

Farm Structure Survey 2007
National Methodological Reports (NMR)

Member State: Sweden

FARM STRUCTURE SURVEY 2007

NATIONAL METHODOLOGICAL REPORT

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SUMMARY

The Farm Structure Survey 2007 (FSS 2007) was carried out as a combination of a census for national purposes and a survey according to EU legislation. Data were collected from postal questionnaires or from questionnaires on the web, from administrative registers (IACS, Bovine Register and the Organic Farming Register) and from complementary telephone interviews to reduce non-response. There were also some other sources, which were used when data were missing.

The statistics division at Swedish Board of Agriculture was responsible for the survey. A special survey team was organised which consisted of persons working at this division. Many of these persons were also working with FSS 2003 and FSS 2005. As the survey was carried out as a postal questionnaire and the questionnaires should be sent directly to the Board, there was no need for field staff or other staff. Booklets and questionnaires were mainly printed outside the Board.

The planning of the survey started in the end of September 2006 and the main activities started in mid October 2006 with construction of the questionnaires. On 25 May 2007 the questionnaires were sent out to about 79 800 holdings. Of these holdings, 31 200 were included in the sample for FSS 2007 according to EU legislation. The reference date for the survey was 7 June 2007.

Registration and processing started in the end of May 2007. Three reminders were sent to the holdings during the summer and one more was sent out in late September. In addition to this some holders received e-mail reminders. This was a pilot test to evaluate the effects of e-mail reminders on the overall response rate, the response rate on the web and of the promptness of which answers are submitted.

The collection of data from questionnaires was ended in mid January 2008. The response rate for the census ended at 95 %, and for the survey according to the EU legislation, 97 %. The high response rate was reached by spending a lot of resources on telephone interviews with non-respondents after all reminders had been sent out.

In January and February 2008 information from IACS and the bovine register, about crop areas and number of bovine animals, was merged together with the information from the questionnaires. A database from the survey was processed and established with start in March 2008. Dissemination of final national statistics based on the survey started in April 2008 and is planned to be finished during October 2008.

The target population for FSS 2007 consisted of all agricultural holdings in Sweden, which met at least one of the following criteria on 7 June 2007:

- More than 2.0 hectares of arable land.
- At least 50 cows or 250 cattle or 50 sows or 250 pigs or 50 ewes or 1000 poultry (including chickens).
- At least 200 m² area under glass or 2500 m² outdoor horticultural cultivation.

This definition of the target population has since long time been used in Sweden, both for national purposes and for Farm Structure Surveys according to EU legislation. The number of holdings in 2007 within the target population has been estimated to 72 609.

The statistical farm register, which has been in use since 1968 as a frame for different agricultural surveys, was the frame also for FSS 2007. The 2007 frame population consisted of information for holdings in the Farm Structure Survey 2005, holdings in the sample for the national livestock survey 2006 and holdings applying for subsidies 2007. The poultry-, sheep- and pig registers were also used to identify holdings that had the potential to be qualified for the target population.

Over coverage - holdings which are not part of the 2007 target population, mainly holdings which have recently closed down - has been identified during the survey process and these holdings have been removed from the register and have not been included in the processing.

Under coverage – There might have been a few newly created holdings, which did not apply for subsidies in 2007 (and thus were not included in IACS) or were not found in the poultry-, sheep or pig registers. The number of such holdings is estimated to be very small, as it is considered to be very rare in Sweden that new holdings appear which do not appear in any of the mentioned registers.

The frame was according to pre-stratification divided into 125 different strata. Variables for stratification were region, area of arable land and number of animals of different kinds. The principle for building up strata was the same as in earlier farm structure surveys. Simple random samples were drawn in 89 strata and total sampling (100% sampling ratio) in 35 strata. In each of the strata simple random sampling was used and the number of units in the sample was based on Neyman allocation. One strata, containing holdings that were suspected to have closed down according to information from administrative sources, were only included in the national sample with 100% sampling ratio.

Data from questionnaires were scanned and computer checks were made of individual data according a number of different checking criteria. Missing or incorrect data items were collected or corrected by using different sources, as questionnaires, administrative registers, earlier structure surveys and telephone interviews.

The calculated statistical results for national purposes have been compared with corresponding results earlier years on macro level for groups of holdings (regions, size classes) before dissemination. These comparisons show for most characteristics, concerning crop areas and number of different animals, no differences that cannot be explained. The final number of holdings in 2007 within the target population has been estimated to 72 609, a decrease with 3 200 (4%) since 2005.

1. INTRODUCTION

1.1 History, scope

The experience in Sweden of agricultural statistics dates back to the beginning of the nineteenth century. Statistics on holdings, crop areas, crop production, livestock etc. according to established statistical methods were introduced in the first half of the twentieth century. Up to July 1993, Statistics Sweden was the responsible authority for most of the official statistics in Sweden according to a statistics act and was the

main producer of the national official statistics. A new statistics ordinance promulgated in 1993 changed the rules and in 1994 certain national authorities took over the statistical responsibility in their sectors. In the Official Statistics Ordinance (SFS 2001:100) promulgated on 15 March 2001 it is appointed that Swedish Board of Agriculture is the responsible authority for all official agricultural statistics in Sweden.

Statistics Sweden has carried out all farm structure surveys and produced all farm structure statistics up to year 2000 on behalf of the authorities responsible for the statistics. From 2001 and onwards these surveys have been conducted by the Swedish Board of Agriculture. There have been continuous consultations between the Board and Statistics Sweden concerning methods used and experiences from earlier surveys.

The establishment of a statistical farm register in 1968 led to improved coordination of the different parts of the agricultural statistics. To this register data was collected annually from holdings with more than 2 hectares of arable land, from holdings with a large number of animals but not more than 2 hectares of arable land (from 1969) and from holdings with horticultural production (from 1970). The farm register has since then been the sample frame for the farm structure surveys and other statistical surveys. From 1968 to 1994 the farm register also served various administrative purposes, e.g. for harvest damage insurance and national aid payments.

Certain methodological changes were introduced in the farm structure surveys during the 1990s on administrative and budgetary grounds. The two most important ones were the transition from total surveys or censuses to sample surveys some years and the technical changes involved in the changeover from mainframe production to compiling statistics in the client server environment (PC-environment). The previous mainframe production meant that some data recording took place outside Statistics Sweden. The transition from mainframe processing in the farm structure surveys was initiated in 1998 when processing was carried out in a PC-environment. In 1999 the whole production of farm structure statistics was based on PC-environment.

Both the technical change and the change to sample surveys led to a reduction in the costs of producing agricultural statistics. However, the carrying out of surveys some years instead of censuses resulted also in a slightly less precision than earlier in the produced national statistics and therefore not all statistics could be compiled as detailed as earlier for municipalities and parishes.

Since the Swedish accession to the EU in 1995, the collected data and produced statistics have been adapted to EU legislation. According to this legislation the farm structure surveys in 1995, 1997, 1999, 2003, 2005 and 2007 were more extensive concerning included characteristics than in 1996, 1998, 2000, 2001, 2002, 2004, and 2006 when they primarily had to meet national requirements.

The EU farm structure surveys in 1995, 1997 and 1999 were carried out as postal questionnaires by Statistics Sweden. The surveys in 2003, 2005 and 2007, according to EU legislation, have been carried out by Swedish Board of Agriculture. For the last three surveys the data have been collected from postal questionnaires, questionnaires on the web, administrative registers and complementary telephone interviews to reduce non-response.

1.2 National legislation

In Sweden there is an Official Statistics Act (SFS 2001:99) promulgated on 15 March 2001 and an Official Statistics Ordinance (SFS 2001:100) promulgated on the same date. In the ordinance it is appointed that Swedish Board of Agriculture is the responsible statistical authority for all national agricultural statistics. As responsible statistical authority, the Board has the mandate to decide which organisations or authorities will conduct statistical surveys to meet the statistical requirements both at national level and at EU level.

In the provision SJVFS 2007:20 from Swedish Board of Agriculture, it was stipulated that the Board was responsible for FSS 2007. It was also stipulated that there was an obligation for farm holdings belonging to a well defined population to provide information about the holdings to the Board according to one of the questionnaires, which were appended the provision. The information from the holdings should be provided by ordinary mail or on the web. If data were not provided, a penalty could be imposed according to the abovementioned act. In the provision it was also stated that the reference date for the survey was 7 June 2007. There was no need to describe in this provision that also administrative sources about the holdings would be used in the survey.

2. CONTENT

2.1 Characteristics and reference period

FSS 2007 was carried out as a combination of a census for national purposes and a survey according to EU legislation. The national census included following information and statistical characteristics:

- a) The holder's name, address, personal or organisational number, telephone number, e-mail address, client number in the administrative register for single farm payment, client number in the Organic Farming register (at the control body) and production location number for bovine animals.
- b) Areas of different types of land.
- c) Areas of different crops.
- d) Set aside areas under the EU aid programme.
- e) Number of livestock of different kinds.
- f) Organic farming: Utilized agricultural area (fully converted and in the conversion period) and organic production methods in animal production (totally, partly, not at all)

The statistical characteristics b) – f) were collected in order to produce the customary annual national structure statistics as well as to fulfil the requirements from EU.

For the holdings included in the sample for the FSS 2007, characteristics in the following agricultural fields were added:

- g) Farm labour force
- h) Areas for horticultural production
- i) Organic farming

- j) Rural development
- k) Irrigation

The reference date was 7 June 2007 and the reference date has in earlier structural surveys been one day in the first week of June. For the characteristics in the fields of farm labour force, and irrigation the reference period was June 2006 – May 2007.

Following characteristics were not collected while they are non-existing or considered to be non-significant in Sweden according to Commission Regulation (EC) 204/2006:

B1b,
C3, C6a, C6b,
D2, D6, D7, D9f, D9g, D12, D16, D23, D24, D25, D27, D28, D30, D31, D32, D33,
D34, D35
E
G1b, G1c, G2, G3(a+b), G4 (a+b+c+d), G6, G7
I2, I8c, I8d, I8e
J10, J16b, J16c, J16d, J17, J18, J19

Sweden considers characteristic J19 as non-significant. However, this is not flagged in the regulation and Sweden has not asked of permission to consider J19 as non-significant. The characteristic J19 is considered to be NS because there are very few animals in this category. Possible animals are mainly reindeers, minks and Alpaca. There are about 4000-6 000 reindeers on agricultural holdings in a specific part of a nuts3 region (region 25). The farmers are not allowed to have more than 30 reindeers each. The estimated slaughter, in total, is about 30 000 kg which means that the production is negligible. There are about 180 holdings with minks in Sweden; about 10 of these are on agricultural holdings. This means that there are about 14 000 breeding females at agricultural holdings. Furthermore there are in total 238 alpaca in Sweden, 96 Lama, 37 Camels and 100 Jaks.

The characteristic L10 was estimated from other sources. From a survey on other gainful activities on agricultural holdings in 2005, the number of days that the holdings had worked with agricultural services was estimated. These results were then adjusted with the change (in percent) between FSS2005 and FSS2007 of the number of holdings with contractual work. An estimation of days that milk farmers have hired people was also added. These results are presented on NUTS II-level for L10.

There are no changes of definitions of characteristics or reference time or measurement affecting the comparability with the previous survey or census data. However, the imputation method for rural development has been improved since 2005. This change of method has affected the results and the number of holdings with different kinds of rural development has increased considerably partly due to this.

2.2 Questionnaire

The total survey involved mainly two different kinds of questionnaires, one used for the EU sample and one for the remaining national sample. For the EU sample two different types of questionnaires were used, one type for holdings operated by natural persons and one type for holdings operated by legal persons. The only difference between these types was how the questions about farm labour force on the holding were designed. The questionnaires were sent out to the holdings in paper format and

the holdings were informed that they should send back filled-in questionnaires by post or reply on electronic questionnaires on the web. Each holding received an individual password for the website.

31 200 holdings in the register were sampled to be included in the FSS 2007 according to EU legislation, which received a questionnaire of four pages. The holdings in the frame, which didn't belong to the EU sample, received a questionnaire of two pages for national purposes. The main difference between the two types of questionnaires was that there were no characteristics concerning farm labour force, rural development and irrigation in the questionnaire for national purposes. The national statistics were intended to be based on information from all holdings but only for some selected variables (areas of different type of land, crops and livestock).

All holdings had to give information on the total and rented area of arable land and the total and rented area of pasture and meadow. For holdings, which applied for single farm payment in 2007, the data source for crop areas was IACS. For holdings, which didn't apply for this payment, crop areas were imputed usually from information from an earlier year. Information about bovine animals was for all holdings collected from the Bovine Register.

The questionnaire for the EU sample consisted of four pages in duplicate with an information booklet of eight pages. The questionnaire for the holdings not in the EU sample consisted of two pages in duplicate with an information booklet of eight pages (see annex).

The questionnaire for the EU sample was divided into 16 sections. Some information about the holdings was pre-printed. If this pre-printed information was incorrect, the persons replying on the questionnaires was asked to correct it. The different characteristics were distributed to the pages in the following way.

Page 1

In the top right-hand corner following information was pre-printed: ID number, personal/organisational number, telephone number, name and address of the holder.

1. Land use
2. Client number at Swedish Board of Agriculture
3. Irrigation
4. Horses
5. Sheep broken down by category
6. Pigs broken down by category
7. Poultry broken down by category

Page 2

8. Production location number for livestock (bovine) according to the Bovine Register (pre-printed)
9. Holder, spouse and employees on the holding during the past 12 months, broken down by categories

Page 3

9. Employees on the holding over the past 12 months, broken down by categories
10. Cultivation of fruit and berries
11. Green houses
12. Nurseries

13. Client number in the Organic Farming Register (at the control body)
14. Rural development

Page 4

15. Changes on the holding concerning holder, name, personal/organisational number, address, telephone number and e-mail address
16. Signature of the respondent

From the main questionnaire and the information booklet the respondents had all the necessary information to fill in the requested information. Instructions on how to fill in the form were also included. Crop areas, number of bovine animals, organic farming, direct investment aids and areas with environmental restrictions were not included in the questionnaires as these data were collected from administrative registers.

An external company printed the questionnaires and the same company printed the pre-printed information. At the end of May 2007 letters were sent to those holdings in the farm register, which were considered to have an obligation to provide information (approx. 79 800 holdings). These letters contained questionnaires, information booklets with instructions and reply envelopes.

The stated reference date for the information from the holdings was 7 June 2007 and the completed questionnaires should have reached Swedish Board of Agriculture by 19 June at the latest. The holdings, which had not sent in the questionnaire by that date received reminders on a maximum of four occasions during the period from the beginning of July to end of September. A new pre-printed form was included in the first two reminders. Some holdings were also reminded by e-mail.

3. SURVEY METHODOLOGY

3.1 Survey organisation

The survey was planned and conducted by a survey team at the statistics division within Swedish Board of Agriculture. In all 17 persons were involved in the survey team which included

- one survey manager with the overall responsibility
- three persons responsible for sample frame and sample design, setting up criteria and procedures for control of data, methods for handling missing or incorrect data items, estimation procedures and other methodological questions
- two persons working with questionnaires, information booklets and the national legislation for the survey
- three persons working with IT-applications, scanning and archive functions and web application
- four persons responsible for establishing the final register and transmission of information to Eurostat,

- ten persons working with collecting questionnaires, registration, basic checks of data, processing of information and collecting complementary information by telephone calls to farmers.

One person had often more than one area of responsibility.

In addition to those 17 persons mentioned above there were, during a short period of time, also temporary staff employed to collect complementary information, due to partially non-response. This was done by telephone interviews.

As the survey was carried out as a postal questionnaire and the questionnaires should be sent directly to the Board, there was no need for field staff or other staff. Booklets and questionnaires were printed outside the Board.

3.2 Calendar (overview of work progress)

The main activities were planned and followed the following scheme.

Activity	Start date	Final date
Construction of questionnaires	2006-10-15	2007-02-23
Work with National legislation	2006-11-01	2007-03-15
Writing information and instructions to be sent to the holdings	2007-01-15	2007-05-04
Basic work with the farm register (frame)	2006-12-01	2007-04-27
Sample design and methodological questions	2007-03-01	2007-05-15
Developing IT-application	2007-01-01	2007-05-30
Developing scanning	2007-03-10	2007-05-25
Developing web application	2007-03-10	2007-05-25
Sending out questionnaires (including reminders)	2007-05-25	2007-09-30
Collection of questionnaires	2007-05-26	2008-01-20
Registration, processing and control of data	2007-05-30	2008-04-30
Work on setting up the statistical farm register 2007	2008-01-07	2008-02-29
Processing and establishing the register to Eurostat	2008-03-03	2008-06-13
Dissemination of national statistics	2008-04-22	2008-10-28
Transmission of final data (incl. comments) to Eurostat	2008-06-13	2008-06-30

During the period from October 2006 until February 2008 there were also a lot of work done in developing/adjusting methods and procedures for use in different stages of the survey and for setting up the farm register for 2007.

3.3 Preparing the survey operations ('Planning the survey')

3.3.1 Population and frame

Population

In the context of agricultural statistics an agricultural holding is a business unit under single management, which operates in agriculture, animal husbandry or horticulture. Holdings are divided into groups in terms of legal status and management.

- Holdings operated by natural persons.
- Holdings operated by legal persons (estate of deceased person, Limited Liability Company, state, municipality, church, other).

The target population for FSS 2007 consisted of all agricultural holdings (according to the definition above) in Sweden, which met at least one of the following criteria in June 2007:

- More than 2.0 hectares of arable land.
- At least 50 cows or 250 cattle or 50 sows or 250 pigs or 50 ewes or 1000 poultry (including chickens).
- At least 200 m² area under glass or 2500 m² outdoor horticultural cultivation.

This definition of the target population has since many years been used in Sweden, both for national purposes and for Farm Structure Surveys according to EU legislation. The number of holdings in 2007 within the target population was about 72 600.

The comparability with previous survey data, especially for the number of holdings and areas for temporary grasses, is limited because of the implementation of the CAP reform in 2005 and the change from area based subsidies and animal subsidies to single farm payment (see NMR2005). Between 2005 and 2007 is however the comparability good.

Frame

The statistical farm register, which has been in use since 1968 as a frame for different agricultural surveys, was the frame also for FSS 2007. The 2007 frame population consisted of holdings in the FSS 2005 updated with information from holdings in the sample of the national livestock survey 2006 and holdings applying for subsidies 2007 (IACS). The frame was also updated with information from the poultry-, sheep- and pig registers.

Over coverage - holdings which are not part of the 2007 target population and mainly holdings which have recently closed down - has been identified during the survey process and removed from the register and have not been included in the processing.

Under coverage – There might have been a few newly created holdings, which did not apply for subsidies in 2007 (and thus were not included in IACS) or were not found in the poultry-, sheep or pig registers. The number of such holdings is estimated to be

very small, as it is considered to be very rare in Sweden that new holdings appear which do not appear in any of the mentioned registers.

The register was updated when respondents report changes on holdings according to the instructions in the questionnaires. When the reported data were inadequate, further investigations were necessary. In general the remaining degree of under coverage was considered to be so small that no correction for this was needed.

There was a risk for duplicate or multiple listings in the frame. This depends on the fact that the frame consists of holdings appearing in IACS and other holdings that are not. In some cases, when creating the frame population, it was not possible to merge the two kinds of holdings. In some cases the same holding could receive two questionnaires. If so, the respondent was asked to give information about this and only to respond on one of the questionnaires. However, because of non-response and partial non-response there were still some duplicates left after the survey was conducted.

To minimize the risk for duplicates all holdings with more than 7 hectares of arable land and not applying for single farm payment were removed. Holdings above 7 hectares are therefore assumed to apply for subsidies. Of course this assumption is not correct in every single case but it is assumed to be the best estimate of the total number of holdings. About 600 holdings were eliminated this way.

3.3.2 Survey design

The frame was divided into 125 different strata. Variables for stratification were

- region,
- area of arable land,
- number of animals of different kinds.

The principles for building up strata are the same as in earlier farm structure surveys. Pre-stratification was used. For the EU survey simple random samples were drawn in 89 strata and total samples (100% sampling ratio) in 35 strata. The design is presented in the following tables.

Sampling ratios of 100% were used in the strata with holdings of large size in some respect. Such strata will have a large influence on produced statistics and the statistical precision of most of the estimates would be much less without total sampling in these strata.

For each of the other strata different sample sizes were calculated according to Neyman allocation based on area of arable land, number of bovines, number of pigs, number of sheep and number of animal units. The final sample size for each stratum was usually chosen as the average of the sample sizes according to the different Neyman allocations. Simple random sampling was used in each of these strata. The total sample size was about 31 200.

One strata, called “removed”, consists of holdings for which information from administrative registers indicates that the holding have closed down. They were not part of the EU sample. However, they were part of the census to avoid under-coverage. Preliminary results show that 21% of these holdings had not closed down.

These holdings have been poststratificated after the survey and all raising factors have been corrected to avoid bias.

On the following three pages the population size, sample size and sampling ratio for each stratum are shown.

A. Population size N in each stratum.

Main overview plan

	0-199 bovines		200- bovines	
	0-99 sheep	100- sheep	0-99 sheep	100- sheep
0-999 pigs	64 497*	1 036	1 278	27
1000- pigs	694	8	28	2

*=see specification below

Selection strata (specification of the upper left cell in the overview)

County	0-5 ha	5-20 ha	20-50 ha	50-100 ha	100-ha
Stockholms län	219	728	407	235	191
Uppsala län	249	733	631	495	375
Södermanlands län	213	679	455	323	297
Östergötlands län	395	883	756	628	438
Jönköpings län	732	1 574	792	324	53
Kronobergs län	650	1 046	440	166	27
Kalmar län	464	1 120	740	439	125
Gotlands län	161	338	345	322	149
Blekinge län	292	551	273	105	27
Skåne län	1 477	3 014	1 934	1 105	849
Hallands län	603	1 390	760	340	102
Västra Götalands län	2 526	6 023	3 022	1 464	708
Värmlands län	915	1 703	648	316	175
Örebro län	435	869	553	331	203
Västmanlands län	180	612	625	396	275
Kopparbergs län	516	921	478	229	87
Gävleborgs län	510	1 157	548	266	94
Västernorrlands län	688	1 089	371	185	56
Jämtlands län	588	749	283	160	62
Västerbottens län	735	1 186	450	284	111
Norrbottens län	374	622	260	142	46
Unknown County	514	699	252	97	30

Special strata

Poultry	314
Broiler	108
Sow pool	35
Boar	2
Turkey	25
Horticulture	277
Other	279
Removed*	6 665

= Sample
 =Census

*= "Removed" are farms that are suspected to have closed down according to information from different administrative sources. However, they are still considered to be a part of the frame for the total survey, as long as we are not sure about their status.

B. Sample size n in each stratum.

Main overview plan

	0-199 bovines		200- bovines	
	0-99 sheep	100- sheep	0-99 sheep	100- sheep
0-999 pigs	22 858*	1 036	1 278	27
1000- pigs	694	8	28	2

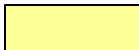

*=see specification below

Selection strata (specification of the upper left cell in the overview)

County	0-5 ha	5-20 ha	20-50 ha	50-100 ha	100-ha
Stockholms län	21	148	164	133	191
Uppsala län	75	226	235	375	375
Södermanlands län	66	144	235	226	297
Östergötlands län	91	264	400	508	438
Jönköpings län	116	430	413	250	53
Kronobergs län	79	274	194	119	27
Kalmar län	106	367	487	370	125
Gotlands län	34	112	184	273	149
Blekinge län	97	172	189	92	27
Skåne län	417	1 025	1 233	916	849
Hallands län	211	445	539	283	102
Västra Götalands län	601	1 448	1 592	1 219	708
Värmlands län	54	281	235	203	175
Örebro län	48	163	232	227	203
Västmanlands län	9	107	209	240	275
Kopparbergs län	54	188	200	183	87
Gävleborgs län	32	204	185	164	94
Västernorrlands län	112	185	171	117	56
Jämtlands län	32	166	114	114	62
Västerbottens län	51	193	161	223	111
Norrbottens län	21	108	102	88	46
Unknown County	5	35	26	18	30

Special strata

Poultry	314
Broiler	108
Sow Pool	35
Boar	2
Turkey	25
Horticulture	26
Other	279
Removed*	0

 =Sample
 =Census

*= "Removed" are farms that are suspected to have closed down according to information from different administrative sources. However, they are still considered to be a part of the frame for the total survey, as long as we are not sure about their status.

C. Sampling ratio in each stratum.

Main overview plan

	0-199 bovines		200- bovines	
	0-99 sheep	100- sheep	0-99 sheep	100- sheep
0-999 pigs	35%*	100%	100%	100%
1000- pigs	100%	100%	100%	100%

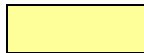

*=see specification below

Selection strata (specification of the upper left cell in the overview)

County	0-5 ha	5-20 ha	20-50 ha	50-100 ha	100-ha
Stockholms län	10%	20%	40%	57%	100%
Uppsala län	30%	31%	37%	76%	100%
Södermanlands län	31%	21%	52%	70%	100%
Östergötlands län	23%	30%	53%	81%	100%
Jönköpings län	16%	27%	52%	77%	100%
Kronobergs län	12%	26%	44%	72%	100%
Kalmar län	23%	33%	66%	84%	100%
Gotlands län	21%	33%	53%	85%	100%
Blekinge län	33%	31%	69%	88%	100%
Skåne län	28%	34%	64%	83%	100%
Hallands län	35%	32%	71%	83%	100%
Västra Götalands län	24%	24%	53%	83%	100%
Värmlands län	6%	17%	36%	64%	100%
Örebro län	11%	19%	42%	69%	100%
Västmanlands län	5%	17%	33%	61%	100%
Kopparbergs län	10%	20%	42%	80%	100%
Gävleborgs län	6%	18%	34%	62%	100%
Västernorrlands län	16%	17%	46%	63%	100%
Jämtlands län	5%	22%	40%	71%	100%
Västerbottens län	7%	16%	36%	79%	100%
Norrbottens län	6%	17%	39%	62%	100%
Unknown County	1%	5%	10%	19%	100%

Special strata

Poultry	100%
Broiler	100%
Sow pool	100%
Boar	100%
Turkey	100%
Horticulture	9%
Other	100%
Removed*	0%

 = Sample
 =Census

*= "Removed" are farms that are suspected to have closed down according to information from different administrative sources. However, they are still considered to be a part of the frame for the total survey, as long as we are not sure about their status.

3.3.3 Pilot Survey

No pilot survey was conducted in advance of the FFS 2007. The FSS 2007 survey was designed in a similar way as the farm structure surveys 1995, 1997, 1999, 2003 and 2005 and these were considered to be a sufficient basis for planning FSS 2007.

3.3.4 Informing and training the staff and respondents

Most of the staff at Swedish Board of Agriculture has experience since many years in the administration of agricultural policy including direct support to the farmers. There have been a lot of contacts between this staff and the farmers and their organisations. The staff at the statistics division at the Board of Agriculture has during the last years conducted the FSS for 2003 and 2005, livestock surveys, horticulture censuses, surveys on rents for agricultural land and a number of other statistical surveys and has also produced statistics from administrative registers. Any major investment in training of the staff was therefore not considered to be necessary.

However, for the survey, there were persons employed on a non-regular basis mainly working with collecting questionnaires, registration and collecting complementary information by telephone calls to the holders. These persons were informed about the purpose of the survey and trained in the process of collecting questionnaires and complementary information from the holders.

Due to a large partially non-response, mainly in the labour force section, it was necessary to collect complementary information from a large number of holdings. In addition to the staff employed on regular basis and on non-regular basis, even more temporary staff was employed during a short period of time. They were given a short introduction on the purpose of the survey and detailed instructions on how to collect the information from the holders by telephone interviews.

Information about the survey was published in the two weekly Swedish agricultural magazines on 8 June 2007. The information contained background and need of the survey, time for receiving questionnaires, day of reference and that the holders had an obligation to send back the questionnaires. There were also a website constructed for those who wanted to answer the web-questionnaires. This contained short information about the survey, documents containing legislation in force e.t.c.

No investment in training for the respondents was judged to be required. Since the questionnaires were very like those used in earlier farm structure surveys, most holders were well acquainted with them. The information booklet with instructions of how to fill in the form provided a useful guidance. In addition there was a special telephone group with staff from the Board, which could give advice on completing the questionnaire to the respondents. The holders were given the opportunity to phone a special number, free of charge, to ask questions during the whole survey period.

3.4 Sampling, data collection and data entry

3.4.1 Drawing the sample

A stratified probability sample of about 31 200 holdings for FSS 2007 was drawn from the entire frame population (except strata “removed”). The statistical package SAS was used for this.

3.4.2 Data collection and entry

The survey group at the statistics division within Swedish Board of Agriculture collected data from paper questionnaires or from questionnaires on the web, from administrative data sources and from complementary telephone interviews. All respondents had the opportunity to fill in the questionnaire on the web. For about 10 % of the holdings this opportunity was used. In FSS 2005 the corresponding rate was 5%.

The staff working with the paper questionnaires worked with detailed instruction for how to handle the different types of questionnaires. In short, the process of incoming paper questionnaires could be described as follows. First a bar code scanner recorded the date of receipt of each postal questionnaire. Then there was a check if the holders had changed any of the pre-printed information (holder, addresses, telephone numbers) or if the holding had been sold or rented out to another holder. If the questionnaire contained any changes of these kinds they were sorted out and the changes was recorded in the database before scanning. Questionnaires could also be sorted out due to comments made by the holder on the questionnaire leading to further investigations on the state of the holding or if the questionnaire were torn in such a way that it could not be scanned etc. Questionnaires with no changes in the pre-printed information or any other remarks were then scanned and stored in the database. The paper version was archived.

The web-questionnaires, as in the case of paper questionnaires, were checked for changes on the pre-printed information, comments by the holder leading to further investigations etc. Changes were recorded in the database. In the case of the web-questionnaire a first check of the data was made at the same time as the holders were filling out the form. The checking criteria were designed in a way that in some cases the holders were instructed to change the information he had given, since it obviously was incorrect, in other cases the holders were instructed to check parts of the information filled in and confirm the correctness or make a change. The information was then transferred to the database.

During the autumn 2007 a lot work were made to reduce non-response. Telephone calls to holders were used both to remind holders to answer questionnaires not returned at all but also to collect information on partial non-response, mostly on the labour force section. Calling the holders, the Board of Agriculture preferred to fill in the questionnaires during the phone call, as a service for the holders and to speed up the process. These questionnaires then went into the process, described above, as if they had been sent in by post. Some holders though, preferred to fill in the questionnaires by themselves and return them.

3.4.3 Utilisation of administrative data sources

The three administrative data sources used in FSS were IACS, the Bovine Register and the Organic Farming register.

In IACS the information from the applications for single farm payments are registered and is based on Council Regulation (EC) no 1782/2003. When applying for single farm payment the farmers have to declare the use of all agricultural areas on the holding; e.g. which crops are grown and the area for each crop or the area of fallow

land. The reporting units are single persons and legal enterprises, which send applications to Swedish Board of Agriculture.

There is not an exact correspondence between the responsible person/enterprise (the reporting unit) applying for single farm payment and the definition of holding in the farm structure surveys. This depends on the fact that it is possible for more than one person to apply for single farm payment for areas belonging to the same statistical holding.

The main linkage between the holdings in the statistical farm register and the reporting units in IACS is the personal number for natural persons and organisational number for legal enterprises. These numbers are unique for each entity. In the farm register there is for every holding registered one personal number for each farmer on the holding. For units, which mismatch according to this method, the linkage characteristics client number at the Swedish Board of Agriculture followed by production location number are used. All remaining reporting units in IACS are considered to form new holdings in the farm register.

The characteristics taken from IACS are areas for different crops and other uses of the agricultural area. IACS does not contain information from all statistical holdings in the target population, as there are holdings with more than 2 ha of arable land not applying for single farm payment. However it is judged that farmers/enterprises are applying for single farm payment for nearly all arable land in Sweden.

The quality of the information in IACS is judged to be very high, as there are controls on a part of the holdings about the information delivered by the farmers and as the farmers may lose some part of the single farm payments if the reported areas are incorrect.

The definitions of crop areas and other areas in IACS are in line with the definitions in the farm structure surveys and the relevant areas in IACS can be translated to corresponding areas in the farm register. The reference date in FSS 2007 is 7 June, which corresponds to the reference time (crop year) in the system for single farm payments.

The second administrative data source used in FSS 2005 is the Bovine Register. This register, in Sweden called the Central Cattle Register (CDB), was set up in accordance with Council Regulation (EC) No 1760/2000 of 17 July 2000. The register's main objective is to make it possible to trace contagious animal diseases. The Commission approved the CDB in Sweden for use in pursuing this main objective from 1 November 1999. The register has also been approved to be used for other objectives and since 2000 it has been used, and served as the basis, for various EU cattle premiums (special beef premium, slaughter premium, suckler cow premium, extensification aid, etc.).

The CDB is made up of the following two main parts:

- One part contains information on the identity of individual animals, both living and dead, such as sex, date of birth, breed and age.
- Another part contains information on events relating to individual animals, such as birth, slaughter, purchase and sale as well as transfer between different holdings, etc.

Farmers with bovine animals must report each event for each individual animal – such as birth, transfer, sale for slaughter, etc, - to CDB within seven days. A calf should be

tagged within 20 days of birth and then reported within seven days to CDB. Late reporting will incur additional charges for the farmer.

There is not an exact correspondence between the responsible person/enterprise (the reporting unit) for bovine animals and the definition of holding in the farm structure surveys. This depends on the fact that the holders in the statistical farm register are not necessarily the persons responsible for the reporting to CDB. It could also be the case that a holding has more than one production location in the farm register and that different persons are responsible for the reporting to CDB for different production locations.

The main linkage between the holdings in the statistical farm register and the reporting units in CDB is the personal number for natural persons and organisational number for legal enterprises. These numbers are unique for each entity. In the farm register there is for every holding registered one personal number for each farmer on the holding. For units that mismatch according to this method, the linkage characteristics production location is used.

The quality of the information in CDB is judged to be very high, as there are both administrative controls and field-controls on part of the holdings and as the farmers may lose some part of the single farm payments if the reported information is incorrect.

The reported information about bovine animals in CDB, as date of birth and sex, can together with information in a milk database on milk deliveries to dairies be translated to the definitions of the different kinds of bovines in FSS 2007. However, as all cows on holdings delivering milk to dairies are considered to be milk cows, there will be a small over estimate of the number of milk cows and a corresponding under estimate of the number of other cows. The same method is used in the statistical surveys on cattle according to the Council Directive 93/24/EEC.

The reference date for the transmission of information from CDB to the farm register is 7 June, the same reference date as for FSS 2007.

The third administrative data source used in FSS 2007 is the Organic Farming Register based on the Council regulation EEC N. 2092/91. In 2007 there were two control bodies on the market working with controls of agricultural holdings on which organic farming methods are applied. The control bodies are authorized by the Swedish Board for Accreditation and Conformity Assessment.

The data concerning the characteristics on organic farming (C/5 a,d,e) in FSS 2007 are based on existing information on individual holdings in registers at the control bodies. The registers cover all holdings applying organic farming methods or are in the conversion period. To establish a link to the statistical farm register and to have the information suitable for the FSS 2007, the Board of Agriculture sent a questionnaire to the control bodies asking for information on

- the personal/organisational number of the holder or holding,
- the client number of the holding at the control body,
- UAA on which organic production methods are applied,
- UAA under conversion to organic production methods,
- organic production methods applied in the animal production

Information on addresses and telephone numbers of the holder/holding was also transmitted from the control bodies.

In the FSS questionnaires, as mentioned in section 2.2, holders were asked to fill in their client number at the control body. By using the personal/organisational number of the holding combined with the information on client number at the control body and in the FSS questionnaires, a link between the Organic Farming Register and the statistical farm register could be established. In cases of mismatch addresses and telephone numbers were also used to link holdings in the different registers. In the end there were only a few mismatches.

3.4.4 Control of the data

Computer checks were made of individual data on the questionnaires. Checking criteria were supplied for checking different parts of the report. These comprised:

- Completeness checks
- Summation and arithmetic checks
- Checks of extreme values (outliers)
- Logic and relational checks
- Checks of unusual combinations

Data, which did not meet one or more of the checking criteria, were checked manually. In many cases the identified errors could be corrected using data from the questionnaires. In some cases the respondents were contacted by telephone and in those cases also such information was asked for, which had not been completed in the questionnaires. The instructions, which were in force for the total survey process, generally permitted the data to be corrected or completed by the staff directly on PC.

3.4.5 Non-response

When the data collection from questionnaires had come to its deadline, the non-response rate concerning returned questionnaires belonging to the survey according to the EU legislation was 3 %. The non-respond rate for the total census was 5 %. For part of these non-respondents, information about crops and bovine animals was found in administrative registers and was inserted in the database. The rest of the non-respondents were judged to be holdings which had closed down and thus didn't still exist and which thus belong to the over coverage of the frame.

In addition, there were partial non-responses, e.g. various missing characteristics because respondents had provided incomplete data. An example on this is the section on farm labour force where the respondents may have given information on data on age and sex for employed persons but not number of hours worked in an agricultural or non-agricultural activity. The partial non-response was substantial in some parts of the questionnaire. It was a problem especially in the part about worked hours and rural development.

Partial non-responses after the complementary efforts were completed by imputations based on different imputation methods (see section 3.5.1)

3.5 Data processing, analysis and estimation

3.5.1 Methods for handling missing or incorrect data items

As already described, different methods were adopted to complete missing data and to correct errors. The following ones were the most important methods used:

- a:** Following methods were used for correcting general information about the holdings.
- Analysis of holding transfers indicated on the questionnaires, which were sent back. This often resulted in the closure of holdings, as these holdings usually had been combined with other holdings.
 - From the telephone directory information was collected about telephone numbers for holdings.
 - From the enterprise database information was collected about addresses and if holdings are still existing.
- b:** Following methods are among those, which were used to complete/correct data on the survey characteristics.
- From telephone interviews with the respondents.
 - From the taxation register, information was collected about spouses and about incomes from other sources than agriculture.
 - Information from the 2005 horticultural census updated with information from the sample surveys for 2006 and 2007. (The next census is being conducted in the beginning of 2009 concerning the year 2008).
 - Information for the same holdings from previous farm structure surveys.
 - Information from a survey on other gainful activities on agricultural holding that was conducted in 2006/2007.

In cases where the above-mentioned methods failed or was inadequate, an imputation procedure took place. The methods differed depending on which part of the questionnaire should be imputed. The methods differed also if there were missing values in a whole section of the questionnaire or if just some single values were missing. In the following some examples of methods used are described.

In cases when there were no data in the whole section of the labour force section, the whole section was imputed with the same values as on similar farms which had given information in the questionnaires. A stratification based on the Swedish typology was used to categorise the holdings for these imputations. In the livestock section the principle of last known value was used and in the section of irrigation logical checks against the utilized agricultural area section together with last known value was used.

Single missing values were only imputed if there should be some value of logical reasons or by definition. This was mainly done in the labour force section. If for example the number of working hours were missing for one or more person on the farm, standard working hours on the farm were used indirectly for imputation. With help of standard working hours on the farm the total expected number of hours

worked on the farm were estimated. However, since the total standard working hours differs from the hours filled in by the farmers in the questionnaire, the quota between these two values on national level 2005 were used as correction factor. These "imputation hours" were then distributed among the persons with missing value for the number of working hours.

Results from the mentioned survey on other gainful activities on agricultural holdings, which was made during 2006/2007, gave reason to change imputation method for rural development. From 1999 to 2005 those holdings that did not answer the question were supposed not to have any activities of that kind. The survey in 2006/2007 gave in light that this assumption was wrong and a new imputation method has therefore been designed. The new method assumes that some part of the non-responders does have activities and therefore some imputations are made. Since the non-respond rate was high in that part of the questionnaire, the effect was a big increase in the number of holdings with rural development, partly because of the change of method. However, there was also an actual increase in the number of holdings with rural development that has been estimated to 15%.

The instructions, which were in force for the total survey process, generally permitted the data to be corrected or completed by the staff directly on PC. The software used in this part of the process was SAS, and Excel.

3.5.2 Estimation and sampling errors

During spring 2008 statistics for the number of holdings, crop areas and the number of animals of different kinds have been disseminated nationally. Estimates for these characteristics were based on data from all holdings in the population, which means that the estimates are based on a census. Thus there are no sampling errors for these characteristics in the national statistics. Sampling errors have not been calculated for the FSS 2007 based on the sample of about 30 000 holdings which has been transmitted to Eurostat. However, during the autumn statistics based on the EU sample (Farm labour force and other gainful activities) will be disseminated with standard errors.

3.5.3 Non sampling errors

Coverage error

Over coverage - holdings which are not part of the 2007 target population and mainly holdings which have recently closed down - has been identified during the survey process and removed from the register and have not been included in the processing. The over-coverage in the survey is therefore negligible.

Under coverage – There might have been a few newly created holdings, which did not apply for subsidies in 2007 (and thus were not included in IACS) or were not found in the poultry-, sheep or pig registers. The number of such holdings is estimated to be very small, as it is considered to be very rare in Sweden that new holdings appear which do not appear in any of the mentioned registers.

The register was updated when respondents report changes on holdings according to the instructions in the questionnaires. When the reported data were inadequate, further investigations were necessary. In general the remaining degree of under coverage was considered to be so small that no correction for this was needed.

There was a risk for duplicate or multiple listings in the frame. This depends on the fact that the frame consists of holdings appearing in IACS and other holdings that are not. In some cases, when creating the frame population, it was not possible to merge the two kinds of holdings. In some cases the same holding could receive two questionnaires. If so, the respondent was asked to give information about this and only to respond on one of the questionnaires. However, because of non-response and partial non-response there were still some duplicates left after the survey was conducted.

To minimize the risk for duplicates all holdings with more than 7 hectares of arable land and not applying for single farm payment were removed. Holdings above 7 hectares are therefore assumed to apply for subsidies. Of course this assumption is not correct in every single case but it is assumed to be the best estimate of the total number of holdings. About 600 holdings were eliminated this way.

Other coverage errors have not been detected and are estimated to be very small.

Measurements errors

The total measurement errors from questionnaires are estimated not to be of significant magnitude, which depends on following circumstances. In Sweden farm structure censuses/surveys have been conducted annually and therefore most of the holders/respondents are usually very well acquainted with these surveys/censuses and the questionnaires, which are used.

Processing errors

Processing errors from the scanning procedure have been detected. These errors have as far as possible been taken care of by different types of checking criteria. Some other minor processing errors have also been detected and been taken care off. On the whole the errors from processing is judged not to be of significant magnitude, even though some errors still can exist on individual holdings.

Non-response errors

Only a few (less than 100) of the respondents refused to fill in the questionnaire or give information at telephone contact.

In the census as a whole, 5 % of the respondents did not answer the questionnaire at all. The corresponding non-response for the survey according to the EU-legislation was 3 %. Some of these holdings have probably been closed down while others have not been able to get in contact with despite efforts put down in reminders by post and telephone calls. For part of these non-respondents, information about crops and bovines were found in IACS or CDB, which confirmed that these holdings still existed. The holdings where no information was found in administrative registers where closed down due to the risk of double counting of e.g. crop areas.

Partial non-response was most frequent in the farm labour force section and the rural development section. In the farm labour force section about 38 % of the respondents had at least one missing value. However only 4 % had missing values for all characteristics in the labour force section. In the rural development section the partial non-response was about 40%. The partial non-response has been considered to be the

most serious type of non-sampling errors. To avoid bias from partial non-response, much work has been done to create new imputation methods minimizing the risk for bias from imputation.

Model assumption errors

In the questionnaires the holders are asked to give information about the total area of arable land and total area of pasture and meadow. The total agricultural area from IACS, for individual holdings, is not always corresponding to the information given by the holders in the questionnaires. In the end, data from IACS is used for crop areas and areas of pasture and meadows. This procedure could cause errors on individual holdings. However the procedure used should not cause any systematic errors.

3.5.4 Evaluation of results

The calculated national statistical results for 2007 were compared with corresponding results earlier years on macro level before dissemination. These comparisons show for most characteristics concerning crop areas and number of different animals no differences, which cannot be explained. However, the estimated number of holdings with more than 2 hectares of arable land was estimated to 74 900 for year 2005, which is 9 000 more holdings than earlier has been estimated for 2004. In 2007 they were estimated to be 71 800 which is considered to be a normal decrease.

The background for the increase in the number of holdings 2005 is the following one. The Swedish farm register is updated by using postal questionnaires (FSS) and administrative sources (IACS, Bovine Register). The main data source for figures on arable land has since 2000 been the IACS system, in which there is information on crop areas for all holdings applying for area based subsidies. This method has been used in order to reduce the response burden for farmers, as they should not be obliged to give information about crop areas twice every year. It has been judged that farmers are applying for subsidies for nearly all arable land in Sweden. This method has also implied that new holdings, which have not been applying for subsidies, usually have not been inserted in the farm register unless they have not been found in some other administrative registers (e.g. the Bovine Register).

During 2005 Sweden implemented the single farm payment system as a part of the CAP reform. A consequence of this was a strong increase in the number of farmers applying for subsidies. A large part of these had not applied for subsidies earlier and had not been registered in IACS earlier years. These farmers could for example be landowners who, as a consequence of the implementation of the single farm payment system, have decided to cultivate the land by themselves instead of renting it out for tenant farming. In this example these farmers will end up as new holders in the farm register.

Furthermore there were applications in 2005 on payments for areas, which had not received any subsidies earlier. The change in the system for subsidies has mainly increased the areas for temporary grasses, green fodder and fallow land and the number of holdings with such areas. In total the area of arable land, on holdings in the farm register with more than 2 ha of arable land, increased with about 1,5 % compared to 2004. Part of these areas could be referred to holdings that might have been deleted from the farm register earlier years although they still existed. This could be the case if the information, given by the holders in the postal questionnaires, is

incorrect concerning the register variables or if the holders have not replied to the questionnaires for several years. These areas could also be areas on holdings that never have been included in the farm register.

Since there have been no changes in CAP between 2005 and 2007 the comparability between these two years are good.

4. PUBLICATION AND DISSEMINATION

The national agricultural statistics are disseminated free of charge in the series Statistical Reports on the web site www.sjv.se under the heading Statistics and on the web site www.scb.se. These reports include, in addition to the statistical results, a short description of the methodology. In addition there is for each survey a quality declaration, which is published in connection with the reports. The results of the farm structure survey are also published together with other agricultural statistics in the Yearbook of Agricultural Statistics.

From the farm structure survey 2007 following reports have been disseminated or are planned to be disseminated.

Title	Reference	Publication date
Livestock in June 2007. Preliminary results	JO 20 SM 0701	30 October 2007
Use of agricultural land 2007. Final statistics	JO 10 SM 0801	22 April 2008
Livestock in June 2007. Final statistics	JO 20 SM 0801	29 April 2008
Holdings and holders in June 2007	JO 34 SM 0801	10 June 2008
Type of farming in 2007. Swedish typology	JO 35 SM 0801	19 June 2008
Farm labour force in 2007	JO 30 SM 0801	14 October 2008
Other gainful activities on agricultural holdings 2007	JO 47 SM 0801	28 October 2008

REFERENCES

ANNEXES

- Questionnaires