

CHAPTER 3

METHODOLOGICAL CONSIDERATIONS

This chapter discusses some important methodological issues to be considered in the development of a census of agriculture. The timing and objectives are reviewed, and the scope of the census is discussed. The concepts of agricultural holding and agricultural holder are reviewed and two new items, the sub-holding and the sub-holder, introduced. Options for the frame for the census of agriculture and the use of complete or sample enumeration are discussed. The steps involved in developing and undertaking an agricultural census are also summarized.

Timing of the census of agriculture

3.1. WCA 2010 covers the ten-year period 2006–2015. Countries are encouraged to carry out their agricultural census as close as possible to the year 2010, to help to make international comparisons more meaningful, while recognising that the timing of a country's census is determined by many factors, including administrative and financial considerations .

3.2. In particular, Countries should take into consideration the timing implications imposed by the population census, especially where the two censuses are to be coordinated. In the population census programme, it is recommended that countries undertake their censuses in years ending in "0" or as near to those years as possible. Many countries adhere to that recommendation. There are many advantages in running the agricultural census at the same time as, or soon after, the population census, especially as agriculture related data and field materials will still be current.

Objectives of the census of agriculture

3.3. In the past, the census of agriculture has aimed to provide data on the structure of agricultural holdings, with attention given to providing data for small administrative units and other detailed cross-tabulations of structural characteristics. Agricultural censuses have also been used to provide benchmarks to improve current crop and livestock statistics and to provide sampling frames for agricultural sample surveys. Previous agricultural censuses have focused on the activities of agricultural production units; that is, households or other units operating land or keeping livestock. They have not been seen as censuses of rural households.

3.4. Since agricultural censuses are undertaken only every ten years, it is natural to associate them with those aspects of agriculture that that change relatively slowly over time. Thus, agricultural censuses are mainly concerned with data on the basic organizational structure of agricultural holdings, such as farm size, land use, crop areas, livestock numbers and use of machinery. Agricultural censuses have not normally included data that change from year to year, such as agricultural production or agricultural prices.

3.5. The basic objectives of the census of agriculture have remained relevant over the past few agricultural census rounds. One development since the 2000 agricultural census programme has been the MDG framework for sustainable economic development (see paragraphs 2.5–2.6). Countries are giving increasing emphasis to monitoring progress towards the MDGs, and the agricultural census is seen as an important source of data for this purpose. There has also been more focus on poverty alleviation. An additional objective has been included to reflect this emphasis. For WCA 2010, the objectives of the agricultural census are:

- (a) To provide data on the structure of agriculture, especially for small administrative units, and to enable detailed cross-tabulations.
- (b) To provide data to use as benchmarks for current agricultural statistics.
- (c) To provide frames for agricultural sample surveys.
- (d) To provide data to help monitor progress towards global development targets, in particular the MDGs.

Scope and coverage of the census of agriculture¹

3.6. Broadly speaking, an agricultural census aims to measure the structure of the agricultural production industry. The scope of the agricultural production industry could be interpreted very broadly to cover not only crop and livestock production activities, but also forestry and fisheries production activities, as well as other food and agriculture related activities. Past agricultural census programmes have taken a narrow view of agriculture by focusing only on those units engaged in the production of crop and livestock products. Units engaged in forestry or fisheries were not covered unless they also had some crop or livestock production activities.

3.7. For the 2010 round of agricultural censuses, it is recommended that the scope of the agricultural census remains the same as in previous programmes. However, it is recognized that aquaculture is becoming increasingly important in many parts of the world, and countries are encouraged to conduct an aquacultural census in conjunction with the agricultural census, where there is a need for aquacultural data. Further information on the aquacultural census is given in Chapter 7.

3.8. International statistical standards for defining areas of economic activity are given in the International Standard Industrial Classification of all Economic Activities (ISIC) (UN, 2004b). For more information on ISIC, see Appendix 1. The scope of an agricultural census may be defined under ISIC (Rev. 3.1) as follows:

- Group 011: Growing of crops; market gardening; horticulture.
- Group 012: Farming of animals.
- Group 013: Growing of crops combined with farming of animals (mixed farming).

3.9. Ideally, an agricultural census should cover all agricultural activity in a country according to the above ISIC groupings. In the past, many countries have applied a minimum size limit for inclusion of units in the census or excluded certain areas such as urban centres. This is justified on the grounds that there are usually a large number of very small holdings making little contribution to total agricultural production and it is not cost-effective to include them in the agricultural census. However in many countries, small-scale agriculture makes a significant contribution to household food supplies and is often an important source of supplementary household income. In some countries, almost all households have some own-account agricultural production activities, such as keeping a few chickens or having a small kitchen garden. The inclusion of small holdings is also important to reflect women's participation in agricultural work.

3.10. Various criteria may be used to establish minimum size limits, such as: area of holding, area of arable land, area of temporary crops, number of livestock, number of livestock over a certain age, quantity of output produced, value of agricultural production, quantity of labour used, and quantity of produce sold. Sometimes, the scope of the agricultural census is restricted to commercial agricultural activities, omitting households with a small area of crops used solely for home consumption. Minimum size limits are often difficult to apply. For livestock numbers, one needs to have complex criteria involving numbers of each type of livestock. For example, one may wish to omit households with less than 20 chickens or with less than

¹ In WCA 2010, the word "scope" refers to the target group of units for the agricultural census. "Coverage" refers to the extent to which certain units, such as small holdings, are omitted. In previous programmes, the word "scope" referred to the data items included in the census.

three pigs, but what if a household has 18 chickens and two pigs? Setting a minimum value of agricultural production is difficult to apply, especially where a large part of the agricultural output is for the household's own consumption.

3.11. An alternative to minimum size limits is to cover all units regardless of size, but ask only some very limited questions for small units. This is easy to do where, as is often the case, the frame for an agricultural census is a list of households and some initial questions are needed to screen out those who are not agricultural holdings. Here, the following approach could be used:

- First, ask questions about crops and livestock needed to identify all agricultural production units, regardless of size. Collect some basic information for those units.
- Second, ask some additional questions to identify those agricultural production units above the minimum size limit. Proceed to ask the more detailed questions for those units.

3.12. Sometimes, countries omit certain areas of the country or certain types of agricultural activity – such as remote areas or areas with security problems – for operational reasons. Countries should decide on any out-of-scope areas according to local conditions, making sure that the usefulness of the census is not jeopardized. For example, omitting remote desert regions may result in missing important livestock resources, such as in nomadic areas. Sometimes, it might be appropriate to cover only the household sector, if it is dominant in agriculture. Often, agricultural activities of the military are excluded; sometimes, schools and religious organizations are also omitted.

3.13. Usually, it is not possible to cover all agricultural activity in an agricultural census for one reason or another. In planning the agricultural census, countries should be realistic about what can be done within available budgets and staff resources, and ensure that what is done is done well.

3.14. It should be recognized that, in an integrated agricultural statistics system, any exclusions from the agricultural census affects not only the results of the agricultural census, but also the surveys that are conducted based on the agricultural census. Thus, an agricultural production survey based on an agricultural census frame will not cover the census out-of-scope units, and agricultural production estimates from the survey will be affected accordingly.

3.15. Countries should clearly specify the scope in the presentation of agricultural census results. Where certain geographic areas or types of agricultural activity are excluded, this should be highlighted in the census reports to help users interpret and analyse the results.

Content of the census of agriculture

3.16. The modular approach for the census of agriculture envisages a core census module based on complete enumeration to collect key data, and a series of sample-based supplementary modules to collect more in-depth data. A list of recommended core items is shown in Chapter 4, along with a list of optional items for inclusion in the supplementary modules, as required. Items have been selected as being suitable for the core module on the basis of the following criteria:

- The items are the key items needed for agricultural policy-making and planning.
- Data for the items are required to be produced for small administrative units such as districts or villages, or in the form of detailed cross-tabulations. Such data could not be provided from an agricultural sample survey because of high sampling errors.
- The data involve the measurement of rare events, such as unusual crops or livestock, which would not be possible to estimate from a sample survey because of high sampling errors.
- The data are required to establish sampling frames.
- The data are required to make international comparisons.

3.17. In developing its census of agriculture, a country should include in the core census module all the recommended census core items, plus additional items from the list of supplementary items according to national requirements.

3.18. One reason a country might include additional items in the core module is because detailed geographic data are needed. For example, if livestock numbers by age and sex are needed at the district or village level, these items may need to be included in the core module, rather than a supplementary module. Countries should carefully consider the suitability of each item for the core census module and the costs involved. For example, education data are of interest in an agricultural census to broadly analyse the relationship between education and farm characteristics, not to measure education levels as in a population census, and this item is therefore better suited to a supplementary module.

3.19. Another possible reason to include additional items in the core census module is to provide data to help create sampling frames for the census supplementary modules and for the programme of agricultural surveys. Where possible, countries should plan their agricultural survey programme prior to the agricultural census to ensure that the census can be designed to meet the sampling frame needs. For example, if an in-depth fertilizer survey was to be conducted, a fertilizer usage item could be included in the core census module for sampling frame purposes.

3.20. Countries should carry out one or more census supplementary modules according to the national requirements, based on the list of items provided. Additional items may be added as required. Several modules may be combined into a single survey.

3.21. Some further issues for consideration in deciding on the content of the agricultural census are:

- The data needs of agricultural policy-makers and planners. The agricultural census should be developed specifically to meet the needs of agricultural policy-makers and planners. Data requirements will be different in each country, depending on the policy issues and priorities.
- The suitability of the census vehicle for the collection of the data required. An agricultural census is intended to collect structural data and the items included should focus primarily on those types of data. Operational data are usually not suited to an agricultural census. Items requiring in-depth questions, such as cost of production, are also best collected in other agricultural surveys.
- The technical, operational and financial resources available to undertake the census. Conducting censuses is not only costly but also requires considerable human resources for the development, data collection and data processing. Countries need to balance the need for data against the resources available. The ability to produce timely data is an important issue.
- The willingness and ability of the public to supply the information required. Care is needed in the selection of items and the design of questionnaires to ensure that reliable data can be collected from respondents. Some items may be sensitive because of cultural or economic reasons – for example, respondents are sometimes reluctant to supply land data because they fear it may have taxation consequences.
- The data collected in previous rounds of the agricultural census. Collecting the same data as in past censuses can be valuable in tracking changes in the structure of agriculture over time. However, items should not be automatically carried over from one census to the next without reviewing their continuing relevance to current data needs and the suitability of the concepts and definitions used.
- The need for data for international comparisons. The 16 recommended core items will provide the basis for FAO to make a global assessment of agricultural holdings. FAO recommends that all countries collect these items so that international comparisons can be made.

Statistical unit

3.22. The statistical unit for a data collection is the basic unit for which data are collected. In previous agricultural census programmes, the statistical unit used has been the agricultural holding and this is used again in WCA 2010.

3.23. The definition of an agricultural holding remains the same as in previous programmes; that is:

“An agricultural holding is an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery or draught animals.”

3.24. For information on the relationship between an agricultural holding and the national accounting framework, refer to Appendix 1.

3.25. There are two types of agricultural holdings: (i) holdings in the household sector – that is, those operated by household members; and (ii) holdings in the non-household sector, such as corporations and government institutions. In most countries, the majority of agricultural production is in the household sector. The concept of “agricultural holding” is therefore closely related to the concept of “household”.

3.26. The household is one of the basic elements of a national statistics system and standards for defining a household have been laid down by the United Nations in its guidelines for population and housing censuses as follows:

“The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either (a) a one-person household, that is to say, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household, or (b) a multi-person household, that is to say, a group of two or more persons living together who make common provision for food or other essentials for living. The persons in the group may pool their incomes and may, to a greater or lesser extent, have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated” (UN, 1998, paragraph 1.324).

3.27. A household may occupy the whole of a dwelling, part of a dwelling, or more than one dwelling. There may be more than one household living in a dwelling. Some households consist of extended families making common provision for food and may occupy more than one dwelling. In other cases, different family units live in separate dwellings, but have a common head, such as in polygamous unions. Some households live in camps, boarding houses or hotels, or as administrative personnel in institutions. They may also be homeless. Often, the concept of a “family” is more readily understood than a “household”, but it is not the same thing; a family may include people living in other households in other places.

3.28. For the household sector, there is usually a one-to-one correspondence between an agricultural holding and a household with own-account agricultural production activities; in other words, all the own-account agricultural production activities by members of a given household are usually undertaken under single management. Managing agricultural production activities usually goes hand-in-hand with making common arrangements for food and other essentials, pooling incomes, and having a common budget. It is unusual for different household members to operate agricultural land or livestock completely independently, but pool incomes. It is also unusual for household members to operate land or livestock as a single unit, but to have independent household budgets. Even if there is a degree of independence in the agricultural activities of individual household members, the income or produce generated by different household members is usually pooled. Often, different members of the same household own land, but usually the agricultural operations in the household are carried out as a single unit.

3.29. There are two special cases where the agricultural holding and household concepts may diverge:

- If there are two or more units making up a household, such as where a married couple lives in the same dwelling as their parents, the two units may operate land independently but, as members of the same household, they make common arrangements for food and pool incomes.

- In addition to an individual household's agricultural production activities, a household may operate land or keep livestock jointly with another household or group of households. Here, there are two agricultural holding units associated with the household: (i) the agricultural production activities of the individual household itself; and (ii) the joint agricultural operations with the other household(s).

3.30. In the past, some countries have found it difficult to strictly apply the agricultural holding concept in the agricultural census and, instead, have defined the agricultural holding to be equivalent to a household with own-account agricultural production. Usually, there is little difference between an agricultural holding and a household with own-account agricultural production. Equating the agricultural holding and household units has several benefits:

- The identification of the holding in the agricultural census would be simplified; it would no longer be necessary to find out about the management of the household's own-account agricultural production activities.
- It would bring the concept of agricultural holding into line with the practice already used in previous agricultural censuses in many countries.
- The use of a common statistical unit – the household – would enable the agricultural census to be more easily linked to the population census.
- It would facilitate the analysis of household characteristics.
- If the scope of the agricultural census was expanded to also include other households not engaged in own-account agricultural production, there would be a common unit between agricultural production units and other households.

3.31. Countries should consider the advantages of defining the agricultural holding unit in this way, taking account of operational considerations and the issues mentioned above. The definition of the holding should be clearly stated in the presentation of census results to help in the interpretation of data.

3.32. Care is needed in defining the statistical unit for the non-household sector. Corporations and government institutions may have complex structures, in which different activities are undertaken by different parts of the organization. The national accounting concept of establishment should be used (see Appendix 1), where an establishment is an economic unit engaged in one main productive activity operating in a single location.

3.33. One problem with the definition of an agricultural holding is that a single holding may have land parcels in more than one village, district or province. This sometimes creates anomalies in the census results. The holding definition refers to the different parcels making up the holding "sharing the same production means, such as labour, farm buildings, machinery or draught animals". Thus, parcels of land a few hundred kilometres apart should not be considered part of the same holding because they cannot share the same inputs. Countries should review the application of the definition to their local conditions. Some countries may wish to define a holding as being within a single administrative unit such as a district or province.

3.34. The following additional points relate to the identification of an agricultural holding:

- Agricultural holdings may have no significant land area; for example, poultry hatcheries or holdings keeping livestock for which land is not an indispensable input for production.
- Agricultural holdings may be operated by persons who do not have any rights to agricultural use of the land except for the products of the trees grown on it (tree holdings).
- If a member of a cooperative, religious organization, government agency, clan or tribe is assigned a separate unit for agricultural production that is operated under the member's management, and over which the member has general, technical and economic responsibility, then this unit represents a holding.

- Open rangeland (such as land open to communal grazing) is not normally considered a holding. A specified area delimited by fencing, or any other form of boundary demarcation may be an exception.

3.35. Normally, an agricultural holding is defined according to whether the unit is an agricultural production unit at the time of the agricultural census. However, there are some special cases for holdings in the household sector.

- If a household sold all its land and livestock during the census reference year, it is no longer an agricultural production unit and therefore does not represent an agricultural holding. The household that is operating the land and livestock at the time of the census represents the agricultural holding and, moreover, should report all crop and livestock activities during the reference year, including activities carried out prior to the sale. This can be difficult to apply.
- If a household leases land to grow crops in a particular season, but the census is undertaken in a different season, the household should be considered as an agricultural holding, even though it is not engaged in agricultural production activities at the time of the census. Here, the household should report crop activities during the reference year in the normal way.
- Sometimes, a household owning a piece of land may operate the land itself during the summer season, but rent it out to another household to cultivate during the winter season. Here, the piece of land should be reported as part of the area of holding for both households. This results in some double counting of land.

Agricultural holder

3.36. The agricultural holder is defined as the civil or juridical person who makes the major decisions regarding resource use and exercises management control over the agricultural holding operation. The agricultural holder has technical and economic responsibility for the holding and may undertake all responsibilities directly, or delegate responsibilities related to day-to-day work management to a hired manager.

3.37. By definition, the agricultural holding is under single management, and therefore there cannot be more than one agricultural holder for an agricultural holding. However, there may be more than one joint holder in a holding. A joint holder is a person making the major decisions regarding resource use and exercising management control over the agricultural holding operations, in conjunction with another person. A joint holder can be from within the same household or from a different household.

3.38. The concept of an agricultural holder is often difficult to apply because of the complex decision-making processes on the holding. Often, a holding is managed jointly by members of the household, such as a husband and wife. If there is one person making the major decisions, he/she should be defined as the holder. If more than one person is involved in major decision-making, each of those persons should be considered as a joint holder. If there are two quite distinct agricultural management units in a household, the household should be split into two agricultural holdings (see also sub-holding and sub-holder concepts 3.42–3.52 below)

3.39. The concept of agricultural holder is normally only applied to agricultural holdings in single-holding households. Agricultural holders can be identified for other types of holdings, but the data are not useful for census analysis. The agricultural holder is often, but not always, the household head. The agricultural holder may do other work in addition to being a holder; being a “farmer” may not even be his/her main occupation. A distinction should be made between an agricultural holder and a hired manager; a hired manager is a paid employee who manages an agricultural holding on behalf of the agricultural holder.

3.40. Some countries may wish to provide more detailed information on the management of the holding. The sub-holding and sub-holder concepts have been introduced in WCA 2010 to reflect this need. For more information, see paragraphs 3.42–3.52.

3.41. Countries need to carefully consider how best to collect agricultural holder information in the

agricultural census. Care is needed to differentiate between the household head and the agricultural holder; often, cultural factors influence who is determined to be the household head – sometimes, it is the oldest male – and that person may not be actively involved in the household’s agricultural operations. Often, a single question on who is the main decision-maker for the holding is insufficient, and it may be necessary to ask a series of questions about each household member, their work on the holding, and their role in managing the holding. Special attention needs to be given to ensuring that the role of women is adequately acknowledged in identifying the agricultural holder. As with all data collection, questionnaires must be carefully designed and tested, and enumerators well trained and closely supervised.

Sub-holding and sub-holder

3.42. The concept of an agricultural holder as the major decision-maker for the holding may not provide a realistic picture of the often complex decision-making processes of the holding. Often, different members of the household take responsibility for managing particular aspects of the operations of the holding. Sometimes, women carry out specific activities such as cultivating particular land plots or managing particular livestock activities. There may also be different levels of management; for example, one person may make the strategic decisions (“this year we plant potatoes”), while other people are responsible for operational decisions such as when to plant, who to employ, and how to market.

3.43. Some countries may feel that the concept of agricultural holder alone does not adequately reflect the management of the holding, and, in particular, fails to recognize the role of women in managing agricultural activities. To overcome this problem, the concepts of “sub-holding” and the associated “sub-holder” have been introduced in WCA 2010.

3.44. A sub-holding is defined as a single agricultural activity or group of activities managed by a particular person or group of persons in the holder’s household on behalf of the agricultural holder. There may be one or more than one sub-holding in a holding. A sub-holding could comprise a single plot, a whole field, a whole parcel, or even the whole holding. A sub-holding could also be a livestock operation associated with a plot, field or parcel, or a livestock operation without any land.

3.45. A sub-holder is a person responsible for managing a sub-holding on the holder’s behalf. There is only one sub-holder in a sub-holding, but there may be more than one sub-holder in a holding. The holder may or may not be a sub-holder. The sub-holder concept is broadly similar to the concepts of “plot manager” and “farm operator” used in some countries.

3.46. A typical situation is where the holder is designated as a male and takes prime responsibility, as a sub-holder, for growing the primary crops. The holder’s wife may be a second sub-holder, with specific responsibility for managing, for example, the kitchen garden. Other household members could also be sub-holders with specific responsibilities on the holding, such as livestock.

3.47. The same piece of land could be part of two sub-holdings – for example, if one person grows rice on the land in the summer and another grows vegetables on the land in the winter. The association of livestock with land needs to be carefully considered. A person responsible for cattle on the holding’s grazing land is the manager of that grazing land, whereas someone managing livestock in communal land would not be specifically managing a piece of land associated with the livestock.

3.48. In an agricultural census, interest often centres on identifying the specific crops grown or livestock raised by sub-holders, and these items are included in the agricultural census as supplementary Items 1213 and 1214. For these data to be meaningful, the sub-holding must consist of activities related to specific crops grown or specific livestock raised by the sub-holder. The sub-holding concept makes no provision for one person being responsible for crop planting and another for crop harvesting.

3.49. The use of the sub-holding/sub-holder concepts could provide a better way of identifying the agricultural holder. Rather than identifying the holder directly, each sub-holder could first be identified and this information used to determine the primary decision-maker on the holding.

3.50. The sub-holding/sub-holder concepts are complex, involving notions of management,

decision-making and delegation of authority. They will not be suitable for all countries. However, countries wishing to bring a gender perspective to the agricultural census will find these concepts provide a useful basis for measuring the role of women in agriculture. The two concepts are very broad and countries will be able to adapt them to fit national circumstances and data requirements.

3.51. Countries will need to put considerable effort into developing suitable data collection methods and questions to identify sub-holdings and sub-holders in the agricultural census. The approach used by a country will depend on national agricultural practices and social and cultural conditions, taking into consideration the data collection methodology used for the rest of the agricultural census. Usually, a series of questions about each household member will be needed, to find out about the types of work each carried out on the holding and their role in managing agricultural production activities.

3.52. Data on sub-holdings and sub-holders are recommended for inclusion in the supplementary component of the agricultural census under Category 12: Management of the holding.

Agricultural census frame

3.53. In a statistical collection, the frame is the means by which the statistical units to be enumerated in the collection are identified; in this case, agricultural holdings. An ideal frame would be a list of all agricultural holdings, identifying each unit without omissions or duplications and without any units other than agricultural holdings. Such a list could be obtained through a population census, a farm register, or another source.

3.54. Where a farm register exists, it can be a good frame for an agricultural census provided it is regularly updated to remove units that cease to operate as holdings and to add new holdings. Usually, a register contains some basic information about each unit, such as some sort of size measure, which is updated periodically. Farm registers can be created in different ways. Sometimes, they are initially created at the time of an agricultural census and regularly updated thereafter using information from various sources.

3.55. For non-household agricultural holdings, frames may exist in the form of records from government regulatory agencies. Most countries have a business registration or licensing system. Membership information from industry associations may also be useful. Such frames can also be created by asking local officials to provide lists of agricultural units in their area of responsibility.

3.56. One problem with frames based on farm registers is that they are often established for administrative purposes and therefore may not be compatible with statistical needs. The unit on the register often does not correspond with the agricultural holding unit for the agricultural census. For example, the register may be based on cadastral or other land records where each parcel of land is identified, rather than the holding unit. Also, registers are usually based on land ownership, which is not always suitable to an agricultural census because several people in a household may own land separately. Also, the land owner is not the land operator if the land is rented out. Frames based on business registration or licensing procedures are not always suitable as they represent what the business is licensed to do, not what they actually do.

3.57. Another type of frame for the household sector of an agricultural census is one created from the population census as a one-time exercise, without it being kept up-to-date or maintained as a farm register afterwards. The population census could include additional questions on agriculture to help identify agricultural holdings for the agricultural census (see paragraphs 6.18-6.27). Alternatively, the identification of agricultural holdings in the household sector could be carried out as part of the cartographic work or pre-census listing exercise. For such a frame to be useful, the agricultural census would need to be undertaken as soon as possible after the population census to ensure that the list of agricultural holdings is accurate.

3.58. Another consideration with frames based on the population census is the statistical unit. Even if additional questions on agriculture are included in the population census or pre-census listing exercise, the frame would typically identify households engaged in own-account agricultural production, not agricultural

holdings. Such frames may still be useful for enumeration of the agricultural census as follows: (i) contact each household with own-account agricultural production for the agricultural census; (ii) ask each household with own-account agricultural production about the management of agricultural activities in the household to identify each agricultural holding; and (iii) enumerate all agricultural holdings for the agricultural census.

3.59. Even a list of all households from the population census can provide a useful frame for an agricultural census, as follows: (i) contact each household for the agricultural census; (ii) ask each household about the household's own-account agricultural production activities and the management of agricultural activities in the household, to identify each agricultural holding; and (iii) enumerate all agricultural holdings for the agricultural census.

3.60. Where a frame of agricultural holdings, households with own-account agricultural production, or households is unavailable from an existing farm register or the population census, it is usually not worthwhile creating a frame in this form just for the agricultural census. Instead, a different type of frame is used. First, the country is divided into suitable geographical units, called enumeration areas (EAs), covering the whole in-scope national territory. Then, each EA is visited to identify all agricultural holding units through interviews with local authorities or visits to each household. Population censuses are usually done using this type of frame and it is often possible for the agricultural census to piggyback onto the population census field system by using the same EAs and making use of maps and other field materials.

3.61. An EA is a geographical unit of suitable size to organize the census data collection – typically, 50 to 100 households. An EA could correspond to existing administrative units, such as villages. Often, it is necessary to subdivide administrative units to form suitable sized units. This is done by examining existing maps and administrative records, with field inspection undertaken as required. Aerial photographs and satellite imagery can also be useful in forming EAs.

3.62. Typically, a combination of frames is used for the agricultural census. Often, the household sector is enumerated based on the population census EA frame, whereas a frame of agricultural holdings in the non-household sector is obtained from administrative sources.

3.63. Care is needed in establishing frames for the agricultural census to ensure that all agricultural production units are covered. If agricultural holdings are missing from the frame, they will not be enumerated in the agricultural census and the validity of the census results will be compromised. This is especially important in an integrated agricultural statistical system, as any weaknesses in the agricultural census frame will be reflected in all the surveys that follow.

Complete and sample enumeration methods

3.64. From the start, agricultural censuses were intended to be censuses in the traditional statistical sense; that is, a complete enumeration of all agricultural holdings in a country. Complete enumeration collections are costly and difficult to manage in comparison to a sample survey. However, there have been several key reasons for using a complete enumeration approach for the collection of structural data in the agricultural census.

3.65. First, data can be produced for small administrative units such as districts or villages. Such detailed data are usually not possible from sample surveys because the sample estimates at this level are based on small sample sizes and are therefore subject to high sampling errors.

3.66. Second, a census enables more detailed cross-tabulations to be produced than is possible from a sample survey. For example, in a census, the number of holdings could be cross-tabulated by area of holding, household size and number of livestock; this level of detail may not be possible in a sample survey because of high sampling errors.

3.67. Third, a census can measure rare events such as the area of rarely grown crops or the number of unusual types of livestock. In a sample survey, few of these cases would be picked in the sample and therefore the data would be subject to high sampling errors.

3.68. In recent years, many countries have carried out the agricultural census using a sampling approach, and this has limited the amount of sub-national and other finely-classified data able to be produced. Usually, sample sizes have been large enough to retain many of the attributes of a full census providing district data, even if finer level data such as for villages could not be provided.

3.69. WCA 2010 provides for a combination of complete enumeration and sample methods. Complete enumeration in the core census module is needed to provide the detailed data for the key items, as well as sampling frames. However, it is recognised that it may not be possible for some countries to use complete enumeration, even for a limited set of key items, and sampling methods may need to be employed.

3.70. It is not possible to give specific recommendations on the required sample size for a sample-based core census module. Usually, the sample should be big enough to provide data down to the third level of administration – for example, at the national, province and district levels – and to provide suitable sampling frames. Other factors, such as the sample design, agricultural conditions in the country, the data content of the census, and the administrative structure of the country are also important. For example, if data are required for each of 100 districts, the sample size may need to be at least 25,000 holdings.

3.71. It is expected that the sample sizes for the census supplementary modules will be relatively small, but will depend on data requirements and the factors mentioned in the previous paragraph.

Agricultural census reference period

3.72. The census reference period is a period of twelve months, usually either a calendar year or an agricultural year, generally encompassing the various time reference dates or periods of data collection for individual census items. This reference period applies to both the core and supplementary modules of the agricultural census. Other agricultural surveys can be undertaken any time after the census.

3.73. The reference period for agricultural census items varies according to the type of data. The reference periods are usually the day of enumeration (for inventory items) or a twelve-month reference period (for continuing activities). The agricultural year is usually the most suitable reference period because respondents find it easier to think of their agricultural activities in terms of seasonal activities.

3.74. Sometimes, the agricultural census is carried out over an extended period of time, because of a shortage of enumerators or other field staff. Certain regions of a country may be enumerated at different times of the year because of seasonal and agricultural conditions. Countries need to establish suitable census reference periods to deal with these problems.

Field organization of census core and supplementary modules

3.75. The core and supplementary module(s) can be implemented as part of a single data collection operation, with the enumerator interviewing each holder to collect data for both the core and supplementary census modules at the same time. This may be done using a single questionnaire or separate questionnaires for each module. Typically, the enumerator's job is to:

- Collect data for the core census module.
- Apply specific sampling procedures, based on responses to the core census questions, to determine whether the holding is included in the supplementary module(s). A separate sampling scheme is used for each module. For example, with supplementary modules on aquaculture and livestock, the sampling procedures might require that, in certain pre-assigned sample EAs, each holding with aquaculture is included in the aquacultural module and each holding with livestock is included in the livestock module.
- If the holding is included in the sample for the supplementary module(s), proceed to ask the additional questions required for the supplementary module(s). Otherwise, the interview is finished.

3.76. Alternatively, the core and supplementary module(s) can be done separately. Here, the core census is undertaken first, with the core questionnaires being returned to the office for use in selecting the sample for the supplementary modules. Enumerators then return to the field to carry out the census supplementary module(s). In cases where the supplementary modules are carried out over a period of time, some updating of the census frame may be necessary, in advance of the field work.

Steps in developing an agricultural census

3.77. Information on how to develop and conduct an agricultural census is given in *Conducting Agricultural Censuses and Surveys* (FAO, 1996a). The basic steps are:

- Determine the overall strategy for the agricultural census as part of the system of integrated agricultural censuses and surveys.
- Define the objectives of the agricultural census.
- Develop a work plan and budget for developing and carrying out the census.
- Prepare census legislation, if required.
- Form a National Census Committee to oversee the census.
- Develop and implement the census publicity campaign.
- Create the Agricultural Census Office and recruit the necessary staff.
- Prepare frames.
- Prepare maps for census field operations.
- Develop the tabulation plan.
- Design and test questionnaires.
- Design and test the computer processing system, including data entry, editing and tabulation.
- Prepare field instruction manuals.
- Develop the field system; recruit and train field staff.
- Census enumeration.
- Data processing.
- Undertake quality control checks on the data.
- Tabulate and analyse the data.
- Prepare census reports and disseminate results.
- Reconcile the census data with the data from the system of current statistics.