Farm structure survey 2007

National methodological report

July 2008

Member state: Hungary

Contents

SUMMARY

The **2007 Farm Structure Survey** (FSS 2007) was implemented by the Hungarian Central Statistical Office (HCSO) between 12 and 30 November 2007. The main objectives of the survey were to provide the necessary information for the elaboration of the Common Agricultural Policy (CAP), to follow the structural changes in the Hungarian agriculture since the Agricultural Census 2000 (AC 2000) through Farm Structure Surveys 2003 (FSS 2003) and 2005 (FSS 2005) as well as to meet the domestic information needs coming from Hungarian policy makers.

The Act XLVI of 1993 on Statistics provides the general regulatory framework of surveys implemented in Hungary. All the surveys are included in the National Program of Statistical Data Collection (NPSDC) approved each year in a Government Decree. Considering the Council Regulation No 2467/96 HCSO initiated the implementation of FSS 2007 in the appropriate NPSDC.

The annual data collection system managed by the **Agricultural and Environmental Statistics Department (AESD)** was adapted to cover all FSS 2007 characteristics. Accordingly the questionnaire of the Regular Annual December Survey on private holdings was complemented with those FSS characteristics not included in current statistics. In case of agricultural enterprises two questionnaires of annual surveys were modified to meet the data needs of FSS 2007.

For the implementation of FSS 2007 the combination of exhaustive and sample survey was used; the earlier for enterprises and the latter for private holdings. All agricultural enterprises had received the questionnaires and instructions by mail, and after completion they sent back it to the Szeged Regional Directorate of HCSO responsible for the data collection on agricultural statistics. Around 7660 enterprises reported agricultural activity in FSS 2007.

In case of private holdings one-stage cluster sampling method was applied. Firstly the survey districts of AC 2000 were selected randomly and within these districts a full scope survey on private holdings were implemented. The sample covered 1219 settlements of the 3157 registered ones in Hungary. The enumerators made face-to-face interviews at private holdings and completed 111 000 questionnaires. Besides the private holdings within the selected survey districts, a handful of private holdings having significant agricultural activity but located outside the sample districts were observed by mailed questionnaires.

The survey was implemented by applying the well-proven methods designed by AESD. All the 7 Regional Directorates and 12 County Representatives were involved in the implementation under the central management of the AESD. The staff of directorates and representatives was responsible for recruiting, training and monitoring the work of enumerators.

Local and national press releases, posters and toll-free line helped to inform the general public. In case of private holdings the rate of refusal was negligible (0.05 percent) due to the well-trained enumerators having good communication skills. The successful communication campaign prior to FSS 2007 also contributed to improving the response rate. The survey

supervisors with the help of the local authorities managed to convince nearly all the non-respondents to answer, thus legal steps were not taken.

All the data entry applications of FSS 2007 were developed in the framework of uniform Data Entry and Validation System run by the HCSO. The staff at the directorates, representatives and the central office made the data entry. As many as possible checks were incorporated in the data entry applications to ensure the consistency of data. Further verification applications were developed for data quality check after data entry. The individual data and the calculated aggregations were confronted with earlier information and statistics from other sources.

Estimation, data processing and data of publication tables were produced within the production database system called HOMBÁR[1] and handled by statisticians of the AESD.

A dissemination plan was prepared for the publication of the FSS 2007 results. The preliminary data will be released at a press conference on 1 September 2008 (it can also be found on website of the HCSO in pdf format). The publication about final data in two volumes is planned to issue at the end of October and December. Data will be available mainly in Internet. The different aggregations are computed on country and regional levels (NUTS 1 and 2).

1. Introduction

1.1 History, scope

The systematic statistical data service on agriculture looks back to more than 100 years of history in Hungary. Before the first census in Hungary only data from some segments of agriculture were collected.

The **first census** was implemented in Hungary in 1895 and covered all characteristics of agriculture (land, livestock, labour force). The **second census of 1935** also was a comprehensive survey and had a speciality, whereas the indebtedness of farms also was observed. The international recommendations (issued by the predecessor of the FAO, the International Agricultural Institute in Rome) have been taken into account during the implementation of this census.

After the World War II the agriculture and subsequently the system of statistical data collection on agricultural production were undergone a thorough transformation. From the 1970's the small-scale household farming appeared together with the state farms and agricultural co-operative farms established as consequence of nationalisation. Beside the regular observation of large-scale farms, HCSO also collected data on the agricultural production of small-scale household farms.

In the years **between 1956 and 1959 a nation-wide orchard survey**, in 1960 the survey on agricultural machinery, and **between 1961 and 1963 a nation-wide vineyard survey** was carried out by the HCSO.

[1] HOMBÁR is the name of the production database system of agricultural data handled by the statisticians of AESD.

In 1972 Hungary joined the FAO World Census of 1970 and fulfilled also the international data requirements. For this time censuses were conducted in Hungary at 10-year regular intervals and between the censuses statistical observation took place through the consistent annual data collection system based on the latest census.

The census of 1981 was also linked with the recommendations of the FAO World Census. In case of the large-scale producers one full scope observation was carried out, while five sample surveys covered the performance of small-scale producers.

In 1991 HCSO conducted the first census after the change of political system in 1989. Following this census in 1994 a farm structure survey was implemented, but this survey had an incomplete coverage and included only a narrow range of characteristics. The main deficiency of this survey was not covering the farmers living in the urban areas.

The **Agricultural Census 2000 (AC 2000)** is a historical landmark in the chronicle of Hungarian censuses. This was the first comprehensive survey that, apart from meeting the data needs of FAO, was also compliant with the relevant EU regulations. Based on the results of AC 2000 the data set for the EUROFARM database were compiled and provided to EUROSTAT.

Before the **Basic Survey on Vineyards and Fruit Plantations in 2001 (CVFP 2001)**, the land areas of plantations were surveyed on a full-scope basis almost 40 years earlier.

During the negotiations talks Hungary has committed itself to carry out the **Farm Structure Survey 2003 (FSS 2003)** according to EU relevant regulations. After the survey the micro-data of about 280 thousand agricultural holdings were sent into the EUROFARM database handled by EUROSTAT.

The **FSS 2005** implemented by HCSO in November 2005 was the first survey carried out after the accession of Hungary to the EU.

The **FSS 2007** was carried out between 12 and 30 November 2007. The main objectives of this survey were the following:

- providing the necessary information for the elaboration of the Common Agricultural Policy (CAP);
- following the structural changes in the Hungarian agriculture since AC 2000, FSS 2003, and FSS 2005;
- also meeting the domestic information needs coming from the Hungarian policy makers on the agricultural sector;
- satisfying the data needs of the international organizations;
- updating the farm register.

1.2 Legislation

The Act XLVI of 1993 on Statistics provides the general regulatory framework of surveys implemented in Hungary. All the surveys are included in the National Program of Statistical Data Collection (NPSDC) approved annually by a Government Decree.

Considering the Council Regulation No 571/88 and its amendments (in particular the Regulation 2467/96) the HCSO initiated the implementation of FSS 2007 in the appropriate NPSDC.

In case of the **agricultural enterprises** two regular postal-based surveys – NPSDC 2128/07 *"Annual data of agricultural enterprises, 2007"* and NPSDC 1087/04 *"Livestock on 1st December 2007"* – have covered the FSS characteristics.

In case of the **private holdings** the *annual Livestock survey of private holdings* in December (NPSDC 1089) was merged into *Regular Annual December Survey* (NPSDC 1677/07), meanwhile the latter was also amended to cover all FSS characteristics.

According to the government decree the respondents are liable to provide adequate data. If they refuse to answer, it can entail legal action.

The identification, protection and responsibilities of the enumerators are not stipulated by the NPSDC. Under the Criminal Law enumerators are considered and are entitled to be protected as official person. The HCSO had issued registered identification badges valid only for the duration of the survey together with the ID card. This identification tool was provided to each person involved in the implementation of FSS 2007.

In virtue of the Act LXIII of 1992 on Data protection all data are qualified as confidential and were treated as such. Survey data were validated and checked exclusively by the staff members of the HCSO and each enumerator was responsible for preventing unauthorized access to the questionnaires.

2. CONTENT

2.1 Characteristics and reference period

In the 90's following the change of political and economical system in Hungary far-reaching changes were taken place in the society and in the agriculture, as well. As a result of the privatization the private farming ousted the earlier overwhelming state ownership and two key groups of farming – the individual and corporate ones – became characteristic for the Hungarian agriculture. In the respect of agricultural statistics it is also a considerable change that the ownership and use of land sharply separated from each other whilst the number of farmers living within city boundaries has increased.

There are two main groups of respondents: agricultural enterprises and private holdings. The enterprises engaged in agricultural activity were observed on full scope basis. Around 10 000

agricultural enterprises constituted the survey population based on the information from the Business Register.

In case of households with agricultural activity reaching or exceeding certain physical threshold (private holdings) the survey method was the following: enumeration districts of the AC 2000 were randomly selected and within these districts the private holdings were observed on full scope basis.

In the design of the questionnaires the peculiarities of the two key groups of respondents – agricultural enterprises and private holdings – were considered. According to the Hungarian practice the agricultural enterprises accomplish their regular reporting obligations towards the HCSO by mail, whilst the surveys of private holdings are carried out by face-to-face interviews. This procedure also was applied in the FSS 2007.

The annual data collection system managed by the AESD was elaborated in a way of covering all FSS characteristics. The following variables or groups of characteristics had to be incorporated in the annual December survey of 2007 in order to fulfil the FSS requirements:

- Agricultural land area by settlements (to produce the figures relating to less-favoured area A.2)
- Agricultural areas with environmental restrictions (A.3)
- Destination of the holding's production (C.6)
- Areas no longer used for production purposes, subject to the payment of subsidies, and area subject to set-aside incentive schemes (I.8)
- Farm labour force (L)
- Rural development (M)

The observed FSS characteristics were specified according to the Commission Regulation No 204/2006. Annex I. of the said Regulation and also the recent NMR list the characteristics, which were required by the EU but are non-significant or non-existing in Hungary.

At the same time some questions were included in the questionnaire of FSS 2007 to meet only domestic users' needs, just like a more detailed observation of some FSS indicators. The following table lists these topics/characteristics and the reasons of their necessity:

Topics/Characteristics	Description of demand
Agricultural qualification of each person belonging to the private holding	– Ensure the comparability with previous data – Necessary for the EEA
Form of activity of each person belonging to the private holding	
Is the main income of the holder coming from the private holding surveyed?	
Production by crops	– Necessary for the crop supply balance sheets – More detailed breakdown (peas, potatoes, rape seeds, etc.)
More detailed observation of livestock	– More detailed demand of domestic users – Incorporation of Livestock Survey in December

Production of milk and milk products	– Necessary for the EEA
Animal products	– Necessary for the supply balance sheets of animal products
Investment in the agricultural holding	– Necessary for the EEA
Expenditures on agricultural activities	– Necessary for the EEA
More detailed observation of indicators on rural development	– More detailed demand of domestic users
Agricultural services provided	– Necessary for the EEA
Indicators on agro-engineering other than irrigated area	– Needed for calculations environmental indicators
Compensation premium for flat-rate farmers	– VAT own source calculations

The reference period of the FSS characteristics was the calendar year of 2007, except for the following ones:

- Livestock: 1st December 2007;
- Farm labour force: the 12 month preceding the day of survey.

2.2 Questionnaires

In order to simplify the implementation of the FSS 2007 the annual livestock survey questionnaire (NPSDC 1089) was built in the questionnaire of the Regular Annual December Survey (NPSDC 1677/07); meanwhile the latter was complemented with those FSS characteristics not included in the current statistics. In case of the **private holdings** the updated **NPSDC 1677/07** met all information needs of the FSS 2007.

In case of the **agricultural enterprises** two questionnaires – **NPSDC 1087/04** and **2128/07** – of the annual surveys were applied to implement the FSS 2007.

The following table shows the relations of the questionnaires used for the FSS 2007:

Topic	**NPSDC ID number**	
	Agricultural enterprises	**Private holdings**
Livestock	1087/04	1677/05
Structure of agricultural activity, 2007	2128/07	

FSS QUESTIONNAIRE FOR PRIVATE HOLDINGS

NPSDC 1677/07
Title: Regular Annual December Survey, 2007
Form: 14 pages

In case of private holdings only one questionnaire was applied in the FSS 2007. All relevant FSS characteristics were included on NPSDC 1677/07 questionnaire and were defined according to the relevant EU regulation. The sequence of the questions was worked out to simplify completing the questionnaire during the face-to-face interview. The tables were clearly arranged and the main arithmetical linkage among the cells of tables were specified by formulas appeared on the questionnaire.

FSS QUESTIONNAIRES FOR AGRICULTURAL ENTERPRISES

NPSDC 2128/07
Title: Annual data of agricultural enterprises, 2007
Form: 18 pages

Originally, the function of this annual questionnaire was to report on the following topics: production of crops, orchards, vineyards, production data and balance sheet tables. Questions regarding the main characteristics of production methods, annual change in livestock, production of livestock for slaughter and animal products were also included.

In 2007 the FSS characteristics not included in current statistics were built in the questionnaire.

NPSDC 1087/04
Title: Livestock, 1st December 2007
Form: 4 pages

The observation of livestock is carried out three times per year within the framework of the annual data collection system. The survey includes data by age, sex and type of cattle, pigs, horses, sheep, chickens, geese, ducks, turkeys, as well as number of other animals. In 2007 this questionnaire on the livestock of 1st December 2007 also served to produce information covering the FSS characteristics relating to livestock.

All the FSS questionnaires were typographically printed on paper and in Excel format available via Internet, as well. The English versions are attached to this report in Annex 2.

3. SURVEY METHODOLOGY

3.1 Survey organization

3.1.1 Organization of management

In the new organisational system of the HCSO there is a share of competency between the AESD and the Szeged Regional Directorate[2]. It means that the tasks of the different parties

[2] The territorial organization of the HCSO is the following: in each 7 statistical region (NUTS 2 level) one regional directorate implements the statistical work, except for the region Central Hungary where the Population

concerning the implementation of the FSS 2007 were determined in a contract. The FSS 2007 was the first survey implemented within this new organisational system.
The following organizations had a key role in the successful preparation and implementation of FSS 2007:

- ***FSS-team***: 3 experts of the AESD were responsible for preparatory works of the FSS 2007. The FSS is a very complex project thus the other statistical experts of AESD were also involved in the work co-ordinated by this team. The competences of the team were all methodological preparations, the sample design, the imputation of data, the analysis and the publication of the data.

- ***Szeged Regional Directorate***: This directorate is responsible for the implementation of agricultural statistics within the HCSO including the logistic tasks of the data collection, the management of data capturing and the budget planning. During the implementation phase this directorate kept continuously contact with the other directorates, in particular the directorate responsible for the implementation of the household surveys.

- ***Consultative Committee***: The AESD, the Szeged Regional Directorate, the IT Department and the Ministry of Agriculture and Rural Development delegated the members to this committee. The committee approved the questionnaires and the other survey documents as well as discussed all other professional aspects of FSS 2007.

- ***Budgetary Committee***: The heads of the AESD, the Agricultural Statistics Unit and the Finance and Budgeting Department, as well as the director of Szeged Regional Directorate were the delegated members of this committee. The committee was responsible for finalising the detailed budget plan, specifying the fees paid for the enumerators and working out the procedures of accounting and the financial monitoring.

3.1.2 Organization of implementation

Private holdings

The FSS 2007 organization of implementation was hierarchical. The upper levels controlled the levels below them. The structure was similar to a pyramid, which had the following levels:

- survey team of the AESD;
- survey team of the SZRD;
- survey supervisors;
- enumerators.

Survey team of the AESD: The task of the staff involved in the survey was to contribute at the trainings for trainers. It served as a basis for uniform understanding of survey characteristics and concepts.

Statistics Department operates belonging to the central management of the HCSO located in Budapest. The regional directorates control the work of three county (NUTS 3) representative offices furnished with a very small staff.

Survey team of the SZRD: The logistic of the fieldwork was organized and managed by this team. The team co-operated with the survey staff of directorates, managed the field work, participated in the data entry and in the comprehensive validation before processing, as well as in the quality control after data entry. They were also responsible for supplying monitoring information to the FSS-team. The basic data for financial accounting were provided by them.

Survey supervisors: (260 persons): People selected from the staff of the regional directorates and county representatives were responsible for survey implementation at a specific part of the county. Their responsibilities included setting up the enumeration districts, recruitment and training of the enumerators, co-ordination of the field-work in the area of their authority. They controlled and assisted the work of the enumerators.

Enumerators (1900 persons): Enumerators visited the data-suppliers within their survey districts during the implementation period (12-30 November 2007). Many of them have a job in the local government as civil servant.

Agricultural enterprises

The staff of the AESD, the IT Department and the Szeged Regional Directorate was involved in the implementation of survey on agricultural enterprises.

According to the survey design developed by the AESD the selection of the agricultural enterprises from the Business Register was carried out by the IT department. The FSS questionnaires (see chapter 2.2), the attached instructions and a letter (part of the questionnaire) were sent to the respondents by mail centrally. The respondents sent back the completed questionnaires to the Szeged Regional Directorate.

3.2 Calendar (overview of work progress)

Key activities of the survey	Date/period
Determination the target population, sampling plan	16 May 2007
Finalization the questionnaires, the instructions for enumerators and other survey documents	22 July 2007
Elaboration the specifications of applications for data capture and EUROFARM database file	22 June 2007
Setting up the consultative and budgetary committees	April 2007
Final budget plan	August 2007
Selection of the sample	16 May 2007
Recruitment of the enumerators by the regional directorates and county representatives	19 October 2007
Communication campaign	end of October – November 2007
Training of the staff involved in survey	25 October – 09 November 2007
Printing of the questionnaires and other survey documents	28 September 2007
Delivery of the questionnaires and other survey documents	21 October 2007
Training of the enumerators	9 November 2007

Setting up the organization of implementation	12 November 2007
Implementation period of the survey	12-30 November 2007
Survey monitoring	12-30 November 2007
Cost accounting and paying fees to the enumerators	22 December 2007
Data entry and editing	2 January – 7 April 2008
Quality check	April – May 2008
Uploading the validated data into the central database	14 April 2008
Producing tables for the preliminary data in HOMBÁR	23 June 2008
Releasing preliminary data at press conference	1 September 2008
Integration of administrative data	July 2008
Providing EUROFARM database version 1 to EUROSTAT	31 July 2008
Publication of the final data in two volumes	October - December 2008
Publication of the typology	December 2008

3.3 Preparing the survey operations

3.3.1 Population and frame

Regulation 571/88 of the European Commission (571/88 EC) specifies the agricultural holding as a single unit both technically and economically, which has a single management and which produces agricultural products. The target population of the FSS 2007 in Hungary was determined to comply with this definition.

The target population has two main groups in Hungary which are the following: private holdings and agricultural enterprises.

Private holdings

The private holdings are households engaged in any agricultural activity reaching or exceeding certain physical threshold at the reference time of the survey. The physical threshold applied in the FSS 2007 fits to the coverage criteria of the regulation 571/88 EC (fixing the threshold at a level excluding only the smallest holdings which together contribute 1% or less to the total SGM).

According to the physical threshold of the FSS 2007 a private holding on 1st December 2007

uses at least

- 1500 m^2 of productive land area (including jointly or severally arable land, kitchen garden, orchard, vineyard, meadow, pasture, forest, fish-pond, reed), or
- 500 m^2 of orchards or vineyards, jointly or severally, or
- 100 m^2 of land area under cover, or
- 50 m^2 of mushroom area, or

has at least

- one head of bigger animals, such as cattle, pig, horse, sheep, goat, buffalo, emu, ostrich, donkey, or

- 50 heads of poultry jointly of severally, such as hens, geese, ducks, turkeys, guinea fowls, or
- 25-25 heads of rabbits, furry animals, pigeons for slaughter, or
- 5 bee colonies.

This is the same definition used in during the previous FSSs (2003 and 2005) and similar to the one applied in the AC 2000. The only difference is that the agricultural services were included in the threshold definition of the AC 2000. Consequently, the comparison of the different survey data is possible without any problems.

960 000 private holdings were observed in the AC 2000. The same figure in the FSS 2003 was 766 000 and 719 000 in 2005. This sharp fall reflects the rapid changes still ongoing in the Hungarian agriculture and shows also the overall European trend.

The farm register of private holdings is updated with the information from the regular annual sample surveys, the Basic Survey on Vineyards and Fruit Plantations 2001 (BSVFP 2001) and the FSS 2003 and 2005. Unfortunately, no administrative sources can be used for this purpose at this time and there is no available information on the newly appeared holdings between censuses. The last update of the new private holdings was provided by BSVFP 2001.

Considering the above mentioned facts area frame approach was applied in the FSS 2007. The frame constituted the 13 676 survey districts determined in the AC 2000 of which 2 013 (around 15 percent) were randomly selected. Within these districts all active private holdings were visited by the enumerators.

Agricultural enterprises

Agricultural enterprises are legal entities engaged in any kind of agricultural activity regardless of its size. The selection of the agricultural enterprises was based on the information from the Business Register. The list of about 10 000 enterprises constituted the survey population of agricultural enterprises.

All agricultural enterprises are part of the Business Register. The Business Register is updated continuously and data are transmitted to HCSO from the Registry Court. The agricultural enterprises existed in 2007 and newly established agricultural enterprises since 2005 were selected to be observed by the FSS 2007.

3.3.2 Survey design

For the implementation of the FSS 2007 the combination of exhaustive and sample survey was used.

In case of **private holdings** one-stage cluster sampling method was applied. Elaborating the sampling method two possibilities emerged as cluster: settlements or survey districts of the AC 2000. The results of the analysis in this matter showed that using survey district is more advantageous than using settlements. The problem with the use of the settlement was that the number of the private holdings has too high variance municipality by municipality, thus the number of the final survey units to be observed depends too much from the size of the settlements.

Some figures relating to the survey districts of the AC 2000:

Total number of survey districts of the AC 2000	13 676
Minimum number of the private holdings per district	1
Maximum number of the private holdings per district	300
Average number of the private holdings per district	70.09
Variance of number of the private holdings per district	38.50
Relative Deviation (RD) by survey districts (%)	54.95

Considering the high RD mentioned above, the selection of the primary survey units (PSU) was based on probability proportional to the number of private holdings per district. The selection of PSUs was carried out by regions and by counties after ranking the enumeration districts by the number of holdings. Firstly the estimations and the aggregations were calculated at county level.

Survey districts of the FSS 2007 were the same as used in the AC 2000, of which 2 013 were selected randomly. When the survey districts of the AC 2000 had been determined, the following principles had been taken into consideration:

- the number of the respondents within a survey district must be harmonized with the length of time for implementation;
- the overlapping of districts is not permitted;
- generally one survey district covers one settlement;
- one survey district can not cover more settlements;
- usually one enumerator is entrusted to visit one survey district;

Within the selected primary survey units 192 000 private holdings were active according to the information from the farm register, however a sharp decline in the number of private holdings has occurred since previous census, thus the number of final survey units (FSUs) was expected around 123 000. (Finally, the enumerators completed 111 000 questionnaires about the private holdings in FSS 2007.) The sample covered 1 219 settlements of the total 3 157 municipalities of Hungary.

To enhance the effectiveness of the FSS 2007 estimations, stratification was applied and a separated stratum was created for the units having significant agricultural activity ("significant producers"). Regarding their agricultural land area and livestock 29 private holdings were filtered out from the AC 2000 population prior to the survey. These holdings were situated on 28 settlements outside the selected PSUs, thus the questionnaires were sent them by post. After the 2007 survey further such private holdings were taken out based on their reported data and considered as significant producers. Altogether the total number of such holdings was 185. This stratum was considered as being observed exhaustively.

The classification criteria applied for the significant producers selected prior to the survey were the following:

Arable land area, ha	$\geq$	250 and/or
Vineyard, ha	$\geq$	17 and/or
Orchard, ha	$\geq$	22 and/or
Cattle, head	$\geq$	100 and/or
Pigs, head	$\geq$	300 and/or

Horses, head	≥	50 and/or
Sheep, head	≥	750 and/or
Goats, head	≥	100 and/or
Chickens, head	≥	20 000 and/or
Geese, head	≥	5 000 and/or
Ducks, head	≥	5 000 and/or
Turkeys, head	≥	5 000 and/or
Guinea fowls, head	≥	250 and/or
Rabbits, head	≥	500 and/or
Pigeons, head	≥	500 and/or
Bee hives, families	≥	400 and/or

The classification criteria applied for the significant producers selected after the survey were the following:

Cattle, head	≥	100 and/or
Pigs, head	≥	5 000 and/or
Sheep, head	≥	1 000 and/or
Chickens, head	≥	5 000 and/or
Geese, head	≥	1 000 and/or
Ducks, head	≥	1 000 and/or
Turkeys, head	≥	1 000 and/or

3.3.3 Pilot Survey

Pilot survey was not implemented for several reasons. On the one hand the main part of the questions, tables and indicators of the questionnaires was the same as in the regular agricultural surveys, so fulfilling the reporting obligations was not a new challenge for the respondents. On the other hand the method and the organization of the survey – face-to-face interviews in case of the private holdings and data supply by mail in case of the enterprises – are tested and well proven in earlier statistical surveys on agriculture.

3.3.4 Informing and training the staff and respondents

The staff of the regional directorates and county representatives taking part in the survey was trained in a one-day course concentrating on the practical tasks of the survey implementation. At the training held by the AESD all the questions and comments were answered. The participants of the training received all survey documents beforehand, so they could prepare for the training and think over possible questions.

The staff of regional directorates and county representatives recruited the enumerators employed in the survey. The main aspects of the selection were the following:

- experiences in enumerators' work;
- good communication skills;
- professional knowledge of agriculture;
- being familiar with the area where he/she works.

The trained survey officers of the regional directorates and county representatives trained the enumerators employed in the survey of the private holdings according to the instruction provided by the AESD. The schedule of the trainings was specified as follows:

- necessity, objectives and organization of the FSS 2007;
- survey implementation, handling the List of Respondents;
- filling in questionnaire;
- questions, consultation;
- demonstration of filling the questionnaire in with an example;
- arrangement of the documents, other business;
- summary of the most important tasks.

The survey documents were available at the regional directorates and county representatives before the beginning of the local trainings. This offered an opportunity to send the questionnaires, instructions for enumerators and other materials to the recruited people before the training, so generally they arrived to the spot of the training already prepared. Participation at the training was obligatory to each enumerator. There they received detailed information about the implementation of the survey. Moreover they could met with their supervisor and the description of their survey district supplemented with the list of the private holdings were also given to them.

Almost 80 training courses were held all over the country mostly in premises of the municipalities. Each training course took about five hours, and the average number of participants was 25 persons.

Traditionally, the agricultural enterprises and other business units receive the questionnaires for completion by mail in Hungary (self-completion method). An unambiguous instruction prepared by FSS-team was attached to the questionnaires to assist the respondents understanding the concepts and the consistency of data. Besides a letter also was sent to each respondent in which the objective of the survey, the legal background, the deadlines and the necessary technical information were provided.

External and internal communications

According to the documentation compiled by FSS-team, announcements about the FSS 2007 were published in the nation-wide and local media. Articles and interviews relating to the implementation as well as the main features of the survey were published. Posters informing about the survey were placarded in towns and villages.

An in-house on-line information system relating to the FSS 2007 was set up between the AESD and the regional directorates and county representatives to expedite communication (questions, answers and comments) between the central management and the execution staff, and to download background information and documentation for the county staff in the period of preparation and implementation. This system enabled a standard handling of the emerging questions and problems reported by the execution staff.

An official letter was sent to the notaries and parish-clerks in the selected survey districts. They were informed about the legal background, the main objectives of the survey, the method of data collection (house by house) and the data to be collected. They were asked to

support the work of the enumerators and the staff of the HCSO regarding the survey preparation and the implementation.

For the information of the general public a toll-free line was available during the period of the survey. It proved also to be useful in the communication between the enumerators, the survey supervisors and other staff of the regional directorates and county representatives. Besides the mistrustful respondents have had the possibility to check the identity of the enumerators. Phone calls on the toll-free line were received by the territorially competent regional directorate or county representative. Each place one person being familiar with all the survey documents in details was appointed to receive and answer the phone calls.

3.4 Sampling, data collection and analysis

3.4.1 Drawing the sample

Private holdings

As first step 2 013 survey districts were selected randomly from the total number of 13 676 survey districts of the AC 2000. The number of private holdings by survey districts had high deviation that is why the selection was based on probability proportional to the number of the private holdings per district. Before the selection the survey districts were ranked by size i.e. by the number of holdings. Within the selected survey districts all private holdings active on 1st December 2007 constituted the sample. In order to increase the effectiveness of FSS 2007 estimations, stratification was applied and a separated stratum was created for holdings having significant agricultural activity ("significant producers"). This latter stratum was including 185 holdings.

According to the information from the farm register 192 000 private holdings were active in the selected survey districts, however a continuous decline in number of private holdings has occurred from the AC 2000, thus the number of holdings was expected around 123 000. The selection was carried out by the IT Department of the HCSO with Oracle/SQL.

Agricultural enterprises

The selection of the enterprises was made on the basis of their activity recorded in the Business Register. Each enterprise reporting agriculture as its major or supplementary activity was selected. The Business Register reflected the situation of the month preceding the selection, so up-to-date information could be used. All the agricultural enterprises existed in 2007 were selected, thus new agricultural enterprises established since 2005 were included. The number of the selected enterprises amounted to more than 10 000.

3.4.2 Data collection and data entry

Field-work organisation

The data collection was implemented by applying well-proven methods and experiences of the previous surveys of the AESD. Enumerators made face-to-face interviews and completed

the questionnaires about the households engaged in any agricultural activity reaching the physical threshold.

Enumerators visited and interviewed households house by house within their survey districts. However, the house by house method could not be used in the inner area of cities (most cases covered by blocks of houses), where the enumerators visited only the addresses of private holdings included in the farm register. (The number of survey districts in urban areas was 62.)

The survey period was limited to 2 weeks in 2007, thus in order to finish the field observation within the deadline some survey districts were split into 2 sub-districts. In average 179 respondents per enumerators were visited in FSS 2007.

The local authorities supported the implementation of the survey in many ways: they informed the general public, ensured rooms for the trainings and encouraged their civil servants to participate as enumerator.

The agricultural enterprises fulfilled their obligation of data supply by mail: they filled in the questionnaires according to the instructions enclosed and returned the completed questionnaires to the Szeged Regional Directorate.

Implementation of field-work

The precise description of the survey district was given to the enumerators and their work was also assisted by the List of Respondents (LR) per district. The function of LR was to check the completeness of addresses, to update the farm register and to provide information for arranging the payments.

The names and addresses of private holders within each district were printed beforehand. The whole list of 184 000 private holdings were produced according to the information coming from the farm register. The list per district was arranged by streets and within it by increasing order of house numbers to support the enumerator visiting all addresses house by house within the boundaries of his/her survey district.

When the enumerators moved within their districts they met three types of respondents:
- private holdings,
- households engaged in agricultural activity but under the physical threshold,
- respondents not engaged in any agricultural activity (for example households without any agricultural activity, churches, shops, schools or other institutes etc.)

The enumerator was allowed to complete a questionnaire about only private holdings (households reached the threshold on 1st December 2007). After finding the private holding printed on LR, the enumerator had to check whether the address and name were correct. On the questionnaire the correct identification data must have been written and any differences to the previous information had to be indicated.
When the questionnaire was not filled in, the enumerator had to register on the LR one of the following codes:

Status code	Description
101	Agricultural activity is given up
107	Holding can not be contacted
203	Agricultural activity suspended
204	Agricultural activity is below threshold

When the enumerator found the holding printed on the LR without changes its address and name, and its agricultural activity reached or exceeded the threshold, a questionnaire was filled in. When a holding moved to another place within the same survey district, the enumerator had to visit it on the new address and interviewed it. In case of another holding was found on the address printed on the LR, a questionnaire was filled in. The house by house method made it possible, that holdings were not printed on LR could be discovered. These new holdings were registered on the LR and the questionnaires were also completed.

The enumerators recorded the households engaged in agricultural activity but under the physical threshold, as well. To provide certain statistical information on this agricultural activity, the productive land area, the number of chickens, geese, ducks, turkeys and bee colonies was noted.

The enumerators had to register on the LR the names and addresses of respondents without any agricultural activity, too. They were the so-called 'respondents not engaged in any agricultural activity'. This information is essential to check the completeness of the survey.

Questions had to be asked from an adult person (holder, spouse or family member of holder, manager) who was able to give reliable answers. If the enumerator did not find anybody on the spot who could answer properly, he/she had to fix another date for the visit. If the respondent was not at home, the enumerator left a note with the date of his next visit. After three unsuccessful visits he/she had to report the case to his/her survey supervisor, just like any case when the respondents refused to answer. If the identification was done and the holding reached or exceeded the threshold, the enumerator filled the questionnaire in, which took 30-35 minutes on the average.

Finally, 111 000 questionnaires were completed and the enumerators visited altogether around 360 000 addresses during the implementation period. The difference can be accounted as follows:

- 145 000 households were below farm threshold;
- 104 000 households did not carry out any agricultural activity.

More then 9 000 enterprises returned the questionnaires to the Szeged Regional Directorate of HCSO. About 7 660 of them had some agricultural activity in 2007. The rest was engaged in agricultural services only and had no agricultural activity at all. There are several reasons the agricultural enterprises did not returned the questionnaires: a part of them stopped the agricultural activity or being liquidated, others had registered agricultural activity to the Registry Court but in reality they were not involved in such activity.

Data entry

A uniform Data Entry and Validation System is run by HCSO having the following main features:
- application in ORACLE form,
- data is stored in the Central Database,
- integrated with other systems (e.g. Meta-Database, Survey Control System, XML system),
- ensuring flow control.

The data entry applications of the LR and the questionnaires of private holdings and agricultural enterprises were developed by the IT Department of HCSO according to the specifications elaborated by the AESD.

The staff of the AESD, the Szeged Regional Directorate and the IT Department tested the data entry applications for 3 weeks. During the test period there was direct and continuous communication with the soft-ware developers, so the detected problems, mistakes could be corrected immediately and suggestions on modifications were built in the applications continuously.

Before the data entry of the private holdings' questionnaires the information of the LRs had to be entered. The register codes of the holdings directed the data entry of the questionnaires.

The logical and arithmetical coherency within and between the tables was incorporated in the data entry program. Besides entering the data, the application could produce different check lists: number of entered questionnaires per counties per days, number of questionnaires entered with an error, list of errors, aggregated data per tables per counties, statistics about the staff keying the data. These lists helped to monitor the whole process of data entry carried out by the staff of the regional directorates and county representatives as well as the central staff of HCSO.

The FSS-team prepared a detailed guide for data entering. This guidance among others included instructions about the use of the keyboard, the process of data entry (e.g. query of list of errors, the type of errors, etc.), navigation between tables, handling of lists etc.

Data were entered into an Oracle database according to the tables of the questionnaires. With the help of a predefined interface table data were loaded into the production database system called HOMBÁR and handled by the statisticians of the AESD. Estimations, data processing and data for the publication tables are produced within the HOMBÁR.

3.4.3. Utilization of administrative data sources

A. ORGANIC FARMING

Based on the Regulation (EEC) 2092/91 of 24 June on organic production of agricultural products and indications all holdings involved in organic farming have to be registered. According to Council Regulation 473/2002 (EC) all the farms having received subsidies for organic production in 2007 are included in the organic farming register.

The organic farming register is managed by two organizations in Hungary: the Biokontroll Hungária Nonprofit kft. and the Hungarian ÖKO Garancia. Biokontroll Hungária Nonprofit kft. is an organisation for public benefit. These organisations are authorised to certify organic farming, and able to maintain organic farming register in Hungary.

The HCSO has an agreement with both organisations for using the data they store in their registers. According to these contracts the data are checked and provided to the HCSO in an electronic format suitable for statistical use.

Characteristics collected from organic farming register

Eurofarm code	Name of the characteristics
C5a	The utilized agricultural area of the holding on which organic farming production methods are applied according to European Community rules
C5d	The utilized agricultural area of the holding that are under conversion to organic farming production methods
C5e	Is the holding applying organic production methods also to the animal production?

Relevance and comparability

There are no differences between the register definitions and Eurofarm definitions. The link between the organic farm register and the holdings surveyed is created by the statistical ID Code in case of the economic organisations and by the name and address in case of the private holdings.

Clarity

Legal base: Regulation (EEC) No 2092/91
Council Regulation (EC) 473/2002
Ministerial Regulation (MARD) No 140/99
Ministerial Regulation (MARD-EM) No 2/2000

Completeness

The organic farming register maintained by Biokontroll Hungária Nonprofit kft. covers majority of the organic farms in Hungary (about 95% of the certified production). Data on the remaining data of organic farms (5%) are collected by the Hungarian ÖKO Garancia.

Data validation

The administrative data on organic farming was compared with the same data of the previous years. A detailed coherency check was done concerning the coding, land area and livestock types.

Note: The organic production is underrepresented in the EUROFARM dataset sent to the EUROSTAT, whereas this activity was not among the selection criteria of the FSS 2007. Only a limited number of holdings with organic farming activity could be included from the administrative data source.

B. AREA OF QUALITY WINE GRAPES

Based on the Census of Vineyards and Fruit Plantations in 2001 the Vineyard Register (VR) was established and for that time it is updated regularly by the National Council of Wine Communities (NCWC). The wine communities are obliged to follow the annual grubbing and plantation of stock, as well as the production. They represent 85 % of the Hungarian vineyards.

The co-operation between the NCWC and the HCSO goes back for many years. An agreement was signed for using the data of the vineyard register. According to these contracts the data are checked and provided to the HCSO in an electronic format suitable for statistical use.

Characteristics collected from vineyard register

Eurofarm code	Name of the characteristics
	Vineyards
	of which normally producing:
G04a	quality wine

Relevance and comparability

There are no differences between the register definitions and Eurofarm definitions.

Data imputation

In the FSS land area data are collected only on vineyards according to the main use (for wine, table, other). In order to split the quality wine grapes the following method was used:

1. the land area of quality and other wines by wine communities have been received from the NCWC, from which a ratio among them was calculated on the lowest available level
2. the list of municipalities for each wine community is available
3. the holdings cultivating vineyards were linked to the relevant wine community using the names (codes) of the settlements
4. the vineyard area of each farmer in the relevant wine community was split among the quality and other wine categories according to the calculated ratio
5. the vineyards outside the wine communities are considered as other wines, because legally quality wines are not to be produced on areas outside the wine communities
6. the calculated quality/other wine area figures were inserted into the EUROFAM database

3.4.4 Control of the data

During the implementation a multilevel quality assurance system was applied in which the upper levels controlled the levels below. The well-trained, experienced enumerators familiar with the survey districts contributed to the high quality of the data to a great extent. The FSS-

team compiled the instructions for surveyors containing the unambiguous description of the agricultural concepts, the main aspects how to complete the questionnaire, and the most important validation rules supporting the work of the enumerators largely. Based on this the enumerators could check the coherency of the received information immediately on the spot. If the questionnaire included any kind of unreliable or erroneous items, the survey supervisors had to give it back to the enumerator for correction.

Considering the fast data entry, it was unnecessary to stop the work in every case for correcting mistakes; the verification could be done later on. Four categories of error flags were used during data entry of questionnaires as follows:

- less serious ones only for information (e.g. if there is any difference between sown and harvested area),
- errors can be accepted, but justification is needed (e.g. the yield of a certain crop falls out from the interval specified earlier),
- serious errors can be accepted only by the authorized survey administrators (e.g. a certain crop has harvested area but no production due to hail),
- unacceptable errors must be corrected immediately, the data entry only can be carried on after correction (e.g. the code is not applicable or the totals are incorrect).

The data entry system stores the identification code of the person who carried out the data entry. By that it is possible to monitor the quality of data entry per persons. Only correct questionnaires were accepted in the central database.

Further verification applications were developed according to the specification of the FSS-team, which aimed at picking up extreme values and examining further – not obligatory – coherency of data. Altogether 39 SQL query programs were developed. Data validation following data entry was implemented by the staff of the Szeged Regional Directorate and the AESD.

3.4.5 Non-response

Private holdings

The rate of refusal was not more than 0.05 % due to the well-trained enumerators having good communication skills. The intensive communication campaign also contributed to improving the response rate. The survey supervisors with the help of the local authorities managed to convince nearly all the non-respondents and legal steps were not taken. In case of holders, who could not be contacted, the enumerator left a note to inform the holder about the time of his/her next visit. The rate of non-response amounted to 0.4 %.

The item non-response is negligible as during the face-to-face interviews the appropriate tables of the questionnaires have been completed by the enumerator. Taking into consideration the coherence of the questionnaire they asked for all the necessary information in accordance with the resources of the holding.

Agricultural enterprises

The AESD has laid particular emphasis on ensuring the completeness. After the deadline the agricultural enterprises were urged by the colleagues of the Szeged Regional Directorate to return the questionnaires. In case of any mistakes or missing data, the staff clarified the

problems by phone. Finally, 12 enterprises (0.1%) refused to complete the questionnaire. The staff of Regional Directorate have not managed to get the contact with 59 enterprises, however any information about these units are not available from other statistical surveys, it can be assumed that they have no agricultural activity at all. The rate of non-response amounted to 0.7 percent.

3.5 Data processing, estimation and analysis

3.5.1 Methods for handling missing or incorrect data

Private holdings

As the survey was implemented by enumerators who collected all the necessary information, the item non-response may not have occurred and the unit non-response was negligible, thus no procedure was necessary to handle this problem.

Agricultural enterprises

In unambiguous cases the missing data (e.g. missing of total values) were fixed by the colleagues of the Szeged Regional Directorate. If it was not possible, they contacted the concerned enterprise to make the correction.

When the respondent enterprises were determined the enterprises engaged in forestry activity have not been selected in 2007. In order to have the same basic population than in 2005, these units had to be inserted at the end of the data processing. Their data from 2005 were imputed as a whole set of data into the EUROFARM data-file.

3.5.2 Estimation and sampling errors

In order to increase the effectiveness of the FSS 2007 estimations a separated stratum was created for the private holdings having significant agricultural activity (significant producers). Regarding their significant agricultural land area and livestock 29 private holdings were filtered out from the Farm Register prior to the survey. After the 2007 survey further such private holdings were taken out based on their reported data and considered as significant producers. Altogether the total number of such holdings was 185. This stratum was considered as being observed exhaustively.

The characteristics of the private holdings and the households were estimated by the following five strata by 20 counties (19 + Budapest):

1. New private holdings discovered in BSVFP 2001 and not had been observed in the AC 2000
2. Private holdings having at least 1 ESU economic size in the AC 2000
3. Private holdings below 1 ESU economic size in the AC 2000
4. New private holdings discovered in the FSS 2007
5. Households under threshold having productive area, or chickens, or geese, or ducks, or turkeys, or bee colonies

For the estimation of the different characteristics of the private holdings two type of estimation methods were applied: proportion estimation and grossing up by simple inflation ("mean estimation"). The formulas for estimations and sampling errors (the square of standard errors) can be found in the Annex 3.

Proportion estimation was applied to estimate the number of private holdings and livestock. The correlation between the figures at the time of the FSS 2007 and the AC 2000 has proved high, thus livestock was calculated by ratio estimation. The totals of the rest characteristics (farm labour force, land, crops, etc.) were calculated by mean estimation.

In case of land area the aggregations of the private holdings contain only the area that can be connected to the agricultural holdings. The livestock estimations were adjusted to cover the households under the threshold, but having certain species in order to ensure the comparability with national data (livestock statistics).

For the important characteristics in Hungary, the values of coefficients of variation (CV) at national level are presented in the table:

Code	Characteristic	CV (%)
-	Number of the holdings	0.74
D-G	Utilised agricultural area	0.97
D	Arable land area	1.11
D/01	Wheat (excl. durum wheat)	1.40
D/06	Grain maize (excl. hybrid)	1.71
D/27	Sunflower for oil production	2.12
D/04	Barley	1.87
D/11	Sugar beet	3.09
J/02-J/08	Cattle	1.20
J/11-J/13	Pigs	0.74

References

Estevao, V., Hidiroglou, M. A. and Särndal, C. E. (1995) Methodological principles for a generalized estimation system at Statistics Canada. *J. Off. Stat.* 11 181-204**.**

Särndal, C. E, Swensson, B. and Wretman, J. (1992) *Model Assisted Survey Sampling*. New York: Springer.

3.5.3 Non sampling errors

Private holdings

As it was mentioned before, the frame population of private holdings can not be expanded between full-scope censuses, although the ongoing changes are still notable in Hungarian agriculture. Our frame of private holdings is out-of-date, that is why the area frame approach was preferred to be used.

A number of measures were taken to reduce the survey errors. A particular stress was laid on the training of survey participants, and the design and implementation of a multilevel quality assurance system.

As many validation rules as possible were incorporated in the data entry application and after data entry the micro- and macro-data were analysed thoroughly, and confronted with other agriculture statistics.

Agricultural enterprises

The survey population exceeded the target population. The reason for this over-coverage is that some enterprises had indicated agriculture among its activities but in 2007 they were not engaged in such activity, or there are enterprises which closed down or are being liquidated. They sent back the questionnaires blanc, with a comment about the reason. Our Business Register is updated with this information.

3.5.4 Evaluation of estimates

Validation of the estimates was made from several aspects. Data are compared with the results of the regular agricultural sample surveys in 2007, AC 2000, FSS 2003 and 2005 and the Basic Survey on Vineyards and Fruit Plantations 2001. The FSS 2007 results have proved to be of good quality, however, the aggregates of different land areas cover only the area that can be connected to the agricultural holdings. (At the same time the current statistics covers the land area unidentifiable with holdings as well, which means that the published aggregates contain and reflect additional expert estimations.)

4. PUBLICATION AND DISSEMINATION

The dissemination and communication tasks of the FSS 2007 were fulfilled by the staff of the AESD. The following publications were and will be produced:

Title of publication	Form		Issued on	Content
	Inter-net	Pa-per		
Livestock 1 December, 2007	X		Jan. 2007	Livestock by age, sex and varieties and per legal form of holdings. Data on county, regional and national level.
Agriculture in Hungary, 2007 (preliminary data)	X		1 Sept. 2008	Number of holdings, objective and type of farming, land use; livestock, organic farming, farm labour force, machineries and non-agricultural activities in the holdings. Data on national and regional level.
Agriculture in Hungary I., 2007 (final data)	X		Oct. 2008	Number of holdings, Gross Product Value, land use; crops on arable land; production of vegetables, fruits and grapes; agro-engineering. Data on national and regional level.
Agriculture in Hungary II., 2007 (final data)	X		Dec. 2008	Livestock, farm labour force and non-agricultural activities in the holding. Data on national and regional level.
Typology of holdings	X	X	Dec. 2008	Results according to the typology system of the EU.

The publication about livestock on 1st December 2007 was issued in the framework of the regular, annual dissemination system of the HCSO and was made available only on the web-site of HCSO. The preliminary data will be released at a press conference on 1 September 2008 FSS 2007 publications will be compiled and available on Internet.

Beyond the data tables the publications of FSS 2007 contain methodological remarks including detailed definitions connected to the published data and general information about the implementation of the survey.

Annex 1

NS and NE characteristics in Hungary

Code	Characteristics	NS	NE
B.1.(b)	One or more natural persons who is/are a partner, where the holding is a group holding	X	
D.9.(g)	Other protein crops harvested dry	X	
D.24.	Hops	X	
D.25.	Cotton		X
D.31.	Flax	X	
D.33.	Other textile crops		X
G.1.(b)	Fruit and berry species of subtropical climate zones		X
G.2.	Citrus plantations		X
G.3.(a-b)	Olive plantations		X
G.4.(d)	Raisins		X
G.6.	Other permanent crops	X	
G.7.	Permanent crops under glass	X	

Annex 2

1677/07 Questionnaire
2128/07, 1087/04 Questionnaires
(See the “Annex 2.zip” file)

Annex 3

Estimation methods

1. Estimation of number (N_{ij}) of the private holdings (and households) by strata *(i = 1,2,…, 20; j = 1,2,…,5):*

in case of the new holdings discovered in CVFP 2001 *(j = 1)* and holdings from AC 2000 *(j = 2,3)*

$$N_{ij} = \frac{n_{ij}}{n_{ij}^0} N_{ij}^0,$$

in case of the new holdings discovered in FSS 2007 and the households under threshold *(j = 4, 5)*

$$N_{ij} = \frac{n_{ij}}{m_i} M_i$$

where:

- n_{ij} number of the holdings observed in the survey districts in FSS 2007 in the given stratum,
- n_{ij}^0 number of the holdings observed in the survey districts in AC 2000 and in CVFP 2001 in the given stratum,
- N_{ij}^0 total number of the holdings in the given strata in AC 2000 and in CVFP 2001,
- m_i and M_i number of the survey districts selected in FSS 2007 and total number of the survey districts within the counties.

2. Estimation of number (K_{ij}) of the private holdings keeping certain animal species or having certain type of land area by strata

Proportion estimation is applied by strata as follows:

$$K_{ij} = p_{ij} N_{ij} = \frac{k_{ij}}{n_{ij}} N_{ij}$$

where:

p_{ij} and k_{ij} proportion and number of the holdings within the survey districts of the given stratum.

This implies that

in case of the new holdings discovered in CVFP 2001 *(j = 1)* and holdings from AC 2000 (*j = 2,3)*

$$K_{ij} = \frac{k_{ij}}{n_{ij}} \frac{n_{ij}}{n_{ij}^0} N_{ij}^0 = \frac{N_{ij}^0}{n_{ij}^0} k_{ij},$$

in case of the new holdings discovered in FSS 2007 and the households under threshold *(j = 4, 5)*

$$K_{ij} = \frac{k_{ij}}{n_{ij}} \frac{n_{ij}}{m_i} M_i = \frac{M_i}{m_i} k_{ij}.$$

3. Estimated total of the rest characteristics *(X_{ij})* by strata

Estimation of the mean or ratio estimation is applied by strata as follows:

$$X_{ij} = \frac{x_{ij}}{n_{ij}} N_{ij}$$

$$X_{ij} = h_{ij} X_{ij}^0 = \frac{x_{ij}}{x_{ij}^0} X_{ij}^0$$

where:

x_{ij} total of the holdings observed in survey districts in FSS 2007 by strata,

x_{ij}^0 and X_{ij}^0 total of the sample and the whole population in AC 2000 or CVFP 2001 by strata,

h_{ij} the ratio of x_{ij} and x_{ij}^0.

This implies that

in case of the new holdings discovered in CVFP 2001 *(j = 1)* and the holdings from AC 2000 (*j = 2,3)*

$$X_{ij} = \frac{x_{ij}}{n_{ij}} \frac{n_{ij}}{n_{ij}^0} N_{ij}^0 = \frac{N_{ij}^0}{n_{ij}^0} x_{ij},$$

in case of the new holdings discovered in FSS 2007 and the households under threshold *(j = 4,5)*

$$X_{ij} = \frac{x_{ij}}{n_{ij}} \frac{n_{ij}}{m_i} M_i = \frac{M_i}{m_i} x_{ij}.$$

Sample errors

1. Since the number (N_{ij}) of the holdings by strata is estimated, it also has a sampling error. The square of the standard errors is calculated as follows:

in case of the new holdings discovered in CVFP 2001 *(j = 1)* and holdings from AC 2000 (*j = 2,3)*

$$\sigma^2_{N_{ij}} = L_i \sum_{l=1}^{m_i} \left(n_{ijl} - \frac{n_{ij}}{n^0_{ij}} n^0_{ijl} \right)^2 ,$$

in case of the new holdings discovered in FSS 2007 and the households under threshold *(j = 4, 5)*

$$\sigma^2_{N_{ij}} = L_i \left(\sum_{l=1}^{m_i} n^2_{ijl} - \frac{n^2_{ij}}{m_i} \right)$$

where:

$L_i = \dfrac{M_i (M_i - m_i)}{m_i (m_i - 1)}$, and

n_{ijl} number of the holdings observed in survey district ‘l” in FSS 2007,

n^0_{ijl} number of the holdings observed in survey district ‘l” in AC 2000 or in CVFP 2001.

2. The square of the standard errors relating to the number (K_{ij}) of the private holdings keeping certain animal species or having certain type of land area, by strata are calculated as follows:

$$\sigma^2_{K_{ij}} = L_i K^2_{ij} \sum_{l=1}^{m_i} \left(k_{ijl} - \frac{k_{ij}}{n_{ij}} n_{ijl} \right)^2$$

where:

k_{ijl} number of the appropriate holdings within the survey district “l” in the given stratum.

3. The square of the standard errors relating to the estimated total (X_{ij}) of the rest characteristics by strata is calculated as follows:

in case of **the** mean estimation,

$$\sigma^2_{X_{ij}} = L_i \sum_{l=1}^{m_i} \left(x_{ijl} - \frac{x_{ij}}{n_{ij}} n_{ijl} \right)^2 ,$$

in case of the ratio estimation,

$$\sigma^2_{X_{ij}} = L_i \sum_{l=1}^{m_i} \left(x_{ijl} - \frac{x_{ij}}{x^0_{ij}} x^0_{ijl} \right)^2$$

where:

x_{ijl} total of the holdings observed in survey district "l" in FSS 2007 in the given stratum,

x^0_{ijl} total of the holdings observed in survey district "l" in AC 2000 or in CVFP 2001 in the given stratum.

To calculate the square of the standard errors relating to unions of strata *(i = 1,2,…, 20; j = 1,2,…,5)* squares of the standard error relating to the various strata are summed up. As usual, the coefficient of variation (CV) is computed by dividing the standard error with the appropriate number of holdings or totals.