their impact is smaller than the impact of the soil disinfectants. Their impact is especially on earthworms, the groundwater and they also have an impact due to their persistence.

15.2.3   Production of vegetables in open air

A distinction was made between the intensive production of vegetables, a production especially for the fresh market, and the extensive production of vegetables, a production especially for the processing industry. Intensive production of vegetables is found on horticultural holdings, extensive production of vegetable is found on agricultural holdings. In Flanders there are about 6,000 ha of intensive vegetable production and 13,000 ha of extensive vegetable production (peas and beans for industry excluded). Table 15.3 indicates the use of plant protection products for the vegetables in open air. For the intensive production of vegetables in 2003 14.87 kg of active substances were used per hectare, more than 50% were fungicides, 28% were herbicides and 16% insecticides. The extensive production of vegetables used about 10.00 kg of active substances per hectare, more than 60% were fungicides, 27,5% were herbicides and 16% were insecticides. The proportion of the three groups of plant protection products was almost the same for the intensive and extensive production of vegetables in open air. To protect the production of vegetables in open air against diseases and pests in total 217 tons of active substances were used in Flanders; this represents 11.57 kg per hectare.

Table 15.2   Top 10 of active substances with the highest POCER value 'environment' and the highest use (kg) in the production of vegetables in greenhouses

	Active substance	Type	Use (kg)		Active substance	Type	POCER-value 'environment'
1	Methylbromide	S	62,345	1	Methylbromide	S	94,453
2	Thiram	F	17,031	2	Dichloorpropene	S	21,026
3	Dichloorpropene	S	12,396	3	Sulphur	F	9,241
4	Propamocarb	F	7,197	4	Thiram	F	6,796
5	Sulphur	F	4,913	5	Propamocarb	F	1,625
6	Iprodione	F	3,268	6	Carbendazim	F	1,555
7	Ethefon	G	1,903	7	Chloropicrin	A	1,272
8	Tolylfluanide	F	1,452	8	Iprodione	F	1,040
9	Toclofos-methyl	F	1,314	9	Dichloran	F	1,013
10	Mancozeb	F	1,288	10	Methomyl	I	653

With F=   Fungicide
      I =   Insecticide
      S=   Soil disinfectation
      G=   Growth regulator
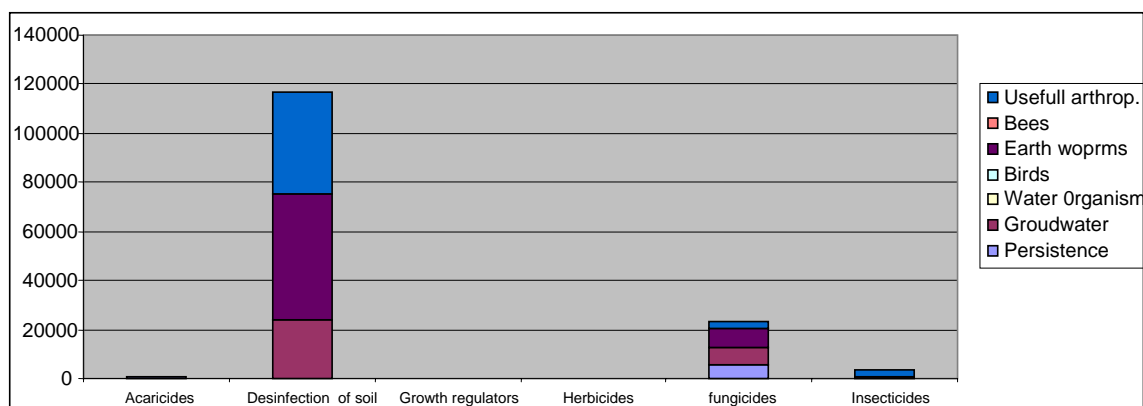   A=   Acaricide

Figure 15.1   POCER-values for the 7 environmental components per category of plant protection products vegetables in greenhouses

Table 15.4 gives the ten most important active substances that are used in the production of vegetables in open air. One can see that Mancozeb, a fungicide, represents 28% of the total quantities used, sulphur comes on the second place with 5%. The third place of Methiocarb is remarkable, this is a product that is used against snails. When the ten most important active substances are classified on the basis of their impact on the environment (POCER value) one can see that Mancozeb and Methiocarb are responsible for a large part of the POCER environmental score. It is remarkable that only five active substances figure in the top ten of substances with the highest use and in the top ten of highest POCER values.

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Table 15.3 *Overview of the use of plant protection products in the production of vegetables in open air in 2003*

Group of crops	Type	Average use (kg/ha)	Total use (kg)
Intensive production of vegetables	Fungicides	7.70	43,724
	Herbicides	4.14	23,468
	Insecticides	2.40	13,619
	Other products	0.63	3,579
	Total	*14.87*	*84,389*
Extensive production of vegetables	Fungicides	5.61	73,335
	Herbicides	2.09	27,344
	Insecticides	1.58	20,660
	Other products	0.72	9,443
	Total	*10.00*	*130,781*
Intensive + extensive production of vegetables	Fungicides	6.28	117,839
	Herbicides	2.75	51,573
	Insecticides	1.84	34,583
	Other products	0.69	12,986
	Total	*11.57*	*216,982*

Table 15.4 *Top 10 of active substances with the highest POCER value 'environment' and the highest use (kg) in the production of vegetables in open air*

	Active substance	Type	Use (kg)		Active substance	Type	POCER-value 'environment'
1	*Mancozeb*	F	61,026	1	*Mancozeb*	F	59,817
2	Sulphur	F	10,811	2	*Methiocarb*	M	19,343
3	*Methiocarb*	M	9,136	3	*Chloorpyrifos*	I	13,601
4	*Maneb*	F	9,029	4	*Dimethoate*	I/A	6,056
5	*Chloorpyrifos*	I	6,924	5	Cyanazin	H	4,364
6	*Dimethoate*	I/A	6,068	6	Furathiocarb	I	4,345
7	Metoxuron	H	5,480	7	Diazinon	I/A	4,095
8	Glyfosate	H	5,421	8	Omethoate	I	3,915
9	Thiram	F	5,387	9	Methabenzthiazuron	H	3,901
10	Propachloor	H	5,136	10	*Maneb*	F	3,803

With F=   Fungicide
      H=   Herbicide
      I=   Insecticide
      A=   Acaricide
      M=   Molluscicide

In figure 15.2 the POCER-value is indicated for the acaricides, de soil disinfectation products, the growth regulators, the herbicides, the fungicides and the insecticides. For each of these groups of active substances the impact on useful arthropods, bees, earthworms, birds, water organisms, groundwater and persistence are indicated. One can

see that the fungicides have a large impact on the environment, especially on water organisms and groundwater. So fungicides have an important impact on the environment, but their impact is not as large as the impact of soil disinfectants. They have especially an impact on earthworms, the groundwater and they have also an impact as they are rather persistent. The same remarks can be made for the herbicides. The insecticides and the other products (mainly molluscicides) have the greatest impact on the arthropods and the water organisms.
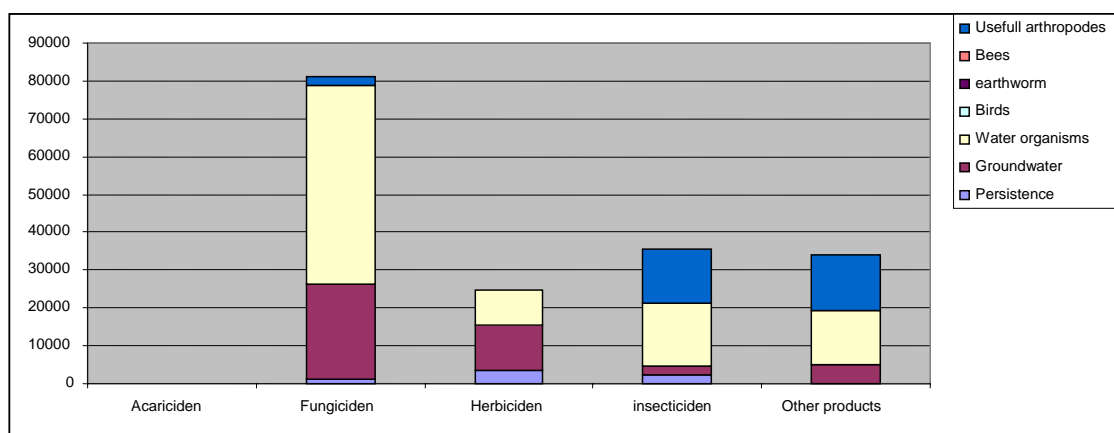

Figure 15.2   POCER-values for the 7 environmental components per category of plant protection products vegetables in open air

15.2.4   The production of ornamental crops

The area of ornamental plants in greenhouses, azaleas excluded, is about 500 ha. There are 400 ha for the production of azaleas, more than 50% of this area is for the production of azalea in greenhouses. Based on the data of the FADN the use of plant protection products in ornamental plants in greenhouses and azaleas was determined. For the production of ornamental plants and tree nursery the number of observations was to low to make reliable estimations. As indicated in table 15.5 about 48 kg of active substances per hectare are used in the production of ornamental plants in greenhouses, about 50% of this quantity is fungicides. It is also remarkable that 15% of the active substances are growth regulators. For the production of azaleas (in greenhouses and in open air) the use of active substances is 44,33 kg per hectare. The share of fungicides is 36%, for growth regulators it is about 27%. As the production in open air of azaleas is rather large it is logic that a lot of herbicides are used.

Table 15.6 gives the ten most important active substances that are used in the production of vegetables in open air. The most important active substance is a growth regulator, namely chloormequat. When the ten most important active substances are classified on the basis of their impact on the environment (POCER value) one can see that Chloormequat stays the most important active substance. Contrary to the production of

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vegetables there is no substance that stands out. Only five active substances figure in the top ten of substances with the highest use and in the top ten of highest POCER values.

Table 15.5   Overview of the use of plant protection products in the production of ornamental plants

| Group of crops	Type	Average use (kg/ha)	Total use (kg)
Production of ornamental plants in greenhouses	Fungicides	26.27	12,914
	Herbicides	2.23	1,096
	Insecticides	5.69	2,796
	Growth regulators	7.07	3,475
	Acaricides	2.19	1,077
	Other products	4.48	2,201
	Total	47.93	23,559
Azalea	Fungicides	16.00	6,412
	Herbicides	9.84	3,948
	Insecticides	5.04	2,021
	Growth regulators	11.84	4,747
	Acaricides	0.28	112
	Other products	1.33	535
	Total	44.33	17,775
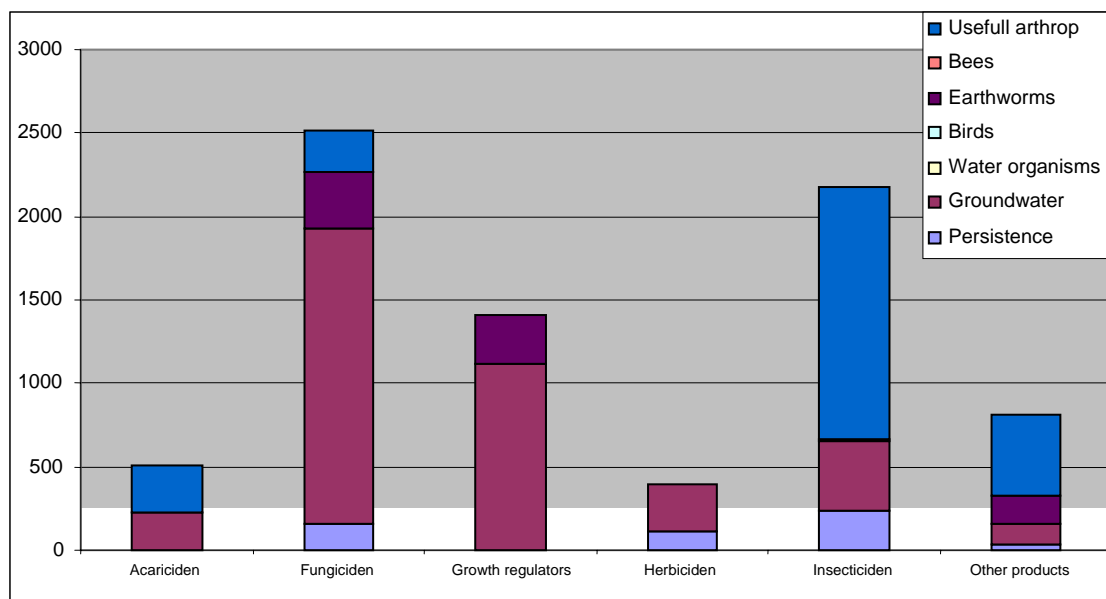
Figure 15.3   POCER-values for the 7 environmental components per category of plant protection products ornamentals in greenhouses

In figure 15.3 the POCER-value is indicated for the acaricides, de soil disinfectation products, the growth regulators, the herbicides, the fungicides and the insecticides. For each of these groups of active substances the impact on useful arthropods, bees, earthworms, birds, water organisms, groundwater and persistence are indicated. One can see that the fungicides, the growth regulators and the insecticides have the largest impact on the environment. Fungicides and growth regulators have an impact on earth worms and groundwater. Insecticides have an impact on the useful arthropods.

Table 15.6　　*Top 10 of active substances with the highest POCER value 'environment' and the highest use (kg) in the production of ornamental plants*

	Active substance	Type	Use (kg)		Active substance	Type	POCER-value 'environment'
1	*Chloormequat*	G	2,592	1	*Chloormequat*	G	1,140
2	Fosethyl	F	1,981	2	Acefaat	I	489
3	Captan	F	1,950	3	Endosulfan	I/A	449
4	*Carbendazim*	F	1,299	4	*Dienochloor*	A	426
5	Thiram	F	1,181	5	*Carbendazim*	F	423
6	*Dimethomorf*	F	908	6	Dichloorvos	I	356
7	*Dienochloor*	A	862	7	Methomyl	I	296
8	*Daminozide*	G	859	8	*Dimethomorf*	F	286
9	Thiofanaat-methyl	F	797	9	*Daminozide*	G	255
10	Propamocarb	F	765	10	Oxamyl	N	252

With	F=	Fungicide	A=	Acaricide
	I =	Insecticide	N=	Nematicide
	G=	Growth regulator		

15.2.5　Fruit production

In Flanders the most important kinds of fruit are apple and pear. The total area of fruit is about 13,600 ha. In the production of fruit 28 kg of active substances are used per hectare (see table 15.7). Almost 80% of this quantity are fungicides, 12% are herbicides and 9% are insecticides. Since 1999 the use of chloormequat, a growth regulator, is forbidden in the production of pears, as a consequence the use of active substances decreased with 6 till 9 kg per hectare. Based on the FADN data the use of active substances in integrated and traditional production could be calculated. In 1998 it was found that for the traditional production of apples about 38 kg of active substances were used per hectare against 28 kg for the integrated production method. For pears, where the traditional method is very close to the integrated method the difference was smaller and the use in the integrated production was even larger than in the traditional method.

Table 15.7   Overview of the use of plant protection products in the fruit production

Group of crops	Type	Average use (kg/ha)	Total use (kg)
Apple + pear (2000/2001)	Fungicides	21.49	283,796
	Herbicides	3.43	45,254
	Insecticides	2.42	31,943
	Acaricides	0.18	2,380
	Growth regulators	0.16	2,129
	Other products	0.84	11,140
	Total	27.65	376,642

Table 15.8 gives the ten most important active substances that are used in fruit production. of vegetables in open air. The most important active substances are Captan and Thiram, two fungicides. There are 8 fungicides in the top ten. is a growth regulator, namely chloormequat. When the ten most important active substances. Contrary to what is noticed for the production of vegetables and ornamental plants most of the active substances that are in the top ten of total use are also in the top ten of the POCER values.

Table 15.8   Top 10 of active substances with the highest POCER value 'environment' and the highest use (kg) in the production of fruits

	Active substance	Type	Use (kg)		Active substance	Type	POCER-value 'environment'
1	*Captan*	F	97,950	1	*Thiram*	F	40,447
2	*Thiram*	F	51,421	2	*Sulphur*	F	27,746
3	*Tolylfluanide*	F	22,591	3	*Dodine*	F	23,544
4	*Sulphur*	F	18,657	4	*Tolylfluanide*	F	22,866
5	*Dodine*	F	15,597	5	*Koperoxychloride*	F	21,486
6	*Mancozeb*	F	14,432	6	*Koperhydroxide*	F	19,368
7	*Koperoxychloride*	F	13,483	7	*Mancozeb*	F	14,071
8	*Koperhydroxide*	F	11,816	8	*Captan*	F	13,604
9	Amitrol	H	11,535	9	Endosulfan	I/A	8,745
10	Mineral oil	I	10,993	10	Chloortoluron	H	8,040

with   F=   Fungicide
      H=   Herbicide
      I =   Insecticide
      A=   Acaricide

In figure 15.4 the POCER value is indicated for the acaricides, de soil disinfectation products, the growth regulators, the herbicides, the fungicides and the insecticides. For each of these groups of active substances the impact on useful arthropods, bees, earthworms, birds, water organisms, groundwater and persistence are indicated. One can

see that the fungicides have the largest impact on the environment with a high score for water organisms, ground water and persistence.
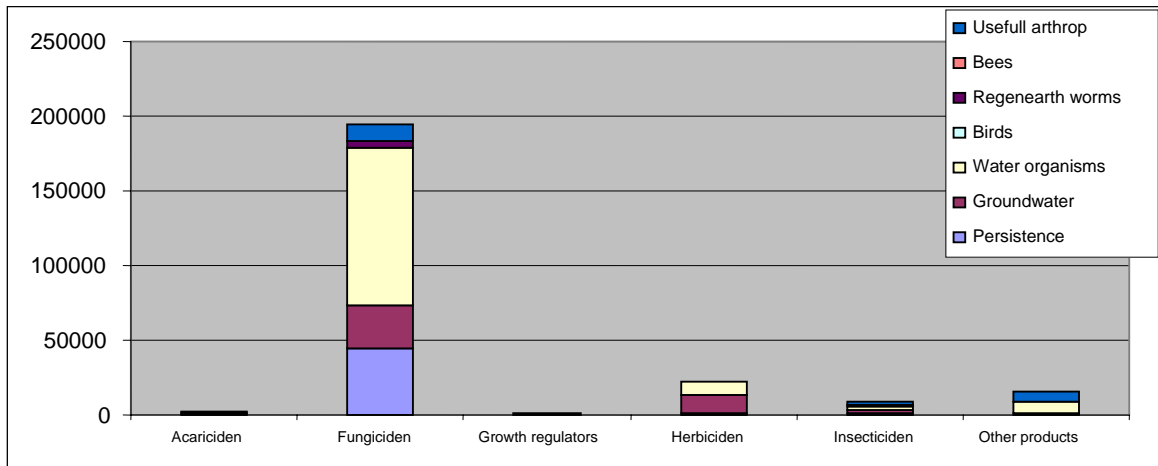

Figure 15.4   POCER-values for the 7 environmental components per category of plant protection products fruit production

15.2.6   Horticulture

Based on the data of the FADN one could calculate for almost the entire Flemish horticulture the use of plant protection products. There is only a lack of data for tree nursery and production of ornamental crops in the open air. For the examined area the use
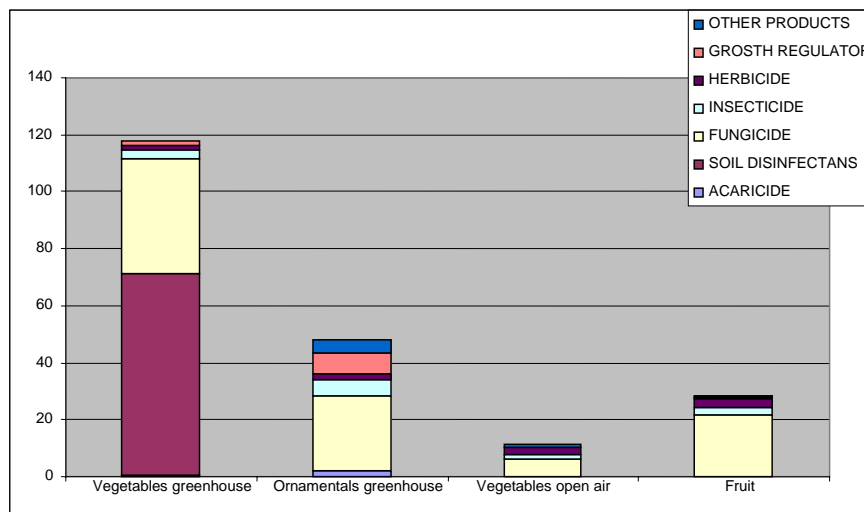

Figure 15.5   Use of (kg/ha) plant protection products per sub sector

of active substances can be estimated at 763 tons. On the basis of a study from the University of Ghent, the estimated use of plant protection products in the Flemish horticulture is almost equal to the quantities used in agricultural production (B. De Smet and W. Steurbaut, 2002). In figure 15.5 the use per hectare is showed for the different sub sectors in horticulture. The use in the production of vegetables in greenhouses is much higher than in the other sub sectors. In this sub sector there is a particular high use of soil disinfectation products. As the use of methylbromide is forbidden the quantities of soil disinfection products is lower than before. As indicated in figure 15.6 the POCER value per hectare is also the highest for the production of vegetables in greenhouses. The same remark as before can be made; the high POCER value is especially due to the use of soil disinfection products (methylbromide) that are now forbidden.

15.3 Use of nutrients

15.3.1 Method

To determine the use of nutrients the same method is used as for the plant protection products. The accountants could introduce in the computer per crop the quantities used of each fertilizer. They could also indicate for each fertilizer the content of nitrogen, phosphorous and potassium. The databank that was obtained was used to calculate the amount of minerals that were used per hectare. Next these data were multiplied with the area of the different sub sectors. Contrary to what was done for plant protection products there was no research on the use of nutrients in Flemish horticulture. The data on nutrients in this study are all data for 2003.

15.3.2 Horticulture

As shown in table 15.9 the nutrient use for the production of vegetables in greenhouses is very high and is more than twice the use for the production of vegetables in open air. The production of vegetables on substrate is very intensive and concerns almost always vegetables that are botanically a fruit with high productions (tomatoes, cucumbers), that is why they need more nutrients. In the hydroponics production no organic fertilizers are used, in the production in ground in greenhouses the accent also is on mineral fertilizers.

In the production of vegetables in open air the use of nutrients is higher for the extensive production as for the intensive production. This may seem a little bit strange because one should expect that the need for nutrients is higher in intensive production. The names extensive and intensive have more to do with the intensity of labour then with higher production. A lot of extensive crops (cabbage, celeriac, and so on) have higher kilogram production than the intensive vegetable crops (lettuce, string-beans and so on), so they need more nutrients. The more in extensive vegetable crops more manure is used than in intensive crops. Extensive vegetable corps are more frequent on agricultural holdings, these holdings keep cattle and so manure is available.

The production of ornamental crops needs less nutrients per hectare than vegetable crops, the more the use of manure is less important than in the production of vegetable

crops. In the study of nutrient use the area of ornamental crops includes all the areas of the crops in greenhouses or in open air, tree nursery was also studied. This was not the case in the study of the plant protection products. It is especially in the tree nursery that manure is used.
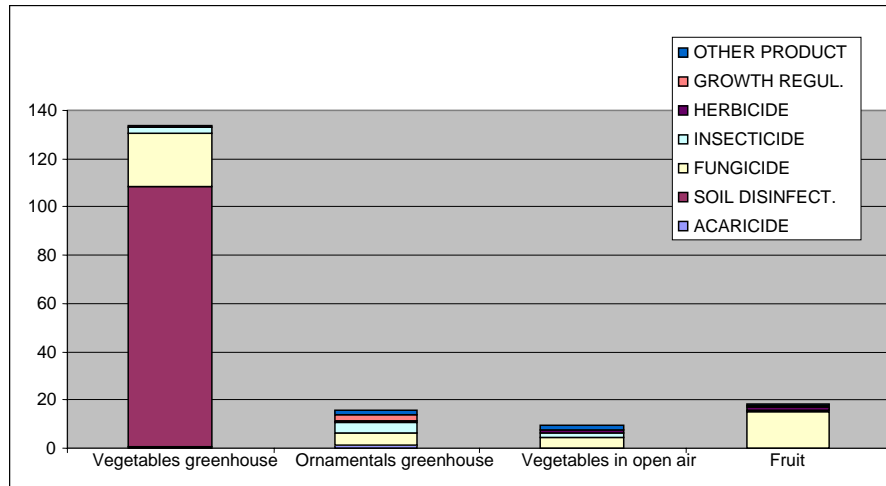

Figure 15.6   POCER-environment per hectare per sub sector

In the fruit production there is a limited use of nutrients. In these perennial crops only the nutrients that leave the field with the fruit have to be replaced. Leaves, prunings, and so on stay in the fields and the nutrients in it will be available for the fruit trees after some time.
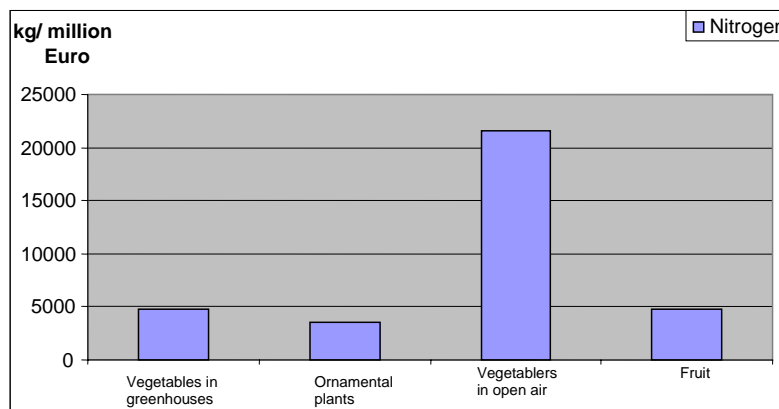

Figure 15.7 Average use of nitrogen per unit of production value in 2003 per sub sector (per million Euro production)

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For some horticultural sectors the use of nutrients is rather high. These high values are linked with an intensive production. Expressing the nutrient use per unit of production value gives another image as is shown in figure 15.7. The calculations were done with the production values that were obtained in the FADN. One can see that per unit of production value the use of nutrients, nitrogen and phosphorus are the highest for the production of vegetables in open air. For the three other sectors, including the production of vegetables in greenhouses, these values are much lower.

Table 15.9   Average use of nutrients in kilogram per hectare for different horticultural sectors in 2003

	N (kg/ha)			P_2O_5 (kg/ha)			K_2O (kg/ha)		
	mineral	organic	total	mineral	organic	total	mineral	organic	total
Vegetables in greenhouses									
On substrate	1933.80	0.63	*1933.43*	963.93	0.33	*964.26*	3315.80	0.07	*3315.87*
In ground	706.08	64.33	*770.42*	287.54	46.70	*334.24*	1116.11	70.71	*1186.82*
Total vegetables	1252.34	35.97	*1288.31*	588.74	26.05	*614.79*	2095.64	39.25	*2134.89*
Vegetables in open air									
Extensive production	128.17	146.33	*274.50*	25.04	79.01	*104.05*	177.08	107.59	*284.67*
Intensive production	143.33	52.88	*196.22*	39.41	28.31	*67.72*	158.95	36.96	*195.91*
Total vegetables in open air	126.43	114.03	*240.46*	30.56	61.52	*92.08*	181.21	83.42	*264.63*
Ornamental crops	135.22	56.48	*191.71*	65.54	26.95	*92.49*	145.65	49.53	*195.18*
Fruit	41.25	8.59	*49.84*	20.51	3.48	*23.98*	50.81	7.63	*58.44*

Table 5.10   Total use of nutrients in the Flemish horticulture

	N (ton)			P_2O_5 (ton)			K_2O (ton)		
	mineral	organic	total	mineral	organic	total	mineral	organic	total
Vegetables in greenhouses	1,632	47	1,679	767	34	801	2,731	51	2,783
Vegetables in open air	3,742	3,375	7,117	904	1,821	2,725	5,363	2,469	7,833
Ornamental crops	696	291	987	337	139	476	750	255	1,005
Fruit	627	130	757	312	53	364	772	116	888
Total horticulture	6,697	3,843	10,540	2,320	2,047	4,366	9,616	2,891	12,509

Table 5.10 gives the total use of nutrients in the Flemish horticulture. The highest use of nutrients is found for the production of vegetables in open air. The use of organic nutrients is rather low in horticulture excepted for the production of vegetables in open air. In that sub sector more than 50% of the nutrients come from manure.

15.4 Conclusions

It seems that for Flanders there are very few reliable data sources on the use of plant protection products and nutrients in horticulture (the same goes for agriculture). The data that are available are only partial and incomplete data. If they are collected then they are collected as part of a research and cover only one crop or a group of crops. Data for the entire Flemish horticulture or agriculture are not available. In this research we found that it was possible to obtain such data on the base of the accountancy data network. Each year the data are available in the FADN. As the accountants use new software to introduce all the data on purchases, productions and so on it is easier and less expensive to work with the data. However it will always ask time and knowledge to estimate the total use of plant protection products and nutrients. This knowledge can be used to improve the quality of the accountancy data, so there is also a benefit for the FADN. It would be very interesting to calculate for each year the POCER values, so the evolution of the impact on the environment can be measured. This offers an instrument of high value to the government in order to monitor environmental problems. It is clear however that this research never will be a routine work and that such research will need a good financing.

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16. Transfer of agricultural properties and agricultural land areas

Finn G. Andersen[42]

Abstracts

In Norway it is an extensive legislation and regulation connected with transfer of agricultural and forestry properties. The purpose of this legislation is to provide suitable conditions to ensure that the land areas including forests and mountains may be used in the manner that is most beneficial to society and the agricultural sector. The regulations are in addition of great importance for pricing agricultural properties and agricultural land areas.

The owner family of an agricultural or forestry property often has a special legally protected right to keep the property in the family's possession. This allodial right is a very old Norwegian right.

Until 2006, capital gains were taxed as ordinary income with a flat tax rate of 28 per cent. From 2006 capital gains are included in the basis for calculated personal income. The taxation of capital gains is now increased from 28 per cent to between 35.8 and 51.3 per cent, depending on whether or not surtax on high income is charged.

The special right to sell agricultural and forestry properties without capital gain tax after a period of 10 years or more as owner of the property, is since 2005 removed for transfers outside the family. Transfers inside the family are still excepted from capital gain tax after an owner period of 10 years or more.

Keywords: agricultural transfer, legal frameworks, allodial, concession, taxation

16.1 Transfer of agricultural properties and legal framework

16.1.1 Introduction

In Norway the transfer of agricultural properties and land areas is extreme regulated of the statutory framework. They most important acts in this area are:
- the Concession Act (Act No. 98 of 28 Nov 2003 - replace Act No. 19 of 31 May 1974);
- the Allodial At (Act No. 58 of 28 June 1974);
- the Land Act (Act No. 23 of 12 May1995).

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This extreme regulation is of great importance for pricing of agricultural properties and agricultural land areas.

The Concession Act determines the social considerations conditions for the purchaser; inter alia that the purchaser has to taking up residence on the property himself and operating it for a minimum of five years.

In connection to the Concession Act has the Ministry of Agriculture and Food given guidelines for valuation of agricultural and forestry properties.

The Land Act gives the guidelines for in which cases agricultural or forestry land can be used for other purposes. The law has also sections about prohibition against division of land properties.

The Land Act has no decision about pricing or valuation. However the Land Act gives strong regulations for in what way the land areas can be disposed. In this way the Land Act will have indirectly influence of the price level.

The Allodial Act is an ancient Norwegian inheritance law intends to keep agricultural and forestry properties in the same family's possession.

If the property is sold out of the family, family members have - on particular conditions - priority to buy the property back within a specified date.

16.1.2   The Concession Act

The purpose of the Concession Act (section 1 in the Act) is to regulate and control the sale of real property in order to achieve an effective protection of agricultural production areas in such a way that ownership and utilization are most beneficial to society, inter alia, in order to provide for:
-      the needs of future generations;
-      agricultural industry;
-      the need for development sites;
-      consideration for the environment, general interests of nature conservation and outdoor recreation;
-      consideration for settlements.

There are some transfers that don't need concession. These exceptions are:
-      exceptions based on the character of the property:
    - undeveloped land areas if they are located in an area that is regulated by a local development plan for other than agricultural use or that is designated as a development area by the land-use part of the municipal master plan;
    - built-on property not exceeding 10 ha, where not more than 2 ha of the area are fully cultivated;
-      exceptions based on the status of the acquirer. Concession is not necessary when the acquirer:

- is the owner's spouse or is related by blood to the owner or the owner's spouse in a direct line of ascent or descent or in the first collateral line of the owner or owner's spouse including children of siblings, or is related by marriage to the owner in a direct line of ascent, provided that the owner's concession is in order;
- has an allodia entitlement to the property.

In the acquisition of agricultural and forest properties with a total area more than 10 ha, or where more than 2 ha are fully cultivated, dispensation from the concession requirement is conditional upon that the acquirer take up residence on the property within one year and stay there and operate the farm himself for a minimum of five years. The acquirer may fulfil the operation obligation by renting out the farmland as additional land to another agricultural property for a minimum of ten years.

The acquirer's duty to taking up residence on the property is personal and can not be fulfilled in that way that another person takes residence on the property.

If the acquisition is conditioned on concession, different factors are of importance for the decision whether the acquirer shall get concession or not:
- provide the agreed price for a socially justifiable price development?
- take the acquirer's purposes into account the interests of settlements in the area?
- involves the acquisition an operationally satisfactory solution?
- is the acquirer regarded as qualified to work the property?

An application for a concession pursuant to this Act shall be sent to the Chairman of the Municipal Council of the municipality where the property is located.

Principle of valuation

The Ministry of Agriculture and Food has given guidelines for valuation of agriculture properties in cases where concession is necessary:
- cultivated land and forest area: utility value;
- out buildings and other constructions: replacement value (written-down);
- farmhouses and other domestic buildings: replacement value (written-down) or annual letting value;
- rights (hunting rights, fishing rights, pasture rights etcetera) and other resources: utility value or replacement value.

The guidelines from The Ministry of Agriculture and Food provide that the capitalization rate of interest have to be 4 per cent. Before 2001 the rate of interest was 7 percent. In 2001 the interest was reduced to 5 per cent for forest but still 7 per cent for agriculture. From 2004 the interest rate is 4 per cent both for forest and agriculture. Chattels are to be valuated separately and it not regulated by the Concession Act.

16.1.3   The Land Act

The purpose of the Land Act is to provide suitable conditions to ensure that the land areas in the country including forests and mountains and everything pertaining thereto (land

resources) may be used in the manner that is most beneficial to society and to those working in the agricultural sector. This is supplementary described in section 1 in the law:

> *'Land resources should be disposed in a way that ensures an appropriate, varied system of use with a view to the development of the local community and with emphasis on settlement, employment and effective solutions.*
> *Ensuring that resources are used in a manner beneficial to society entails taking into account the fact that the resources shall be disposed of with a view to the needs of future generations. Land resource management shall be environmentally sound and, among other things, take into consideration protection of the soil as a production factor and preservation of land and cultural landscapes as a basis for life, health and well-being for human beings, animals and plants.'*

The Land Act shall apply to the entire country, but some areas are except from the act. Inter alia the act doesn't concerns areas as in accordance to the Planning and Building Act have been allocated for purposes other than agriculture.

In accordance with section 12 in the Act, property that is used or may be used for agriculture or forestry can not be divided without the consent of the Ministry. The term property also includes rights appurtenant to the property.

The prohibition against division shall also apply to tenancy, long-term leases entitling the lessee to build a house on the property and similar leases or right of use of part of the property when the said right has been established for a period of more than ten years or cannot be revoked by the owner/lessor. The prohibition against division has been maintained for properties of 0.5 ha.

The Land Act has no definition of property that is used or may be used for agriculture or forestry. In the law there are no exact demands to minimum area, farming system or whether the farm is operated as an enterprise or not.

The prohibition against division can also include rental cabins, ski slopes, downhill slopes, camping sites etcetera if these activities are connection to the farm enterprise

16.1.4   The Allodial Act

Allodial privilege is a very old right as give one family a special legally protected right to keep a property in the family's possession The property has to be a agricultural or forestry property or a part of such properties.

The allodial Act determine the minimum size of the property to 0.5 ha agricultural land or 10 ha of productive forestry land. The allodial privilege include only for the real estate. Chattels as belongs to the farm are not included in the allodial privilege.

The allodial right difference between allodial land and land capable of being vested with allodial rights and. Land capable of being vested with allodial rights is land without allodial rights, but as for the moment is free from allodial rights.

An acquirer will be a holder of an allodial right when she or he has been the owner of the property for 20 years. The allodial right is only for agriculture and forestry properties. The descendant will automatically get the allodial right if the owner in the earlier generation had allodial right to the property. If the property transfers to a new owner

without allodia right to that special property, the property will be free of allodial right until the new owner has been owner in 20 new years.

The oldest of the children and her or his descendants has the best allodial right. The sex of the children is of no signification according to the allodial right.[43]

The Allodial Act has approached the same rule for taking residence on the property and to operate the farm as the Concession Act. Only physical person can get allodial right and not juridical persons.

16.1.5   Change in agricultural policy

The transfer price for agricultural and forestry properties is strongly regulated by the Concession Act and the guidelines from the Ministry of Agriculture and Food. However about the last 10 years the agricultural authorities have accept a rising in the price level. Especially has this change effect for farms in the neighbourhood of cities and other urban areas; - first and foremost for the price for the dwelling house at the farm.

The capitalization rate of interest has gone from 7 to 4 per cent in a few years. This change in the rate level is of big importance for the increase in the price level for farms selling in the open marked.

Concession is not necessary for sale of a farm inside the family. The price level for family sale is therefore free. Most of transfers of farms in Norway take place inside the family.

The rule in both the Concession Act and in the Allodial Act about that acquirer has to take resident at the farm in not less than five years, is much discussed in Norway. The purpose for this rule is to maintain the settlement pattern in rural area. At the same time the rule can prevent development in both rural and urban areas, but may be most in rural areas.

Most of all farms in Norway are personal owned. The middle size of a Norwegian farm is little compare with farms in Western Europe. More and more farmers therefore have started co-operation in the enterprise. Co-operating is most usual in the milk production. One reason for this is the system of milk quote. It is most common that to farms co-operate in the milk production. Each farmer still owned each farm himself but they manage the enterprise together in a partnership. Both the Concession Act and the Allodial Act will obstruct to put the farms area into a company or a partnership.

More and more of the farmers start other industries on the farm. This can be tourist enterprises, small-scale food production, contractor operations etcetera. Often it will be difficult to division the different enterprises. Inter alia because of this it will be more and more difficult to have too special rules for agriculture in some area.

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[43] Until 1965 a younger brother had better allodia right than an older sister.

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16.2 Taxation

16.2.1 Income tax

Since 1990 it have been two tax reforms in Norway; - one in 1992 and a new one in 2006. The Norwegian income tax system has since 1992 been based on a two-tier structure. Taxable income is split in two different parts as ordinary income and personal income. Ordinary income as capital income is taxed at a flat tax rate of 28 per cent. Personal income as income from employment and pensions is taxed progressively.

The main purpose for the tax reform in 1992 was to reduce tax-induced distortions to a minimum by lowering the tax rates and broadening the tax base. Until 2005 it was big difference between the level of taxation of capital and wage income; - 28 per cent flat rate for capital income and 51.3 per cent marginal tax rate exclusive employers' social security contributions.

The difference in the maximum marginal tax rates between wage and capital income created tensions in the tax system, i.e. by increasing the incentives for tax planning. This circumstance was the main reason for initiating a new tax reform in 2006.

Table 16.1   Direct Taxes and Thresholdes etc. for 2006

Employee's National Insurance contribution	
Wage income	7.8 per cent
Income from self-employment within agriculture, forestry and fisheries	7.8 per cent
Other income from self-employment	10.7 per cent
Pension income etc.	3.0 per cent
Lower threshold for the payment of employee's National Insurance contributuon	NOK 29,600
Surtax	
Bracket 1 - rate	9.0 per cent
Bracket 1 - lower threshold	NOK 394,000
Bracket 2 - rate	12.0 per cent
Bracket 2 - rate	750,000 NOK
Tax on ordinary income	
Individuals	28 per cent
Maximum effective marginal rates	
Ordinary income (individual taxpayers and corporatins)	28.0 per cent
Dividends received by invidual taxpayers (as per cent of distributed dividends)	48.2 per cent
Wages, excl. employers' social security contribution	47.8 per cent
Wages, incl. employers' social security contribution	54.3 per cent
Income from self-employment in agriculture, forestry and fisheries	47.8 per cent
Other income from self-employment	50.7 per cent
Special allowance applicable to income from self-employment within agriculture etc.	
Income-indepent allowance	NOK 36,000
Allowance rate above income-independent allowance	19.0 per cent
Maximun overall allowance	NOK 71,500

16.2.2   Taxation of self-employment income

16.2.2.1   Generally

From the fiscal year 2006, the earlier split-income model for taxation of income from self-employment is replaced by various taxation models. Contrary to the split-income model, these models are designed differently for various types of business enterprises. One of the main goals of the new tax system is to reduce the current difference between capital and labour taxes.

16.2.2.2   Companies

Private limited and cooperative companies are taxed according to *the shareholder model*. Companies have to pay 28 per cent tax on profits in the same way as before 2006, but in addition from 2006, personal shareholders have to pay once more 28 per cent tax on the share of dividends exceeding the protective allowance. The aggregate tax rate then will be 48.16 per cent (28% + (100-28) * 28%). The allowance is usually the share's cost price multiplied by a risk-free protective allowance rate, which is fixed at about 3 per cent. Capital gains from realisation of shares will also be taxed according to the same principle.

    Profits kept within the company and not distributed to the shareholders as dividends, are still subjected to only 28 per cent tax. The second step of 28 per cent tax is not charged before dividends are distributed.

16.2.2.3   Partnerships

The shareholder model is also the basis for the design of the *partnership model* for companies tax-assessed as partnerships (general partnerships and apportioned liability partnerships). Labour income is no longer calculated in such partnerships. The taxable result is still determined at the company level and each partner takes his share of the result for taxation as ordinary income (28 per cent tax). In addition, the funds distributed among the partners are subject to 28 per cent tax, according to the same principles as the shareholder model.

    Neither the shareholder model nor the partnership model distinguishes between active and passive shareholders and partners, or the ownership share of individual shareholders or partners in a company. After the tax reform 2006, the shareholders and the partners must have paid employment in the enterprise to obtain personal income, and obtain social security rights.

16.2.2.4   Sole proprietorships

Sole proprietorships are taxed according to *the source-based model*, which distinguish between ordinary and personal income. The earlier *capital yield basis* before 2006 is replaced with *the protective allowance basis*, which is determined in the same way as the main rule in the split-income model. The protective allowance (protective allowance basis multiplied by the protective allowance rate) is taxed as ordinary income.

The source-based model can be distinguished from the other two models in that profits always are to be taxed in the year they were generated, even if all or some of the profits are kept within the company.

Since the distinction between passive and active business participants is omitted, personal income is to be calculated for all income from self-employment in sole proprietorships, even if own labour input in the proprietorship is below 300 hours per year. This change especially have a negative effect on forest owners who do not farm themselves, as many of these outsource all of their forest operations to forest contractors or forest owner associations. Since the 300 hours jointly applied to agriculture and farming, the removal of the 300-hour rule will not affect those operating combined farm/forestry enterprises, no matter if they work in the forest themselves or not.

16.2.2.5   More business enterprises in agriculture?

The vast majority of farm enterprises are nowadays organized as sole proprietorships. Concession and land tenure regulations limit the inclusion of real estate in the formation of business enterprises. However, it has become increasingly common to form businesses for the organization of farm operations, especially as joint operations in the dairy sector. The new taxation models may contribute to an acceleration of business enterprise establishment in agriculture.

16.2.2.6   Capital gains generally

Until 2006 capital gains were taxed as ordinary income with a flat tax rate of 28 per cent. From 2006 capital gains are included in the basis for calculated personal income. The taxation of capital gains is now increased from 28 per cent to between 35.8 and 51.3 per cent, depending on whether or not surtax on high income is charged.

16.2.2.7   Capital gains and agriculture

Capital gains with transfer of agricultural real estates (entire properties or parts thereof) have been tax-free if the seller has owned the farm for 10 years or more. The relationship between seller and buyer had no consequence for the exemption from taxation. The exemption concerned both family sales and sales on the free market. It was neither any condition that it still was farming on the property. The only condition for the exemption from taxation was that the seller had been the owner of the farm for 10 years or more. The tax-free included assets as land, buildings and other constructions and milk quota if it was sold as a part of the farm sale.

In the Budget proposal autumn 2004 the Government would take away the special arrangement of tax-free sale of agriculture and forestry properties. The conclusion of this proposal is that exemption from capital gain tax is removed for sales *without the family*. How long time the seller has be the owner of the farm, has no signification. Sales *within the family* are still tax-free, but the condition for tax-free sale is limited. The concept of family is limited to persons who are interstate heirs in accordance with the Inheritance Act;

this means relatives including cousins. The exemption from capital gain tax is still determined on that the seller has been the owner of the farm for 10 years or more.

Some simplified capital gain is the difference between historical cost and the sale price. Generally it is a long time lag between buying and selling a farm. Therefore it is given access for adjustment of historical cost of non- depreciable assets with the exception of the farmhouse i.e. farmland, forest area and outlying fields. It is given a specially regulation about this adjustment of historical cost. The adjustment of historical cost according to this regulation is much higher than an adjustment according to consumption price index. The access for adjustment include only sales which would be exempted from capital gain tax if the farm or the forest were sold before 31 December 2004 according to the old regulations.

16.2.2.8   Taxation of capital gains with transfer of real property in sole proprietorship

Until 2006
Generally: 28 per cent tax as ordinary income
Agricultural or forestry properties
      The seller has been the owner for
      10 years or more: No tax at all
      Less than 5 years: 28 per cent tax as ordinary income
      Between 5 and 10 years   Tax on part of the capital gains

After 2006
Generally: Until 50.7 per cent as personal income
Agricultural and forestry properties (from 2005)
      Selling outsides the family: As the generally rules with until 47.8 per cent independent of how long time the seller has owned the property
      Transfers within the family: No capital gain taxation if the seller has be the owner of the property 10 years or more. The price must not exceed 75 per cent of estimated sales value

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Workgroup Session 1
Towards Global networks of data exchange; what steps to make?

Theme of session 1

In the best tradition of the stakeholder orientation that we often use in PACIOLI, we started with a classical brainstorm on the needs of stakeholders. In the previous presentations Mrs. Moreddu and Mr. Daatselaar explained that they would like to exchange aggregated micro economic data.

In this workgroup session we identified the stakeholders for each initiative, and the do's and don'ts per stakeholder. Using a flip over, each group was asked to brainstorm ideas for the question: 'How can we please the different stakeholders of the initiative, and how can we make them mad?'

Group A: OECD initiative on micro economic data for distribution analysis
Group B: LEI initiative on global dairy farming
Group C: OECD initiative on micro economic data for distribution analysis
Group D: LEI initiative on global dairy farming

Group composition

Group A		*Group C*	
Chair:	Finn Andersen	Chair:	Dineke van Zwieten
Reporter:	Hans Vrolijk	Reporter:	Fredrik von Unge
	Josip Juracak	Members:	Gezim Ramqaj
	Jasna Mikulecky		Marcin Cholewa
	Elektra Tzanellou		Boris Tacquenier
	Ashok Mishra		

Group B		*Group D*	
Chair:	Koen Boone	Chair:	Beat Meier
Reporter:	Katrin Nagelschmitz	Reporter:	Torbjørn Haukås
Members:	Jasna Matić	Members:	Dirk Van Lierde
	Zaklina Jurisic		Marina Miksic
	Apostolos Polymeros		Zdenka Berak

Group A
(OECD)

Stakeholder	DO	DO NOT
OECD	- Provide thorough analyses in the cheap and best way	- Postponing - Not giving accurate data - Running away with the idea
Delegates	- Accurate data for their country	- Messy data, contradictory data for their country
Data collectors (CSO,FADN)	- Recognition for their hard work - Approvement of their data	- Question the quality of the data - Data abuse (other use) - Individual data on the street
Policy maker Agro-non agro National-local	- Provide support for their ideas/decisions - Provide new insights	- Showing the incorrectness of their policy
Research institutes	- Recognition of their good work - Opportunity to cooperate in a network	- Question their approach - Give the assignment to a competitor
Farmers union	- Show the need for support	- Don't respect privacy - Just treat them as enterpreneurs - Collect to much information
Environmental groups	- All support should be dependent on the environmental performance - Include chapter on environmental impact	- Ignore environmental aspects
Financial institutions	- Thorough practical analyses on financial position	- No accurate data

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Group B
(LEI)

Stakeholders	DO	DO NOT

Farmers (= data source + data user)	- Clear methodology
	- Low burden methodology
	- Quick results
	- Quick access to relevant info
	- Useful information for decision-making for:
	   - Farmer
	   - Farm advisor
		- Too much administration
		- Too much obligation (data source and user)
		- Too high costs 'one more fee'
		- Data instead of information
		- Confidentiality issue
		- Used for purposes that are not in interest of farmers

Dairy Processors Dairy trade organisation	- Accurate trends - Accurate analysis - Better performing suppliers (farmers)	- High cost - Most useful information - Information also to competitors (vs. exclusive access)
Policy makers (Government; Administration)	- Useful information for policy - Transparent, reliable data - Added-value - Network leads to better performing farmers	- High cost - Duplication - No data access - Non-comparable data; not representative

Group B (continuation)

|		

Researchers
Educational Institutions
	- Good methodology
	- Distinct methodology
	- Availability of data in a flexible way (at the most detailed level!)
	- A venue for researchers to publish their work, exchange research
	- Direct contact to farmers for:
	  - Researcher
	  - Educators
	- Relevant for educational purposes
	- Attractive for educational purposes
		- Outdated data (for researchers)
		- Missing values
		- Lack of userfriendliness
		- Lack of documentation (researchers)

Consumers of dairy products
 	
they want:
- low price
- food safety
- sustainable production (animal welfare, environment)
	- Information that leads to better decisions of:
	  - Farmer
	  - Policy makers
	- Information also on:
	  - Food safety
	  - Production technology
	  - Sustainability issues
	- Information available to *all* farmers
		- Cost of network to government, farmers, etc.
		- Use of data in a way that does not lead to higher welfare of society

Media (agriculture)	1	2

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Group C
(OECD)

Stakeholder	DO	DO NOT
OECD - Committees - Directorates	- Access to data - Personal network - Clear priorities - Goor interactivity	- Legal restrictions - Low comparability - Too large network - Costly
Ministries of OECD MS	- Good policy advice - Correct use of microdata - Useful data/comparable data	- Sensitive data (not in line with politics) - Costs
Research Institutes/ Universities (planning bureaus/others/ consultants *general question:* *how does OECD* *compensate for the data* *collection and analysis*	- Benefit from OECD reports - Contribute to OECD reports - Share experiences	- No feedback
Farm interest groups/NGO's	- Use of data for lobbying	- Sensitive data (not in line with own goals)
Industry?		

Group D

(LEI)

Stakeholders	DO	DO NOT
Dairy-farmers	- Good information - Individual feedback to farmers - To be representative 'for what'	- Break privacy - Ask them to pay - Giving data to non-members - Try to make it representative - Collect and not use data - Critizise the rest of the producers (small) - Give information on cost of production to dairy industry
Dairy farmers organisations	- Good information	- Give information on cost of production to dairy industry
Cooperations farmers and processors	- Good information - Make valuable forecasts	- Try to make it representative
Dairy industry	- Good information - Make valuable forecasts	- Try to make it representative
Research institutes	- Good information - Projects and data - High level of details	
Private extensions	- Good information - Projects and data - High level of details	
Public extensions	- Good information - Projects and data - High level of details	
FADN-institutes	- Good information - To different from FADN	- To copy the FADN-institutes
IFCN	- Good information	

Policy makers	- Good information - Make valuable forecasts - To be representative 'for what'	- Ask them to pay
Consumers	- Good information - Make valuable forecasts - Increase the quality of the milk production - Lower production costs	- Industrial production
Supply companies (feed, etc.)	Good information Process innovation	
Non dairy producers	Good information Process innovation	Making dairy more competitive

Responsibility

FADN

IFCN

Level of detail

GDF
EDF

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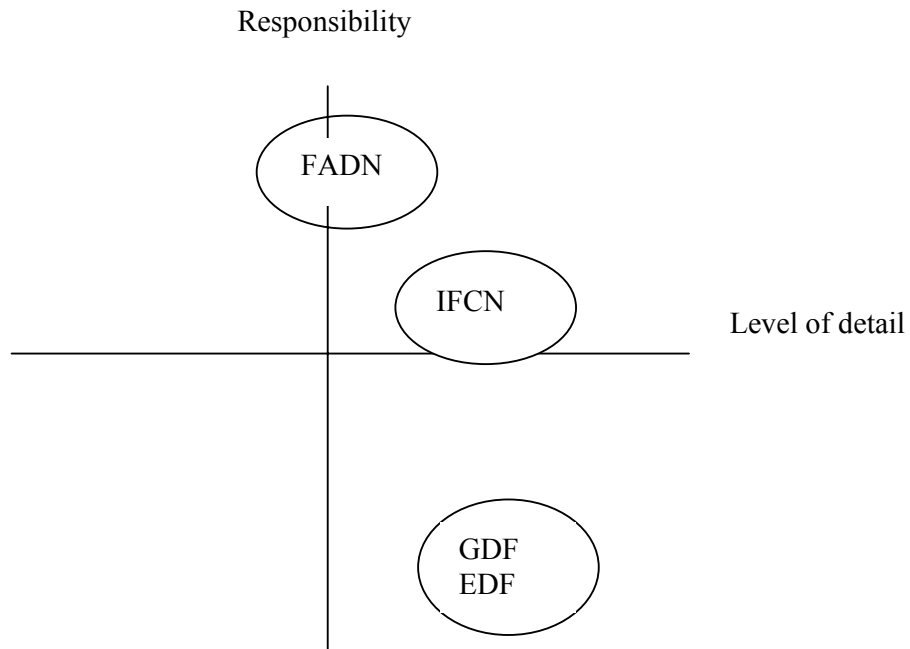
Workgroup Session 2
How to develop an ideal FADN

Theme

Based on our experience and the previous presentations we exchanged our know how on the management of FADNs by designing together the 'ideal FADN'. How would the ideal FADN look like?

To foster creativity we applied lateral thinking (the shifting of thinking patterns away from entrenched or predictable thinking to new or unexpected ideas).

Every group got a paper with the name of an object and benefits of the object were written down. When this list was more or less complete and no new aspects could be identified, we tried to imagine what these aspects would mean in an FADN context.

Group composition

Group A
Chair: Dirk Van Lierde
Reporter: Ashok Mishra
Members: Jasna Mikulecky
           Jasna Matić
           Koen Boone
           Torbjørn Haukås

Group B
Chair: Hans Vrolijk
Reporter: Boris Tacquenier
Members: Josip Juracak
           Marina Miksic
           Apostolos Polymeros

Group C
Chair: Katrin Nagelschmitz
Reporter: Elektra Tzanellou
Members: Gezim Ramqaj
           Zdenka Berak
           Finn Andersen

Group D
Chair: Beat Meier
Reporter: Marcin Cholewa
Members: Zaklina Jurisic
           Dineke van Zwieten
           Fredrik von Unge

Group A
(LION)

Benefits	FADN	Step
- strong	- reliable	3
- brave	- standarisation + innovative	5
- dangerous	- independent	2
- sleeps a lot	- tentative/clear mind	
- lazy	- planning	
- effective	- effective	4
- king	- dependance/leading role	6
- knowledge	- developing of experties	
- clever	- flexible	5
- beautiful	- pr/user-friendly	1
- nice hair	- attractive application	1
- teamwork	- specialisation/cooperative with stakeholders	1
- scary	- make simple/familiar with	1

Steps

1. Identify user needs
2. Translate needs on aspects
3. Pilot FADN
4. Evaluation with stakeholders
5. Convince the stakeholders about reliability etc.
6. Feedback - corrections
7. Implementation
8. Improvement/identify user needs, technological developments

Group B
(UMBRELLA)

Benefit	FADN	Importance 1-5
Protection	- Privacy - For good policy	5 5
Coverage	- Historical data/time series - Representative - Broad set of data	3 4 3
Foldable	- Aggregating data different criteria	4
Easy to use	- Clearly defined -> metadata - Methods how to use - Collection, storage - Userfriendly interface for quick results, slideshow - Good IT solutions	5 4 2 3 4
Proven technology	- Harmonise data/standarisation - Since 1965! - Learning from mistakes - Experience - Applications/users	5 1 4 5 4

Diverse design/ looks	- Tailormade systems -> requirements of the country
	- Different sample sizes -> results
	- Variables
	- Different sectors
	    - horticulture
	    - agriculture
	    - (aquaculture)
	    - forrestry
	    - fisheries
	- IT-systems
	
	Not that important for ideal FADN
		2
		
		1

Disadvantage	FADN	Importance 1-5
Only use it when it rains	- New views/applications -> as useful as possible - More exposure of the results	4
Fragile (windy)	- Not us it for wrong purposes	
Threat	- Independant/objective institute	5

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Group C
(SWEATER)

Benefit	FADN
Warm	- Warm contact with farmers
Nice	- Nice person/nice organisation

Useful	- Useful for policy makers
	- Data collectors also give:
	  - useful advise
	  - are very knowledgable

Breathable	- Breathable (relief; solution) for policy makers and researchers to find data they need
Absorbant	- Get data from many different farms

Flexible	- Flexible for many types of research for:
	  - many different countries
	  - needs of national countries, EU, other institutions

Modern/advanced	- Computerized; electronically available
Has to fit	- Provides information for EU to make good decisions
Good quality (to last a long time)	- Good quality numbers
Bargain (good value for money)	- Pay to get good data

Attractive	- Attractive for:
	  - researchers
	  - farmers (e.g. report returned)

Necessary	- Necessary for:
	  - farmers
	  - politicians
	  - researchers

Group D
(FLY)

Benefit	**FADN**
Positive	
- Observant	- Adjust very quickly to certain need *
- Uncatchable	- Persistant role in economic discussion *
- Fragile	- Clear, common methodology, strong ***
- Good senses	- Comparable **
- Unpredictable	- Predictions
- Adjustable	- Independency
- Intensive live but short	- Technically advanced
- Fertile	- Efficiency *
	- Broad dissemination to the public and other stakeholders **
Negative	
- Boring	- Useless
- Nasty	- Communication
- Contagues	- Not only adding but also excluding = flexibility of the data
- Distracting (interrupting)	- Balance between comparability and adaptability *****

* = participants gave stars to benefits thought as most important (they had 3 stars to give away)

Workgroup Session 3
How to develop FADN in a rural actor database

Theme

In this workgroup session we discussed aspects of a database on all rural activities and actors. We have done this with Open Space technology (originally developed by Harrison Owen, USA). Open Space is based on the idea that the most interesting things are discussed and exchanged in the corridors and the bar, not in a meeting.

Open Space has four principles:
1. whoever comes to a discussion, they are always the right persons;
2. whatever happens: that's fine;
3. it starts when it starts;
4. it ends when it ends.

And there is one big rule: the law of *voting with your feet*. If you have the impression that you're in a place where you can't learn anything or can't contribute anything, just leave for a better place.

At the beginning of this Open Space we have put four themes on a flip chart in different places:
1. content of the database;
2. stakeholders of the database;
3. data sources;
4. tables to be created from the database for policy reports.

Content of the database

Micro economic????

- information about land ownership and land use
- average of income (total)
- employment
- demographical info (No. of inhabitants, age, education, occupation, …)
- distance to school and shops
- economic activities
- recreation - community centres, libraries
- participation in community activities
- infrastructure: roads/public transport
- environmental: water/land/mountain
    - fertilizer
    - chemicals used
    - crop protection
    - forests
    - manure/minerals
- geographical: location/landscape
- rural business (number, employment, …)
- investments
- agricultural activities, farm related activities, nature management

Stakeholders

- local authorities -> how to define the regions?
  - communities
  - counties
- state
- farmers associations (regional and national)
- research institutes (central and regional)
- all business people on the countryside
- potential investors
  o constructors
  o prospectors
- environmental groups
- people living on the countryside
- people organizing social activities
- political parties
- people visiting (tourist) + tourist boards
- different organizations
- chamber of commerce
- financial institutes
- (big) investors
- EU comm./EU investment bank
- Worldbank (developing countries)
- OECD
- News agencies

Sources for rural actors database

Network

- Official statistics
- Governmental offices: State (MAF, ENV, ...), Regional, Local
- Not govern.: International (OECD, FAO, WB, EBRD, EU …)
- Tax register/VAT register
- Farm register -> IACS/LPIS Animal reg.
- FADN   · Social security Funds (pension)
- Banks (credits)
- Farm structure survey
- Chambers: agricultural, economic, crafts
- Farmers organizations and cooperations and associations
- Facuties and institutes
- Processing industry (dairy, imputs, slaughtering, etc.)
- Extension service
- NGO's
- Environmental monitoring system
- Cadastre and land books
- Meteorological institutes
- Remote sensing - GIS

WHAT ABOUT SOCIAL PEOPLE INDICATORS?

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Tables for policy reports

Policy officers
> We need a 'marketing approach' in relation to the tables we want to communicate. Content of tables differs from the public / the audience -> is it for the Ministry, for the EC, for the newspaper…..

No tables -> Graphics

If yes, than tables should be clearly explained, through headings, titles, etc.

Mirror for region (which is responsible itself for own development) on (economic) vitality.

Attractiveness	Dynamics
for living, moving-in	Growth in income?
attraction foreign companies	Growth in population?
landscape	type/size companies
cultural supply	R&D investment / innovation
	New start-ups

Interim-conclusion:
Now FADN focuses on extra data on non-farm activities of farmers
We need: Database on micro-economic data of businesses + households (in rural areas).

Is there a theory of 'Economic Vitality' that helps to identify tables/data?

- data should span rural-urban for:
  - benchmarking
  - comparisons
  - dynamics over time

- social cohesion rural and urban
to investigate what the rural problem actually is

- Distances are not important but time-distances (45 min. commutation) and this effects impacts on shops available

Rural/regional context

How to cope with the multi-actor/multi-level/multi-sector dimensions?

It is not possible to get an overview -> Who is to help?
                                                -> And how?

Make an expert(persons)-database (formal solution)   ⟶   no: social network
(and prohibit pre pension-schemes in case of   website like hyves.nl, etc.
braindrain)

What informal solutions   -> workshops
                                -> regioinal activities
                                -> future conferences
                                -> network building (who takes the load
                                     depends on our motivation)

Losers and Winners -> what is at stake
                          competitiveness between institutes
                          Use ICT-solutions, websites

To link an expert database to (a) existing network(s)

Look for examples/success stories

Make meta databases
E-bay system for expertise knowledge indicators

Let experts advertise on their website

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What is a rural area?

- Population density   # people/km² (country specific)
    - which area to measure
    - percentiles

- % commuters/type of work

- distance to a big city
    - physical
    - travelling/perceived

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