

Sample of Dutch FADN 2008

Design principles and quality of the sample
of agricultural and horticultural holdings



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of agricultural and horticultural holdings

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Mede voor de Europese Unie organiseren het CEI en het LEI jaarlijks de verzameling van technische en financieel-economische gegevens van circa 1.500 bedrijven in de akkerbouw, tuinbouw en veehouderij. Alle gegevens worden vastgelegd in het Bedrijven-Informatienet. In dit rapport wordt verantwoording afgelegd over de steekproef 2008, toegespitst op de Nederlandse bijdrage aan het Farm Accountancy Data Network van de Europese Unie. De diverse fasen, van het opstellen van het selectieplan, het werven van de bedrijven tot het beoordelen van de kwaliteit van de resulterende steekproef worden beschreven.

The EU Farm Accountancy Data Network (FADN) requires the Netherlands to yearly send bookkeeping data of 1,500 farms to Brussels. This task is carried out by LEI and CEI. For national policy purposes additional data are collected, such as pesticide use, manure production, nature management, non-farm income and rural development. This report explains the background of the farm sample for the year 2008. All phases from the determination of the selection plan, the recruitment of farms to the quality control of the final sample are described in this report.

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Preface

The EU Farm Accountancy Data Network (FADN) requires the Netherlands to yearly send bookkeeping data of 1,500 farms to Brussels. This task is carried out by LEI and CEI. This report explains the background of the sample for the year 2008. All phases from the determination of the selection plan, the recruitment of farms to the quality control of the final sample are described in this report. This report provides essential background information for the European Commission, the Dutch Ministry of EL&I and researchers of LEI and other organisations to fully understand the statistical aspects of the Dutch FADN sample.



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Summary

S.1 Key results

The European Commission requires the yearly establishment of a selection plan describing the sample of agricultural and horticultural holdings in the Dutch FADN. This report describes how this requirement is fulfilled for the year 2008.

The number of agricultural and horticultural farms in the agricultural census is 75,000 in the year 2008. The Dutch FADN aims at farms between 16 and 2,000 European size units (ESU). This field of observation covers 57,500 farms which are responsible for 90% of total production capacity.

For the bookkeeping year 2008, 1,511 farm reports have been delivered to the European Commission. The legal obligations of 1,500 farms has been fulfilled. The data are of major importance in the evaluation of the agricultural policies and the monitoring of the economic developments in the agricultural sector.

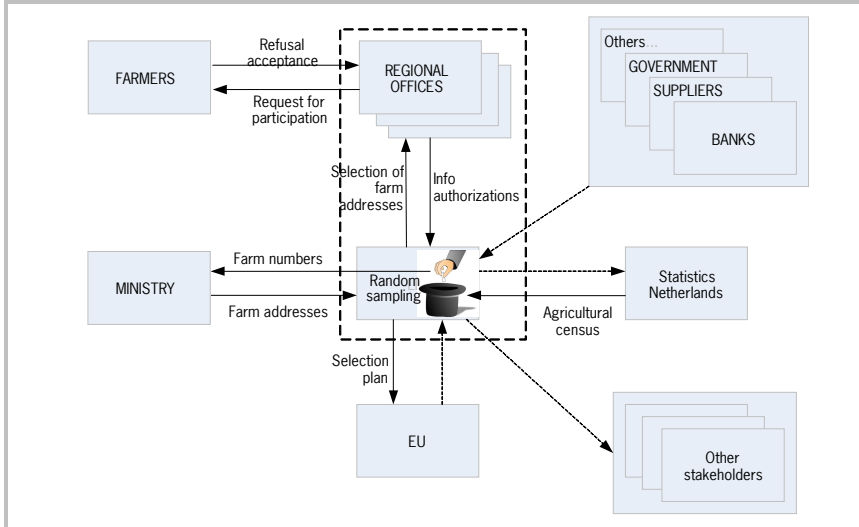
In the design of the selection plan, a stratification based on type of farming and size class has been used. Stratification enables a better control over the representativeness of the sample and contributes to more reliable estimates.

S.2 Complementary findings

This report describes all phases of the sample for the year 2008, from the determination of the selection plan, the recruitment of farms to the quality of control of the final sample. With this information it provides a solid description of the background of the sample for users of the data or results of the Dutch FADN.

The perceived value to a farmer in providing data and in the Dutch FADN in general are important factors determining a farmer's willingness to participate or not. Also the trust of a farmer that LEI will treat the data with utmost confidentiality is an important factor.

Figure S.1 **Sampling and selection procedures**



S.3 Background

The European Commission requires the yearly establishment of a selection plan for the Dutch contribution to the EU FADN. The selection plans contribute to the harmonisation of the samples from different countries in the EU.

The agricultural census provides the sampling frame for selecting farms to be included in the FADN. Based on the most recent agricultural census, farms are assigned to strata, which are defined by type of farming and economic size class.

For each stratum the number of farms to be included in the Dutch FADN sample is determined. This number is dependent on the economic importance of a sector, the number of farms in a stratum, the policy relevance of a group and the heterogeneity of farms.

Farms are randomly selected from the agricultural census. The selected farms are contacted with a request for participation in the Dutch FADN. The farms that are willing to cooperate are taken into administration. The farms that refuse to participate are asked a few questions to enable an analysing of the reasons and potential effects of non-response.

Samenvatting

S.1 Belangrijkste uitkomsten

De Europese Commissie vereist ieder jaar het opstellen van een selectieplan waarin de opbouw van de steekproef van land- en tuinbouw bedrijven wordt beschreven. Deze publicatie beschrijft hoe aan deze verplichting is voldaan.

Het aantal bedrijven in land- en tuinbouw is 75.000. Het Bedrijven-Informatienet richt zich op de bedrijven tussen de 16 en 2.000 Europese grootte-eenheden. Dit zijn circa 57.500 bedrijven die verantwoordelijk zijn voor meer dan 90% van de totale productiecapaciteit.

Voor het jaar 2008 zijn 1.511 bedrijven aangeleverd aan de Europese Commissie. Hiermee is voldaan aan de wettelijke eis van 1.500 bedrijven. Deze gegevens zijn van grote waarde voor de evaluatie van het gemeenschappelijke landbouwbeleid (GLB) en het monitoren van de financieel-economische situatie in de land- en tuinbouw.

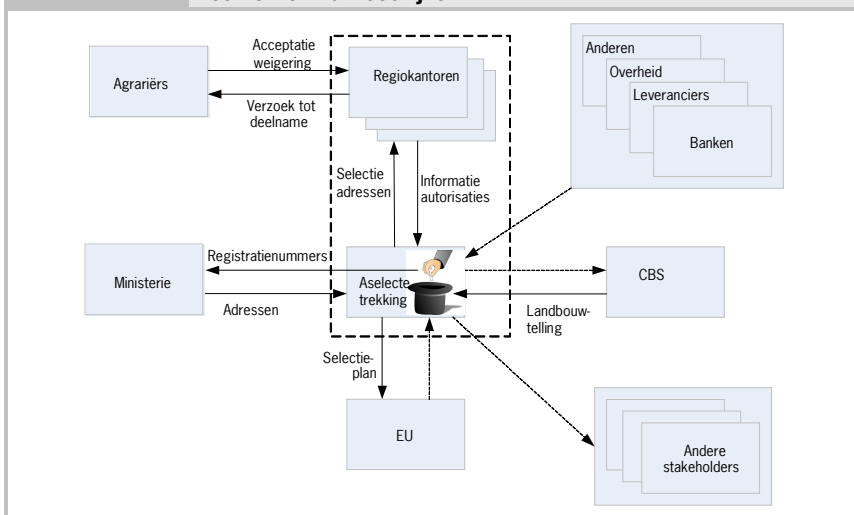
In het selectieplan is gebruik gemaakt van een stratificatie naar bedrijfstype en economische omvang van bedrijven. Stratificatie draagt bij aan een betere representativiteit en betrouwbaarheid van schattingen.

S.2 Overige uitkomsten

Deze rapportage beschrijft alle fasen van het tot stand komen van de steekproef voor het jaar 2008. Het opstellen van het steekproefplan, het werven van de bedrijven tot het beoordelen van de kwaliteit van de resulterende steekproef komen aan de orde. Hiermee geeft het belangrijke informatie voor gebruikers van gegevens en resultaten van het Bedrijven-Informatienet.

Het nut dat een boer ziet in het beschikbaarstellen van gegevens, en in het Bedrijven-Informatienet zijn belangrijke factoren die bepalen of een boer al dan niet wil deelnemen. Ook is het vertrouwen van een boer dat het LEI zorgvuldig met zijn/haar gegevens omgaat een belangrijke factor.

Figuur S.1 **Procedures voor het vaststellen van de steekproef en het werven van bedrijven**



S.3 **Achtergrond**

De Europese Commissie vereist dat jaarlijks een selectieplan wordt opgesteld. Dit selectieplan draagt bij aan de harmonisatie van informatienetten in verschillende EU-landen.

De landbouw telling vormt het uitgangspunt voor het vaststellen van de steekproef voor het Bedrijven Informatienet. Op basis van de meest recente landbouw telling worden bedrijven ingedeeld in strata, die zijn gevormd op basis van het bedrijfstype en de economische omvang.

Voor elk stratum wordt vastgesteld hoeveel bedrijven in de steekproef moeten worden opgenomen. Dit aantal is afhankelijk van onder andere de economische betekenis van de sector, het aantal bedrijven in de groep, de beleidsrelevantie en de heterogeniteit van bedrijven.

Bedrijven worden aselect getrokken uit de landbouw telling. Vervolgens worden deze bedrijven benaderd door het LEI met het verzoek om deel te nemen aan het Informatienet. De bedrijven die willen deelnemen worden in de administratie opgenomen. De bedrijven die niet willen deelnemen, worden enkele vragen voorgelegd, zodat zicht wordt verkregen op redenen en consequenties van non-response.

1 Introduction

1.1 Objective of the report

In 1965 the European Commission adopted a regulation (nr. 79/65/EEG) in which member states were obliged to set up a network for the collection of accountancy data on the incomes and business operation of agricultural holdings in the European Economic Community. The purpose of the data network is defined as the annual determination of incomes on agricultural holdings, and a business analysis of agricultural holdings. The Netherlands were required to provide financial economic information on 1,500 farms to Brussels.

For the management of the system, the EU requires information on the selection of farms that are included in the national FADN systems. In particular the regulation prescribes the provision of data on the establishment of a selection plan and the recruitment of farms.

With respect to the selection plan the regulation EEG 1859/82 prescribes (article 6):

'Each Member State shall appoint a liaison agency whose duties shall be: [...] to draw up and submit to the National Committee for its approval, and thereafter to forward to the Commission:

- the plan for the selection of returning holdings, which plan shall be drawn up on the basis of the most recent statistical data, presented in accordance with the Community typology of agricultural holdings.'

This report provides all the relevant background information on the population, the selection plan, implementation of the selection plan and quality of the sample of data that it to be provided to Brussels and which forms the basis for a wide range of national and international research projects.

1.2 Structure of the report

Chapter 2 gives a description of the background of the Dutch FADN system. Chapter 3 describes the agricultural population in the year 2008. This chapter will also consider the demarcation of the population as used in the Dutch FADN. Also the design of the sample of the Dutch FADN system is described. Chapter 4 reports on the selection plan 2008. Chapter 5 provides information on the implementation of the selection plan and the recruitment of new farms. Chapter 6 provides a qualitative and quantitative evaluation of the sample 2008.

2 Statistical background of the Dutch FADN sample

2.1 Introduction

In the Dutch FADN detailed records on 1,500 agricultural and horticultural farms are kept. Besides financial economic information, a broad set of technical-economic, socio-economic and environmental-economic data is collected. One of the reasons for the Dutch FADN system is the legal obligation to provide information on the financial economic situation of farms to Brussels. However, an even more important use of the data can be found at the national level. Data from the FADN system is used for many national policy evaluations and research projects.

Based on a sample of farms, estimations are made for the whole population. This might raise the question how conclusions can be drawn for the whole population if only a limited number of farms are observed. The answer to this question can be found in the selection of farms that are included in the sample. A cook also does not eat all the soup to judge the quality of the soup. It is important to stir well before tasting; the spoon of soup should reflect all flavours in the pan of soup. The spoon of soup should be representative of the whole pan of soup. The same is true for the FADN sample. The farms that are included in the FADN should be representative of the whole population. In this way a sample can provide better information than a census (in which all units are observed). With a fixed budget it is much easier to collect good data on a limited number of farms instead of collecting information on all farms. With a limited number of farms and thus a limited number of data collectors, it is easier to ensure good procedures and good training to collect reliable data.

An important issue is how to ensure that the farms that are included in the FADN sample are representative of the whole population. Use is made of a disproportional stratified random sample. A stratified sample implies that the population is divided into a number of groups. Subsequently farms are selected from each of the groups. The variables on which the groups are defined should be relevant variables to make sure that the farms that are included in one group are similar (at least with respect to the important aspects). Using this stratifica-

tion, and selecting farms from each group, ensures that farms from all groups and consequently with different characteristics are included in the sample.

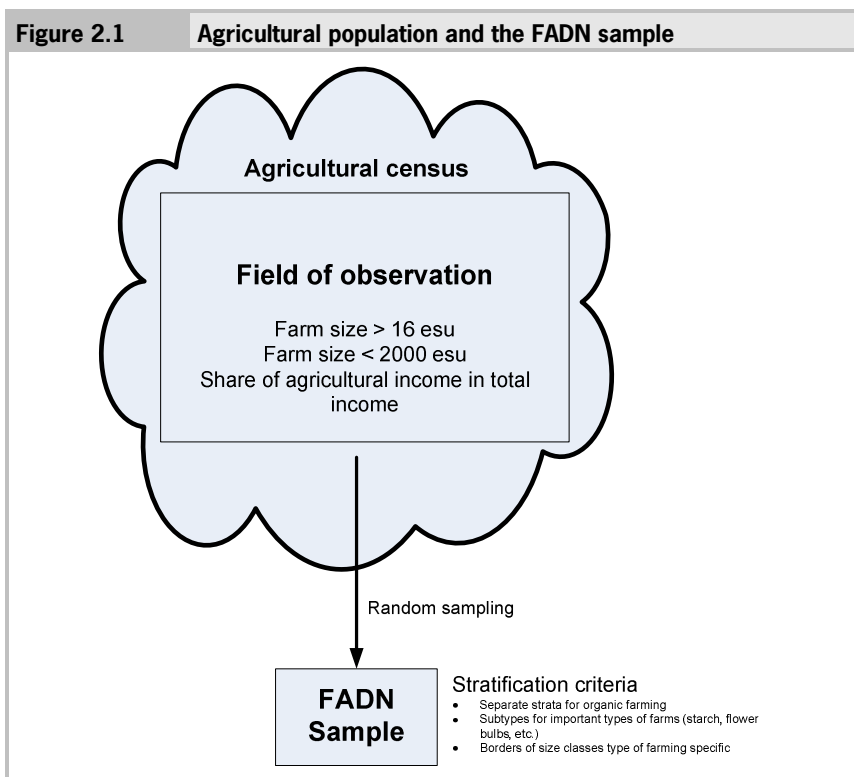
Disproportional means that not all farms have the same chance of being included in the sample. Groups which are relatively homogeneous, i.e. farms which show large similarities, have a lower chance of being included in the sample. After all, if all the farms are very similar, a limited number of observations is enough to draw reliable conclusions (in the extreme case that all farms are exactly identical, it would be enough to have only one observation). In case of less homogeneous groups it is important to have a larger number of observations to make reliable estimates. The choice of the stratification variables has therefore an important impact on the quality of the sample.

This way of selecting farms makes it possible to make unbiased estimates for the whole population of farms. Stratification assures that farms are selected from all groups, thereby allowing estimations for all groups. All groups together make up the whole population. In the FADN this is achieved by assigning a weight to each sample farm. The weight is calculated by dividing the number of population farms in a group by the number of sample farms in the same group. Stratification also improves the representativeness in case of non-response. If a farm which is asked to join the FADN system refuses, another farm in the same size class and of the same type of farming can be selected. If there is a difference between the selection plan and the actual implementation, stratification helps to improve the representativeness by taking into account the real sampling fraction.

Finally, stratification makes the maintenance of the sample easier. Due to attrition and changes in the population it is sometimes necessary to supplement certain groups. Stratification makes a more focused replacement possible.

The relationship between the agricultural population and the FADN sample is presented in Figure 2.1. The agricultural census provides an almost complete description of the agricultural population. Part of this census or part of this population is defined as the field on observation in the FADN. In the definition of the field of observation a lower threshold and an upper threshold are applied. Furthermore, an additional criterion on the share of agricultural income in total income is used. These criteria will be further discussed.

Figure 2.1 Agricultural population and the FADN sample



Lower threshold

The lower threshold of 16 ESU has been used for a long period. It is specified in the legislation underlying the FADN. The historical background was to distinguish small farms which were only held as a hobby or as side activity from real commercial farms producing for the market. Although the number of farms excluded from the field of survey is quite substantial, the percentage of production value which is not covered due to this threshold is very limited.

Upper threshold

The upper threshold was introduced to exclude some non-agricultural organisations from the field of observation. The agricultural census contains some organisations with a lot of land but which are not considered as agricultural holdings (examples are airports, nature organisations and in earlier days organisations which managed the reclamation of land from water bodies). Furthermore

the inclusion of these very large farms would result in a substantial decrease in the reliability of estimates due to the large heterogeneity of these farms. Another practical reason to exclude the large farms is the complexity and size of the bookkeeping and therefore the large demand for limited human resources.

In order not to judge each individual holding, an upper threshold was introduced to exclude these from the field of survey. Due to the growth in size of farming in especially horticulture it was decided to increase the upper threshold in order to fulfil the requirement to cover at least 90% of the agricultural productivity.

At the current moment a project is being undertaken to assess whether farms above the threshold can be included in the sample in the future. Issues to be addressed will be: are large farms willing to cooperate, how they can be motivated, is the farm comparison report useful for them, how much resources will it take to administer these farms, etcetera. Based on the results of this project a decision will be made whether the upper limit will be maintained in the future.

Other income sources

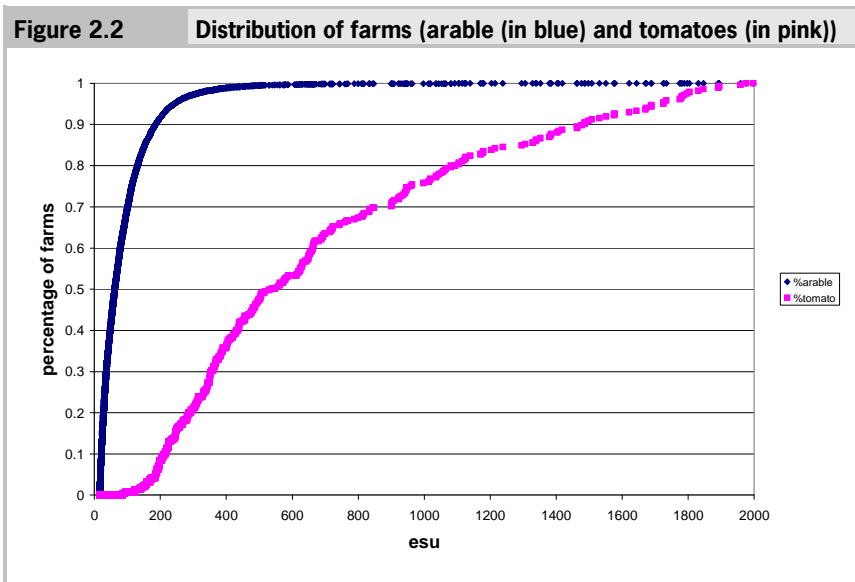
For practical and methodological reasons a limitation on 'other income of the holding' is used. In earlier times the rules were not clearly specified. Firms with a high share of other income sources were excluded from the sample because of practical reasons such as the impossibility to allocate costs and revenues to different activities, firms would refuse to participate anyway because they cannot be motivated to participate, etcetera. Recently clear rules have been specified whether a firm belongs to the field of observation or not. A firm should have at least 16 ESU from primary agricultural activities, at least 25% of the turnover should come from primary agricultural activities and agricultural activities - in the broadest sense, so as to include other gainful activities - should be the largest share of turnover of the holding.

Stratification criteria

Given these three criteria the field of observation of the FADN system is defined. Within this field of observation a stratification scheme is used. The stratification of the Dutch FADN is based on size of farming and type of farming. Although these criteria are similar to those used by the commission, a more detailed look reveals substantial differences with the EU stratification. Differences are for example the use of separate strata for organic farming, and in several types of farming more detailed subtypes of farming are specified which are relevant for

Dutch Agriculture (for example starch potato farms, flower bulb farms, horticultural farms by type of production).

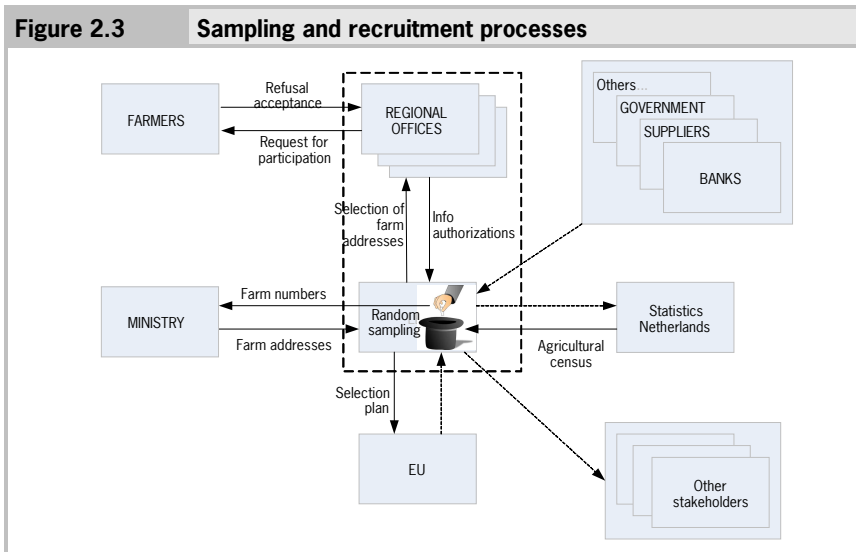
The Dutch situation is somewhat more complicated due to the fact that the size classes are different within different types of farming. The size distribution of, for example, horticultural farms is completely different than the size distribution of arable farms. This is illustrated in Figure 2.2. This figure illustrates that almost all arable farms are smaller than 400 ESU; almost 70% of the tomato growers are larger than 400 ESU. To take these differences into account the borders of the size classes have been established for each type of farming separately. Despite this complication the strata are still a cross section between types of farming and size-classes. In total 98 strata have been defined.



2.2 Sampling and recruitment processes

Figure 2.3 presents an overview of the sampling and recruitment processes. The agricultural census from the Statistics Netherlands (CBS) is the starting point for the random sampling of farms. The random sampling takes place based on the selection plan as submitted to the European Commission. The selection plan will be further described in Chapter 4. Based on the selection plan

farms from the agricultural census are randomly drawn. This census (as available to researchers) does not contain addresses but only farm identifiers. These farm identifiers are sent to the ministry and the ministry returns the addresses. These addresses are forwarded to the regional offices that are responsible for contacting farmers to request their participation. The farmers either refuse or accept the request to participate; this recruitment process and the non-response will be described in Chapter 5. The regional offices collect the authorisations and forward them to the central office in The Hague. These authorisations are used to receive electronically available information from banks, suppliers, governmental institutions and others. The information on the acceptance and refusal of farmers is also used to verify the quality of the sample (see Chapter 6).



3 2008 Population

3.1 Introduction

This chapter will describe the population or, more precisely, the field of observation as covered by the FADN sample. A lower threshold is used to define the field of observation. This threshold and the consequences of this threshold will be described in Section 3.2. Section 3.3 describes the strata which are used to divide the population. Section 3.4 reports the number of farms in each of the strata.

3.2 Defining the field of observation

Collecting detailed information at farm level requires considerable time and money. To assure an efficient and effective allocation of the available budget, the sample design focuses on certain groups in the population. Given the limited capacity it is important to apply a sampling procedure that optimises the reliability of the sample estimates (through stratification).

Regulation 1859/82 of the EU Commission (adapted by regulation EEG no. 3548/85) defines the population (field of observation) for the Dutch FADN as those farms with a size of more than 16 European size units (ESU). Until 2001 this threshold was translated into 16 Dutch size units (DSU), which is roughly similar to 18.7 ESU. For the statistical use of the data and the comparability of results it was considered advisable to apply the ESU threshold. Therefore the lower limit of the Dutch FADN system has been 16 ESU since the year 2001.

In addition to a lower threshold there is also an upper threshold. This upper threshold has been adjusted every few years to take into account the growth of the average size of farms. Until 2001 the upper threshold was 800 DSU. In 2001 the upper threshold was raised to 1,200 ESU. The percentage of farms and the agricultural output excluded due to this upper threshold has been growing since 2001. For this reason the upper threshold has been increased again to 2,000 ESU.

Table 3.1 Number of farms and their relative economic importance (measured in European size units - ESU) in the 2008 agricultural census		
	Number of farms	Percentage ESU
All farms in the agricultural census (a)	75,152	100
Minus farms less than 16 ESU	17,541	1.73
Minus farms larger than 2,000 ESU	203	7.96
Total of non covered farms (b)	17,744	9.69
Total of covered farms (a) - (b)	57,408	90.31

The increase has been introduced on a trial basis in 2006 and has been integrated in the sample and weighting scheme starting from the year 2007. In this report all analyses presented are based on the upper threshold of 2,000 ESU. In 2008, 203 farms were excluded from the field of observation because of the upper threshold of 2,000 ESU. These farms were responsible for 7.96% of the total production (see Table 6.2 for additional information). This is a large increase compared to the 6.37% in 2007. Due to the lower threshold 17,541 farms were not covered by the FADN sample. Although this is a large number of farms, they are only responsible for 1.73% of the total production capacity. This is a slight decrease compared to 2007 (1.83%). The population (field of observation) of the Dutch contribution to the EU FADN system is displayed in Table 3.1.

3.3 Design of the stratification scheme

Farms are allocated to strata according to the following stratification variables: type of farming and size class. In the past, a more detailed stratification scheme was used, but this resulted in numerous practical problems due to empty or nearly empty cells. Combining cells can easily lead to a distortion in the calculated results (a bias). Farms of a certain type of farming are divided into 3 or 4 size classes. In the last years 3 size classes were used. The increase from 3 to 4 size classes is caused by the increase of the upper threshold. Increasing the upper threshold without replacing the whole sample in the largest size class results in distorted samples.

In total 29 types of farming are distinguished (see Table 3.2). For a number of types of farming a distinction is made between organic farming and non-organic farming. A compromise was found to fulfil the increasing demand for research on organic farms. Random selection of organic farms from the total population would result in a very low number of observations because of the low proportion of organic farms. The definition of separate strata would result in many practical problems. The number of strata would double. The problem of empty or nearly empty strata would increase seriously. In line with the existing stratification, a number of types of farming were selected where organic farming is especially relevant. The types that were originally selected were: field crop farms, dairy farms, field vegetables and combined crop farms (Vrolijk and Lodder, 2002). The growth in the organic sector was however lower than expected and aimed for by policy makers. This resulted in practical problems in the recruitment of organic farms, for example due to the fact that the number of farms according to the selection plan was close to or even higher than the actual number of farms in the population. To deal with this problem a number of organic strata have been combined. 'Organic field crops farms', 'field vegetables' and 'combined crop farms' have been integrated in one stratum 'organic crop farms' (Vrolijk, 2006).

The breakdown in subtypes is as follows: 'field crop farms' have been itemised into 'starch potato farms', 'organic crops' and all 'other field crop farms'. The 'vegetables under glass' farms have been broken down in 'paprika', 'cucumber', 'tomato' and 'other'. 'Cut flowers under glass' are divided into 'roses', 'chrysanthemums' and 'other cut flowers'. The dairy farms are split into organic and non-organic dairy farms. Within 'field vegetables' and the 'combined crop farms' the organic farms have been separated. These are subsequently combined with the organic field crop farms.

The final stratification and the size thresholds for each of the strata are displayed in Table 3.2. The size classes 1 and 2 have remained the same, size class 3 has been slightly redefined due to the introduction of the 4th size class in certain types of farming. This redefinition has been based on practical criteria. A more thorough analysis of the definition of the strata will be made in the transition of standard gross margins to standard outputs as a base for the definition of farm size and types of farming.

Table 3.2 Stratification of the Dutch FADN sample				
Type of farming	Size class			
	1	2	3	4
<i>Field crop farms</i>				
- Starch potatoes	16-66	66-140	140-2,000	
- Organic crops	16-45	45-90	90-2,000	
- Other field crop farms	16-73	73-178	178-2,000	
<i>Horticulture</i>				
<i>Vegetables under glass</i>				
- Paprika	16-245	245-480	480-900	900-2,000
- Cucumber	16-201	201-393	393-800	800-2,000
- Tomato	16-269	269-518	518-1,100	1,100-2,000
- Other	16-106	106-336	336-600	600-2,000
<i>Cut flowers under glass</i>				
- Rose	16-260	260-495	495-900	900-2,000
- Chrysanthemum	16-194	194-373	373-750	750-2,000
- Other	16-142	142-342	342-550	550-2,000
Plants	16-186	186-464	464-850	850-2,000
Other glass	16-108	108-292	292-500	500-2,000
Field vegetables	16-86	86-257	257-2,000	
Fruit	16-64	64-139	139-2,000	
Nurseries	16-85	85-251	251-2,000	
Mushroom	16-188	188-445	445-900	900-2,000
Bulbs	16-185	185-477	477-900	900-2,000
Other open air	16-116	116-356	356-2000	
<i>Grazing livestock</i>				
<i>Dairy</i>				
- Organic	16-86	86-128	128-2,000	
- Non-organic	16-89	89-159	159-2,000	
Calf fattening	16-64	64-150	150-2,000	
Other grazing livestock	16-47	47-146	146-2,000	

Table 3.2		Stratification of the Dutch FADN sample (continued)			
Type of farming	Size class				
	1	2	3	4	
<i>Intensive livestock</i>					
Breeding pigs	16-116	116-263	263-2,000		
Fattening pigs	16-60	60-161	161-2,000		
Integrated pig farms	16-129	129-253	253-2,000		
Laying hens	16-138	138-345	345-2,000		
Poultry	16-100	100-203	203-2,000		
Other intensive livestock	16-113	113-261	261-2,000		
<i>Combined</i>	16-81	81-206	206-2,000		

3.4 Number of farms in the 2008 population

Table 3.3 presents the number of farms in the population (2008 agricultural census). In this table the stratification according to size class and type of farming is applied as described in Table 3.2.

Table 3.3		Number of farms per stratum according to the 2008 agricultural census				
Type of farming	Size class					
	1	2	3	4	total	
<i>Field crop farms</i>						
- Starch potatoes	406	357	192	0	955	
- Organic crops	57	68	108	0	233	
- Other field crop farms	3,627	2,127	766	0	6,520	
<i>Horticulture</i>						
<i>Vegetables under glass</i>						
- Paprika	43	104	83	58	288	
- Cucumber	42	80	66	27	215	
- Tomato	35	58	81	55	229	
- Other	373	226	67	52	718	

Table 3.3 Number of farms per stratum according to the 2008 agricultural census (continued)

Type of farming	Size class				total
	1	2	3	4	
<i>Cut flowers under glass</i>					
- Rose	57	78	87	45	267
- Chrysanthemum	67	48	58	22	195
- Other	678	569	202	155	1,604
Plants	415	330	168	120	1,033
Other glass	249	189	70	60	568
Field vegetables	445	272	135	0	852
Fruit	592	581	292	0	1,465
Nurseries	892	683	404	0	1,979
Mushroom	103	57	26	22	208
Bulbs	382	278	131	72	863
Other open air	679	369	135	0	1,183
<i>Grazing livestock</i>					
<i>Dairy</i>					
- Organic	111	106	83	0	300
- Non-organic	5,299	8,768	4,100	0	18,167
Calf fattening	380	490	289	0	1,159
Other grazing livestock	5,477	2,194	326	0	7,997
<i>Intensive livestock</i>					
Breeding pigs	600	528	163	0	1,291
Fattening pigs	859	523	189	0	1,571
Integrated pig farms	358	434	185	0	977
Laying hens	541	312	55	0	908
Poultry	158	182	74	0	414
Other intensive livestock	76	46	23	0	145
Combined	2,644	1,638	822	0	5,104
Total	25,645	21,695	9,380	688	57,408

This table shows that 57,408 farms fall within the field of observation. Dairy farms are clearly the largest group of farms. This is a decrease of 2.3% compared to the 58,787 farms in 2007. Almost one in every three farms is classified as a dairy farm.

4 2008 Selection plan

4.1 Introduction

The allocation of the total capacity of sample farms is based on the relative importance and the heterogeneity of the different types of farming (see Dijk et al., 1995a and Vrolijk and Lodder, 2002). Within each type of farming an optimal stratification (determination of thresholds of size classes) and optimal allocation has been applied (distribution of sample capacity over the different size classes). In the introduction of the 4th size class practical considerations such as the availability of sampling farms have been considered (see Vrolijk et al., 2009).

4.2 2008 Selection plan

The design principles of the sample of the FADN system facilitate an efficient alignment with the goals of the system (see Chapter 2). A summary of the 2008 selection plan is provided in Table 4.1. Given the goals of the FADN system the numbers provided in the table are the required number of observations per type of farming.

For the samples of 2007 and 2008 the changes are related to the increase of the upper threshold. To anticipate this development in 2006 a start has been made to increase the number of sample farms in those farm types that have at least more than a few farms above 1,200 ESU. This concerns the glasshouses (vegetables as well as flowers), plant growers, mushroom growers and bulb growers. These are the types of farms where the share of production above the upper limit increased substantially during the last years.

Table 4.1		Desired sampling size per type of farming (selection plan) 2008		
Type of farming	Code	Number of farms		
		main type	type	sub type
<i>Field crop farms</i>	1	210		
- Starch potatoes			30	
- Organic crops			30	
- Other field crop farms			150	
<i>Horticulture</i>	2 + 3	530		
Vegetables under glass	2012		134	
- Paprika				34
- Cucumber				33
- Tomato				34
- Other				33
Cut flowers under glass	2022		108	
- Rose				34
- Chrysanthemum				32
- Other				42
Plants	2022		44	
Other glass	other 2022 and 2013, 2023, 2039, 349 (>50% glass)		30	
Field vegetables	2011		30	
Fruit	3210		40	
Nurseries	3480		40	
Mushroom	2033		32	
Bulbs	2021		42	
Other open air	other 2022 and 2013, 2023, 2039, 349 (<50% glass)		30	
<i>Grazing livestock</i>		410		
Dairy	4110, 4120, 4370		330	
- Non-organic				300
- Organic				30
Calf fattening	4380		30	
Other grazing livestock	4410, 4420, 4430		50	

Table 4.1 **Desired sampling size per type of farming (selection plan) 2008**
(continued)

Type of farming	Code	Number of farms		
		main type	type	sub type
<i>Intensive livestock</i>	5	230		
Breeding pigs	5011		50	
Fattening pigs	5012		50	
Integrated pig farms	5013		40	
Laying hens	5021		30	
Poultry	5022		30	
Other intensive livestock	other 5		30	
<i>Combined</i>	6, 7 and 8	120		
Total		1,500		

5 Recruitment of farms in 2008

5.1 Basic principles for 2008

The recruitment for 2008 took place in the autumn of 2007. An assessment was made of the farms available for the FADN system for 2007 and 2008 (considering farms dropping out of the system). Part of the recruited farms were still used for the bookkeeping year 2007, the others were included in the system starting from the year 2008.

5.2 Elaboration of selection plan

Table 5.1 gives a more detailed description of the selection plan as presented in Table 4.1.

Table 5.1 Detailed selection plan 2008 per stratum					
Type of farming	ESU size class				
	1	2	3	4	total
<i>Field crop farms</i>					
- Starch potatoes	10	10	10		30
- Organic crops	10	10	10		30
- Other field crop farms	45	51	54		150
<i>Horticulture</i>					
<i>Vegetables under glass</i>					
- Paprika	9	13	8	4	34
- Cucumber	9	13	6	5	33
- Tomato	9	9	8	8	34
- Other	10	10	8	5	33
<i>Cut flowers under glass</i>					
- Rose	11	9	9	5	34
- Chrysanthemum	10	9	9	4	32
- Other	13	14	10	5	42
Plants	12	13	13	6	44
Other glass	10	10	6	4	30

Table 5.1 Detailed selection plan 2008 per stratum (continued)					
Type of farming	ESU size class				
	1	2	3	4	total
Field vegetables	10	10	10		30
Fruit	12	14	14		40
Nurseries	13	13	14		40
Mushroom	10	10	8	4	32
Bulbs	13	13	11	5	42
Other open air	10	10	10		30
<i>Grazing livestock</i>					
Dairy					
- Organic	10	10	10		30
- Non-organic	100	100	100		300
Calf fattening	10	10	10		30
Other grazing livestock	17	16	17		50
<i>Intensive livestock</i>					
Breeding pigs	20	16	14		50
Fattening pigs	16	16	18		50
Integrated pig farms	14	12	14		40
Laying hens	10	10	10		30
Poultry	10	10	10		30
Other intensive livestock	10	10	10		30
<i>Combined</i>	37	41	42		120
Total					1,500

5.3 Recruitment of farms

Based on the available number of farms in the FADN sample and the expected number of farms ending their participation before or during 2008 an estimate was made of the number of farms to be recruited. Furthermore, the variant of bookkeeping has been explicitly considered. A distinction is made between CSP observations (corporate social performance) and the total number of observations. Poppe (2004) describes that the introduction of a new bookkeeping system and budget cuts resulted in a large pressure on available capacity. To deal with this pressure, a flexible data collection system has been introduced with

two main variants in the data collection: the EU variant and the CSP variant. In the EU farm-income variant the most essential financial economic information is collected. This is the information that each member state is obliged to provide to Brussels. The information covered in this variant mainly focuses on family farm income, the balance sheet, a limited number of technical data (cropping pattern, livestock) and information on the EU subsidies. In the second variant, the CSP variant, a wide range of data is collected for EU and national purposes. It covers all the topics that are nowadays considered relevant in a report on the corporate social performance of a company or a farm. Therefore, besides the financial economic information as collected in the EU variant, a wide range of data is collected such as environmental data, other farm incomes, off-farm income, animal welfare, animal health and the level of innovation of firms.

An evaluation has been made of the policy and research relevance of sectors and based on this importance a decision has been made whether a type of farming is assigned to the EU variant, the CSP variant or a combination of both. This implied that some farms had to be switched to the other variant. Based on the number of farms to be recruited, farms were randomly selected from the 2007 agricultural census. The random draw of farms took place per stratum. The number of farms drawn per stratum was 7 times higher than the required number of farms to ensure enough addresses, even with a high non-response rate in specific types of farming. The addresses were requested from an agency (Dienst Regelingen) of the Ministry of Agriculture. The farm identifiers of the randomly selected farms were sent to the Ministry who sent back the addresses of these farms (under the strict condition that this information was only used for the recruitment of farms for the FADN). Using these addresses farms were contacted and asked to participate in the FADN.

Farms are asked to participate in the system in order to compensate for attrition and to take structural changes in agriculture into account. Some of the farms approached during the recruitment phase refused to participate. These refusals do not cause problems if these farms do not differ from farms that participate in their place. In the case where farms that refuse to participate systematically differ from the participating farms, this could result in a bias. If for example older farmers are less inclined to participate, this will result in a different age distribution in the sample compared to the population. The representativeness of the data with respect to age will be called into question - whether this is a problem or not depends on the research goals and the extent to which the important variables correlate with age. The representativeness is analysed in Chapter 6. Table 5.2 describes the response rate in the different types of

farming. This table only includes those farms which were asked to participate in the CSP variant.

Table 5.2		Response rate in different types of farming, recruitment for CSP variant				
	Refusals	Recruited	Unsuitable	Total	Unsuitable %	Response %
<i>Field crop farms</i>						
- Starch potatoes	10	1	0	11	0	9
- Organic crops	5	1	0	6	0	17
- Other field crop farms	11	0	1	12	8	0
<i>Horticulture</i>						
<i>Vegetables under glass</i>						
- Paprika	19	6	7	32	22	24
- Cucumber	30	3	7	40	18	11
- Tomato	8	2	1	11	9	20
- Other	30	4	4	38	11	12
<i>Cut flowers under glass</i>						
- Rose	22	0	3	25	12	0
- Chrysanthemum	10	2	5	17	29	17
- Other	16	4	2	22	9	20
Plants	15	5	6	26	23	25
Other glass	3	0	1	4	25	0
Field vegetables	2	0	0	2	0	0
Fruit	9	2	8	19	42	18
Nurseries	0	0	0	0		
Mushroom	0	0	0	0		
Bulbs	1	0	0	1	0	0
Other open air	0	1	0	1	0	100
<i>Grazing livestock</i>						
<i>Dairy</i>						
- Organic	0	0	0	0		
- Non-organic	0	0	0	0		
Calf fattening	1	0	0	1	0	0
Other grazing livestock	12	5	4	21	19	29

Table 5.2		Response rate in different types of farming, recruitment for CSP variant (continued)				
	Refusals	Recruited	Unsuitable	Total	Unsuitable %	Response %
<i>Intensive livestock</i>						
Breeding pigs	20	7	2	29	7	26
Fattening pigs	1	0	0	1	0	0
Integrated pig farms	1	2	0	3	0	67
Laying hens	0	0	0	0		
Poultry	5	0	0	5	0	0
Other intensive livestock	0	0	0	0		
<i>Combined</i>	3	0	1	4	25	0
Total	234	45	52	331		

To develop a better understanding of the reasons for non-response a number of questions were asked to all farmers approached. Table 5.3 shows the results for the questions asked. In these questions the farmer had to indicate to which extent he or she agrees with a statement about his knowledge or his attitude. The table shows a clear difference between those farmers who are willing to cooperate and those who are not. The ones who are willing to participate are more informed about the activities of LEI and the use of FADN data. Providing data and the FADN system is considered more useful by those who are willing to participate. The opinion about LEI with respect to objectivity and carefulness is better among the participants. The last question shows that non-participants have a significantly lower trust in the government.

	Non participant		Participant		
	average	SE	average	SE	
1 Informed about the LEI	1.11	0.06	1.59	0.06	s
2 Informed about the FADN system	0.42	0.06	0.87	0.12	s
3 Informed about the use of FADN data	0.13	0.06	0.64	0.12	s
4 Usefulness of FADN system	0.29	0.05	1.14	0.10	s
5 Usefulness of providing data	0.22	0.05	1.35	0.08	s
6 Carefulness of LEI	0.45	0.04	1.28	0.09	s
7 Objectivity of LEI	0.47	0.04	1.21	0.08	s
8 Trust in the government	-0.20	0.04	0.09	0.08	s

SE - standard error; s - significant difference, ns - non-significant difference.

Using these same variables discriminant analysis was applied to find the factors that are most discriminating between farmers who are willing to participate and farmers who refuse to participate. The analyses of the attitude of farmers show that 'usefulness of providing data' is the most important factor in predicting the participation of an individual farmer. The next important factors are 'Carefulness of LEI' and 'Usefulness of FADN system'. These results are in line with the previous recruitment (Vrolijk et al., 2009). Compared to some other years the trust in the government is not a strong predictor.

Table 5.4 describes the number of farms where accounts were completed for the first time for the bookkeeping year 2008. Due to several factors this is not exactly the same as the number of farms recruited. First, farms can drop out during the first year of participation. Second, some farms were already recruited during a previous year, but due to capacity problems their bookkeeping was not completed for that year.

Type of farming	ESU size class			
	1	2	3	4
<i>Field crop farms</i>				
- Starch potatoes				
- Organic crops				
- Other field crop farms			1	

Table 5.4		Number of farms with 2008 as first year of completion of bookkeeping, recruited for EU or CSP (continued)			
Type of farming	ESU size class				
	1	2	3	4	
<i>Vegetables under glass</i>					
- Paprika		1			
- Cucumber		1	1		
- Tomato		1	1		
- Other	2	1		1	
<i>Cut flowers under glass</i>					
- Rose					
- Chrysanthemum		1			
- Other	2		3		
Plants	2				
Other glass	1	2			
<i>Field vegetables</i>					
Fruit	2	1	1		
<i>Nurseries</i>					
Mushroom	1			1	
Bulbs	1	1	2		
Other open air	1		3		
<i>Grazing livestock</i>					
Dairy					
- Organic	1	2	3		
- Non-organic	1	2	5		
Calf fattening	5				
Other grazing livestock			1		
<i>Intensive livestock</i>					
Breeding pigs	1				
Fattening pigs	1				
Integrated pig farms	2				
Laying hens					
Poultry					
Other intensive livestock					
Combined		1	1		
Total	23	14	22	2	

Table 5.5 Comparison of the field of observation (population) and the sample available for research purposes in 2008 (2008 agricultural census)

Type of farming	Code	Number of farms		
		population	total	CSP
<i>Field crop farms</i>	<i>1</i>			
- Starch potatoes		955	27	24
- Organic crops		233	23	20
- Other field crop farms		6,520	152	137
<i>Horticulture</i>	<i>2+3</i>			
Vegetables under glass	2012			
- Paprika		288	26	25
- Cucumber		215	32	31
- Tomato		229	27	25
- Other		718	34	30
Cut flowers under glass	2022			
- Rose		267	22	19
- Chrysanthemum		195	24	23
- Other		1,604	67	56
Plants	2022	1,033	43	39
Other glass		568	32	11
Field vegetables	2011	852	34	7
Fruit	3210	1,465	38	30
Nurseries	3480	1,979	30	0
Mushroom	2033	208	21	0
Bulbs	2021	863	48	29
Other open air		1,183	30	10
<i>Grazing livestock</i>	<i>4</i>			
Dairy	4110+4120+4370			
- Organic		300	39	38
- Non-organic		18,167	322	247
Calf fattening	4380	1,159	30	12
Other grazing livestock	4410+4420+4430	7,997	51	34
<i>Intensive livestock</i>	<i>5</i>			
Breeding pigs	5011	1,291	44	38
Fattening pigs	5012	1,571	43	34

Table 5.5 Comparison of the field of observation (population) and the sample available for research purposes in 2008 (2008 agricultural census) (continued)				
Type of farming	Code	Number of farms		
		population	total	CSP
Integrated pig farms	5013	977	44	40
Laying hens	5021	908	37	32
Poultry	5022	414	27	24
Other intensive livestock	other 5	145	12	2
<i>Combined</i>	<i>6-8</i>	5,104	104	54
Total		57,408	1,463	1,071

5.4 Supply of 2008 farm results to the European Commission

The final delivery of 2008 data to the EU has taken place in December 2009. Data of 1,511 farms have been provided to Brussels (Table 5.6). This number is at the same level as in 2007 (1510) and 2006 (1506).

Table 5.6 Number of farms supplied to the EU			
Bookkeeping year	Provided to the European Commission	Weighted farms available for research	Other available farms a)
1990/91	1,587	1,576	12
1991/92	1,505	1,547	8
1992/93	1,513	1,516	7
1993/94	1,525	1,520	7
1994/95	1,546	1,534	13
1995/96	1,536	1,530	6
1996/97	1,551	1,545	6
1997/98	1,529	1,522	7

a) Other available farms are farms that are also available but without a weight. Reasons for not having a weight are: a farm is outside of the defined field of observation because a farm is too large or too small according to the information in the agricultural census. In alternative weighting systems (based on the characteristics of the farm these farms do get a weight; b) Bookkeeping year 1999/00 ended for arable farms and husbandry at 30 April 2000. Due to capacity problems related to IT problems, farm data for the period from 30 April 2000 to 31 December 2000 (respectively 1 January 2000 to 31 December 2000) are not processed but estimated based on data of 1999/00 and 2000/01.

Bookkeeping year	Provided to the European Commission	Weighted farms available for research	Other available farms a)
1998/99	1,368	1,363	5
1999/00	1,341	1,334	7
2000 b)	N/A	N/A	N/A
2001	1,330	1,310	20
2002	1,358	1,344	14
2003	1,437	1,399	38
2004	1,420	1,392	28
2005	1,458	1,406	52
2006	1,506	1,472	34
2007	1,510	1,485	25
2008	1,511	1,463	48

a) Other available farms are farms that are also available but without a weight. Reasons for not having a weight are: a farm is outside of the defined field of observation because a farm is too large or too small according to the information in the agricultural census. In alternative weighting systems (based on the characteristics of the farm these farms do get a weight; b) Bookkeeping year 1999/00 ended for arable farms and husbandry at 30 April 2000. Due to capacity problems related to IT problems, farm data for the period from 30 April 2000 to 31 December 2000 (respectively 1 January 2000 to 31 December 2000) are not processed but estimated based on data of 1999/00 and 2000/01.

6 Evaluation of 2008 sample

6.1 Introduction

In this chapter the FADN sample for the year 2008 is evaluated in a qualitative and quantitative way. Section 6.2 provides an evaluation of the methodology of stratification and weighting. A crucial element is the calculation of weights. Section 6.3 provides the quantitative evaluation of the year 2008. This section focuses on the quality of the estimations that can be made based on the sample. This chapter is based on the standard approach of making estimations based on weights assigned to farms. In Appendix 1 an alternative approach to make estimations is described. This alternative approach can be used to improve the quality of estimates.

6.2 Evaluation of stratification and weighting

6.2.1 Introduction

This section deals with some practical problems related to the estimation process. Weights of individual farms are used to make estimations of frequencies, totals and averages of groups of farms (aggregated results) based on the data from the agricultural census and the FADN data.

The method to calculate the weights of individual farms is crucial. The goal is to achieve unbiased estimates with a minimal variance. This enables the estimation of the confidence interval of the real population value and the minimisation of the total error. This is true for direct estimators. In the case of a ratio estimator this is not necessarily true, but ratio estimators are outside the scope of this publication see Vrolijk et al. (2001) for a more extensive description of ratio estimators and other estimators, see also Appendix 1).

6.2.2 Method of calculation of weights

The objective of the Dutch FADN system is to give a representative view of the total population. The question is therefore how to draw conclusions on totals, averages and frequencies that are valid for the whole population based on indi-

vidual farm data. For example, how much is the average family farm income of all farms in agriculture and horticulture? The practical solution is found in weighting: the individual farm data are raised to the population level (for some variables the estimated values can be compared to the data that is available for the whole population, i.e. data which are included in the yearly agricultural census). A weight is assigned to every observed farm in the FADN system. The weight is defined as the ratio between the number of farms in a stratum according the agricultural census and the number of farms in the sample (in the FADN system). For the assignment of farms in the FADN system to strata the information from the year 2008 is used. These data can be different from the data when the farm was chosen in the system for the first time. This implies some kind of post-stratification. Weights can be calculated as soon as a substantial number of farms have been completed. During the year, when additional farms are completed, the weights are recalculated. The weights of the farms are recalculated until the accounts of all farms are completed and the final set of weights can be established. For preliminary estimations based on for example 50% of the farms, one should be aware of the fact that this 50% is not necessary representative for the whole population.

The (post) stratification of the farms is based on the 2008 agricultural census. The population in a specific stratum is continuously changing. Therefore the farms that belong to a stratum in 2007 are not exactly the same as the farms that belong to that stratum in 2008. Due to these changes farms included in one stratum could have had different inclusion probabilities at the time of recruitment. In theory, to achieve unbiased estimators these differences in inclusion probabilities should be taken into account in the estimation process. However, the consequence of this would be a very complicated system with many different substrata with different inclusion probabilities. Therefore this complicated procedure is not applied. As a result, the theoretical assumption of a strict a-select sample can not be validated.

Although the calculation method applied in practice can lead to systematic distortions between estimated values and real values, the assumption of a random sample is made. This leads to several attractive consequences. The method to calculate weights is relatively easy, involving a limited set of homogenous strata and resulting in a more effective use of data.

Because of the applied sampling procedure (see Section 2.1) the different strata have different sampling fractions. Strata with relatively homogenous units have a lower sampling fraction than very heterogeneous strata. This also implies that farms have very diverging weights. Farms from a homogeneous cluster will

have a larger weight (in principal the reciprocal of the sampling fraction) and therefore represent a larger number of farms. The differences in sampling fractions are shown in Table 6.1. These percentages are calculated by dividing the required number of farms in the selection plan (Table 5.1) by the number of population units (Table 3.3).

Table 6.1 Sampling fractions in different strata (2008 sample)				
Type of farming	ESU size class			
	1	2	3	4
<i>Field crop farms</i>				
Starch potatoes	0.02	0.03	0.05	
- Organic crops	0.18	0.15	0.09	
- Other field crop farms	0.01	0.02	0.07	
<i>Horticulture</i>				
<i>Vegetables under glass</i>				
- Paprika	0.21	0.13	0.10	0.07
- Cucumber	0.21	0.16	0.09	0.19
- Tomato	0.26	0.16	0.10	0.15
- Other	0.03	0.04	0.12	0.10
<i>Cut flowers under glass</i>				
- Rose	0.19	0.12	0.10	0.11
- Chrysanthemum	0.15	0.19	0.16	0.18
- Other	0.02	0.02	0.05	0.03
Plants	0.03	0.04	0.08	0.05
Other glass	0.04	0.05	0.09	0.07
Field vegetables	0.02	0.04	0.07	
Fruit	0.02	0.02	0.05	
Nurseries	0.01	0.02	0.03	
Mushroom	0.10	0.18	0.31	0.18
Bulbs	0.03	0.05	0.08	0.07
Other open air	0.01	0.03	0.07	
<i>Grazing livestock</i>				
<i>Dairy</i>				
- Organic	0.09	0.09	0.12	
- Non-organic	0.02	0.01	0.02	

Type of farming	ESU size class			
	1	2	3	4
Calf fattening	0.03	0.02	0.03	
Other grazing livestock	0.00	0.01	0.05	
<i>Intensive livestock</i>				
Breeding pigs	0.03	0.03	0.09	
Fattening pigs	0.02	0.03	0.10	
Integrated pig farms	0.04	0.03	0.08	
Laying hens	0.02	0.03	0.18	
Poultry	0.06	0.05	0.14	
Other intensive livestock	0.13	0.22	0.43	
<i>Combined</i>	0.01	0.03	0.05	

6.2.3 Remarks on the weights of 2008

In the report on farm results for 2008 the research population is defined as all farms in the 2008 agricultural census (between the lower and upper threshold). The weight per farm is calculated as the ratio between the number of farms in the census and the number of farms in the sample.

In the calculation of aggregated results (averages, frequencies and totals) for the year 2008 the 2008 agricultural census is the starting point. Because of the complete registration of farms in the population (almost all farms are registered in the agricultural census) the aggregated numbers of farms are exactly the same as the number of farms in the census. However, in using these numbers in the calculation of weights for estimations for 2008 two remarks should be made.

Every year all horticultural and agricultural farms are registered in the agricultural census, but this registration only represents the situation at a certain moment during the year. Therefore it is possible that farms are missing from this registration. Furthermore, the number of farms tend to fall significantly (this trend is stronger for certain types of farms and less strong for others). As a consequence estimations for the year 2008 might be overestimations of reality.

Distortions in the number of farms in the census can therefore cause incorrect estimations of aggregates.

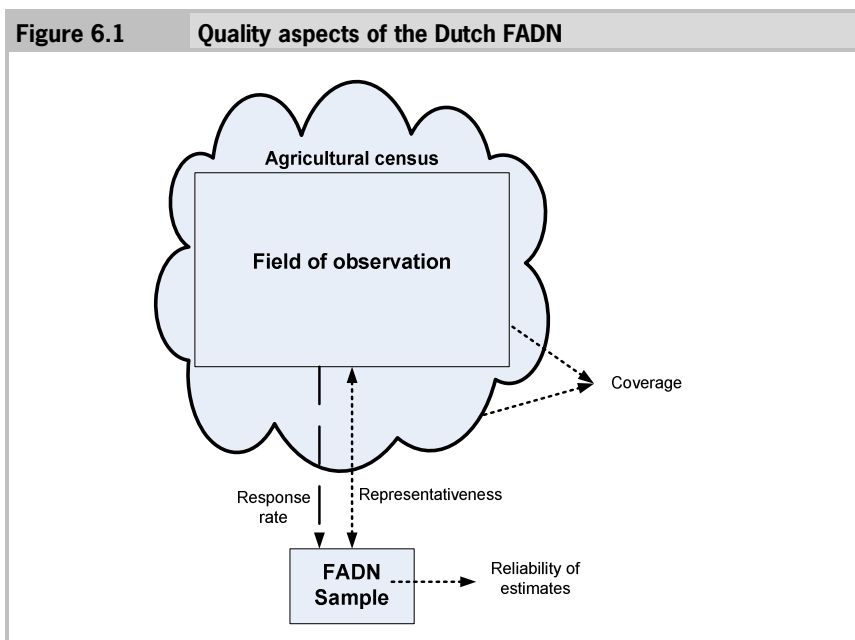
Furthermore, the typology of farms according to the agricultural census might differ from the typology according to the FADN data. The census reflects the situation at a certain point in time, while the FADN system describes the farm during a whole year. In order to take these differences into account two weighting methodologies are available in the Dutch FADN system. From a theoretical point of view weighting based on the characteristics of the farm in the census is more correct. The census is used as the sampling frame; the weights should reflect information from this sampling process. Furthermore, if there are substantial differences, then the variables type and size of farming in the agricultural census are different from the variables size and type of farming in the FADN. In a weighting procedure based on the population numbers in the census and the characteristics in the FADN these variables are considered to be the same.

6.3 Quantitative evaluation of 2008

6.3.1 Introduction

This section focuses on the quality of the estimations based on the 2008 FADN sample. Figure 6.1 shows the same structure as displayed in Figure 2.1, but it adds the quality aspects. Section 6.3.2 provides information on the coverage of the sample; the coverage compares the total population as described by the census and the field of observation of the FADN sample. Section 6.3.3 analyses the extent to which distortions might occur between the sample and the population due to over or under representation of farms with specific characteristics; it compares the characteristics of the field of observation and the actual FADN sample. Section 6.3.4 provides information on the reliability of estimates based on the FADN sample. The last quality aspect listed in Figure 6.1, the response rate and the non-response, has already been described in the previous chapter.

Figure 6.1 Quality aspects of the Dutch FADN



6.3.2 Coverage

It is desirable to have a sample that represents the population as well as possible. A clear distinction should be made between the coverage and the representativeness. This section describes the coverage, Section 6.3.3 deals with the representativeness. To get an idea about the extent to which the total population is covered by the sample it is relevant to distinguish several aspects. Farms that are too small or are not registered in time are not part of the agricultural census (b). The sampling frame (c) is the basis for the choice of sample farms and consists of farms registered in the agricultural census and have a size of more than 16 ESU and less than 2,000 ESU. From this sampling frame the sample is drawn (d).

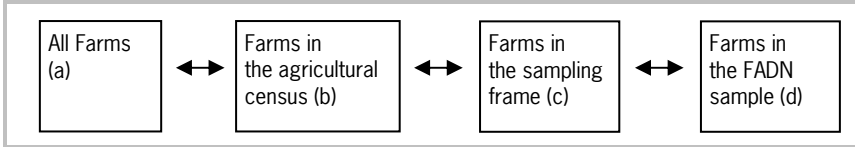
Figure 6.2 Relationship between FADN sample and all farms

Table 6.2 gives an indication to what extent the FADN sample covers the whole population. A comparison is made between the farms in the sampling framework (all the farms that have a chance of being included in the FADN sample) (c) and the total population as described by the agricultural census (b). Direct comparison with all farms (a) would be better but the unregistered farms are unknown, and the practical difference is very limited. The sampling framework covers the population to a large extent. For example with respect to the production, almost 91% is covered by the sample. Small farms are excluded from the sampling framework, this means that a substantial number of the farms and to a lesser extent also of labour are outside of the sampling frame. With respect to agricultural activities, the table shows that some activities are not well covered by the sample. This mainly concerns the activities that are commonly found on very small (ewes) or on very large specialised farms (tomatoes).

Table 6.2 Coverage of the sample compared to 2008 agricultural census

Variable-agricultural census	Number according to census	Not covered in sample (%)		Percentage covered - by sample
		of which <16 ESU	of which >2,000 ESU	
Farms	75,152	23.3	0.3	76.4
Dutch size units	7,337,196	1.8	7.3	90.9
Farm managers	60,519	14.0	0.3	85.7
Total labour	150,849	8.5	3.7	87.8
Paid labour	48,054	2.6	11.2	86.3
Family labour	102,836	11.2	0.2	88.5
Agricultural area	192,9273	5.3	0.5	94.2
Arable	100,3407	4.5	0.3	95.2

Table 6.2 Coverage of the sample compared to 2008 agricultural census (continued)				
Variable-agricultural census	Number according to census	Not covered in sample (%)		Percentage covered - by sample
		of which <16 ESU	of which >2,000 ESU	
Grassland	82,7809	6.8	0.0	93.2
Horticulture under glass	15,651	3.1	1.1	95.8
Horticulture in the open air	140,617	4.4	0.3	95.3
Dairy cows	1,466,134	0.1		99.9
Fattening calves	898,713	0.7		99.3
Ewes	607,055	23.4	0.0	76.5
Breeding pigs	1,221,571	0.1	1.2	98.7
Fattening pigs	5,838,974	1.0	0.9	98.1
Laying hen	44,241,237	0.2		99.8
Broilers	44,357,773	0.1	0.1	99.9
Winter cereal	140,617	4.4	0.3	95.3
Seed potatoes	3,229.42	0.6	0.3	99.1
Consumption potatoes	69,301	1.7	0.5	97.7
Starch potatoes	46,033	0.9	0.1	99.1
Sugar beets	72,231	1.8	0.5	97.6
Peas	5,968	2.0	0.8	97.2
Seed onions	20,300	0.5	0.2	99.3
Waspeen	2,379	2.3	0.1	97.6
Winterpeen	5,285	0.4	0.1	99.5
Brussels sprouts	3,162	0.7		99.3
Grass seed	15,651	3.1	1.1	95.8
Green maize	241,726	7.5	0.0	92.5
Apples	9,301	1.6		98.4
Pears	7,475	1.6		98.4
Cucumber under glass	621	0.0	2.3	97.7
Paprika under glass	1,184	0.0	15.0	85.0

Variable-agricultural census	Number according to census	Not covered in sample (%)		Percentage covered - by sample
		of which <16 ESU	of which >2,000 ESU	
		Tomatoes under glass	1,600	
Chrysanthemum	522	0.1		99.9
Freesia	129	0.0		100.0
Roses	583		10.7	89.3
Asparagus	2,477	2.0	0.8	97.2
Cauliflower	2,539	0.6	0.3	99.1
Tulips	11,390	0.1	7.2	92.7
Hedges	2,888	1.9	0.7	97.3
Park trees	5,770	0.6	10.1	89.3
Mushrooms	77	0.1	23.4	76.5
Cabbage all types	2,539	0.6	0.3	99.1
Ornamentals flower	941	0.0	24.5	75.5
Ornamentals leave	489	0.1	14.2	85.7

In policy analysis and research it is essential to distinguish between farming types (for example specialised pig fattening farms) and agricultural activities (pig fattening). In the report on the redesign of the FADN sample it was illustrated that types of farming should not be the only focus of research (Vrolijk and Lodder, 2002). Agricultural activities are important in many research projects.

To give a complete picture of a certain agricultural activity it is therefore important to look at the activities on all farm types. For example, not only pig fattening farms will create added value from pig fattening, also other types of farms can be involved in this activity (although it is not their main business). The next table describes to which extent a certain activity can be found on certain types of farming. For example, 85.7% of the agricultural activity breeding pigs can be found on the intensive livestock farms. This means that 14.3% of this activity can be found on farms that belong to other types of farming, especially mixed farms.

Table 6.3		Relationship between types of farming and agricultural activities - share of ESU 2008							
Type of farming	Dairy	Cattle	Sheep	Goat	Grass-land	Breeding pig	Other pig	Laying hen	Poultry
<i>Field crop farms</i>									
- Starch potatoes	0,01	0,46	0,22	0,02	0,06	0,00	0,21	0,02	0,98
- Organic crops	0,00	0,27	0,20	0,24	0,06	0,01	0,01	0,05	0,06
- Other field crop farms	0,05	2,27	4,24	0,23	0,92	0,07	0,48	0,51	2,52
Horticulture	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
<i>Vegetables under glass</i>									
- Cucumber	0,00	0,00	0,01	0,00	0,01	0,00	0,00	0,00	0,00
- Tomato	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
- Other	0,00	0,00	0,08	0,02	0,02	0,00	0,01	0,08	0,00
<i>Cut flowers under glass</i>									
- Rose	0,00	0,00	0,02	0,01	0,00	0,00	0,00	0,00	0,00
- Chrysanthemum	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00
- Other	0,00	0,00	0,13	0,03	0,02	0,00	0,05	0,00	0,00
Plants	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Other glass	0,00	0,00	0,02	0,02	0,01	0,00	0,01	0,00	0,00
Field vegetables	0,01	0,69	0,22	0,02	0,05	0,01	0,10	0,02	0,10
Fruit	0,01	0,14	0,20	0,03	0,09	0,01	0,11	0,14	0,00
Nurseries	0,07	1,19	0,19	0,96	0,14	0,30	0,57	0,23	0,14
Mushroom	0,00	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00
Bulbs	0,03	0,18	0,19	0,02	0,07	0,01	0,18	0,02	0,00
Other open air	0,02	0,16	0,17	0,27	0,05	0,05	0,22	0,14	0,33
<i>Grazing livestock</i>									
<i>Dairy</i>									
- Organic	1,31	0,80	0,51	0,22	1,60	0,05	0,06	0,14	0,00
- Non-organic	93,18	46,04	26,07	2,74	69,70	1,59	6,95	1,08	0,92
Calf fattening	0,02	0,75	0,72	0,16	0,65	0,02	0,30	0,30	0,19

Table 6.3		Relationship between types of farming and agricultural activities - share of ESU 2008 (continued)							
Type of farming	Dairy	Cattle	Sheep	Goat	Grass-land	Breeding pig	Other pig	Laying hen	Poultry
Other grazing livestock	1.36	31.19	53.33	87.46	20.51	0.31	0.79	0.18	0.10
Intensive livestock									
Fattening pigs	0.01	0.37	0.71	0.45	0.29	0.40	39.85	0.10	0.07
Breeding pigs	0.04	0.26	1.02	0.38	0.39	59.02	3.07	0.26	0.06
Integrated pig farms	0.05	0.51	0.61	0.23	0.26	26.23	26.99	0.00	0.63
Laying hens	0.02	0.12	0.62	0.18	0.18	0.08	0.25	80.91	0.13
Poultry	0.01	0.02	0.17	0.16	0.07	0.00	0.12	0.00	66.26
Other intensive livestock	0.02	0.04	0.18	0.01	0.06	1.14	1.65	4.79	4.77
Mixed	3.79	14.53	10.05	6.11	4.75	10.70	18.04	11.02	22.72
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Field crop farms</i>									
- Starch potatoes	6.47	14.30	0.17	0.08	0.01	0.00	0.01	0.00	0.01
- Organic crops	1.70	1.00	3.41	0.19	0.04	0.02	0.07	0.02	0.00
- Other field crop farms	54.58	62.22	3.17	0.90	0.11	0.00	0.69	0.00	0.01
<i>Vegetables under glass</i>									
- Paprika	0.01	0.00	0.00	0.00	0.00	0.00	0.00	28.32	0.03
- Cucumber	0.01	0.00	0.02	0.05	0.00	0.00	0.00	15.76	0.02
- Tomato	0.01	0.01	0.05	0.00	0.01	0.00	0.00	28.85	0.02
- Other	0.16	0.01	1.84	0.26	0.06	0.00	0.00	23.06	0.09
<i>Cut flowers under glass</i>									
- Rose	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.06	23.22
- Chrysanthemum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.82
- Other	0.09	0.03	0.19	0.08	0.21	0.00	1.96	0.31	54.44

Table 6.3 Relationship between types of farming and agricultural activities - share of ESU 2008 (continued)

Type of farming	Dairy	Cattle	Sheep	Goat	Grass-land	Breeding pig	Other pig	Laying hen	Poultry
Plants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other glass	0.08	0.02	1.68	0.30	2.28	0.00	4.32	1.78	5.07
Field vegetables	0.74	0.45	61.9	0.46	0.07	0.00	0.05	0.34	0.02
Fruit	0.54	0.21	0.29	83.7	0.13	0.00	0.01	0.02	0.00
Nurseries	0.74	0.27	0.61	0.27	84.90	0.00	0.06	0.00	0.09
Mushroom	0.02	0.00	0.02	0.08	0.00	99.63	0.00	0.00	0.00
Bulbs	0.89	1.02	0.53	0.14	0.01	0.02	75.23	0.00	1.38
Other open air	0.82	0.57	6.32	1.75	3.77	0.00	8.62	0.71	3.56
Grazing livestock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dairy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Organic	0.24	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00
- Non-organic	4.04	3.15	0.83	0.66	0.25	0.03	0.50	0.01	0.00
Calf fattening	0.37	0.13	0.12	0.14	0.07	0.00	0.00	0.00	0.00
Other grazing livestock	4.07	0.59	0.28	0.23	0.09	0.00	0.01	0.00	0.00
Intensive livestock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fattening pigs	1.73	0.28	0.16	0.05	0.03	0.00	0.00	0.00	0.00
Breeding pigs	2.01	0.40	0.17	0.12	0.22	0.00	0.01	0.00	0.00
Integrated pig farms	2.32	0.66	0.49	0.06	0.11	0.00	0.01	0.00	0.00
Laying hens	0.67	0.14	0.13	0.10	0.02	0.00	0.00	0.00	0.00
Poultry	0.36	0.11	0.07	0.01	0.01	0.00	0.00	0.00	0.00
Other intensive livestock	0.20	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Mixed	17.12	14.36	17.47	10.35	7.43	0.29	8.43	0.71	0.45
Total	100.0	100.0	100.	100.0	100.0	100.0	100.0	100.0	100.0

6.3.3 Representativeness

Because of the stratification scheme the sample will provide a good representation of the population on the main characteristics (stratification variables) at the beginning of a year. During the year farms might drop out of the sample and changes might occur in the population. Despite these changes the representativeness is maintained by applying post-stratification on the resulting sample and the changed population. Representativeness with respect to the stratification variables does not necessarily imply that the sample is representative for all variables. Such a full representativeness is impossible unless the sample size approximates the whole population or highly correlated with the stratification variables. Table 6.4 shows to what extent the sample is representative for a number of variables in the agricultural census.

The following guideline can help in the interpretation of the table: a relative difference which is close to the relative standard error cannot be regarded as proof of systematic differences between the sample and the population. If the relative difference is more than two times the relative standard error then it is less likely that these differences can be explained by sampling errors. It is very unlikely that the difference is caused by coincidence if the relative difference is more than 3 times the relative standard error.

An example can illustrate how the table should be interpreted. The average number of DSU (Dutch size units) of pigs as measured in the 2008 agricultural census is 9.1 (i.e. the average of all farms within the field of observation). If the same variable is estimated based on the FADN sample an average of 9.67 is calculated. It might seem that the number of pigs is slightly overestimated in the sample. However, the relative standard error of the estimate is 3.4%. When this standard error is compared to the relative difference between both values (5.9%), then the conclusion that there is a significant difference, cannot be supported.

Table 6.4 Comparison of farms in the agricultural census (16-2,000 ESU) and farms in the Dutch FADN (2008 agricultural census)						
Variable	Average calculated based on		Relative standard error (FADN)	Ratio Census and FADN		
	census (1)	FADN (2)		all farms	farms with value >0	
				average (1/2)	number	average
Size						
DSU	116.71	120.14	0.9	97.2	100	97.2
Activities (DSU)						
Field crops	13.67	14.88	2.6	91.8	92.2	99.6
Grassland	2.21	2.36	12.8	93.5	97.5	95.9
Horticulture in the open	18.35	18.42	3.5	99.6	102.79	96.9
Horticulture under glass	24.73	24.29	2.0	101.8	99.04	102.8
Cattle	38.5	39.47	1.7	97.5	98.11	99.4
Dairy	30.88	31.72	1.8	97.4	100.84	96.6
Veal	2.19	2.29	9.1	95.5	87.32	109.4
Horses	2.32	1.09	20.8	212	138.89	152.6
Sheep	0.42	0.43	22.7	99.6	96.22	103.5
Goats	0.41	0.99	32.7	41.2	72.27	57.0
Pigs	9.1	9.67	3.4	94.1	91.3	103.1
Fattening pigs	4.38	4.82	4.9	90.8	89.37	101.6
Breeding pigs	4.68	4.85	4.6	96.5	91.21	105.8
Poultry	3.63	4.06	5.7	89.5	82.06	109.1
Fattening peepers	1.04	1.27	12.6	81.4	73.61	110.6
Laying hen	1.77	2.35	8.8	75.3	69.71	108.0
Turkey	0.1	0.13	45.2	78.3	122.51	63.9
Rabbits	0.05	0.24	56.9	19	28.07	67.7
Fur animals	0.72	1.05	41.1	69	71.04	97.1

Table 6.4 Comparison of farms in the agricultural census (16-2,000 ESU) and farms in the Dutch FADN (2008 agricultural census) (continued)						
Variable	Average calculated based on		Relative standard error (FADN)	Ratio Census and FADN		
	census (1)	FADN (2)		all farms average (1/2)	farms with value >0	
					number	average
Sizes (ha)						
UAA	31.82	33.18	1.7	95.9	99.64	96.2
Field crops	16.73	18.11	2.7	92.4	95.56	96.7
Horticulture open air	1.44	1.58	4.8	91.3	102.79	88.8
Horticulture glass	0.15	0.15	2.4	97.3	98.98	98.3
Permanent grass	12.9	12.94	3.6	99.7	98.67	101.0
Fallow	1.9	1.49	15.4	127.6	97.61	130.7
Other	0.09	0.02	28.2	443.6	119.45	371.4
Forest	0.09	0.02	28.2	443.6	119.45	371.4
Acres field crops						
Grains	3.98	4.28	5.6	93	93.34	99.6
Leguminous plants	0.04	0.06	32.3	74	80.02	92.5
Commercial crops	0.17	0.2	17.5	84.5	77.55	109.0
Seeds	0.28	0.41	14.8	67.4	63.96	105.4
Tuberous and carrots	3.86	4.34	3.6	89	85.84	103.7
Green fodder	7.26	7.71	4.8	94.1	94.25	99.8
Green fertiliser	0.12	0.14	22.3	88.3	97.75	90.3
Horticulture in the open air						
Stone fruit	0.3	0.33	7.8	91.5	111.23	82.3
Small fruits	0.03	0.08	47.5	40.1	90.63	44.2
Flower nursery	0.04	0.05	21.7	97.4	112.11	86.9
Tree nursery	0.24	0.24	15.2	101.2	109.57	92.4
Flower bulbs	0.39	0.42	6.3	94.5	91.69	103.1

Table 6.4**Comparison of farms in the agricultural census (16-2,000 ESU) and farms in the Dutch FADN (2008 agricultural census) (continued)**

Variable	Average calculated based on		Relative standard error (FADN)	Ratio Census and FADN		
	census (1)	FADN (2)		all farms	farms with value >0	
				average (1/2)	number	average
Glass houses						
Vegetables	0.06	0.06	3.7	95.2	98.12	97.0
Tomatoes	0.02	0.02	5.4	100.6	117.24	85.8
Cucumbers	0.01	0.01	5.0	95.2	100.57	94.7
Paprika	0.02	0.02	6.5	100.6	107.69	93.4
Cut flowers	0.05	0.05	4.9	98.3	110.29	89.1
Roses	0.01	0.01	4.7	104.3	108.65	96.0
Chrysanthemum	0.01	0.01	7.3	96.3	100.25	96.1
Plants	0.03	0.03	5.0	97.2	97.7	99.5
Mushrooms						
Size (are)	0.04	0.07	36.3	49.5	142.15	34.8
Bulbs						
Tulips (pieces)	0.01	0.01	29.7	105.5	135.41	77.9
Narcissus (kg)	0.04	0.05	5.0	91.6	94.36	97.1
Substrate growing (are)						
Vegetable	0.04	0.02	5.0	107.6	101.79	105.7

Table 6.4 Comparison of farms in the agricultural census (16-2,000 ESU) and farms in the Dutch FADN (2008 agricultural census) (continued)						
Variable	Average calculated based on		Relative standard error (FADN)	Ratio Census and FADN		
	census (1)	FADN (2)		all farms	farms with value >0	
				average (1/2)	number	average
Stable capacity (number of animals)						
fattening calves	17.57	18.3	9.6	96	96.34	99.6
fattening pigs	116.25	125.07	5.0	92.9	92.43	100.5
peepers	901	1312	14.6	68.7	64.56	106.4
			56.7			
Rabbits	8.61	42.82		20.1	34.29	58.6
Fur animals	83.84	126.57	38.7	66.2	71.91	92.1
Labour						
Male	2.1	2.08	1.7	100.9	99.07	101.8
Female	1.22	1.26	2.7	97.1	95.34	101.8
Paid labour	1.1	0.97	4.7	113.5	101.06	112.3

The information in Table 6.4 gives an indication for which variables and consequently for which research projects it might be wise to perform post-stratification or use alternative estimation techniques to take into account the differences between the sample and the population. For example, in studies in which the age of the farmer plays an important role it might be useful to apply alternative estimation techniques. Table 6.4 gives a description for the whole population. In case of research projects on specific types of farming, similar tables could be generated for only farms of that type of farming.

The last two columns of Table 6.4 provide more detailed information on the difference between the population and the sample. These differences can be explained on one hand by differences in the number of farms on which a certain activity occurs (a value larger than zero) and on the other by the average of this activity on farms which are in this activity. For example: the number of DSU dairy cows in the FADN is higher than in the agricultural census (no significant difference). This difference is partly explained by a slight difference in the num-

ber of farms with dairy cows and especially by a higher estimation of DSU of dairy cows on farms with dairy cows ($97.4 = 100.84\% * 96.6$).

A comparison between the sample and the population as registered in the agricultural census does not fully answer the question whether estimations of financial, economic and technical characteristics are bias free. It is for example possible that farms with relatively good or bad management skills and therefore performance are over represented in the sample.

6.3.4 Reliability

The previous subsection provides some indicators whether there are systematic differences between the sample and the population (representativeness of sample). This section focuses on the reliability of the estimates.

The calculation of averages of groups based on sampling units implies that there can be differences between the estimated value and true population value. These differences can occur due to the random selection of units to be included in the sample. Table 6.5 provides an indication of the level of precision of the estimates for a set of important goal variables.

The precision of estimates can be measured by the standard error of the estimate of a variable. The standard error is used to calculate the confidence interval. This confidence interval describes the range in which the true population value will be given a certain level of certainty. The confidence interval ranges from the calculated average minus two times the standard error to the calculated average plus two times the standard error. The calculated averages of two groups are significantly different (with a 95% certainty) if the difference is larger than two times the square root of the sum of squares of the standard errors of the two group averages.

This section provides the reliability of estimates for a number of important goal variables for different types of farming. This calculation is based on the available CSP observations (see Section 5.3).

Table 6.5 Reliability of estimates of important goal variables per type of farming, based on FADN sample (2008)

Type of farming	Goal variable					
	family farm income	total revenues	return a)	savings	income farm	net farm result
<i>Field crop farms</i>						
- Starch potatoes	17,004	94,681	3.0	15,208	17,277	12,451
- Organic crops	59,999	150,531	6.0	63,223	64,356	60,973
- Other field crop farms	5,861	15,091	2.0	7,729	6,666	4,739
<i>Horticulture</i>						
<i>Vegetables under glass</i>						
- Paprika	100,193	203,404	3.0	96,053	99,937	62,689
- Cucumber	38,064	97,138	2.0	42,152	40,716	33,091
- Tomato	58,059	282,515	2.0	51,365	58,133	50,465
- Other	17,765	48,259	6.0	17,500	17,969	19,209
<i>Cut flowers under glass</i>						
- Rose	120,302	384,565	3.0	87,787	118,367	70,607
- Chrysanthemum	52,283	101,388	3.0	51,704	52,525	45,571
- Other	19,909	46,868	3.0	23,995	22,694	16,574
Plants	22,668	79,733	3.0	19,593	22,486	25,016
Other glass	12,297	67,047	7.0	26,033	17,961	20,352
Field vegetables	*	*	*	*	*	*
Fruit	16,236	20,741	5.0	12,891	16,897	16,665
Nurseries	*	*	*	*	*	*
Mushroom	*	*	*	*	*	*
Bulbs	95,097	86,795	5.0	96,473	95,201	95,426
Other open air	19,144	60,283	8.0	9,769	19,637	18,974
<i>Grazing livestock</i>						
<i>Dairy</i>						
- Organic	7,448	25,235	2.0	8,641	7,645	6,786
- Non-organic	3,146	6,820	1.0	4,405	4,409	2,879

Table 6.5		Reliability of estimates of important goal variables per type of farming, based on FADN sample (2008) (continued)				
Type of farming	Goal variable					
	family farm income	total revenues	return a)	savings	income farm	net farm result
Calf fattening	10,239	35,944	3.0	10,620	11,239	13,005
Other grazing livestock	9,748	24,600	4.0	12,080	8,130	10,383
<i>Intensive livestock</i>						
Breeding pigs	15,446	46,726	2.0	18,972	15,909	12,349
Fattening pigs	10,561	48,404	2.0	18,755	12,168	8,559
Integrated pig farms	10,496	52,559	1.0	13,808	10,412	11,355
Laying hens	12,586	59,019	2.0	17,765	12,597	11,409
Poultry	14,438	94,283	1.0	13,302	15,288	11,197
Other intensive livestock	*	*	*	*	*	*
Mixed	8,415	27,205	3.0	37,144	34,251	8,092

Table 6.6		Reliability of estimates of important goal variables per main type of farming, based on FADN sample (2008)				
Type of farming	Goal variable					
	family farm income	total revenues	return	savings	income farm	net farm result
Field crops	5,684	17,924	1.62	7,067	6,337	4,674
Vegetables under glass	24,276	66,343	2.91	23,322	24,370	18,251
Cut flowers under glass	22,472	62,335	2.13	22,351	23,854	16,351
Pigs	7,266	28,604	1.12	10,581	7,774	6,154
Poultry	9,755	50,150	1.34	12,893	9,888	8,585
Grazing livestock	3,526	8,555	1.23	4,564	3,765	3,595
All farms	2,944	7,291	0.76	4,744	4,344	2,821

There are clear differences in the significance of estimates between different types of farming. The estimates for the dairy sector are the most reliable because of the large number of farms included in the sample, which reflects the importance of the dairy sector in Dutch agriculture. The decision on the number of farms is described in Vrolijk and Lodder (2002).

Tables 6.7 and 6.8 describe the relative standard error (coefficient of variance). This is the standard error divided by the group average. A higher relative standard error implies less reliable estimates, but the value is strongly affected by the absolute value of the average. If the average value approaches zero, the relative standard error can become very large. A meaningful evaluation of the standard error requires a simultaneous use of tables 6.5 and 6.6 on one hand and tables 6.7 and 6.8 on the other.

Table 6.7		Coefficient of variation of estimates of important goal variables per main type of farming, based on FADN sample (2008)				
Type of farming	Goal variable					
	family farm income	total revenues	return	savings	income farm	net farm result
Field crops	0.108	0.062	0.019	1.688	0.093	-0.210
Vegetables under glass	-0.542	0.059	0.034	-0.175	-0.592	-0.160
Cut flowers under glass	-6.244	0.068	0.024	-0.239	-2.814	-0.168
Pigs	0.550	0.045	0.013	-0.352	0.270	-0.120
Poultry	1.630	0.067	0.015	-0.292	0.635	-0.129
Grazing livestock	0.088	0.034	0.016	12.009	0.070	-0.080

Table 6.8		Coefficient of variation of estimates of important goal variables per type of farming, based on FADN sample (2008)				
Type of farming	Goal variable					
	family farm income	total revenues	return	savings	income farm	net farm result
<i>Field crop farms</i>						
- Starch potatoes	0.29	0.29	0.03	0.98	0.26	-3.66
- Organic crops	0.48	0.37	0.06	2.00	0.72	1.46
- Other field crop farms	0.12	0.05	0.02	4.99	0.10	-0.17
<i>Horticulture</i>						
<i>Vegetables under glass</i>						
- Paprika	-0.65	0.12	0.03	-0.34	-0.63	-0.36
- Cucumber	-0.24	0.07	0.02	-0.16	-0.24	-0.14
- Tomato	-1.06	0.14	0.02	-0.32	-1.44	-0.36
- Other	0.48	0.09	0.07	-0.68	0.41	-0.43
<i>Cut flowers under glass</i>						
- Rose	-8.36	0.20	0.04	-0.74	20.00	-0.57
- Chrysanthemum	-0.69	0.06	0.03	-0.31	-0.75	-0.28
- Other	2.88	0.07	0.03	-0.30	-6.66	-0.19
Plants	0.40	0.08	0.03	-0.73	0.37	-0.88
Other glass	0.26	0.10	0.10	-3.55	0.31	-0.46
Field vegetables	*	*	*	*	*	*
Fruit	0.32	0.07	0.06	-1.56	0.30	-0.56
Nurseries	*	*	*	*	*	*
Mushroom	*	*	*	*	*	*
Bulbs	-0.53	0.13	0.07	-0.37	-0.53	-0.36
Other open air	0.32	0.21	0.10	0.72	0.28	-0.77
<i>Grazing livestock</i>						
<i>Dairy</i>						
- Organic	0.15	0.09	0.02	0.75	0.12	-0.16
- Non-organic	0.05	0.02	0.01	0.26	0.06	-0.08
Calf fattening	0.32	0.20	0.04	-0.55	0.35	-0.30

Table 6.8		Coefficient of variation of estimates of important goal variables per type of farming, based on FADN sample (2008) (continued)				
Type of farming	Goal variable					
	family farm income	total revenues	return	savings	income farm	net farm result
Other grazing livestock	-5.43	0.16	0.07	-0.35	0.45	-0.15
<i>Intensive livestock</i>						
Breeding pigs	4.50	0.07	0.02	-0.40	1.00	-0.17
Fattening pigs	0.52	0.10	0.02	-1.72	0.30	-0.33
Integrated pig farms	0.72	0.06	0.01	-0.36	0.38	-0.17
Laying hens	3.76	0.10	0.02	-0.34	1.19	-0.16
Poultry	1.23	0.09	0.01	-0.50	0.58	-0.22
Other intensive livestock	*	*	*	*	*	*
Mixed	0.27	0.08	0.04	-0.67	16.57	-0.19

The previous tables give an indication of the reliability of estimates for certain types of farming. These tables are used to evaluate the allocation of sampling capacity to the different types of farming. Also in research projects the tables give an indication of the reliability of estimates and should therefore be considered before drawing statistical conclusions.

The tables also give an indication of the dispersion of observations. A large dispersion makes it more difficult to make precise estimates of group characteristics. Dispersion is however also one of the main advantages of the FADN systems. The micro economic information at farm level makes it possible to show and analyse differences between farms.

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