

Collecting Agricultural Data from Population Census: Overview of FAO recommendations and experiences of Burkina Faso and other countries¹

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Abstract N.95:

The FAO World Programme for Census of Agriculture 2010 recommends a modular approach to census and survey planning with a core module based on a complete enumeration of limited set of key items followed by sample based complementary thematic surveys. In order to facilitate the implementation of this approach, the new Programme for Census of Agriculture recommends countries, whenever possible, to coordinate their population census with agriculture census. The WCA document highlights the technical and operational benefits of this strategy for agriculture census and provides guidelines on modalities for this coordination. This approach is in line with the Global Strategy to Improve Agricultural Statistics and the guidelines on population and housing censuses issued by the United Nations Statistics Division.

To assist countries in the process of linking population and agriculture census, FAO has undertaken a detailed review of country practices of collecting agricultural data in Population Census and proposed a set of standard questions that can be included in the Population Census. The results of this study are presented in the paper². The case of Burkina Faso, which included a comprehensive agricultural module into its population census to serve as a frame for upcoming agricultural census and at the same time to provide data on most of the core agricultural census items on a complete enumeration basis, is discussed in some details as an example. The lessons learnt with the implementation of this approach are highlighted.

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² The paper, a starting version of detailed practical guidelines to be published by FAO Statistics Division, builds upon the background work done by Mr Jack Colwell, Senior FAO Consultant [FAO/PARIS21,2007]. The authors also acknowledge the support provided by Ms Adriana Neciu and Mr Fabio Mozzilo to feed further research reported in this paper.

“While the population and housing censuses have a close relationship, their relationship with the agricultural census is less well defined. However, as the result of increasing integration within programmes of data collection, the relationship between the population and housing census and the agricultural census is now far closer than in the past, and countries are increasingly looking at new ways to strengthen this relationship.”

[UNSD 2008, Paragraph 1.44]

1. Introduction

The population census has a key role to play in an integrated national statistical programme (including agricultural statistics) both as a source of information on human capital and also as a instrument of providing frame for subsequent surveys in many sectors. For long it had been argued that since the enumeration units — the household for population and housing census and the agricultural holding for the agriculture census — are different, the two censuses cannot be combined/ linked very easily. However, it has also been observed in practice that a vast majority of agricultural holdings, particularly in developing countries, are managed by households or members of households, either singly or jointly. As an example, during the 1997 agricultural census in China, there were 193 million household holdings and only 358,000 non-household holdings. For many countries across the world this reality provides considerable scope and opportunity to carry out the preliminary work for an agriculture census during their population census. This approach facilitates integration of agricultural statistics with the statistics on population e.g. demography, education, migration, living standards, occupation, thereby increasing the scope of analysis for policy making.

The *World Programme for the Census of Agriculture 2010 (WCA2010)* [FAO, 2005] strongly recommends countries to consider the option of coordination of Agriculture census with the population census at early stage of census planning. The document provides technical and operational guidelines on modalities for this coordination for development of an efficient agriculture census strategy. These guidelines are based on a detailed review of country practices on collecting agricultural data in the population census, and have been developed in close cooperation with United Nations Statistics Division (UNSD). These are also reflected in *Principles and Recommendations for Population and Housing Censuses, Revision 2* [UNSD, 2008]. WCA 2010 discusses the relationship between the two censuses in detail. It should be clarified that the linkage at operational level is more suitable for countries where both the censuses are carried out as a household enquiry. In countries where agricultural census is based on other approaches e.g. as an aerial frame survey or based on administrative records, linking of population data with agriculture data even after the censuses may be a suitable option.

The approach of integrated planning of population and agriculture census is consistent with the *Global Strategy to Improve Agricultural and Rural Statistics* [UNESCSC, 2010]. One of the three pillars of the Strategy is integration of agriculture statistics into the national statistical system. At the operational level this integration is to be achieved through: (1) strategic vision for the integrated survey framework (2) strategy to develop a master sample frame for agriculture (3) an integrated data management system. Coordinated population and agriculture data collection is recommended as one of the key elements for developing a master sample frame for agriculture.

2. Modalities of Coordination

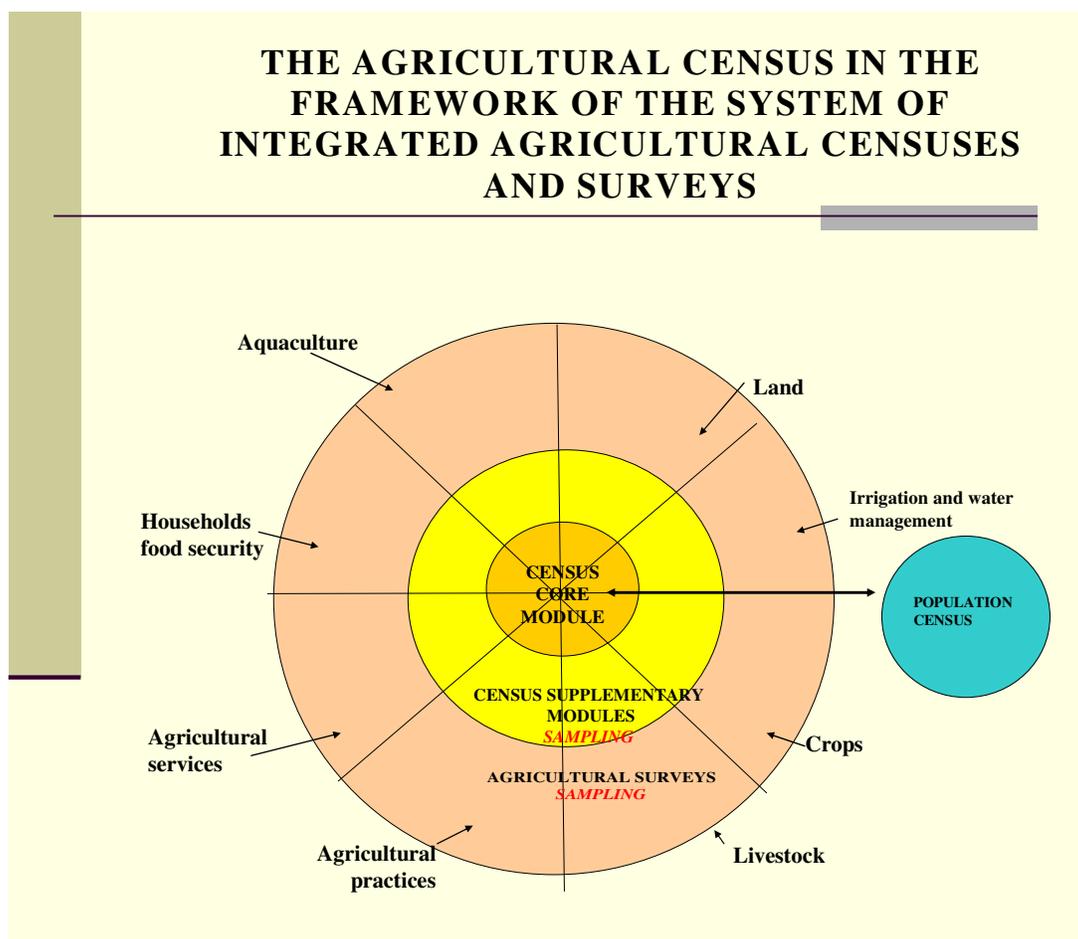
In countries where there is one-to-one correspondence between households and agricultural holdings, at least in a vast majority of cases, because most agricultural production activities are in the household sector, the coordination between the two census activities can save costs and

effort needed for an agricultural census. While the holding in the non-household sector will need to be covered through some other survey e.g. enterprise survey, the operations relating to agricultural holdings operated by households can be easily identified through the population census.

The coordination between agriculture and population census can take several forms:

- ✓ use of common concepts, definitions and classifications;
- ✓ sharing field materials e.g. boundaries/definitions of enumeration areas;
- ✓ using the population census to provide a frame for household component of the agriculture census;
- ✓ making use of agriculture-related data from the population census for preparing a sampling design for agriculture census;
- ✓ collecting additional agriculture-related data in the population census;
- ✓ linking data from the two censuses;
- ✓ conducting the two censuses as a joint field operation.

This coordination between population census and agriculture census is fully consistent with the modular approach to agriculture census and survey planning being advocated by FAO WCA 2010. The approach allows countries to collect data on some items recommended for the core agriculture census on a complete enumeration basis during the population census. The figure below, illustrate this approach:



3. Country Practices

During the WCA 2000 round which related to 1996-2005, about 25 countries have used the approach of designing their agriculture census based on agriculture related information in the population census. The extent of use of population census for collection of agriculture related information, however, varies widely across countries. At the minimum level countries have used the listing operation for population census to identify the agricultural holdings in the household sector. The other extreme is to collect data in a separate agriculture module, which contains all the core items of an agriculture census and could be considered as a mini agriculture census, during the population census. During the WCA 2010 round (2006-2015) so far 6 countries are reported to have used the approach of linking the two operations as recommended in FAO guidelines, while many other are seriously considering making this approach an integral part of their data collection strategy. The examples of agriculture related questions asked in the population censuses of selected countries for the two rounds of WCA are given in the Annex. The modalities of coordination of the two censuses are discussed below in some details.

Use of common concepts and definition

The use of common statistical standards in the agricultural and population censuses ensures that data from the two sources are consistent and comparable, making it easier to analyse and interpret data on structure of agriculture in relation to demographic data. Previous agriculture census programmes have also given emphasis to ensuring that concepts, definitions and classifications used in the agriculture census conform to international standards and, where applicable, with those used in the population census. The WCA 2010 programme recommends countries to give special attention to this aspect in planning their agriculture census.

Sharing field materials

The simplest form of coordination between the two statistical operations is to use the cartographic material prepared during the population census for conducting the agriculture census. If an agriculture census is conducted soon after the population census, the listing and boundaries of administrative units and enumeration areas prepared for field work of population census could be used for agriculture census also, perhaps with little updating. Such an approach saves cost and effort required for the agriculture census. Even in countries where the two censuses are carried out as completely independent exercises, using completely different frames, the use of common codes for administrative units for reporting data helps juxtaposition of results from the two censuses to facilitate better analysis. For example, Indian agricultural census is based on records of land rights but uses the administrative codes of population census. This permits merging of aggregate data from the two sources at village level which is the lowest administrative unit. In the framework of Geographical Information Systems, this facility could yield many interesting types of analysis, particularly when combined with community level data. Also some field equipment and data processing equipment from the population census can be used for the agriculture census when this operation is organised not far from the population census.

A frame for agriculture census and survey programme

Identification of agricultural holdings managed by households as part of the pre-census listing exercise or as part of the enumeration exercise of population census saves considerable workload for field work during the census.

For the purpose of identification of agricultural holdings, FAO recommends to include atleast the following questions in the population census:

A1. *Whether the household is engaged in any form of own-account agricultural production?*

A2. *Area of land used for agricultural purposes?*

Countries which have used this approach include Albania, Belize, Botswana, Cyprus, Dominican Republic, Fiji, Kiribati, Mauritius, Nauru, Nepal, Occupied Palestinian Territory, Papua and New Guinea, Niue, Poland, Seychelles, Sierra Leone, Tokelau, Tuvalu, Vanuatu and Zambia.

The exact questions asked by countries in their population census would basically depend upon the structure of agriculture in the country and the nature of their agriculture survey programme. Nonetheless, a few standard agriculture related questions are commonly asked in the population census for identification of agriculture holdings or for creation of frames for sample surveys. These are given in Box 1 below.

Box 1: Common questions asked in population censuses for building frames for agriculture census and surveys

Q1. Type of economic activity (identification of holdings):

Was your household (or any member of the household) engaged in any of the following production activities during the reference period for own account: Crops/Livestock/Aquaculture/Forestry [simply tick boxes: Yes/No]

Q2. Is household engaged in growing any of the of specified crop(s)?

Wheat/ Rice/ Maize etc.(list of important crops) [simply tick boxes: Yes/No]

Q3. Scale of activity:

Land area/ numbers of livestock/ aquaculture area/ value of production/ volume of sales (equivalent to or above the threshold limits established for the agricultural census/survey).

Q4. Main purpose of production: Subsistence/ Commercial

Q5. Primary/ secondary source of maintenance of household

(Sector of employment of principal income earner)

It is not necessary that all the above questions are included in the population censuses of all countries. The type of question will actually depend upon the scope of agriculture census and follow-up survey programme, for which sampling frames will be required.

Before deciding to add extra questions in the population census for the agriculture census, consideration should be given to the availability of agriculture related data in a standard population census questionnaire. Three such items, which are usually collected in the population census for each economically active person, are of special interest for planners of agriculture census:

- Main occupation. This item can be used to identify persons working in an agricultural occupation (own account or as employee)
- Main industry. Industry is the activity of the establishment in which the person

works in his/her main job. This item can be used to provide tabulations of persons working in the agricultural industry (own account or employee)

- Status in employment. This item refers to whether the person is working as an own-account worker, family worker or employee.

If the tabulations indicate that any of the households member is “*in agricultural occupation, works in agriculture sector and is an own account worker*” it indicates a strong possibility of existence of an agricultural holding in the household. Depending upon the national definition of agricultural holding adopted for agriculture census, one or two additional questions presented in Box 1 will help complete identification of holdings.

One weakness in obtaining data on agriculture related employment from the population census is that they are normally collected in respect of a person’s main activity during a short reference period, such as a month. This may not identify all persons working in agriculture, because of the seasonality of agricultural activities. Nevertheless, data on occupation combined with status in employment from the population census could be used to help establish a tentative frame for the agriculture census, in case more direct questions are not included in the population census. More definitive test of existence of holding will be through additional information from the minimum questions recommended by FAO or questions given in Box 1.

If sufficient frame type/register type information and agriculture census core module data are collected in the population census, then the detailed agriculture census could be carried out as sample survey or a series of sample survey modules focussing on specific issues, e.g crops, livestock, and aquaculture. This approach results in substantial savings in time and resources.

Improved sampling design for agriculture census and surveys

Some countries have found it convenient to go beyond the level of identification of agriculture holdings to collect more detailed information from population census (e.g. size of land being operated by the holding, number of each species of livestock, or area under specific crop of national importance) in a small agriculture section or module of the population census questionnaire. This approach was used in the National Sample Census of Agriculture 2000 of Nepal for identification of holdings based on size of the land operated. Detailed data on livestock numbers is proposed to be collected in the 2010 population census with a view to preparing an improved sampling design for better coverage of livestock characteristics in the 2010 National Sample Census of Agriculture. The choice of type of design (cluster/ stratified) will become possible on the basis of study of spatial distribution of population of various livestock species, as well as bi-variate distribution of land and livestock. Agricultural holdings can also be stratified by different scales of operation or different type of agricultural activities on the holding. Besides improving the reliability of livestock statistics from the sample agriculture census, this approach will also contribute to planning of livestock production surveys or crop yield surveys

Linking data from population and agriculture census

A major benefit of coordinating the agriculture and population censuses is that it opens up the possibility of linking unit level data from the two surveys. Linking unit level data means that a particular household in the population census is matched to an agricultural holding in the agricultural census, so that data from the population census can be used in the agriculture census tabulation and analysis. For example, size of holding could be tabulated against household composition, income, or other data from the population census. Linking data in this way adds considerable analytical value to data sets from both censuses.

The facility to link data from the two censuses can also avoid duplication in data collection efforts. There may not be any need to collect demographic and employment data again in agriculture census because these could always be obtained through linking of population census data. The items which could be obtained from population census for merging with the agriculture census include:

- Sex of agricultural holder
- Age of agricultural holder
- Household size
- National/ethnic group of household head or agricultural holder
- Sex of each household member
- Age of each household member
- Relationship to household head for each household member
- Marital status of each household member
- Educational attainment of each household member
- Activity status of each household member
- Status in employment for each economically active household member
- Occupation of main job for each economically active household member

Linking unit level data is a complex statistical process. It becomes especially difficult when the two statistical activities are quite distanced from each other in time. Some households and holdings may disappear over a period of time and new ones may be created. The possibility of more than one holding in a household or many households managing a single holding also complicates the linking of data. This issue requires more research to assess the magnitude of the problem and documentation of good practices.

Collecting additional agriculture-related data in the population census

Some countries may decide to use the population census to collect as much agriculture related data as possible.

FAO recommendations of additional agriculture data is based on data items included in the core module of the agriculture census. Where appropriate the supplementary module to be added to a population census could be anything from a few questions to a small-scale agricultural census. The questions may be related to the following items:

- S-A1. Identification of agricultural holders.*
- S-A2. Main purpose of production.*
- S-A3. Area of agricultural land according to land use types.*
- S-A4. Land tenure types.*
- S-A5. Presence of irrigation.*
- S-A6. Types of temporary crops grown.*
- S-A7. Types of permanent crops and whether in compact plantations.*
- S-A8. Number of animals for each livestock type.*
- S-A9. Presence of aquaculture.*
- S-A10. Presence of forest and other wooded land.*

The island countries in the Pacific viz. Cook Islands, Fiji, Kiribati, Tuvalu, Niue and Vanuatu have used this approach for counting the livestock of different species. Population censuses of Barbados (2010) and Burkina Faso (2007) have included detailed modules on agriculture in the population census. The case of Burkina Faso is discussed in details in following section.

The most detailed module on agriculture was implemented by Federal Republic of Yugoslavia in their 2001 Population Census. The pilot of Serbian Population Census carried out in 2009 followed the same approach of including a detailed module on agriculture. Montenegro is

reported to have carried out their agriculture censuses in 2009 as an independent as a complete enumeration exercise. This approach was adopted to have an in-depth coverage of different aspects of agriculture. This approach was also chosen because the population censuses of Montenegro is scheduled to be carried out in April 2011 which will be after the recommended reference year (2010) for agriculture census in European countries. It is to be noted that in these countries cost of field operation may not be a major issue due to their sizes and well established infrastructure (statistical, administrative and communication).

Conducting the two censuses as a joint field operation

Some countries collect the data for the population and agriculture censuses as a joint field operation. Normally, each census retains its separate identity and uses its own questionnaire, but field operations are synchronized so that the two data collections can be done at the same time by the same enumerators. Occasionally, the two censuses are merged into a single data collection exercise, but maintaining the separate identity of each one.

A common approach to the field work for a joint population/agriculture census is for the enumerator to:

- Interview each household to collect data for the population census, using the population census questionnaire.
- Ask the household a question (or questions) to determine if it is engaged in own-account agricultural production activities.
- If it is engaged in own-account agricultural production, collect data for the agricultural census at the same time as, or soon after, the population census, using the agriculture census questionnaire.

Synchronizing the two census field operations in this way has several benefits:

- By doing the data collection for both censuses in a single field visit, the cost of data collection is reduced.
- It facilitates the use of the population census as a frame for the agriculture census, as it eliminates the problem of the population census household lists being out-of-date.
- It provides an immediate link between population and agriculture census household-level data.
- Doing the data collection together makes it easy to apply standard concepts and definitions in the two censuses.
- There may be organizational benefits in having one enumeration team responsible for data collection in both censuses. Field training would be easier and a higher standard of enumeration work could be expected.

Statistics Canada conducts both agricultural and population censuses every five years as a joint field operation. Each census is carried out as a separate statistical activity but the two data collection operations are done at the same time using the same field staff. The most recent censuses were carried out in May 2006.

The 2006 censuses were conducted by self-enumeration. In urban areas, population census questionnaires were mailed to all households. In rural areas, a census enumerator visited each household to deliver the census forms. Each household received a population census questionnaire: 80% received a short form containing eight basic demographic items, and 20% received a long form containing more detailed data. As well, the enumerator asked the household the question:

Is anyone in the household a farm operator?

If the answer was “Yes”, an agricultural census questionnaire was left with the household. An agricultural census questionnaire was also left with any household that appeared to be a farm household but could not be interviewed. The population census questionnaire also included a similar question to identify any other farm household that did not receive an agricultural census questionnaire, such as in urban areas. Completed questionnaires for both censuses were mailed back to Statistics Canada or submitted via the Internet.

There may also be some problems in taking this approach. Countries usually face administrative problems in synchronizing the two census field operations, and special coordination arrangements need to be put in place to successfully carry out the joint operation. This is especially so if different government agencies are responsible for the two censuses. Another problem is that the population and agriculture censuses may need to be conducted at different times because of administrative or operational considerations. Care is also needed in designing field systems to ensure that bringing the two census field operations together does not affect data quality for either census.

Another problem in synchronizing the two censuses is that agricultural holdings in the non-household sector are not covered in the population census. These may need to be enumerated separately. However, sometimes the non-household sector is included in a combined census operation, as follows:

- Enumerators visit each Enumeration Area (EA) to interview each household to collect population census data and, where applicable, agriculture census data.
- While in the EA, enumerators identify each agricultural holding in the non-household sector, using information from local sources. Enumerators then enumerate each non-household unit for the agriculture census.

4. Case of Burkina Faso

The National Agricultural Statistics System

In Burkina Faso, the agricultural and food information system is structured around the Directorate-General of the Forecast and Rural Economy (DGPER) of the Ministry for Agriculture, Hydraulics and Halieutics Resources (MAHRH). The DGPER has the responsibility of monitoring food security indicators. The DGPER centralizes the agricultural statistics coming from the decentralized structures of the agriculture department and other structures and prepares a data base. It has the responsibility of conducting annual agricultural surveys and General Censuses of Agriculture (GCA). For the livestock statistics, the Directorate-General of the Forecasts and Statistics of Livestock (DGPSE) of the Ministry for Animal Resources play a similar role. The Directorate-General of the Halieutics Resources (DGRH) is responsible for fishery statistics. Other structures contribute to the production of agricultural data.

The institutional framework of statistical coordination is governed by a statistical law and the organization in charge of coordination of National Statistical System (NSS) is the National Council of Statistics (NCS). The Commission of “rural sector and environment statistics“, which is chaired by the DGPER, ensures the coordination of the National Agricultural Statistics System (NASS). It is charged amongst other things to deliver its opinion on the requests for preliminary authorization for the surveys concerned with the sector of agriculture.

The surveys and other statistical activities of the public institutions in charge of statistics production are scheduled in a National Strategy for the Development of Statistics (NSDS).

The current NSDS covers the period 2010-2015 and succeeds a first which covered the period 2004-2009.

The GCA and the RGPH were included in the NSDS 2005-2009 and became official statistical operations endorsed politically by the Government. Then, it was easy to start advocacy toward technical and financial partners for the financing and the implementation of the two important operations. The realization of the two operations simultaneously was decided under the initiative of the decision makers.

Each year, an annual program is established by the NCS and covers all the statistical activities. The programme for year 2010 covers the activities of analysis and publication of the General Census of Agriculture (GCA).

Justification for an agricultural module of the General Population and Housing Census (Recensement General de la Population et de l'Habitat-RGPH)

The first census of agriculture, called National Survey of Agricultural Statistics (ENSA) carried out in 1994, was focused on the rainfed crops. A second National Livestock Census (ENEC) was carried out in 2002 and provided current data on livestock. Burkina Faso carried out its second GCA in 2007.

The general objective of the second GCA 2007/2008 was to obtain more detailed and up-to-date and complete data on the entire primary sector, as compared to the data of 1994.

The specific objectives of the CGA 2007/2008 were:

- a better knowledge of the major changes that happened in the agricultural sector during the last decade in particular with regard to the balance between food crops and commercial crop, the changes in technical and economic orientations of the agricultural holdings;
- a better knowledge of the irrigated crops, which experienced a significant development parallel to that of the infrastructures and characterized by a strong specialization of the irrigated crops basins and a significant development of marketing networks;
- a better knowledge of the fishery sector.

The plan of integrated agricultural census and surveys

In order to fully meet the above objectives the GCA, was designed in two phases. The first phase was dedicated to collect data needed for developing an adequate sampling frames and the second phase was for the conduct of specific surveys on thematic modules using the sampling frames of the first phase. For each topic (rain-fed crops, arboriculture, horticulture, irrigated crops, fishery, livestock), a suitable statistical unit was defined. Taking into account the difference of the statistical units (agricultural household, owner of irrigated parcels, fishing), phase 2 was divided in modules according to various themes.

The modules of phase 2 were:

- basic module: survey on rain-fed crop, livestock and arboriculture ;
- irrigated crops module: survey on irrigated crops (rice growing, vegetables farming, other irrigated crops);
- fishery module: survey on fisheries;

- modern agricultural holding module: an exhaustive survey on modern agricultural holdings.

For the basic module, the statistical unit was the agricultural household. For the irrigated crops, the statistical unit was the irrigated parcel holder which is identified on the sites of production. It is the same for the survey on fishery the statistical unit was the fisherman identified on the sites of fishing.

The objective of phase 1 was to collect basic data on agricultural holdings to produce, on the one hand, data necessary to characterize agriculture, livestock and many other activities as fishery, forestry and, on the other hand, to obtain sampling frames necessary to conduct the modular surveys of the second phase and other specific surveys.

This phase 1 included two modules:

- The module 1 related to the complete enumeration of the agricultural households. The data was collected as part of the RGPH using a questionnaire "agricultural module" attached to RGPH questionnaire which was filled within each household of the country during the RGPH in December 2006.
- The module 2 related to the inventory of the agricultural holders on the sites of production of irrigated crops (rice growing, vegetables farming, other irrigated crops), on the sites of fishery and the modern agricultural holdings. These operations have been conducted after the RGPH during March 20 to May 30 2007 on all the territory.

The sampling frame of the agricultural households obtained through the RGPH covered all agricultural households of Burkina Faso. The definition of the agricultural household adopted in the framework of the RGPH was the household (according to the definition of the RGPH), in which at least one member declared to be carrying out agricultural activities (rainfed crop, irrigated crops, horticultural, arboriculture, forestry, livestock, fishing) during the agriculture year 2006/2007. This agricultural module also integrated variables which are used to establish the universe of agricultural households, but also to classify them according to the main technical and economic orientations to which these households are attached (type of crop, livestock, horticulture, level of equipment, membership of agricultural organization, etc.).

In the same way the complete inventories of the sites (rice, vegetable, other irrigated crops, fishery, pastorals zones) allowed to collect necessary information on the sites in particular on their importance (area, number of owners) as well as the agronomic, environmental and socio-economic variables useful to carry out a good stratification and to define effective sample designs for the estimates relating to these crops.

The synchronization of phase 1 of the GCA and the RGPH aimed to:

- collect data for the two censuses by a single team during single displacements, allowing to reduce the cost of the two censuses by the mutualisation of the means (human resources, training, equipment, sensitization);
- use concepts and definitions harmonized for the two censuses;
- facilitate the use of the data file of the RGPH to draw up the list of the agricultural holdings for the use of the GCA;
- facilitate more detailed analysis using data on the households of the RGPH and the GCA. The data on the demographic characteristics and economic activity of the households which are necessary for the GCA can be drawn directly from the

RGPH. One thus avoids duplicating the collection of these variables in the GCA and realizing savings;

- use agricultural data of the households collected from the GCA for the analysis of the RGPH;
- better characterize agriculture fields for which surveys are not appropriate to take into account their marginal character.

Use of data from the agricultural module of the RGPH and statistics produced

The objective of the phase 1 was to collect basic information on the agricultural holding to produce, on the one hand, data necessary to characterize agriculture, livestock and many other activities as fishery, forestry and, on the other hand, to constitute sample frames necessary to conduct modular and specific agricultural surveys during the second phase reached its results.

The data obtained from the agricultural module of phase 1 was used to develop sampling frames for the "basic module" survey in phase 2. This module covered the rain-fed crops, livestock and arboriculture. In the same way, the data on variables from phase 1 allowed for stratification of agricultural households and primary sampling units.

The "basic module" survey covered the 45 provinces of Burkina Faso. The sample design adopted was two stages sampling with the selection of primary sampling units (villages) in first stage with Probabilities Proportional to Size (PPS). The measure of size of villages was the number of agricultural households. For the second stage, a sample of agricultural households was selected with equal probability.

For each province, the sampling frame of the primary units was prepared using the variables collected in the agricultural module of the RGPH. The agricultural household was redefined to take into account the limitation of the field of the survey to the agricultural households involved in rain-fed crops, livestock and arboriculture. This allowed:

- calculation of size of the villages like primary units of the survey in terms of number of agricultural households, as size measure for PPS selection;
- calculation of the size of the provinces in term of number of agricultural households; information was used for the calculation of the optimal samples sizes of the agricultural households by province;
- information on characteristics of the agricultural households (size, number of fruit trees, animals owning, agricultural equipment owning) which was used for the classification of the agricultural households using a discriminating function established with data from previous surveys.

The data provided by the agricultural module of the population census thus made it possible to develop a complete sampling frame of the villages and agricultural households of Burkina Faso and provided the necessary elements for the definition of an effective sampling design for the basic module survey.

In addition to availability of the sampling frame for the basic module, phase 1 made available a detailed cartography of crops grown and livestock systems and for the first time in Burkina Faso basic statistics on arboriculture and fishery. The statistics on the agricultural households are available for the fifth level of the administrative division of the country, i.e. the village. This information is useful for decision-making for all the development actors, in particular at local level.

Which basic types of survey can be developed using the agricultural module?

The implementation of the agricultural module of the RGPH made it possible to prepare a database of all the agricultural households covered by the RGPH and listing of all Enumeration Areas (EA) through a complete enumeration of entire territory, without overlap or double counting. Information relating to the agricultural activities of the members of the households, which the database contains, makes it possible to measure the existence and the intensity of all the types of agricultural activities within each EA (rain-fed crop, irrigated culture, horticulture crops, arboriculture products, livestock, fishery, silviculture). In the same way the importance various types of crops in each EA, measured by the number of households growing the crop, is available.

In practice, with this information, specific sampling frames for agricultural surveys can be developed. Specific sampling frames could be prepared surveys on specific crop or specific animal species by incorporating for each EA the number of households involved in this type of crops or this type of livestock. The advantages of these sampling frames include:

- they will not contain the EAs which are not concerned with the field of the survey because automatically eliminated from sampling frame (urban EA for example);
- they give information on the size of the EA in term of number of households concerned with the crop or the livestock ;
- they allow effective sampling design (stratification of the EA, selection with probabilities proportional to size, etc).

This sampling frame is suitable also for surveys on rare or dispersed agricultural activities (like the survey on production of honey); it is possible to identify the zones concerned with this activity and limiting the geographical field of the survey to this zone. In fact, it is possible to widen the field of the agricultural surveys in the urban environment by taking into account the urban EA really concerned.

For some activities like livestock and arboriculture, additional information concerning the number of heads of animal species or the number of plants per type of fruit tree reinforces the effectiveness of the sampling frame for the surveys in these fields. For the survey on productivity of the herd, the determination of the sample size by domain of study in proportion to the total number of heads is sometimes required, and this information is available in the sampling frame. Auxiliary information like the level of equipment (plough, tractor, etc), the number of agricultural workers allows other improvements of sample designs.

Information contained in the sampling frame of EAs and its structure is necessary for the design of inter-censal agricultural surveys. Each EA is in only one commune which belongs to only one province. The province belongs to only one region. Moreover, each EA belongs to only one zone (urban or rural).

This structure of EA sampling frame provides information necessary for the design of a master sampling frame for several agricultural surveys. The advantages of master sampling frame include:

- sharing the cost the implementation and updating of master sampling frame for all relevant the agricultural surveys;
- use of the same cartographic documents in limited number for several surveys;
- possibility of stabilizing the field teams in the same zones for several surveys facilitating work of sensitizing and reducing the costs of transportation;

- possibility to integrate various surveys by ensuring the common level of significance of the estimates resulting from this surveys and the analysis of topics based on the common samples to several surveys having used the master sampling frame.

The principal disadvantage for the master sampling frame is the difficulty to design an effective sample for all the surveys covering different themes (vegetable production, livestock and fruit production, etc.).

Follow-up survey programme based on the frame

The surveys program based on sampling frames of GCA and RGPH include:

- permanent agricultural survey;
- permanent surveys on irrigated crops;
- survey on fishery;
- market information system.

The Permanent Agricultural Survey (PAS) will be a survey on economic situation and living condition of the rural populations, with is a module regarding horticulture production, fruit production, the vulnerability of the households, the nutritional state of the populations and gender.

Surveys on livestock, fishery and other sets of specific themes regarding agricultural incomes, environment, gender and food security issues could be programmed.

Lessons learned at methodological and operational level

The agricultural module of the RGPH was implemented in an adequate way with some difficulties.

Operational lessons

The two operations were led by two distinct institutions and successful coordination mechanisms were established. The good practices of this coordination were at three levels.

1. Design of the agricultural module of the RGPH, organization and supervision

The Statistical Services of the Ministry of Agriculture (MA) have designed the technical documents of agricultural module and trained the census enumerators to fill it. They took part in the design of the community questionnaire on the socio-economic potentialities of the villages which was implemented during cartography operation of RGPH.

Moreover, MA contributed to RGPH supervision team with 352 agents used as communal delegates of the RGPH and 4 staffs integrated in the national supervision team. This arrangement allowed the best follow-up of agricultural module during data collection.

MA did not take part in the cartographic work. This participation would have allowed MA staff to acquire experience in the identification of limits of EA, useful for the future agricultural surveys.

2. Centralization of the questionnaires

The centralization of the agricultural module in the RGPH was a successfully organised. The questionnaire of the agricultural module was planned to be detached from the census questionnaire and sent to the agricultural statistical units of the Ministry of Agriculture. The team of the Central Office of the Census of Agriculture (BCRA) was responsible for the final checking and the transfer of the questionnaires at the central level for data processing. Each field controller had a batch of envelopes on which the identification codes of the Region, Provinces, Village, EA, and Number of batch of questionnaire of the enumerator were pre-printed. When the field controller finished checking a batch of questionnaires, he detached the agricultural module and put it in the envelope exclusively reserved for it. This avoided the loss of the agricultural module filled for each household of the RGPH.

3. Identification of agricultural households during the second phase of GCA

In order to facilitate the enumeration operation of the agricultural households after the selection of the sample of villages for phase 2 of the GCA, a card containing the identification particulars of the households (region, province, commune, village, EA, name and RGPH code of household) was prepared. At the end of the interview with each household, the enumerator gave this identification card to the head of the household for carefully preserving as an identity for future reference. The card was also used by the supervisors and the field controllers of the RGPH for checking the visit of the enumerator to the households. About 2.700.000 cards were printed and given to the enumerators.

Methodological lessons

Several technical difficulties appeared and have been solved:

1. Recognition of the EA

The difficulties are inherent to this type of operation in particular the problem of the poor delimitation of EA; a part of village taken as a whole village, etc

2. Identification of the agricultural household in list of demographic households

For the GCA, the definition of agricultural household adopted was as follows: "any household which declared during the RGPH 2006 as having engaged in at least one of the following activities: temporary crops (rain-fed crops, horticulture), livestock or arboriculture". On the other hand, for the RGPH, another operational definition of the household was adopted: "a demographic household consists of a couple with their unmarried children living in the same home". The questionnaire is filled for each demographic household. An agricultural holding can be operated by several demographic households, if they operate agricultural parcels jointly.

It was necessary to provide in the questionnaire a number corresponding to the code of the demographic household which coordinates the agricultural activity for all demographic households making-up a holding. In order to prepare the list of the agricultural households, the demographic households were grouped to form one "agricultural household" using this subsidiary code added in the questionnaire. The head of the demographic household ensuring the coordination of the agricultural activities of the group in the same home is the head of the agricultural household.

3. Filling of the agricultural module of RGPH.

The following difficulties were encountered:

- the average time of interview of the two census (GCA and RGPH) relatively long and was difficult to support by surveyed households;
- the level of understanding of the agricultural module by the surveyed households was sometimes a challenge;
- some enumerators forgot to deposit the visit card with households;
- the level of detail on the crop and products of agricultural module posed a problem of recognition by the enumerator and their translation in local languages was a challenge. Taking into account the diversity of the languages, a picture handbook would have avoided the confusion of the crops by surveyed households.

5. Concluding remarks

This review paper confirms that the coordination of Population and Agriculture data collection recommended in the Global Strategy to Improve Agriculture and Rural Statistics, in particular collecting agricultural data from Population Census recommended by FAO World Programme for Census of Agriculture 2010 is a very cost-effective way of integrating agriculture into the national statistics system. This approach is being relied by a growing number of countries where household based agriculture is the main feature of the sector.

The construction of effective master sample frame for agriculture can be facilitated by adequately planning and coordinating population and agriculture census as an integrated census programme

In order to assist countries in the process of linking population and agriculture census, FAO has undertaken a study of country practices and is developing a handbook with guidelines and a set of standard questions that can be considered for inclusion in the Population Census. The model questionnaire, developed by FAO jointly with PARIS 21, on additional agriculture related data items to be included in the population census, can be accessed on the website of WCA. This questionnaire would need to be adapted to specific country situation keeping in view the national strategy on data collection.

The example of Burkina Faso and other countries illustrates the benefits and challenges of implementing the integrated approach.

In order to optimise the efficiency of the national statistics programme, the population and housing census and the agriculture census should be planned at the same time. The Governments and donors may find it easier to fund an integrated survey plan than two separate plans.

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WCA 2000 Round (1996-2005)
Country (Census year): Respondent
Albania (2001): Household
Q1. Do you own agricultural land? (Yes/No)
Q2. If yes, who is the land cultivated by? (1) <i>Yourself</i> (2) <i>Others</i> (3) <i>Not cultivated</i>
Q3. Where is that land situated? (1) <i>District</i> (2) <i>Com/Municipality</i>
Bangladesh (2001): Household
Q1. What is the household's main field of economic activity? (1) <i>Agriculture/forestry/animal husbandry</i> (2) <i>Fishing</i> (3) <i>Agricultural labour</i>
Q2. Owned land? (1) <i>Has</i> (2) <i>Has not</i>
Belize (2000): Person
Q1. Do you own any land for farming? (Yes/No)
Botswana (2001): Household
Q1. Does any member of this household own any of the following livestock? (1) <i>Cattle</i> (2) <i>Goats</i> (3) <i>Sheep</i> (4) <i>Pigs</i> (5) <i>Poultry</i> (6) <i>Donkeys/horse</i>
Q2. Does any member of this household plant any of the following crops during the agricultural season? (1) <i>Maize</i> (2) <i>Millet</i> (3) <i>Sorghum</i> (4) <i>Beans</i> (5) <i>Other crops</i>
Q3. Does this household own the land used for planting and/or grazing? (Yes/No)
Q4. How was the land used for planting and/or grazing acquired?
Q5. Since 1999, did household members receive cash from sale of? (1) <i>Cattle</i> (2) <i>Goats/sheep</i> (3) <i>Poultry</i> (4) <i>Maize</i> (5) <i>Sorghum/millet</i>
Cook Island (2001): Household/ Person
Q1. What agricultural activity is the household engaged in? (1) <i>Mainly subsistence</i> (2) <i>Mainly commercial</i> (3) <i>No agricultural activity</i>
Q2. What fishing activity is the household engaged in? (1) <i>Mainly subsistence</i> (2) <i>Mainly commercial</i> (3) <i>No fishing activity</i>
Q3. How many livestock or pets are raised by your household? (1) <i>Pigs</i> (2) <i>Goats</i> (3) <i>Cattle</i>
Q4. How many items of farm machinery are owned by members of this household? (1) <i>Tractors</i> (2) <i>Rotary hoes.</i>
Q5. How many items of fishing equipment are owned by members of this household? (1) <i>Spear gun</i> (2) <i>Canoe</i>
Q6. How have your land right been determined by the land court? (1) <i>By succession</i> (2) <i>Sole occupation</i> (3) <i>Joint occupation</i> (4) <i>Lease/-Sub -lease</i>
Cyprus (2001): Household
Q1. Is there a person in this household who is a holder or rents or cultivates agricultural land (arable or non arable) or operates an animal farm? (Yes/No).
Dominican Republic (2002): Household
Q1. Do any of the men or women members of this household have land plots that are sown, uncultivated, at rest, fallow or which they have harvested over the last 12 years? (1) <i>Yes</i> (2) <i>No</i>
Q2. Do any of the men or women of this household have animals for household consumption or sale? (1) <i>Yes</i> (2) <i>No</i>

Fiji (1996): Household
Q1. Did anyone in the household earn money from the following activities? (1) <i>Producing cash crops</i> (2) <i>Raising livestock</i> (3) <i>Catching/collecting fish products</i>
Kiribati (2005) Household
Q1. Does the household have plants? (1) <i>Yes</i> (2) <i>No (babai, breadfruit, banana, pawpaw, sweet potatoes, te bero, te kaina)</i>
Q2. How many does this household have? (1) <i>Pigs local</i> (2) <i>Chickens local</i>
Mauritius (2000): Household
Q1. Fruit trees of bearing age on premises (1) <i>Peach</i> (2) <i>Bibasse.</i>
Nauru (2002) Household
Q1. What livestock does this household have/produce? (1) <i>Pigs</i> (2) <i>Chicken</i> (3) <i>Ducks</i>
Nepal (2001): Household
Q1. Is any agricultural land possessed by the household? (<i>Yes/No</i>)
Q2. If yes, what is the area by land type?
Q3. Does your household raise livestock or poultry? (<i>Yes/No</i>)
Q4. If yes, how many livestock/poultry does your household raise? (1) <i>Livestock</i> (2) <i>Poultry</i>
Occupied Palestinian Territory (1997): Household
Q1. Identification of holdings and holders.
Q2. Area of holding.
Q3. Type of holding: (1) <i>Crops</i> (2) <i>Livestock</i> (3) <i>Both livestock and crops</i>
Papua New Guinea (2000): Household
Q1. Does this household grow/raise any of the following: (1) <i>Cocoa</i> (2) <i>Coffee</i> (3) <i>Pigs.</i> (Data collected according to whether it is for cash or own consumption)
Poland (2002): Household/Persons
Q1. What is the main source of maintenance of the household? (19 categories)
Q2. What is the secondary source of maintenance of the household? (19 categories).
Q3. Are you a holder of an agricultural farm (plot) or are you a member of a household with an agricultural farm (plot)?
Q4. How many months did you work in your agricultural farm/plot in the last twelve months?
Q5. If holder, what is the size of the farm/plot?
Seychelles (1997): Household
Q1. Did this household farm in the last twelve months? (<i>Yes/No</i>)
Q2. Did this household sell agricultural products in the last twelve months? (<i>Yes/No</i>)
Q3. What was the main purpose of agricultural production? (1) <i>For sale</i> (2) <i>Sale of surplus</i>
Q4. Did this household rear any livestock in the last twelve months? (<i>Yes/No</i>)
Q5. What was the main purpose of livestock production? (1) <i>For sale</i> (2) <i>Sale of surplus</i>
Sierra Leone (2004): Household
Q1. What is the area of each crop grown? (1) <i>Upland rice</i> (2) <i>Lowland rice</i>
Q2. What is the livestock owned by household members? (1) <i>Cattle</i> (2) <i>Sheep</i>

Tokelau (2001) : Household
Q1. Does this household own any animals that produce food? <i>(1) Pigs female (2) Pigs male (3) Chickens</i>
Tuvalu (2002): Household
Q1. The household is engaged in agricultural activity? <i>(1) Subsistence only (2) Commercial only (3) Subsistence and commercial (4) No agricultural activity</i>
Q2. The number of livestock and pets owned: <i>(1) Pig (2) Chicken (3) Duck (4) Cat (5) Dog</i>
Q3. The household is engaged in fishing actively? <i>(1) Subsistence only (2) Commercial only (3) Subsistence and commercial (4) No fishing activity.</i>
Q4. Where does the household? <i>(1) Only on reef (2) Only outside reef (3) Both in and outside reef.</i>
Uganda (2003): Household
Q1. Does any member of this household engage in the following? <i>(1) Crop growing (2) Livestock rearing (3) Poultry keeping (4) Fishing farming</i>
Q2. If yes, what is the size of the holding?
Q3. Did this household grow crops during the last season (January –June 2002) <i>(Yes/No)</i>
Q4. If yes to crop growing, how many plots were used for growing each type of crop? <i>(1) Pure stand (2) Mixed crop</i>
Q5. If yes to livestock raising, how many of each type of livestock were there on the enumeration day?
Q6. If yes to poultry keeping, for each poultry type what was the average poultry reared per months in the last three months?
Q7. If yes to fish farming, how many fish ponds are there by type?
Federal Republic of Yugoslavia (2001): Household
Q1a. Total land used by household: <i>(1) Owned (2) Taken on lease (3) Given on lease {of which cultivable}</i>
Q1b. Number of parcels of land.
Q2a. On your holding, which of the following crops did you grow? <i>(1) Wheat (2) Maize</i>
Q2b. For the crops grown <i>(1) Area harvested (2) Total production (3) Supplies at the end of the year</i>
Q3. Consumption of artificial fertilizers and plant protection preparations: <i>(1) Quantity of fertilizers consumed s (2) Quantity of plant protection preparations consumed</i>
Q4. Number of horses on the holding (young and other head) <i>of which: Mares and fillies in foal</i>
Q5. Number of cattle on the holding (young and other head) <i>of which:</i> <i>(1) Calves and heifers (2) Cows and heifers in calf (3) Oxen, bulls and other cattle</i>
Q6. Number of sheep on the holding (young and other head) <i>of which: (1) Lambs and lambs under 1 year (2) Ewes for breeding (3) Rams and other sheep</i>
Q7. Number of goats on the holding (young and other head)
Q8. Number of pigs on the holdings (young and other head) <i>of which:</i> <i>(1) Suckling pigs under two months (2) Pigs from 2 to 6 months (3) Boars and other</i>
Q9. Number of all kinds of poultry.
Q10. Beehives (number of)
Q11. Number of tractors and combines on the holdings: <i>(1) One axis tractors (2) Two axis tractors (3) Combines for cereals</i>

Zambia (2000): Household
Q1. Did your household engaged directly in agricultural activity; that is crop growing, livestock and poultry raising, and fish farming, since 1 October 1999? <i>(Yes/No)</i> .
Q2. If yes, on your holding which of the following crops did you grow since 1 July 1999? <i>(1) Cattle (2) Sorghum (3) Millet.</i>
Q3. On your holding which of the following livestock did you raise 1 October 1999? <i>(1) Cattle (2) Goats (3) Pigs</i>
Q4. Did your agricultural enterprise include fish farming since 1 October 1999? <i>(Yes/No)</i> .

WCA 2010 Round (2006-2015)
Country (Census year): Respondent
Barbados (2010): Household
Q1. What is your area of involvement in agricultural activity? <i>(1) Farmer (2) Processor (3) Backyard Gardener/ Landless Farmer</i>
Q2. In what type of agricultural farming activity are you involved? <i>(1) Sugarcane (2) Vegetable (3) Root Crop (4) Livestock (5) Poultry (6) Fruit (7) Horticulture (8) Fish (9) Herbs (10) Cotton (11) Other</i>
Q3. What is your main reason for your involvement in agricultural activity? <i>(1) Sale (2) Home Consumption (3) Not Stated</i>
Q4. What is your land tenure? (more than one option permitted) <i>(1) Own (2) Lease (3) Rent (4) Rent Free</i>
Q5. What is the total area of the agricultural land owned by you?
Q6. What is the total area of agricultural land that you rent, lease, or operate rent free?
Q7. In which parish is the land located whether owned, rented, leased or rent free?
Q8. Is the agricultural land under cultivation? <i>(Yes/No)</i>
Q9. What is your main source of water supply? <i>(1) Private well (2) Dam (3) Stream (4) BWA (5) BADMC Irrigation (6) Other (7) None</i>
Burkina Faso (2007): Household
Q1. Whether the household grows specific annual crops <i>(Yes/No for wet season and dry season for each crop)</i>
Q2. Whether the household grows horticultural crops <i>(Yes/No for wet season and dry season for each crop)</i>
Q3. Number of fruit trees of different types.
Q4. Whether the household practices different types of silviculture <i>(Yes/ No for each crop)</i>
Q5. Whether the household practices fisheries <i>(Yes/ No for fish/prawns and frogs)</i> .
Q6. Number and type (traditionally farmed, nomadic, intensively farmed) of specific livestock groups.
Q7. Number of drought animals by type.
Q8. Number of items of specific types of machinery owned.
Q9. Whether a member of the household belongs to a farmer's association <i>(Yes/No)</i> .
Canada (2006): Household
Q1. Is anyone in this household a farm operator who produces at least one agricultural product intended for sale? <i>(Yes/ No)</i> .
Q2. Does this farm operator make day to day decisions related to the farm? <i>(Yes/No)</i> .
Fiji (2007): Household
Q1. How many of the following livestock and pets does this household own? (state number). <i>(1) Cows (2) Pigs (3) Goats</i>

Niue (2006): Household
Q1. How many pigs does this household own in total? <i>(1)Males (2)Females</i>
Q2. How many pigpens does the household own in total?
Q3. Over the last 12 months how many plantations did the household have in total?
Q4. How many plantations were eaten by pigs?
Republic of Serbia (2009) - Pilot Questionnaire: Household
Q1. Land owned by the household (owned by all members of the household).
Q2. Rented land (area): including <i>for money, on lease, sharecropping and free of charge.</i>
Q3. Land given on rent (area):including <i>for money, on lease, sharecropping and free of charge</i>
Q4. Total land available to household :
Q4a. Utilized agricultural land (area) <i>(1) Arable land and gardens with break down for:</i> <ul style="list-style-type: none"> - <i>cereals, industrial crops, fodder crops, and potatoes;</i> - <i>vegetables, strawberries, and melons;</i> - <i>flowers and ornamental plants;</i> - <i>other.</i> <i>(2) Kitchen gardens</i> <i>(3) Orchards</i> <i>(4) Vineyards</i> <i>(5) Nurseries</i> <i>(6) Meadows</i> <i>(7) Pastures</i>
Q4b. Non utilized agricultural land (area).
Q4c. Forest
Q4d Other land <i>Of which: fishponds</i>
Q5. Does the household own livestock, poultry or bees? <i>(Yes/No)</i>
Q5a. Number of cattle on the holding: <i>Of which: cows</i>
Q5b. Number of pigs on the holding.
Q5c. Number of sheep on the holding.
Q5d. Number of goats on the holding.
Q5e. Number of horses on the holding.
Q5f. Number poultry on the holding.
Q5g. Number of beehives
Q6. Does the household have its own agricultural production? <i>(1) Yes, its own use and selling</i> <i>(2) Yes, only for its own use</i> <i>(3) Does not have its own agricultural production.</i>
Vanuatu (2009): Household
Q1. Does this household have any livestock? (state number in appropriate box) <i>(1) Cattle (2) Pigs (3) Goats (4) Horses</i>
Q2. Which of the following cash crops are grown by the household? <i>(1)None (2) Kava (3) Coconut (4)Cocoa (5) Coffee</i>