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2014 REGJISTRIMI I BUJQËSISË
POPIS POLJOPRIVREDE
AGRICULTURE CENSUS

AGRICULTURE CENSUS IN THE REPUBLIC OF KOSOVO 2014

Quality Report

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Quality Report
Agricultural Census 2014

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Preface

The quality report complements the disseminated data of Agricultural Census 2014 and provides an overview of quality dimensions of the Agricultural Census 2014 in Kosovo.

The Agriculture Census was conducted in the Republic of Kosovo in November 2014 after more than 50 years. The last Agriculture Census was conducted in 1960. The methodology of Agricultural Census 2014 was in compliance with the international standards; Food and Agriculture Organization (FAO) and with the EU legislation: Regulation (EC) 1166/2008 of the European Parliament and of the Council on farm structure surveys and the survey on agricultural production methods and repealing the Council Regulation (EEC) 571/88. The Agricultural Census is the basic statistical survey in agricultural statistics, where the data on farm structure are collected. In line with the Food and Agriculture Organization (FAO) recommendations, the Agricultural Census should be conducted every ten years, while in EU countries it is mandatory to conduct it every ten years in accordance with the EU legislation. The policies and strategies in the Republic of Kosovo have been based thus far on municipal data and the surveys of the former Statistical Office of Kosovo (at present Kosovo Agency of Statistics), which data were collected through various methodologies. As part of the Population Census, conducted in April 2011, several questions related to agriculture, land use and livestock were included. The implementation of the Agriculture Census in 2014 provided detailed structural information on agriculture based on which the new policies on economic development in agriculture sector can be developed. The data provides a framework for conducting regular surveys and along with the census it will constitute the backbone of agricultural statistics system covering national needs and international standards.

The census was prepared to be carried out in all territory, but 4 municipalities with majority of Serbian ethnicity (Mitrovica North, Zvecan, Zubin Potok and Leposavic) refused to participate and the data are published only for the remaining 34 municipalities. The census was implemented by KAS in close cooperation with MAFRD and MMCs. The project was funded from the Trust Fund established by the Government of Kosovo and EU Office in Kosovo with the participation of other international donors such are SIDA, DFID, SDC, Government of Luxemburg and Government of Denmark. The Trust Fund was managed by UNOPS.

The data were collected from 1-20 November 2014 using paper questionnaires for recording the data in the face-to-face interviews. In rural areas, the data were collected using a door-to-door method, while in urban areas the list of agricultural holdings from Population and Housing Census 2011 was taken as a frame for data collection. Also, all legal entities with agriculture activity were interviewed.

The data quality was evaluated by different means and methods (PES, data validation, response analyses). The key quality indicators indicate that the data quality can be considered as sufficiently high and acceptable by most of the standard criteria.

Unweighted nonresponse rate was 2.8%, while weighted nonresponse rate was 2.4%

The **coverage** of the AC was affected by missing data for four municipallities. The Agriculture Census could not be conducted in municipalities in northern Kosovo (Leposavic, Zvecan, Zubin Potok and Mitrovica North), because these municipalities refused to participate.

For the territory which was covered, the PES survey indicated moderate **coverage error**. UAA was under estimated by 4.9% and number of cattle by 2.7%. The **over reporting error** compensated most of the under-coverage error, therefore the aggregates related to key variables were only slightly under estimated; UAA by 0.3% and cattle by 1.7%.

Also, no significant **measurement error** for key variables was detected; UAA was over estimated by 1.1% and cattle by 1.7%.

List of abbreviations and symbols

AC	Agriculture Census
AH	Agicultural Holding
AHS	Agricultural Household Survey
ACL	Agriculture Census List
AWU	Annual work unit
CC	Census Commission
CV	Coefficient of variation
DFID	United Kingdom Department for International Development
DR	Daily report
EA	Enumeration Area
EC	European Commission
EU	European Union
EUROSTAT	Statistical Office of the European Communities
FAO / UN	United Nations Food and Agriculture Organization
KAS	Kosovo Agency of Statistics
LSU	Livestock Size Unit
MAFRD	Ministry of Agriculture, Forestry and Rural Development
MCC	Municipal Census Commission
PES	Post Enumeration Survey
PHC 2011	Population and Housing Census 2011
SDC	Swiss Agency for Development and Cooperation
SIDA	Swedish International Development Cooperation Agency
TFM	Trust Fund Manager
UAA	Utilized agricultural area
UN	United Nations
UNOPS	United Nations Office for Project Services
%	Percentage
ha	Hectares

1. Methodological explanations

1.1. Objective of the survey

The objective of the Agriculture Census was to:

Provide accurate and updated statistical information on a broad number of characteristics for all units that carry out agricultural activities in the territory of the Republic of Kosovo and make them available for general public and specialized users (researchers, policy makers, etc.)

Provide accurate and updated statistical information on a broad number of characteristics on the level of municipality for the needs of local authorities.

Create a Statistical Farm Register as a basis for conducting statistical sample surveys on the Agricultural Holdings.

To provide the government with basic information on designing, planning and implementing the general and specific policies to support agricultural development at the local and national level.

1.2. Legal background

The basic legislation for implementation of the Agriculture Census in Kosovo was the following:

Law No.04/L-036 of 21 October 2011 on “Official Statistics”,

Law on Agricultural Census No.04/L-127 (Official Gazette No. 1/2013/17.01.2013), Law No. 04/ L-253 amending and supplementing the Law No. 04/L-127 on the Agriculture Census (Official Gazette No. 32/2014/15.05.2014).

The methodology of the Agricultural Census 2014 was in compliance with the EU legislation: Regulation (EC) 1166/2008 of the European Parliament and of the Council on farm structure surveys and the survey on agricultural production methods and repealing Council Regulation (EEC) 571/88.

1.3. Units of observation

Units of observation are the agricultural holdings.

Agricultural holding is an independent technical and economic production unit, in which a (1) household or (2) legal entity performs (3) agricultural activity as their primary or secondary activity under single management and use joint production assets (land, vehicle, building, etc.).

(1) Household refers to an individual family union or other union of persons (individuals), who live together and are situated completely or partly in a family household, and are supplied with groceries and other essential items for living. Members of this group can join their income to a greater or lesser extent.

Agricultural household is a household the members of which are engaged in agricultural production as their primary or secondary activity, having a single management and use joint production assets, such as the land, vehicles and buildings. An agricultural household can produce for market, own consumption or both.

(2) Legal entities are agricultural cooperatives, individual businesses and other organizational forms with the status of legal entity that are enumerated as having the agricultural production as their primary activity, and enterprises, institutions and other legal entities that are enumerated in another activity and have branches or other organizational sections where they carry out agricultural production.

(3) Agricultural activity means:

- Cultivation of agricultural crops (cereals, potatoes, dried grain pulses, tobacco, fodder plants, vegetables, flowers, ornamental plants, seeds, seedlings, fruits, grape and mushrooms etc.);
- Livestock, poultry and other animals breeding (cattle, pigs, sheep, goats, equidae - horses, donkeys, mules, chickens, bees, rabbits, etc.), and
- Vine production from grape produced by the agricultural holding.

The following holdings were also included:

- Research institute holdings, religious communities, schools and prisons dealing with agriculture production,
- Agriculture holdings which are part of industrial enterprises,
- Agriculture holdings that are engaged with the livestock but on the reference day they have no livestock; the holding is temporarily empty due to the temporary production break (livestock sanitary stable cleaning, potential diseases or similar reasons).

Agricultural production excludes:

- racing horses for leisure,
- processing of agricultural products (excluding vine produced from the grape cultivated in the holding),
- forestry, hunting, fishing or fish cultivation and
- performance of agricultural services by own machinery to other agricultural holdings

1.4. Coverage

In the Agriculture Census only the agricultural holdings which met at least one of the following criteria were included:

- The holding is cultivating 10 ares (1000 m2) or more agricultural land for producing agricultural products, or
- The holding cultivates vegetables, plants or other agricultural products in greenhouses for further sale, or
- The holding is raising one or more cattle or horses, or
- The holding is raising at least 3 grown up pigs, or

- The holding is raising at least 4 grown up sheep or goat and pigs together, or
- The holding is raising at least 50 heads of grown up poultry and female rabbits together, or
- The holding is in possession of at least 20 bee hives, or
- The holding is producing mushrooms for sale

Data collected by the Agricultural Census:

For agricultural households: the name of the holder, sex, personal identification number, age, e-mail, phone number was collected.

For legal entities: the name of the legal entity, registration number of legal entity, e-mail, location, and phone number was collected.

For all agricultural holdings also the following information were collected:

- Data on location of the holding and its identification number in MAFRD.
- Data on total land area of the holding, utilized agricultural area, of which area of land owned, area of land rented in, and other forms of land tenure; unutilized area by the holding.
- Data on use of agricultural land by individual crops.
- Data on livestock – by species and categories.
- Data on agricultural machinery, equipment and buildings.
- Data on agricultural holding labour force:
- Data on sale of agricultural products, organic agricultural production, other profitable activities.
- Data on agricultural production methods.
- Data on rural development measures.
- Forestry area within the holding.

1.5. Reference periods

Data on utilized land area and agricultural labour refer to the agricultural **year: 31 October 2013 - 1 November 2014.**

Data on animal number refer to the number of animals in the agricultural holding as of **1 November 2014**.

1.6. Agriculture Census instruments

The technical instruments for the Agriculture Census (Questionnaire and Guide) were drafted in accordance with the Agriculture Census 2010 (FAO - UN) World Program and the Eurostat methodology on conducting the Farm Structure Survey: Regulation (EC) No. 1166/2008 and Regulation (EC) No.1200/2009. The content of the Agriculture Census **Questionnaire** also covered specific national needs.

A single questionnaire was used for agriculture households and legal entities. Questionnaires were on paper with pre-printed identification data: bar-codes, unique code of the questionnaire, name,

surname and address of the agricultural household/legal entities (building number, settlement and municipality).

Agriculture Census Guide contains all the necessary explanations about the purpose of the census, concepts, definitions, and the details on tasks of participants in the Agriculture Census. It provided detailed information on how to fill out the questionnaire and how to use other Census instruments (daily and summary reports, Agriculture Census List, maps, etc.). All participants in the Agriculture Census had to comply with the guidelines.

The Census staff was also equipped with other supportive documents: maps, daily reports (DR), information letter, notification letter, handover report, list of holdings /legal entities to be visited (ACL).

Maps of the entire Kosovo territory were prepared by KAS, based on satellite images from October 2010, and updated with the data from the field from the Population and Housing Census 2011. The maps covered the enumeration areas for which the enumerator, controller, supervisor or MCC was responsible.

All AC instruments and field work organization was tested in the **Pilot Agriculture Census**, which was carried out in November 2012 in all the municipalities of Kosovo; where around 1600 households were included. Beside households also 2 legal entities dealing with agriculture were interviewed in each municipality.

Pilot Census provided the necessary information to finalize the AC instruments, plan the training, plan the final field work organization and prepare the system for data entry and data cleaning process In addition, in the Pilot AC all KAS regional offices staff was trained.

1.7. Field work impementation

The field work was implemented in accordance with the Law on Census and on the basis of the experience gained in the Population and Housing Census 2011 and Pilot Agriculture Census carried out in November 2012.

In the AC field work participated: 2 797 enumerators (out of them 228 reserve), 496 controllers (out of them 63 reserve), 71 supervisors (out of them 9 reserve) and 155 members of MCC.

Supervisors and controllers were recruited by KAS, while the enumerators were recruited by municipalities following the KAS guidelines. Candidates had to fulfil the basic criteria, such as education, work experiences, speaking relevant language and living in the settlement he/she is supposed to work. All candidates were tested beforehand, while priority was given to the candidates with agriculture background.

1.8. Organization structure of the field work

The whole organization of field work was based on the division of territory of Kosovo into enumeration areas (EA), which enabled approximately equal workload by enumerators, enabled to finish the data collection within the foreseen time and enabled all households to be able to provide the answers in the language they speak.

Data from the Population and Housing Census 2011 were used as the frame for preparation of Agriculture Census.

Prior to Population and Housing Census 2011, Kosovo Agency of Statistics has divided the inhabited territory of Kosovo into 4 677 small geographical units, called Enumeration Areas (EA). An Enumeration Area is the smallest geographical unit for collection of data on the field. The number of households in one EA was adjusted to the needs in data collection in Population and Housing Census, where it was planned that one enumerator can collect the data from one EA in two weeks' time.

In the Agriculture Census, the data collection period was longer then in the Population and Housing Census 2011 (6 days longer) and the length of the interview was different. Based on the Pilot Census 2012, it was estimated that one person can enumerate around 70 households in urban areas, and around 100 households in rural areas. Rural and urban areas in Kosovo are defined on the level of settlement by municipal administrative decision.

Rural area is a non-urbanized geographical area characterized by low population density and usually most of the land in used for agriculture, while urban area is characterized by high population density and vast buildings

According to the above mentioned principle, Kosovo inhabited territory for the Agriculture Census was divided into 2 640 enumeration zones, where an enumeration zone was equal to one or more enumeration areas. Each zone had its own unique code and was used as the basic unit for organizing other activities such as: training documents, reports, dissemination and collection of census materials and payments for field enumerators. An enumerator speaking the language of the population in the enumeration zone was assigned to each zone. In ethnically mixed zones, two or more enumerators of respective ethnicities were assigned.

For each enumeration zone, the list of households, namely the Agricultural Census List (ACL) was prepared. The Agriculture Census List (ACL) included potential agricultural holdings in Kosovo. The main source for compiling the ACL was the PHC 2011 database. In PHC 2011, some data on agriculture were collected, with the main aim to provide the frame for the AC. For municipalities where PHC 2011 was not conducted, the frame prepared for PHC 2011(updated in 2008-2010), was used. For municipalities where PHC 2011 was only partially conducted, the data from the PHC 2011 frame and the data updated in 2008-2010 were used.

For legal entities the KAS Business Register was the source for preparation of ACL.

The Pilot AC in 2012 showed that the list of households with agriculture activity is not complete in all settlements. From the PHC 2011 database, it was concluded that in rural areas the majority of households carry out agriculture activity, while in urban areas households with agriculture activities are rare. In order to guarantee the right coverage, the ACL in rural areas included all households (agriculture and non-agriculture). In urban areas the ACL included only households which in Population and Housing Census 2011 stated to have been dealing with agricultural activities (above the threshold used in AC), since interviewing of all households would not be realistic and would not contribute much to the coverage. The ACL also included all legal entities with registered agriculture activities.

Enumerators had to visit all households/legal entities in the ACL. Moreover, in order to obtain a good coverage, the new households, if identified in the field in rural areas, were interviewed as well and included in the ACL and maps, no matter if they carry out agricultural activities or not and

no matter if they reach the threshold or not. In urban areas, only the households on the list were visited.

1.8.1. Training of the field staff

MCC members were trained for 2 days by KAS staff and the trainings took place two months in advance in the regional centres.

Trainings of field staff were implemented through the Cascade method; the Agriculture Census methodology team trained the supervisors, supervisors trained the controllers and the controllers trained the enumerators. The training took 5 days for each level.

Supervisors were trained in KAS, controllers in municipal premises, while enumerators in 147 premises provided by the MCCs and in average around 20 enumerators were trained in the same room.

The trainings were provided in Albanian, Serbian and Turkish language. The trainings were supported by uniform training material (PPP). All trainings were monitored by the KAS methodology team and MCCs. MCCs provided venues and technical assistance on trainings.

1.8.2. Data collection

Data collection took place in the period 1-20 November 2014.

The data collection was performed through the "door-to-door" method (PAPI-paper assisted personal interview) and by using the face-to-face interview method. The ”door- to door method” was supported by the ACL list and respective maps with numbered buildings. The data were collected by enumerators in Albanian, Serbian or Turkish language; according to ethnicity and mother tongue of the household members.

1.8.3. Monitoring of data collection

Field work was monitored at different levels. The first level of control was performed by controllers, who had to communicate with the enumerators on daily basis and had to review all the questionnaires. If necessary, they requested the corrections including repetition of the interview. Supervisors were in contact with the controllers on daily basis and had to check 10% of the questionnaires.

The work of supervisors was monitored and coordinated by KAS and MCC members, in particular by the members of regional statistical offices.

The whole process was monitored and coordinated by KAS team, which has daily visited different municipalities, met with field staff and MCC members, evaluated some questionnaires, daily discussed the problems in the field and provided support in solving methodological and logistical problems.

1.9. Key variables and key statistics

Key variables of AC were the following:

Arable land, grain cereals, wheat, grain maize, potatoes, vineyard area, orchard plantations area, permanent meadows and pastures, cattle, dairy cows, breeding sheep (female), breeding goats (female), Total poultry

Key statistics of AC were the following:

Total utilized agricultural area; Total livestock size units; Total annual work units; Average utilized agricultural area per agriculture holding; Average livestock size units per agriculture holding; Average annual work units per agriculture holding.

1.9.1. Definitions of key variables and key statistics

KEY VARIABLES:

Arable land is the land area which is cultivated regularly with different crops or sown with a certain sequence of crops (**crop rotation system**). Utilized arable land area refers to **the main area** during the agriculture year (31 October 2013 -1 November 2014).

Under grain **cereals** the area of cereals harvested per grain, regardless of their utilization (for human or animal consumption on farm, sale, or seeds) is included. The area of grain cereals refers to the plants harvested in 2014, even if they are planted in the fall of 2013 (i.e. wheat and rye). Areas with green cereal crops for animal feeding are included in category “Fodder crops”.

Under **grain maize** it is included the maize grain harvested by hand, by corn picker or combined harvesting, regardless of the utilization, including grains for silage. It also includes grains harvested together with cobs, but with moisture higher than 20% and that are used for silage (the so-called corn-cob-mix). Sweet maize cobs for human consumption are included under other vegetables.

Potatoes include early, late potatoes and seed potatoes, in the arable land, for own needs as well as for sale on the market.

Vineyard plantations are areas with grape vines with a distance between rows and between vines, which enable the use of agricultural machinery and equipment and application of agro-technical measures.

Orchard plantations – are areas with fruit trees with a distance between rows and within rows, which allows the use of machinery and equipment for orchards, and where usually other agro-technical measures are performed. Usually, these are large plantations of trees.

Meadows - represent the land used permanently (for five years or more) to grow various plants, through cultivation (planting) or naturally (self-sowing), and are not involved in the rotation of crops in the agricultural holding. Meadows may be used for grazing, or mowing for hay or silage.

Pastures (rough and natural pastures) - land used for grazing, usually in low quality land areas, for example in hilly and high altitude land, usually untreated with fertilizer, cultivator, re-sowing or drainage. These areas are usually used for extensive grazing and are usually not mowed or they

are mowed in a classic way; the areas are not suitable for large herds of livestock. All types of pastures are included: intensive (low lands) and extensive (hilly land).

Common land – is the land that does not belong directly to the agricultural holding, but in which common rights apply. It may consist of pastures, meadows or other land. In general terms, the common land is the utilized agricultural area owned by a public authority (state, municipality), for which a person can exercise the common rights, and these rights are generally exercised together with others.

Cattle - include all types of cattle.

Dairy cows – are the cows that have already calved (including those aged less than two years), and which because of their race, or special qualities are raised exclusively to produce milk for human consumption or for milk processing. These include dairy cows at the end of their productive ability, which are currently not kept for milk production but have emerged from the milk production (lactation) period and designated for slaughter regardless if they are fattened between last lactation and the slaughtering.

Breeding female sheep include:

- **Ewes that lambed** – include the female heads that have already lambed.
- **Ewes put to the ram for the first time** – are sheep that have been bred for the first time and which are expecting the first lambs.

Breading female goats include:

- **Goats that kidded** – include the female heads which have already kidded.
- **Goats mated for the first time** – are goats that have mated and that are expecting the first kid.

Total poultry - Include all types of poultry. Birds reared in isolation for hunting purposes and not for meat production are excluded.

KEY STATISTICS:

Livestock size unit (LSU) is a standard measurement unit that allows the aggregation of the various categories of livestock in order to enable them to be compared between years or between different countries. 1 LSU represents 500 kg of live weight of animals. The LSU used is harmonized with EU.

Utilized Agriculture Area (UAA) refers to the total area taken up by arable land, permanent grassland, permanent crops and kitchen gardens used by the holding, regardless of the type of tenure or of whether it is used as a part of common land.

Annual Work Unit (AWU) means **t**he full-time equivalent employment, i.e. the total hours worked divided by the average annual hours worked in full-time jobs in the country. Full-time means the

minimum hours required by the national provisions governing contracts of employment. 1800 hours was taken as minimum hours (225 working days of eight hours per day).

2. Quality assessment of the Agricultural Census

The main source for evaluation of the quality of the collected data of AC 2014 was the Post Enumeration Survey. PES was carried out by Kosovo Agency of Statistics. Data were collected from 1-15 December 2014, by using paper-questionnaires for recording of the data during face-to-face interviewers. In rural areas, the data was collected using door-to-door method, while in urban areas the frame for data collection was the list of holdings from Population and Housing Census 2011.

The purpose of Post Enumeration Survey (PES) is to provide users with the quality evaluation of the census results. Estimation of the quality of the census data was obtained by carrying out a small (around 1%) sample survey, which was implemented approximately one month after the census completion.

The unique reference sampling frame available to extract the sample was based in the last version of the Census Population 2011. Sample design was defined separately for rural and for urban areas.

30 EAs were selected in the sample. The north part of Kosovo was not included in the sample. Small sample size is considered the larger limitation of the Kosovo PES and restricted its evaluation to the national level.

Estimation of the following errors was the main objective of the PES:

- **Coverage errors.** The main focus was on under-coverage; hence on detecting the members of the target population that was not reached through the census data collection.
- **Identification errors.** Accuracy of the identification variables was controlled by collecting again the key data on the sampled units.
- **Measurement errors.** Key variables were asked again by using the best evaluated interviewers from the census. Differences in the obtained results can be used for the estimation of the measurement error and consequently of the bias of the census result.
- **Non-response errors.** Non-responding units are contacted again, aiming at getting at least some key information on agriculture holding. Results are used for the estimation of the non-response bias of the census results.

2.1. PES questionnaire

PES questionnaire includes questions and other information for several purposes:

- Re-survey of some households of targeted population of the census;
- Possibility to successfully connect later the data based on the household data that includes household's identification number, name, name of father / husband and the surname of the

head of the household, identification data about the municipality, settlement, EA code, the building code from the map, number of entry and number of dwelling;
- Assessment of coverage errors;
- Allowing the assessment of measurement errors by collecting several key variables two times independently.

2.2. Sample design

Since the Enumeration Areas are pretty heterogeneous by its size, we decided to take the areas which were assigned to the enumerators as the sampling unit. We called these areas Enumerator Areas and denoted them by EA. In the following text the term unit will always refer to EA.

The sample design was defined separately for rural and for urban areas.

The main characteristics of the sample design for rural areas:

- The sampling frame was created by excluding urban areas from the pre-census database and then taking all the EAs from the obtained list
- Region was used for the explicit stratification
- Municipality was used for implicit stratification
- Target sample size was 25 EAs. Due to the rounding in the phase of sample allocation, the final sample size was 26 EAs
- Proportional allocation was used to allocate the sample across the strata. Number of sampled units (n_h) in stratum *h* was hence calculated as follows:
  $n_h = round(\frac{N_h}{N} * 25)$, where

  N_h…Number of all EA in stratum N_h

  N… Number of all EA in the frame

- Frame was sorted by region and municipality

Allocated sample was selected by using systematic sampling inside of each stratum.

2.3. Data collection in PES

For statistical purposes, Kosovo is divided into seven "statistically administered" regions, each of them having a KAS regional office, which mainly deals with the data collection.

During the census implementation, an enumerator was assigned to one or more enumeration areas depending on the number of households. In Agriculture Census, the number of households assigned to an enumerator varied depending on urban and rural areas.

Organization of the PES was fully supported in this existing structure to maximize the quality of interviews carried out in the field. The PES data collection staff consisted of the group of KAS methodologists, in Pristina by regular supervisors each covering seven regions and the enumerators distributed in seven regions in Kosovo.

Two levels of field staff work have been involved in implementation of the PES.

Enumerator - Enumerator is the person who interacts very closely with the public and collects the PES data for all households within the enumeration areas assigned to her/him. Enumerators have been selected based on their experience in collecting data for the surveys. Mainly the best enumerators who have been working during the Agriculture Census process have been selected, taking into account also their knowledge about the area to be covered and the ethnicity of the community in that area. The selection criterion was the condition that the enumerator did not work in the same enumeration area during the Agriculture Census. Each enumerator was responsible for a specific enumeration area of PES. Quality and the work performance of enumerators have been closely monitored and checked during the entire process of PES. Each enumerator has been responsible for her/his enumeration area. In total 30 enumerators have been engaged.

Supervisor – was the person responsible to manage 3-4 PES enumerators. The supervisor has worked very closely with the enumerators during their work. The supervisor was responsible to support the enumerators, to carry out their work efficiently, help them in case of difficulties, and undertake certain controls ensuring that their work is correct, support the administration and support in terms of logistics.

He/she was the person who reported to the PES team. The role of supervisors was to facilitate the correction of inefficiencies and ensure the satisfactory progress during the Census period. In total 8 supervisors have been engaged.

Before starting the PES work in the field, the PES team within the KAS organized two-day training for supervisors and field enumerators. Communication with the field staff was maintained on a daily basis. Field work was monitored by the KAS methodology staff, which has provided additional explanations when needed.

PES was conducted during the period 1-15 December 2014.

Collected data refers to the following periods:

- Land use, one (1) agricultural year, from 31 October 2013 until 1 November 2014;
- Livestock, 1 November 2014;
- Labour force, one (1) agricultural year from 31 October 2013 until 1 November 2014;

For data collection the method of face-to-face interview has been used.

2.4. Data entry and editing

Data entry and data processing of the PES results have been carried out at the same time as the Census data entry. PES data have been entered manually by selected data entry operators using the data entry application that was prepared by the IT experts. The data entry application was developed according to specifications elaborated by the PES and methodology staff.

2.5. Application for PES data entry

Application for PES data entry has been developed in MS Access and VB (Visual Basic). The database used for this application is My SQL.

The application was designed to support Double Data Entry and verification of numerical data based on the total (Two-pass verification). In the second data entry the double Data Entry ensured the verification, of each data entered during the first data entry.

3. Quality dimensions and quality indicators of AC 2014

3.1. Relevance

Relevance in an attribute of statistics measuring the degree to which statistical information meets current and potential needs of the users. Relevance is measured by the availability of indicators needed by the users and to which extent the disseminated data and associated concepts and definitions match the needs of users.

Key data users

Key data users are the following:

- Government
- Ministry of Agriculture, Forestry and Rural Development (MAFRD),
- Research institutions and universities
- Municipal administrations

Communication with data users

Communication with data users was implemented by different channels:

- Press conferences
- Inclusion of key users in Census Commission
- Meetings of Census Commission
- Inclusion of member of MAFRD in the AC methodology working group
- Inclusion of MAFRD staff in Municipal Commissions

3.2. Share of missing statistics

All data requested by Regulation (EC) 1166/2008 were collected except the data related to the non-significant and non-existing phenomena in Kosovo.

In addition some data were collected for the national needs. Those data were: data on number of fruit trees/vines (total number and number of trees in productive age), detailed data on agriculture machinery and equipment by age and ownership, data on agricultural buildings other than animal housings and data on wood cutting and processing on the farm.

4. Accuracy of estimates

*The **accuracy** of statistical outputs in the general statistical sense is the degree of closeness of computations or estimates to the exact or true values that the statistics were intended to measure.*

4.1. Sampling errors

In the Agricultural Census for all variables the data were collected from all units in the frame, therefore sampling error is not relevant indicator.

4.2. Non-sampling errors

Non-sampling error is the error that arises as a result of factors other than the fact that the survey was implemented on the basis of the sample.

Non-sampling errors, which apply to all statistical processes, may be categorised as:

- coverage errors:
- non-response errors;
- measurement errors; and
- processing errors.

4.3. Non-response error

Non-response errors occur when the survey fails to get a response to one, or possibly all, of the questions.

4.4. Unit non-response rate

Unit non-response rate refers to the ratio of the number of units with no information or not usable information (non-response, etc.) to the total number of in-scope (eligible) units. The ratio can be weighted or un-weighted.

Table 1: Unit non-response rate (un-weighted)

Number of eligible units	134 009
Number of non-responses	3 716
Non-response rate (%)	2.8

Table 2: Unweighted and weighted unit non-response rate by region

Region Name	Unweighted Non-response rate (%)	Weighted Non-response rate (%)
Kosovo	**2.8**	**2.4**
Pristina	3.6	3.1
Mitrovica	2.3	1.9
Peja	1.8	1.3
Prizren	2.6	2.5
Ferizaj	1.7	1.4
Gjilan	4.6	4.3
Gjakova	2.0	1.9

As weights in the calculation of the weighted non-response rate, the data on utilized agriculture area collected in PHC 2011 were used. Weighted non-response rate calculated refers only to 34 municipalities which participated in the AC; non-participating 4 municipalities are not considered in the calculation.

4.5. Editing and imputation rate

Editing and imputation rate for a selected key variable is the rate of units for which the value of the variable was during the editing process changed, either with deterministic corrections either with imputation procedures. Weighted editing and imputation rate is calculated as ratio between the total of changed values to the total of all values.

Table 3: Editing and imputed rate for key AC variables

Key variable	Rate (%)
Arable land	5.36
Cereals for grain	0.25
Potatoes	0.48
Vineyard area	4.58
Orchard plantation area	30.88
Permanent meadows and pastures (without common land)	8.33
Cows (All cows)	0.02
Breeding sheep (female)	0.83
Breeding goats (female)	0.19

In the following table we present the impact that the editing and imputation procedures has on some of the key statistical results, estimated and disseminated in AC census. This indicator is calculated as the relative difference of key statistics, calculated before and after editing and

imputation process. The positive value of the indicators means that the value of the statistics increased after editing and imputation process and decreased in the case of negative values.

Table 4: Impact of editing and imputation procedures to the key AC statistics

Key statistics (totals of key variables)	Relative difference (%)
Arable land	0.23
Cereals for grain	-0.35
Potatoes	-0.76
Vineyard area	0.80
Orchard plantation area	2.94
Permanent meadows and pastures (without common land)	6.08
Cows (All cows)	1.21
Breeding sheep (female)	0.03
Breeding goats (female)	-4.97

4.6. Treatment of item non-response

For missing values different imputation methods were used; predominantly the hot deck, and average ratio methods. Imputations were implemented by custom made application, which used the so-called 'Meta data driven' approach.

4.7. Coverage error

Coverage errors are the errors that arise due to omissions or duplications of units in the census enumeration.

4.7.1. Frame over-coverage error

Over-coverage: *Units accessible via the frame which do not belong to the target population*

Over-coverage rate: *The rate of over-coverage is the proportion of units accessible via the frame that do not belong to the target population (are out-of-scope).*

Table 5: Frame over-coverage rate

Number of units in the frame:	210 910
Number of non-eligible units	76 901
Over-coverage rate (%)	36.5

The frame used for AC was based on Population and Housing Census 2011. During the pilot agriculture census in 2012 it was identified that not all households with agriculture activity are

included in the list from population census 2011. In order to have good coverage in the AC in rural areas all households were included in the frame. In addition enumerators were obliged to identify all new households in the field, even if they were not engaged in agriculture. During the AC many of the household listed appeared as not being involved in agriculture and they represent the frame over coverage.

4.7.2. Under-coverage and over-reporting error

Under-coverage refers to units not included in the frame, but which should be.

The Agriculture Census could not be conducted in four municipalities in northern Kosovo (Leposavic, Zvecan, Zubin Potok and Mitrovica North), because these municipalities refused to participate. The final results of the Agriculture Census include data for 34 municipalities.

In the part of Kosovo, where the AC was implemented, the coverage in respect to the key variables was estimated by using the following formula for under-coverage rate:

$$UCR = \frac{\sum_{i \epsilon U} w_i}{\sum_{j \epsilon P} w_j},$$

where w_i is the weight of the unit, U is the set of all the units that were surveyed (over threshold) in PES, but were not surveyed in Census (refusal under threshold, out-of-scope).

When comparing the PES and Census data, another phenomenon related to coverage problem was identified. We called this phenomenon over-reporting and it is estimated by using the following formula:

$$OVC = \frac{\sum_{i \in C} W_i}{\sum_{j \in P} W_j},$$

where w_i is the weight of the unit, C is the set of all the units that were surveyed (over threshold) in AC, but identified as 'under threshold units' in PES, and P is a set of linked units[1].

To estimate influence of both of the above mentioned errors, under-coverage and over-reporting, another indicator was estimated. The net coverage rate is estimated by using the following formula:

$$NC = \frac{\sum_{i \in E} W_i - \sum_{i \in C} W_i}{\sum_{j \in P} W_j},$$

where w_i is the weight of the unit, E is set of all linked units that are identified as over threshold in PES and found as under threshold in AC, C is the set of all the units that are identified as over threshold in AC and found as under threshold PES. P is a set of all linked units.

[1] Units that were on the individual level successfully linked from both sources

Table 6. Under-coverage rate, over-coverage rate and net coverage rate

Key variables	Under coverage (%)	Over reporting (%)	Net coverage (%)
Number of agriculture holdings	5.30	3.50	0.01
Utilized arable land-main area	4.73	2.79	-0.49
Area of wheat (grain)	4.53	2.44	-0.60
Area of maize (grain)	5.05	1.50	0.95
Area of potatoes	18.78	0.24	15.24
Area under vegetable	5.77	2.48	2.46
Vineyard area in plantations	0.46	6.82	-6.37
Fruits-area of plantations	16.81	10.80	3.98
Area of permanent meadows and pastures in use (without common land)	4.78	2.56	1.38
Total utilized agricultural area (without common land)	4.92	2.79	0.30
Cattle	2.75	0.61	1.69
Dairy cows	2.52	0.89	1.21
Breeding female sheep	0.00	0.00	0.00
Breading female goat	0.55	0.00	0.55
Total poultry	5.35	3.67	-1.34

The estimated under-coverage error indicates that the AC database is missing 5.3% of agricultural holdings in rural areas; the agricultural holdings exist, but were not identified as agricultural holdings in the census. This will have an impact in the future use of the AC database as sampling frame. However, the identified over-reporting error compensates the under-coverage error for the aggregates related to the key variables. 3.5% of the agricultural holdings in the AC database were identified in PES as not satisfying the criteria of agricultural holding and therefore should not be part of the AC database. We can conclude that its presence to a large extent compensates the identified under-coverage. Taking into account the under-coverage and over-reporting error, the difference in number of agricultural holdings and area of UAA is negligible (less than 0.5%).

4.8. Measurement errors

Measurement error can occur in different phases and for different reasons. They can be defined as the bias between the recorded value provided by the respondent (which might not be the actual value) and the true but unknown value of the given variable. The main sources of such errors are typically the questionnaire and the data collection process in general.

The most common reasons for measurement errors can be categorized in three main categories:

- *Deficiencies of survey instrument (in our case the questionnaire)*
- *Erroneous information (consciously or unconsciously) provided by respondent:*
- *Erroneous information due to the influence of the interviewer*

Measurement error was estimated on the set of PES and Census units that were successfully linked. Differences of recorded values of key variables in both sources were calculated, and the relative difference on the population level was calculated by taking into account the grossing-up weights. Measurement error was evaluated only for rural area since the PES sample was not representative for urban area. In case of large differences on individual level, the data were verified by call-back method. Since the relative difference was calculated on the basis of the random sample, the coefficient of variation was also estimated for each estimation.

Table 7. Measurement error for key variables

Key variables	(PES – AC)/PES (%)	CV (%)
Utilized arable land-main area	-1.14	5.1
Area of wheat (grain)	-1.09	6.2
Area of maize (grain)	1.05	9.9
Vineyard area in plantations	-9.05	10.7
Fruits-area of plantations	4.85	18.3
Area of permanent meadows and pastures in use (without common land)	6.40	5.4
Total utilized agricultural area (without common land)	1.70	3.9
Cattle	-1.73	2.03
Milking cows	0.21	1.64
Breeding female sheep	-1.22	14.89
Breading female goat	8.44	13.12
Total poultry	-2.30	3.77

Measurement error is presented only for the estimations for which coefficient of variation (CV) is less than 20 %.

4.8.1. Source of measurement errors

The potential sources of measurement errors were evaluated. From PES it can be concluded that the main source of error was the performance of enumerators. The reasons may be different. It is assumed that the training of enumerators and monitoring of enumerators might be the main problem. Despite the fact that training took five days, probably some information was missed or wrongly interpreted within the cascade system of training..

The source of the measurement error might be also due dominance of small subsistence farms, which do not produce for market and does not know exactly the data related to the land use and therefore they estimate the areas.

4.8.2. Treatment of measurement errors

Those measurement errors that were identified as inconsistencies during the data validation were corrected in the data editing process. Small amount of outlying values were verified by re-contacting the farmers by telephone and individually corrected, if needed. However, most of the errors were corrected by using systematic, automatic corrections. For identification and correction of the errors the custom made application, based on a 'Meta data driven' approach, was used.

4.8.3. Measures used to decrease the measurement errors

AC implementation included many activities with the aim to minimize the measurement errors. The main activities in this respect were:

- Testing of all census instruments in the pilot census 2 years before the AC took place.
- Training of field staff,
- Monitoring of field staff
- Training of data entry staff.
- Monitoring of data entry

5. Timelines and punctuality

5.1. Timelines

Timelines describe the length of time between data availability and the event or phenomenon they describe.

Table 8: Timelines of first results

Reference time:	1.11.2014
Date of publication:	28.2.2015
Time lag (months)	4 months

Table 9: Timelines of final results

Reference time:	1.11.2014
Date of publication:	26.11.2015
Time lag (months)	13 months

5.2. Punctuality

Punctuality is the time lag between the actual delivery of data and the target date on which they were scheduled for release as announced in an official release calendar, set forth under the Regulations or previously agreed among partners.

Table 10: Punctuality of final results

Reference time	01.11.2014
Forecasted date of publication:	30.09.2015
Date of publication.	26.11.2015
Time lag (days)	57 days

5.3. Reasons for delays and measures taken to reduce the delay

The time for data cleaning and analysis was limited by the project frame and was extremely short. In the analysis phase there were discovered problems which needed to be solved and for that additional time was needed.

6. Accessibility and clarity

Accessibility and clarity refer to the simplicity and ease, the conditions and modalities by which users can access, use and interpret statistics, with the appropriate supporting information and assistance.

6.1. Accessibility

Accessibility is an attribute of statistics describing the set of conditions and modalities by which users can obtain data. According to the European Statistics Code of Practice, the European statistics should be presented in a clear and understandable form, disseminated in a suitable and convenient manner, available and accessible on an impartial basis with supporting metadata and guidance.

Publication with main results was available on-line at the time of data dissemination. KAS publications, tables and material for press release are always available in three languages: Albanian, English and Serbian. The tables are also available in platform for dissemination of data online called ASKDATA. Users do not have direct access to micro-data, but by law researchers and institutions can request access through KAS.

6.2. Clarity

Clarity is an attribute of statistics describing the extent to which easily comprehensible metadata are available, where these metadata are necessary to give a full understanding of statistical data.

Clarity is sometimes referred to as "interpretability". It refers to the data information environment: whether data are accompanied by appropriate metadata, including information on their quality, and the extent to which additional assistance is provided to users by data providers. In the European Statistics Code of Practice, clarity is strictly associated to accessibility to form one single quality criteria: "accessibility and clarity": the conditions and modalities by which users can use and interpret data.

All definitions of the variables and indicators are available to the users in printed publication and in form of web publication. The methodological guidelines and questionnaire are available on the web. In addition, the key indicators of quality (non-response rate, under-coverage rate and measurement error) are presented in the publication where the main data are published as well as quality report is available to the users in printed version and on the web. KAS provide additional explanation on the request of the users. Ad hoc requests are handled by Agriculture Statistics Department of KAS.

7. Comparability

Comparability is a measurement of the impact of differences in applied statistical concepts, measurement tools and procedures where statistics are compared between geographical areas or over time.

7.1. Comparability over time

The last Agriculture Census conducted in 1960 is not comparable with the AC 2014 due to methodological differences, due to major changes happening during that period (war, independence in 2008), and due to differences in the geographical area covered. AC data are also not fully comparable with the annual sample survey on agricultural households (AHS), both; due to differences in the definitions and differences in geographical coverage.

7.2. Geographical comparability

While AC in 1960 and AHS are covering the whole territory of Kosovo, in the AC 2014 four municipalities are omitted. Despite all efforts, the four municipalities in the north (Leposavic, Zvecan, Zubin Potok and Mitrovica North), having mostly Serbian population, did not participate in the Census.

The methodology of Agriculture Census 2014 was in compliance with international standards; food and Agriculture Organization (FAO) and with EU legislation: Regulation (EC) 1166/2008 of the European Parliament and of the Council on farm structure surveys and the survey on agricultural production methods and repealing the Council Regulation (EEC) 571/88. The data are comparable with other countries of EU and those carrying out the AC on the bases of FAO recommendations.

8. Coherence

Coherence measures the adequacy of the statistics to be combined in different ways and for various uses.

8.1. Internal coherence

The extent to which statistics are consistent within a given data set.

Table 11: Difference between provisional and final data

Statistics	Change (%) in respect to first results
Number of agricultural holdings	1.2
UAA (without common land) (ha)	3.2
Cattle total	3.2
Goat total	-2.3
Sheep total	7.4
Poultry total	-0.1

Reasons for the differences between first results and final results:

- For production of the first results the data from Daily Reports were used.
- In the data editing stage also available administrative data were used in order to verify the coverage in particular the coverage of the legal units.
- The following administrative sources were used:
- Livestock register from Food and Veterinary Agency
- Vineyard register of MAFRD
- Data base on subsidies of MAFRD

Administrative sources were matched with the AC database and all units above the defined threshold were contacted in order to verify their existence in the AC database. All units which were identified as being not surveyed during filed work in November 2014 were interviewed by phone during September 2015.

8.2. Coherence with other sources

The extent to which statistics are reconcilable with those obtained through other data sources or statistical domains.

Table 12: Difference between final data of AC and Agricultural Household Survey (AHS)

Key variable	AHS	AC	Difference (in %) in respect to AHS	Difference in respect to AHS
Arable land (ha)	191 059	180 381	-5.9	-10 678
Cereals for grain (ha)	141 912	131 949	-7.6	-9 963
Potatoes (ha)	2 777	3 694	24.8	917
Vineyard area (ha)	1 647	3 215	48.8	1 568
Orchard area (ha)	3 720	4 390	15.3	670
Permanent meadows and pastures (without common land) (ha)	92 393	76 823	-20.3	-15 570
Cattle total	321 384	261 689	-22.8	-59 695
Cows (all cows)	178 557	136 209	-23.7	-42 348
Breeding sheep (female)	107 991	146 924	36.1	38 933
Breeding goats (female)	16 684	23 575	41.3	6 891

Data from the Agricultural Household Survey are not directly comparable with AC due to the following reasons:

- AHS sample was prepared from not updated frame
- AHS survey is sample survey
- AHS covers all Kosovo, while in AC 4 municipalities are missing
- Some definitions are different: for example in case of arable land in AHS also former arable land, which is used as permanent grassland is counted as arable land. In AC the EU harmonized definition is applied (see in the chapter definitions of key variables).
- AHS did not cover systematically agriculture legal units.

9. Cost and respondent burden

Cost and burden is the cost associated with the collection and production of a statistical product and burden on respondents.

Table 13: Costs

Total costs	4.9 milion EUR*
Census budget (Trust Fund)	4.7 milion EUR
Cost of KAS staff	260 713 EUR
Cost per agricultural holding	37.9 EUR per agricultural holding

* Included are all costs for agriculture and non-agriculture households included in the list and surveyed.

10. Confidentiality

Confidentiality is a property of data indicating the extent to which their unauthorized disclosure could be prejudicial or harmful to the interest of the source or other relevant parties.

During the implementation of AC, all rules in respect to confidentiality defined by the Law on Agriculture Census and Law on Official Statistical were complied with. All tables published were controlled in respect to disclosure and all data where the disclosure could take place due to small number of units or due to dominance of one unit were not published. Individual data are not available for the users.