

Farm Structure Survey 2009/2010

Survey on agricultural production methods 2009/2010

National Methodological Report (NMR)

According to Art. 12 of Regulation (EC) No 1166/2008 of the European Parliament and of the Council of 19 November 2008 published in the Official Journal of the European Union L 321, p.14 of 1 December 2008

Member State: **ITALY**

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SUMMARY

Six agricultural censuses have been conducted in Italy in the years 1961, 1970, 1982, 1990, 2000 and the latest, to which data here refer, in 2010.

Its objective is:

- a) to provide a statistical picture on the structure of the agricultural and livestock system at national, regional and local level.
- b) to fulfil the Regulation (EC) n. 1166/2008 of the European Parliament and of the Council of 19 November 2008 on farm structure (FSS) and the survey on agricultural production methods (SAPM) and the Council Regulation (EEC) No 357/79 of 5 February 1979 on statistical surveys of areas under vines.
- c) To update and validate the statistical register of the agricultural holdings built up by Istat through the integration of the administrative sources.

The Agricultural Census cover all agricultural holdings whoever is its management, with Utilized Agricultural Area (UAA) or livestock equal or higher than minimum thresholds stated by Istat (see chapter 2.5),

The organisation of the census network has been flexible. The Institution responsible for carrying out the Census is Istat. The Regions and the Autonomous Provinces of Bolzano and Trento have decided their role within two different models: high and integrative participation level model. Depending on the model chosen the enumerators have been selected by the Region or by the Municipality or by an intermediate administrative level.

In the preparatory phase, a Census Committee was created with advisory functions, It was composed by members of Istat, Regions, Ministry of Agriculture, some Research Institutes and representatives of Municipalities and Provinces.

Data collection has been carried out through two alternative techniques:

- Traditional technique based on the face-to-face interview of the holder by the enumerator using a paper questionnaire;
- New technique based on the self-compilation of the electronic questionnaire in the web by the holder.

The field work has started on October 25, 2010 and ended on January 31, 2011, with the exception of one Region.

14 Regions and the Autonomous Provinces of Bolzano and Trento have recorded directly the questionnaires collected. The questionnaires collected by 5 Regions have been recorded in outsourcing by an enterprise selected by a contest.

The non-sampling errors has been identified and treated by an Editing and Imputation System (E&IS), preserving as much as possible the collected information. The E&I activities could be grouped in three main stages. The first stage refers to the checks performed at the data gathering phase. The second stage concerns the activities carried out in order to provide the provisional figures. The last stage relates to the procedures aiming to release the final data.

The whole process of E&I has been monitored by the analysis both of the data distributions and of the performances of the scheduled editing steps. By computing a set of tables, at regional and provincial level, the final results of the procedures have been compared with the available statistical and administrative sources

The SAPM has been joined with FSS at census level. A unique questionnaire has been used for collecting information both on FSS and SAPM.

1. CONTACTS

Contact organisation	Italian National Institute of Statistics
Contact organisation unit	Department of Censuses, Administrative and Statistical Registers
Contact name	Massimo Greco
Contact person function	Alessandra Reale, Mariella Dimitri, Mara Cammarota (database management) Alessandra Reale (data elaboration) Giampaola Bellini (geographical reference of the holding, volume of water used for irrigation) Matteo Mazziotta (Post enumeration surveys) Massimo Greco, Aurea Micali, Cristiana Conti (dissemination)
Contact mail address	Viale Oceano Pacifico, 171 - 00144 Roma
Contact email address	msmagrec@istat.it
Contact phone number	+39 06 4673 4570

2. SURVEY METHODOLOGY

2.1 National legislation

The art. 15 of Legislative Decree n. 322/89 put the National Statistical Office (Istat) in charge of censuses activities.

General measures for the 6th Agricultural Census are stated in the art. 17, comma 2 of the Law Decree 25 September 2009, n.135, converted with modification in the law 20 November 2009, n.166. More in detail, this article call and finance the agricultural census, discipline the census activities in general and refer to the Decree of Republic President n. 154 of 23 July 2010 for establishing the rules of its execution.

These are the main articles of the Decree of Republic President n. 154:

Art. 1 - Objectives

The objectives of the 6° Agricultural Census are:

- a) to provide a statistical picture on the structure of the agricultural and livestock system at national, regional and local level
- b) to fulfil the Regulation (EC) n. 1166/2008 of the European Parliament and of the Council of 19 November 2008 on farm structure (FSS) and the survey on agricultural production methods (SAPM) and the Council Regulation (EEC) No 357/79 of 5 February 1979 on statistical surveys of areas under vines.
- c) To update and validate the statistical register of the agricultural holdings built up by Istat through the integration of the administrative sources.

Art. 2 - Time reference

The reference date of the agricultural census is 24th October 2010.

Art. 4 - Coverage

The Agricultural Census surveys in each Municipality all the agricultural and livestock holdings whoever is its management, with Utilized Agricultural Area (UAA) or livestock equal or higher than minimum thresholds stated by Istat in the General Plan of the Census with regards to the Regulation (EC) n. 1166/2008.,

Art.5 – Technique of the enumeration

comma 4. The statistical units are identified by a pre-census list established by Istat on the information provided by the SIAN (Sistema Informativo Agricolo Nazionale) with particular reference to the *Integrated Administration and Control System (IACS)* and to administrative archives of Public Bodies containing data useful for the purpose.

Art. 27 - Obligations of the respondents

1. All the units under art. 3 are obliged to provide the information requested by the questionnaire.
2. In case of refusal, administrative penalties under the art. 11 of the Legislative Decree n. 322/89 are applied.

Administrative and financial provisions are stated in art. 32, 33, 34 and 35.

From the technical and organizational point of view, Istat adopted a Census General Plan and, according with it, Regions and Autonomous Provinces of Bolzano and Trento have drawn up own Census Regional Plans.

Moreover, the survey is performed in compliance with the law governing the treatment of personal information (Legislative Decree n. 196/2003 and the Deontology Code for the bodies belonging to the National Statistic System under Legislative Decree no. 322/89 as amended by Legislative Decree n. 281/99).

The Agricultural Census is carried out every 10 years in Italy.

2.2 Characteristics and reference period

For national purposes, the characteristics stated in the annex III of the Regulation (EC) n.1166/2008 have been integrated with new items or some new characteristics have been added at the list. The request of new characteristics or items comes mainly from Ministry of Agriculture, Regions, National Account Service of Istat, INEA, ISPRA or for keeping comparisons with the past. The number of new items added to the Census questionnaire than those of the annex III of the Regulation (EC) 1166/2008 are 218 of which 74 referred to new characteristics (see the table below).

Table 1 – Further characteristics and items collected in 2010 FSS and SAPM

Characteristic	NEW or already existing in the Regulation 1166/2008	Number of new items	Description
Legal personality of the holding		9	<ul style="list-style-type: none"> - Individual holding - Ordinary partnership - Other joint partnership (S.n.c., S.a.s., etc.) - Joint-stock company (S.p.a., S.r.l., etc.) - Cooperative company - Public administration or Institution - Common land - Non-profit private institution - Other legal status
Type of tenure		3	<ul style="list-style-type: none"> - Total Agricultural Area for owner farming - Total Agricultural Area for tenant farming - Total Agricultural Area for free use(*)
Land Units	New	1	- Number of land units in the holding

Holding activity state	New	2	- Active or temporary inactive
Holding computerization	New	8	- Does the holding have a computer and/or other computer equipment for business purposes? - The holding normally uses its own computer equipment for: a) Administration purposes b) Computerized management of crops c) Computerized management of livestock - Does the holding normally use Internet for its own purposes? - Does the holding have a Web site or one or more pages on Internet? - The holding uses e-commerce to: a). Sell holding goods and services b) Purchase goods and services
Support for rural development		4	- Cooperation for development of new products, processes, and technologies in the agriculture and food sector and in the forestry sector - Natural handicap payments to farmers in mountain areas - Natural handicap payments in other areas with handicaps than mountains - Agro-environment payments of which in the framework of integrated agriculture
Arable land		7	- Sorghum - Table tomatoes - Industrial tomatoes - Young plants for vegetables - Young plants for flowers and ornamental plants - Other young plants - Lucerne
Fruit of temperate climate zones		9	- Apples - Pears - Peaches - Nectarines - Apricots - Cherries - Plums - Figs

			- Other fruits
Fruit of subtropical climate zones		2	- Kiwi - Other fruits
Nuts		5	- Almonds - Hazelnuts - Chestnuts - Walnuts - Other nuts
Citrus plantations		5	- Orange - Mandarin - Clementine and hybrids - Lemon - Other citrus fruits
Nurseries		3	- Fruit tree - Ornamental plants - Others
Short rotation coppices		1	- Poplar plantations
Wooded area		3	- Timber forest - Coppice - Other wooded area)
Specific information on vineyards	New (according to Reg. (EC) n. 357/79)	23	See section 2 of the questionnaire - Specific information on vineyards
Irrigation		5	Temporary grass and permanent grassland have been split in three categories: green maize, other temporary grass and permanent grassland. Two new items have been added: Other permanent crops and short rotation coppice
Source of irrigation water used on the holding		2	Off-farm water from common water supply networks: a) delivery by rotation b) by demand.
Irrigation consultancy	New	1	- The holding uses irrigation consultancy services and/or irrigation requirement determination systems ?
Irrigation methods employed		2	- Microirrigation - Other methods
Organic farming		1	- Green fodder
PDO and PGI production methods		8	- Cereals - Dried pulses - Potatoes - Vegetables - Olive - Citrus fruits - Orchards

			- Other crops
Soil conservation: crops rotation		3	- Monoculture - Free rotation - Rotation scheme
Controlled grassing	New	1	Controlled grassing of the area of fruit trees
Bovine animals		7	- Bovine animals under one year old a) Male b) Female - Breeding heifers - Heifers for slaughtering - Buffalo's calves - Buffalo's milk - Other buffaloes
Equidae		2	- Horses - Others
Sheep		2	- Dairy sheep - Other breeding females
Pigs		7	- Piglets from 20 kg to less than 50 kg - Fattening pigs: a) from 50 kg to less than 80 kg b) from 80 kg to less than 110 kg, c) from 110 kg and more - Boars - Covered sows - Other sows
Poultry		5	- Turkeys - Geese - Ostriches - Guinea-fowls - Other poultry
Rabbits		1	- Other rabbits
Organic production methods to animal production		3	- Buffaloes - Rabbits - Bees)
PDO and PGI production methods		7	-Bovine -Buffaloes -Sheep -Goats -Pigs, -Poultry -Bees
Animal grazing on the holding		1	- Total number of animal grazing
Animal grazing on other farms		3	- Total number of animal grazing - Area grazed during the last year - Amount of time when animals are outdoors on pasture

Animal grazing on common land		1	- Area grazed during the last year
Animal housing: broilers	New	1	- On the ground with outdoor access - On the ground without outdoor access
Manure storage and treatment facilities		12	- Solid dung a) accumulation in field b) uncovered pit c) uncovered pit - Liquid manure a) covered tank b) uncovered tank c) covered lagoon d) uncovered lagoon - Slurry a) covered tank b) uncovered tank c) covered lagoon d) uncovered lagoon
Location of holding land and livestock by Municipality	New	15	- Arable land - Vineyards - Fruit and berry plantation excl. vineyards - Kitchen garden - Permanent grassland - UAA - Short rotation coppices - Wooded area - Other land - Total area - Bovine and Buffaloes - Pigs - Sheep and goats - Poultry - Other livestock
Labour force		10	- Citizenship (for all) - Professional status (for holder and holder's family) - Type of contract (for non family labour force regularly employed) - Number of working days (for all) - Average daily hours of work (for all) - % of time dedicated to other gainful activities (for all) - Other work outside the holding (for holder and holder's family) a) time dedicates b) main activity sector

			c) position - Holder's family not working in the farm
Other gainful activities		8	- Teaching farms - Recreational and social activities - Initial processing of agricultural products - Processing of agricultural products - Processing of animal products - Services for livestock - Fixing up of parks and gardens - Production of complete and complementary feed
Third party work	New	10	- Active third party work - Passive third party work - Days of work carried out on the holding - of which in other farms - Type of operations carried out on the holding a) full operations b) partial operations - Ploughing - Fertilisation - Sowing - Mechanical harvesting and initial processing of agricultural products - Other operations on crops - Other operations not on the area
Production of feed to be used in the holding	New	1	- Was complete and complementary feed produced on the holding to be re-used on the holding ?
Accounting	New	3	- Flat rate - Ordinary - No accounting
Revenues (%)	New	3	- From sales of farm products - From other gainful activities - From direct payments
Destination of the holding's production (self-consumption)		2	- Self-consumption of all production value - Self-consumption of 50% or less of the production value
Marketing of the holding's production (%)	New	6	For a list of 18 products concerning crops, animal products and processed products, it has been asked the channel of marketing, if existing: - Direct sales in the farm

			<ul style="list-style-type: none"> - Direct sale out the farm - Sales to other farms - Sales to industrial enterprises - Sales to commercial enterprises - Sales or transfer to associated organisms
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(*)The “free use” is a particular form of contract where the holder gets to use the land in "loan for use" but the land remains in the property of the owner. The code used for this variable in the file transferred to Eurostat is A_3_1_1 if the holding has a direct management by the holder or a management with wage-earners or A_3_1_3 if the holding has an other form of management (Soccida) (see questionnaire in English). This is the approach followed since ever and it is based on national legislation.

The following characteristics have not been included in the Census because they are not existent (NE) in Italy:

- Energy crops of which on set-aside area
- Genetically modified crops

In fact,

- The regulation (EC) 1782/2003 under which energy crops of which on set-aside should be provided, has been abolished.
- the national legislation (D. Lgs. n. 224/03 and D. Lgs. n. 70/05) allows the GMO cultivation in the national territory only for research purposes and The Regulation (CE) n. 73/2009 repealing the Regulation (CE) n.1782/2003 Regions have stated that energy crops on set-aside in fact more existing in Italy.

The Census provides a point-in-time stocktaking of legal status, management system, total and utilized agricultural area of holding and livestock with the reference date of 24 October 2010.

Information on land use, agricultural and animal production methods, labour force and other gainful activities related to the farms refer to the agricultural marketing year (1st November 2009 to 31st October 2010).

Data on the professional status of the holder, his/her family and related, on the head of farm, agricultural skills of farm manager refer to the 12 months prior to the census day.

Characteristics concerning the landscape features and rural development support refer to the last three years

Definitions of characteristics and/or reference time and/or measurement are not changed than in the previous survey (census). Nevertheless the comparability with the past could be affected by the following methodological changes.

- In 2010, only physical thresholds have been used for selecting the units in the population of the survey. In 2000 physical and economical thresholds were applied. The impact of this change could affect the number of holding time series.
- In 2010 specific actions have been implemented to include all Common lands with UAA in the population of the survey. In 2000 such actions were not carried out. The impact of this

change could affect the area of permanent grassland (and consequently UAA and Total Area) time series.

- In 2010 only data on sheep, goats, pigs, poultry, rabbits for marketing or of which products are marketing, have been collected. In 2000 all data on heads were collected regardless their destination. The impact of this change could affect the number of sheep, goats, pigs, poultry, rabbits time series.

It has to point out that data on irrigation could be different in the national dissemination than Eurostat dissemination for the following causes:

1) Italy considers some irrigated crops not listed in the Regulation:

- Other permanent crops that are nurseries (2.04.05), other permanent crops (2.04.06), permanent crops under glass (2.04.07).
- Short rotation coppices

2) Italy consider also the secondary crop irrigated if the main crop is not irrigated.

Handbook on implementing the FSS and SAPM definitions – Revision 9 has been used.

A copy of questionnaire(s) in Italian, English, German and Slovenian is provided in Annex.

2.2.1 Different definition

A different definition than Eurostat is applied for the categories of agricultural training of manager “practical experience only” and “basic training”. Data for these two categories are therefore not comparable to data of other countries. In Italy, “practical experience only” refers to cases where the manager has completed no type of education and “basic training” refers to cases where the manager has completed a level of education (primary school, secondary education, higher education) but not directly related to agriculture.

2.3 Survey organisation

2.3.1 The census network

The network of 6th Agricultural Census has been organized on two different models:

- High level participation model: 14 Regions and 2 autonomous Provinces (Bolzano and Trento) choosing this model have defined the census network within its area and have carried out most part of the process (field work, data entry and first stage of the check and correction functions).
- Integrative participation model: 4 Regions (Puglia, Marche, Toscana and Veneto) choosing this model have carried out more limited tasks since Istat was in charge of the organization. The Municipalities of these Regions have conducted the field operations and managed the census network; Istat has been in charge of data entry as well as all check and corrections phases.
- 1 Region (Molise) has chooses the high level model but Istat has been in charge of data entry and check and corrections phases.

Table 2 - The gathering net choices of Italian Regions

Regions	High level participation	Integrative participation
Piemonte	X	
Valle d'Aosta	X	
Lombardia	X	
Bolzano - Bozen	X	
Trento	X	
Veneto		X
Friuli-Venezia Giulia	X	
Liguria	X	
Emilia-Romagna	X	
Toscana		X
Umbria	X	
Marche		X
Lazio	X	
Abruzzo	X	
Molise	X	
Campania	X	
Puglia		X
Basilicata	X	
Calabria	X	
Sicilia	X	
Sardegna	X	

This organization has been very different from the past. In 2010 every Region had the opportunity of an important and direct involvement in the Census activities.

Istat edited the Census General Plan on December 2009. It was the base for the building of Regional Census Plans showing the internal census network with actors and functions.

Each Region was obliged to define in the plans:

- Census Regional Office (URC): the Census office for the coordination of regional census activities. In the Regions with high level participation model it had also the training and the activities monitoring responsibility.
- Regional Technical Commission (CTR): bodies created to evaluate and control the census activities.
- Istat Territorial Responsible persons (RIT): they were people working in the Istat Regional Offices. They were supporter for training and inspector in their area.

- Inter-municipal Coordinators (CIC): their main assignment were to monitor gathering data.
- Interviewers: they worked with assistance of coordinators.

Table 3 - The dimension of the Census network

Region	Interviewers	Cic	Rit	Farms in pre-census list	Average number of farms for interviewer	Number of interviewer for Cic
Piemonte	823	21	8	96.231	117	39
Valle d'Aosta/Vallée d'Aoste	20	1	8	4.889	244	20
Lombardia	465	29	7	88.731	191	16
Bolzano/Bozen	171	15	1	25.661	150	11
Trento	157	2	1	22.557	144	79
Veneto	1.329	11	6	153.791	116	121
Friuli Venezia Giulia	151	3	5	29.063	192	50
Liguria	159	3	4	32.955	207	53
Emilia Romagna	629	53	5	95.879	152	12
Toscana	781	17	5	97.935	125	46
Umbria	217	10	2	43.890	202	22
Marche	574	11	5	59.996	105	52
Lazio	1.017	27	4	147.971	145	38
Abruzzo	321	15	2	82.290	256	21
Molise	325	2	3	31.607	97	163
Campania	817	95	5	173.745	213	9
Puglia	2.071	12	8	304.311	147	173
Basilicata	302	24	4	57.436	190	13
Calabria	1.161	21	5	157.579	136	55
Sicilia	1.320	84	7	261.793	198	16
Sardegna	426	5	6	79.638	187	85
ITALIA	13.236	461	93	2.047.948	155	29

Figure 1 - High level participation model

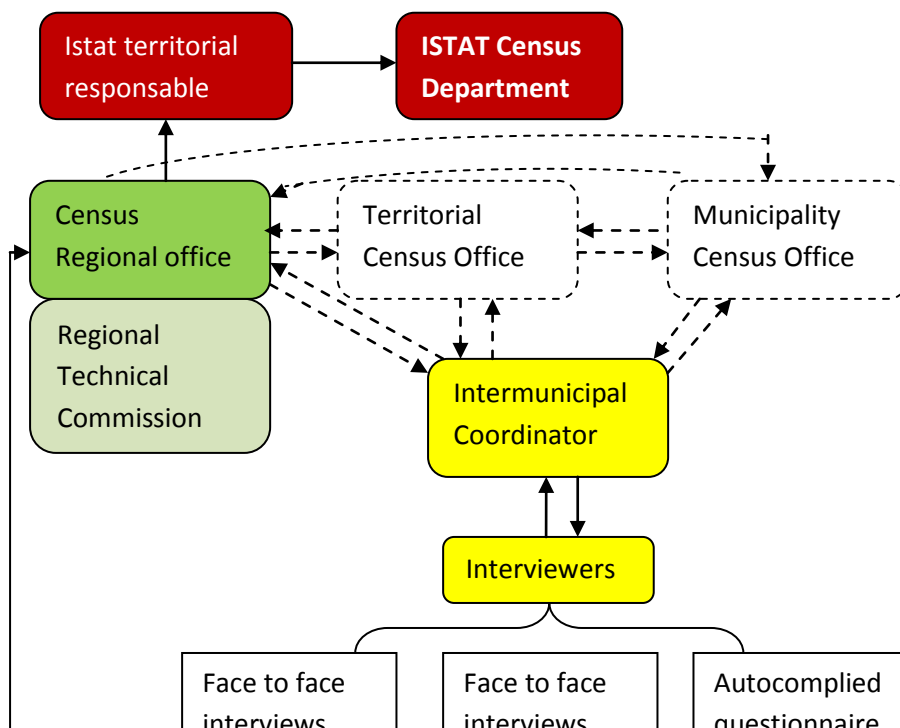
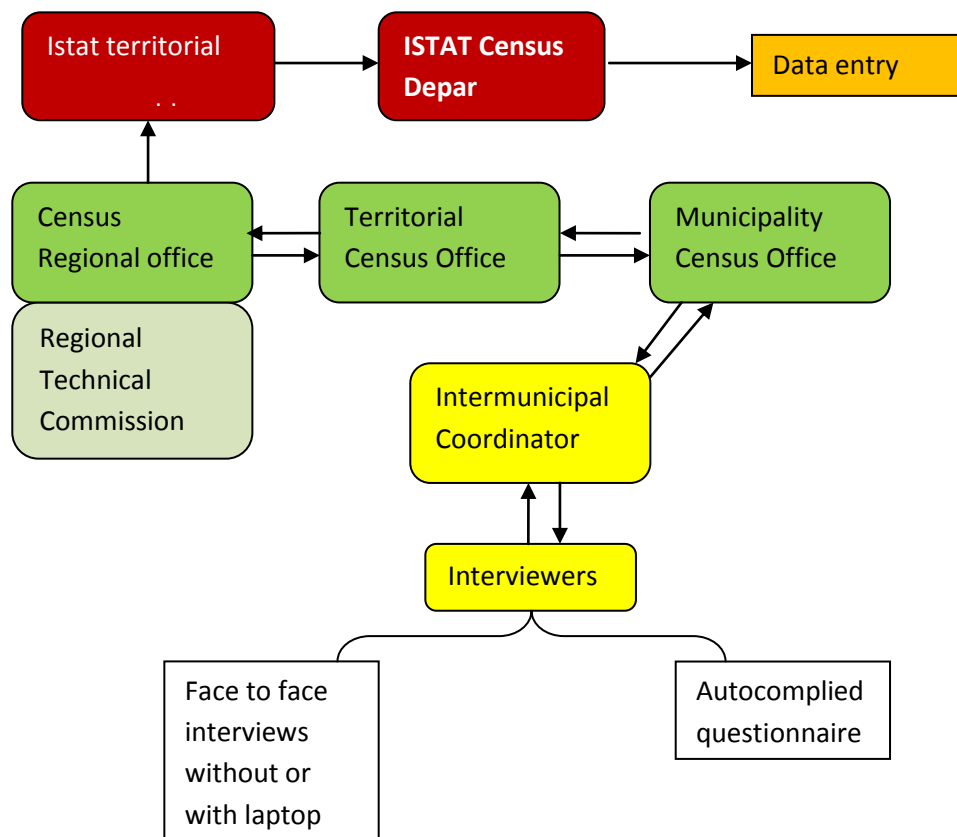


Figure 2 - Integrative participation model

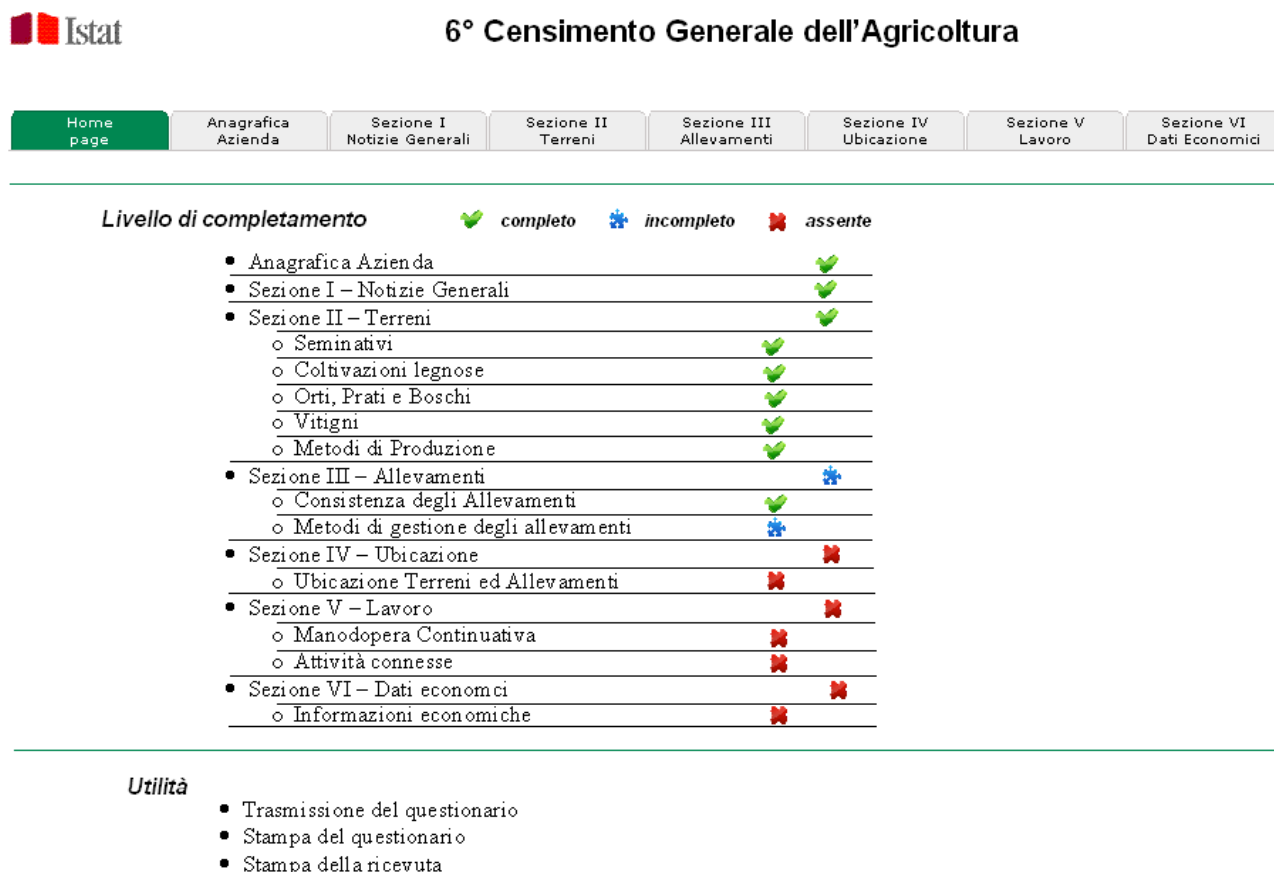


2.3.2 Data collection model

Data collection was carried out by two alternative modalities: the face-to-face interview and the electronic questionnaire compilation directly by holders. In any case the interviewers were responsible for data recording, validation and confirmation of the questionnaires.

Holders received a code for questionnaire internet access. The guided questionnaire was very simple to compile thanks to the filter questions and the on-line guide. At the end of the self-compilation, holders received a message of correct delivery on their private e-mail and could print the compiled questionnaires.

Figure 3 - The home page of the electronic questionnaire



2.3.3 Training for Census.

The aim of the Census training was to transfer methods and organization for Census operation to all the network: Contents (Census organization, Questionnaire, Definitions, Regulation, etc.), Methods (techniques of statistical data gathering), Role (Census operators function).

Training beneficiaries were more than 10.000 people, divided in:

- Istat Territorial Responsible Person (RIT)
- Census regional offices
- Territorial Responsible persons and Coordinators
- Interviewers

To plan and organize the training was created a Working group formed by Istat members of Census of Agricultural Holdings Office, Communication Office, Training Office and Regional Offices. The assignments of the working group were to fix a plan, the contents and instruments of the training.

The developed idea was a “fall” training. It consisted in a training for trainers organized in three steps. The first one was a training section between Istat General Central Census Department (DCCG) and Istat Territorial Responsible (RIT). It was a workshop of four days fixed on May 2010 with the following training plan:

1. CENSUS GOALS AND FEATURES
 - a. Agricultural Census goals, laws and acts about Census
 - b. Communication for Census
 - c. Data dissemination
2. GATHERING NET: ACTORS AND FUNCTIONS
 - a. Organization models of Regions
 - b. Gathering phases and activities
 - c. Activities calendar

3. QUESTIONNAIRE

4. INFORMATIONAL SYSTEM FOR CENSUS, EDITING AND IMPUTATION OF DATA

The second step was the organization of workshops for Regional Census Offices held by Istat Census Office and RIT to transfer the know how discussed during the first step.

The last step was the dissemination of the information at territorial level. Regional Census Offices with the support of RIT called meeting with Territorial Coordinators and, after with Data Collector to explain the work for Census Operation for the different roles.

During all of these steps have been used two kinds of training instruments. A classic classroom session supported by slide, handbooks, etc. and a self-training on-line. The web site for the Census network had a section “training” using DOKEOS, an open source online learning suite. It provided all the features needed for e-learning and blended learning management: from Authoring to Reporting. There’re slides and test for each argument. The user could decide own formative route selecting part or all the arguments of e-learning and the relative tests of evaluation. The tests were independent from the level of self-training and the users visualized immediately the result deciding when make it again.

The self-training on-line had been very important to improve the know-how of Census operators and to simplify the training in case of substitution of people of the Census network.

2.3.4 Help desk for the Census network

- A Web site for the Census network has been created for three aims:
 1. to have a place for posting every new about the 6th General Agricultural Census
 2. to support the gathering net during the data collection
 3. to support the operators managing the free number call center

- Census Regional Office (URC), Istat territorial Responsible persons (RIT), Interviewers, Istat Census Department members, toll free number operators has access to the Web site for gathering net through password.

The main command bar control contained these menu:

Home: news about Census and the Italy map.

Organization: choosing the region it was possible visit the Census Regional Plan, its summary and list of undelivered newsletters.

Instruments: this area contained tools for carrying out the survey. There were the questionnaire survey and additional sheets, manuals of instruction divided into chapters and documents useful to compile the sections of the survey.

Documents: this area contained the official reference documents for the 6th Agriculture Census. It was also the official documentation on related topics, such as the main reference standards in the agriculture sector and the protection of personal data.

FAQ: This area contained answers to the questions on the census of Agriculture. The questions were organized by categories. It was possible see questions and answers clicking on one of the categories in the list or by entering a keyword in a box.

Contacts: Selecting the region it was possible find the contacts of the head of Census Regional Office and ISTAT territorial referents.

Glossary: In this area there were the main questionnaire definitions.

Figure 4 - *Web site for the Census network*

Sei in: Home

02.01.2012 14:20

Aggiornamento Area Documenti

E' stata inserita nell'area documenti la circolare numero 14 del 21 dicembre 2011, riguardante...

[continua]

Categoria: **Aggiornamenti**

31.08.2011 11:51

Aggiornamento Area Documenti

E' stata inserita nell'area documenti la circolare numero 13 del 29 luglio 2011, riguardante...

[continua]

Categoria: **Aggiornamenti**

15.06.2011 12:09

Chiusura SGR

Da domani, 16 giugno 2011, il sistema SGR sarà disponibile esclusivamente in modalità...

[continua]

Categoria: **Comunicazioni di servizio**

03.06.2011 12:44

Indagine di copertura

Nell'area Documenti è stata inserita la circolare 12, riguardante l'indagine di copertura del 6°...

[continua]

Categoria: **Operazioni Censuarie**



- **Bulletin board system**

Intranet system connecting RIT with the Istat central Census Office. Questions on methodological, IT, administrative, organizational aspects were posted by the RIT in the bulletin board and they find fast answers from Istat central Census Office.

- **E-mail censagr@istat.it**

This mailbox had the same functions of the bulletin board system. In this case the questions were addressed by the Census network outside Istat.

- **The Survey Management System (SGR)**

In order to support in the survey network in conducting the various steps of the Census, an information technology system has been implemented. More specifically, a dedicated application based on the use of web technologies has been set up, enabling data collection, data editing functions as well as that of monitoring the various data processing phases. The website set up ensures maximum data security during the data transmission and storage phases, in compliance with the National Statistical Institute's standard rules. The management system can be seen as a distributed workflow system in which each operator can work independently, following a clearly defined procedure. This design moreover has had to provide for the management of recycling in

production processes (delete of questionnaires, changes of status, reactivation of check, etc.) to prevent any problems from becoming such that Istat can only work on them manually. This operating procedure has produced benefits in terms of timeliness, data quality and costs.

The system includes over 50 functions grouped by type and organized into 5 macro-areas:

QUESTIONNAIRES – includes all functions strictly connected to the survey (recording of the interview, data entry, data check, etc.)

OPERATORS – enables the survey network and user profiles to be defined and the units in the pre-census list to be assigned to a specified enumerator

SUMMARY REPORTS – includes a set of survey progress monitoring reports

SUMMARY FORMS – includes all functions for primary variables data collection and a summary of the primary variables necessary for publication of provisional data

UTILITIES – includes a set of network support functions spanning the entire survey process

Figure 5 - SGR



2.4 Calendar (overview of work progress)

Table 4 - Calendar of major census operations

Key Activity	Actor	Time
Formation of the advisory Committee for preparing the 6° general agricultural census at regional level	Istat, Regions, Ministry of Agriculture, AGEA, ISMEA, ANCI, ANPCI, IZS, CISIS ¹	21 February 2008
Legal act for calling and financing the Census	Italian Government	25 September 2009
Census General Plain	Istat	22 December 2009
Regional Census Plains	Regions	15 March, 2010
Preparation of the pre-census list	Istat	by 30 April, 2010
Legal act for establishing the rules to execute the Census	Italian Government	23 July, 2010
Delivery of the Census materials to the network	Istat	by 1 September, 2010
Interviewers' recruitment	Regions/Municipalities	by September 15, 2010
Interviewers' training	Inter municipal coordinators (with contributions of RIT)	27 September - 20 October 2010
Affixing official public poster of Census	Municipalities	by October 9, 2010
Informative letter to the holders in the list	Istat	by October 10, 2011
Data Collection	Enumerators/Holders	October 25, 2010 - January 31, 2011
Questionnaire review	Regions/Municipalities	October 25, 2010 - February 15, 2011
Data entry	Regions/in service	by 31 March, 2011 for the Regions with high level participation model by 31 July, 2011 for the Regions using

¹ AGEA = Agency for the Disbursement in Agriculture; ISMEA = Service Institute for Food and Agricultural Market;; ANCI = National Association of the Italian Municipalities; ANPCI = National Association of the Small Italian Municipalities; IZS = Experimental Institute for infectious diseases in animals; CISIS= Inter-Regional Centre for the informative, geographical and statistical systems

		data recording “in service”
Data control and correction	Istat/Regions/Municipalities	May 2, 2011- December 31, 2011
Provisional data dissemination	Istat/Regions	by June 30, 2011
FSS, RD and SAPM data transmission to Eurostat	Istat	by 20 June, 2012
Final data dissemination	Istat/Regions	by June 30, 2012

Deviation from the timetable

To ensure the smooth progress of census operations was necessary to postpone some deadlines relating to the data collection of the questionnaires.

A plurality of causes have created difficulties, a territorial level, in keeping the schedule:

- Flooding in some area of the North
- L'Aquila Earthquake
- Delays in starting the census network organisation in some Regions (Abruzzo, Lazio, Sicilia). Special organizational problems were found in Lazio, where the field work took a significant extension until May 16, 2011.

The most important delay was caused by the Company selected by Istat for recording the questionnaires of Puglia, Marche, Toscana, Veneto, Molise (Regions that have chosen the data recording in service). The C&C procedure and final dissemination deadline had to be postponed because of that.



Table 5 – Activities postponed

Key Activity	Actors	Original Deadline	New date	Actors concerned in the delay
Data Collection	Regions/Municipalities	October 25, 2010 - January 31, 2011	October 25, 2010 - May 16, 2011	Lazio
Questionnaire review	Regions/Municipalities	October 25, 2010 - February 15, 2011	October 25, 2010 - May 16, 2011	Lazio
Data entry in Service	in Service	31 July, 2011	31 December, 2011	Company registration
Data Control and Correction	Istat/Region	May 2, 2011- December 31, 2011	May 15, 2012	
Provisional data	Istat/Region	by June 30, 2011	by July 5, 2011	

dissemination				
Final data dissemination	Istat/Region	April 30, 2012	30 July 2012	

Figure 6 – Flow chart of the activities

Key activity	2010												2011												2012											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Data Collection																																				
Questionnaire review																																				
Data entry in Service																																				
Data Control and correction																																				
Provisional data dissemination																																				
Final data dissemination																																				

 Scheduled date
 Deviation from the time table

2.5 Population and frame

The 2010 Agricultural Census has been carried out as a survey assisted by list, according with the 2010-2011 Italian census strategy based on a large use of administrative data to support the census operations, in order to increase timeliness of data dissemination, decrease the response burden and improving data quality at the same time.

The agricultural holding (census unit) was defined as a single unit, both technically and economically, which has a single management and which undertakes agricultural activities listed in Annex I to the European Parliament and Council Regulation (EC) No 1166/20082 within the economic territory of the European Union, either as its primary or secondary activity.

Census coverage includes all agricultural holdings where the Utilized Agricultural Area (UAA) is equal or more than the regional thresholds reported in the table 6 and the livestock holdings if the animals kept or their products are, totally or partially, destined to marketing. No thresholds have been applied to the holdings with flowers and ornamental plants, vegetables, vineyards and fruit trees because of their relevant economic value.

² European Parliament and Council Regulation (EC) No 1166/2008 of 19 November 2008 on farm structure surveys and survey on agricultural production methods and repealing Council Regulation (EEC) No 571/88 (OJ L 321, 1.12.2008, pp. 14-34).

Table 6 - Regional thresholds for including the holdings in the observation fields of the Census

REGION	INCLUSION LEVEL OF UAA SIZE (HA)
Piemonte	≥ 0.3
Valle D'Aosta	≥ 0.4
Lombardia	≥ 0.3
Bolzano	≥ 0.2
Trento	≥ 0.2
Veneto	≥ 0.3
Friuli Venezia Giulia	≥ 0.3
Liguria	≥ 0.3
Emilia Romagna	≥ 0.3
Toscana	≥ 0.3
Umbria	≥ 0.3
Marche	≥ 0.4
Lazio	≥ 0.3
Abruzzo	≥ 0.3
Molise	≥ 0.3
Campania	≥ 0.3
Puglia	≥ 0.2
Basilicata	≥ 0.3
Calabria	≥ 0.3
Sicilia	≥ 0.2
Sardegna	≥ 0.2

These categories of holdings have been also included in the survey:

- Agricultural holdings managed by non-profit and public entities;
- Agricultural holdings managed by industrial, good and services enterprises;
- Holdings with livestock only for reproductive goals, breeding of horses and poultry hatchery;
- Agricultural holdings without agricultural land (exclusively zoo-technical ones);
- Zoo-technical holdings which use pasture and meadows belonging to Municipalities and/or other public/private entities;
- Common lands;
- Holdings with NACE code rev. 2 number 01.61, which have the task of good status maintenance of land.

While in 2010 only physical thresholds have been applied, in 2000 both physical and economic thresholds have been used. In fact, in 2000 all the agricultural holdings with UAA more than 1 ha or, if less, with an agricultural marketed output of 2.065,83 euro or more have been included in the agricultural census. The methodological change has been introduced because in 2010 the census list has been build up using administrative sources where variables on the economic value of the farm where not existing. The threshold applied in 2010 has some effects on the comparability between the last two censuses. Using the 2010 thresholds on the 2000 data the number of units estimated for 2000 is 2.396.274 versus 2.153.720 that is the number of units estimated in 2000 with the 2000 thresholds. At the beginning the pre-census list has included 2.047.948 units (see table 3).

The list of agricultural holdings has been obtained by the integration of administrative and statistical sources which contain information concerning the agricultural world and its units. Some sources are specific for the agricultural sector while others have a more general nature as they collect information on different productive sectors too.

Specific sources are: the Integrated Administration and Control System³(AGEA) – year 2009 , the System for the Identification and Registration of Bovine Animals and other species (AA.ZZ.) – year 2009, the Lands' property Incomes (Tax Agency) year 2007, the Land registry – year 2009.

General sources are: the Chambers of Commerce – year 2008, the VAT and Tax Revenue declarations (Tax Agency)- year 2007.

Statistical sources are the 2000 Census of Agriculture and the Business Register – year 2007.

The most significant and complete source is the Integrated Administration and Control System. The database managed by AGEA (Agency for the Disbursement in Agriculture) has been set up in accordance with the EC n. 885/2006 that, under the Common Agricultural Policy, acts in the coordination and execution of payments to support farmers. The Integrated Administration and Control System has been realized in order to record, verify and control data. The core of this system is made of files containing information on data that each agricultural holding is obliged to present for any aid application. In the database there are many available information; they can be divided into two main groups:

1) identification data of the farmer or the agricultural holding: Unique Code of Agricultural Holdings (CUAA code) that corresponds to the fiscal code of the holder. The CUAA code is mandatory whenever a relation with the Public Administration is undertaken. Holder's name, permanent address or place of residence, VAT number if present. Dates of inscription and updating.

2) territorial data: agricultural parcels of the holding; information on the use of each parcel (crops, livestock); hectares invested by type of product (cadastral area and agricultural area utilized for farming).

³ COUNCIL REGULATION (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers.

Moreover if the holder is not the owner of the parcels it is recorded the identification code of landholders and the type of contract that links farmer to landholder. AGEA data are of primary importance especially to estimate the agricultural area by crops and to locate farms on the territory. A big advantage of this source is the presence of a unique identification code (CUAA) that identifies the holding and that solves problems of links with different sources having a system of units identification based on fiscal codes. In theory AGEA should have a total coverage but it is underestimated because some crop productions are not subject to aids.

The System for the Identification and Registration of Bovine Animals and other species are registers in an archive (AA.ZZ) managed by the Ministry of Health. Recorded units concern animals and their holders with the scope to preserve public welfare. The covered animal species are bovines, pigs, sheep and goats, poultry, equines. The national database of Bovine Animals realized in accordance with the EC n. 1760/2000 for the setting up of a System for the Identification and Registration of Bovine Animals, is the only fully operative register up to date. Then as bovines are well covered both in terms of livestock holdings and number of units (monthly time series of bovine animals are available) some of other animal species have yearly data on the number of animals, others species have no information at all, therefore coverage is not assured.

The database managed by the Tax Agency, called lands' tax revenue, covers those tax payers that for a given tax year declare an income because of landlord's rights and/or agricultural activities and/or livestock farming and/or agritourisms⁴ are carried out. Even if this source has big potentiality it presents coverage problems. In fact, all different forms of organization, like limited liability companies or cooperative, are not included in this universe as they produce business income (so they have to fill in different fiscal models). Moreover, because of a very big difference in terms of unit definition in comparison to the statistical one, more than one administrative unit can represent only one agricultural holding and therefore an over-coverage is predictable. For example both the owner and the tenant of the same land have to make tax declaration as well as two or more co-landowners but only one is the holder according to the statistical rule.

The Land Registry contains information on parcels, their owners and ownership's title. Among the great variety of information the most significant ones for parcels are: parcel identification codes, parcel characteristics like soil quality, hectare, estimated agricultural income. As the administrative unit is the land (the parcel) over-coverage problems can be determined by the correct and updated use of that land. Land registry, in theory, guarantees the absence of under-coverage in terms of lands.

The general administrative sources are the Chambers of Commerce having selected only those units carrying out an agricultural economic activity, principal or secondary (section A- B of Nace rev 1.1) and VAT declared by units having a VAT code to carry out agricultural activity too. These sources cover mostly business units.

⁴ There are four models taxpayers have to fill in according to their juridical status (1) natural persons, 2) Simple partnership 3) non profit institutions 4) earned income files.

The linkage process of the different input sources has been realized using the fiscal code as primary key for unit identification.

The pre-census list enabled, first of all, the unit selection according to the observation field, as stated in the European Regulation n.1166/2008. In other words, it has been the frame at which to apply the minimum physical threshold at NUTS2 level ex-ante to exclude some units from the survey. In second place, pre-census list has allowed to pre-print partially the questionnaires with some basic personal information. Moreover, the list of agricultural holdings has been the support to assist data collectors.

Finally, one of the Census objectives fixed by Italian Regulation is to allow the validation of the national Farm register based on the matching process of administrative sources. Since 2008, Istat is engaged in the complex project to build up a register of units operating in the agricultural sector starting from the available information in administrative files. The purpose is mainly to retrace the process that allowed the realization of the business register ASIA that covers all active enterprises, obtained from a process of integration of administrative files, where statistical methodologies have been developed to estimate and impute characteristics, yearly updated. The project aiming at the realization of the Farm register is organized into phases and, whereas the building up of the prototype-list of agricultural holding is the first one, the final one is its setting up using the results of the Census as a benchmark.

2.5.1 The survey for checking coverage and quality of the prototype of list of agricultural units

The final pre-census list used to support the Agriculture Census 2010 has been available from April 2010 while a preliminary version of it, called as list prototype or Integrated Base of Administrative Sources (BIFA), has been realized in 2008.

In order to test on the field the building-up methodology procedures adopted to estimate the information, a survey for checking coverage and quality of the prototype of the list of units (CLAG) has been carried out in collaboration between Istat and Regional Statistical Offices of Italy. As the building up of the prototype-list is the first planned activity before the Farm register is implemented, it has been of fundamental importance to test its quality.

The CLAG survey has been set up with the specific aim to:

- i) check the integration methodologies,
- ii) test the relevance of the used administrative sources,
- iii) test the criteria of units identification

- iv) compare methods for characteristic imputation.

Particularly, the strategic purpose of the CLAG survey has been to estimate and to analyze the coverage error due to the inclusion in BIFA of units not carrying out an agricultural activity.

This survey has been carried out from October 2008 to March 2009 on a sample of about 16.000 units distributed over 80 municipalities - selected by the Censuses Department in accordance with the network of regional statistical offices - representing different agricultural areas according to the results of the last Census of Agriculture.

The sample survey procedure followed a multi-domain methodology strategy. As only 80 municipalities have been chosen and due to the constraints in terms of number of units to be interviewed, a big attention has been then given to those units that presented a low degree of reliability (low number of sources integrated, few signals of agricultural status, etc). These "uncertain" units represented about the 70% of the sample. For these units it has been more difficult to understand whether they were simple owner of piece of lands without carrying out any significant agricultural activity. They had been requested high efforts in terms of discovering their actual status and for that reason it has been stressed the need to have a high quality survey.

The survey technique has been consisted in face-to-face interviews carried out in the unit's residence place asking information about all lands and livestock wherever they are located. In all, Italian Regional Statistical Offices had employed 262 expert on agriculture data collectors.

Detailed information was requested at municipality level such as the agricultural utilized area by each crops growing, number of different species of animals, some information on the farm structure and in particular on the relationship with other apparently independent units. In particular, in presence of clusters formed by individuals (family structures) an head-cluster has been identified and he/she is interviewed even about the existence of links; for units in cluster involving individuals and firms like partnerships, interviews are carried out separately and the reconciliation is left to the ex post desk activities.

In order to manage all phases of the survey, Istat has implemented a web-based integrated system which comprised several functions, including a recording and data editing system and a monitoring system with excellent results. This operational mode provided the benefits of timeliness, data quality and costs and it has been implemented for agricultural census (SGR – Survey Management System).

Survey results have been then analyzed and compared to the administrative information, in the so called "reconciliation" process, in order to delineate a set of relevant rules aiming at the improvement of the methodology for the identification of eligible units. The application of such rules to all units has been allowed to fit statistical methods in order to better identify those agricultural units to be included in the final pre census list.

2.6 Survey design

Exhaustive survey.

2.7 Sampling, data collection and data entry

2.7.1 Drawing the sample –for SAPM and/or OGA, if applicable

Not applicable

2.7.2 Data collection and data entry

Data collection has been carried out through two alternative techniques:

- Traditional technique based on the face-to-face interview of the holder by the enumerator using a paper questionnaire;
- New technique based on the self-compilation of the electronic questionnaire in the web by the holder.

The traditional technique has required application, precision and knowledge of the technical and organisational rules from the enumerators. Normally the interview has been completed out in more stages:

- identification of the unit in the list through the personal data printed in the questionnaire or in the list.
- First contact with the holder to fix an appointment for the interview
- Update of the list and of the personal data of the unit as outcome of the first contact
- Interview of the holder
- Check and analysis of the data provided
- Periodic delivery of the paper questionnaires to the Census Office responsible in the territory
- Return to the holder, if necessary.

The online data collection system let the holder to complete the questionnaire electronically by accessing the Istat server that hosts the web-based data recording application. The online questionnaire has followed the paper-based version, making it possible for agricultural holdings to browse it by sections.

The programme has simplified the questionnaire compilation for the holdings by:

1. automatic calculating arithmetical operations;
2. reporting errors in data input, displaying the appropriate message and automatically drawing the user's attention to the point where correction is necessary;

- displaying additional messages on mouse-over of words or phrases requiring a brief explanation.

Figure 7 – Electronic questionnaire



24 OTTOBRE 2010
(art. 17 del decreto legge 25 settembre 2009, n. 135, convertito con modificazioni dalla legge 20 novembre 2009, n. 166)

6° Censimento generale dell'agricoltura

Home page INFO Sez. 1 Generali Sez. 2 Terreni Sez. 3 Allevamenti **Sez. 4 Ubicazione** Sez. 5 Lavoro Sez. 6 Altro

SEZIONE II - UTILIZZAZIONE DEI TERRENI (annata agraria 2009 - 2010)

11 PRATI PERMANENTI E PASCOLI

Voce	Codice	Superficie	
		Ettari	Are
11.1 Prati permanenti	86		
11.2 Pascoli (utilizzati)			
a) Pascoli naturali	87		
b) Pascoli magri	88		
11.3 TOTALE PRATI PERMANENTI E PASCOLI UTILIZZATI	89	0	0
11.4 Prati permanenti e pascoli non più destinati alla produzione, ammessi a beneficiare di aiuti finanziari	90		

In addition, to simplify the compilation of the questionnaires still further the system has allowed various steps in processing the questionnaire: saving it as a draft, which enables users to enter data without worrying about their accuracy, or saving a final version which entails the activation of control rules, and final sending. Obviously the holder might choose to skip these partial saves and send the questionnaire directly.

The controls included in the questionnaire regard correctness and consistency; in the first case any error regarding a wrong entered data item was reported, while in the second case any inconsistencies between data items belonging to different questionnaire sections were reported. In order to minimize the statistical burden and online compilation being subsequently abandoned, it was decided to include a minimal set of controls by assigning data correction to other phases.

A toll-free number and a multimedia documentation on the web has supported the holders in the compilation of the electronic questionnaire. In total, the electronic questionnaire has been compiled by 61.226 holdings (2,9%).

2.7.3 Use of administrative data sources

Administrative sources have been used in two steps of the Census activities:

- Preparation of the pre-census list
- Data control and correction

For more details see the chapters 2.5 and 3.

2.8 Specific topics

2.8.1 Common Land

The common land is a public or private good on which individual belonging to a determinate community have some rights of use. The rights concerns area of different kind and destination (pasture, wood, water bodies, etc.).

For the purpose of the 2010 FSS, the common land taken in consideration has been the area where the agricultural activity is made, specifically the grazing. Therefore, the common land concerning wood and non agricultural area has been excluded from the survey.

To avoid duplications in the questionnaire two cases have been distinguished:

- The area is not allotted to an agricultural holding and it is at disposal of the individuals having rights of use.
- The area is allotted to agricultural holdings, in specific and formal way.

These are the rules of the questionnaire compilation followed.

FIRST CASE -Common land not allotted

The Institution or the Municipality managing the common land is considered as an agricultural holding (enumeration unit). These units have filled the following part of the questionnaire:

- Legal status 1.7 (Institution or Municipality that runs common land)
- Management system 2.1c (Other form of management)
- Land ownership 2.2 (ownership)
- Land use – Section II
- Animal grazing

Figure 8 – Example of compilation of animal grazing section (1)

ANIMAL GRAZING

39.1 Has the holding had grazing animals? 1 YES 2 X If you have answered no, go to point					
TYPE OF GRAZING LAND	Code	TOTAL NUMBER OF GRAZING ANIMALS	UTILIZED AREA (permanent grass, pastures and temporary)		NUMBER OF MONTHS
			Hectares	Are	
39.2 Grazing on the holding	01				
39.3 Grazing on other holdings	02				
39.4 Common land grazing	03				

If you have answered point 39.4, indicate the name of the Municipality or Institute that manages the joint-property land

- Labour force - Section IV

Section III on livestock has not been compiled because the number of heads will be counted in the questionnaires of the farmers using the not allotted common land.

The agricultural holdings using not allotted common land have not to declared the area on land ownership (2.2) and on land use (section II) but they have filled in the following part of the questionnaire

- Livestock – section III
- Animal grazing

Figure 9 – Example of compilation of animal grazing section (2)

ANIMAL GRAZING

39.1 Has the holding had grazing animals? 1 X 2 NO If you have answered no, go to point					
TYPE OF GRAZING LAND	Code	TOTAL NUMBER OF GRAZING ANIMALS	UTILIZED AREA (permanent grass, pastures and temporary)		NUMBER
			Hectares	Are	
39.2 Grazing on the holding	01				
39.3 Grazing on other holdings	02				
39.4 Common land grazing	03	X X X			X X

If you have answered point 39.4, indicate the name of the Municipality or Institute that manages the joint-property land

SECOND CASE - Common land allotted

The area of the common land allotted is recorded by each beneficiary farm therefore is not anymore considered as common land but as land of the beneficiary farm . In the land ownership (2.2) this area has been indicated as rented or in free use in accordance with the kind of formal agreement between the Institution/Municipality and the farm. The “free use” is a particular form of contract were the holder get to use the land in "loan for use "but the land remains in the property of the owner. ines remain the property of the company.

If the allotted area is a pasture, the animal grazing point of the questionnaire has been filled in.

Figure 10 – Example of compilation of animal grazing section (3)

ANIMAL GRAZING

39.1 Has the holding had grazing animals? 1 X 2 NO <i>If you have answered no, go to point</i>					
TYPE OF GRAZING LAND	Code	TOTAL NUMBER OF ANIMALS GRAZING	UTILIZED AREA (permanent grass, pastures and temporary)		NUMBER
			Hectares	Are	
39.2 Grazing on the holding	01				
39.3 Grazing on other holdings	02				
39.4 Common land grazing	03	X X X	X X X	X X	X X

If you have answered point 39.4, indicate the name of the Municipality or Institute that manages the joint-property land

The descriptive variable at the bottom of the box 39 let to link the Institution/Municipalities with the farm for both cases (area allotted and not allotted).

The 2010 Census has recorded, 2,233 Common land not allotted (0,1% of the total holdings), managing agricultural area (normally permanent grassland). The corresponding UAA has been 610,165 (4,7% of the total UAA).

Also in 2000 FSS Common land have been included in the population using the same methodology for collecting data. But it has to underline that for building up the 2010 FSS list of units, Istat has carried out a pre-survey on the Regions and on the “Consulta delle Proprietà Collettive” to identifying all the Common land with AUU existing in the Country. This operation has been not made in 2000.

2.8.2 Geographical reference of the holding

2.8.2.1 Holding headquarter definition and questionnaire

In order to geocode the agricultural holding headquarter (HH), and to release the related geographical coordinates, – latitude and longitude – with the precision of 5 minutes, Istat, through the 6th Agriculture Census questionnaire, has collected specific information about agriculture holding (AH) location. According to the Regulation 1166/2008/EU, the agriculture holding (AH) location is where the main part of all agricultural production takes place, leaving Member State the possibility of adopting the most suitable definition for their own situation. The actual definition adopted by Istat refers to the “location where the building (one or more) connected to the agricultural activities is, within the agricultural land perimeter. This building can have different functions: it can be the holder residence or the residence of agricultural labour force, or the stable for livestock, or where mechanical equipment used for agricultural activity is stored, as well as buildings used for products storage purpose. Whether within the agricultural land perimeter there are no buildings, the holding headquarter is where the largest agricultural area is located”. Furthermore, as the holder’s residence can be considered as the reference place of the AH whether the localization of the holding headquarter (HH) falls within 5 km (in a straight line) from it, also this information was collected by questionnaire .

Therefore, to identify the agriculture holding location, specific information to locate the HH was necessary. The information has been collected in two different sections of the questionnaire, one referring to the holder residence and the other one to the HH. Supplementary information was required in order to establish if the HH lies within 5 km from the holder’s residence.

In the holder residence section (box A, pre-printed with information derived from administrative archives and, eventually corrected by the holder in case of errors or omissions) the information considered (among others) for AH location purpose has been: address, municipality name and Istat code, province name and Istat code (see Figure 11).

Figure 11 – Box A, Holder residence section

The diagram illustrates the layout of the 'Holder residence section' form. It consists of three rows of input fields. Each row has a long text box on the left and a smaller text box on the right. Below each text box is a green vertical scale bar. The first row is for 'Address (Road/Square/Locality and number)' and 'Postal Code'. The second row is for 'Municipality' and 'ISTAT code'. The third row is for 'Province' and 'ISTAT code'.

In the holding headquarter section (box E) the information collected refers to address and to cadastral polygon (map sheet or parcel) in which the HH falls. For information on cadaster, in particular: cadastral section, cadastral map sheet and cadastral parcel, depending on kind of cadastre used in each specific territorial area, were collected. None of these information were pre-printed, as it is the case for the location of the holder’ residence. The information referring to the distance between the localization of the holding headquarter (HH) and the holder residence

(whether it falls within 5 km - in a straight line - or not) was collected also in this questionnaire section (see Figure 12). It has to be underlined that the holding headquarter section had to be filled in by farmer only if the HH location was different from the holder residence.

Figure 12 – Box E, Holding headquarter location section

E LOCATION OF THE HOLDING
 Only fill in this section if the location of the holding is different from the residence or registered office of the holder
 The holding headquarter is identified by the buildings connected with the holding activity located within the perimeter of the holding land or, if there are no buildings, the place that identifies the greatest part of the holding area

Address (Road/Square/Locality and number of the holding headquarter) Postal Code

Municipality ISTAT code

Province ISTAT code Telephone number (area code and no.)

For all Municipalities excluding Trento and Bolzano and those listed in appendix B of the instruction booklet

a Censorship section Cadastral map sheet

For those Municipalities with land register listed in appendix B of the instruction booklet

a Censorship section Cadastral parcel / Type a

For those Municipalities in the provinces of Trento and Bolzano

Cadastral municipality Cadastral parcel / Type a

For those Municipalities with open sheet cadastre in appendix B of the instruction booklet

a Censorship section Cadastral sheet and parcel

Is the holding headquarter localised less than 5 km from the residence or registered office of the holder? 1 YES 2 NO

Depending on which information was collected, two main different approaches have been identified to locate HH: the address and/or the cadastral map.

In the data process flow, the address location was considered the most accurate information so, for location purpose, it was treated at first, while geocoding through cadastral map was considered when the first option was not feasible.

Another option – as already mentioned – was to consider the information on the distance between the holding headquarter and the holder’s residence. When the address of the HH lies within 5 km from that of the holder’ residence and it is in the same municipality, but the unit cannot be located through the information collected with the Box E of the questionnaire, than the address registered for the holder’ residence has been processed.

Processing information on address or on cadastral information, Istat has released the geographical coordinates of the centroide of the 2010 census enumeration areas in which the agricultural HH falls. In doing so, Istat will meet European Union requirements in terms of precision.

The procedures adopted to couple information collected through the questionnaire and the enumeration areas were different.

Referring to addresses were coupled with enumeration areas in two different ways:

i) through address processing with a commercial software, named Egon that, among other things,

normalize the street or road description followed by geo-referencing and geo-coding;

ii) through deterministic matching procedure with two national street archives derived from two specific and recent surveys (reference year 2010) realized for the preparation of the population census.

The cadastral information declared in the questionnaire are matched, instead, with geocoded cadastral maps that have been in advance processed and matched with enumeration areas through a spatial join.

In all cases it is guaranteed that the holding is in the same/correct municipality. Municipalities are "comuni" in the Italian language - which correspond to LAU2.

In the following the two different approaches are described in details.

2.8.2.2 Geo-referencing through address matching

Once the agricultural HH is identified – whether coincident with holder residence or not – the related address information is treated.

First, the addresses are processed by Egon, a software that normalize and validates addresses and by a SAS program *ad hoc* in order to standardize the addresses. After this, the addresses are matched with ANSC (Administrative National archives of streets and street numbers for municipalities with less than 20.000 residents) and RNC (Istat Survey on street numbers realized on municipalities with population not less than 20.000 residents) datasets in order to have the census enumeration areas in which they fall (2010) and the related centroide coordinates.

It has to be underlined that Egon software also gives the possibility of coupling with the address the related geographical coordinates, providing a code to describe the quality of the geographical coordinates coupled with the involved addresses. This code can assume values from A10 (high quality) to B30 (low quality). In addition, Egon couple with these coordinates also the enumeration areas defined for the Population Census run in 2001 year. Thus, a transposition table has been created - through a spatial join function - to refer each 2001 enumeration area to the one designed for Census in year 2010.

As ANSC and RNC lists represent the most recent address dataset geocoded to the 2010 census enumeration areas, updated or realized for the preparation of the population census so they have been considered the first datasets to be used in the procedure. The addresses that didn't match with these two national address files/census enumeration areas, Istat were geocoded through Egon process to the 2010 enumeration areas obtained using the transposition table mentioned above. Thus, in the data processing flow, the coordinates obtained for the holding headquarter through the ANSC and RNC lists have been taken as first and, only in absence of these, the ones obtained through the transposition table from Egon were included.

2.8.2.3 Geocoding through cadastral maps

In Italy, the cadastral maps have different characteristics in terms of typologies, projections, geometry and polygons encoding. At national level, the Agenzia del Territorio (AdT) is the authority with the task of maintenance of the central cadastral maps (except for the territory of the autonomous provinces of Trento and Bolzano-Bozen): encoding new cadastral Municipality and updating the centralized cartography with the one officially produced at local level.

In order to proceed with geocoding, centroe coordinates of cadastral maps or sheets, depending on cadastral type, have been extracted from the digital maps and joined with the administrative units in which they fall.

After, the extracted centroe coordinates were spatially joined to census enumeration areas to get their centroe coordinates coupled with each cadastral polygon.

Then a unique key code was created and another matching procedure was applied. In doing so, the enumeration area centroe coordinates could be coupled with each specific HH.

Also this procedure has produced some discarded records as cadastral information, in some cases, were wrong.

The discarded records were processed through an imputation procedure described in the following paragraph.

2.8.2.4 Geographical coordinates imputation for discarded records

Other assigning procedures have been identified for the imputation of coordinates to the units which couldn't be geo-referenced through address matching or geo-coding cadastral maps.

The objective was to assign the missing value (the geographical coordinates) through donor imputation.

The donors and the records with missing coordinates have been stratified by municipality and by other variables, creating three different strings with three levels of detail.

In fact, specific strings have been created and used as linkage key between donors and records with missing values. Those strings have been defined according to specific farm characteristics, at three different levels of detail (long: higher detail, medium: intermediate detail, and short: minimum detail). In the process of allocation, the strings associated to the donors were taken into account in turn, starting from the long one to the short one. The donors were always located in the same municipality of the receiving agricultural holdings, so that the geographical coordinates would fall in the municipality where the farmer declared the location of its HH.

In case AHs were located in more than one municipality, only the information on land use and livestock raising characteristics related to the HH's municipality was considered for string assignation.

Strings used as linkage key have been defined as follow:

- A) the 'long string' was based, for land use on: arable land, vineyard, permanent crops, kitchen gardens, permanent grassland, wooden permanent crops, farm forest, other land uses. These variables have been classified into new different variables which values have been defined by the classes values. In particular, for permanent crops and for farm forest the classes are: equal to zero (value equal to 0), higher than zero and lower than 500 ares (value equal to 1), higher/equal than 500 and lower/equal 2000 ares (value equal to 2) and higher than 2000 (value equal to 3), and for kitchen gardens only presence (value equal to 1) or not (value equal to 0) has been considered. Arable land, vineyard permanent grassland, wooden permanent crops, farm forest and other land uses values are classified into 4 classes defined as: equal to zero (value equal to zero), higher than zero and lower than 200 ares (value equal to 1), higher/equal than 200 and lower/equal 900 ares (value equal to 2), higher than 900 ares (value equal to 3). For livestock, based on: bovines, buffaloes, pigs, sheep-goats, poultry and other livestock, only presence or not has been considered, for each specific specie;
- B)
- C) similar procedure has been adopted for the construction of the "medium string". In this case, for land use: a specific digit refers to presence or absence of each specific macro-category; for livestock: a specific digit refers to presence or absence of at least one of the raised specie;
- D) in the short string: two digits define the presence - or not - of i) at least one kind of land use mentioned above and ii) at least one kind of livestock specie.

The procedure separates donors (geo-referenced AH) from receiving units (non-geo-referenced AH), thus the latter were linked to the previous ones taking into account the municipality code and the AH string value described above. The linkage procedure considered first the long string than the following ones.

Once the linkage was established, since the receiving unit could have more than one donor units, located in different census enumeration, it has been chosen as donor the AH that minimizes the sum of the absolute difference between the true specific value of the single variable used for the strings construction. Then the census enumeration area centroid coordinates in which the specific AH chosen is located were transferred from the donor unit to the receiving unit.

Residual records have been assigned to 2010 census enumeration areas randomly, excluding census enumeration units coded as water bodies, infrastructure or deserted mountain.

Table 7 - Geocoding of agricultural holding per kind of geocoding procedure

REGIONE	Street archives deterministic matching	Egon probabilistic matching	Cadastral polygons matching	Question on distance of HH < 5 km from Holder' residence	Donor imputation method	Census enumeration area random imputation	Total	of which located at Holder' residence	of which located not at Holder's residence	of which obtained with imputation procedure
PIEMONTE	37.469	19.139	1.818	375	8.205	142	67.148	50.344	8.457	8.347
VALLE D'AOSTA	1.125	1.829	82	10	494	14	3.554	2.743	303	508
LOMBARDIA	26.271	18.455	2.556	782	6.091	178	54.333	37.201	10.863	6.269
BOLZANO	5.707	8.041	1.320	114	5.038	27	20.247	12.945	2.237	5.065
TRENTO	2.926	4.806	6.196	889	1.572	57	16.446	6.309	8.508	1.629
VENETO	70.454	37.192	3.709	616	7.391	22	119.384	92.134	19.837	7.413
FRIULI VENEZIA G.	13.603	5.352	1.420	190	1.714	37	22.316	16.592	3.973	1.751
LIGURIA	6.923	7.137	2.882	572	2.636	58	20.208	11.431	6.083	2.694
EMILIA ROMAGNA	29.973	30.680	3.713	203	8.838	59	73.466	47.258	17.311	8.897
TOSCANA	20.624	20.965	12.345	706	18.008	38	72.686	33.131	21.509	18.046
UMBRIA	8.578	15.325	4.627	373	7.329	12	36.244	19.269	9.634	7.341
MARCHE	16.631	18.202	3.246	231	6.550	6	44.866	26.669	11.641	6.556
LAZIO	20.994	41.437	14.125	3.291	18.316	53	98.216	51.271	28.576	18.369
ABRUZZO	24.554	25.898	7.373	348	8.641	23	66.837	41.713	16.460	8.664
MOLISE	4.067	10.230	7.997	717	3.255	6	26.272	8.512	14.499	3.261
CAMPANIA	32.687	50.078	22.577	4.452	27.011	67	136.872	67.899	41.895	27.078
PUGLIA	13.402	49.459	152.560	15.671	40.618	44	271.754	37.163	193.929	40.662
BASILICATA	4.828	13.179	24.737	1.616	7.383	13	51.756	10.870	33.490	7.396
CALABRIA	16.578	41.778	47.287	5.632	26.455	60	137.790	42.008	69.267	26.515
SICILIA	10.257	59.395	97.365	10.688	41.889	83	219.677	28.471	149.234	41.972
SARDEGNA	1.886	4.705	34.445	5.644	14.068	64	60.812	8.899	37.781	14.132
ITALIA	369.537	483.282	452.380	53.120	261.502	1.063	1.620.884	652.832	705.487	262.565

HH= Holding headquarter

2.8.2.5 Data quality

The geographical datasets used in the geocoding procedure have been checked in terms of spatial completeness (particularly for cadastral maps referring to the territory involved) and logical accuracy (in terms of correspondence between actual position of the polygons used for geocoding procedures and the related administrative units, again for cadastral maps).

The final location of the AH has been also checked. Particularly, , it has been checked the correspondence between the final municipality in which falls the census enumeration and the municipality information collected on HH location has been assessed.

2.8.3 Volume of water used for irrigation

The information on volume of water used for irrigation in the agrarian year 2009-2010 has been estimated through a modeling method named MARSALA. The estimation is available for each agricultural holding that uses water for irrigation purpose, as required by Regulation 1166/2008.

Irrigated crops for which irrigation volumes are calculated are:

- Cereals for the production of grain (including seed) (excluding maize and rice);
- Maize (grain and green);
- Rice;
- Dried pulses and protein crops for the production of grain (including seed and mixtures of cereals and pulses);
- Potatoes (including early potatoes and seed potatoes);
- Sugar beet (excluding seed);
- Rape and turnip rape;
- Sunflower;

- Fibre crops (flax, hemp, other fibre crops);
- Fresh vegetables, melons and strawberries — open field;
- Temporary grass and permanent grassland;
- Other crops on arable land;
- Fruit and berry plantations;
- Citrus plantations;
- Olive plantations;
- Vineyards;
- Other crops on permanent land (*not required by regulation*);

Moreover have been included water volumes used in kitchen gardens and for crops under protective cover as

- Fresh vegetables, melons and strawberries under glass or other (accessible) protective cover
- Flowers and ornamental plants (excluding nurseries) under glass or other (accessible) protective cover

MARSALa (Modelling Approach for irrigation waterR eStimation at fArm Level) project was realized in the framework of the Eurostat Grant Program 2008 (Theme “Pilot studies for estimating the volume of water used for irrigation”)⁵ by the National Institute of Agricultural Economics (INEA). Istat cooperated and contributed to the implementation of the project in several phases since the beginning. Aim of the project was to design a methodology for the estimation of the irrigation water consumption at farm level in Italy by using, as a key source of information, the results of the 6th General Agricultural Census (having as reference for crops the agrarian year - 1st November 2009, 31st October 2010). An integration of the first provisional version of the questionnaire⁶ has been performed in order to collect the most appropriate variables to be utilized in the MARSALa model.

The methodology grounds on the development and integration of three models dealing with the main aspects related to the farm irrigation water consumption: the crops irrigation demand (Model A), the irrigation systems efficiency (Model B) and the farmer’s irrigation strategy (Model C). Each model was developed by considering state-of-the-art methodologies as well as the available datasets (climate, soil, crops characteristics and statistics) in Italy, taking into account also the expert knowledge.

The three models are implemented and integrated through a software application called MARSALa.NET, developed to estimate the farms irrigation water consumption. MARSALa.NET has a client-server architecture and has several routines for pre-processing the required data from the Census results as well as a built-in set of databases about crop phenology, soil characteristics and agro-meteorology. In the following chapters the questionnaire integration and the three mentioned models will be described.

⁵ Grant Agreement No. 40701.2008.001008.140. http://circa.europa.eu/Members/irc/dsis/agrienv/library?!=/consumption_irrigation/consumption_irrigation&vm=detailed&sb=Title

⁶ Bellini G., Lupia F. and De Santis F. *Water use for irrigation purpose in agriculture: the integration of a modelling approach and the Sixth Agriculture Census survey*. La Statistica nei 150 anni dall’Unità d’Italia. Convegno Intermedio SIS 2011. Bologna, 8 - 10 giugno 2011. Book of short paper. Quaderni di Dipartimento. Serie Ricerche 2011, n. 10. Alma mater studiorum. Università di Bologna 2011. ISSN 1973-9346.

2.8.3.1 Census questionnaire integration

The Census questionnaire content based on the Regulation (EC) 1166/2008 requirements has been integrated on the irrigation section in order to get the most appropriate variables for developing the model.

Particularly, the integration of questions refers to the questions on:

- the main irrigation method used (i) Superficial flowing water and infiltration; ii) Flood; iii) Aspersión; iv) Micro-irrigation; v) Other system) that is required specifically per each crop irrigated at least once in the agrarian year 2009-2010;
- on the use of irrigation advisory services and/or systems for determining the crop irrigation demand;
- on irrigation water source supply referring to the modality off-farm water from common water supply networks, where it was required to specify whether delivery of irrigation water was: i) arranged by rotational turns; ii) on-demand. This information feed Model C being strictly connected with the irrigation strategy of the farm.

In order to assess whether asking the irrigation system by crop type could have introduced a bias, a preliminary elaboration was made on 2007 FSS data to better understand the distribution of the irrigation system adopted at farm level. The analysis has been performed showing that 76% of the irrigated area is in farms adopting only one irrigation system, 22.1% in farms with two different irrigation systems, whereas only 1.9% is irrigated in farms with three or more irrigation systems.

Furthermore, it has to be stressed that Census data must be necessarily pre-processed to be used for the estimation, for two different reasons:

- A) irrigated crop categories might be an aggregation of a number of specific crop, thus those categories have to be split into specific irrigated crops combining irrigated area with more specific information on farm land use (collected in a different section of the questionnaire). Different rules have been defined depending on crops involved. The easiest case occurs when the same crop category is mentioned in the two mentioned sections of the questionnaire as for potato and rice. The second case is when an irrigated crop category is split into several crops in the land use section of the questionnaire, as it is the case for other irrigated arable land and the other permanent crops. In those cases a priority for irrigated area is given to the cultivated area not yet in production and the remaining is attributed to the other possible cultivations according to the relative incidence over the total. The third case occurs when crop category declared in the 'Land use section' is still undefined, as it is for vegetables: those data will be combined with information on

vegetables cultivated in the province as arise from the annual Istat survey on crop surface and harvest, according to the weight of each crop on the total vegetables cultivated at provincial level. Then again the value of the irrigated area will be attributed to each specific component.

- B) moreover data on irrigated crops and on land use are collected per farm and whether farms are spread on different municipalities a more complex approach in order to split irrigated crop area per municipality has been defined. In fact, a specific questionnaire section requiring data per municipality on more aggregated land use has been set up so that it's possible to treat also those cases. Specific rules have been defined in order to estimate the irrigated crop area by municipality.

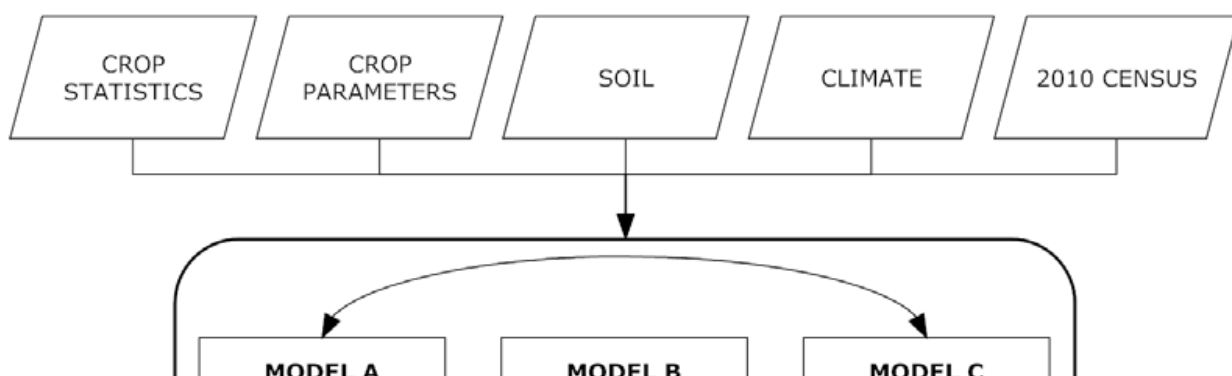
The complete information derived from the questionnaire refers to: irrigated areas by crop type, irrigation system by crop type and related area, geographical localization (municipality level), type of delivery of irrigation, irrigation water source and use of irrigation advisory services.

2.8.3.2 The three models⁷

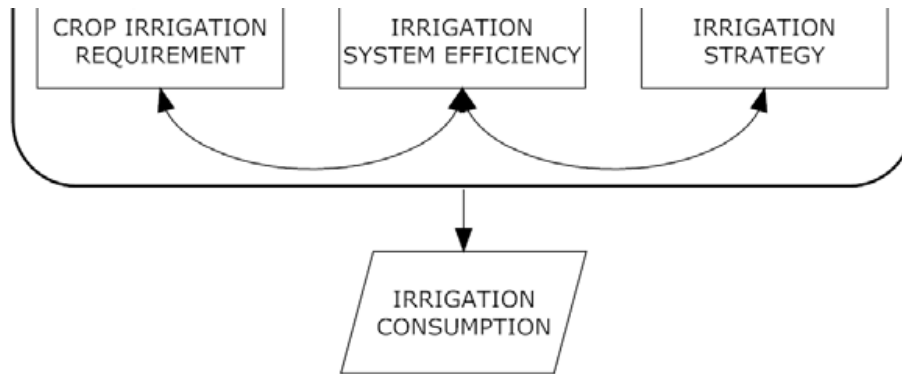
The estimation was performed by using the software MARSALa.NET by setting appropriately the input data required coming from the Census and the software built-in databases.

The three models used are: the crops irrigation demand (Model A), the irrigation systems efficiency (Model B) and the farmer's irrigation strategy (Model C).

Figure 13 – Marsala models



⁷ The text reported here is and extract of the MARSALa project report: Inea - Lupia, F.: MARSALa (Modelling Approach for irrigation water eStimation at fArm Level) - Project Report. EUROSTAT Grant Programme 2008, Grant Agreement No. 40701.2008.001-2008.140. (2010). More detailed information on model description can be found in it.



The crops irrigation demand (Model A)

To determine irrigation dates and depths, a daily root zone water balance (1) has been computed:

$$RZWD_i = RZWD_{i-1} - Re_i - I_i + ET_i + (RO_i + D_i)$$

where $RZWD_i$ and $RZWD_{i-1}$ (mm) are the root zone soil water deficit on days i and $i-1$, respectively, and Re_i (mm), I_i , ET_i , RO_i and D_i (all in mm) are the effective rainfall, irrigation, crop evapotranspiration, irrigation runoff, and drainage, respectively, on day i . The root zone water holding capacity (RZWHC) is the depth of water (within the root zone) between field capacity and wilting point. Effective rainfall data has been derived from the data acquired in agroclimatic stations. Evapotranspiration (ET, mm) has been computed using FAO methodology, based on the concepts of crop coefficient and reference evapotranspiration (Doorembos and Pruitt, 1977). Reference evapotranspiration (ET_o , mm) has been calculated using the Penman-Monteith equation (Monteith and Unsworth, 1990, Cap. 11; Allen et al., 1998) with data of solar radiation, wind speed, air temperature and relative humidity acquired in agro meteorological stations. The crop coefficients have been derived using the dual approach (Wright, 1982) in the form popularized by FAO (Allen et al., 1998).

This approach separates crop transpiration from soil surface evaporation. Particularly crop transpiration is calculated as

$$ET = (K_{cb}K_s + K_e)ET_o$$

where K_{cb} is the basal crop coefficient.

The variation of K_{cb} during plant life cycle is typically represented based on the values of K_{cb} at the initial, middle and final stages of the crop growth cycle and the duration of the initial, rapid growth, mid-season, and late season phases.

Irrigation has been triggered in the water balance model when the soil water deficit in the root zone reaches the management allowed depletion (which will be an output of Models B and C). The irrigation depth has been determined by the root zone water deficit (Model A) the irrigation efficiency (Model B) and the irrigation strategy (Model C).

The irrigation systems efficiency (Model B)

The irrigation application efficiency, thus the irrigation drainage losses, depends on irrigation system factors and management factors. An irrigation system is characterized by its application uniformity. The management factors are considered in the management deficit coefficient. If the deficit coefficient is high, a large fraction of the field will not receive the water required to maintain full evapotranspiration; contrary, if it is low and the application uniformity is low as well, then a significant part of the applied irrigation will be lost as drainage, i.e., the application efficiency will be low.

Three irrigation performance indicators may be defined: Application Efficiency (Ea), Percolation Coefficient (CP) and Deficit Coefficient (CD).

The basic data required by Model B are:

- Irrigation method:
 - o Distribution Uniformity (DU)
- Irrigation strategy:
 - o Relative Irrigation Supply (RIS)

The distribution uniformity (DU: defined as one minus the ratio between the average applied depth in the quarter of the field receiving less water and the average applied depth in the whole field) may be expressed as a function of the coefficient of variation (CV) of the applied water (Warrick, 1983). Once DU is known for the irrigation system of concern, CV may be computed. Model C will provide a value of RIS from which CD has been computed (Eq.12). With the value of the required depth, output of Model A, irrigation (Ii) and irrigation application efficiency (Ea) have been obtained. Once Ea is known CP can be computed as follows: $CP = 1 - Ea$

The farmer's irrigation strategy (Model C)

The irrigation practice in a given farm for a given agrarian year is the result of the farmer's decision process concerning the total amount of water to provide to the crops as well as the start and end of irrigation. Model C is intended to deal with the concept of the farmer's irrigation strategy by taking into account all the elements of the farm and the surrounding territory having a connection with the decision process of the irrigation activity. The irrigation strategy refers to the decision of the farmer in relation to the irrigation depth and frequency and to the degree of stress to which the crop will be subjected. This strategy depends on the crop type, but also on other factors such as the water availability, the irrigation method, the distribution system, the economic dependence on irrigated crops, the education and habits, the irrigation equipment, the size of the farm, etc. Therefore, the crucial elements in the irrigation decision process are two:

- water amount provided to the crops (the irrigation depth), modeled by the parameter Relative Irrigation Supply (RIS);
- level of stress tolerable by crops, modeled by the parameter f1.

Model C consists of a set of rules and decision trees to determine f1 and RIS. These rules result from correlations found in the farm surveys and from expert's knowledge. The two parameters are

determined by Model C for each crop and each farm. The decision trees were built by using all the available information reported in the CQ along with some rules defined by expert knowledge, additional information about the territory where the farm is located and the relevance of each farm's crop in case of water shortage is also taken into account. The values indicated in the decision tree are those imputed following an expert based criteria; the values were used during calibration to simulate the irrigation water consumption of all the crops of the farms interviewed. The calibration phase allowed to tune RIS and f1 values to approach the simulated water consumption to the measured one, thus MARSALa.NET will use as final values of the leaves of the last hierarchical tree level those defined during calibration.

2.8.4 Other issues: soccida (livestock lease)

The "soccida" is a livestock lease agreement entered into between the owner of livestock (lessor, "soccidante" in italian) and a farmer (lessee, "soccidario" in italian) who breeds the animals. The lessee has the benefit of the income and profits from the livestock during the term of the lease. At the end of the lease, the lessee has to return livestock of a similar type and age as the stock were at the outset, unless other provisions are required. The agreement contemplates a lease of one or more years.

Traditionally, the agreement enters between two agricultural holders in Italy. A new kind of "soccida" is developing more and more often in the recent years where the lessor is a manufacturing company.

In order to avoid duplications for compiling the questionnaire, the following rules have been followed: the number of animals in the lease agreement have been indicated by the lessor if the lease has been entered between two farms (this is a convention used traditionally in the previous FSS) and by the lessee if the agreement has been entered between a manufacturing company and a farm.

2.9 Response-burden policy

To encourage the collaboration of farm holders an advertising campaign was launched, in the months preceding the census and during the field operations, through informative posters to be displayed in public places and agricultural fairs, along with direct advertising inserted in the specialized press, radio and television.

Moreover, just before the start of the field work, letters to the agricultural holders were posted, informing them on the statistical significance of the Census of Agriculture, its purpose, the

importance of their co-operation and compliance with data protection regulations through the duty of statistical confidentiality. In addition, there was also the whole dimension of response obligation.

In order to simplify the collection data, the interviewers had personal holders details, name, surname, address, telephone and mobile numbers. However, when this information was not available the interviewer had to proceed to the holding's address without notice. When the holder was not found, a note stating that an interviewer had passed by was left in the letter box. The interviewer left details for an appointment and also a contact number.

When personal holders information was present in the pre-census list, the interview contacted holders for an appointment. If the holder or appointee failed to attend the interview, he/she fixed a second appointment. Besides Istat sent to the holders a letter informing them of the mandatory nature of the census and the fines to which he/she was subject in case of non-compliance. In case of refusal, verified by Census Regional Office or Census Municipal Office, the agricultural holders were legally pressed. In this way it was possible increase the number of achieved interviewers.

According to the law 25 November 1981, n.689, penalty procedure entails the following steps:

- verification of the illicit by the Census Office
- challenge and notification within 90 days from the date of verification.
- payment of the reduced fee within 30 days from the date of challenge and verification or recourse to the Civil Governor.
- report to Prefetto by Istat if the fee have been not paid
- public notice of dismissal or injunction by the competent authority (Prefetto)
- appeal to the judgment
- enforcement

In case of electronic questionnaire compilation directly by holders, the interviewers monitored the completeness of information. If the questionnaires were partly completed they contacted holders to conclude the questionnaire for the deadline. Sometimes it was necessary remake the interviews with face-to-face modality to bring to an end the questionnaire.

To support the respondents in questionnaire compilation and for other questions related to the Census the following instruments have been applied.

a) Web sites

An official web site has been developed by a specialized agency under Istat indications. It contains general Census information useful for respondents like aims, official documents, declaration about statistical confidentiality.

In order to give it a great visibility, the link was posted in all advertising channels used (television, posters, brochure, gadgets). With the aim to increase the number of self-compilation of the questionnaires via Internet, a link to the questionnaire web page was established as well some video of holders who had already made on-line questionnaire compilation.

For helping the on-line compilation there were also some tutorial video clip, a real multimedia guide for every questionnaire section. In addition, in the official web site was posted also the Facebook link, the toll free number and the e-mail address.

Figure 14 – *Web page of the Italian Agricultural Census*

Un grande progetto per l'agricoltura

Il censimento: la parola alle aziende

Documentazione Ufficiale

Tutela della privacy

 [Guarda lo spot](#)  [Il censimento: La parola alle aziende](#)

COMPILIAMOLO INSIEME

Compilare il questionario online è facile e rapido. Ma lo sarà ancora di più con l'aiuto del nostro rilevatore, che in questi video ti guida sezione per sezione e ti consiglia per il meglio.

01 - Una grande novità: il questionario online



NEWS E CALENDARIO

La Liguria presenta i dati provvisori (19 ottobre 2011)

E' il momento del Molise. (27 luglio 2011)

[Vedi tutte le news >>](#)

»» **SCARICA IL CALENDARIO** ««

I DATI DEL CENSIMENTO



»» **DATI PROVVISORI** ««

SALA STAMPA



b) The toll free number

The toll free number for respondents, like the institutional Web site, was a support instrument for the respondents of the 6th Agriculture Census.

In order to make aware holders and give visibility at the free number, the information about it was disseminated by the official letter to the agricultural holders, by the official web site and by brochures distributed in exhibitions and conferences.

The service was provided by a private specialized call center Enterprise that operates throughout the country.

The service has been active since October 10th 2010 until February 28th 2011 and was available for the users every day from Monday to Sunday, from 10:00 a.m. to 8:00 p.m.

ISTAT has managed a specific training to the call center operators and prepared more than 600 FAQ, divided into three different classifications (administrative, methodological and technical-informatics). The operators were linked to the web site for the census network, where the FAQ were allocated.

The new questions (not included in the FAQ), to which the operators were not able to give an answer, were transmitted immediately to Istat staff by an automatic e-mail.

In 139 days of activity, the toll free number has received a total of 76,174 calls.

c) e-mail cens2010@istat.it

The e-mail address cens2010@istat.it, as other public tools, was devoted to the FAQs of farm holders, for a better understanding of all the aspects (both technical and legal), related to 6th Agriculture Census.

This service started at April 2010 and it is still in use (June 2012). During the field work (October 2010- April 2011) 12,356 e-mail were received and 11,313 were replied by Istat (some e-mail did not require answers). The delay of response was not more than two working days. The main items of the e-mail regarded:

- On line questionnaire contents
- Deadlines for questionnaire delivery
- Privacy information
- Financial and administrative penalties

d) Facebook for Census

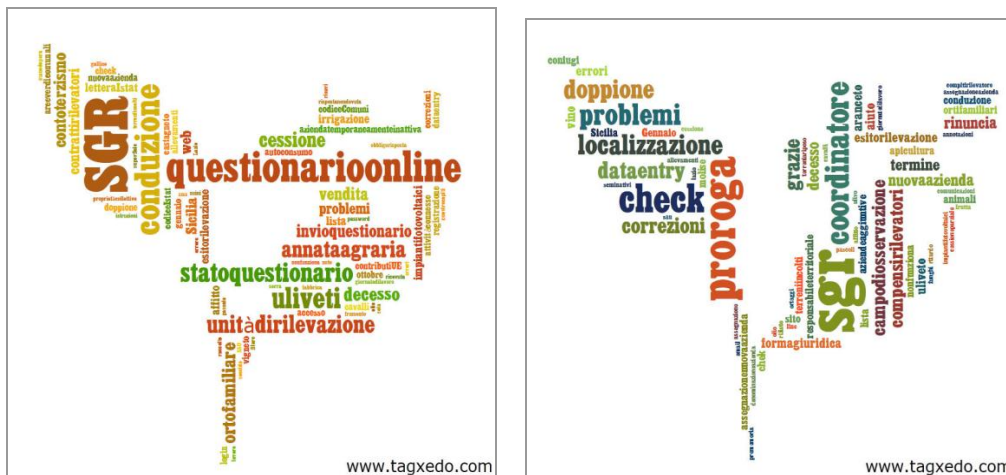
Another important tool designed to encourage the collaboration of farm holders was the Facebook page of the 6th General Census of Agriculture, which also marked the ISTAT's debut on this social network. Facebook was also used by other National Statistical Institutes to support particularly for the respondents. Real time communication realized through social media channels overcomes the concept of distance in time and space between producer of official data and final users, which deals also with psychological implications. For this reason, choosing to introduce the social network in a wide survey, it has been necessary to provide an adequate commitment of professional resources for monitoring in real time the tool.

In fact the Facebook page of the 6th General Census of Agriculture (active from October 5, 2010) has shown a high level of interactivity with its 7,265 members (at the date of 3 May 2011). Considering the 211 days of activity, there were a total of over 24,637 contacts (17,820 comments and 6,817 posts) published in the wall. A more exact idea of the level of information collected and disseminated by the page is given by the average daily traffic: over 500 unique visitors, 559 active users, 32 posts and 84 comments. On peak days the number of posts, received and resolved by ISTAT, have exceeded 300 units.

Analyzing the page contents, it clearly appears that Facebook *becomes* a tool in supporting enumerators and, in second time, of the agricultural holdings. In two of the days reporting the largest number of interactions (25 November 2010 and 26 January 2011, respectively with 412 and 277 comments/posts) the majority of the questions, as shown in the tag cloud, refers to technical

issues (SGR - Survey Management System - is the term most posted in both days), followed by questions relating to specific sections of the questionnaire (such as the conduction system, the location of the company, the outcome of the survey, etc..) and the field of observation.

Figure 15 - Tag cloud about the Facebook page of the 6th General Census of Agriculture



Posts published 25 November 2010

Posts published 26 January 2011

Finally, at the end of the survey more than 100 posts have been published by the enumerators to communicate the end of their work with the desire to thank the Facebook page and share their experience with the community.

3. ACCURACY AND RELIABILITY OF THE DATA COLLECTED

3.1 Data processing, analysis and estimation

3.1.1 Estimation and sampling errors – for SAPM and/or OGA, if applicable

Not applicable

3.1.2 Non sampling errors

In a total statistical survey such as a census, two kinds of non sampling errors could be encountered: measurement (or response) error and coverage error. The non-sampling error is a function of many factors: organizational aspects of the survey, the behaviour of a plurality of individuals or institutions.

The unit non-response rate computed considering the holdings without information (74,758 units) or with unusable information (34,070 units) on the total number of in-scope units is 5.2%. Concerning the item non-responses analysis, the ratio of eligible holdings doesn't exceed 5% for all variables. While all item non-responses have been imputed, the unit non-responses have not been

corrected by the editing and imputation procedures. The non-sampling errors could seriously affect the reliability of final results, particularly in complex surveys such as those on agricultural topics that require a considerable effort of memory by the respondent and knowledge of the productive and socio-economic phenomena by the interviewer,.

Two post-Census surveys, coverage survey (Post Enumeration Survey – PES) and Re-interview survey, have certified the statistical quality of the information collected by the 6th Italian Agricultural Census.

3.1.2.1 The Coverage Survey (PES)

This survey has the specific objective to measure the under-coverage and over-coverage of the agricultural holdings enumerated within the Agricultural Census 2010. The survey has been designed with the aim to obtain reliable estimates of undercount and overcount, for each of the Italian Regions, using another independent list of units existing in a sample of cadastral maps. Thus, the PES can indicate specific coverage problems inherent the census data and these errors can be quantified.

The real number of agricultural holdings, N , is estimated, using the dual-system estimation approach, which requests an independent enumeration of the entire agricultural holdings.

The coverage survey aims to estimate the number of agricultural holdings really existing on the Italian territory during the 6th General Agriculture Census (24 October 2010) and the coverage rate as the ratio between the number of agricultural holdings pointed out over the Census and the number of agricultural holdings really existing on the Italian territory during the Census itself. The survey was conducted from June to July 2011 in Veneto (pilot survey) and from October 2011 to January 2012 in the other Regions. A total survey was conducted on a portion of areas sampled. The areal sample was approximately 1,500 cadastral maps of the land register that have constituted the final sampling units. Since the autonomous provinces of Trento and Bolzano adopt a different cadastral system, 1,641 (Trento) and 776 (Bolzano) of land parcels were extracted as sample units. The coverage survey was a two stage stratified sample survey. The primary sampling units were the Italian Municipalities, while the second-stage units were the cadastral maps. Each cadastral map sample was surveyed in order to fix the agricultural holdings having lands in the territories of the cadastral map. The estimates domains were: the whole national territory, the 5 main geographical areas, the Regions. Moreover, a further study in detail will be executed in order to have estimates at the provinces level, using small area estimation techniques.

Istat has selected, from the land Register, a number of sheet maps sufficient to provide regional estimates of the coverage rate. Moreover, Istat has also executed an «overlap» between the sheet maps selected and the Istat frames in order to obtain, for each cadastral parcel, several information related to the owners of the parcels (address, telephone number, etc.). The owners of cadastral parcels were subject to detection.

Starting from personal data of the cadastral parcel owners and from other information, the interviewer had to find the holder of the agricultural holdings. In addition, the interviewer had the mapping of the sample sheet, where the boundaries were drawn around the perimeter, roads, waterways, buildings, etc. and in which the parcels were confined.

STEP 1 – Identification of the holdings

The interviewer detected all holdings (with centre business included or not on the sheet map) whose surface, on 24 October 2010, was in whole or in part on the sheet map. In this phase, the interviewer would have contacted the owners of the parcels included in the sheet map in order to find the holder of the holdings whose lands includes the parcel in question.

STEP 2 – Interview with the holder

The interviewer interviewed the holder identified in step 1 in order to have information about the holdings themselves. The list of agricultural holdings was obtained after these two steps. One of the main innovative aspects is the organizational use of a computerized system (called SGR COP, Coverage Survey Management System); in fact, the interviewer, thorough SGR COP, acquired the information given by Istat, performed the two steps of the survey and returned the information to Istat.

The results of the survey will be available in the next months.

Figure 16 - The homepage of SGR COP



3.1.2.2 The Re-interview Survey

This survey was carried out thorough a re-interview of a sample of agricultural holdings already interviewed by the Agricultural Census in order to measure the response error due to the respondent and/or enumerator. Among the different possible techniques, Istat adopted the re-interview of a sample of the Census agricultural holdings, collecting information on a limited number of variables already collected within the Census questionnaire, through a short questionnaire. The procedure consisted on the comparison between the two answers given by the same unit on the selected questions. In all cases of differences between the two responses, the reconciliation procedure was applied. In this procedure, the respondent (the holder) has to choose the right one, between the two different response given to the census and to the re-interview survey.

The survey was carried out on a sample of about 50 000 holdings selected with a one-stage stratified sampling from the Census frame. The territorial domains included 5 geographic divisions, 21 regions and 2 provinces autonomous (and all provinces with small area estimations techniques). The survey was conducted from May 2011 to January 2012. The re-interview was carried out, through a Computer Assisted Telephone Interviewing (CATI), by an external specialized company.

Istat transmitted to the specialized company the sample of the holdings to be re-interviewed (100,000 units in total – 50,000 for the basic sample and 50,000 for the substitutions) and together they planned the management software of the survey. Istat trained the telephone interviewers and also prepared (and sent) the informative letters to the holders in order to inform them about the survey. The variables selected from the Agricultural Census questionnaire and used for the re-interview telephone questionnaire were:

Total Arable land and in detail: Common wheat and spelt; Durum wheat; Grain maize; Fresh vegetables; Flowers and ornamental plants; Fallow land subject to the payment of subsidies, with no economic use (good agronomic and environmental conditions). Total permanent crops and in detail: Vineyards (quality wine, other wine and table grapes); Olive plantations; Citrus plantations; Apples. Permanent grassland, Pastures and meadows; Utilized Agricultural Area (UAA), Total holding land; Irrigated area and Organic Area. Livestock (bovine, buffalo, sheep, goat, pigs) and Labour force (workers –family and non- family).

The interviewer did not know the response of the Census until to the moment in which the provided value to the telephone survey is different to the Census value. At this moment, the Census value appeared on the monitor (in fact the value shown did not coincide in the established range) and the interviewer asked to the respondent to reconcile the data.

The reconciled value represents the “true value” and it allows the use of models to estimate the response error.

The controls included in the questionnaire permitted the preservation of specific constraints between the aggregate variables (for example AAU) and their components (Arable land; Permanent Crops, Kitchen gardens; Permanent grassland, Pastures and meadows).

Ultimately, 47,017 complete interviews (eligible units) have been conducted by the external company and all strata are represented. There were non cases of item non-response.

Actually, Istat is proceeding with the phase of estimation of the parameters. The results of the survey will be available in the next months.

3.1.3 Methods for handling missing or incorrect data items

The Editing and Imputation System (E&IS) has been one of the main projects launched to improve census data quality. The main purpose of an E&IS is to identify and treat the non-sampling errors, preserving as much as possible the collected information.

The main guidelines followed in planning the new E&IS have been:

- a. Scheduling of two main phases centrally managed by Istat after data collection;
- b. Use of administrative sources (for example, AGEA Archive, Vineyard Land Register, Bovine animals Register) for micro and macro data checks;
- c. Use of Forward Search methods for the outliers detection;
- d. Use of score functions to prioritize records to be manually reviewed in order to identify and treat potentially influential errors;
- e. Adoption of techniques that minimize the number of changes, particularly for the treatment of not influential random errors;
- f. Mix of different imputation methods as nearest neighbour approach or model based imputation.
- g. Monitoring of E&I main steps by a set of quality indicators;
- h. Performance of the E&I process from data collection to the final figures;
- i. Ad-hoc documentation to evaluate data changes due to the E&I process.

The strategy adopted is the outcome of different simulation studies, carried out for identifying the most suitable methodologies to solve problems of missing, invalid or inconsistent values.

The E&I activities can be grouped in three main stages. The first stage refers to the checks performed at the data gathering phase. The second stage concerns the activities carried out in order to provide the provisional figures. The last stage relates to the procedures aiming to release the final data.

3.1.3.1 E&I during the data gathering phase

In order to improve data quality, different types of checks have been performed during the data collection phase, trying to limit the respondent burden. These editing activities have been differentiated according to:

- a. the data collection technique;
- b. the degree of involvement of Regions in census field operations;
- c. the entity responsible for data entry.

The Regions with a medium degree of interaction with Istat (integrative participation model) were responsible for data gathering and for recording from the paper questionnaires only the subset of variables for provisional figures (about 20 variables). For these Regions, the E&I activities at the data collection phase have been limited to this subset of variables. After data collection, all paper forms have been recorded in outsourcing and centrally checked by Istat for final figures dissemination. The electronic forms filled via web by the holdings have been checked by the regional staff before the release of collected data to Istat.

The 17 Regions with intensive degree of interaction with Istat (high level participation model), in addition to data gathering, have also recorded the filled paper questionnaires by a controlled data entry system. In order to prevent and correct fatal errors and missing values, especially for the items related to farms identification and localization, a set of 220 checking rules has been implemented in the data entry system. The system analyzed at unit level (micro-editing check) the coherence between the answers referring to related topics with the aim to find missing or inconsistent values. In the case of electronic form filled via web by the holdings, the same set of rules were integrated in an automatic checking procedure performed by the regional staff before the release of collected data to Istat.

Two types of edit rules have been used:

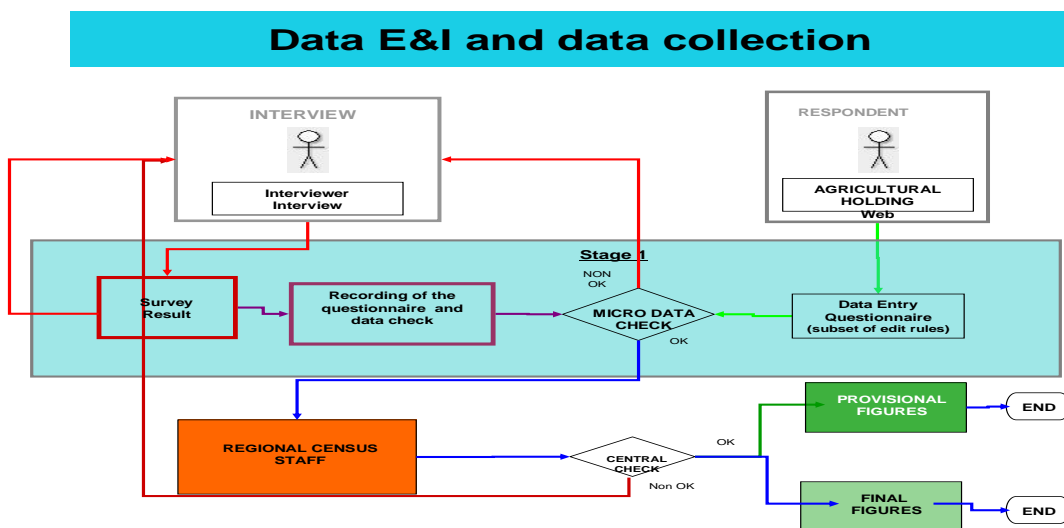
- a. Fatal edit rules, to underline errors and force the respondent or the interviewer to restore data correctness;
- b. Query edit rules, to highlight the need to do further investigation on the information gathered.

The set of rules has been adjusted according to the type of data capture technique to simplify data release and reduce potential obstacles in filling or recording the questionnaires.

For 17 Regions with intensive degree of interaction with Istat, the E&I procedures during the data collection phase have been performed on the subset of the variables (about 310) describing the farm structure (named primary variables).

The main phases of the E&I activities for the 17 Regions are shown in the following figure.

Figure 17 - *E&I for the Regions with high level participation model*



3.1.3.2 E&I to provide provisional figures

For the provisional figures, only the variables describing the farm structure (primary variables) have been checked, taking into account timeliness and deadlines. Particularly, the main holding characteristics considered have been: land use, livestock, vineyards and, for the Regions responsible for data recording, the labour force too.

During data collection, while regional census staff was still in force, a set of activities have been performed to detect outlier values and influential errors. The output has been some lists of holdings prioritized for manual review by census regional staff, according to the value of a score function based on the relevance of the potential errors (selective editing).

Aiming at limiting the follow up of respondents, the selective editing has been supported by the available information, as time series, statistics or administrative sources. The review of outliers and relevant errors has allowed to promptly reduce the errors with a significant impact on provisional figures, thus reducing the distance between initial and final results.

For detecting outlier values, a special procedure, based on the robust technique of Forward Search (Atkinson and Riani, 2000; Riani et al., 2012) has been implemented in partnership with the University of Parma and centrally applied by Istat. The selection of outliers was done by using a robust procedure to detect holdings in which the collected information by the census was not in agreement with that coming from the register kept by the General Agency for Agricultural Subsidies (AGEA). This method is developed on the hypothesis that the differences between two data sources depend on the differences due to the classification schemes, the reference time, or observation field. The outlier detection was carried out within strata of holdings defined according to the farm size, the region and the area corresponding to the following main surfaces: Utilised Agricultural Area (UAA), total area, vineyards and olive plantations.

The influential errors have been identified by an automatic checking procedure applied only to the primary variables.

For each Region, Table 8 shows the number of holdings checked and the results of the outlier detection and relevant error detection procedures.

Table 8. - Number of holdings checked and results of the outlier detection and relevant error detection procedures for Region.

Region	Total number of holdings processed (x)	Total number of holdings having at least one fatal error or outlier values (y)	% of holdings having at least one fatal error or outlier values (x/y)*100	Total number of fatal errors and outlier values (z)	Average of fatal errors per holding (z/y)	Total number of holdings having at least one outlier value (t)	% of holdings having at least one outlier value (t/y)*100	Total number of outlier values (u)	Average of outlier values per holding (u/t)
Piemonte	99,013	6,322	6.39	8,369	1.32	4,009	4.05	5,937	1.48
Valle d'Aosta	5,142	409	7.95	538	1.32	295	5.74	424	1.44
Lombardia	90,870	4,404	4.85	5,773	1.31	2,672	2.94	4,266	1.60
Veneto*	160,462	-	-	-	-	3,721	2.32	5,881	1.58
Friuli-Venezia Giulia	29,668	1,015	3.42	1,291	1.27	605	2.04	906	1.50
Liguria	34,071	1,269	3.72	1,475	1.16	632	1.85	738	1.17
Emilia-Romagna	99,132	4,019	4.05	4,726	1.18	2,775	2.8	3,421	1.23
Toscana*	104,220	-	-	-	-	4,340	4.16	5,126	1.18
Umbria	46,045	2,748	5.97	3,226	1.17	1,388	3.01	1,786	1.29
Marche*	62,691	-	-	-	-	1,604	2.56	2,301	1.43
Lazio	152,963	6,095	3.98	8,082	1.33	3,463	2.26	5,270	1.52
Abruzzo	85,844	4,106	4.78	5,588	1.36	2,441	2.84	3,698	1.51
Molise*	33,161	-	-	-	-	993	2.99	1,500	1.51
Campania	182,869	11,684	6.39	14,526	1.24	4,595	2.51	7,021	1.53
Puglia*	321,399	-	-	-	-	8,778	2.73	12,546	1.43
Basilicata	60,135	4,184	6.96	5,580	1.33	2,456	4.08	3,779	1.54
Calabria	163,518	12,273	7.51	15,890	1.29	5,602	3.43	9,028	1.61
Sicilia	272,403	13,850	5.08	19,243	1.39	8,526	3.13	13,855	1.63
Sardegna	83,092	8,538	10.28	11,580	1.36	6,554	7.89	9,416	1.44
Bolzano-Bozen	26,752	1,705	6.37	1,919	1.13	560	2.09	667	1.19
Trento	22,885	1,384	6.05	2,054	1.48	1,026	4.48	1,575	1.54
<i>Italia</i>	<i>2,136,335</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>67,035</i>	<i>3.14</i>	<i>99,141</i>	<i>1.48</i>

*For the Regions having an integrative participation model, only the outlier detection has been performed due to the limited number of variables

The following table shows the proportion of the census data confirmed, corrected with the AGEA source or replaced with values coming from other sources (including call-backs to holdings).

Table 9 - Distribution of outliers subject to investigation by type of organizational model, type of variable and outcome of the investigation: absolute and percentage values (in brackets)

Region's involvement degree	Invested area	Number of census values confirmed	Number of census values corrected according to AGEA value	Number of census values replaced with values coming from other sources	Total number of outlier units reviewed
Integrative participation model	Total area	8,452 (78.14)	125 (1.16)	2,239 (20.70)	10,816 (100.00)
	UAA	7,840 (82.74)	55 (0.58)	1,581 (16.68)	9,476 (100.00)
	Vineyards	5,087 (72.03)	200 (2.83)	1,775 (25.13)	7,062 (100.00)
High level participation model	Total area	30,079 (86.61)	607 (1.75)	4,043 (11.64)	34,729 (100.00)
	UAA	25,997 (88.50)	442 (1.50)	2,937 (10.00)	29,376 (100.00)
	Vineyards	4,126 (82.24)	159 (3.17)	732 (14.59)	5,017 (100.00)
	Olive plantations	2,029 (76.14)	175 (6.57)	461 (17.30)	2,665 (100.00)

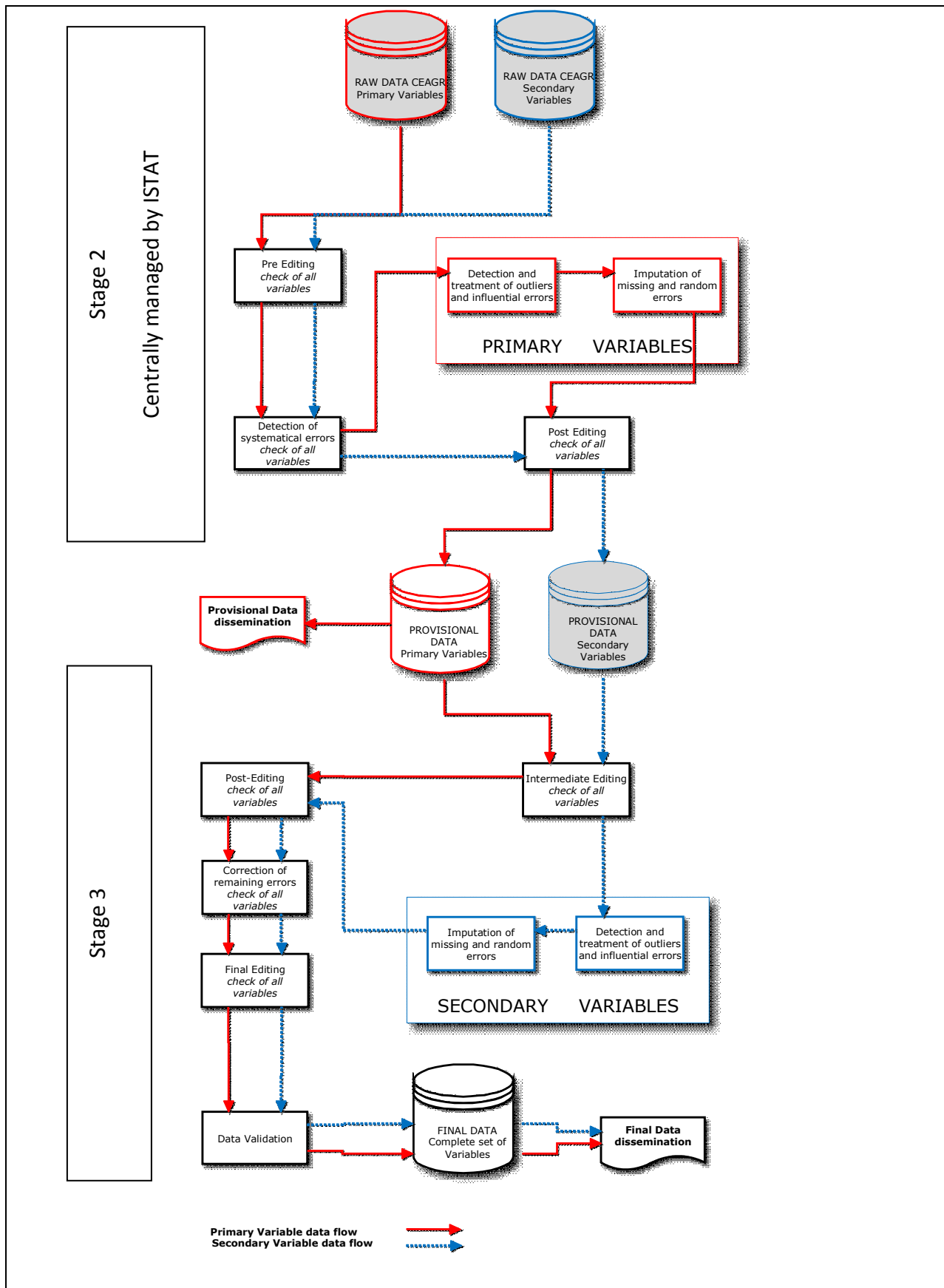
After the manual review the remaining errors in the primary variables have been treated at central level by automated procedures managed by Istat. To solve these inconsistencies, the same E&I methods used for the treatment of the secondary variables have been applied, as described in the following section.

3.1.3.3 E&I to release the final data

In the third stage, for the final figures dissemination, the secondary variables (about 330, related to other gainful activities, agricultural production methods, rural development, energy production, livestock management methods, location of the holding, accounting, revenues, destination and marketing of the holding's production) have been processed, keeping fixed the values imputed in the previous stage.

The E&I process has been structured in different sequential steps, briefly described in Figure 18.

Figure 18 - The two main stages of the E&I process managed by Istat



In order to detect errors, during this stage, a list of more than 1200 consistent and not redundant edit rules has been used. These edit rules, referring to single variables or to the expected relations among them, correspond to logical and/or mathematical constraints that must be satisfied simultaneously by the values of an individual record (within-record edit rules), or by the aggregation of different records included in the same subset of analysis (between-records edit rules). Consider, for example, the rules defined for grape varieties and for the labour force treatment.

Both in the second stage of E&I for provisional figures and in the third stage for final results, the complexity of the constraints has been managed by dividing the variables into subsets that are treated in different E&I steps.

In each E&I stage, every single step has been separately processed when the subsets of variables were unconnected (the edit rules didn't affect variables belonging to different subsets) so that the order of the processing runs was not of influence. Otherwise, when the subsets of variables were connected (there were edit rules defined on variables of different related subsets), during the performance of a single procedure, all the variables imputed in the previous runs were maintained fixed. For this reason, the primary variables which have been corrected in the second stage of the E&I process have not been modified in the following steps. The inconsistencies between primary and secondary variables have been treated by changing the values of the secondary variables.

The following steps have been repeated, both in the second and the third E&I stages, centrally managed by Istat:

Automatic error detection:

- (a) Micro-editing: error detection at unit level, according to the whole set of checking rules. For each responding unit, the minimum number of values to be modified, for restoring the situation of correctness has been identified. The detection of errors has been performed conditionally to the path followed in the compilation of the questionnaire (relative minimum change), according to the answers given by the units without errors (donors) closest to the wrong unit. This phase has been performed jointly for the qualitative and quantitative variables.
- (b) Macro-editing: data validation, by analysing the aggregates describing the structure of agriculture system (e.g. the total number of farms collected, the Utilised Agricultural Area, area invested in the major crops, etc..).

Treatment of errors:

- (a) Detected outliers and influential errors have been manually reviewed by experienced staff. In particular, the most relevant units have been clerically edited, by using score functions to prioritize micro data review in selective editing. For this purpose, the available auxiliary information from statistical or administrative registers has been used.

- (b) Random errors, having a lower impact on data dissemination have been treated by automatic methods.

The treatment of not influential random errors has been based on the minimum change approach.

Once the minimum number of values to be modified for restoring the situation of correctness has been identified at unit level, the most appropriate imputation method has been adopted for each subset of related variables.

3.1.3.4 The imputation methods

As a whole, the imputation process has been a combination of the following methodologies:

- (a) deductive imputation, if the values to impute are uniquely determined by the values assumed by other variables;
- (b) rule based imputation (based on deterministic rules like "if-then");
- (c) nearest neighbour imputation;
- (d) model based imputation (preferred for the imputation of the continuous variables);
- (e) interactive imputation.

Particularly, the imputation of missing non linearly dependent data concerning the different types of crops has been performed through conditional Copula functions in continuous variables. This procedure is the result of several tests conducted by Istat, in cooperation with researchers from the University of Bologna (Bianchi et al., 2009; Di Lascio and Giannerini, 2012; Nelsen, 2006; Sklar, 1959). This new approach has allowed to preserve the variables distribution, as the missing values imputed have been randomly chosen from the conditional distribution of missing values, given the observed values.

For the vineyard section, two models of Integer Linear Programming have been developed. They both consider at the same time the number (or equivalently weighted sum) and the extent of the changes.

The main features of these models are:

1. the first one is a general ILP model for data editing and imputation with minimum change (minimum number of variables to change) and minimum difference between the original value and the imputed value;
2. the other one is a specialised model focused on balance-edits (constraints which checks that a total equals the sum of its parts).

The last model has been determined by taking into account both, vertical constraints (the sum by column should have been equal to the total vineyard area for all types of vineyard) and horizontal constraints (the sum by row should be equal to the total vineyard area).

The following figure shows the different constraints related to the section of the questionnaire referring to vineyard area.

Figure 19 - Section II - Specific information on vineyards

21.1 Grape varieties for the production of wines with a protected designation of origin (PDO wines) and a protected and guaranteed designation of origin (PGDO)	Code	AREA FOR VINEYARDS ACCORDING TO THE PLANTATION YEAR													
		TOTAL AREA PER VINEYARD		After August 2007		From September 2004 to August 2007		From September 2000 to August 2004		From September 1990 to August 2000		From September 1980 to August 1990		Before September 1980	
		Hec.	Ar.	Hec.	Ar.	Hec.	Ar.	Hec.	Ar.	Hec.	Ar.	Hec.	Ar.	Hec.	Ar.
	1.....														
	1.....														
	1.....														
TOTAL	1999														

In order to treat the remaining continuous variables, mostly for the labour force section, the software DIESIS has been used, both for the detection and the imputation of the inconsistent values.

DIESIS system (Bruni et al., 2001) is a software developed in C++ language, and was implemented to treat the demographic variables in 2001 Population and Housing Census. In DIESIS, the detection of errors is based on the Integer Linear Programming, solved by applying Branch and Cut methods (Bruni et al., 2001). The DIESIS system allows to deal both with qualitative and quantitative variables simultaneously. The 'first donors then fields' algorithm has been used for the treatment of the labour force variables, while the 'first fields then donors' algorithm has been used for handling some vineyards variables.

For the interactive imputation, a special Java web application (CORRINT) has been developed. For each section of the questionnaire, different users interfaces have been implemented to insert the new value for the single item to be corrected. The same edit rules implemented in the data collection system have been integrated in the module, thus combining data entry and data editing. During this stage, if the new value failed an edit rule, an alert appeared describing the failed rule, in order to find the best solution to restore the coherence at unit level. The process ended when all edit rules were satisfied and the questionnaire was saved.

3.2 Evaluation of results

The whole process of E&I has been monitored by the analysis both of the data distributions and of the performances of the scheduled editing steps. By computing a set of tables, at regional and provincial level, the final results of the procedures have been compared with the available statistical and administrative sources. A careful analysis of detected errors and imputed values has

been essential for the improvement of the E&I process. At the end of the E&I process and before final data release, a special procedure has been arranged, to check data consistency according to the validation rules listed in the “Eurofarm Manual for Data Suppliers - Farm Structure Survey 2010 and Survey on Agricultural Production Methods”.

For monitoring the E&I process, as suggested in the EU recommended practices for editing and imputation in Cross-sectional Business Surveys (EUREDIT-Project) (Luzi et al., 2007), the following indicators have been computed for each item of the questionnaire:

- (a) Imputation rate
- (b) Net imputation proportion
- (c) Cancellation proportion
- (d) Modification proportion

These indicators have been computed for the main variables both at national and regional level (tables 10, 11 and 12), taking into account the eligible units only. Particularly for the main crops, the eligible holdings are those having UAA not null, while for animal breeding, the farms having LSU (Livestock Standard Unit) not null. In addition to imputation rates, table 10 also reports the percentage distribution of imputed values according to the type of imputation (Net imputation, Cancellation and Modification).

Table 10 - Imputation rate and net imputation, cancellation and modification proportions of the main variables at national level (percentage values)

Variables	Imputation rate %	Proportion of imputed values %			
		Net imputation	Cancellation	Modification	Total
<i>Crops</i>					
Cereals	0.459	94.09	0.12	5.79	100.00
Industrial plants	0.018	80.48	1.71	17.81	100.00
Fresh vegetables	0.381	89.06	0.56	10.39	100.00
Flowers	0.002	45.95	13.51	40.54	100.00
Vineyards	3.568	8.11	0.05	91.84	100.00
Olive plantations	0.657	96.25	0.02	3.73	100.00
Citrus plants	0.006	82.08	5.66	12.26	100.00
Fruit berry plantations	7.516	77.04	0.00	22.96	100.00
UAA	5.957	22.23	0.46	77.32	100.00
Total area	6.909	18.78	0.10	81.12	100.00
<i>Livestock</i>					
Bovines	0.102	94.29	0.00	5.71	100.00
Pigs	0.075	75.48	6.45	18.06	100.00
Sheep	0.841	8.11	0.12	91.77	100.00
Goats	0.068	87.23	4.26	8.51	100.00
Poultry	0.172	80.00	5.35	14.65	100.00

Table 11 - Imputation rate of the main crops at regional level (percentage values)

Region	Imputation rates									
	%									
	<i>Crops</i>									
	Cereals	Industrial plants	Fresh vegetables	Flowers	Vineyards	Olive plantations	Citrus plants	Fruit berry plantations	UAA	Total area
Piemonte	0.022	0.000	0.360	0.000	0.039	0.010	0.000	22.998	0.196	1.862
Valle d Aosta	0.000	0.000	0.141	0.000	4.494	0.000	0.000	11.928	4.481	4.509
Lombardia	0.066	0.006	0.212	0.000	3.926	0.006	0.000	2.904	4.033	8.367
Veneto	2.783	0.159	0.638	0.005	2.012	0.304	0.002	2.550	9.385	10.709
Friuli Venezia Giulia	0.036	0.022	0.251	0.000	5.865	0.013	0.000	2.013	5.783	6.956
Liguria	0.005	0.000	0.199	0.000	3.277	0.037	0.000	5.741	3.286	5.800
Emilia-Romagna	0.070	0.023	0.447	0.003	0.036	0.012	0.008	5.535	0.293	0.633
Toscana	0.727	0.039	1.341	0.008	8.162	3.568	0.004	8.508	15.478	18.039
Umbria	0.059	0.043	0.332	0.003	5.490	0.083	0.000	2.317	5.688	7.326
Marche	2.259	0.050	0.857	0.004	8.007	2.077	0.002	3.784	16.045	17.374
Lazio	0.015	0.000	0.276	0.000	3.076	0.058	0.000	10.249	3.037	4.467
Abruzzo	0.004	0.000	0.093	0.000	7.649	0.033	0.000	2.746	7.517	8.566
Molise	1.423	0.007	0.522	0.000	6.956	1.674	0.004	1.445	13.511	14.764
Campania	0.009	0.001	0.139	0.001	6.835	0.037	0.003	13.678	6.628	7.484
Puglia	0.724	0.001	0.608	0.006	5.193	2.172	0.021	7.032	12.038	11.472
Basilicata	0.106	0.000	0.162	0.002	0.070	0.117	0.011	2.437	0.483	2.012
Calabria	0.010	0.000	0.124	0.000	1.154	0.043	0.005	4.536	1.256	2.165
Sicilia	0.005	0.000	0.131	0.000	1.039	0.033	0.007	11.849	1.066	1.450
Sardegna	0.031	0.002	0.404	0.003	0.040	0.041	0.007	4.018	0.172	1.649
Bolzano-Bozen	0.000	0.000	0.189	0.000	0.005	0.000	0.000	1.535	0.280	0.329
Trento	0.000	0.000	0.109	0.000	11.643	0.012	0.000	3.581	11.583	13.765
<i>Italia</i>	<i>0.459</i>	<i>0.018</i>	<i>0.381</i>	<i>0.002</i>	<i>3.568</i>	<i>0.657</i>	<i>0.006</i>	<i>7.516</i>	<i>5.957</i>	<i>6.909</i>

Table 12 - Imputation rate of the main types of livestock at regional level (percentage values)

Region	Imputation rates %				
	<i>Livestock</i>				
	Bovines	Pigs	Sheep	Goats	Poultry
Piemonte	0.000	0.032	0.016	0.016	0.037
Valle d Aosta	0.000	0.000	0.074	0.000	0.000
Lombardia	0.037	0.042	0.023	0.019	0.051
Veneto	0.313	0.106	0.620	0.090	0.695
Friuli Venezia Giulia	0.032	0.064	0.000	0.000	0.160
Liguria	0.042	0.000	0.042	0.042	0.042
Emilia-Romagna	0.058	0.281	0.008	0.017	0.347
Toscana	0.246	0.101	4.029	0.224	0.280
Umbria	0.062	0.000	0.062	0.041	0.103
Marche	0.315	0.282	4.925	0.083	0.415
Lazio	0.106	0.028	0.106	0.056	0.078
Abruzzo	0.000	0.000	0.000	0.000	0.013
Molise	0.463	0.129	10.960	0.206	0.334
Campania	0.007	0.021	0.014	0.014	0.035
Puglia	0.405	0.535	6.613	0.535	1.005
Basilicata	0.017	0.000	0.070	0.017	0.052
Calabria	0.081	0.000	0.041	0.020	0.020
Sicilia	0.000	0.000	0.034	0.020	0.014
Sardegna	0.074	0.064	0.424	0.148	0.020
Bolzano-Bozen	0.072	0.000	0.000	0.000	0.000
Trento	0.000	0.000	0.000	0.000	0.000
<i>Italia</i>	<i>0.102</i>	<i>0.075</i>	<i>0.841</i>	<i>0.068</i>	<i>0.172</i>

This analysis has enhanced the data accuracy and consistency due to the new E&I System tools. The improvements introduced have also concurred to deal with timeliness constraints.

The following administrative sources have been used for the evaluation of the results:

- Integrated Administration and Control System
- System for the Identification and Registration of Bovine Animals and other species
- Vineyard cadastre

The following statistical sources have been used for the evaluation of the results:

- 2000 Census
- 2007 FSS
- Annual crop survey
- Animal surveys
- Agritourism survey
- Organic farm survey
- PDO/PGI product survey

The comparison with other statistical sources shows a general coherence of the results. Here a selection of the comparison for some relevant items:

Common wheat (ha): 542,874(AC 2010)	548,867 (annual crop survey 2010)
Durum wheat (ha) 1,419,106 (AC 2010)	1,281,608 (annual crop survey 2010)
Maize (ha) 890.237(AC 2010)	926,776 (annual crop survey 2010)
Olive (ha) 1,123,330 (AC 2010)	1,190,694 (annual crop survey 2010)
Cattle (Head) 5,592,700 (AC 2010)	5,832,457 (animal survey 2010)
Pigs (head) 9,331,314 (AC 2010)	9,321,119 (animal survey 2010)
Agritourisms (Number) 19,304 (AC2010)	19,973 (agritourism survey 2010)
Organic farm 43,367 (AC 2010)	42,925 (Organic farm survey 2010)
PDO/PGI holdings (Number) 64,936 (AC 2010)	79,536 (PDO/PGI product survey 2010)

The number of surveyed units is reported in the following table

Table 13 – Number of the units surveyed

	FSS /SAPM
Number of units in the pre-census	2,047,948
Number of holdings with completed questionnaires*	2,137,030
Number of units included in the Census coverage	2,085,744
Holdings not existing or duplicated	356,032
- of which out of the field of observation (<i>i. e. only with kitchengarden, only with animals for self-consumption, only with wooded area</i>)	50,935
- of which non agricultural holding	56,826
- of which definitively ceased	46,100
- of which with whole activity rented or sold to other holding	161,191
- of which duplication in the list	40,980
Unit Non-response:	74,758
- of which refusals	2,447
- of which for holder untraceable	50,389
- of which for other reasons (<i>holder emigrating or deceased</i>),	21,922
Holdings temporarily inactive	34,070
Number of records transferred to Eurostat	1,620,884
Common land units (A_2_1)	2,233

*During the field work 89,082 units not existing in the pre-census lists have been surveyed mainly because of split or transfer of the activity from holders in the list to new holders

Units with refusal have been not imputed.

Comments on major trends from FSS 2007 to FSS 2010.

Table 14 – comparison on major trends from FSS 2007 to FSS 2010

	From FSS 2007	From FSS 2010	Differences in %	Comments
Number of holdings;	1,679,439	1,620,884	-3.5	
UAA (A_3_1), ha;	12,744,196	12,856,358	0.9	
Arable land, ha;	6,938,831	7,009,621	1.0	
Permanent grassland (B_3), ha;	3,451,756	3,434,073	-0.5	
Permanent crops (B_4), ha;	2,323,184	2,380,769	2.5	
Wooded area (B_5_2), ha;	3,813,643	3,002,672	-21.3	The decrease is probably caused by the holdings with only wooded area, excluded by the field of observation, which in 2007 were included because mixed (with UAA and Wooded area)
Unutilised Agricultural area (B_5_1), ha;	592,153	648,746	9.6	
Fallow land (B_1_12_1 + B_1_12_2), ha;	494,217	547,723	10.8	The increase of fallow land is related to the impact of the CAP decoupling of aid rules
LSU in LSU;	9,900,671	9,911,518	0.1	
Cattle (C_2), head;	6,080,762	5,592,700	-8.0	
Family Labour force - in persons;	3,056,539	2,932,651	-4.1	
Family Labour force - in AWU;	205,724,527	200,912,733	-2.3	
Non family labour force - in persons;	958,045	858,702	-10.4	The trend showing the Census data, for all the farm work categories, but particularly for the non-family labour force, is that the number of workers is reducing heavily but the numbers of AWU per person is strongly increasing. Therefore the holdings are aiming on improving the productivity
Non family labour force - in AWU	48,390,539	48,713,803	0.7	

3.3 Data Revision Policy

As stated in the paragraph 2.2, some methodological changes have been introduced in 2010 FSS. In particular:

- In 2010, only physical thresholds have been used for selecting the units in the population of the survey. In 2000 physical and economical thresholds have been applied.

- In 2010 only data on sheep, goats, pigs, poultry, rabbits for marketing or of which products are marketing, have been collected. In 2000 all data on heads have been collected regardless their destination.

To make perfectly comparable the 2010 data with the previous censuses data, Istat is recalculating the values of the main variables for the 2000, 1990 and 1982 censuses. The results of these elaborations will be disseminated through the datawarehouse.

4. ACCESSIBILITY AND PUNCTUALITY

4.1 Publications

Data dissemination of 2010 Italian agricultural Census is a crucial step of the survey. Because of the heterogeneity of potential users, Istat has decided to diversify data dissemination, using both traditional (volumes on paper) and more appealing interactive systems of the web (datawarehouse, e-book, eXplorer).

Preliminary results have been disseminated on 5th July 2011 on the web by a press release and 23 tables available for the users (<http://censimentoagricoltura.istat.it/index.php?id=73>). The number of variables disseminated have been 178 for the 17 Regions with high level participation model and 84 variables for the other Regions.

The quality of the preliminary results have been very high as confirmed by the discrepancies with the final data shown in the following table.

Table 15 – Comparison between preliminary and final data

	2010 - preliminary data	2010 - final data	Differences in %
Number of holdings;	1,630,420	1,620,884	0.6
UAA, ha	12,885,186	12,856,358	0.2
Arable land, ha	7,014,892	7,009,621	0.1
Permanent grassland, ha	3,469,663	3,434,073	1.0
Permanent crops, ha	2,370,560	2,380,769	-0.4
Cattle, head	5,677,963	5,592,700	1.5
Pigs, head	9,648,383	9,331,314	3.4

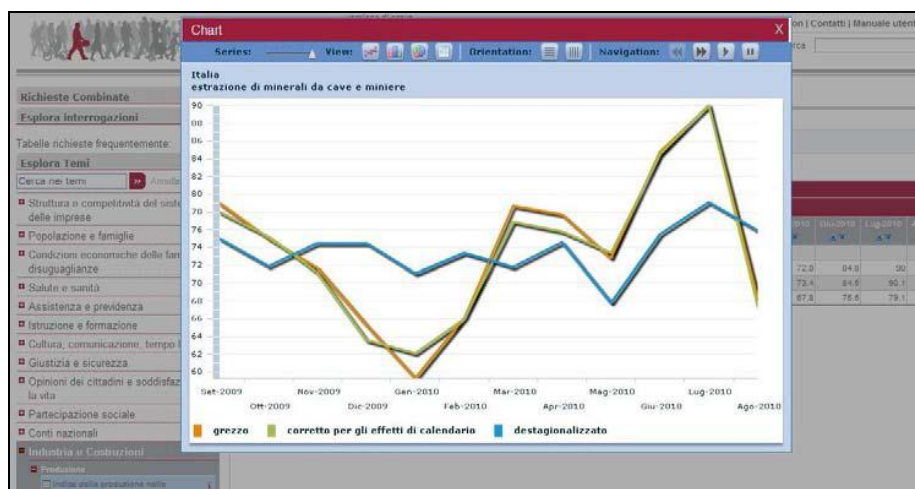
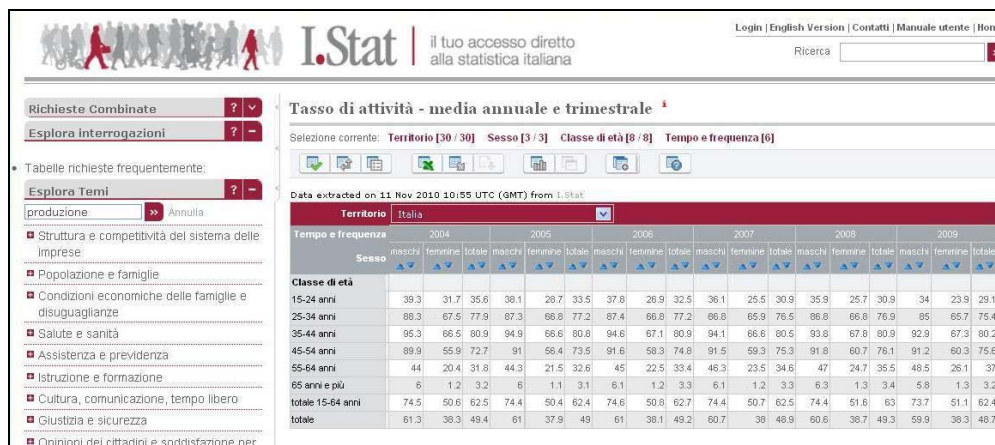
The final results will be released starting from the 12th July 2012.

The web represents the main form for disseminating the census data through a datawarehouse (I.stat) and specific tools (Single Exit Point, E-book, Explorer) derived from itself in order to complement its functions and potentiality:

- I.stat is a corporate statistical data warehouse that provides the users a single online platform for analysis and dissemination of data produced by Istat. This tool allows to build customized

statistical tables and extract data of interest for further analyses. The system is enriched with metadata and allows the generation of the more common graphs. Concerning the agricultural census Istat will release 51 thematic hyper cubes containing from 12 to 14 variables. The user will then be able to interactively explore the corpus of data derived from census, generate tables of interest and export them to its PC to perform *ad-hoc* analyses.

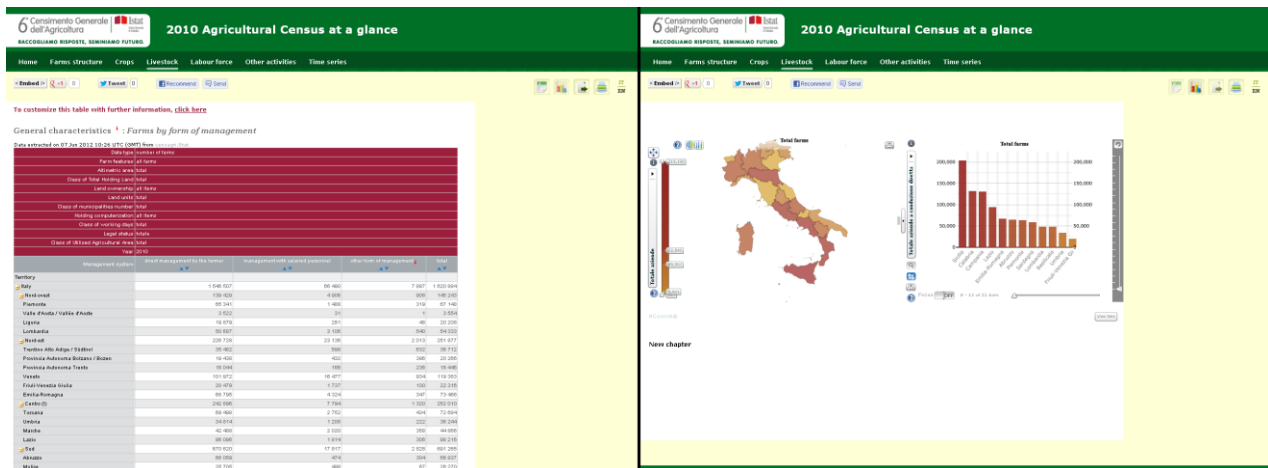
Figure 20 – I.stat



The specific tools connected to I.stat are:

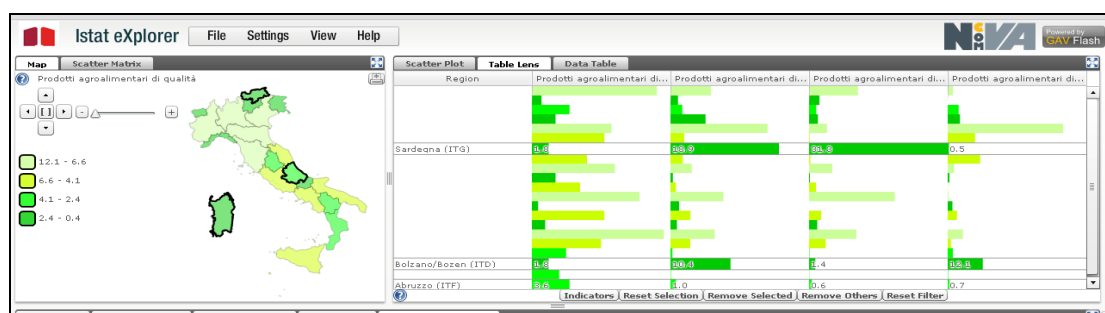
- Single exit point: the generalized system for dissemination through web-service data in the format through I.stat SDMX standards
- E-books: website platform with 30 summary tables and dynamic graphic, up to regional level, extracted from I.stat Agriculture Census data warehouse and Istat eXplorer.

Figure 21 – e-book



- Explorer: an interactive graphics display system statistics and dynamics of space-time.

Figure 22 - Explorer



Concerning the traditional form of paper dissemination, Istat will provide four different publications:

- Main structural characteristics of the Italian agriculture: It consists of 84 selected tables providing an overview of the agriculture of Italy in order to evaluate the changes occurred in the farm structure and in the agricultural activity (general characteristics, land use, irrigation, livestock, employment, time series) and the production methods adopted by them. The territorial distribution analyses the provincial level.

- Typological characteristics of the Italian agricultural holdings: paper volume containing tables on the agricultural holdings classified by typological characteristics under the COMMISSION REGULATION (EC) No 1242/2008.
- Thematic volumes: It consists in volumes of tables, available on the web. The aim is to analyze and deepen detailed data on specific informative areas. The focus will regard the vineyards, the methods of productions, the women in agriculture and the localization of land and livestock.
- Acts of the census: It consist in a slipcase with 5 paper volumes documenting the census activity. The themes will concern: Normative and official documents; Network organisation and use of the web; The system of data control & correction, The Survey Management System (SGR), the post enumeration surveys.

All the publications (both on web and on paper) contain methodological information. Moreover, metadata on the census are stored in SIDI that is an informative system for documenting the process and the quality of all surveys carried out by Istat, in a standard way.

4.2 Timeliness and punctuality

Timeliness

Timeliness of information reflects the length of time between its availability and the event or phenomenon it describes. The reference day of the 2010 census has been the 24th October 2010. The preliminary results have been released on 5th July 2011, therefore about 8 months was the time lag for the first results. The final results will be released on 12th July 2012, therefore about 20 months will be the time lag for the final results.

Punctuality

Punctuality for delivery and dissemination is the number of days between the delivery date of data and the target date on which they were scheduled for release.

The data transmission to Eurostat has taken place along the deadline forecasted by Regulation (EC) 1166/2008. Even, SAPM data have been transmitted 6 months earlier.

Table 16 – Time lag for the data transmission to Eurostat

Data	Regulation (EC) 1166/2008 deadline	Transmission to Eurostat	Time lag
FSS	June 30, 2012	June 18, 2012	- 12 days
RD	June 30, 2012	June 18, 2012	- 12 days
SAPM	December 31, 2012	June 18, 2012	- 196 days

The national publication of data takes place with some delay than the forecasted deadlines for the reasons explained in the paragraph 2.4

Table 17 – Time lag for the data dissemination

Publication	Scheduled date of publication	Actual date of publication	Time lag
First results	by June 30, 2011	July 5, 2011	- 5 days
Final results	by April 30, 2012	July 12, 2012	- 73 days

5. CONFIDENTIALITY AND SECURITY

The rules of confidentiality and security are provided by general and specific normative. General normative regard all statistical surveys carried out within the National statistical system. Specific rules are referred to the Census survey.

In general, the information collected are protected by the statistical confidentiality and data are treated within the law on the protection of personal data (Legislative Decree of 9 September 1989, n.322, Legislative Decree of June 30, 2003 – n. 196 and Deontology code and of good practice for the treatment of the personal data for statistical and scientific research within the National Statistical System).

The Decree of Republic President n. 154 of 23 July 2010 establishing the rules for the Agricultural Census execution, confirms the previous general legislation (art.28). But with the aim to satisfy the informative needs of statistical information on the agricultural structure of the Country at a suitable territorial level, Istat can disseminate the results also in unbundled form under the art.4 comma 2, of the Deontology code and of good practice for the treatment of the personal data for statistical and scientific research within the National Statistical System (art.30)⁸.

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⁸ "the variables which can be disseminated in unbundled form are identified in the national Statistical programme, if necessary for satisfying particular cognitive needs also at international and Community level" (art.4 comma 2, of the Deontology code and of good practice for the treatment of the personal data for statistical and scientific research within the National Statistical System

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