1315 Agricultural input prices

These prices should also be considered prices at the farm gate. If an input is bought off the farm, except from local or village craftsmen or tradesmen, then marketing charges, taxes and transport expenses should be added to the price paid at the point of purchase to arrive at the conceptual price paid at the farm gate. If subsidies are provided to farmers to induce or enable them to buy sufficient quantities of certain agricultural inputs, and if these subsidies effectively reduce the price actually paid, then the farm-gate price paid by farmers should be the reduced, subsidized price.

5.3.13 Category 14: Post-Harvest Foodgrain Losses

Foodgrain losses are defined as the reduction in weight of edible grain available for human consumption, except the weight of moisture lost in drying. There are three stages at which losses are reported in this category, each of which is a classification division: on holdings, by intermediaries, and at warehouses. Only the first division is further disaggregated here, where losses on the holding may occur at several stages of on-farm processing, some of which are described below.

Harvesting refers to the cutting, gathering, bundling and stacking of a crop, whether done manually or mechanically. Losses, principally due to shedding, depend on the time of harvesting, where later harvests yield greater losses. In the threshing process, the grains are beaten, either manually or mechanically, to separate them from the husk, as for rice, or from the plant to which they are attached, as for maize. Losses in this operation arise from damage to the grains or grains escaping collection after threshing. Then, in winnowing, some of the grain may be blown away with the chaff. Drying losses can occur in two ways. First, when grain is spread out for sun drying, such as on a road or yard, part will be eaten by birds, rodents, insects and other pests; secondly, inadequate drying may lead to fungal damage or increased milling losses. Finally, storage losses, mostly due to pests, humidity and temperature, account for more on-farm post-harvest losses than at any other stage.

5.3.14 Category 15: Income and Outlay

Income and outlays of holdings and households are covered in the six divisions of this category. Since most of the items determining revenues and outlays of holdings and agricultural service establishments, as well as off-farm employment earnings, are included

in appropriate classifications in categories 04-12, only items not covered elsewhere are itemized in this category. Also, a separate division contains information of household income from sales of personal property and miscellaneous sources. The division on household consumption (156) is disaggregated only to the subsection level because of the potentially large number of country-specific items involved. The countries are therefore recommended to prepare item lists reflecting their own culturally and economically determined consumption patterns. (See Appendix II for one possible detailed classification of consumer food items). Countries should also clearly specify whether their income and outlay data are determined by the accrual or cash method of acounting.

5.3.15 Category 16-17: Other

The final category includes miscellaneous information generated by a food and agricultural information system -- e.g., climatic and agricultural extension data -- and information available from other components of a national informations system or from other countries -- e.g., foreign trade accounts and national budgets and accounts.

5.4 Refinement and Standardization

The classification scheme and operational definitions presented in this chapter and in Appendix I are intended to serve as a prototype of a comprehensive, consistent design of the content of an information system for food and agricultural decision making. As a prototype, much will be learned in applying it to actual statistical and analytical work in developing countries, e.g., in the 1990 World Census of Agriculture and the design of other national food and agricultural censuses and surveys and policy analysis models (see Chapters 6 and 7, respectively).

In particular, individual countries will adapt specific classification items and definitions to their own unique situation through additions, deletions and modifications. This practical experience will assist in refining the general classification to better meet national needs while maintaining a high degree of international comparability. In addition, exposure to a wider review will ensure a standardization consistent with other classification schemes of the UN and its specialized agencies, particularly in subject areas where the scheme proposed here overlaps similar areas of other classifications.

CHAPTER 6

THE STATISTICAL PROGRAMME

Two major components of an information system for food and agricultural decision making are the statistical programme and the analytical programme. As explained in Section 4.4, the analytical programme concentrates chiefly on interpreting and analysing data and other information in light of existing knowledge and communicating the results to decision makers. The statistical programme, on the other hand, is primarily responsible for (a) producing data by observing and measuring the target world, i.e., the components of the socio-economic system pertaining to food and agriculture; (b) processing data; and (c) contributing to the upgrading of data by performing statistical analyses as part of the interpretation and analysis process.

This chapter discusses the functional, technical, and organizational issues surrounding the development of statistical programmes in developing countries. The next chapter performs a similar task for analytical programmes. Section 6.1 summarizes means available for measuring the information items classified in Chapter 5, while Section 6.2 outlines the technical aspects of statistical observation and measurement, including the quality of data. Finally, organizational infrastructure is discussed in Section 6.3.

6.1 Measurement Instruments and Data Sources

A classification scheme for the items of information useful for food and agricultural decision making is discussed in Chapter 5, with a detailed itemization presented in Appendix I. For each item, Appendix I also suggests what are, from the point of view of enumerators and statisticians, suitable statistical instruments for measuring that item in the target world. For users of the resulting data, on the other hand, e.g., statisticians, economists, decision makers and other analysts, the measurement instruments -- or more appropriately the reports of their findings, such as census reports, survey reports, and statistical summaries and yearbooks -- represent data sources. Table 6.1 summarizes the correspondence between the 21 instruments and sources and the major categories of information.

Operationally, the measurement instruments numbered 1 through 17 in Table 6.1 can be considered censuses and surveys, which are the main generators of data in most countries. While there are areas where censuses or surveys constitute the only sources of accurate

Table 6.1

Data Sources and Measurement Instruments for Categories of Food and Agricultural Information

Categ.	Description	Data Sources/Instruments*																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
01	Identification	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
02	General Characteristics	X		X				X											X	X		
03	Demographic Characteristics	X		X	X	X			X		X		X	X			X		X	X	X	
04	Employment	X		X	X	X		X	X		X		X	X		X	X		X			
05	Land and Water	X	X	X	X		X				X								X	X	X	X
06	Crops	X	X	X	X						X								X	X	X	X
07-08	Livestock	X	X	X	X						X	X							X	X	X	X
09	Machinery and Equipment	X	X	X	X						X	X			X					X		X
10	Buildings and Other Structures	X		X	X		X				X		X				X	X		X		X
11	Ancillary Activities	X	X	X	X	X						X				X						
12	Credit, Marketing, Stock	X		X	X							X							X	X		
13	Prices				X							X						X	X	X	X	
14	Post-Harvest Losses						X															X
15	Income and Outlay			X	X			X									X	X				
16-17	Other		X	X	X	X				X		X			X			X	X	X	X	X

The data sources and measurement instruments are as follows:

1 Census of agriculture
2 Periodic agricultural production survey
3 Farm management survey
4 Rural household income and expenditure survey
5 Food consumption survey
6 Survey of post-harvest losses
7 Survey of agricultural service establishments
8 Rural labour force survey
9 Soil survey
10 Livestock
11 Special agricultural censuses and surveys on particular subjects
12 Census of population and housing
13 Demographic survey
14 Census of industrial establishments
15 Survey of rural household industries
16 Urban household income and expenditure survey
17 Other non-agricultural censuses and surveys
18 Administrative records
19 Locality
20 International statistical publications
21 Technological research

data, this is not always the case and in almost all countries budgetary allocations for statistical purposes are nevertheless limited. Therefore, administrative and locality records, which are much less costly, should be used to supplement or replace censuses and surveys wherever feasible.

The sources/instruments for which FAO is responsible, plus those numbered 18 to 21 in Table 6.1, are briefly described in the following sections. Later volumes in this Statistical Development Series treat them at greater length.

6.1.1 The Agricultural Census and Production Survey

Censuses and surveys are statistical activities undertaken to collect data from units of interest by direct observation and measurement, interview or mail, or respondent record keeping. Although some surveys are designed to study the same selected units continuously over time, censuses and surveys are generally conducted at intervals to obtain data on a statistical population for a specific point in time.

The statistical unit for the census of agriculture is the operational agricultural holding. In the statistical literature, "census" refers to a complete enumeration of all statistical units in the population, while a survey collects data only from a selected number of statistical units, called a sample. Thus, a census of agriculture implies that data is collected from all holdings in the population. However, in many countries, it has been found impractical to conduct a complete enumeration of all holdings in a census of agriculture with a large scope. Therefore, census-of-agriculture data are collected in such countries only from a sample of holdings. While such an enumeration is, strictly speaking, a survey, it is nevertheless generally referred to as a "sample census of agriculture".

The purposes of the agricultural census are to: (a) collect data on the structure of agriculture, including a limited inventory of durable factors of production, the tenure rights of holders with respect to the factors of production, and the availability of agricultural inputs (goods and services); and (b) provide a frame for agricultural surveys. These purposes are limited, since it is assumed that countries supplement the census with other measurement instruments to meet their data needs. Thus, data collected in the agricultural census are limited to those aspects of agriculture which change relatively slowly over time under normal conditions.

The periodic agricultural production survey serves as the source of current statistics on agricultural production, with crop forecasting considered to be a complementary activity. Since the agricultural census does not include data on agricultural production, the production survey should be conducted every year, including the year of an agricultural census. The statistical unit for the production survey is the agricultural holding, and the population from which the sample is drawn should, if possible, cover all holdings in the country.

6.1.2 Other Food and Agricultural Censuses and Surveys

The main purpose of the farm management survey is to provide detailed data on all aspects of decision making on holdings, e.g., investment and disinvestment, assets, organizational structure, the allocation of resources, and input-output relations. Thus, the agricultural holding is the statistical unit for farm management surveys. Since agro-climatic conditions may vary greatly from one region to another, the survey sample should include regions representing the various conditions in the country. With a large scope covering the whole country, the survey should be conducted at five- to eight-year intervals.

The aim of the rural household income and expenditures survey is to obtain data on the income of rural households derived from all sources and on the expenditure patterns of these households. Thus, the statistical unit is the household, and, with a large scope, the survey should be repeated every five to ten years, depending on the rate at which changes are taking place in the conditions of rural life.

Emphasis in the food consumption survey is on the nutrition of individuals. Thus, with the individual as the statistical unit, the objective is to obtain data on the intake of food and its nutritive value. For technical reasons, the household is the statistical unit of a food consumption survey. Since food expenditures are one of the subjects covered in household income-expenditure surveys, countries may prefer to combine the two surveys by adding food purchases to the scope of the income-expenditure survey. Subsample surveys may be directed at the food intake of individuals and anthropometric measurements within the family unit.

An important aspect of the food problem in many countries is the waste and spoilage of agricultural products between field and table. The survey on post-harvest losses aims to measure these losses,

particularly for foodgrains, the major part of agricultural production destined for human consumption. Since the survey covers losses at various stages of marketing, transportation and storage, the statistical units for the corresponding phases of the survey are agricultural holdings, intermediaries, and warehouses respectively. Similarly, a survey on pre-harvest losses of foodgrains due to pests and diseases provides data for planning a programme to reduce foodgrain losses.

The survey of agricultural service establishments, for which the statistical unit is the agricultural service establishment, collects data on these important contributors to agricultural gross domestic product.

The soil survey, which is not normally the responsibility of the agricultural statistical agency, is a systematic study of soil classifications, property mappings, crop adaptation, and the distribution of various soil types. Statistical units for the survey are areas with well defined boundaries.

The livestock census or survey collects data, on both animals and holdings with livestock, necessary to evaluate animal husbandry practices. Its scope should be broad enough to include all animal husbandry systems practised in the country, including nomadic ones. The agricultural holding is the statistical unit for this survey. Countries may want to conduct a livestock census, at eight- to ten-year intervals, in addition to more frequent (at least annual) livestock surveys.

Price statistics are generally collected through specialized price surveys but may also be collected through other agricultural surveys. Agricultural and food prices derive their meaning and significance from the stage of marketing they relate to, i.e., prices received by farmers, wholesale prices, retail prices, export prices, import prices and prices paid by farmers.

The statistical unit for collecting price statistics varies according to the type of price and to the prevailing marketing systems in the country. Thus, the statistical unit might be the holding or the agricultural household or the wholesale market in the case of prices received by farmers. The wholesale market and the terminal market are the primary sampling units for wholesale and export prices, respectively, while the transactions themselves or the outlets are the secondary sampling units. The retail outlet, holding or agricultural household may be the sampling unit for prices paid by farmers for agricultural production inputs.

Special agricultural censuses and surveys on particular subjects include all agriculturally related censuses and surveys not specifically mentioned above. Examples include: number and type of fruit trees, fishery and forestry as ancillary activities of agricultural holdings, non-agricultural uses of machinery and equipment, credit, stocks, and marketing. There are also small-scale surveys required, for example, to develop conversion factors between greasy and clean fleece weights for wool and goat hair, and between carcass weight and liveweight of livestock.

As has been pointed out, food and agricultural information is but a subsystem of a national information system. A food and agricultural statistical programme, however, depending on the organizational structure of statistical institutions in the country, does not necessarily provide all the statistical information needed by food and agricultural decision makers. These decision makers also typically need data on the target world -- e.g., on population, prices, labour force, income and expenditure, and rural industrial establishments -- measured by other censuses and surveys (outside the responsibility of FAO) such as those numbered 4, 8, and 12 through 17 in Table 6.1. Indeed, a similar role is played by agricultural censuses and surveys, providing agriculturally related data needed by decision makers in other sectors.

6.1.3 Administrative Records

Some records kept by administrative agencies for internal use may advantageously serve more general purposes if made available to the public in statistical form. For example, measurements done by cadastral offices to establish cadastral maps are administrative records, and, as such, they are legal documents. However, such records may also be used to identify the parcels of a holding and thus to find the total area of the holding or the distribution of its land by class of use. Similarly, for example, records of prices at wholesale markets, of imports and exports, of livestock slaughtered at slaughterhouses, and of the implementation of irrigation schemes and other government projects are all useful sources of data.

Such administrative records, once established, should not be revised very often. Therefore, extreme care should be exercised in identifying the data to be recorded and in determining the definitions of concepts to be adopted and the format of the forms to be used for recording. A control scheme, at least on a sample basis, should be built into the record-keeping activity to improve the quality of data.

6.1.4 Locality Records

Locality records are kept by the inhabitants of a locality on a voluntary basis. They differ from administrative records in that they are not the by-products of government agencies but constitute a form of people's participation in rural development.

Such records may contain a variety of agricultural and non-agricultural facts about the locality -- e.g., relating to households, livestock, land, markets, cottage industries, extension services, and irrigation facilities -- not found in any other source of data, thus constituting an important component of community-level statistics. If this data is to be aggregated to higher geographic or functional levels, however, the definition of concepts and the forms used for record keeping should be standardized.

6.1.5 International Statistical Publications and Data Banks

The statistical publications and data banks of other countries and of international agencies are useful in cross-country comparative studies and in checking export statistics against the import statistics of other countries, forecasting exports, and monitoring world prices. Such sources have a further important use for a country which, lacking statistics of its own on a particular topic, e.g., capital-output ratios or demographic vital rates, adapts the statistics of other countries having similar conditions with respect to that topic.

The usefulness of international statistics is highly dependent on the uniformity of the concept definitions used and the classification schemes adopted. Although much has been accomplished in securing such uniformity among countries, there is still room for further improvement. Countries have been urged to provide, in their statistical publications, detailed definitions of concepts which differ from those given in international recommendations.

6.1.6 Technological Research in Food and Agriculture

Technological research is generally performed in laboratories, universities and research institutes and involves experiments with food crops, animals and agricultural inputs. It aims mainly at discovering causal relations, in contrast to other data sources which collect primarily descriptive data. Indeed, it is this difference

that makes technological research and other data sources complementary to one another. That is, the descriptive statistics obtained from censuses and surveys may aid the formulation of hypotheses to be tested by technological research; similarly, research results may suggest, for example for confirmation purposes, additional information to be obtained through censuses or surveys.

6.1.7 Relationships among Measurement Instruments

In order to optimize the allocation of data collection resources and the quality of the data collected, linkages among the above measurement instruments and data sources need to be clearly identified. There are two dimensions to the linkages, or relationships: design and organization. The design of an instrument refers to such technical considerations as scope, coverage, methodology, timing, publication programme and data storage, while organizational considerations include institutional structure, human resources and supporting infrastructure. These topics are discussed in the following sections.

6.2 Technical Considerations

There are many technical aspects to consider in designing and conducting agricultural censuses and surveys, e.g., sample design, questionnaire design, enumeration, data processing, publication, statistical analysis and data quality. Many of these and other considerations will be treated fully in subsidiary manuals to be published in this Statistical Development Series. This section considers the following implications and advantages of linkages among measurement instruments: conceptual definitions, timing, master frame and data storage.

6.2.1 Conceptual Definitions

One objective of linking measurement instruments through their design is to make it possible to combine data from various sources as needed for particular analyses. Therefore, the need for uniformity in conceptual definitions and classification schemes cannot be over-emphasized. For example, an agricultural holding should be defined identically for farm management surveys and agricultural censuses, and size classes of holdings should be the same or mutually convertible for all measurement instruments and data sources. The classification scheme and definitions presented in Chapter 5 and Appendix I are an attempt to promote this conceptual consistency.

6.2.2 Timing

Equally important is the timing of the various censuses and surveys. That is, proper scheduling enables the information collected in one instrument to be used in the design of another. A particularly important example is that, if possible, the census of agriculture should be undertaken just after completion of the population census (discussed further below). Information on who is engaged in agricultural activities, acquired while listing households in the population census, is of utmost importance in preparing the frame of the census of agriculture. In many countries, urban areas are inadequately covered, if at all, in censuses of agriculture. In such cases, subjective guesses must be made regarding agricultural production in urban areas in order to estimate national production for use in the national accounts. Therefore, it is recommended that the population census include items indicating whether any household members, even in urban areas, are engaged in agricultural activities.

Table 6.2 illustrates a simplified outline of a ten-year cycle of data collection activities and serves as a guide in the timing of various measurement instruments, as indicated by the X in the appropriate year. Table 6.2 omits items 17-21 from Table 6.1, because these represent data sources not subject to design and timing decisions of food and agricultural statistics. Furthermore, such data collection activities as 4, 8 and 12-17 are the responsibility of other UN agencies, which may suggest timings other than those indicated in Table 6.2. For the rest, three censuses are to be undertaken once every ten years: population, agriculture and industry; one survey is to be conducted annually: the periodic agricultural production survey; and six surveys and one census are to be carried out every five years: farm management, rural and urban household income and expenditure, food consumption, agricultural service establishments, rural labour force, and livestock. A soil survey may be taken once every ten years. In addition, special agricultural surveys (number 11) may be conducted in any year.

A population census is important for the national food and agricultural information system in two respects: (a) to establish the statistical frame for food and agricultural surveys, and (b) to identify the socio-economic groups at which level agrarian reform and rural development programmes are to be monitored and evaluated. It is not certain that traditional population censuses adequately enumerate a country's socio-economic groups for the latter purpose.

Table 6.2
A Ten-Year Cycle of Data Collection Activities

	Instruments and Sources	Year (ending in digit) 0 1 2 3 4 5 6 7 8 9
1	Census of agriculture	X
2	Periodic agricultural production survey	X X X X X X X X X X
3	Farm management survey	X X
4	Rural household income-expenditure survey	X X
5	Food consumption survey	X X
6	Survey of post-harvest losses	X
7	Survey of agric. service establishments	X X
8	Rural labour force survey	X X
9	Soil survey	X
10	Livestock census	X X
11	Special agricultural censuses and surveys	X X X X X X X X X X
12	Census of population and housing	X
13	Demographic survey	X
14	Census of industrial establishments	X
15	Survey of rural household industries	X
16	Urban household income-expenditure survey	X X

The network in Figure 6.1 outlines an approach to satisfying both needs, with the hypothesis that most of such information could, in many developing countries, be provided by population censuses. Figure 6.1 disaggregates a population into nine levels, with the total population of a country at level 1 and the rural/urban disaggregation at level 2. Population censuses traditionally identify the geographic location of the population, e.g., by state, province, region, city, town, etc., at the third level, as illustrated on the urban side of Figure 6.1. For an ideal agricultural statistical frame, one that could be fully stratified by socio-economic group within agro-ecological zones, the rural side of Figure 6.1 identifies the agro-ecological or other land or resource zone at level 3.

At level 4, the household is identified, including whether it has a male or female head. An institutional category is also designated at this level. In the traditional sense, this institutional designation could include schools, hospitals, military installations and other organizations providing institutional food and housing. With respect to the rural population, state and collective farms of socialist countries are identified.

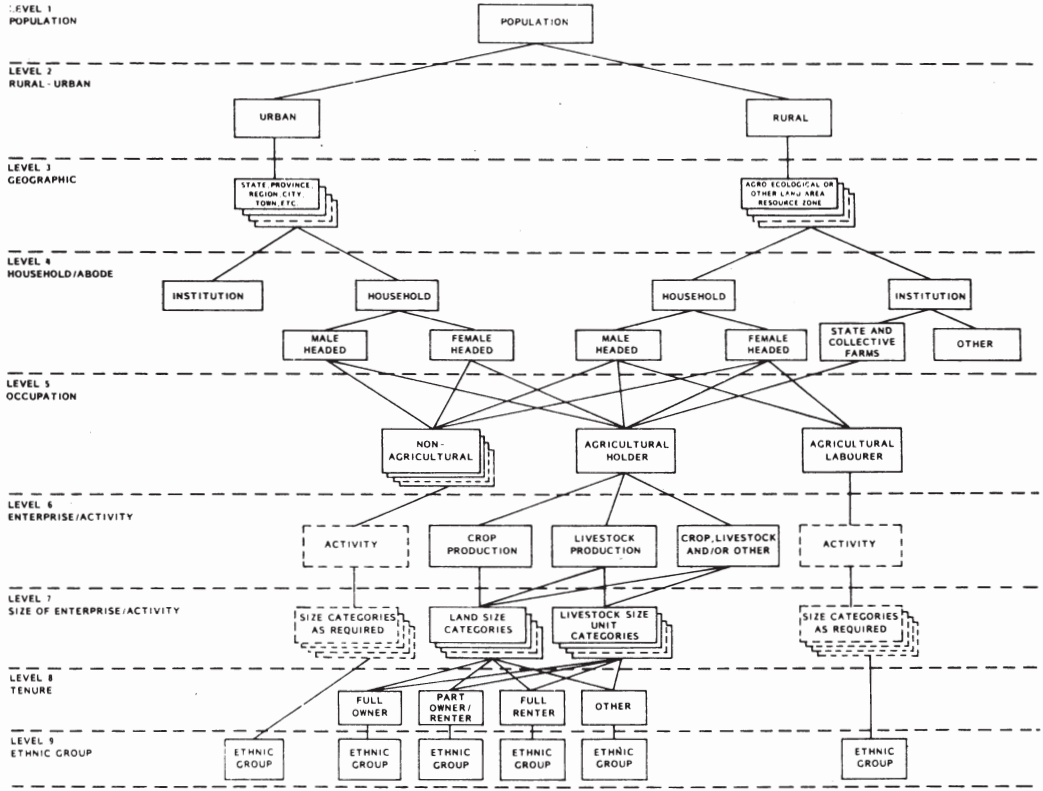

Figure 6.1

Delineation of socio-economic groups and agricultural holders by agro-ecological zone or other geo-political area

The agricultural holder or labourer within each household is identified at the occupational level, level 5. There is also an opportunity at this level to record rural households as non-agricultural and urban households as containing agricultural holders.

Level 6 identifies the basic type of agricultural enterprise, such as crop production, livestock production, or some combination of crop, livestock and other agricultural enterprises. Levels 6, 7 and 8 in Figure 6.1 may not be essential in the traditional sense for providing a statistical frame in food and agriculture. However, access to land is an indicator of a dominant socio-economic group, and is thus important for monitoring and evaluating agrarian reform and rural development programmes, as is the designation of ethnic group at level 9.

At level 5 and in Figure 6.1, the designated information begins to exceed what is normally included in a population census. However, the goal of providing both a statistical frame and an identification of socio-economic groups could be extended to other non-agricultural statistical areas. For this purpose, much more detail would be needed than is provided in Figure 6.1. Thus, the dotted lines indicate areas possibly needing further development for such purposes. With very limited resources available for statistical frames in developing countries, there is often competition for carrying out not just the population and agricultural censuses but also censuses in other important areas, e.g., housing. However, if the population census could provide agriculture and other important sectors with the information outlined in Figure 6.1, multi-year schedules of sample surveys could be developed to collect, in a much more timely and cost-effective manner than otherwise, most of the statistics necessary beyond those derived from the population census itself.

6.2.3 Programme Coordination and Integration

Adequate coordination is a prerequisite for the successful implementation of a national statistical programme for food and agriculture. A national coordination committee will be useful in reviewing and monitoring the implementation programme. It is important to review the plan periodically, for possible changes in priority and timing necessitated by such unforeseen factors as delays caused by shortages of funds.

A long-term integrated programme of data collection activities can increase the efficiency and timeliness of statistical activities and the accuracy and consistency of statistical information. Such a programme is comprised of (a) a well specified and detailed description of the data instruments to be undertaken; and (b) a realistic schedule of collection, processing, analysis and dissemination of quantitative information. The data instruments are programmed in advance for each year and over a period of, say, 10 years in such a way that maximum use is made of the common or interrelated aspects of the data requirements and statistical operations to achieve economy and efficiency and to enable the accumulation of experience for improving future data collection activities. Such a programme must, of course, take into consideration the limitations imposed by the availability of human and financial resources and supporting infrastructure.

6.2.4 Frame

The success of any census or survey depends to a large extent on the quality of the frame (list, map or other means) used to identify the statistical units in the population. The ideal would be to have a complete list of all statistical units, with prior information for each of them on particular characteristics of interest, before starting the census or survey. Registers of statistical units (e.g., agricultural holdings, agricultural service establishments, or households) are not generally available in most countries. Consequently, many surveys are based on multi-stage sampling schemes due to insufficient prior information on sampling units, resulting in the need for large, costly samples. A population census should provide a frame of agricultural households for the agricultural census. In turn, an agricultural census should provide a sound frame for other agricultural surveys whose statistical units are agricultural holdings.

6.2.5 Sampling Techniques

Sampling techniques are increasingly being used in agricultural censuses and surveys, especially in developing countries, to (a) allocate limited human and financial resources effectively; (b) publish important results rapidly; carry out quality control checks on collected data; and (c) better control field operations.

The sampling design depends on available resources, the accuracy desired in the estimates of principal items, and the control of field activities. Many sampling designs have been used, the most common