1980 WORLD CENSUS OF AGRICULTURE

methodological review

Food and Agriculture Organization of the United Nations

FAO Statistics Series No. 107

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1992

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P-78
ISBN 92-5-103015-4

Foreword

This publication is a review of methodological aspects of the national agricultural censuses conducted within the framework of the Programme for the 1980 World Census of Agriculture of the Food and Agriculture Organization of the United Nations. Although much effort was made to pool together all sources of information available in countries that participated in the 1980 World Census of Agriculture, this report is by no means exhaustive. Some census reports did not contain an adequate description of methodological subjects. This lack of information has been the limiting factor in the contents of the publication. Nevertheless, the publication contains experiences of many countries in conducting their agricultural censuses during the period 1976-1985.

The publication was prepared with the assistance of a consultant, Dr Tuncer Bulutay. It is hoped that it will be useful to national authorities in planning their future agricultural censuses.

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Introduction

This report on the 1980 World Census of Agriculture (WCA), the fourth decennial census of agriculture promoted by the Food and Agriculture Organization of the United Nations (FAO) is based mainly on information available in the FAO Statistics Division as of April 1990. The sources were the following, in order of importance: national census documents and reports; *National methods of collecting agricultural statistics*, Vols I and II (FAO, 1974a; FAO, 1975a); *Supplements to national methods of collecting agricultural statistics* Nos 1-19 (FAO, 1979-1984); and documents of various FAO meetings and sessions.

Several publications, census documents and national or FAO reports are quoted often. In general such quotations are given in full without changes. For all quotations the sources are mentioned, the only exception being references to the *Programme for the 1980 World Census of Agriculture.*

Throughout this document the territories are treated separately in the same manner as countries with regard to their agricultural census. Accordingly, the word "country" is used to refer to both countries and territories.

This report, made up of 11 chapters, is quite similar in structure to the *Report on the 1970 World Census of Agriculture.* However, Chapters 2, 10 and 11 are substantially new. The register system in developed countries and the use of administrative records in socialist countries, treated in Chapter 7, are also new subjects.

The first chapter summarizes some general features of the Programme of the WCA. The historical evolution of the Programme, country participation in the Programme and related national publications are the subjects of this chapter.

In the second chapter participation, methods and techniques in agricultural censuses are described in three sections. The first section deals with the period before the 1980 WCA, the second treats the 1980 WCA and the third summarizes the main trends in agricultural census methodology.

Chapters 3 and 4 discuss the concepts and the scope of national agricultural censuses in the 1980 WCA. Country practices in eight sections of the 1980 Programme are shown in detailed tables and explained in the text.

Census legislation, which is one of the basic components of an agricultural census, is considered in Chapter 5. Census legislation practices of some countries are summarized in this chapter.

Chapter 6 details one of the most important and exacting tasks in the preparation of a census, namely the development of census questionnaires. The first section briefly mentions mail and interview techniques, which are the two main techniques for obtaining census data. The length of questionnaires and question grouping are the subjects of the following sections. Two examples are given in the last section: the census questionnaire of Grenada and the list of characteristics to be covered in national questionnaires in the European Economic Community.

Techniques of data collection are the subject of Chapter 7. The first section provides detailed information on the mail and interview techniques mentioned in the previous chapter. The register system applied in some developed countries and the use of administrative records in socialist countries are the important new parts of this chapter.

Sampling techniques, largely developed in the present century, are essential to those agricultural censuses based on sample enumeration. Chapter 8 discusses this important subject. A general explanation of sample design is given in the first two sections. The third and last section of the chapter considers sampling practices used by several countries in the 1980 WCA.

Chapter 9 deals with data processing and tabulations. In the first

section practices of some countries are described as examples. The second section analyses the tabulation of results by country.

Accuracy and reliability of census data are vital. To determine the possible presence and magnitude of errors and biases and to minimize them for present and future agricultural censuses are tasks of the highest priority. Various studies and surveys are recommended to accomplish them. Chapter 10 discusses these studies and surveys and the practices of some countries in the 1980 WCA.

Chapter 11 concludes the general analysis of this report with a review of the main features of the 1980 WCA and prospects for the future. The first section of the chapter summarizes important aspects of the 1980 census. Important problems remaining after the 1980 WCA and the solutions proposed for resolving them in the 1990 Programme are considered briefly in the second section of the chapter.

How the agricultural census work was organized and carried out in certain countries is described in the "Case studies". One country is selected from each region, except for Africa, Asia and the Pacific and Europe. For Europe two countries are taken: one with a market economy and the other with a centrally planned economy. For Africa and for Asia and the Pacific two examples instead of one are considered more illustrative of the objectives of this report.

The Annex lists the training programmes organized for the 1980 WCA. The bibliography contains the publications of countries that participated in the 1980 census as well as other sources used as references in this report.

Chapter 1

The Programme of the 1980 World Census of Agriculture

Some general features of the Programme of the WCA are summarized in this chapter, which consists of three sections. The first section briefly reviews the historical evolution of the Programme. The second section deals with the preparation of the 1980 WCA. The last section gives information on the participation and publications of countries in the 1980 census.

HISTORICAL EVOLUTION OF THE PROGRAMME OF THE WCA

Periodic agricultural censuses supply basic quantitative information on the structure of agriculture that is needed in development planning, socio-economic policy formulation and the establishment of national priorities. Such censuses also provide the basis for the development of comprehensive and integrated national statistical programmes on food and agriculture.

The Programme for the 1980 WCA, the fourth decennial international programme launched, promoted and supported by FAO, refers to national agricultural censuses undertaken during the ten years 1976-1985.

The first WCA programme was launched by the International Institute of Agriculture with the title Programme of the 1930 World Census of Agriculture; 53 countries participated. It was the intention of the institute that the 1930 census should be the first of a series of censuses taken at intervals of ten years. Another WCA, therefore, was planned for 1940. Preparations were made,

but the Second World War interfered with the full implementation of the programme (FAO, 1958, p. 2, 3).

FAO, having succeeded the International Institute of Agriculture, launched the Programme for the 1950 WCA. In that first FAO programme emphasis was put on methodological and operational aspects to make them fit local circumstances. Another new element in the 1950 Programme was the existence of both a short list of essential census information which should be collected by all countries and an extended list which contained items considered of secondary importance. The 1950 Programme also gave increased attention to the definitions of census items.

There were further important changes in the Programme for the 1960 WCA. Most were in the field of methodology. The basic difference was the introduction and use of sampling methods. Knowledge of sampling methods was not widespread in the 1950s, but around 1960 expertise on sampling methods became more widely extended among statisticians. The capacity to use such methods increased the number of countries participating in the census of agriculture. It reached 100 in 1960 as compared with 81 in 1950. The use of sampling had other positive results: there was more interest in conducting quality checks and a higher level of flexibility was attained to adjust methodologies to local conditions.

The *Programme for the 1970 World Census of Agriculture* envisioned in principle the collection of data directly from all individual holdings by a complete enumeration. However, it stressed the importance of sampling by saying, "in some situations sample censuses can provide data with greater accuracy than complete enumeration" (FAO, 1965, p. 3). It also pointed out that the planning and taking of a census by sample enumeration was generally more complicated than by a complete enumeration and called for even more intensive preparations.

More important, according to the 1970 Programme sample enumeration and complete enumeration are not mutually exclusive. Information on some items can be collected by complete enumer-

ation, while for other information sampling can be used. Large agricultural holdings or holdings of a special pattern may be enumerated completely; for small holdings sampling can be applied.

Apart from the above uses, the 1970 Programme recommended the use of sampling in surveys to measure changes, in pilot censuses and in pre-testing surveys. It also stressed the importance and advantages of using sampling to assess the quality of field work and to control errors of processing.

The 1970 Programme retained the sections and structure of the 1960 Programme and the main concepts and items covered in the former were essentially the same as those included in the latter. There were, however, three main changes in the 1970 Programme:

- Section 0 was extended to include a new topic, "Type of holding".
- Some changes were introduced in Section 4 on "Employment in agriculture": a new item was included to get information on the respective contributions of holder's household and hired workers to the agricultural work of the holding. An additional item was proposed to learn the number of hours worked by the members of the holder's household on and off the holding.
- A new section, "Association of agricultural holdings with other industries", was introduced. The objective of introducing this section was to collect data on the magnitude and nature of the association and relationship between the agricultural holdings and related industries.

By the time work started on the preparation of the 1980 Programme the following trends and conditions prevailed: important experience had accumulated from past agricultural censuses in which participation had been encouraging; food problems were increasing, and concern with them was widespread; governments were showing increasing interest in agricultural and rural life and in the well-being of the people in agriculture; they were becoming more aware that agricultural statistics were unsatisfactory and that

for successful agricultural planning, accurate and relevant data were of top priority.

FAO, when introducing the *Programme for the 1980 World Census of Agriculture*, took all these factors into account. The 1980 Programme recommended the following policies: the census of agriculture should be used as a basis for the collection of current data by improved methods; it should be utilized for the development and improvement of an overall programme of food and agricultural statistics using harmonized concepts, definitions and methods; a permanent full-time, well-trained and experienced data-collection staff should be retained; more elaborated tabulations now feasible through computer applications should be produced and each country should have greater flexibility and more freedom in adapting the programme.

PREPARATION OF THE 1980 PROGRAMME

In preparing the 1980 Programme, FAO benefited from the experience gained in the preceding decennial census rounds. Moreover, the views and comments of selected national and international experts from all over the world were solicited during 1973/74. Two internationally known agricultural census specialists were engaged by FAO to advise on recent trends in such censuses and on a preliminary draft of the 1980 Programme. It was also discussed in detail by the FAO Statistical Advisory Committee of Experts (SAC) at its Sixth Session in 1973. Subsequently, a draft of the 1980 Programme was prepared for consideration in 1974/75 by the FAO Regional Statutory Bodies in Agricultural Statistics in Asia and the Pacific, Europe, Latin America and the Caribbean, Africa, and the Near East. In addition, small group consultations with countries were held in Africa and Asia and the Pacific. The draft was circulated for comments to Member Nations, to statistical offices in other United Nations agencies, to members of the United Nations Statistical Commission, and to national and international experts. The draft was then reviewed by the Seventh

Session of SAC held in 1975, which agreed to its finalization, incorporating the recommendations made.

At its Eighteenth Session held in November 1975, the FAO Conference welcomed the 1980 Programme and noted the emphasis placed on the role of the census in the development of national, ongoing, integrated systems of food and agricultural statistics. The Conference approved the Programme and stressed the importance of early preparations for agricultural censuses by Member Nations and the need for technical assistance to developing countries, including assistance in data processing.

Training for the 1980 WCA

The importance of training census personnel, especially at the grassroots level, was further emphasized in the 1980 Programme itself. Starting with the 1978-79 biennium, the FAO Statistics Division began organizing National Demonstration Centres (NDCs) to provide training and demonstration of the various census operations for local census personnel in selected countries in all the developing regions of the world. The duration of each NDC was approximately two to four weeks, depending on the contents of the course.

The objective of the training programme for the 1980 WCA was to meet countries' specific needs in carrying out their censuses of agriculture. The training programme provided field demonstration as well as classroom lectures and exercises for local census personnel in selected developing countries that intended to carry out a national census of agriculture. To promote the 1980 WCA, a few participants from selected neighbouring countries were also invited to attend the NDCs at FAO's expense. A large number of field staff at the grassroots level were trained to perform the census field work. The NDCs helped to improve efficiency in carrying out the census in developing countries and hence improved the quality of results. The content, though different from country to country, included the following general elements:

Classroom lectures. Classroom lectures were limited to concepts, definitions and techniques necessary for the participants to appreciate the census methodology, the importance of the field work and certain procedures designed to improve the quality of census results. Main objectives and main concepts related to the agricultural census and the extent of coverage in taking the census were explained. Basic concepts related to the holding, holder, etc. were studied, and difficulties likely to be encountered in the application of these concepts (and possible solutions) were noted. Some problems specific to certain countries, e.g. enumeration of nomadic livestock including animals crossing national borders, mixed and/or continuous cropping, shifting cultivation and use of different measurement units, were dealt with separately.

Exercises. Procedures for carrying out the following major field operations were explained and illustrated by the participants during the classroom exercises; some of these operations required repetition in the field on a small scale:

- Cartographic preparations: updating and correcting the available maps, sketching the main features and boundaries of the enumeration districts (EDs); examining means of segmentation of area, e.g. cadastral maps, aerial photographs, other maps.
- Listing of holdings: techniques of dwelling-to-dwelling count in the EDs.
- Interviews: techniques of interviewing; filling in the questionnaires, e.g. holding questionnaire, village questionnaire; checking completed questionnaires.
- Area measurements: using measuring instruments; drawing sketches; calculating the areas of parcels, fields and plots; using programmable pocket calculators, etc.
- Crop-cutting experiments: using crop-cutting instruments; determining the size and shape of plots; specifying procedures, etc.
- Editing, coding and tabulating data.

Part of the workshop was devoted to the preparation, tabulation and analysis of the results of the field work. Procedures developed by the participants during the exercises, such as the segmentation of the experimental area and selection of the sample, questionnaires, forms, instructions, organization of field work, etc. were utilized in the field demonstration.

Field demonstration. Participants were required to carry out all or part of the major operations described in the preceding section during the field work. This was a rehearsal of a part or the whole main agricultural census, examining all the important operations and procedures used in the taking of an agricultural census. During the listing of holdings, maps of EDs were used to plot all the houses or dwellings found and to indicate where a holding existed. This procedure helped the participants to identify the holdings for the interview of the holders. During the enumeration some problems arose because of refusals and the not-at-homes, and in those instances several calls were necessary. Completed questionnaires were scrutinized and checked before leaving a holding. The following quality checks were carried out on a sample of holdings: objective measurement of area and yield of crops to check data obtained through interview; actual counting of the number of livestock and poultry to check data collected through interview and repetition of the interview by different enumerators.

Arrangements. The global organization and conducting of these NDCs for the 1980 WCA were the responsibility of the FAO Statistics Division in close collaboration with the statistical staff of the FAO regional offices and the country FAO/UNDP agricultural statisticians. The NDCs were organized at the initiative of the host government, and national institutions were contracted to organize and conduct them. The FAO Representative, or the Senior Agricultural Advisor and the UNDP Resident Representative in the

host country provided support and assistance in organizing and conducting the NDC.

A list of training programmes organized for the 1980 WCA is given in the Annex.

PARTICIPATION AND PUBLICATIONS OF COUNTRIES IN THE 1980 WCA

It is known that 103 countries carried out a census of agriculture during 1976-1985, but FAO had received the census results from only 86 countries as of April 1990. These countries are listed in Table 1 with the year in which the census was taken. After the names of the regions are shown the number of countries within the region participating in the 1980 WCA. The letter (p) after country names signifies that FAO has published their 1980 WCA results in Census Bulletins.

The number of countries and territories that participated in the 1980 WCA by FAO regions were Africa 20, Asia and the Pacific 19, Europe 22, Latin America and the Caribbean 26, Near East 11 and North America 2.

Countries normally publish the results of their agricultural censuses, and at least one publication has been produced by each country that participated in the 1980 WCA.

There is, of course, some interval between the date of the census and the publication of the results. From the data available it seems that the most common interval is about two years. This is the case, for example, in Australia, Austria, Belgium, Cape Verde, Cyprus, Fiji, Federal Republic of Germany, Guam, Israel, Japan, the Republic of Korea, the Netherlands, New Zealand, the Philippines, Togo, the United States and the US Virgin Islands. An interval of one year (Canada, Czechoslovakia, Denmark, Ethiopia, Grenada, Ireland, Italy, Luxembourg and Switzerland) or three years (American Samoa, Guatemala, Malawi, Nepal, Northern Mariana Islands, Spain and Uruguay) is less common. This interval

TABLE 1

Countries participating in the 1980 WCA

Region and country	Census year
Africa (20)	
Botswana (p)	1982
Cameroon	1985
Cape Verde (p)	1981
Central African Republic (p)	1985
Congo (p)	1986
Ethiopia (p)	1977
Ghana	1984
Kenya (p)	1979
Lesotho	1980
Madagascar (p)	1984
Malawi (p)	1981
Mali	1984
Mauritania (p)	1985
Niger (p)	1980
Reunion (p)	1981
Rwanda (p)	1984
Sierra Leone (p)	1985
Swaziland [1]	1984
Togo (p)	1983
Zambia	1982
Asia and the Pacific (22)	
American Samoa (p)	1980
Australia (p)	1980
Bangladesh (p) [2]	1977
Federated States of Micronesia	1980
Fiji (p)	1978
Guam (p)	1978
India (p)	1976
Indonesia	1983
Japan (p)	1980
Korea, Republic of (p)	1980
Malaysia	1977
Marshall Islands	1980
Nepal (p)	1981
New Zealand (p)	1980
Northern Mariana Islands (p)	1980
Pakistan (p)	1980
Palau, Republic of	1980
Philippines (p)	1981
Sri Lanka (p)	1982
Thailand (p)	1978
Tonga (p)	1985
Vanuatu	1983
Europe (22)	
Austria (p)	1980
Belgium (p)	1979
Czechoslovakia (p)	1980
Denmark (p)	1979

TABLE 1 (cont.)

Countries participating in the 1980 WCA

Region and country	Census year
Finland (p)	1980
France (p)	1979
Germany, Federal Republic of (p) [3]	1979
Greece	1981
Hungary (p)	1981
Ireland (p)	1980
Italy (p)	1982
Luxembourg (p)	1980
Malta (p)	1979
Netherlands (p)	1979
Norway (p)	1979
Poland (p)	1980
Portugal (p)	1979
Spain (p)	1982
Sweden (p)	1981
Switzerland (p)	1980
United Kingdom (p)	1979
Yugoslavia (p)	1981
Latin America and the Caribbean (26)	
Antigua and Barbuda (p)	1984
Bahamas (p)	1978
Barbados	1984
Belize (p)	1985
Brazil (p)	1980
Chile	1976
Costa Rica	1985
Dominican Republic	1982
Ecuador	1984
French Guiana (p)	1980
Grenada (p)	1981
Guadeloupe (p)	1980
Guatemala (p)	1979
Jamaica (p)	1978
Martinique (p)	1980
Mexico	1981
Panama (p)	1981
Paraguay (p)	1981
Peru	1983
Puerto Rico (p)	1978
Saint Lucia	1984
Suriname (p)	1981
Trinidad and Tobago (p)	1982
Uruguay (p)	1980
Venezuela	1984
Virgin Islands (US) (p)	1978
Near East (11)	
Bahrain (p)	1980
Cyprus (p)	1977
Egypt	1982
Israel (p)	1981

TABLE 1 (cont.)
Countries participating in the 1980 WCA

Region and country	Census year
Jordan (p)	1983
Oman (p)	1978
Saudi Arabia (p)	1982
Syrian Arab Republic	1981
Turkey (p)	1980
Yemen Arab Republic (p) [4]	1983
Yemen, People's Democratic Republic [4]	1984
North America (2)	
Canada (p)	1981
United States (p)	1978

Notes: (p) Indicates that census results have been published by FAO.
[1] Date of last census; but data available for Swaziland refer to 1980 census.
[2] There are two agricultural censuses (1977 and 1983/84) in Bangladesh within the 1980 WCA.
[3] Now part of Germany.
[4] The Yemen Arab Republic and the People's Democratic Republic of Yemen now form Yemen.
General Note: Countries taking part in the 1980 WCA whose names have subsequently changed, will henceforth be referred to by their name at the time of the census.

is longer in some countries (for example, four years in Brazil and Paraguay).

Some countries produce several volumes on their censuses of agriculture. For example, five volumes are published in Switzerland and the United States; eight in Norway and 20 in Canada. In the United States, the five volumes contain several reports.

FAO publishes the results of the agricultural censuses of participating countries in Census Bulletins. Selected results for 78 countries in the 1980 WCA have been published in these bulletins as of April 1990.

Chapter 2

Participation, methods and techniques in agricultural censuses

The history of agricultural censuses in the world is quite long, and during the course of agricultural census development various trends have emerged. The first section of this chapter describes the situation before the 1980 WCA, the second section presents the main features of the 1980 WCA and the third and last section summarizes the trends in agricultural censuses.

AGRICULTURAL CENSUSES BEFORE THE 1980 WCA

Table 2 provides information on participation in agricultural censuses.

Participation in and periodicity of censuses

While the history of the agricultural census is quite long in some countries, beginning in 1840 in the United States, there are also countries that did not conduct such censuses prior to the 1980 WCA.

Many countries have participated in the WCA that was launched first by the International Institute of Agriculture and then by FAO. Participation in the census programme increased throughout the years up to the 1970 WCA: 53 countries participated in 1930, 81 in 1950, 100 in 1960 and 111 in 1970.

The ten-year interval recommended by FAO for agricultural censuses seems satisfactory for the majority of countries. It conveniently allows the census objectives to be fulfilled, namely the collection of data on those aspects of agricultural structure that

TABLE 2

Countries participating, with year of participation, in the World Censuses of Agriculture: 1980, 1970, 1960, 1950 and 1930

Region and country	Year of participation in the world censuses of				
	1980	1970	1960	1950	1930
World					
Total participants	103	111	100	81	53
Africa					
Total participants	20	24	26	17	7
Algeria	—	1973	—	1950/51	1930
Angola	—	—	1961	—	—
Benin	—	—	—	—	[1 2]
Botswana	1982	1969	1962 [3]	1950 [3]	—
Burkina Faso	—	—	1961	—	[1 2]
Cameroon	1985	1972	—	—	—
Cape Verde	1981	—	—	—	—
Central African Rep.	1985	1973	1960	—	—
Chad	—	1972	—	—	—
Congo	1986	1972	1960 [4]	—	—
Côte d'Ivoire	—	1973/74	—	—	[2 1]
Ethiopia	1977	—	—	—	—
Gabon	—	1973/74	1960	—	—
Gambia	—	—	—	1950 [2]	—
Ghana	1984	1970	1964	1950 [2 5]	—
Guinea	—	1974/75	1964	—	1929/30 [2 1]
Guinea-Bissau [6]	—	—	1960/61	1953	—
Kenya	1979	1969/70	1961	1954	1930
Lesotho	1980	1970	1960 [7]	—	—
Liberia	—	1971	—	—	—
Madagascar	1984	—	1961/62	—	—
Malawi	1981	1969	1960/61 [8]	1950 [8]	1929/30 [2 8]
Mali	1984	—	1961	—	[2 1]
Mauritania	1985	—	—	—	[2 1]
Mauritius	—	—	—	1950	1929/30
Morocco	—	1974	1962	—	—
Mozambique	—	—	—	1951	1930
Namibia [9]	—	—	1959/60	—	—
Niger	1980	—	1960	—	[2 1]
Nigeria	—	1974/75	—	1950 [10]	1929/30 [2]
Reunion	1981	1973	—	—	—
Rwanda	1984	—	—	—	—
Saint Helena	—	—	—	1950 [2]	—
Senegal	—	—	1960	—	[2 1]
Seychelles	—	—	1960	1950	1929/30
Sierra Leone	1985	1971	—	1950 [2]	—
Somalia	—	—	—	1950 [2 11]	—
South Africa	—	1970/71	1960	1950	1930
Swaziland	1984	1972	—	1950	1930
Tanzania	—	1972	1960 [12]	1950 [12]	—
Togo	1983	1970	1961	—	—
Tunisia	—	—	1961/62	1949/50	—
Uganda	—	—	1963/64	1950	—

TABLE 2 (cont.)

Countries participating, with year of participation, in the World Censuses of Agriculture: 1980, 1970, 1960, 1950 and 1930

Region and country	Year of participation in the world censuses of				
	1980	1970	1960	1950	1930
Zaire	—	1971	—	1950 [13]	—
Zambia	1982	1971	1960/61 [8]	1950 [8]	—
Zanzibar/Pemba [14]	—	—	—	1950 [2]	—
Zimbabwe	—	—	1960/61 [8]	1950 [8]	—
Asia and the Pacific Total participants	22	19	20	13	7
American Samoa	1980	1970	1960	1950	1930
Australia	1980	1971	1960	1950	1929/30
Bangladesh	1977	—	—	—	—
Brunei Darussalam	—	—	1964	1950 [2]	—
China	—	—	1961 [15]	—	—
Cook Islands	—	—	—	1950 [2]	—
Federated States of Micronesia [16]	1980	1970	—	—	—
Fiji	1978	1968	1960 [2]	1950 [2]	1929/30 [2]
Guam	1978	1970	1960	1950	1930
India	1976	1971	1960/61	1954	1929/30 [17]
Indonesia	1983	1973	1963	—	—
Japan	1980	1970	1960	1950	1929
Kiribati [18]	—	—	—	1950 [2]	1929/30 [2]
Korea, Rep. of	1980	1970	1961	—	—
Laos	—	1973	—	—	—
Malaysia	1977	—	1960 [19]	1950 [2 19]	1929/30 [2 20]
Marshall Islands [16]	1980	1970	—	—	—
Myanmar	—	—	—	1953/54	—
Nepal	1981	1972	1962	—	—
New Zealand	1980	1972	1960	1950	1930
North Borneo [21]	—	—	1961	1950 [2]	—
Northern Mariana Islands [16]	1980	1970	—	—	—
Pakistan	1980	1972/73	1960 [22]	—	—
Palau, Rep. of [16]	1980	1970	—	—	—
Papua New Guinea	—	—	1961/62	1951	—
Philippines	1981	1971	1960	1948	—
Ryukyu Islands [23]	—	—	—	1951	—
Sarawak [21]	—	—	1961	1950 [2]	1929/30 [2]
Singapore	—	1973	—	1950 [2]	—
Solomon Islands [24]	—	—	—	1950 [2]	1929/30 [2]
Sri Lanka	1982	1973	1962 [25]	1952 [25]	1929 [25]
Thailand	1978	—	1963	1951	—
Tonga	1985	—	—	1950 [2]	1929/30 [2]
Tuvalu [26]	—	—	—	1950 [2]	1929/30 [2]
Vanuatu	1983	—	—	1950 [2 27]	1929/30 [2 27]
Viet Nam	—	—	1960/61	—	—
Western Samoa	—	—	—	1950	—

TABLE 2 (cont.)

Countries participating, with year of participation, in the World Censuses of Agriculture: 1980, 1970, 1960, 1950 and 1930

Region and country	Year of participation in the world censuses of				
	1980	1970	1960	1950	1930
Europe					
Total participants	22	24	17	20	23
Albania	—	—	—	—	1929
Austria	1980	1970	1960	1951	1930
Belgium	1979	1970	1959/60	1950	1929/30
Bulgaria	—	1970	—	—	—
Czechoslovakia	1980	1971	—	1950	1930
Denmark	1979	1970	1959	1949	1929
Estonia	—	—	—	—	1929 [28]
Finland	1980	1969	1959	1950	1929/30
France	1979	1971	—	—	1929/30
Germany, Federal Rep. of	1979	1971	1960	1949 [29]	1933 [29]
Greece	1981	1971	1961	1950	1929/30
Hungary	1981	1972	—	1948	—
Iceland	—	—	—	—	1930
Ireland	1980	1970	1960	1949	1929 [30]
Italy	1982	1970	1961	—	1930
Latvia	—	—	—	—	1929 [28]
Lithuania	—	—	—	—	1930 [28]
Luxembourg	1980	1970	1960	1950	—
Malta	1979	1969	1960 [31]	1950 [31]	—
Netherlands	1979	1970	1960	1950	1930
Norway	1979	1969	1959	1949	1929
Poland	1980	1970	1960	—	—
Portugal	1979	1968	—	1952/54	—
Romania	—	1970	—	1948	1930
Saar	—	—	—	1948 [32]	—
Spain	1982	1972	1962	—	1929
Sweden	1981	1971	1961	1951	1932
Switzerland	1980	1969	—	1950	1929
United Kingdom	1979	1970	1960/61	1950	1931
Yugoslavia	1981	1969	1960	1951	1931
Latin America and the Caribbean					
Total participants	26	31	25	22 [2 33]	10 [2 33]
Antigua and Barbuda	1984	1973/74	1961		
Argentina	—	1969	1960	1952	1930
Aruba [34]	—	—	1960 [2]	1950 [2]	1929/30 [2]
Bahamas	1978	—	—	1950	1929/30 [2]
Barbados	1984	1971	1961	1950	1929/30
Belize	1985	1973/74	—	1950 [2 35]	—
Bermuda	—	—	—	1950 [2]	—
Bolivia	—	—	1964	1950	—
Brazil	1980	1970	1960	1950	—
Chile	1976	—	1965	1955	1930
Colombia	—	1970/71	1960	1951	—

TABLE 2 (cont.)

Countries participating, with year of participation, in the World Censuses of Agriculture: 1980, 1970, 1960, 1950 and 1930

Region and country	Year of participation in the world censuses of				
	1980	1970	1960	1950	1930
Costa Rica	1985	1973	1963	1950	—
Cuba	—	—	—	1952	—
Dominica	—	1974	—	[2 36]	[2 36]
Dominican Republic	1982	1971	1960	1950	—
Ecuador	1984	1974	1962	1954	—
El Salvador	—	1971	1961	1950	1929
Falkland islands	—	—	—	1950 [2]	1929/30 [2]
French Guiana	1980	1972	—	—	—
Grenada	1981	1975	1961	[2 35]	[2 35]
Guadeloupe	1980	1972	—	—	—
Guatemala	1979	—	1964	1950	1930
Guyana	—	1968/69	—	1950 [2 37]	—
Haiti	—	1971	—	1950	—
Honduras	—	1974	—	1952	—
Jamaica	1978	1968/69	1961	1950	—
Leeward islands	—	—	1960 [2]	1950 [2 38]	1929/30 [2 38]
Martinique	1980	1972	—	—	—
Mexico	1981	1970	1960	1950	1930
Montserrat	—	1972	—	[2 33]	[2 33]
Nicaragua	—	1971	1963	—	—
Panama	1981	1971	1961	1950	—
Paraguay	1981	—	1961	—	—
Peru	1983	1972	1961	—	1929
Puerto Rico	1978	1970	1959	1950	1930
Saint Kitts and Nevis	—	—	—	[2 33]	[2 33]
Saint Lucia	1984	1973/74	—	[2 36]	[2 36]
Saint Vincent and the Grenadines	—	1972/73	—	[2 36]	[2 36]
Suriname	1981	1969	1959	—	—
Trinidad & Tobago	1982	—	1964	1951 [2]	—
Uruguay	1980	1970	1961	1951	1930
Venezuela	1984	1971	1961	1950	—
Virgin islands (US)	1978	1970	1960	1950	1930
Windward Islands	—	—	1960 [2]	1950 [2 39]	1929/30 [2 39]
Near East					
Total participants	11	11	8	5	2
Bahrain	1980	1973/74	—	—	—
Cyprus	1977	—	—	1950 [2]	—
Egypt	1982	—	1960/61 [40]	1950	1929
Iran	—	1974	1960	—	—
Iraq	—	1971	1958	1952	—
Israel	1981	1971	—	1950/51	—
Jordan	1983	1972	—	1953	—
Kuwait	—	1970	—	—	—
Lebanon	—	1970	1960/61/62	—	1929/30 [2 41]
Libyan Arab Jamahiriya	—	1974	1960	—	—
Oman	1978	—	—	—	—

TABLE 2 (cont.)

Countries participating, with year of participation, in the World Censuses of Agriculture: 1980, 1970, 1960, 1950 and 1930

Region and country	Year of participation in the world censuses of				
	1980	1970	1960	1950	1930
Saudi Arabia	1982	1972	—	—	—
Sudan	—	—	1963	—	—
Syrian Arab Rep.	1981	1970/71	1961	—	—
Turkey	1980	1970	1963/64	1950	1927
Yemen Arab Rep.	1983	—	—	—	—
Yemen People's Democratic Rep.	1984	—	—	1950 [2 42]	—
North America					
Total participants	2	2	4	4	4
Alaska	—	—	1960 [43]	1950	1929
Canada	1981	1971	1961	1951	1931
Hawaii	—	—	1959 [43]	1950	1930
United States	1978 [44]	1969 [44]	1959	1950	1930

Sources: *Report on the 1970 World Census of Agriculture*. Rome. FAO. 1977.
National Methods of Collecting Agricultural Statistics, 1 & 2. Rome. FAO. 1974 & 1975.
Supplements to National Methods of Collecting Agricultural Statistics. Nos 1-19. Rome. FAO. 1979-1984.

General Note: The totals exclude countries for which data were obtained through special estimates.

Notes:

[1] Then formed part of French West Africa which was counted as one country, and consisted of Benin, Burkina Faso, Côte d'Ivoire, Guinea, Mali, Mauritania, the Niger and Senegal.
[2] Special estimates.
[3] Then called Bechuanaland.
[4] Then called Congo (Brazzaville).
[5] Then consisted of Ghana and Togo, counted as one country.
[6] Previously called Portuguese Guinea.
[7] Then called Basutoland.
[8] Malawi was formerly called Nyasaland; Zambia was formerly called Northern Rhodesia; Zimbabwe was formerly called Southern Rhodesia.
[9] Previously called South West Africa.
[10] Then included British Cameroon which is now a part of Cameroon.
[11] Relates to only part of Somalia which was called British Somaliland.
[12] Relates to what was then called Tanganyika and which now forms part of the United Republic of Tanzania.
[13] Then called Belgian Congo.
[14] Now forms part of the United Republic of Tanzania.
[15] Census year refers to Taiwan only.
[16] Formerly called the Trust Territory of the Pacific Islands.
[17] Including areas which later formed Pakistan.
[18] Refers to Gilbert Islands that are part of Kiribati.
[19] Then called Federation of Malaya which now forms part of Malaysia.
[20] Then called Malaya which now forms part of Malaysia.
[21] Now forms part of Malaysia.
[22] Then including East Pakistan which is now Bangladesh.
[23] Now forms part of Japan.

[24] Previously called British Solomon Islands Protectorate.
[25] Then called Ceylon.
[26] Refers to Ellice Islands that are now part of Tuvalu.
[27] Then called New Hebrides.
[28] Later became part of the USSR.
[29] Borders were different then.
[30] Then called Irish Free State.
[31] Then called Malta and Gozo.
[32] Later became part of the Federal Republic of Germany.
[33] Then part of Windward Islands.
[34] Part of the Netherlands Antilles.
[35] Then called British Honduras.
[36] Then part of Leeward Islands.
[37] Then called British Guinea.
[38] Then included Dominica, Grenada, Saint Lucia and Saint Vincent.
[39] Then included Antigua, Montserrat, Saint Kitts and Nevis and US Virgin Islands.
[40] Then called United Arab Republic.
[41] Then called Lebanese Republic.
[42] Then called Aden Protectorate.
[43] Later became part of the United States.
[44] Including Alaska and Hawaii.

change slowly over time and the provision of a frame for other agricultural surveys.

However, there is a tendency to reduce the interval of census-taking in developed countries. Some countries (such as the United States and Ireland) are using intervals of four or five years instead of ten. Some European countries (such as Belgium, Denmark, the Netherlands and the United Kingdom) are taking annual censuses.

The annual accounting system is predominant in countries with centrally planned economies, and the register system is gaining ground in developed countries. For example, in Sweden a register of all agricultural holdings (the farm register) was introduced by the National Central Bureau of Statistics in 1968. Since its introduction, complete investigations have been carried out every year. Most of the information thus obtained corresponds to that previously obtained in agricultural censuses.

Methods and techniques of census

As its name implies, a census is normally conducted by taking a complete enumeration. Sampling methods, however, are used by various countries in their agricultural censuses. A census conducted in this way is called a "census by sample enumeration" (or "sample

census" in the past). Sample enumeration has been adopted largely as a response to limited financial resources and shortages of trained personnel.

The complete enumeration method has prevailed in developed countries. In contrast, African countries are now using sampling methods in their agricultural censuses. In addition, a number of countries use a combination of both methods.

The predominant methods of agricultural census in countries with centrally planned economies are the annual accounting system and the complete statistical recording. Censuses and sample surveys are used occasionally. For example, a complete survey of irrigation facilities, grape and fruit processing and livestock-keeping equipment is usually conducted in Hungary every five years. A complete enumeration of fruit-trees was done in 1959 in the same country. In Czechoslovakia, fruit-trees and bushes are recorded irregularly, about every ten years, farm animals are recorded twice a year; persons permanently employed in agriculture are recorded every two years. A census of small-fruit and berry plantations and vineyards was undertaken in the USSR in 1970, and a survey of the life of tractors and agricultural machinery was carried out there in 1969.

The sample survey method is also used. For instance, in Hungary every three or four years a sample survey of mechanization and labour is carried out. Also in Hungary, a sample census on a 20-25 percent basis of fruit-trees was undertaken in 1970/71. In Poland, the December censuses of domestic animals were carried out on individual agricultural holdings by sample enumeration. A family budget sample survey, which supplies additional information on agricultural production of personal holdings, was implemented in the USSR.

Two main techniques of data collection are utilized in agricultural censuses: personal interviews conducted by field enumerators and the mail technique. The interview technique is used in the majority of countries. In countries with a low literacy rate, it is

impossible to obtain data from the farmers, who in general are the least likely to be educated, using the mail technique. A few countries (such as Belgium, Canada, the United States and Puerto Rico) use the mail technique in combination with the personal interview.

AGRICULTURAL CENSUSES IN THE 1980 WCA

Table 3 gives information on periodicity, methods and techniques in the 1980 WCA for each country. These features are similar to those of prior censuses with one exception: the number of countries participating in the WCA was smaller in 1980 than in the preceding round.

Participation in and periodicity of censuses

According to information available at FAO as of April 1990, 103 countries participated in the 1980 WCA Programme. However, as was pointed out earlier, only 86 of these have supplied FAO with census results. For a few of these countries, the information available is too scanty to be used.

In the first column of Table 3 the number of years between the last two agricultural censuses for each participating country is shown.

Table 4 is derived from Table 3. The countries that conducted their first agricultural census in the 1980 WCA are not included in this table.

Methods and techniques of census

The 1980 WCA confirms the main trends in methods and techniques noted in previous censuses. Complete enumeration is the predominant method, with 42 of 78 countries having adopted it. All countries in Latin America and the Caribbean and most of the countries in Europe, the Near East and Asia and the Pacific use it. On the other hand, most countries in Africa use sample enumeration. Some countries (Ethiopia, Finland, Hungary, India,

TABLE 3

Periodicity, methods and techniques of the 1980 WCA

Region and country	Interval since previous census (years)	Method			Technique		
		Complete enumeration	Sample enumeration	(a) & (b)	Inter-view	Mail	(d) & (e)
		(a)	(b)	(c)	(d)	(e)	(f)
Africa							
Botswana	13		x		x[1]		
Cape Verde	First in 81	x			x		
Central African Rep.	13		x		x[1]		
Congo	13		x		x[1]		
Ethiopia	First in 77			x	x[1]		
Kenya	9			x	x[1]		
Madagascar	23		x		x[1]		
Malawi	11		x		x[1]		
Mauritania	First in 85		x		x[1]		
Niger	20		x		x[1]		
Reunion	8	x			x		
Rwanda	First in 84		x		x[1]		
Sierra Leone	13		x		x[1]		
Togo	13		x		x[1]		
Asia and the Pacific							
American Samoa	10	x			x		
Australia	1	x				x	
Bangladesh	17		x		x		
Fiji	10		x				x[1]
Guam	8	x			x		
India	7			x	x		
Japan	10	x					x
Korea, Rep. of	10	x			x		
Nepal	10		x		x		
New Zealand	1	x				x	
Northern Mariana Islands	10	x			x		
Pakistan	8		x		x		
Philippines	10			x	x		
Sri Lanka	9			x			x
Thailand	15			x	x		
Tonga	First in 85	x			x[1]		
Europe							
Austria	10	x			x		
Belgium	1	x			x		
Czechoslovakia	1	x					x
Denmark	1	x				x	
Finland	1			x			x
France	9	x		x			
Germany, Federal Rep. of	8			x	x		
Hungary	9			x			x
Ireland	5			x	x		
Italy	12	x			x		
Luxembourg	1	x			x		

TABLE 3 (cont)

Periodicity, methods and techniques of the 1980 WCA

Region and country	Interval since previous census (years)	Method			Technique		
		Complete enumeration	Sample enumeration	(a) & (b)	Inter-view	Mail	(d) & (e)
		(a)	(b)	(c)	(d)	(e)	(f)
Malta	1	x			x		
Netherlands	1	x			x		
Norway	10	x			x		
Poland	1	x					x
Portugal	11	x			x		
Spain	10	x			x		
Sweden	1	x				x	
Switzerland	11	x				x	
United Kingdom	1			x		x	
Yugoslavia	12	x			x		
Latin America and the Caribbean							
Antigua and Barbuda	11	x			x		
Bahamas	First in 78	x			x		
Belize	11	x			x		
Brazil	10	x			x		
French Guiana	12	x			x		
Grenada	6	x			x		
Guadeloupe	8	x			x		
Guatemala	15	x			x		
Jamaica	10	x			x		
Martinique	8	x			x		
Panama	10	x			x		
Paraguay	20	x			x		
Puerto Rico	8	x					x
Suriname	11	x			x		
Trinidad and Tobago	19	x			x		
Uruguay	10	x			x		
Virgin Islands (US)	8	x			x		
Near East							
Bahrain	6	x			x		
Cyprus	17	x			x		
Israel	10	x					x
Jordan	11			x	x		
Oman	First in 78		x		x		
Saudi Arabia	10	x			x		
Turkey	10			x	x		
Yemen Arab Rep.	First in 83		x		x		
North America							
Canada	10	x			x		
United States	4			x			x

Source: Report on the 1980 World Census of Agriculture. Census Bulletins, Nos 3-28. Rome. FAO. 1983-89.

Note:

[1] These countries utilized techniques to measure fields in addition to interview.

TABLE 4

Number of countries by region and by number of years between their agricultural census of the 1980 WCA and their previous census

No. of years	Region						
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	Total
1	—	2	10	—	—	—	12
2	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	1	1
5	—	—	1	—	—	—	1
6	—	—	—	1	1	—	2
7	—	1	—	—	—	—	1
8	1	2	1	4	—	—	8
9	1	1	2	—	—	—	4
10	—	7	3	4	3	1	18
11	1	—	2	3	1	—	7
12	—	—	2	1	—	—	3
13	5	—	—	—	—	—	5
14	—	—	—	—	—	—	—
15+	2	2	—	3	1	—	8
Total	10	15	21	16	6	2	70

Ireland, Sri Lanka, Thailand, Turkey, the United Kingdom and the United States) apply a combination of complete and sample enumeration. Table 5 shows the number of countries by region using each census method, and Table 6 shows the data collection technique used.

Personal interview by enumerators was the predominant technique of the 1980 WCA (62 of 78 countries). Some developed market-economy countries (Australia, Denmark, New Zealand, Sweden, Switzerland and the United Kingdom) and one planned-economy country (Czechoslovakia) used only the mail technique in the 1980 WCA. In some other countries (Finland, Japan, Puerto Rico, Sri Lanka and the United States) a combination of the interview and mail techniques was used.

TABLE 5

Number of countries by region and by census method applied in their agricultural census of the 1980 WCA

Method	Region						
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	Total
Complete enumeration	2	8	16	17	4	1	48
Sample enumeration	10	4	—	—	2	—	16
Both	2	4	5	—	2	1	14
Total	14	16	21	17	8	2	78

TABLE 6

Number of countries by region and by data-collection technique applied in their agricultural census of the 1980 WCA

Technique	Region						
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	Total
Interview	14	11	13	16	7	1	62
Mail	—	2	4	—	—	—	6
Both	—	3	4	1	1	1	10
Total	14	16	21	17	8	2	78

MAIN TRENDS IN AGRICULTURAL CENSUSES

About ten years is the most common interval between successive agricultural censuses, and this is the period recommended by FAO. The time interval between agricultural censuses is decreasing, as evidenced by a trend from decennial to quinquennial to annual censuses, especially in developed countries.

The annual accounting system in planned-economy countries and

the register system in developed countries have also been growing in importance in agricultural statistics. Under these systems agricultural data are generally collected every year. These systems are supported by periodic agricultural censuses, usually conducted every five or ten years.

Although complete enumeration is the predominant method in agricultural censuses, it is sometimes replaced by sample enumeration, especially in African countries. However, complete and sample enumeration are not mutually exclusive. Sampling, with its very useful contribution to statistics in general and agricultural statistics in particular, is a necessary and supplemental method in agricultural censuses.

As noted above, personal interview by an enumerator is the dominant technique in agricultural censuses. In some countries with high levels of literacy, the mail technique is also used, and with development and progress this technique is gaining wider application.

Chapter 3

Concepts used in the 1980 World Census of Agriculture

In this chapter some concepts and definitions used in the 1980 WCA are reviewed and practices concerning them in participating countries are summarized. The chapter includes 14 sections which follow the order of items in the 1980 Programme: holding; tenure of land; holder; legal status; population and employment; land use; crops; livestock, machinery and equipment; irrigation; integration with another establishment; production under contract; high-yielding crop varieties; inorganic fertilizers and pesticides.

HOLDING

Definition and recommendations of the 1980 Programme

The definition of "holding" in the *Programme for the 1980 World Census of Agriculture* is as follows: a holding, for agricultural census purposes, is a techno-economic unit of agricultural production comprising all livestock kept and all land used wholly or partly for agricultural purposes and operated under the management of one person or more, without regard to title, legal form, size or location. The holding as a techno-economic unit under a single management generally uses throughout the same means of production, such as labour, farm structures, machinery or draught animals.

The 1980 Programme advises the following on "minimum size of holding": ideally, the census should include all holdings in a country; however, for practical reasons it is necessary to limit the enumeration to those holdings that conform to certain recognized

criteria and fall above certain prescribed minimum size limits. No uniform lower limits for area, volume or value of output, number of livestock or trees, or labour requirements, for example, are suggested here, for these will vary by country. Nevertheless, in view of the large number of smallholdings in many countries and their considerable contribution to the production of some important food crops, it is strongly urged that the minimum size of holdings covered in the census be set as low as possible. Where holdings below the specified minimum size are important, they may be investigated through special inquiries.

Country practices

The majority of the countries participating in the WCA used the same or a similar concept of holding as that given in the 1980 Programme. On the other hand, some countries (Bangladesh, Hungary, Japan, the Republic of Korea, Malawi, Pakistan and Turkey) stressed the concept of the "household".

According to the definition of the 1980 Programme, establishments producing only forest products are not to be considered holdings. However, some countries (mainly European countries such as Italy, Portugal and Sweden) included forestry in the holding. The definitions of holding adopted by these countries are as follows.

In Italy, for census purposes, an agricultural, forestry or livestock holding is the technical and economic unit comprising one or more pieces of land which may be non-contiguous, located in the same or in different territorial divisions and in some cases the installations and equipment which form part of the same technical unit, which are used for agricultural, forestry or livestock production and which are operated by one person (physical or juridical) alone or sharing the responsibility with others.

In Portugal, a holding is a production unit that satisfies the following four conditions:

- to produce agricultural, livestock or forest products;

- to be at or above a certain limit (area, number of animals, etc.);
- to have a single management;
- to be located in a well-defined place.

In Sweden, a holding is an establishment where operations in agriculture, forestry, animal husbandry, fruit-growing or horticulture are carried out under one management.

Table 7 shows the practice adopted by each country with respect to minimum holding size. As can be seen from Table 8, which summarizes Table 7, the majority of countries participating in the 1980 WCA limit the enumeration to those holdings that are above certain lower limits for area, number of livestock or sale value of production. The countries that do not specify any minimum limits on the size of holding are generally in Africa. The minimum limits take different forms as summarized below.

Austria's practice provides a typical example of the variety of criteria used to set a minimum size limit on holdings. Holdings included in the Austrian census are as follows:

- all holdings with a cultivated area of at least 1 ha, wholly or partly used for agriculture or forestry;
- all holdings with a cultivated area of less than 1 ha or with no cultivated area at all, provided that they have at least one of the following:
  - vineyard areas of at least 25 ares (1 are = 0.01 ha);
  - intensive fruit-growing plants of at least 25 ares;
  - hop cultivation areas of at least 25 ares;
  - tobacco cultivation areas of at least 25 ares;
  - horticulture and nurseries of at least 10 ares;
  - at least one horse, one head of cattle, three pigs, five sheep or goats, 50 poultry;
  - fishery and mushroom cultivation establishments with production for the market;
  - at least 20 bee colonies.

TABLE 7

Countries specifying and not specifying minimum size of holding

Region and country	Census year	Minimum limit specified	Minimum limit not specified
Africa			
Botswana	1982	x	
Cape Verde	1981		x
Central African Rep.	1985		x
Congo	1986		x
Ethiopia	1977		x
Kenya	1979		x
Madagascar	1984		x
Malawi	1981		x
Mauritania	1985		x
Niger	1980		x
Reunion	1981	x	
Rwanda	1984		x
Sierra Leone	1985		x
Togo	1983		x
Asia and the Pacific			
American Samoa	1980	x	
Australia	1980	x	
Bangladesh	1977		x
Fiji	1978		x
Guam	1978	x	
India	1976		x
Japan	1980	x	
Korea, Rep. of	1980	x	
Nepal	1981		x
New Zealand	1980		x
Northern Mariana Islands	1980	x	
Pakistan	1980	x	
Philippines	1981	x	
Sri Lanka	1982	x	
Thailand	1978	x	
Tonga	1985		x
Europe			
Austria	1980	x	
Belgium	1979		x
Czechoslovakia	1980	x	
Denmark	1979	x	
Finland	1980	x	
France	1979	x	
Germany, Federal Rep. of	1979	x	
Hungary	1981	x	
Ireland	1980	x	
Italy	1982		x
Luxembourg	1980	x	
Malta	1979	[1]	[1]
Netherlands	1979	x	
Norway	1979	x	
Poland	1980		x
Portugal	1979	x	

TABLE 7 (cont.)

Countries specifying and not specifying minimum size of holding

Region and country	Census year	Minimum limit specified	Minimum limit not specified
Spain	1982	x	
Sweden	1981	x	
Switzerland	1980	x	
United Kingdom	1979		x
Yugoslavia	1981	x	
Latin America and the Caribbean			
Antigua and Barbuda	1984		x
Bahamas	1978	x	
Belize	1985	x	
Brazil	1980		x
French Guiana	1980	x	
Grenada	1981		x
Guadeloupe	1980	x	
Guatemala	1979		x
Jamaica	1978	x	
Martinique	1980	x	
Panama	1981		x
Paraguay	1981	x	
Puerto Rico	1978	x	
Suriname	1981	x	
Trinidad and Tobago	1982	x	
Uruguay	1980	x	
Virgin Islands (US)	1978	x	
Near East			
Bahrain	1980	[1]	[1]
Cyprus	1977	x	
Israel	1981	x	
Jordan	1983	x	
Oman	1978	x	
Saudi Arabia	1982	x	
Turkey	1980	x	
Yemen Arab Rep.	1983		x
North America			
Canada	1981	x	
United States	1978	x	

Note: [1] Information not available.

In the Netherlands, in the framework of the agricultural census, an agricultural holding is defined as an enterprise on which agriculture is carried out and the size of which is equal to at least ten standard farm units. The standard farm unit (sfu) is a criterion which expresses both the size of the holding and the individual production units within the holding. An sfu equals a certain

TABLE 8

Number of countries by region specifying and not specifying minimum size of holding

Region	Number of countries that have		
	specified min. limit	not specified min. limit	Unknown
Africa	2	12	—
Asia and the Pacific	10	6	—
Europe	16	4	1
Latin America and the Caribbean	12	5	—
Near East	6	1	1
North America	2	—	—
Total	48	28	2

amount of factor costs (labour, interest, rent) in a base period with an efficient holding management operating under normal circumstances. For every crop (per hectare) and every animal, the factor costs are calculated. Totalling these costs results in the total number of sfus per holding. In the census of 1979 an sfu equals f.l 400.

Holdings may also be defined in other ways. In Grenada a holding is a technical unit growing crops and/or livestock with the condition that part of the produce must be sold. This definition excludes holders that grow crops and/or livestock as a hobby or for family consumption and/or those that hold idle agricultural land or forests and woodlands. In American Samoa the definition of the farm is the following: any place that has 15 or more poultry (chickens, ducks, guinea fowl, etc.); five or more livestock (cattle, hogs, goats, etc.); a combined total of ten or more fruit or nut trees or plants; or 100 m^2 or more on which root or field crops or vegetables were harvested for sale during 1979.

In some countries holdings are defined in financial terms. In the United States a farm is, for statistical purposes, any place from which US$1 000 or more of agricultural products were sold or normally would have been sold during the census year. In Canada

the census questionnaire must be completed by holders with sales of agricultural products of Can$250 or more during the previous 12 months.

In some countries the limitations differ according to geographic districts. In Japan, for example, the term "farm household" refers to those households farming, as of 1 February 1980, more than ten ares of cultivated land in eastern Japan and more than five ares in western Japan, and those whose total sales of agricultural products exceeded ¥ 100 000 during the one year preceding the date of the survey, even if the latter's cultivated land was less than any specified figure or practically nil.

Some countries put no limitation on land but impose some limitations on livestock. In Turkey the census covers all holdings engaged in crop production without regard to the size of land, and all holdings having at least two head of cattle or five sheep or goats. In Pakistan holdings without land, e.g. livestock holdings, were included in the census if they had at least one head of cattle/buffalo, five sheep/goats or 20 poultry.

TENURE OF LAND

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* recommended the following five major categories of tenure.

Area of the holding owned or held in ownerlike possession. Area owned is the total area of the holding operated by the holders, for which they possess title of ownership and consequently the right to determine the nature and extent of use. Area owned but rented to others should be excluded. Area of the holding in ownerlike possession comprises the area of the land held under conditions that enable the holders to operate the land as if they were the owners, although they do not possess titles of ownership. Area held in ownerlike possession that is rented to others should be excluded.

Area of the holding rented from others. This includes the total area of all parcels of the holding that are rented or leased by the holder from other persons, usually for a limited period of time. This may be

- land rented for an agreed amount of money and/or produce;
- land rented for a share of produce;
- land rented in exchange for services;
- land operated under other rental arrangements.

Area of the holding operated on a squatter basis. This item comprises the total area of the land operated for which the holders lack title of ownership and for whose use they do not pay rent, even though they retain its total benefit. Land occupied by squatters may be either private or public property occupied without the consent of the owner. This is sometimes tolerated, especially in the public domain.

Area of the holding operated under tribal or traditional communal forms of tenure. The land included under this category is held under a form of tenure in which the joint or communal exploitation is not the result of express planning but of tradition or tribal conditions. The latter form of joint exploitation may be important in countries where land is held on a tribal, village, kindred, or family basis and individuals have certain rights to this land by virtue of their membership in the respective social unit. Title to the land, often vested in the chief of the tribe, is communal in character but not absolute; it is only usufructuary.

Area of the holding operated under other forms of tenure. Forms of tenure other than those described in the preceding paragraphs may be common in certain countries. Examples include land operated under transitory forms of tenure, such as trusteeship (operated by a trustee); land received by members of collective holdings for individual use or land under inheritance proceedings.

Country practices

Many countries classify the land by tenure into a limited number of classes. The reason for limiting the number of classes in presenting the results is the large number of possible combinations of different types of tenure within the same holding. The two most important classes are:

- holdings operated under one form of tenure;
- holdings operated under more than one form of tenure.

The majority of countries that present data classified by types of tenure of land use two subclasses under "holdings operated under one form of tenure". These subclasses are:

- holdings owned or held in ownerlike possession;
- holdings rented from others.

Some of these countries are: American Samoa, Austria, Bangladesh, Belgium, Canada, Cyprus, Fiji, Finland, Malta, Nepal, the Netherlands, Northern Mariana Islands, Oman, Pakistan, Puerto Rico, the United Kingdom, US Virgin Islands and the Yemen Arab Republic.

The Netherlands uses this two-item classification, but in place of the second category it substitutes "Holdings operated under other single forms of tenure".

Seven countries use three subclasses under "Holdings operated under one form of tenure": Panama, Portugal, Saudi Arabia, Thailand, Togo, Trinidad and Tobago and Turkey. Their subclasses are the following:

- holdings owned or held in ownerlike possession;
- holdings rented from others;
- holdings operated under other single forms of tenure.

In applying these classifications, instead of the third category Panama and Trinidad and Tobago use "Holdings operated on squatter basis" and Togo uses "Holdings operated under tribal or traditional communal forms of tenure".

The classification that more closely resembles the recommenda-

tions made by FAO is that with four subclasses, used by the Bahamas, Guam, Guatemala and Uruguay. The subclasses are:

- holdings owned or held in ownerlike possession;
- holdings rented from others;
- holdings operated on squatter basis;
- holdings operated under other single forms of tenure.

Guatemala uses these classifications, but substitutes "Holdings operated under tribal or traditional communal forms of tenure" for the third category.

Under the heading of "Holdings rented from others" some countries — the Bahamas, Nepal, Pakistan, Thailand, Togo and Uruguay — use the following three subheadings:

- for an agreed amount of money and/or produce;
- for a share of produce;
- under other rental arrangements.

Under the same heading, some countries have two subheadings (e.g. Portugal). Oman has four as follows:

- for an agreed amount of money;
- for a share of produce;
- for an agreed amount of money and produce;
- in exchange for services.

HOLDER

Definition and recommendations of the 1980 Programme

In the *Programme for the 1980 World Census of Agriculture* the holder is defined as a person that exercises management control over the operations of the agricultural holding and takes the major decisions regarding the utilization of the available resources. He or she has technical and economic responsibility for the holding, and may operate it directly as owner or tenant or through a manager to whom the responsibility for day-to-day management of the work has been delegated.

When two or more persons belonging to different households jointly share the operation of the holding, each of them should be

recorded as a joint holder. When two or more persons jointly operating a holding are members of the same household, only one (generally the head or another senior member of the household) should be regarded as the holder.

A hired manager is a person who takes the technical and administrative responsibility of managing a holding on behalf of a holder, who may be a civil or juridical person. The manager is responsible for making day-to-day decisions in operating the holding, including the management and supervision of hired labour. A manager paid in cash or in kind is not considered the holder. However, a manager who, in addition to managing the holding, has or shares the economic and financial responsibility, is usually considered a holder or a joint holder, as the case may be.

Country practices

The majority of the countries participating in the 1980 WCA used the same or a similar concept of holder as given in the 1980 Programme. In some countries (such as the Bahamas) the definition of holder is exactly the same as the concept in the 1980 Programme.

Naturally, there are various special cases. In Ireland the holder is the person or body, normally the owner, responsible for the operation of the holding either directly or through a "manager" paid or unpaid. Thus, if the owner is a woman who operates the holding through a son or daughter or other relative, this woman is to be entered as the holder. The practice is similar in the case of an incapacitated or retired farmer. If the responsibility for operating the holding is shared by two or more related or associated persons they are to be considered a single holder and the name of one of them should be entered as the holder. If the entire holding is let for 11 months, the owner is to be entered as the landholder. If let under a longer form of tenancy, the occupier is to be entered as the landholder. (The name entered does not affect legal title.)

In the Netherlands the holder is the person legally and economically responsible for the holding. If the holder also carries out daily management of the holding, one speaks of a "holder with daily management". Such holders, therefore, exploit holdings for their own account.

In some countries (France, French Guiana, Guadeloupe, Martinique and Reunion) the holder is the person who is economically and financially responsible for the holding (*responsable économique et financier*). The holder is a real or juridical person who receives the profit or bears the loss of the holding. In certain cases he or she takes the important decisions such as investment.

Many countries (American Samoa, the Bahamas, France, Guam, Guatemala, Jamaica, the Republic of Korea, the Netherlands, Northern Mariana Islands, Panama, Paraguay, the Philippines, Sri Lanka, Trinidad and Tobago and the United Kingdom) use a definition of hired manager similar to that of the 1980 WCA. Some of these definitions are given below.

In American Samoa, a hired manager is a person who is paid a salary or wages (and sometimes commission) to operate land for another person or for a corporation, institution or other organization. The person is responsible for the agricultural operations on that land and may supervise others in performing these operations. As such, the manager is the person in charge.

In Bangladesh, a hired manager is a person hired by the holder with the responsibility for day-to-day management of the work of the holding.

In France, the chief of the holding (*chef de l'exploitation*) is the term used to indicate the hired manager, who is defined as the real person assuming the daily management of the holding. Daily management involves taking daily decisions concerning the work on the holding and the operations that do not have a heavy economic repercussion on the holding (date of sowing, date of harvest, etc.).

In Guatemala, a hired manager is the person to whom the holder

has delegated the technical initiative to operate the holding. He or she personally manages, supervises, directs and controls the agricultural work and receives a payment in cash and/or in kind.

In Jamaica, the hired manager is the person who takes technical and administrative responsibility for managing the farm as farm operator on behalf of the owner. The hired manager is responsible for making day-to-day decisions in operating the holding including the management and supervision of the hired labour.

In Panama, the hired manager is the person who has the technical and administrative responsibility for management and operation of the holding and who receives remuneration for his or her services. The hired manager should not be confused with a guardian or farmhand.

LEGAL STATUS

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* offers the following advice on legal status: the term "legal status" is not necessarily confined to the strictly legal characteristics of operating the holding, but essentially concerns broader aspects of defining an operation.

A holding may be operated by an individual person or a single household, jointly by a number of persons or households, or by a corporation, cooperative, government agency, tribe or clan, etc. The holder, generally recognized as the person who operates a holding, may be a civil person or a juridical person.

A holding is considered to be operated by a corporation if it is operated by or on behalf of two or more persons that have a separate legal status as a corporation, but not as a cooperative or a collective. Joint stock companies are examples of corporations. As some countries may have special legal and other arrangements regarding corporations and related matters, modifications in the proposed classification of the census items by categories of legal status may be required.

A holding is said to be operated by a cooperative if it is operated by a body constituted as such according to existing national legislation. Cooperatives include several kinds of farm organizations in which the principles of individual and joint ownership or leasehold are combined to various degrees.

A holding is said to be operated by a collective if the operation is consciously planned by a group of persons, not necessarily related by blood, who voluntarily or by mandate of the governing authority join together to exercise land rights in common. Examples of holdings operated by a collective are holdings operated by monastic orders or their equivalent, communal farms or kolkhozes (in the USSR), ejidos (in Mexico) and other collective arrangements of recent origin.

Government holdings are operated by a central or local government, directly or through a special body.

The item "Other, not elsewhere specified" includes holders not belonging to any of the preceding categories. Examples are tribes, clans, religious institutions other than collective monastic orders or their equivalent and schools.

Country practices

In some countries, concepts very similar to that of the 1980 Programme are used: four of these countries with their classifications are shown below.

Brazil

- individual property;
- company or society of persons;
- anonymous societies;
- cooperative;
- government;
- religious institutes;
- other.

Guatemala
- individual;
- partnership;
- cooperative;
- corporation;
- government;
- other.

Jordan
- individual or family;
- partnership;
- two or more individuals belonging to different families;
- cooperative;
- government;
- collective/tribal;
- other.

Paraguay
- individual;
- partnership;
- corporation;
- government;
- other.

Some countries (for example, Canada, Norway, Portugal, Puerto Rico, Spain, Suriname and the United States) apply the same concept, but in a more detailed way. One example follows.

Norway
- individual ownership;
- descendant's estate;
- joint ownership, joint ownership of forest areas for household use, common forest areas;
- joint company, cooperative;

- institution, foundation, etc;
- corporation;
- municipality;
- common forest;
- common forest owned by the central government;
- central government;
- the Educational Fund.

In some countries (for example, India, Israel, the Netherlands, Pakistan, Thailand and the United Kingdom) classifications with two or three subclasses are used. Four of these are given below.

India
- individual;
- joint;
- institutional.

The Netherlands
- civil persons;
- juridical persons.

Thailand
- civil person;
- corporation;
- government agency.

The United Kingdom
- civil;
- non-civil.

A somewhat different classification is used in countries with centrally planned economies. Examples are given below.

Czechoslovakia
- state holdings;
- cooperative holdings;
- private plots operated by members of cooperatives.

Hungary
- large-scale holdings – collective farms:
  - state-owned farms;
  - cooperatives of agricultural producers;
- small-scale holdings – privately operated farms:
  - household plots (operated by members of cooperatives);
  - auxiliary farms, generally shown together;
  - private plots, land owned or rented.

Poland
- private holdings;
- cooperatives (including collectives);
- state farms.

In Malawi and Togo only the following special questions are asked concerning the legal status of holders.

Malawi
- has the household head any position of traditional status?
- has the household head any non-traditional status position?

Togo
- member of a production cooperative?
- member of a development project?

POPULATION AND EMPLOYMENT

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture*, after giving a definition of agricultural work that is the same as that of

the 1970 Programme, makes a distinction between the "employment of holder's household members (including the holder)" and the "employment of workers who are not members of holder's household".

The definition of agricultural work is the following. Agricultural work on the holding refers to all the activities of the holder and the labour force in planning, management and operation of the holding. It includes feeding and caring for livestock and poultry; working in the field and in the market or kitchen gardens; supervising agricultural workers; keeping farm records (including bookkeeping and secretarial work); preparing agricultural products for marketing (including packaging); taking farm products to market; bringing feed, fertilizer and other supplies from town to the holding; repairing fences, farm equipment, machinery, etc.; constructing farm buildings and fences and engaging in land reclamation and improvement and other related activities. It excludes work related to the operation of the home (domestic work), construction work done by persons employed specifically to do such work, labour performed by inmates of institutions, work by persons employed by a contractor and handicraft work.

Characteristics of the type of activity of members of the holder's household (including the holder) at or above a specified age are listed in the 1980 Programme under two different headings:

- for a recent week;
- for the agricultural year.

A member of the holder's household at or above the specified minimum age limit is to be classified under each of these two headings according to the following three classes:

- for a recent week:
  engaged mainly in agricultural work on the holding;
  engaged mainly in work off the holding;
  not economically active.
- for the agricultural year:
  engaged usually in agricultural work on the holding:

- permanent;
- occasional;

usually working off the holding;

not economically active.

The terms "mainly" and "usually" in the items mean that the largest proportion of the working time of the person concerned during each of the two reference periods is spent or expected to be spent in the corresponding type of economic activity or in the usual economic activity of the holding being surveyed. Work "off the holding" includes both agricultural work on other holdings and non-agricultural work (including non-agricultural work in the holder's household).

"Employment of workers who are not members of holder's household" is given in the 1980 Programme under two headings:

- hired permanent agricultural workers;
- hired occasional agricultural workers.

The total number of days worked during the agricultural year (normally six months or more) has been used to distinguish between a permanent and an occasional worker in some countries. However, a permanent worker may actually work for less than six months during the agricultural year, especially in crop husbandry in countries that have one cropping season. Generally, an occasional worker is one who is not expected to work on the holding on a regular, continuing basis, even though he or she may happen to be hired on various occasions during the agricultural year.

Country practices

According to the 1980 Programme, the minimum age limit for the economically active population should be set in accordance with the conditions in each country, but no higher than 15 years. Various practices are observed in different countries. Table 9 shows the countries with their minimum age criteria. The dash (-) is used to indicate countries that did not adopt a minimum age for

labour on the holding in their agricultural census. Table 10 is a summary by region of Table 9. Some of these countries asked the age of the workers (paid workers and/or unpaid family workers) and published the number of workers below a certain age as well as the number of workers in higher age classes. Spain published the numbers of workers under 16 years of age; Brazil, those under 14 years of age and Oman, those under 15 years of age.

It is to be noted that the developed countries have higher minimum age criteria than the developing countries.

The treatment of data on hired labour differs between countries. Some of the definitions adopted by countries and regions for various types of hired workers are given below.

Africa. No example of distinction between various classes of hired labour is encountered. Most commonly unpaid family workers and paid workers are indicated as two broad classes.

Bangladesh. Permanent and temporary workers are distinguished. Permanent workers are those who are engaged in the holding for farm work for half or more than half the period of total annual working days. Temporary workers are those who work on the farm for a period of less than half of the total working period. The workers engaged on a daily basis are also included in the second category.

Jordan. Three categories of workers are distinguished based on the duration of their employ on the holding. Permanent workers are those who work two-thirds of the reference period. Temporary workers are those who work between half and two-thirds of the reference period. Casual workers are those who work less than half of the reference period. The reference period is the period between 1 September 1982 and the date of the interview.

TABLE 9
Minimum age for recording labour on holding

Region and country	Census year	Minimum age
Africa		
Botswana	1982	—
Cape Verde	1981	—
Central African Rep.	1985	10
Congo	1986	15
Ethiopia	1977	10
Kenya	1979	—
Madagascar	1984	—
Malawi	1981	—
Mauritania	1985	—
Niger	1980	14
Reunion	1981	—
Rwanda	1984	—
Sierra Leone	1985	—
Togo	1983	10
Asia and the Pacific		
American Samoa	1980	—
Australia	1980	—
Bangladesh	1977	10
Fiji	1978	—
Guam	1978	—
India	1976	—
Japan	1980	16
Korea, Rep. of	1980	14
Nepal	1981	10
New Zealand	1980	—
Northern Mariana Islands	1980	—
Pakistan	1980	10
Philippines	1981	10
Sri Lanka	1982	—
Thailand	1978	11
Tonga	1985	—
Europe		
Austria	1980	15
Belgium	1979	14
Czechoslovakia	1980	—
Denmark	1979	15
Finland	1980	14
France	1979	16
Germany, Federal Rep. of	1979	15
Hungary	1981	10
Ireland	1980	14
Italy	1982	14
Luxembourg	1980	—
Malta	1979	16
Netherlands	1979	16
Norway	1979	15
Poland	1980	—
Portugal	1979	—
Spain	1982	—

TABLE 9 (cont.)

Minimum age for recording labour on holding

Region and country	Census year	Minimum age
Sweden	1981	14
Switzerland	1980	15
United Kingdom	1979	—
Yugoslavia	1981	—
Latin America and the Caribbean		
Antigua and Barbuda	1984	—
Bahamas	1978	14
Belize	1985	—
Brazil	1980	—
French Guiana	1980	—
Grenada	1981	16
Guadeloupe	1980	—
Guatemala	1979	10
Jamaica	1978	—
Martinique	1980	—
Panama	1981	—
Paraguay	1981	10
Puerto Rico	1978	—
Suriname	1981	10
Trinidad and Tobago	1982	—
Uruguay	1980	—
Virgin Islands (US)	1978	—
Near East		
Bahrain	1980	—
Cyprus	1977	—
Israel	1981	14
Jordan	1983	—
Oman	1978	—
Saudi Arabia	1982	—
Turkey	1980	12
Yemen Arab Rep.	1983	—
North America		
Canada	1981	15
United States	1978	—

New Zealand. Three categories of workers are distinguished.Permanent full-time workers are those who normally work 30 hours or more per week on a farm on a continuing basis. Permanent part-time workers are those who normally work less than 30 hours per week on the farm on a continuing basis. Casual workers are those who are engaged for seasonal or temporary work such as fruit and produce picking.

TABLE 10

Number of countries by region and by the minimum age for recording labour on holding

Region	Minimum age							
	10	11	12	13	14	15	16	None
Africa	3	—	—	—	1	1	—	9
Asia and the Pacific	4	1	—	—	1	—	1	9
Europe	1	—	—	—	5	5	3	7
Latin America and the Caribbean	3	—	—	—	1	—	1	12
Near East	—	—	1	—	1	—	—	6
North America	—	—	—	—	—	1	—	1
Total	11	1	1	—	9	7	5	44

Paraguay. Paid workers are divided into two classes based on the duration of their employment on the holding: those who work six months or more during the year are called permanent and those who work less than six months are called temporary.

Philippines. A person is said to be a permanent worker in the Philippines if he or she works continuously or regularly on the farm during the calendar year, regardless of the length of time devoted to such activity. A seasonal or occasional worker is a household member who works only occasionally.

Portugal. Permanent workers are those who work 44 hours or more in a week. Occasional workers are those who work less than 44 hours per week.

Reunion. Two types of paid employment are distinguished. Permanent work refers to the number of days worked on jobs that regularly continue for at least six months. Seasonal and occasional work is the number of days worked by the relatives of the holder who do not reside on the holding but who come to the holding occasionally to work for pay.

Sweden. Anyone who regularly participates in the work is classified as permanently employed, while anyone who is temporarily hired, as well as a person who takes part in the work only for short periods is classified as temporarily employed.

Trinidad and Tobago. Three classes of hired labour are distinguished. Permanent workers are those who are employed on the holding for an aggregate period of nine months or more during the year. Seasonal workers are those who are employed on the holding for an aggregate of over three months but less than nine months during the year. Occasional workers are those who are employed on the holding for an aggregate of less than three months during the year.

Turkey. Data are collected only on permanent workers who are defined as those who work on the holding for pay continuously throughout the year.

United Kingdom. Workers are divided into two classes: regular and seasonal or casual. Regular workers include those who are regularly employed on the holding on a full-time or part-time basis.

LAND USE

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* proposes a classification of land use based on the five major classes set out below.

Arable land. This refers to all land generally under rotation whether under temporary crops, left temporarily fallow, or used as temporary meadows. The Programme notes that in some countries the term "arable land" includes land under permanent crops and some other countries may also use this term in a different sense. Consequently, it is requested that the national census reports

indicate clearly the definition used. It is suggested that such countries include questions in their national census questionnaires that will make possible the calculation of the area of arable land as defined in the Programme.

Land under temporary crops. This includes all land used for crops with a growing cycle of under one year, sometimes only a few months, that must be newly sown or planted for further production after the harvest. Crops remaining in the field for more than one year should also be considered temporary crops if harvesting destroys the plant (e.g. cassava and yams). Crops grown in rotation and, therefore, destroyed when the land is ploughed (e.g. alfalfa, clovers and grasses) should be considered temporary crops. Asparagus, strawberries, pineapples, bananas and sugar cane, for example, are sometimes grown as permanent or biennial crops and sometimes as annual crops; the respective areas should, therefore, be classified under temporary or under permanent crops as the case may be.

The areas used for specialized cultivation of vegetables, flowers, bulbs, ornamental plants and kitchen and market gardens (including cultivation under protective cover, e.g. glass or plastic) should also be included in this category of land under temporary crops. However, land under trees and shrubs producing flowers, such as roses and jasmine, should not.

Land under temporary meadows and pastures. This is the land temporarily cultivated with herbaceous forage crops for mowing or pasture. Because some practical difficulties may arise in differentiating temporary meadows from permanent meadows and pastures, it is suggested that a period of less than five years be considered temporary. Some countries use different criteria and a few countries do not distinguish between temporary and permanent meadows or pastures. National procedures should be clearly indicated in the census reports.

Land temporarily fallow. This is land at rest for a period of time before it is cultivated again. If the land remains fallow too long,

it might acquire certain characteristics that would indicate its inclusion in other major land-use groups, such as "permanent meadows and pastures" (if it could be used for grazing) or "wood or forest land" (if it has become overgrown with trees that could be used as timber, firewood, etc.), or "all other land" (when it becomes wasteland). A maximum period of idleness, probably less than five years, should be specified. On the other hand, a piece of land should not be considered temporarily fallow unless it has been or is intended to be kept at rest for at least one agricultural year.

If the census is taken at a time when sowing or planting has not been completed, the area lying fallow at that time which will be put under crops soon afterwards should be classified by the crops to be sown or planted and not as fallow land.

Fallow land that is temporarily used for grazing should be classified as fallow if the land is normally used for the cultivation of temporary crops.

All other arable land. This category includes all rotation land not put to any of the uses mentioned above during the census reference year, such as arable land temporarily damaged by floods, land prepared for cultivation but not sown because of unforeseen circumstances and abandoned land.

Land under permanent crops. This signifies land cultivated with crops that occupy it for a long period of time and that do not have to be planted for several years after each harvest. Land under trees and shrubs producing flowers, such as roses and jasmine, is so classified, as are nurseries (except those for forest trees, which should be classified under "wood or forest land"). Permanent meadows and pastures are excluded.

Land under permanent meadows and pastures. This refers to land in the holding used permanently (i.e. for five years or more) for herbaceous forage crops, seeded and cared for or growing naturally (wild prairie or grazing land). Permanent meadows and pastures on

which trees and shrubs are grown should be recorded under this heading only if the growing of forage crops is the most important use of the area. Since some countries do not distinguish between temporary and permanent meadows or pastures, clear indication of national practices in the census reports is essential.

Wood or forest land. This includes all woodlots or tracts of timber, natural or planted, which are part of the holding and have or will have value as wood, timber or other forest products. Nurseries of forest trees should also be classified under this category. Wood or forest land used only for recreation purposes should be reported instead under "land in the holding not elsewhere specified".

All other land. This includes all other land in the holding, not elsewhere specified, whether potentially productive or not. The Programme indicates that some countries may wish to subdivide this class into potentially cultivable and uncultivable.

A more detailed subclassification by areas normally irrigated and not irrigated is proposed for the items within the first three classes to meet the requirements of countries where irrigation is a normal practice. The area normally irrigated is defined as land purposively and normally provided with water other than rain for improving the production of crops or pastures. The uncontrolled flooding of land by the overflow of rivers or streams should not be considered irrigation.

Country practices

Countries have generally adapted the concepts proposed by the Programme regarding land use to their conditions. The adaptation has resulted in a smaller number of land classes in Africa, but in other regions the trend has been to extend the land classes proposed by the Programme into finer subclasses.

The Bahamas. The total area of the holding is divided into the following eight classes:

- Area under temporary crops: that is all land on which there were temporary crops in the month of August 1978 whose harvesting had started earlier, or the bulk of which had been harvested by the end of August. The following classes of land will also be included in this category:
  - lands on which there was no temporary crop in the month of August 1978 but from which one or more temporary crops had been harvested during the census year;
  - lands on which temporary crops were sown to be harvested during the census year but were not harvested for some reason, for example, failure of crops due to drought or insect and pest attack, etc.;
  - lands on which there were temporary crops in the month of August to be harvested in the agricultural year 1978/79 but from which some temporary crops were harvested or lost during the census year.

  Note: Any land on which there were temporary crops in the month of August to be harvested in 1978/79 and from which no temporary crop was harvested or lost in the census year, will not be included in this category. This type of land will fall into the category of "fallow land" if it was in rotation.
- Area under temporary meadows for mowing or pasture: this is land temporarily cultivated with herbaceous forage crops for mowing or pasture. To differentiate temporary meadows from permanent meadows a period of less than five years will be considered temporary.
- Area temporarily fallow: this is land at rest for a period of time before it is cultivated again. The period of rest for the land to be classified in this category will be from one to five years. After five years such land is considered as "permanent meadows and pastures" (if it has become overgrown with trees

that could be used as timber, firewood, etc.) or "all other land" (when it becomes wasteland).

- Area under all other arable land: this category includes all rotation land not put to any of the uses mentioned above during the census year, such as arable land temporarily damaged by floods, or land prepared for cultivation but not sown because of unforeseen circumstances.
- Area under permanent crops: this includes land cultivated with crops which occupy it for a long period of time.
- Area under permanent meadows and pastures: this means land in the holding used permanently (i.e. for more than five years) for herbaceous forage crops, seeded and cared for or growing naturally. Permanent meadows and pastures on which trees and shrubs are grown should be recorded under this category only if the growing of forage crops is the most important use of the area.
- Area of wood or forest land: this includes all woodlots or tracts of timber, natural or planted, which are part of the holding and have or will have value as wood, timber, or other forest products. Nurseries of forest trees also fall under this category. Wood or forest land used only for recreation purposes should be reported under "all other land".
- All other land: this includes all land in the holding, not elsewhere specified, whether potentially productive or not.

Canada. The concepts and definitions used in Canada are as follows:

- Cropland for harvest in 1981: this is the sum of the following five areas less double cropping:
  - area of field crops: this is the sum of areas under various crops seeded or to be seeded for harvest in 1981. These various crops are grouped into the following classes: grains, oil-seeds, hay and fodder crops, other crops;
  - area of tree crops;

  - area of cultivated berries and grapes grown for sale: area under grapes and cultivated small fruits (strawberries, blueberries, etc.);
  - area of vegetables grown for sale;
  - area of nursery products.
- Improved land for pasture: this includes all land which is being used for pasture or grazing and which has had some improvements made to it in recent years. The following are the land improvement practices most likely to have been made: establishment of an effective drainage system, use of an irrigation system, seeding and/or fertilizing the pasture land, and clearing or controlling weeds and/or bush.
- Summer fallow: this includes land from which no crop will be harvested during 1981 but which will be cultivated or worked during the year for weed control and/or moisture conservation, and land on which green manure crops such as sweet clover or buckwheat have been or will be ploughed under this year.
- Other improved land: this includes the following types of land: the area of the "farmstead", that is, the farm buildings and barnyards; idle land which is defined as land that has been cultivated at one time, but which has not been pastured, summer fallowed or cropped this year; the area of home gardens, lanes and roads on the holding; the area of new breaking that will not be cropped in 1981.
- Woodland: this is all woodland, farm woodlots, private land leased from others for woodcutting, sugar bush and cut-over land with seedlings or trees which have or will have value as timber, fuelwood or Christmas trees. It includes the area of trees planted for wind-breaks.
- Other unimproved land: this includes areas of natural pasture or hay land that have not been cultivated, brush pasture, grazing or wasteland, sloughs, marsh, rocky land, etc. that are part of the agricultural holding and which must be enumerated to give a complete account of the total acreage of the holding.

- The total area of the holding is the total of areas in the above six categories.

France. The total area of the holding consists of useful agricultural area, area under poplar trees, wood and forest and non-agricultural area.

Useful agricultural area is subdivided into three classes: utilized agricultural area, area under buildings and non-productive area.

Utilized agricultural area includes the area under the following 13 classes:

- Cereals: this includes all cereals grown for grain, seed, etc.
- Industrial crops: this includes oil-seeds, cotton, tobacco, etc.
- Dry vegetables: this includes beans, lentils, etc.
- Potatoes, beets, etc.
- Feed crops: this includes maize, sudan grass, etc. as well as artificial pastures and temporary pastures (for five years or less).
- Fallow: this is the land on which no crops are grown during the agricultural year and which is left to rest. Sometimes green manure may be grown on this land.
- Fresh vegetables including greenhouses.
- Flowers and ornamental plants.
- Vines.
- Fruit-trees (six main types).
- Other permanent crops.
- Permanent pastures (harvested, not harvested) and alpine land. Permanent pasture is the land whose production per hectare is sufficient to feed a large animal for at least six months. Alpine land is the land which produces less than the permanent pasture. Generally a part of this land is occupied by woody vegetation.
- Family garden: this is a small area (generally less than 20 ares) reserved for crops mainly for the family's consumption.

Area under buildings includes all the area occupied by buildings

including those for mushroom cultivation. Greenhouses are excluded here because they are already counted under utilized agricultural land.

Non-productive area includes land not used for livestock or for crops even if it was so used more than one agricultural year ago.

Area under poplar trees is the regular poplar tree plantations. Wood and forest is the owned or rented area covered with forest trees attached to the holding. It is important that this land be operated by the personnel and the equipment of the holding, otherwise it is excluded from the holding. Included in this group are areas under trees for wind-breaks and Christmas trees.

Non-agricultural land includes roads on the holding, rocky land, amusement gardens and the like.

Pakistan. The farm area is divided into two classes – cultivated and uncultivated. Cultivated area is composed of net area sown plus current fallow. Uncultivated area is subdivided into three classes: forest, culturable waste, and not available for cultivation. These terms are defined as follows:

- "Cultivated area" is the area which is sown at least once during the census year or the year before.
- "Net area sown" is the area which is actually cropped during the census year regardless of the number of crops raised, and includes area under orchards for the same year.
- "Current fallow" is the area which is not cropped during the census year but was cropped during the preceding year.
- "Culturable waste" is the area which is fit for cultivation but is not cropped during the census year and which was not cropped in the preceding year. Total culturable area is the cultivated area plus the culturable waste.
- "Area not available for cultivation" is area under farm homestead, farm roads, and other related purposes which, therefore, is not available for cultivation.

- "Forest area" is the area which is under forest. It does not include area under government forests.

Togo. The following concepts are used: physical area, that is the land area operated by the holding and cultivated area, that is the area where crops are grown. In parts of Togo where there are two crop seasons during the agricultural year, the same physical area is counted twice in cultivated (or developed) area if crops are grown twice on it.

The data published on land use indicate the distribution of cultivated area into two classes: pure stand crop area where only one crop is grown, and mixed or associated crop area where a crop is grown together with other crops but the crop in question constitutes the major component.

CROPS

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* emphasizes the importance of data on "area harvested" or "area expected to be harvested" for temporary crops. The area harvested is the area from which a crop is gathered. The area harvested for each crop grown on arable land is the aggregate of all areas on the holding from which the crop has been harvested throughout the agricultural year, the harvested areas being counted as many times as they are used for growing the crop during the reference period. The Programme differentiates "net crop area" and "gross crop area". The net crop area is the crop area actually harvested, sown or planted, or under the crop, excluding uncultivated patches, bunds, footpaths, ditches, headlands, shoulders, shelterbelts, etc. Gross crop area is the total crop area harvested, sown or planted, or under crop, including uncultivated patches, bunds, footpaths, ditches, headlands, shoulders, shelterbelts, etc. For temporary crops preferably net areas, but otherwise gross areas, should be reported. Gross area is to be reported for permanent crops.

Other concepts relating to crops proposed by the 1980 Programme are as follows:

- "Area sown" is the area on which the sowing or planting has been carried out on the soil prepared for that purpose.
- "Area under crops" generally refers to the area of standing crops or to the area sown or planted, etc.
- "Area of compact plantations" is the area where plants, trees or shrubs are planted in a regular or systematic manner. Plants, trees or shrubs forming irregular patterns but dense enough to permit the collection of information regarding the area are also considered "compact plantations". Scattered plants, trees and vines are those that are so scattered or isolated that it is not possible to determine adequately the aggregate area they occupy.
- "Crop mixtures" are two or more different temporary or permanent crops (but not both temporary and permanent crops) grown simultaneously on the same field or plot. Where certain temporary crops, particularly grains, are grown and harvested as mixtures, the Programme recommends that such a mixture should be treated as if it were a single crop, without attempting to estimate the area under each individual crop. When both temporary and permanent crops are grown simultaneously in the same field, each of the crops is referred to as an associated crop.

Country practices

The great majority of countries have used the concept of "area harvested" as defined by the 1980 Programme, though some countries have utilized the concept of "area sown". For example, Canada has collected data on "total area of the various crops seeded or to be seeded for harvest in 1981". Some countries (Togo, the Congo, Madagascar) used the concept of "cultivated area" (*superficie cultivée*). Other countries, such as Uruguay and

Panama, collected data both on "area sown" and on "area harvested".

The differentiation made between the "net" and the "gross" crop area in the 1980 Programme was not applied. For example, in France all types of land use are expressed in gross area which includes areas occupied by crops as well as areas like passages that are not cultivated.

With regard to the list of crops, some countries adopted classifications different from those of the Programme.

Niger. In the Niger crops were divided into three categories:

- annual crops: the crops that are sown and harvested during the same agricultural year (millet, sorghum, rice, etc.);
- multi-year crops: the crops that remain on the land more than one year but less than five years (cassava, sugar cane);
- permanent crops: the crops that remain on the land five years or more (fruit-trees, etc.).

However, the majority of countries used definitions similar to those proposed by the Programme regarding temporary and permanent crops. The case of Trinidad and Tobago is an example.

Trinidad and Tobago. Temporary crops cover all crops with a growing cycle of less than one year as well as crops which are destroyed on harvesting and crops grown in rotation. Thus, temporary crops include all pulses and grains, e.g. rice, maize, pigeon peas; all root crops (ground provisions), e.g. cassava, dasheen, yam; all vegetables, e.g. tomatoes, cabbage and, for purposes of the census, sugar cane, tobacco and sorrel which are treated as temporary crops.

For purposes of the census in Trinidad and Tobago a permanent crop is one which does not have to be replanted for several years after each harvest. Permanent crops include all tree crops as well as bananas, plantains and pineapples.

In the case of associated and mixed crops the practice of allocating land between various crops differs between countries.

France. In the case of mixed temporary crops, the total area of the mixture is divided among crops in proportion to the land they occupy. In the case of one permanent crop being associated with one temporary crop, the total area is attributed to the permanent crop. If there is more than one permanent crop in the association, the whole area should be assigned to the principal permanent crop, which is defined as the permanent crop whose annual production has the highest value over several years (for example, over the life of the crop). Thus, a young plantation which has not yet started producing can be considered as the principal crop although during the current agricultural year its production was nil.

In case of mixtures of permanent crops the following rules are used:

- if one of the mixed permanent crops is vine, then the whole area is recorded under vine;
- if there is no vine in the mixture, then area is proportionately allocated among various permanent crops.

Paraguay. No attempt is made to allocate area under mixed permanent crops to individual permanent crops. In the case of a mixture of temporary crops, total area is allocated to individual crops. In the case of associated cropland, total area is reported under the permanent crops for land-use purposes, but an estimate is made for the area occupied by the temporary crops for crop area statistics. The estimates of areas for temporary crops are based on the quantity of seeds used, the distance between plants, etc.

Togo. The area of mixed and associated crops is attributed to the principal crop, defined as the crop that occupies the greatest area of the mixture. The published tables indicate for main crops the

area under pure stand and the area as principal crop separately.

LIVESTOCK

Definition and recommendations of the 1980 Programme

Livestock refers to all animals kept or reared mainly for agricultural purposes, including cattle, buffaloes, sheep, goats, pigs, horses, mules, asses, camels, poultry, rabbits, bees and other domesticated animals as well as foxes, minks, etc. reared in captivity on the holding for agricultural purposes.

The *Programme for the 1980 World Census of Agriculture* recommends collecting data on numbers of livestock (except bees) by age groups, by sex and by purpose (for the important kinds of livestock). It is noted that the agricultural census should not be viewed as the main source of current information on livestock numbers, because these numbers are subject to many changes during the year and from year to year. For census purposes the number of livestock present on the holding on the specific reference date should be recorded regardless of ownership.

Certain age classes were proposed in the 1980 Programme. The following are the classes proposed for cattle and sheep:

- Cattle:
  - under one year;
  - one year and under two years;
  - two years and over.
- Sheep:
  - lambs under one year;
  - sheep one year and over.

Country practices

All countries except Grenada collected data regarding the number of livestock. The majority of the countries adopted the recommendation of FAO to record the number of livestock present on the holding on a specific reference date regardless of ownership. Some examples are now cited.

Canada. Number of livestock is the number of all animals on the holding, regardless of ownership. Livestock owned by the holder but kept on a farm, ranch or feedlot operated by someone else are excluded. Livestock owned by the holder but pastured on a community pasture or public land are included.

Central African Republic. For each animal, the number of livestock is the number of animals raised on the holding. All animals belonging to the holding, even though they may be temporarily absent, are included. Nomadic livestock are excluded from the census of agriculture.

Jordan. Number of livestock is the number of animals on the holding as they were on 1 April 1983, irrespective of ownership.

New Zealand. Number of livestock is the number of animals on the holding on 30 June 1983 irrespective of ownership.

Uruguay. Number of livestock is the number of different animals (cattle, sheep, goats, pigs, horses, mules, asses, poultry, rabbits) which exist on the holding on 30 June 1980 (and not the day of the visit of the enumerator) whether or not they are owned by the holder. Those animals that have left the holding being enumerated and are in transit toward markets or other holdings on the reference date should be included in the holding of their origin.

Other countries. Some countries (Bangladesh, Federal Republic of Germany, Jamaica and Pakistan) collected data on the number of livestock owned. For example, in the case of Bangladesh the numbers refer to the animals possessed by the household on the day of enumeration. In the Federal Republic of Germany three sets of data are collected: total number of livestock on the holding; number of livestock on the holding but not belonging to the holder

and number of livestock belonging to the holder but not on the holding. All numbers refer to 3 December 1979.

With respect to age classes, country practices differ from each other. Table 11 shows the age classes used by each country for cattle and sheep.

As can be seen from Table 12, 24 countries out of 77 have not collected data on age classes of cattle. Most of these countries belong to the African or to the Latin America and the Caribbean regions. The two classification schemes that are adopted most often are the following:

- less than one year, one year and above;
- less than one year, one year but less than two years, two years and above.

From Table 13 it can be seen that, in general, countries are not collecting data on age classes of sheep. Those countries, however, that do collect such data prefer a classification in two classes: less than one year, one year and above.

MACHINERY AND EQUIPMENT

Definition and recommendations of the 1980 Programme

These data should refer to agricultural machinery used during the reference period wholly or partly for agricultural production on the holding. Machinery and equipment used during the agricultural year exclusively for non-agricultural work on the holding should be excluded as well as machinery which is not in usable condition. The emphasis in the *Programme for the 1980 World Census of Agriculture* is on whether use is made of certain types of machinery and equipment and on the sources which provide such facilities to the holder.

Machinery and equipment are grouped into three classes: stationary, power-producing machinery, agricultural machinery and transport equipment.

TABLE 11

Age classes in years adopted by countries for cattle and sheep

Region and country	Census year	Cattle	Sheep
Africa			
Botswana	1982	-1, 1-3, 3+	-1, 1+
Cape Verde	1981	[1]	[2]
Central African Rep.	1985	[1]	[1]
Congo	1986	[1]	[1]
Ethiopia	1977	-1, 1-2, 2+	-1, 1+
Kenya	1979	-1, 1-3, 3+	[3]
Madagascar	1984	[1]	[2]
Malawi	1981	-1, 1+	[1]
Mauritania	1985	[1]	[1]
Niger	1980	[1]	[1]
Reunion	1981	[1]	[1]
Rwanda	1984	-1, 1+	[4]
Sierra Leone	1985	[1]	[1]
Togo	1983	[1]	[1]
Asia and the Pacific			
American Samoa	1980	[1]	[1]
Australia	1980	-1, 1+	-1, 1+
Bangladesh	1977	-3, 3+	[1]
Fiji	1978	-1, 1+	[2]
Guam	1978	[1]	[1]
India	1976	-1, 1-3, 3+	-1, 1+
Japan	1980	[1]	[1]
Korea, Rep. of	1980	-2, 2+	[1]
Nepal	1981	-1, 1-3, 3+	-1, 1+
New Zealand	1980	-1, 1-2, 2+	[1]
Northern Mariana Islands	1980	[1]	[1]
Pakistan	1980	-1, 1-3, 3+	-1, 1+
Philippines	1981	-2, 2+	[2]
Sri Lanka	1982	-3, 3+	-1, 1+
Thailand	1978	-1, 1-2, 2+	[1]
Tonga	1985	-3, 3+	[2]
Europe			
Austria	1980	-1, 1-2, 2+	[1]
Belgium	1979	-1, 1-2, 2+	[1]
Czechoslovakia	1980	-1, 1-2, 2+	-1, 1+
Denmark	1979	-1, 1+	[1]
Finland	1980	-1, 1+	[5]
France	1979	-1, 1-2, 2+	[6]
Germany, Federal Rep. of	1979	[7]	-1, 1+
Hungary	1981	[1]	[1]
Ireland	1980	-1, 1+	-1, 1+
Italy	1982	[7]	[1]
Luxembourg	1980	-1, 1-2, 2+	-1, 1+
Malta	1979	-1, 1-2, 2+	-1, 1+
Netherlands	1979	-1, 1-2, 2+	-1, 1+
Norway	1979	-1, 1+	-1, 1+
Poland	1980	[8]	-1, 1+
Portugal	1979	-1, 1-2, 2+	-1, 1+
Spain	1982	-1, 1+	[1]

TABLE 11 (cont.)

Age classes in years adopted by countries for cattle and sheep

Region and country	Census year	Cattle	Sheep
Sweden	1981	-1, 1+	-1, 1+
Switzerland	1980	-1, 1-2, 2+	-1, 1+
United Kingdom	1979	-1, 1-2, 2+	[1]
Yugoslavia	1981	[1]	-1, 1+
Latin America and the Caribbean			
Antigua and Barbuda	1984	[1]	[1]
Bahamas	1978	-1, 1-2, 2+	[1]
Belize	1985	-1, 1-2, 2+	-1, 1+
Brazil	1980	-1, 1-2, 2+	-1, 1+
French Guiana	1980	[1]	[1]
Grenada	1981	[2]	[2]
Guadeloupe	1980	[1]	[1]
Guatemala	1979	-1, 1-2, 2+	[1]
Jamaica	1978	[1]	[1]
Martinique	1980	-1, 1+	[1]
Panama	1981	-1, 1+	[2]
Paraguay	1981	-1, 1-2, 2+	-1, 1+
Puerto Rico	1978	[1]	[1]
Suriname	1981	[1]	[1]
Trinidad and Tobago	1982	[1]	[1]
Uruguay	1980	-1, 1+	[1]
Virgin Islands (US)	1978	-1, 1+	
Near East			
Bahrain	1980	-2, 2+	-1, 1+
Cyprus	1977	-1, 1-2, 2+	-1, 1+
Israel	1981	[1]	[5]
Jordan	1983	-1, 1-2, 2+	-1, 1+
Oman	1978	-2, 2+	-1, 1+
Saudi Arabia	1982	-2, 2+	-1, 1+
Turkey	1980	-2, 2+	-1, 1+
Yemen Arab Rep.	1983	-1, 1+	-1, 1+
North America			
Canada	1981	-1, 1+	-1, 1+
United States	1978	[1]	[1 9]

Notes: [1] No age classification.
[2] No data collected regarding this type of livestock.
[3] Classification: young, adult.
[4] Classification: less than 8 months, 8 months and more.
[5] Classification: less than 6 months, 6 months and more.
[6] Classification: mothers, young females, others.
[7] Classification: less than 6 months, 6 months to 1 year, 1 year and more.
[8] Classification: less than 6 months, 6 months to 1 year, 1 year and more.
[9] Separate class for ewes over 1 year.

TABLE 12

Number of countries by region and by age classes adopted for cattle

Region	Age classes of cattle						
	No age class	Two age classes			Three or more classes		
		-1, 1+	-2, 2+	-3, 3+	-1,1-2, 2+	-1,1-3, 3+	Other
Africa	9	2	—	—	1	2	—
Asia and the Pacific	4	2	2	3	2	3	—
Europe	2	6	—	—	10	—	3
Latin America and the Caribbean	7	4	—	—	5	—	—
Near East	1	1	4	—	2	—	—
North America	1	1	—	—	—	—	—
Total	24	16	6	3	20	5	3

TABLE 13

Number of countries by region and by age classes adopted for sheep

Region	Age classes of sheep				
	No age class	-6 months, 6 months+	-8 months, 8 months+	-1, 1+	Other
Africa	8	—	1	2	1
Asia and the Pacific	8	—	—	5	—
Europe	7	1	—	12	1
Latin America and the Caribbean	12	—	—	3	—
Near East	—	1	—	7	—
North America	—	—	—	1	1
Total	35	2	1	30	3

Country practices

Many countries followed the recommendation of the 1980 Programme and collected data on machinery and equipment used on the holding (as opposed to that owned by the holder). Some

examples of the definition of machinery and equipment covered in the agricultural census are given below.

France. Machinery and equipment are those used by the holding during the agricultural year 1978/79 for agricultural purposes whether or not they are owned by the holder. In the case of used machinery and equipment replaced by new pieces during the year, only the new machinery and equipment are recorded. Machinery and equipment not in usable condition are excluded.

Niger. Agricultural machinery and equipment are those used in the holding irrespective of ownership. The numbers of each piece of machinery are recorded by their source.

Togo. Machinery and equipment are divided into two categories: small and powered. For small equipment the numbers that are owned by the holder are indicated. For powered machinery the numbers of those that are used on the holding are recorded by their source.

Uruguay. Agricultural machinery and equipment are those in usable condition on the holding the day before the enumerator's visit, mainly used for agricultural work whether or not the property of the holder.

Other countries. Some countries collected two different data regarding machinery and equipment: machinery and equipment owned and machinery and equipment used. In the case of Pakistan emphasis was on the number of machines and pieces of equipment owned. Information regarding the machinery and equipment used was restricted to "whether or not used". In Jordan, for each type of machinery two numbers were recorded: the number owned and the number used. Furthermore, the sources of the machinery and equipment that were used were indicated. In Turkey, the number

of machines and pieces of equipment owned on the day of interview was recorded. Information regarding the use of machinery and equipment referred only to tractors and combines and it covered tenure (owned, jointly owned and rented). Sri Lanka collected the number of implements and machines owned whether or not used on the holding. In addition, information on machinery used on the holding was collected. This information included tenure as whether owned, hired, or other.

IRRIGATION

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* recommended two concepts regarding irrigation: the area normally irrigated and irrigation facilities. The area normally irrigated is the gross area of land deliberately and normally provided with water other than rain for improving the production of crops or pastures. The uncontrolled flooding of land by the overflow of rivers or streams should not be considered irrigation. However, when rain-water or water from the uncontrolled overflow of rivers and streams is collected and later used for irrigation, this practice should be considered irrigation. Land irrigated more than once during the agricultural year should be counted only once as area irrigated.

Irrigation facilities refer to the use on the holding of tubewells or boreholes, other kinds of wells with pumps, or irrigation water wheels and gravitational-flow facilities not involving prior pumping or other means of lifting the water. The facilities to be recorded should be located on the holding. Water wheels used mainly for power generation should not be considered as irrigation facilities.

Country practices

Many countries adopted the approach recommended by the 1980 Programme. Nevertheless, some differences between countries in the treatment of irrigation facilities can be observed below.

France. Irrigable area and the area irrigated are differentiated. Family gardens are excluded from both. Irrigable area includes all that area which can be irrigated by means existing on the holding. Irrigated area is the area actually irrigated at least once during the agricultural year. Thus, irrigated area could be nil if the season is humid. The following four techniques of distributing water to the parcels are identified: sprinklers, gravitation, drips, other techniques.

Jordan. Data are collected on the area irrigated. The following sources of water are identified: gravity from a spring, pumping from a spring, gravity from a river without a dam, pumping from a river without a dam, from a dam, underground water, a canal, other, more than one source. As irrigation methods the following were cited: basins of water, canals, sprinklers, drips, more than one method.

Niger. Data on area actually irrigated are collected. Three different sources are identified for water: ponds, wells and rivers. No questions are asked regarding facilities of irrigation.

Pakistan. Data are collected on both the area irrigated during the current agricultural year, and the area with irrigation facilities but not irrigated for some reason during the current agricultural year. The irrigated area is the cultivated area actually irrigated during the census year by artificial means. Irrigation facilities were identified as: canal only, canal and tubewell, canal and other means, tubewell only, well only, pond only, springs or hill ravines only, other.

Panama. The screening question to establish the existence of irrigation was: "Have you used any irrigation system in the holding?" Three types of irrigation systems are identified: gravity, sprinklers, other.

United States. Irrigated land is defined as the land watered by any artificial or controlled means – sprinklers, furrows or ditches, spreader dikes, etc. – and it covers supplemental, partial and pre-plant irrigation as well. Data on irrigated area are collected separately for harvested land by crops, pasture and rangeland and other lands. No data are collected on methods of irrigation in the agricultural census, but a special census was carried out on irrigation.

INTEGRATION OF HOLDING WITH AN ESTABLISHMENT IN ANOTHER INDUSTRY

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* recommended that countries collect data on whether or not the holding is part of a larger establishment whose major economic activity is not agricultural and livestock production. For the cases where the holding is part of an establishment, the Programme proposed the following as possible major economic activities for the establishment:

- manufacturing;
- wholesale or retail trade;
- agricultural services;
- other.

Country practices

Very few countries followed the above recommendation. Some examples follow.

Federal Republic of Germany. The questionnaire contains a question on whether or not the holder is a member of a producer's society engaged in growing or raising the following products:

- cereal;
- potatoes;
- grapes;

- fruit and vegetables;
- cattle for slaughter;
- pigs for slaughter;
- young pigs;
- eggs;
- poultry;
- other.

Italy. For a holding that forms part of an agricultural cooperative or similar organization the economic activities of these cooperatives and organizations are identified. These activities are as follows:

- Acquisition of
  - fertilizers;
  - pesticides;
  - seeds and young plants;
  - livestock;
  - feed;
  - medicine;
  - mechanical means;
  - fuel and oil;
  - other goods.
- Consignment of products of:
  - farming: cereals, sugar beet, tobacco, vegetables, grapes, olives, fruit, others;
  - livestock raising: cattle, pigs, sheep and goats, chickens, eggs, milk, others.
- Other activities, excluding supply of irrigation water and use of mechanical means.

For the consignment of products, three categories of activities are identified for each product:

- selection, conservation and sale;
- transformation only;
- transformation and sale.

Spain. Data are collected to ascertain whether or not the holding is affiliated to another economic entity. These economic entities are either cooperatives or agricultural transformation companies. The following economic activities are identified for these cooperatives and companies:

- manufacturing and/or trade;
- constructing irrigation facilities;
- providing services: irrigation, obtaining and distributing seeds;
- providing specific facilities: electrification, constructing rural roads;
- acquiring and/or using machinery on behalf of members.

PRODUCTION UNDER CONTRACT

Definition and recommendations of the 1980 Programme

Production under contract is an arrangement between the holder and a contractor to produce a particular product or group of products under certain obligations on the part of both parties. These may include the quantities to be produced, the prices at which they are to be purchased by the contractor, and the specific inputs to be provided by the contractor, such as fertilizers, pesticides, baby chicks, livestock or chicken-feed and financial help for operation of the holding.

Country practices

This item is included in the census questionnaire of Belgium only. It is described as follows: contractual relations based on written contracts between agricultural producers and other enterprises, which are generally industrial or commercial, include reciprocal obligations. The object of these contracts is to provide agricultural produce in exchange for provision of means of production. These contracts specify the quantity, the quality and/or the price of goods to be delivered, as well as the timing of the delivery. These contracts do not include the deliveries to the cooperatives of which the holding is a member.

The data collected include information on the percentage of the total production thus contracted for each of the following categories of produce: cereals, fruit and vegetables, cattle, milk and milk products, pigs, poultry and eggs.

HIGH-YIELDING CROP VARIETIES

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* defined a high-yielding crop variety as an improved cultivated variety with a significantly higher yield (higher quantity and/or better quality, better benefit/cost ratio) under specific environmental and improved farming conditions and practices (use of fertilizers, irrigation, pesticides, etc.) than the best traditional varieties of seed currently used.

The Programme recommended countries to collect information on whether or not high-yielding crop varieties were used on holdings for wheat, rice and other crops.

Country practices

Many countries (e.g. France, Ireland, Italy, Panama, Spain, Turkey, the United Kingdom, the United States and Uruguay) did not collect information on the use of high-yielding crop varieties. A few countries included a question in their questionnaires regarding the use of high-yielding crop varieties. Jordan asked the following question: "Did you use improved seed in your holding last year?" without specifying any crop. Pakistan collected separate data on area sown and area irrigated for "new varieties of wheat" in addition to other wheat. The Niger, similarly, collected information only on whether or not "selected seeds" were used in a general sense without reference to any specific crop. In Togo, the subject was studied first at the village level and the village questionnaire of the census contained the following question: "Are selected seeds utilized in this village?" At the holding level more detailed information was collected for each parcel. Holders were

asked to indicate which type of seed they utilized: unimproved seed from own produce, from another holding, selected by a public organization, other.

INORGANIC FERTILIZERS AND PESTICIDES

Definition and recommendations of the 1980 Programme

The *Programme for the 1980 World Census of Agriculture* recommended identification of the entity that applied inorganic fertilizers and pesticides in the holding, if they are applied at all. Two types of entities were proposed. The first type of entity includes holder, members of the household of the holder, other workers of the holding and the free assistance received from other holders and neighbours. The second type of entity is the contractor or agency that applies fertilizers or pesticides under arrangements made with the holder.

The Programme indicated that some countries might find it advantageous to collect information on the areas treated with fertilizers and with pesticides for the major food crops.

Country practices

Some countries (e.g. France, Ireland and Spain) did not collect data on fertilizers and pesticides, but the great majority of countries collected such data. However, they did not follow the recommendation of the 1980 Programme regarding the identification of the entity that carried out the application of fertilizers and pesticides.

Canada. The census collects data on chemical fertilizers only, total cropland fertilized and quantity of fertilizer used during 1980. With respect to pesticides, a distinction is made between pesticides for control of weeds and brush, and pesticides for control of insects and disease. For both types of usage, data on the total area where pesticides are applied are collected.

Jamaica. No distinction is made between chemical and organic fertilizers. Information collected is restricted to whether or not fertilizers and pesticides are applied for each crop. No data on area of application are collected.

Pakistan. The area fertilized is defined as the area of a crop treated with fertilizers irrespective of the number of times it was fertilized. Three classes of fertilizer use are identified: chemical, manure and both chemical and manure. The area covered with plant protection material is the area of a crop on which plant protection material was sprayed irrespective of the number of sprays made. It does not include aerial spray. Data on fertilizers and pesticides cover only important crops.

Togo. For each parcel of land information is collected on whether or not fertilizers and pesticides are applied. Three classes of fertilizer application are identified: manure, chemical and both chemical and manure. For the pesticides, if they are used, information is collected on the number of times they are applied for each parcel.

Chapter 4

Scope of national agricultural censuses

The individual subjects on which information is collected in the census have been referred to as "items". This chapter discusses the participation of countries in the proposed census items of the *Programme for the 1980 World Census of Agriculture*. Table 14 shows the participation of countries in sections. Because of the fact that at the level of "items" there are important differences between countries due to local conditions, tables indicating participation at the item level are prepared only for sections where such differences are not too great. Instead typical examples from various regions are presented.

The chapter includes 11 parts. The first describes the historical evolution of census items. The second provides an overall view of participation at the level of sections. The following parts are on the participation of countries in the specific sections of the 1980 Programme. In these sections, following the presentation of items proposed by the Programme, various country practices are given. The main items of the Programme that are defined below are indicated with an asterisk.

HISTORICAL EVOLUTION OF CENSUS ITEMS

The WCA programmes have always proposed two sets of items: the first set, which is called the "main items" here, refers to the subjects considered the most important. The second set of items covers other desirable subjects which can be called secondary items. The 1930 and 1940 programmes gave the two sets of items

in the form of questions constituting two different parts of a standard questionnaire. In the 1950 Programme the main items were presented under the title of the "short list". The "expanded list" of the same programme included the secondary items, together with the main items. The 1960, 1970 and 1980 programmes included only an expanded list of items in which the main items were identified either in bold letters (1960 and 1970) or with asterisks (1980).

In a working paper (Avralioglu, 1983, p. 32, 33) the following general observations are made on the census items of WCA:

"(a) The main items concerning crops covered almost all crops in 1930 and 1940. Starting with 1950 the number of main items on crops were drastically reduced, to cover only cereals, certain tubers, industrial crops and some fruits. It can also be noted that starting with 1960 a few crops which are important in the diets of some of the developing countries (e.g. cassava) were added to the list of main items, but since 1960 this section of the list of main items has remained more or less the same.

(b) There has been a continuous reduction in the number of main items on livestock. In 1930, 1940 and 1950 various types of poultry were individually cited among main items. In 1960 they were completely removed from the list of main items. In 1970 and 1980 only one item was kept in the list of main items. There were many items on horses in 1930 and 1940. Part of the decrease in the number of main items on livestock is related to the elimination of most of these items. Another important change in this category occurred in 1950 when buffaloes were introduced among the main items. Livestock production was removed from the list of main items starting with 1950.

(c) Employment, which was included in the list of main items in 1930 and 1940, was dropped in 1950 and 1960, was again picked up in 1970, and was enlarged in 1980.

(d) Wood and forest were among the main items in 1930 and

1940 (mainly in 1930), but subsequent programmes did not include any main items on this subject.

(e) Power was introduced in 1950 among main items, and it was further elaborated in succeeding programmes.

(f) Irrigation and machinery were included in the list of main items in 1960 and were given more importance in 1980.

(g) Fertilizers were among the main items in 1960 and 1970 but were transferred to secondary items in 1980.

(h) Legal status of the holder was introduced in 1960 into the list of main items and has been kept there in 1970 and 1980, with further refinements.

(i) Land tenure has been covered in the list of main items in a standard way since 1960.

(j) Land use has always been in the list of main items. However, the categories of land use have been modified.

(k) Certain general information on holding and holder has been included in the list of main items in all programmes.

(l) The 1980 Programme introduced new elements in the list of main items. These items refer to use of high-yielding varieties, production on the holding under contract, and integration of holdings with other industries."

PARTICIPATION OF COUNTRIES IN SECTIONS OF THE 1980 PROGRAMME

The *Programme for the 1980 World Census of Agriculture* presented the proposed census items in the following eight sections:

- Holding
- Holder
- Population and employment
- Land use
- Crops
- Livestock
- Machinery and equipment
- Selected practices and facilities.

In Table 14, showing the participation of countries in the sections of the 1980 Programme, of the 103 countries that participated in the 1980 WCA, only 78 countries are shown. These are the countries for which the census results are published in Census Bulletins. Participation is when at least one question on the section has been included in a country's questionnaire. As is clearly seen in Table 15, which is derived from Table 14, almost all of these 78 countries participated in almost all the sections of the 1980 Programme.

Participation was comparatively less in the section on "Selected practices and facilities", with a total of 56 countries covering it to some extent. Most of the non-participating countries in this section are the developed countries where the selected practices such as irrigation, use of high-yielding varieties, fertilizers and pesticides are normal agricultural practices.

The second section where participation was comparatively low is "Land use". It can be noted that most of the non-participating countries in this section are in the Africa region.

HOLDING

Proposed census items

Under the heading "Holding", the *Programme for the 1980 World Census of Agriculture* covered the identification and fragmentation of holding and its land tenure. The following items are recommended (numbered as in the Programme):

* 11 Location of the holding
* 12 Total area of the holding
* 13 Number of (non-contiguous) parcels of land constituting the holding
* 14 Location and area of each of the (non-contiguous) parcels
* 15 Tenure of land
    * 15.1 Area of the holding owned or held in ownerlike possession

TABLE 14

Participation of countries in sections of the 1980 Programme

Region and country	Census year	Section							
		1	2	3	4	5	6	7	8
Africa									
Botswana	1982	x	x	x		x	x	x	x
Cape Verde	1981	x	x	x			x		
Central African Rep.	1985	x	x	x		x	x	x	x
Congo	1986	x	x	x		x	x	x	
Ethiopia	1977	x	x	x	x	x	x	x	x
Kenya	1979	x	x	x		x	x	x	
Madagascar	1984	x	x	x		x	x	x	x
Malawi	1981	x	x	x		x	x	x	x
Mauritania	1985	x	x	x		x	x	x	
Niger	1980	x	x	x	x	x	x	x	x
Reunion	1981	x	x	x	x	x	x	x	x
Rwanda	1984	x	x	x	x	x	x		
Sierra Leone	1985	x	x	x		x	x	x	x
Togo	1983	x	x	x	x	x	x	x	x
Asia and the Pacific									
American Samoa	1980	x	x	x	x	x	x	x	
Australia	1980	x	x	x	x	x	x		x
Bangladesh	1977	x	x	x	x	x	x	x	x
Fiji	1978	x	x	x		x	x	x	x
Guam	1978	x	x	x	x	x	x	x	x
India	1976	x	x		x	x	x	x	x
Japan	1980	x	x	x	x	x	x	x	
Korea, Rep. of	1980	x	x	x	x	x	x	x	x
Nepal	1981	x	x	x	x	x	x	x	x
New Zealand	1980	x	x	x	x	x	x	x	x
Northern Mariana Is.	1980	x	x	x	x	x	x	x	
Pakistan	1980	x	x	x	x	x	x	x	x
Philippines	1981	x	x	x	x	x	x	x	x
Sri Lanka	1982	x	x	x	x	x	x	x	x
Thailand	1978	x	x	x	x	x	x	x	x
Tonga	1985	x	x	x	x	x	x		
Europe									
Austria	1980	x	x	x	x	x	x	x	x
Belgium	1979	x	x	x	x	x	x	x	x
Czechoslovakia	1980	x	x	x	x	x	x	x	x
Denmark	1979	x	x	x	x	x	x	x	x
Finland	1980	x	x	x	x	x	x		
France	1979	x	x	x	x	x	x	x	x
Germany, Fed. Rep. of	1979	x	x	x	x	x	x		
Hungary	1981	x	x	x	x	x	x	x	
Ireland	1980	x	x	x	x	x	x	x	
Italy	1982	x	x	x	x	x	x	x	x
Luxembourg	1980	x	x	x	x	x	x	x	
Malta	1979	x	x	x	x	x	x	x	x
Netherlands	1979	x	x	x	x	x	x	x	
Norway	1979	x	x	x	x	x	x	x	x
Poland	1980	x			x	x	x	x	

TABLE 14 (cont.)

Participation of countries in sections of the 1980 Programme

Region and country	Census year	Section							
		1	2	3	4	5	6	7	8
Portugal	1979	x	x	x	x	x	x	x	x
Spain	1982	x	x	x	x	x	x	x	x
Sweden	1981	x	x	x	x	x	x	x	
Switzerland	1980	x	x	x	x	x	x	x	
United Kingdom	1979	x	x	x	x	x	x	x	
Yugoslavia	1981	x	x	x			x	x	
Latin America and the Caribbean									
Antigua and Barbuda	1984	x	x		x	x	x		x
Bahamas	1978	x	x	x	x	x	x	x	x
Belize	1985	x	x	x	x	x	x	x	
Brazil	1980	x	x	x	x	x	x	x	x
French Guiana	1980	x	x	x	x	x	x	x	x
Grenada	1981	x	x	x	x	x	x		
Guadeloupe	1980	x	x	x	x	x	x	x	x
Guatemala	1979	x	x	x	x	x	x	x	x
Jamaica	1978	x	x	x	x	x	x	x	x
Martinique	1980	x	x	x	x	x	x	x	x
Panama	1981	x	x	x	x	x	x	x	x
Paraguay	1981	x	x	x	x	x	x	x	x
Puerto Rico	1978	x	x	x	x	x	x	x	x
Suriname	1981	x	x	x	x	x	x	x	x
Trinidad and Tobago	1982	x	x	x	x	x	x	x	x
Uruguay	1980	x	x	x	x	x	x	x	x
Virgin Islands (US)	1978	x	x	x	x	x	x	x	x
Near East									
Bahrain	1980	x	x	x	x	x	x	x	x
Cyprus	1977	x	x	x	x	x	x	x	x
Israel	1981	x	x	x	x	x	x	x	x
Jordan	1983	x	x	x	x	x	x	x	x
Oman	1978	x	x	x	x	x	x	x	x
Saudi Arabia	1982	x	x	x	x	x	x	x	x
Turkey	1980	x	x	x	x	x	x	x	x
Yemen Arab Rep.	1983	x	x	x	x	x	x	x	x
North America									
Canada	1981	x	x	x	x	x	x	x	x
United States	1978	x	x	x	x	x	x	x	x

Note: Section codes:
1. Holding.
2. Holder.
3. Population and employment
4. Land use.
5. Crops.
6. Livestock.
7. Machinery and equipment.
8. Selected practices and facilities.

TABLE 15

Number of countries by region and by section of the 1980 Programme in which they participated

Section	Region						
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	Total
Holding	14	16	21	17	8	2	78
Holder	14	16	20	17	8	2	77
Population and employment	14	15	20	16	8	2	75
Land use	5	15	20	17	8	2	67
Crops	13	16	20	17	8	2	76
Livestock	14	16	21	17	8	2	78
Machinery and equipment	12	14	19	15	8	2	70
Selected practices	9	12	10	15	8	2	56

* 15.2 Area of the holding rented from others
  * 15.21 For an agreed amount of money and/or produce
  * 15.22 For a share of produce
  * 15.23 In exchange for services
  * 15.24 Under other rental arrangements not elsewhere specified
* 15.3 Area of the holding operated on a squatter basis
* 15.4 Area of the holding operated under tribal or traditional communal forms of tenure
* 15.5 Area of the holding operated under other forms of tenure not elsewhere specified.

Country practices

Without exception all countries collected information on the location of holdings. Evidently this is related partly to the desire to establish better control over the field work and partly to the need to publish results by the geographic and/or administrative

subdivisions of each country. Examples of items on this subject are given for several countries below:

- France:
  Where is the headquarters of the holding?
  - the building used for both residential and agricultural purpose;
  - the main agricultural building (where residential and agricultural buildings are separate);
  - the commune where the major part of its land is located?

  Address of these headquarters:
  - place or street, commune, department.
- Malawi:
  - cluster/village;
  - traditional authority;
  - district.
- United States:
  - In what county was the largest share of the value of your agricultural products raised or produced?
  - If you also have agricultural operations in any other county(ies) enter the county name(s), etc....

A question on the total area of the holding exists in all census questionnaires. But not all countries have asked the number of non-contiguous parcels of land existing in the holding. The countries that did not collect this information are mainly the developed countries.

The classes of land tenure proposed by the Programme were adapted to national conditions. The class "owned or held in ownerlike possession" was common in all countries. A few subdivided this class into more specific categories:

- Paraguay:
  - owned with final title;
  - owned with provisional title.
- Sierra Leone:
  - owned by an individual;

- owned by family;
- owned by other.

• Tonga:
- hereditary state;
- leasehold;

Registered tenure:
- on government estate;
- on estate of a noble.

Customary right:
- on government estate;
- on estate of a noble.

Many countries collected information on land rented from others without differentiating between various forms of rent as suggested in the Programme. These are mainly the developed countries. In countries where different rental arrangements prevail, attention is paid to separate "rental for a share of produce" from other types of rent. Bangladesh has identified six subclasses under "rental for a share of produce", based on two aspects of the arrangement, i.e. size of share and whether or not the landlord provides certain agricultural inputs such as seed and fertilizer:

- one-third share with inputs from landlord;
- one-third share without inputs from landlord;
- half share with inputs from landlord;
- half share without inputs from landlord;
- two-thirds share with inputs from landlord;
- two-thirds share without inputs from landlord.

Although rental of land in exchange for services is recognized mainly in the Near East countries, rental for an agreed amount of money and/or produce is common in all regions. A few countries have introduced the source of land (the party that rented out the land) together with the type of rental arrangement. For example:

• Paraguay:
- rented from persons for cash or in kind;
- rented from government for cash.

In a few countries specific rental arrangements are mentioned:

- Rwanda:
  - granted rent free.

Squatters are more frequently noted in the region of Latin America and the Caribbean.

Tribal tenure is recognized as a separate class in some African and Near East countries, for example, Togo and Oman. But some African countries (e.g. the Central African Republic) include tribal tenure in the class "other". In Spain, "communal regime" is specified as a separate tenure class.

HOLDER

Proposed census items

The items in this section identify the holder, the hired manager and the respondent. The section also covers the legal status of the holder. The following items are recommended (numbered as in the Programme):

* 21 Identification of the holder
* 22 Legal status of the holder
  * 22.1 An individual or a household
  * 22.2 Two or more individuals of different households or two or more households
  * 22.3 Corporation
  * 22.4 Cooperative
  * 22.5 Collective
  * 22.6 Government
  * 22.7 Other (e.g. religious institution, private school, tribe or clan)
* 23 Name and address of the hired manager (if any)
* 24 Name and address of the respondent and his relationship to the holder.

As can be noted, all of the items except the one on respondent are among the main items.

Country practices

To identify the holder, all countries collect information on the name and address of the holder. Some countries include the holder's telephone number in this section. For example:

- France:
  - name and family name;
  - number, road;
  - commune;
  - department;
  - telephone number.
- Sierra Leone:
  - province;
  - district;
  - chiefdom;
  - village;
  - enumeration area number;
  - sample household number;
  - name of holder.
- Uruguay:
  - name;
  - nationality;
  - postal address.

The great majority of countries include a question to find out whether or not a hired manager is employed in the holding. Where there is a hired manager, information on his or her name, address and certain other characteristics is collected. For example:

- Oman:
  Who runs the holding:
  - holder;
  - another person?

  If the holding is run by another person, name and address of this person.
- Panama:
  Is the holding managed by a hired manager?

If yes, name and address of the hired manager.
Which diploma has the hired manager:
- agricultural technician;
- agricultural or forestry engineer;
- veterinary;
- other;
- none?

Not all countries try to identify the respondent. For example, Malawi, the Niger, Panama and Uruguay do not collect information on the respondent. Examples of countries that collect this information are given below:

- Oman:
  name of respondent;
  Is holder himself the respondent?
- Paraguay:
  name of respondent.
- Turkey:
  relationship to head of household.
- US Virgin Islands:
  Who furnished the information in this report?
  The following are the alternatives: operator, landlord, wife or a member of the operator's family, hired labourer, neighbour, other.

In Australia, where the census questionnaire is mailed to the holders, the respondent (holder, accountant or other responsible authority) is requested to write his or her name and address in the final part of the questionnaire and sign it.

The legal status of holders is included in the census of the majority of countries except in the Africa region. Considerable differences can be observed among the classes adopted by countries for the legal status of holders. Bangladesh prefers a simple breakdown into two classes: farm holdings, institutional holdings.[1]

[1] In Bangladesh the basic enumeration unit is the household. A household

Similarly, Belgium divides holdings into two classes by the legal status of holder: real person, juridical person. Several countries (e.g. Australia, Cyprus, Federal Republic of Germany, Italy, Jordan, Paraguay, Saudi Arabia, Sweden, the United States and Uruguay) identify government-operated holdings as a separate class.

While only a few countries adopt "collective" as a separate class, cooperative and corporation are classes commonly adopted. Two examples of the detailed classifications are given below:

- Jordan:
  individual or family;
  partnership;
  two or more individuals belonging to different families;
  cooperative;
  government;
  collective/tribal;
  other.
- United States:
  individual or family operation;
  partnership operation;
  incorporated under state law;
  estate;
  trust;
  cooperative;
  state or local government;
  federal government;
  other.

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constitutes a farm holding if it operates a land larger than 0.05 acres (approx. 0.02 ha) of cultivated area. Institutional holdings are the government or semi-government organizations, and farm holdings are private enterprises which operate land to grow various crops and keep livestock.

POPULATION AND EMPLOYMENT

Proposed census items

This section of the *Programme for the 1980 World Census of Agriculture* is intended to provide a quantitative description of the holder's household and the labour used on the holding. Distinctions are made between permanent and occasional agricultural workers. The following items were proposed (numbered as in the Programme):

* 31 Demographic characteristics of each member of the holder's household (starting with the holder)
  * 31.1 Name
  * 31.2 Age
  * 31.3 Sex
  * 31.4 Relationship to holder
* 32 Characteristics of the type of activity of members of the holder's household (including the holder) at or above a specific age
  * 32.1 For a recent week
    * 32.11 Mainly agricultural work on the holding
    * 32.12 Mainly work off the holding
    * 32.13 Not economically active
  * 32.2 For the agricultural year
    * 32.21 Engaged usually in agricultural work on the holding
      * (a) Permanent
      * (b) Occasional
    * 32.22 Usually working off the holding
    * 32.23 Not economically active
* 33 Number of hired permanent agricultural workers on the holding other than members of the holder's household
  * 33.1 Males
  * 33.2 Females
* 34 Indication of the utilization of hired occasional agricultural

workers on the holding other than members of the holder's household
* 34.1 Utilized
* 34.2 Not utilized.

As can be noted, all items except the sex of permanent agricultural workers are among the main items.

Country practices

Some countries listed every member of the holder's household and identified their characteristics individually as recommended by the Programme (e.g. Central African Republic, Cyprus, Israel and Turkey). In some countries a list of persons living on the holding which included other persons in addition to household members was prepared (e.g. Malawi and the Niger). As examples of countries that collected information on each member of the household, three countries' practices are given below:

- Central African Republic:
  serial number;
  name;
  population category:
  - present
  - temporarily absent
  - visitor
  sex;
  completed years of age;
  relationship to holder.
  level of education in French:
  - read and write
  - read but cannot write
  - cannot read and write nor speak
  - speak but cannot read and write
  economic activity:
  - work only on holding
  - work both on and off the holding

- work only off holding
- do not work

activity off the holding:
- work on other holdings
- fishing
- hunting
- forestry work
- trade
- handicrafts
- employee
- agriculture
- other

inactive:
- too young, too old
- student
- ill
- other

• France:
relationship to holder;
main occupation;
serial number;
sex;
year of birth;
marital status;
whether or not living with the holder;
number of hours (by classes) per week worked in the holding;
secondary occupation.

• Guatemala:
serial number;
name;
relationship to holder;
age;
sex;

whether or not worked in the holding during the agricultural year;
for those who worked in the holding during the agricultural year:
- number of days worked in agricultural activity
- number of days worked at handicrafts
- number of days worked in other activity

whether or not worked for payment off the holding during the agricultural year;
for those who worked off the holding during the agricultural year:
- type of activity (agriculture, non-agriculture)
- number of days worked

However, many countries prefer to collect summarized data regarding household members. For example:

- Pakistan:
  total number of household members;
  numbers of household members ten years and over in age by sex:
  - who do only their own agricultural work on a permanent basis
  - who do only their own agricultural work on a part-time basis
  - who are usually engaged in agricultural work of other households for payment
  - who are usually engaged in non-agricultural work of other households for payment
  - who are economically inactive
- Sweden:
  number of members of holder's family (including the holder) by sex and by age group (15-64, 65 and more years of age) who worked in the holding:
  - more than 30 hours per week
  - 30 hours or less per week
  - temporarily

- Trinidad and Tobago:
  total number of members of holder's household by sex;
  number of household members by sex, by age group (under 15, 15-44, 45-64, 65 and more years of age) who mainly:
  - worked on holding doing agricultural work
  - worked elsewhere doing agricultural work
  - worked on holding doing non-agricultural work
  - worked elsewhere doing non-agricultural work
  - did no work

Some countries collect summary data on household members who do not contribute to the labour of the holding but detailed data on household members who do work on the holding.

In Bangladesh, for example, the number of the holder's household members by sex and by age group (under ten, ten and over) are recorded as summarized information. Other summarized information concerns the classification of holdings into one of four classes indicating the total labour contribution of the household members:

- almost all (90 percent and over) agricultural work is done by household members;
- more than half (50 to 90 percent) of agricultural work is done by household members;
- less than half (10 to 49 percent) of agricultural work is done by household members;
- very small part (less than 10 percent) of agricultural work is done by household members.

In addition to these summary data, detailed information was collected on each household member who did some work in the holding: name, age, sex, relationship to head of household and number of days worked during the last week.

Spain collected the following information on each individual unpaid family worker after ascertaining the total number of household members by sex:

- relationship to holder;

TABLE 16

Countries collecting and not collecting information on sex of holder

Region and country	Census year	Information collected	Information not collected	Unknown
Africa				
Botswana	1982	x		
Cape Verde	1981			x
Central African Rep.	1985	x		
Congo	1986	x		
Ethiopia	1977	x		
Kenya	1979	x		
Madagascar	1984	x		
Malawi	1981	x		
Mauritania	1985			x
Niger	1980	x		
Reunion	1981	x		
Rwanda	1984	x		
Sierra Leone	1985	x		
Togo	1983	x		
Asia and the Pacific				
American Samoa	1980		x	
Australia	1980		x	
Bangladesh	1977		x	
Fiji	1978		x	
Guam	1978		x	
India	1976		x	
Japan	1980	x		
Korea, Rep. of	1980	x		
Nepal	1981	x		
New Zealand	1980	x		
Northern Mariana Is.	1980		x	
Pakistan	1980		x	
Philippines	1981	x		
Sri Lanka	1982	x		
Thailand	1978	x		
Tonga	1985	x		
Europe				
Austria	1980	x		
Belgium	1979	x		
Czechoslovakia	1980		x	
Denmark	1979		x	
Finland	1980	x		
France	1979	x		
Germany, Federal Rep. of	1979	x		
Hungary	1981	x		
Ireland	1980	x		
Italy	1982	x		
Luxembourg	1980	x		
Malta	1979	x		
Netherlands	1979		x	
Norway	1979	x		
Poland	1980		x	
Portugal	1979	x		
Spain	1982	x		

TABLE 16 (cont.)

Countries collecting and not collecting information on sex of holder

Region and country	Census year	Information collected	Information not collected	Unknown
Sweden	1981	x		
Switzerland	1980	x		
United Kingdom	1979	x		
Yugoslavia	1981		x	
Latin America and the Caribbean				
Antigua and Barbuda	1984	x		
Bahamas	1978	x		
Belize	1985		x	
Brazil	1980		x	
French Guiana	1980	x		
Grenada	1981		x	
Guadeloupe	1980	x		
Guatemala	1979	x		
Jamaica	1978	x		
Martinique	1980	x		
Panama	1981		x	
Paraguay	1981	x		
Puerto Rico	1978		x	
Suriname	1981			x
Trinidad and Tobago	1982	x		
Uruguay	1980		x	
Virgin Islands (US)	1978		x	
Near East				
Bahrain	1980	x		
Cyprus	1977	x		
Israel	1981		x	
Jordan	1983	x		
Oman	1978	x		
Saudi Arabia	1982		x	
Turkey	1980	x		
Yemen Arab Rep.	1983	x		
North America				
Canada	1981		x	
United States	1978	x		

- sex;
- age;
- whether or not works mainly in this holding;
- if works mainly outside of this holding is his/her work agricultural or not;
- number of days worked in this holding.

TABLE 17

Number of countries collecting and not collecting information on sex of holder by region

Region	Information on sex of holder		
	Collected	Not collected	Unknown
Africa	12	—	2
Asia and the Pacific	8	8	—
Europe	16	5	—
Latin America and the Caribbean	9	7	1
Near East	6	2	—
North America	1	1	—
Total	52	23	3

No information was collected on household members who were not unpaid family workers.

Table 16 shows whether or not information was collected on sex of holder for each country. From Table 17, which summarizes Table 16, it can be seen that 52 countries out of 78 have collected information on sex of holder.

Regarding the number of hired agricultural workers, the majority of countries adopt a reference period of 12 months, which can be the agricultural year or the preceding 12 months. Some countries use a different reference period, for example:

- Bangladesh, Fiji, Oman, Uruguay: the preceding week;
- The Philippines: quarters of the year;
- Belize: last week of April 1984 and the week 9-15 November 1984;
- Panama: month of April 1981.

Not all countries differentiated between permanent and temporary agricultural workers. For example, in Sierra Leone labour of origin outside of holder's household was treated as follows:

- Did you get assistance from the "gang" or labour club during the 1984/85 agricultural year?[1]
- Apart from the club members, how many hired labourers, that are not part of your household, did you employ for agricultural work in the 1984/85 agricultural year?
- In which of the following farming activities did the labourers (gang and/or hired) work and for how many days? Bush clearing, burning, bunding, puddling, transplanting/broadcasting or sowing and planting, weeding, harvesting, other.

In Uruguay the number of workers from outside of the holder's household were subdivided by sex and by age groups (less than 14, 14-34, 35-64, 65 and more years of age), but not by permanent and non-permanent.

The separation of permanent hired labour from other hired labour is the most common practice. Some countries have further subdivided non-permanent workers into temporary and casual depending on the length of time of employment over the 12-month period. For example:

- Oman: continuing, temporary, casual;

where continuing are those who worked for two-thirds or more of the reference period; temporary, those who worked for one to two-thirds of the reference period and casual, those who worked for less than one-third of the reference period.

- Trinidad and Tobago: permanent, seasonal, occasional;

where permanent are those who worked for nine or more months seasonal, those who worked for three to nine months; and occasional, those who worked for less than three months.

Many countries collected data on the number of permanent workers. Some of these countries subdivided the number of permanent workers by sex and by age. For example:

- The Bahamas: number of permanent workers by sex.

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[1] The gang or labour club is the traditional way in which people within a village come together to work for each other alternately.

- Fiji: number of permanent workers by sex and by age groups (adult, juvenile).
- Spain: number of permanent workers by sex, age group (16-24, 25-54, 55-64, 65 and more years of age) and type of employment (full-time, part-time).
- Trinidad and Tobago: number of permanent workers by sex and by age groups (less than 15, 15-44, 45-64, 65 and more years of age).
- US Virgin Islands: number of paid farm hands (hired workers and paid household members) by number of days worked. Number of days worked are grouped into three classes: less than 25 days, 25-149 days, 150 and more days.
- Pakistan, Tonga, Turkey: number of permanent workers (total number only).

Regarding non-permanent workers some countries collected information only on whether or not such workers were employed, e.g. the Bahamas, Pakistan and Tonga. Some countries asked for further detail on the total number of days or weeks worked by these non-permanent workers: Spain (workdays) and Canada (paid work weeks).[1] In the case of Fiji, the number of workdays was classified by sex and by age group (adult, juvenile). Some countries collected the number of non-permanent workers without reference to the length of time they worked, e.g. Trinidad and Tobago and Paraguay. In the case of Trinidad and Tobago the number of non-permanent workers was classified by sex and by age groups (less than 15, 15-44, 45-64, 65 and more years of age). In Paraguay the same information is also available by age groups (from 10 to 14, 15 and more years of age) and by sex for one of the age groups (15 and more years of age). In the Niger where no distinction was made between permanent and non-permanent workers, data on

[1] A week of paid hired labour is one person working for one week. Thus, five people hired for one week are five weeks of paid hired labour. Six days or 48 hours are considered as equivalent to one week.

number of workers and number of days worked were collected for various types of activities: preparation, sowing, harvesting, etc.

LAND USE

Proposed census items

The *Programme for the 1980 World Census of Agriculture* recommended that land of the holding should be classified into five broad classes according to its use: arable land, land under permanent crops, land under permanent meadows and pastures, wood or forest land and other land. Arable land is further divided into more specific subclasses. The Programme indicated that for some of the land-use classes area of irrigated land could be separated from not irrigated land. The census items proposed are (numbered as in the Programme):

* 41 Arable land
    * 41.1 Area under temporary crops (excluding temporary meadows)
        * 41.11 Area normally irrigated
        * 41.12 Area normally not irrigated
    * 41.2 Area under temporary meadows for mowing or pasture
        * 41.21 Area normally irrigated
        * 41.22 Area normally not irrigated
    * 41.3 Area temporarily fallow
    * 41.4 Area under all other arable land
* 42 Land under permanent crops
    * 42.1 Area normally irrigated
    * 42.2 Area normally not irrigated
* 43 Land under permanent meadows and pastures
    * 43.1 Area normally irrigated
    * 43.2 Area normally not irrigated
* 44 Area of wood or forest land
* 45 Area of all other land not elsewhere specified.

As can be noted, all of the land-use types except a few sub-classes are considered as main items.

Country practices

The recommendations of the 1980 Programme regarding land use, except the separation of irrigated land from not irrigated land, were adopted by many countries:

- Oman:
  land under temporary crops:
  - seasonal crops except vegetables;
  - temporary pastures;
  - vegetables;
  - fallow;
  - other seasonal plants;

  land under permanent crops;
  permanent pastures;
  forest;
  other:
  - not presently productive but suitable for reclamation and exploitation;
  - not cultivable and not reclaimable.

- Paraguay:
  land under permanent crops;
  arable land:
  - temporary crops;
  - artificial pastures;
  - fallow;

  natural permanent pastures;
  forest;
  other (buildings, roads, etc.).

Some countries, mainly from Europe, extended the classification into finer details. For example:

- Belgium:

utilized agricultural land;
pastures:
- temporary;
- other;
vegetables harvested dry (beans, etc.);
cereals;
industrial plants (cotton, tobacco, etc.);
agricultural seeds and plants for sale;
feed crops:
- roots and bulbs;
- green forage;
potatoes;
other agricultural crops;
flowers for sale — in open air;
permanent crops for sale — in open air;
vegetables for sale — in open air;
greenhouses:
- vegetables for sale;
- flowers for sale;
- fruits for sale;
vegetable and flower seeds for sale — in open air;
vegetables in open air and in greenhouse for own consumption;
fallow land;
unutilized agricultural land;
forest;
other land (buildings, roads, etc.);
Christmas trees (not included in forest).

- Spain:
Cultivated land:
- temporary crops (sole, mixed, including fallow):
  irrigated;
  not irrigated;

- olive trees (sole or associated with temporary crops):
  irrigated;
  not irrigated;
- vines (sole or associated with temporary crops):
  irrigated;
  not irrigated;
- fruit-trees (sole, mixed with other fruit-trees, or associated with temporary crops):
  irrigated;
  not irrigated;
- fruit-trees mixed with olive trees and/or vines.

Nurseries of tree crops (not forest trees):
irrigated;
not irrigated;
- temporary crops associated with forest trees:
irrigated;
not irrigated.

Not cultivated land:
- permanent pastures:
  irrigated;
  not irrigated;
- high mountain pastures;
- other pastures;
- unploughed pasture;
- esparto grass field;
- shrubs;
- forest:
  broad-leaved trees;
  conifers;
  mixed;
- other (buildings, roads, etc.).

The countries that have land-use classes different from the 1980 Programme are mainly in Africa where lands under temporary or

permanent meadows or forest were not considered as census items. For example:

- Niger:
  crops for rainy season:
  - irrigated;
  - not irrigated;

  vegetables:
  - irrigated;
  - not irrigated;

  permanent crops:
  - irrigated;
  - not irrigated;

  crops for dry season;
  temporary fallow.
- Togo:
  temporary crops;
  permanent crops;
  temporary fallow.

CROPS

Proposed census items

This section deals with the temporary and permanent crops for which data on area, number of trees and other features are desired.

The area information to be collected for temporary crops is the area harvested or the area expected to be harvested. Some countries collect data on the area sown. In such cases it is suggested that information on the area actually harvested or expected to be harvested also be collected, at least for the major food crops and other cash crops. For permanent crops the gross area and the number of trees in compact plantations are to be reported separately for trees of productive age and trees below productive age. Certain countries may find it easier to obtain information by degree of density rather than by numbers, but the reported information should also be convertible to numbers. For scattered

trees, only the total number is to be collected in view of the difficulty of assessing or defining the corresponding areas.

It is desirable that countries where irrigation is the normal practice obtain separate data on areas normally irrigated and areas not normally irrigated, at least for areas under major food crops. Some countries may also find it advantageous to collect information on the areas treated with fertilizers and with pesticides, and on the extent and output of areas planted with high-yielding seed varieties for the major food crops.

In countries with more than one cropping season information on total crop areas for crops grown on arable land, and for temporary crops grown as associated crops, should be obtained for the whole agricultural year. Thus, areas used to grow the same crop or different crops more than once during the agricultural year should be recorded under the crop concerned as many times as they are used. Such countries will often find it desirable to obtain the information for each season separately.

The *Programme for the 1980 World Census of Agriculture* provided the following list of crops:

* 51 Temporary crops
    * 51.1 Cereals harvested for grain
        * 51.11 Wheat
            - (a) Winter wheat
                - (i) Hard wheat (including durum and semihard wheat)
                - (ii) Soft wheat
        * 51.12 Rice
            - (a) Wet land (lowland)
            - (b) Dry land (upland)
        * 51.13 Maize (corn)
            - (a) Hybrid maize
            - (b) Ordinary maize

* 51.14 Barley
  - (a) Winter barley
  - (b) Spring barley
* 51.15 Millet and sorghum
  - (a) Millet
    - (i) Finger millet (e.g. pearl millet, bulrush millet)
    - (ii) Other millet (e.g. bajra, Japanese millet)
  - (b) Sorghum (e.g. jowar, Guinea corn, durra)*
* 51.16 Oats
* 51.17 Rye
  - (a) Winter rye
  - (b) Spring rye

51.18 Mixed cereals for grain (e.g. maslin)

51.19 Others not elsewhere specified (n.e.s.) (e.g. buckwheat, quinoa, spelt, teff)

* 51.2 Tuber, root and bulb crops
  - * 51.21 Potatoes
  - * 51.22 Sweet potatoes
  - * 51.23 Cassava (manioc, tapioca)
  - * 51.24 Yams
  - 51.25 Arrowroot
  - * 51.26 Dry onions
  - 51.27 Dry garlic
  - * 51.28 Taros (cocoyams, dasheen, eddoes, tannia)
  - 51.29 Others n.e.s. (e.g. arracha)
* 51.3 Leguminous plants mainly for grain (excluding soybeans and groundnuts)
  - * 51.31 Edible dry beans
  - 51.32 Dry broad beans (horse beans)
  - * 51.33 Edible dry peas
  - 51.34 Chick-peas (gram)

51.35 Lentils
51.36 Cowpeas
51.37 Pigeon peas
51.38 Vetches
51.39 Others n.e.s. (e.g. lupines, fenugreek, bambarra nuts)

* 51.4 Crops mainly for industrial purposes
  * 51.41 Sugar crops
    * (a) Sugar cane
    * (b) Sugar beets
    (c) Others n.e.s. (e.g. sweet sorghum)
  * 51.42 Oil-seed crops
    * (a) Groundnuts (peanuts)
    * (b) Soybeans
    (c) Flax (linseed)
    (d) Sunflower
    (e) Rapeseed (colza)
    (f) Mustard
    (g) Sesame
    (h) Cottonseed
    (i) Safflower seed
    (j) Castor beans
    (k) Others n.e.s. (e.g. hempseed, poppy seed, Niger seed)
  51.43 Spices, condiments, aromatic and medicinal plants
    (a) Dry peppers, pimentos or chilies
    (b) Oil plants for essence (e.g. geranium, lavender, mint)
    (c) Medicinal plants (e.g. opium, liquorice)
    (d) Others n.e.s. (e.g. aniseed, caraway seed)
  * 51.44 Fibre crops
    (a) Cotton

(b) Flax for fibre
(c) Hemp for fibre
* (d) Jute
(e) Others n.e.s. (e.g. sunn hemp, kenaf, urena)

* 51.45 Other industrial crops
* (a) Tobacco
(i) Flue-cured
(ii) Other types
(b) Chicory
(c) Pyrethrum
(d) Others n.e.s. (e.g. indigo, henna, broom millet, broom sorghum, esparto grass, sugar cane for thatching)

51.5 Vegetables mainly for human consumption
51.51 Leafy or stem vegetables
(a) Artichokes
(b) Asparagus
(c) Brussels sprouts
(d) Cabbage (red, white, savoy)
(e) Celery
(f) Chicory for greens
(g) Chinese cabbage
(h) Cress
(i) Endive
(j) Kale
(k) Leek
(l) Lettuce
(m) Rhubarb
(n) Spinach
(o) Others n.e.s. (e.g. cardoon, fennel, corn salad)

51.52 Fruit-bearing vegetables
- (a) Cantaloupes and other melons
- (b) Chilies (fresh)
- (c) Cucumbers
- (d) Eggplant
- (e) Gourds
- (f) Okra
- (g) Pumpkins
- (h) Squash
- (i) Sweet peppers
- (j) Tomatoes
- (k) Watermelons
- (l) Others n.e.s. (e.g. chayotes)

51.53 Root, bulb and tuberous vegetables
- (a) Carrots
- (b) Green garlic
- (c) Green onions
- (d) Radishes
- (e) Red beets
- (f) Rutabagas or swedes and kohlrabi
- (g) Turnips
- (h) Others n.e.s. (e.g. celeriac, horse-radishes, parsnips, scorzonera, salsify)

51.54 Leguminous vegetables harvested green
- (a) Beans
- (b) Peas
- (c) Others n.e.s. (e.g. broad beans, cow-peas)

51.55 Other vegetables
- (a) Cauliflower and broccoli
- (b) Corn (sweet)
- (c) Others n.e.s.

51.6 Special horticultural cultivation

51.61 Grown in the open
- (a) Flowers, bulbs and corms
- (b) Ornamental plants
- (c) Others n.e.s.

51.62 Cultivation under protective cover (e.g. glass, plastic)
- (a) Vegetables
- (b) Mushrooms
- (c) Flowers and ornamental plants
- (d) Others n.e.s.

51.7 Fodder crops (for grazing or cut for hay, green feed or silage)

51.71 Leguminous forage crops
- (a) Alfalfa
- (b) Clover
- (c) Others n.e.s. (e.g. lespedeza, sainfoin, soybean hay)

51.72 Grasses
- (a) Grown alone (e.g. timothy, red top, orchard grass, Sudan grass)
- (b) Mixed grasses

51.73 Cereals
- (a) Maize (corn) for silage
- (b) Oats
- (c) Others n.e.s.

51.74 Mixed legumes, grasses and cereals

51.75 Other fodder crops n.e.s.
- (a) Cabbage
- (b) Jerusalem artichokes
- (c) Pumpkins
- (d) Sunflower
- (e) Mangels (fodder beets)
- (f) Sugar beets
- (g) Sugar cane

(h) Swedes
(i) Turnips
(j) Others n.e.s. (e.g. carrots)

51.8 Crops grown mainly for the production of seed
51.81 Seed of sugar beet
51.82 Alfalfa seed
51.83 Clover seed
51.84 Ryegrass seed
51.85 Onion seed
51.86 Others n.e.s. (e.g. trefoil)

51.9 Other temporary crops n.e.s.

52 Permanent crops
* 52.1 Fruit- and nut trees
* 52.11 Citrus fruits
* (a) Oranges
* (b) Mandarins and tangerines (including clementines and satsuma)
* (c) Lemons
(d) Grapefruits and pomelos
(e) Sour limes
(f) Others n.e.s. (e.g. bitter oranges, sweet limes, citrons, bergamots)

* 52.12 Pome fruits
* (a) Apples
(b) Pears
(c) Quince
(d) Medlars
(e) Others n.e.s. (e.g. loquat)

52.13 Stone fruits
(a) Apricots
(b) Cherries (including sour)
(c) Peaches
(d) Plums and prunes
(e) Others n.e.s. (e.g. nectarines)

* 52.14 Grapes
- (a) Grapes for wine
- (b) Grapes for table use
- (c) Grapes for raisins

52.15 Small cultivated fruits
- (a) Blueberries
- (b) Cranberries
- (c) Currants
- (d) Gooseberries
- (e) Raspberries
- (f) Strawberries
- (g) Others n.e.s. (e.g. blackberries)

* 52.16 Other cultivated fruits
- (a) Avocados
- * (b) Bananas
- (c) Breadfruit
- (d) Custard apple
- * (e) Dates
- (f) Figs
- (g) Guavas
- (h) Mangoes
- (i) Papaya
- (j) Persimmons
- (k) Pineapples
- * (l) Plantains
- (m) Pomegranates
- (n) Zapotes
- (o) Others n.e.s. (e.g. litchi, carob)

52.17 Edible nuts
- (a) Almonds
- (b) Cashew nuts
- (c) Walnuts
- (d) Chestnuts
- (e) Hazelnuts (filberts)

(f) Others n.e.s. (e.g. pecans, pistachio nuts, Brazil nuts, Macadamia (Queensland) nuts, but excluding coconuts)

52.2 Permanent crops mainly for industrial purposes

52.21 Beverage crops

* (a) Coffee
* (b) Cocoa (cacao)
* (c) Tea
(d) Hops
(e) Yerba maté
(f) Others n.e.s. (e.g. cola)

* 52.22 Oil crops

* (a) Coconut
(b) Oil palm
* (c) Olive
* (d) Others n.e.s. (e.g. tung trees, shea butter trees)

52.23 Spices and aromatic crops

(a) Black pepper
(b) Cinnamon
(c) Cloves
(d) Ginger
(e) Nutmeg and mace
(f) Vanilla
(g) Cardamom
(h) Others n.e.s. (e.g. drumstick)

52.24 Fibre crops

(a) Abaca (Manila hemp)
(b) Agave plants (e.g. sisal, henequen)
(c) Kapok
(d) New Zealand flax (formio)
(e) Ramie and rhea
(f) Others n.e.s. (e.g. fiqué maguey)

52.25 Rubber and tanning crops
* (a) Rubber (hevea)
(b) Black wattle
(c) Quebracho
(d) Others n.e.s.

52.26 Flower crops
(a) Roses
(b) Jasmine
(c) Others n.e.s.

52.27 Other industrial crops
(a) Citronella
(b) Mulberry for silkworms
(c) Sago palm
(d) Palmyra palm
(e) Quinine
(f) Areca (betel) nuts
(g) Others n.e.s. (e.g. lemon grass)

52.3 Nurseries
52.31 Nurseries of fruit-trees, nut trees and vines
52.32 Nurseries of permanent industrial plants
52.33 Nurseries of flower trees, ornamental trees and bushes

52.4 Other permanent crops n.e.s.

COUNTRY RESULTS

All but a few countries collected information on areas of crops. Table 18 has been prepared to show which countries collected data on which cereals. This table is based on the 78 countries for which the agricultural census results are published in the Census Bulletins. From Table 19, which summarizes Table 18, it can be seen that the most common cereal crop is maize, followed by wheat. The main reason that the majority of countries did not collect data on all crops is that not all crops are grown in all countries. For example, no cereals are reported in Bahrain, Jamaica, Reunion and Tonga.

TABLE 18

Participation of countries in collecting data on cereals harvested for grain

Region and country	Census year	Wheat	Rice	Maize	Barley	Millet	Oats	Rye	Other
Africa									
Botswana	1982			x		x			
Cape Verde	1981								
Central African Rep.	1985		x	x		x			
Congo	1986		x	x					
Ethiopia	1977	x		x	x	x			x
Kenya	1979	x		x	x		x		x
Madagascar	1984		x	x					
Malawi	1981	x	x	x		x			x
Mauritania	1985		x	x		x			x
Niger	1980	x	x	x		x			
Reunion	1981								
Rwanda	1984	x	x	x		x			x
Sierra Leone	1985		x	x		x			
Togo	1983		x	x		x			x
Asia and the Pacific									
American Samoa	1980			x					
Australia	1980	x	x	x	x	x	x	x	x
Bangladesh	1977	x	x						x
Fiji	1978		x	x		x			
Guam	1978			x					
India	1976	x	x	x	x	x			x
Japan	1980	x	x		x				x
Korea, Rep. of	1980	x	x	x	x	x		x	
Nepal	1981	x	x	x	x	x			x
New Zealand	1980	x		x	x		x		x
Northern Mariana Is.	1980			x					
Pakistan	1980	x	x	x	x				x
Philippines	1981		x	x		x			x
Sri Lanka	1982		x						
Thailand	1978	x	x	x		x			
Tonga	1985								
Europe									
Austria	1980	x		x	x		x	x	x
Belgium	1979	x		x	x		x	x	x
Czechoslovakia	1980	x		x	x		x	x	
Denmark	1979	x			x		x	x	x
Finland	1980	x			x		x	x	x
France	1979	x	x	x	x	x	x	x	x
Germany, Federal Rep. of	1979	x	x	x	x		x	x	
Hungary	1981	x	x	x	x	x	x	x	x
Ireland	1980	x		x	x		x	x	
Italy	1982	x	x	x	x		x	x	x
Luxembourg	1980	x			x		x	x	x
Malta	1979	x			x				
Netherlands	1979	x		x	x		x	x	

TABLE 18 (cont.)

Participation of countries in collecting data on cereals harvested for grain

Region and country	Census year	Wheat	Rice	Maize	Barley	Millet	Oats	Rye	Other
Norway	1979	x			x		x	x	x
Poland	1980	x		x	x		x	x	x
Portugal	1979	x	x		x	x	x	x	x
Spain	1982	x	x	x	x	x	x	x	x
Sweden	1981	x			x		x	x	x
Switzerland	1980	x		x	x		x	x	x
United Kingdom	1979	x		x	x		x		
Yugoslavia	1981								
Latin America and the Caribbean									
Antigua and Barbuda	1984			x					
Bahamas	1978			x					
Belize	1985		x	x		x			
Brazil	1980	x	x	x	x		x	x	x
French Guiana	1980		x						x
Grenada	1981			x					
Guadeloupe	1980								x
Guatemala	1979	x	x	x		x			
Jamaica	1978								
Martinique	1980								x
Panama	1981		x	x		x			
Paraguay	1981	x	x	x			x	x	
Puerto Rico	1978		x	x					x
Suriname	1981		x	x					
Trinidad and Tobago	1982		x	x					x
Uruguay	1980	x	x	x		x		x	x
Virgin Islands (US)	1978			x		x			x
Near East									
Bahrain	1980								
Cyprus	1977	x			x		x		
Israel	1981	x		x		x			
Jordan	1983	x			x				
Oman	1978	x			x	x			
Saudi Arabia	1982	x		x	x	x			
Turkey	1980	x	x	x	x		x	x	x
Yemen Arab Rep.	1983	x		x	x	x			
North America									
Canada	1981	x		x	x	x	x	x	x
United States	1978	x	x	x	x	x	x	x	x

TABLE 19

Number of countries reporting by region and by cereal crops on which they collected data

Region	Cereal							
	Wheat	Rice	Maize	Barley	Millet	Oats	Rye	Other
Africa	5	9	12	2	9	1	—	6
Asia and the Pacific	9	11	12	7	7	2	2	8
Europe	20	6	13	20	4	19	18	14
Latin America and the Caribbean	4	10	13	1	6	1	2	9
Near East	7	1	4	6	4	2	1	1
North America	2	1	2	2	2	2	2	2
Total	47	38	56	38	32	27	25	40

Furthermore, some countries preferred to limit the scope of their agricultural censuses. For example, Sri Lanka collected data on rice only among all cereals. Two countries (Cape Verde and Yugoslavia) did not collect any area data at the crop level.

LIVESTOCK

Proposed census items

This section is concerned with the number of livestock, poultry and other animals kept on holdings mainly for agricultural purposes. The information to be collected (except for bees) is the number by head of livestock for the specified age groups, subclassified by sex and by purpose for the important kinds of livestock. In particular, information is requested on the numbers of adult cattle and buffaloes primarily kept for draught purposes as an indication of the extent of use of animal power in agriculture. The following are the items recommended in the *Programme for the 1980 World Census of Agriculture* (numbered as in the Programme):

* 61 Livestock

* 61.1 Cattle

* 61.11 Calves, under one year

TABLE 20

Data collected by countries on certain types of livestock: cattle and buffaloes

Region and country	Livestock							
	Cattle				Buffaloes			
	Total	Age	Sex	Purpose	Total	Age	Sex	Purpose
Africa								
Botswana	x	x	x					
Cape Verde	x							
Central African Rep.	x							
Congo	x							
Ethiopia	x	x	x	x				
Kenya	x	x	x					
Madagascar	x		x					
Malawi	x	x	x					
Mauritania	x							
Niger	x							
Reunion	x		x					
Rwanda	x	x						
Sierra Leone	x		x					
Togo	x		x					
Asia and the Pacific								
American Samoa	x			x				
Australia	x	x	x	x				
Bangladesh	x	x	x	x	x	x	x	x
Fiji	x	x	x					
Guam	x			x	x			
India	x	x	x		x	x	x	
Japan	x				x			
Korea, Rep. of	x	x	x					
Nepal	x	x	x	x	x	x	x	x
New Zealand	x	x	x	x				
Northern Mariana Is.	x			x	x			
Pakistan	x	x	x	x	x	x	x	x
Philippines	x	x	x	x				
Sri Lanka	x	x	x	x	x	x	x	x
Thailand	x	x	x	x	x	x	x	x
Tonga	x	x	x	x				
Europe								
Austria	x	x	x					
Belgium	x	x	x					
Czechoslovakia	x	x	x					
Denmark	x	x	x	x				
Finland	x	x	x	x				
France	x	x	x	x				
Germany, Federal Rep. of	x	x	x	x				
Hungary	x		x		x	x	x	
Ireland	x	x	x	x				
Italy	x	x	x	x				

TABLE 20 (cont.)

Data collected by countries on certain types of livestock: cattle and buffaloes

Region and country	Livestock							
	Cattle				Buffaloes			
	Total	Age	Sex	Purpose	Total	Age	Sex	Purpose
Luxembourg	x	x	x	x				
Malta	x	x	x					
Netherlands	x	x	x	x				
Norway	x	x	x					
Poland	x	x	x	x				
Portugal	x	x	x	x				
Spain	x	x	x	x				
Sweden	x	x	x	x				
Switzerland	x	x	x					
United Kingdom	x	x	x	x				
Yugoslavia	x	x	x					
Latin America and the Caribbean								
Antigua and Barbuda	x		x					
Bahamas	x	x	x					
Belize	x	x	x					
Brazil	x	x	x		x		x	
French Guiana	x		x					
Grenada								
Guadeloupe	x							
Guatemala	x	x	x					
Jamaica	x		x					
Martinique	x	x						
Panama	x	x	x	x				
Paraguay	x	x	x	x				
Puerto Rico	x		x	x				
Suriname	x		x		x		x	
Trinidad and Tobago	x		x	x	x	x		
Uruguay	x	x	x	x				
Virgin Islands (US)	x	x	x					
Near East								
Bahrain	x	x	x	x				
Cyprus	x	x	x	x				
Israel	x		x					
Jordan	x	x	x					
Oman	x	x	x					
Saudi Arabia	x	x						
Turkey	x	x	x		x	x	x	
Yemen Arab Rep.	x	x	x					
North America								
Canada	x	x	x	x				
United States	x		x	x				

TABLE 21

Data collected by countries on certain types of livestock: sheep, goats, pigs, horses, mules, asses, camels, bees and rabbits

Region and country	Livestock																
	Sheep			Goats			Pigs			Horses		M	As	Camels		B	R
	T	A	S	T	A	S	T	A	S	T	A			T	A		
Africa																	
Botswana	x	x	x	x	x	x				x		—— x ——					
Cape Verde				x						x							
Central African Rep.	x			x												x	
Congo	x			x													
Ethiopia	x	x	x	x	x	x				x	x	x	x	x	x		
Kenya	x	x		x	x		x	x					x				
Madagascar	x			x			x	x	x	x			x			x	x
Malawi	x			x			x						x				
Mauritania	x			x			x			x				x			
Niger	x			x						x			x	x			x
Reunion	x			x			x			x		—— x ——				x	x
Rwanda	x	x	x	x	x	x	x	x	x								
Sierra Leone	x			x												x	
Togo	x			x			x			x			x			x	
Asia and the Pacific																	
American Samoa							x				—— x ——						
Australia	x	x	x	x			x		x	x							
Bangladesh	x			x													
Fiji				x	x	x	x			x							
Guam				x			x			x							
India	x	x		x	x		x	x		x	x	x	x	x	x		
Japan				x			x		x								
Korea, Rep. of	x			x			x	x	x							x	x
Nepal	x	x	x	x	x	x	x	x			—— x ——						
New Zealand	x		x	x			x	x	x	x							x
Northern Mariana is.				x			x				—— x ——						
Pakistan	x	x	x	x	x	x				x		x	x	x	x		
Philippines				x	x	x	x	x	x	x	x						x
Sri Lanka	x	x		x	x		x	x									
Thailand	x			x			x										
Tonga				x							x	x					
Europe																	
Austria	x			x			x	x	x	x							
Belgium	x		x	x			x			x	x ——	x ——				x	x
Czechoslovakia	x	x		x			x	x	x	x							
Denmark	x						x			x	x						
Finland	x	x					x	x	x	x							
France	x	x	x	x			x		x	x		—— x ——				x	x
Germany, Federal Rep. of	x	x	x	x		x	x		x	x						x	
Hungary	x			x												x	

TABLE 21 (cont.)

Data collected by countries on certain types of livestock: sheep, goats, pigs, horses, mules, asses, camels, bees and rabbits

Region and country	Livestock																
	Sheep			Goats			Pigs			Horses		M	As	Camels		B	R
	T	A	S	T	A	S	T	A	S	T	A			T	A		
Ireland	x	x	x	x			x		x	x		——	x ——			x	x
Italy	x			x			x			x		——	x ——			x	x
Luxembourg	x	x	x	x			x		x	x	x	x					x
Malta	x	x	x	x	x	x											
Netherlands	x	x	x	x	x	x	x		x	x	x					x	x
Norway	x	x		x	x		x	x		x	x						
Poland	x	x	x				x	x		x							
Portugal	x	x	x	x	x	x	x	x	x	x		x	x			x	x
Spain	x	x	x	x	x	x	x		x	x		x	x			x	x
Sweden	x	x					x	x		x	x						
Switzerland	x	x	x	x	x	x	x	x		x		——	x ——			x	x
United Kingdom	x	x	x				x		x	x							
Yugoslavia	x	x					x	x		x						x	
Latin America and the Caribbean																	
Antigua and Barbuda	x			x			x										
Bahamas	x			x			x										
Belize	x	x		x			x			x			x x				x
Brazil	x	x	x	x	x	x	x	x	x	x	x		x x			x	
French Guiana	x			x			x			x		——	x ——			x	x
Grenada																	
Guadeloupe	x			x			x			x		——	x ——			x	x
Guatemala	x	x		x			x	x	x	x		——	x ——			x	x
Jamaica	x			x			x		x			——	x ——			x	x
Martinique	x			x			x			x		——	x ——			x	x
Panama							x			x		——	x ——				
Paraguay	x	x	x				x	x	x	x	x	x	x x			x	
Puerto Rico				x			x	x	x	x		——	x ——			x	x
Suriname	x			x			x										
Trinidad and Tobago	x			x			x			x			x x			x	
Uruguay	x			x			x			——	—x	———				x	x
Virgin Islands (US)	x			x			x	x		x		——	x ——				
Near East																	
Bahrain	x	x	x	x	x	x				x			x	x			
Cyprus	x	x	x	x	x	x	x	x	x							x	x
Israel	x	x	x	x	x	x	x		x	——	—x	———		x		x	
Jordan	x	x	x	x	x	x				x		x	x x	x		x	
Oman	x	x		x	x					x			x x	x		x	
Saudi Arabia	x	x		x	x					x	x			x	x		
Turkey	x	x	x	x	x	x											

TABLE 21 (cont.)

Data collected by countries on certain types of livestock: sheep, goats, pigs, horses, mules, asses, camels, bees and rabbits

Region and country	Livestock																
	Sheep			Goats			Pigs			Horses		M	As	Camels		B	R
	T	A	S	T	A	S	T	A	S	T	A			T	A		
Yemen Arab Rep.	x	x	x	x	x	x							x	x			
North America																	
Canada	x	x					x			x						x	x
United States	x	x	x	x			x			x		——x——				x	x

Notes: T = Total. A = Age. S = Sex. M = Mules. As = Asses. B = Bees. R = Rabbits.

* 61.12 Cattle, one year and under two years
- (a) Males
- (b) Females

* 61.13 Cattle, two years and over
- (a) Males
  - (i) Primarily for draught purposes
  - (ii) For other purposes
- (b) Females
  - (i) Primarily for milk
  - (ii) Primarily for draught purposes
  - (iii) For other purposes

* 61.2 Buffaloes

* 61.21 Buffaloes, under three years
- (a) Calves, under one year
- (b) Buffaloes, one year and under three years
  - (i) Males
  - (ii) Females

* 61.22 Buffaloes, three years and over
- (a) Males *(text follows on p. 132)*

TABLE 22

Data collected by countries on certain types of livestock, poultry: turkeys, other birds, llamas, alpacas and fur-bearing animals

Region and country	Poultry			T	O	L	F
	Total	Age	Use				
Africa							
Botswana	x				x		
Cape Verde							
Central African Rep.	x				x		
Congo	x						
Ethiopia	x	x		x	x		
Kenya	x						
Madagascar	x			x	x		
Malawi	x				x		
Mauritania	x						
Niger	x				x		
Reunion	x		x		x		
Rwanda							
Sierra Leone	x		x		x		
Togo	x				x		
Asia and the Pacific							
American Samoa	x			———x——			
Australia	x		x	x	x		
Bangladesh	x				x		
Fiji	x		x		x		
Guam	x	x	x	———x——			
India	x	x	x		x		
Japan	x	x	x				
Korea, Rep. of	x	x	x	x	x		
Nepal	x	x			x		
New Zealand	x		x	x	x		
Northern Mariana Islands	x			———x——			
Pakistan	x		x		x		
Philippines	x	x	x	x	x		
Sri Lanka	x	x	x	x	x		
Thailand	x		x		x		
Tonga	x	x			x		
Europe							
Austria	x				x		
Belgium	x	x	x	x	x		
Czechoslovakia	x		x	x	x		
Denmark	x	x	x	x	x		
Finland	x	x					
France	x	x	x	x	x		x
Germany, Federal Rep. of	x	x	x	x	x		
Hungary	x	x	x				
Ireland	x	x	x	x	x		
Italy	x		x		x		x
Luxembourg	x	x	x	x	x		
Malta	x	x	x	x	x		

TABLE 22 (cont.)

Data collected by countries on certain types of livestock: poultry, turkeys, other birds, llamas, alpacas and fur-bearing animals

Region and country	Poultry			T	O	L	F
	Total	Age	Use				
Netherlands	x	x	x	x	x		
Norway	x	x	x	x	x		x
Poland	x	x					
Portugal	x	x	x	x	x		
Spain	x	x	x		x		
Sweden	x	x	x				
Switzerland	x	x	x		x		
United Kingdom	x	x	x	x	x		
Yugoslavia	x						
Latin America and the Caribbean							
Antigua and Barbuda							
Bahamas	x		x	x	x		
Belize	x		x	x	x		
Brazil	x	x	x		x		
French Guiana	x		x		x		
Grenada							
Guadeloupe	x		x		x		
Guatemala	x	x	x		x		
Jamaica	x		x	x	x		
Martinique	x		x		x		
Panama	x	x	x		x		
Paraguay	x		x		x		
Puerto Rico	x	x	x	———x——			
Suriname	x		x				
Trinidad and Tobago	x		x	x	x		
Uruguay	x		x		x		
Virgin Islands (US)	x	x		———x——			
Near East							
Bahrain	x	x	x		x		
Cyprus	x	x	x	x	x		
Israel	x	x	x	x	x		
Jordan	x	x		x	x		
Oman	x						
Saudi Arabia	x						
Turkey							
Yemen Arab Rep.							
North America							
Canada	x	x	x	x	x		x
United States	x	x	x	x	x		x

Notes: T = Turkeys. O = Other birds. L = Llamas and alpacas. F = Fur-bearing animals.

TABLE 23

Number of countries by region and by livestock characteristics on which they collected data: cattle and buffaloes

Region	Livestock							
	Cattle				Buffaloes			
	Total	Age	Sex	Purpose	Total	Age	Sex	Purpose
Africa	14	5	8	1	—	—	—	—
Asia and the Pacific	16	12	12	12	9	6	6	5
Europe	20	19	20	13	1	1	1	—
Latin America and the Caribbean	16	9	14	5	3	1	2	—
Near East	8	7	7	2	1	1	1	—
North America	2	1	2	2	—	—	—	—

TABLE 24

Number of countries by region and by livestock characteristics on which they collected data: sheep, goats, pigs, horses, mules, asses, camels, bees and rabbits

Region	Livestock																
	Sheep			Goats			Pigs			Horses		M	A	Camels		B	R
	Tot.	Age	Sex	Tot.	Age	Sex	Tot.	Age	Sex	Tot.	Age			Tot.	Age		
Africa [1]	13	4	3	14	4	3	7	3	2	8	1	1	6	3	1	5	3
Asia and the Pacific [2]	9	5	4	15	6	4	13	6	4	8	3	2	2	2	2	1	3
Europe [3]	21	16	12	15	6	6	19	9	12	19	6	2	2	—	—	10	9
Latin America and the Caribbean [4]	14	4	3	13	1	1	16	6	5	11	2	4	4	—	—	11	7
Near East [5]	8	8	6	8	8	6	2	1	2	4	1	1	4	6	1	4	1
North America [6]	2	2	1	1	—	—	2	—	—	2	—	—	—	—	—	2	2

Notes: Tot. = Total. M = Mules. A = Asses. B = Beehives. R = Rabbits.

[1] Excluded from the table are two countries that combined mules and asses.

[2] Excluded from the table are two countries that combined horses, mules and asses and one country that combined horses and mules.

[3] Excluded from the table are five countries that combined mules and asses.

[4] Excluded from the table are eight countries that combined mules and asses and one country that combined horses, mules and asses.

[5] Excluded from the table is one country that combined horses, mules and asses.

[6] Excluded from the table is one country that combined mules and asses.

TABLE 25

Number of countries by region and by livestock characteristics on which they collected data: poultry, turkeys, other birds, llamas, alpacas and fur-bearing animals

Region	Livestock						
	Poultry			Turkeys	Other Hirds	Llamas and alpacas	Fur-bearing animals
	Total	Age	Use				
Africa	12	1	2	2	9	—	—
Asia and the Pacific [1]	16	8	11	5	12	—	—
Europe	21	17	17	12	16	—	3
Latin America and the Caribbean [2]	15	5	14	4	12	—	—
Near East	6	4	3	3	4	—	—
North America	2	2	2	2	2	—	2

Notes: [1] Excluded from the table are three countries that combined turkeys and other birds.
[2] Excluded from the table are two countries that combined turkeys and other birds.

(i) Primarily for draught purposes
(ii) For other purposes

(b) Females

(i) Primarily for milk
(ii) Primarily for draught purposes
(iii) For other purposes

* 61.3 Sheep

* 61.31 Lambs, under one year
* 61.32 Sheep, one year and over

(a) Males
(b) Females

* 61.4 Goats

* 61.41 Goats, under one year
* 61.42 Goats, one year and over

(a) Males
(b) Females

* 61.5 Pigs
  * 61.51 Under six months
  * 61.52 Six months and over
    (a) Females for breeding
    (b) Others (including sows for fattening)
* 61.6 Horses
  61.61 Under three years
  61.62 Three years and over
* 61.7 Mules and hinnies
* 61.8 Asses
* 61.9 Camels
  61.91 Under four years
  61.92 Four years and over

* 62 Poultry
  * 62.1 Hens, cocks, pullets and chicks
    62.11 Cockerels, pullets and chicks, under four months
    62.12 Cocks, capons, hens and pullets, four months and over
    (a) Laying hens
    (b) Others n.e.s.
  62.2 Ducks
  62.3 Geese
  62.4 Turkeys
  62.5 Guinea fowls
  62.6 Pigeons
  62.7 Others n.e.s.

63 Beehives and bee colonies

64 Other domesticated animals n.e.s. (including those reared in captivity)
  64.1 Rabbits and hares
  64.2 Llamas and alpacas
  64.3 Fur-bearing animals (reared in captivity for fur or skin)

64.31 Foxes
64.32 Minks
64.33 Other fur-bearing animals n.e.s.
64.4 Others n.e.s (e.g. reindeer, zebras, ostriches, elephants).

Country practices

The types of livestock and the number of characteristics of livestock that are covered in the census vary from country to country. Tables 20 to 22 show the data collected by each country. Tables 23 to 25 summarize this information.

Cattle are seen to be the common large livestock. Age and sex of cattle are covered by the majority of countries in all regions except Africa. The purpose for which cattle are kept is also covered to a considerable extent.

Buffaloes constitute an important group of livestock mainly in the region of Asia and the Pacific. Outside this region buffaloes are not treated separately in the census, with the exception of Brazil, Hungary, Suriname, Trinidad and Tobago and Turkey.

Sex and age data on sheep and goats are collected mainly by the countries in the Near East. Some countries in Europe and Asia and the Pacific have also included these items in their census. In general, more attention is paid to reporting the number of breeding female stock. In Spain the following data are collected regarding sheep and goats: number of mothers, number of young females (that will replace mothers) and others. In Denmark sheep are classified into two groups: breeding ewes and other sheep. In the United States, the following items are included in the census: number of sheep and lambs of all ages and ewes one year old or older.

Many countries collect data on the weight of pigs. Examples of items on pigs follow:

- Canada:
  boars six months and over for breeding;

sows for breeding and bred gilts;
all other pigs:
- under 20 kg;
- 20 to 60 kg;
- over 60 kg.

• France:
females for breeding — mothers;
young females for breeding — 50 kg or heavier;
young pigs of both sexes less than 20 kg;
other pigs of both sexes — 20 kg or heavier.

Regarding horses, mules and donkeys some countries (e.g. Japan and Turkey) did not collect any data. A few countries (American Samoa, Israel, Northern Mariana Islands and Uruguay) collected data on total numbers of these three species taken together. Another group of countries put mules and asses in the same group: Belgium, Botswana, France, French Guiana, Guadeloupe, Guatemala, Ireland, Italy, Jamaica, Martinique, Panama, Puerto Rico, Reunion, Switzerland, the United States and US Virgin Islands. In Nepal horses and mules were put in the same class. The majority of countries did not collect age data on horses. In some countries different characteristics of horses were used to classify them. The items on horses in some of these countries are given below:

• Puerto Rico:
race and show horses;
other horses.

• Switzerland:
horses used for agricultural work;
horses used for non-agricultural work;
horses not yet used.

• United Kingdom:
agricultural horses of all types and ages;
all other horses and ponies:
- used for breeding;
- others.

In some countries the age of horses and their use were used to classify them. For example:

- Belgium:
  agricultural horses:
  - less than three years of age;
  - three years old or older;

  other horses:
  - less than three years of age;
  - three years old or older.

Camels are seen to be concentrated in some countries of the Near East, Asia and the Pacific and Africa. Data on the age of camels are not generally collected and most countries seem to be satisfied with data on the total number of camels. However, in some countries detailed data on camels are collected. For example:

- India:
  number of camels less than four years old:
  - male;
  - female;

  number of camels four years old or older:
  - male;
  - female.
- Pakistan:
  number of camels less than three years old;
  number of camels three years old or older;
  - male;
  - female.

Data on bees and rabbits are collected mainly in Europe, the Near East and Latin America and the Caribbean. In Jordan beehives are separated into two classes: local and modern. In Paraguay data on the quantity of honey and wax produced are collected in addition to the number of beehives. However, Panama has collected data on honey produced but not data on the number of beehives.

Data on rabbits concern their total number. In Italy rabbits are separated into two categories: mothers and other rabbits.

All countries except Antigua and Barbuda, Cape Verde, Grenada, Rwanda, Turkey and the Yemen Arab Republic collected data on the number of poultry. Data on the use of poultry are also quite commonly collected except in Africa. But data on age are restricted mainly to Europe, the Near East and Asia and the Pacific. Two examples of countries that collected detailed data on poultry are given below:

- Jordan:
  number of herds raised per year:
  - broiler;
  - layer;

  normal capacity of birds per each herd:
  - broiler;
  - layer;

  number of birds less than six months of age:
  - broiler;
  - layer;

  number of birds six months old or older:
  - broiler;
  - layer.
- Puerto Rico:
  number of layers less than one year of age;
  number of layers one year old or older;
  number of started pullets (raised for sale only);
  number of fighting cocks;
  number of other roosters.

In most countries other birds are "specified" during enumeration. In the case of turkeys, in European and North American countries a separate place is identified in the questionnaire of the census. Similar practices are adopted for birds that are common in some other countries, for example, ducks in Paraguay and Trinidad and Tobago.

In the countries covered in this document llamas and alpacas

were not specifically mentioned. Fur-bearing animals are included in the questionnaires of a few countries: Canada, France, Italy, Norway and the United States. Among the fur-bearing animals that are covered are foxes, minks and chinchillas.

Among other livestock, silkworms are covered in several countries: Brazil, the Republic of Korea and Thailand. Some animals are covered by only a few countries. New Zealand collected the following data on deer:

- Number of red deer:
  - male:
    - less than one year of age;
    - one year old or older;
    - female:
    - less than one year of age;
    - one year old or older.
- Number of red/wapiti cross deer:
  - male:
    - less than one year of age;
    - one year old or older;
    - female:
    - less than one year of age;
    - one year old or older.
- Number of wapiti deer:
  - male:
    - less than one year of age;
    - one year old or older;
  - female:
    - less than one year of age;
    - one year old or older.
- Number of fallow deer:
  - male:
    - less than one year of age;
    - one year old or older;

- female:
  - less than one year of age;
  - one year old or older.
- Number of other deer:
  - male:
    - less than one year of age;
    - one year old or older;
  - female:
    - less than one year of age;
    - one year old or older.

In India, Malawi and Norway data are collected on the number of dogs. India classified dogs into two groups: domestic dogs and other dogs.

MACHINERY AND EQUIPMENT

Proposed census items

The *Programme for the 1980 World Census of Agriculture* treated machinery and equipment in three subgroups: stationary power-producing machinery, agricultural machinery and transport equipment.

The information to be reported for stationary power-producing machinery includes the number in usable condition located on the holding and intended primarily for use in agricultural work on the holding being surveyed. The information to be reported for agricultural machinery and transport equipment is simply whether the related machinery and equipment have been used for agricultural work on the holding and the sources of such machinery or equipment, regardless of any payments made for their use. Also, the use of stationary power-producing machinery should be reported by source regardless of its location. The source or sources of the machinery and equipment used on the holding should be reported by the following categories:

- owned solely by the holder;
- owned jointly by the holder and others;
- provided by the landlord;

- provided by other holders (excluding cooperatives and collectives);
- provided by private contractors;
- provided by a cooperative or a collective;
- provided by a government agency.

The following list of machinery and equipment is proposed (numbered as in the Programme):

* 71 Stationary power-producing machinery
- * 71.1 Prime movers
  - * 71.11 Internal combustion engines
  - 71.12 Steam engines
  - 71.13 Windmills
  - 71.14 Others n.e.s. (e.g. water wheels)
- 71.2 Electric generators
- 71.3 Electric motors

* 72 Agricultural machinery
- * 72.1 Tractors
  - * 72.11 Tracklaying (crawler) tractors
  - 72.12 Four-wheel tractors
  - 72.13 Power tillers and other single-axle tractors
- 72.2 Ploughs, tillers and harrows
  - 72.21 Ploughs
    - (a) Wooden
    - (b) Iron or steel ploughs operated by animals
    - (c) Tractor-operated ploughs
  - 72.22 Rotary tillers (tractor-operated)
  - 72.23 Harrows (rotary or disc)
    - (a) Animal-operated
    - (b) Tractor-operated
- 72.3 Grain drills
  - 72.31 Hand-operated
  - 72.32 Animal-operated
  - 72.33 Tractor-operated

72.4 Sprayers and dusters
72.41 Hand-operated
72.42 Animal-operated
72.43 Engine-operated
* 72.5 Reapers, mowers and binders
* 72.51 Reapers
(a) Animal-operated
(b) Tractor-operated
* 72.52 Mowers
(a) Animal-operated
(b) Tractor-operated
72.53 Binders
* 72.6 Combines (harvesting and threshing)
72.61 Tractor-operated
72.62 Self-propelled
* 72.7 Threshing equipment
* 72.71 Hand-operated
* 72.72 Animal-operated
* 72.73 Engine-operated
* 72.8 Milking machinery and equipment
* 72.81 Milking machines (fixed or movable)
72.82 Milk coolers
72.83 Cream separators
72.9 Others n.e.s.
73 Transport equipment
73.1 Trucks
73.2 Cars, jeeps and station wagons
73.3 Carts and wagons (animal-drawn)
73.4 Wheelbarrows
73.5 Others n.e.s.

Country practices

The proposed categories of the 1980 Programme concerning the type of source of machinery and equipment are adopted almost

exactly by some countries (Jordan, the Netherlands, Oman and Saudi Arabia). The Bahamas and Turkey used somewhat different classifications: "owned, rented, other" for the Bahamas; "own property, shared, rented" for Turkey. In Luxembourg the following classifications are used: "owned solely by the holder; owned jointly by the holder and others".

Countries generally adopted the list of machinery and equipment proposed by the 1980 Programme. The most frequently reported subsections are "tractors", "combines" and "transport equipment".

There are, of course, some items of machinery and equipment reported that differ from those proposed by the Programme. For example, in Uruguay forage mills, field rollers, wind-rowers, shellers, hay rakes, fertilizer distributors, disc tillers, hay balers, shearing equipment, incubators, brooder (houses) and honey separators are reported.

In the 1980 Programme the detailed classification of tractors by horsepower has been dropped because of the difficulties of obtaining adequate information from holders. In spite of this, tractors are classified by horsepower in some countries (for example, in Austria, India, Suriname, Turkey and Uruguay).

SELECTED PRACTICES AND FACILITIES

Proposed census items

This section is concerned with additional selected characteristics of the holding relating to some important agricultural practices and facilities. The topics covered include the use of certain irrigation facilities, the integration and association of the holding with establishments in other industries, the use of high-yielding varieties of seeds and the use and application of inorganic fertilizers and pesticides. Information on these is of interest in itself and is also especially recommended for providing an efficient frame for the design of sample surveys for in-depth study of these topics. The following items are proposed (numbered as in the *Programme for the 1980 World Census of Agriculture*):

* 81 Use of irrigation facilities on the holding
  * 81.1 Tube-wells or boreholes
  * 81.2 Other wells with pumps or irrigation water wheels
    * 81.21 Hand-operated
    * 81.22 Animal-operated
    * 81.23 Engine-operated
  * 81.3 Solely by gravitational flow
  81.4 Other irrigation facilities n.e.s.
* 82 Integration of holding with an establishment in another industry
  * 82.1 Holding is part of an establishment in another industry
    82.11 Part of a manufacturing establishment
    82.12 Part of a wholesale or retail trade establishment
    82.13 Part of an agricultural services establishment
    82.14 Part of an establishment in another industry
  * 82.2 Holding is not part of another establishment
* 83 Production on the holding under contract for another establishment
  * 83.1 Part or all of production (specify products)
  * 83.2 None
* 84 Use of high-yielding crop varieties on the holding
  * 84.1 Wheat
  * 84.2 Rice
  * 84.3 Others (specify crop)
  * 84.4 None

85 Use and application of inorganic fertilizers and pesticides
  85.1 Fertilizers
    85.11 Applied solely by holder
    85.12 Applied solely or partly by others
    85.13 No fertilizers used

85.2 Pesticides
85.21 Applied solely by holder
85.22 Applied solely or partly by others
85.23 No pesticides used.

Country practices

Portugal is the only country that used a classification similar to the one given above. Other countries employed different classifications.

Czechoslovakia uses categories parallel to subsections 82 and 84 of the 1980 Programme:

- Integration of holdings with other industries:
  number of holdings reporting integration;
  number of holdings reporting integration with:
  - industrial holdings;
  - agricultural holdings;
  - machine and tractor stations;
  - other establishments.
- Use of high-yielding crop varieties:
  number of holdings reporting use of high-yielding varieties of:
  - winter wheat;
  - maize;
  - spring barley;
  - potatoes.

Bangladesh uses the following classifications of high-yielding crops:

- Use of high-yielding crop varieties:
  number of holdings reporting use of high-yielding varieties of:
  - wheat;
  - Aman rice broadcast;
  - Aman rice transplanted;
  - Aus rice broadcast;
  - Aus rice transplanted;
  - Boro rice.

In some other countries (Brazil, Norway, the Philippines, Thailand, Trinidad and Tobago and the United States) information on "soil conditioners" is collected.

Except for the countries and practices mentioned above, the participation of countries in "Selected practices and facilities" is restricted to two subsections: "Use of irrigation facilities on the holding" and "Use and application of inorganic fertilizers and pesticides".

A small number of countries reported information on pesticides: the Bahamas, Jamaica, Jordan, Malawi, Nepal, Oman, Paraguay, Sri Lanka, Suriname, Thailand, the US Virgin Islands and Uruguay.

A great number of countries provide results on irrigation. Among these the following countries have detailed classifications on irrigation: Australia, Austria, the Bahamas, Bahrain, Bangladesh, Canada, Cyprus, France, India, Italy, Jamaica, Jordan, Mali, Nepal, the Niger, Oman, Pakistan, Panama, the Philippines, Puerto Rico, Saudi Arabia, Sri Lanka, Trinidad and Tobago, Turkey, and Uruguay. Listed below are the irrigation classification systems of a number of countries as examples:

- Australia:

  Method of irrigation:
  - sprays;
  - furrows and/or flood;
  - trickle;
  - other and multiple methods.

  Source of water:
  - surface water from state irrigation schemes;
  - other surface water (including private group schemes):
    direct from rivers, creeks, lakes;
    from farm dams;
  - underground water supply (e.g. bore, spear, well);
  - town or country water supply.

- The Bahamas:
  Number of holdings reporting use of:
    boreholes;
    wells;
    windmills;
    pumps hand-operated;
    pumps engine-operated (portable);
    pumps engine-operated (fixed).
- Jamaica:
  Surface water use of wells (winter season):
    well;
    tank;
    public water supply;
    micro dam;
    not stated.
- Mali:
  Source of water:
  - river;
  - dam;
  - tube-wells;
  - wells.

  Way of drawing water:
  - manual;
  - animal;
  - manual pump;
  - mechanical pump;
  - electric pump.

  Transport of water:
  - nearby;
  - carrying;
  - with animal;
  - with canal.
- Philippines:
  Method of irrigation:

- by gravity;
- by pump;
- others.

Source of water:

- from the farm itself only;
- from outside the farm only;
- from both inside and outside the farm.

• Saudi Arabia:

Number of holdings reporting use of wells (winter season):

ordinary wells;
flowing wells;
artesian wells.

A great number of countries have collected data on fertilizers, though the distinction between organic and inorganic fertilizers is not generally made. Some countries give detailed classifications on fertilizers. The following classifications used by Saudi Arabia are the closest to that of the 1980 Programme:

• Fertilizers

Number of holdings reporting use:

applied solely by the holder;
applied partly by the holder and partly by other sources;
applied through other sources.

Some countries (Bahrain, Botswana, Guatemala, Oman, the Philippines, Portugal and Turkey) make a distinction between organic and chemical fertilizers. Jamaica asks the name of crops to which fertilizers were applied. Uruguay asks which fertilizers were used and the area fertilized. Some other countries (Australia, India, Jordan, Pakistan, Panama, Sri Lanka and Thailand), using detailed classifications in fertilizers, make a distinction between organic and chemical fertilizers and give results on fertilizers applied to different crops. The classifications used by Jordan and Pakistan are given below:

• Jordan:

Chemical fertilizers:

- with nitrogenous fertilizers only;

- Austria:
  Classes of drainage:
  - public;
  - own sewerage (not connected with public waterways);
  - cesspool;
  - utilization on holding;
  - flowing off and/or diversion.
- Norway:
  agricultural area drained during the past five years;
  agricultural area in need of (more) drainage.

Many countries collect information on credit. The coverage of Guatemala and Panama is given below:

- Guatemala:
  Source of credit:
  - government;
  - cooperative;
  - private banks;
  - individuals;

  Guarantee of credit:
  - personal;
  - pledge;
  - mortgage;

  Purpose of credit:
  - crops;
  - livestock;
  - other.
- Panama:
  During 1980/81 agricultural year have you received any credit for the activities of the holding? (Yes or no).
  From where and how much credit did you get?
  - official sources;
  - private sources;
  - cooperatives;

- other sources;

What was the original purpose of the credit and where was it used?

- agriculture:
  - machinery;
  - inputs or labour;
  - other;
- livestock:
  - machinery;
  - inputs or labour;
  - other.

A few countries include certain interesting questions in their agricultural censuses. For example:

- "How many minutes does it take to travel to the water from your lands and to come back?" (Botswana)
- "Indicate the approximate distance from this household to the nearest: improved water supply, firewood supply, medical dispensary, clinic, primary school, etc." (Malawi)
- "Is this holding producing mainly for home consumption or for sale?" (American Samoa, Guam, Northern Mariana Islands, US Virgin Islands)
- "Does the household carry out any cottage industry?" (Bangladesh)
- "What are the factors which are the most problematic for you?" (nine questions) (Grenada)

Certain interesting subjects which are raised in the census questionnaires of Canada and the US Virgin Islands are given below:

- Canada:
  - What is your estimate of the present market value of the buildings and land you operate? (In dollars)
  - Questions on selected expenditures during 1980. (11 questions)

- What is the total gross value of the agricultural products sold during 1983?

• US Virgin Islands:

- Is the farm located on a hard-surface (all-weather) road? If not, about how many miles is it to the nearest hard-surface road?
- Is this holding producing mainly for home consumption or for sale?
- Selected expenditures in the last 12 months on machine hire and customwork; wages and salaries; feed purchased for livestock and poultry; insecticides, etc.; fertilizers; livestock and poultry purchased.
- Do you have electricity, piped running water?

Chapter 5

Agricultural census legislation

Census legislation is one of the most important aspects of taking an agricultural census. The *Programme for the 1980 World Census of Agriculture* stresses the importance and need for census legislation with the following words:

> "Legal authority for the census is required for establishing primary administrative responsibility, obtaining the necessary funds, determining the general scope and timing of the census and placing upon the public a legal obligation to cooperate. The census legislation should grant full executive authority over budget and administrative organization to the agency legally responsible for preparation and implementation of the census, in order to provide the census agency with the means for reallocating resources when unforeseen difficulties may arise, especially during enumeration and data processing. If a country lacks permanent legal authority for taking periodic censuses, it is important to act early to establish it. In the census legislation, the confidentiality of the information collected for individual holdings should be strongly and clearly established and guaranteed by adequate legal sanctions so as to form a basis for confident cooperation by the public."

Another FAO publication (FAO, 1978, p. 1) gives the following warning on the timing of the legislation:

> "The decree, or other type of legislation, must be ready sufficiently in advance of planning the census. This is all the more necessary if no census type of activity can be started without the support of a corresponding law. In this case, it must be issued preferably three years before the start of the

census. Any delay in promulgation of such law will unduly delay the commencement of the census taking. Therefore, the most convenient date for its publication must be looked into carefully, so as to take full advantage of all the support which adequate legislation will afford the census."

Countries usually have laws or other legal instruments that govern their agricultural censuses. FAO's publication on agricultural census legislation presents information which has been obtained from documentation supplied to FAO by some of these countries in connection with the 1970 and 1980 WCAs. This publication includes a list of laws or other legal instruments promulgated in various countries for the institution and carrying out of an agricultural census. Countries covered in the list are the following: Australia, the Bahamas, Belgium, Bolivia, Canada, Colombia, the Dominican Republic, Ecuador, Finland, France, the Federal Republic of Germany, Guatemala, Honduras, Italy, the Republic of Korea, Liberia, Luxembourg, Malta, Mexico, Norway, New Zealand, Pakistan, Panama, Paraguay, the Philippines, Samoa, Seychelles, Sierra Leone, Sri Lanka, Suriname, Thailand, Togo and the United Kingdom. (FAO, 1984a, p. 4-6).

In the annexes to this publication, selected national and international enactments are given. Table 26 is composed by using the information in these annexes, but includes only those countries that participated in the 1980 WCA.

The rest of this chapter is on important aspects of agricultural census legislation. The juridical basis of agricultural census legislation, census-executing authority, scope of census legislation, obligatory collaboration and confidentiality of information are investigated in that order. In the last section two examples of enactments are given: the Regulation of the European Economic Community, and the decree for Togo.

The main source for the following explanation is FAO, 1984a. In addition to that, Canada, 1971, FAO, 1977, FAO, 1978, Norway, 1979a, France, 1979, Japan, 1980, Republic of Korea,

TABLE 26

Legislation related to the 1980 WCA

Country	Enactment and date
Australia	Act No. 15 of 1905: Census and Statistics Act 1905, 8 December 1905. Act No. 15 of 1977: Census and Statistics Amendment Act 1977, 28 February 1977. Census and Statistics Amendment Act 1981, 30 April 1981. [1]
Bahamas	Government Notice relative to the Census of Agriculture of 1978 under the authority of the Statistics Act No. 22 of 1973.
Canada	Statistics Act, 11 February 1971.
Finland	The Agricultural Statistics Act, 25 August 1975. The Agricultural Statistics Ordinance, 31 October 1975.
France	Decree No. 78-350 prescribing the date of and the conditions governing the conducting of the General Census of Agriculture, 17 March 1978.
Germany, Federal Rep. of	Agricultural Census Act 1979, 5 May 1978.
Italy	Act No. 864 to provide for the financing of the third National Agricultural Census, the twelfth National Population Census, the National Housing Census and the sixth National Census of Industry, Commerce, Services and Crafts, 8 December 1980.
Korea, Rep. of [2]	Operational Regulation of the Census of Agriculture (Ministry of Agriculture and Fisheries Ordinance No. 644; promulgated on 30 October 1976). Article 3 of the Statistics Law. Article 5 of the Operational Ordinance of the Statistics Law; Designated Statistics No. 5.
Malta	Notice of 16 September 1980 under the authority of the Statistics Act No. 15 of 1955.
Panama	Decree No. 144 of 31 December 1980 prescribing rules for the taking of the Fourth National Agricultural Census, pursuant to Decree Law No. 7 of 25 February 1960.
Thailand	Royal Decree on Agricultural Census of 1976 (Thailand year 2519), 10 March 1976.
Togo	Decree No. 82/166/RP prescribing the holding of a Census of Agriculture in 1982, 7 June 1982.
United Kingdom	Agricultural Statistical Act, 22 March 1979.

Source: Agricultural Census Legislation. Rome. FAO. 1984.

Notes: [1] Census and Statistics Amendment Act 1981 is not included in FAO, 1984a.

[2] Taken from Korea, 1981, p. 4, which is not included in FAO, 1984a.

1980, Hungary, 1981 and Bangladesh, 1984 are also used as sources.

JURIDICAL BASIS OF AGRICULTURAL CENSUS LEGISLATION

One of the first steps to take when an agricultural census is being prepared is to consider any relevant law or commitment. Possible cases are considered below.

Most typical is the case that the country has a law governing all statistical activities. For example, in Japan: "The census was conducted under the Statistics Law enacted in 1947 and the Regulations for the Agricultural and Forestry Census prescribed in fiscal 1979." (Japan, 1980, p. 7). In Norway: "The census has been initiated in accordance with a law of 25 April 1907, concerning the collection of data for official statistics." (Norway, 1979a, p. 3).

Some countries authorize the agricultural census by a single act of parliament or government. For example: "In Pakistan the agricultural census was authorized by a single Act of Parliament." (FAO, 1984a, p. 8). "The Government of Bangladesh adapted with suitable modifications the 'Agricultural Census Act of 1958' for the purpose of conducting the 1977 Agricultural Census in Bangladesh." (Bangladesh, 1983, p. 63). "The Executive Council of the Hungarian People's Republic, joining the request of the FAO, has on May the 15, 1980, in its decision No. 3135/1980 decreed that the Central Statistical Office (CSO) should carry out a general agricultural census in 1981." (Hungary, 1981, p. 1).

In some countries (Canada, Mexico, Thailand and Togo) powers to issue the relevant enactment are provided for in the country's constitution. (FAO, 1984a, p. 7).

International commitments and collaboration may provide a juridical basis: for example, the "Regulation of the European Economic Community, namely, Council Regulation No. 218/78 of 19 December 1977" which is provided below. Member countries of the European Economic Community proceeded to their own censuses following this Council Regulation. FAO has reported

other similar situations. "The Customs and Economic Union of Central Africa (CEUCA) is another example of international collaboration. The States at that time making up the Union, namely, Cameroon, Central African Republic, Chad, Congo and Gabon, decided at the meeting of 21 June 1967 to carry out the agricultural census jointly." "In Bolivia, Guatemala, Honduras, Pakistan, Paraguay and Togo the international undertakings entered into by these countries to carry out censuses of agriculture also constitute the necessary juridical basis." (FAO, 1984a, p. 7, 8).

CENSUS-EXECUTING AUTHORITY

Countries generally apply three sets of regulations governing the execution of the census that are not mutually exclusive. Despite this overlap in the census-executing authority, the authority in charge of technical work is generally the national statistics office.

Some countries appoint a responsible statistician (for example, Commonwealth Statistician in Australia, Chief Statistician in Canada, Census Commissioner in Pakistan and Government Statistician in Samoa). In Australia: "It shall be the duty of the Statistician, subject to the regulations and the directions of the Minister, to prepare and issue forms and instructions and take all necessary steps for the taking and collection of the census." "In Pakistan, the Census Commissioner is the executing authority in collaboration with the Agricultural Census Advisory Committee which includes official representatives from the ministries and departments of the central and provincial governments concerned with statistics, planning and agriculture, as well as one representative of the farmers from each province." (FAO, 1984a, p. 8, 9).

Formal executing authorities are the mayors for some countries (for example, Belgium, Italy and Luxembourg) and the Ministry of Agriculture for some other countries (for example, the Bahamas, Hungary, India, the Republic of Korea and Paraguay).

In Finland, France and Togo executing authority and responsibility for the agricultural census lies with commissions. Similarly:

"A Technical Agricultural Census Committee has been established in Togo with sub-committees at regional and local levels. The responsibilities of the National Committee include execution and supervision of census operations, preparations of the budget, publicity, coordination of various services involved in the execution of the census and publication of reports, including the final report." (FAO, 1984a, p. 9).

SCOPE OF CENSUS LEGISLATION

There are differences among countries in the degree of detail in their census legislation. Some countries give nothing more than general directives, while others are more detailed.

As an example of non-intervening legislation, Canada can be cited. The Statistics Act of Canada of 11 February 1971 is a general statistics act regulating population and agricultural censuses in Sections 18 to 20. Section 18 is on population census. Section 19 and the first paragraph of Section 20 are given below (Canada, 1971, p. 447-448):

"19. A census of agriculture of Canada shall be taken by Statistics Canada

(a) in the year 1971 and in every tenth year thereafter; and

(b) in the year 1976 and in every tenth year thereafter, unless the Governor in Council otherwise directs in respect of any such year.

20. (1) The Governor in Council shall by order prescribe the questions to be asked in any census taken by Statistics Canada under section 18 or 19."

In France there is a general directive regarding only the main items of the agricultural census. The first two paragraphs of Article 1 of *"Décret N° 78-350 du 17 mars, 1978, fixant la date et les conditions dans lesquelles sera exécuté le recensement général de l'agriculture en 1979"* are the following (FAO, 1984a, p. 60):

"Art. 1 — A general census of agriculture having as period of reference the 1978/79 agricultural year shall be carried out

in Metropolitan France and the Overseas Departments from 1 September 1979 to 31 March 1980.

The purpose of this operation shall be to collect, for each production unit, the information relating to management, structure, the population engaged in farming, the use of the soil, livestock, means of production, and the economic situation of farms."

The directives of the Bahamas Statistics Act are rather more detailed. According to this:

"During the period of the census, interviewers authorized in writing by the Director of Statistics will visit all farms and holdings and will seek to obtain the following information:

(a) total area of the farm or holding and the agricultural land area;
(b) tenancy of land;
(c) farm population characteristics;
(d) kinds of livestock and livestock resources;
(e) production of crops;
(f) irrigation facilities;
(g) other related agricultural data."

The directives of the Republic of Korea are more detailed than those of the Bahamas. Article 6 of "Operational Regulations of the Census of Agriculture" of the Republic of Korea is given below (Korea, 1980, p. 35):

"Article 6. (Survey Items)

(1) The data on the following items will be collected through the survey. But these may be changed when deemed necessary by the Minister of Agriculture and Fisheries.

(a) Type of agricultural holding and operator
(b) Land utilization
(c) Crops
(d) Livestock and poultry
(e) Employment in agriculture
(f) Farm population

(g) Agricultural machinery and farm implements
(h) Irrigation and drainage
(i) Fertilizers and soil dressings
(j) Products of forestry and fishery
(k) Association of agricultural holdings with other industries

(2) Details of the preceding paragraphs shall be laid down separately by the Minister of Agriculture and Fisheries."

Bangladesh's and Pakistan's Agricultural Census Act is an example of even more detailed census scope.[1] The Act authorized the following list of information (FAO, 1984a, p. 13; Bangladesh, 1984, p. 64):

"(a) Land ownership and land tenure
(b) Land unit and subdivision of land
(c) Land utilization
(d) Crop acreage and production
(e) Livestock and poultry
(f) Employment in agriculture
(g) Agricultural population
(h) Agricultural power and machinery
(i) Irrigation and drainage
(j) Fertilizers and soil dressings
(k) Wood and fishery products
(l) Agricultural credit
(m) Agriculture and silviculture
(n) Fruit and vegetable products
(o) Such other matters as the Central Government may, by notification in the Official Gazette, specify."

[1] Finland's decree of 13 January 1950 is often cited as the example of detailed scope of census legislation (see FAO, 1977, p. 117; FAO, 1978, p. 7; FAO, 1984a, p. 13).

OBLIGATORY COLLABORATION AND CONFIDENTIALITY OF INFORMATION

An agricultural census is a nationwide operation; it is difficult to conduct one satisfactorily without the support and collaboration of the citizens and national organizations.

It is also difficult to secure sufficient and healthy data without a legal obligation to cooperate which does not concern only farmers. The following paragraph shows the necessity of a legal obligation on the part of the public and other organizations (Bangladesh, 1983, p. 63):

> "To conduct a nationwide Agricultural and Livestock Census by the staff of the Bangladesh Bureau of Statistics alone is almost impossible. A large number of persons will be required to work as census enumerators and supervisors. These officials may have to be recruited from amongst the members of the public or borrowed from other organizations having field staff. With a view to facilitating availability of the requisite number of officials either from amongst the members of the public or from other organizations to the Bangladesh Bureau of Statistics during the census field operation it is considered necessary that the members of the public or other organizations should be made legally bound to render necessary assistance towards the taking of the census, and if anybody refused or neglected to perform any census duty imposed upon him, or refused to obey any orders issued to him under the legal authority vested by law in the Bangladesh Bureau of Statistics, such offence should be made punishable under the law."

In addition to this point, there are two important legal obligations: first, that of the agricultural holders to provide correct information as called for by census agents; and second, that of the absolute confidentiality of the information provided by the respondents. Confidentiality must be secured and divulgence of the information that is collected in agricultural censuses must be

forbidden and penalized. Three practices in these two main points in the 1980 WCA are given below.

Section 4 of the Agricultural Statistics Act of 1979 of the United Kingdom states:

> "(1) Any person who, without reasonable excuse, fails to furnish information in compliance with a requirement under Section 1 or 2 above shall be liable on summary conviction to a fine not exceeding 50 sterling pounds.
>
> (2) If any person
>
> (a) in purported compliance with a requirement imposed under Section 1 or 2 above knowingly or recklessly furnishes any information which is false in any material particular, or
>
> (b) publishes or otherwise discloses any information in contravention of Section 3 above,
>
> he shall be liable on summary conviction to imprisonment for a term not exceeding 3 months or to a fine not exceeding the prescribed sum or to both, or on conviction on indictment to imprisonment for a term not exceeding 2 years or to a fine or to both."

Norway's provision for collaboration and confidentiality under long-standing legislation is given below (Norway, 1979a):

> "The census has been initiated in accordance with a law of 25 April 1907 concerning the collection of data for official statistics. This law requires all persons to provide the information called for by the Central Bureau of Statistics. In addition, the law states that information which is collected may not be used for other purposes than statistical use and that all persons working with the returns are required to keep all information confidential.
>
> It is strictly forbidden to use information from an individual census return as a basis for tax assessment, rationing measures, in questions of agricultural law, or for other administrative purposes. The boards of agriculture and forestry councils must

not retain information by making transcriptions or copies of completed forms. The Central Bureau of Statistics will arrange for publication of census results in such a manner that it will not be possible to locate information concerning an individual holding."

The following paragraphs are extracted from the Census Act, Title 13 U.S. Code (United States, 1980a, p. 24):

"214. Wrongful disclosure of information

Whoever, being or having been an employee or staff member referred to in subchapter II of chapter I of this title, having taken and subscribed the oath of office, or having sworn to observe the limitations imposed by section 9 of this title, publishes or communicates any information, the disclosure of which is prohibited under the provisions of section 9 of this title and which comes into his possession by reason of his being employed (or otherwise providing services) under the provisions of this title, shall be fined not more than $5,000 or imprisoned not more than 5 years, or both.

Subchapter II — Other Persons

221. Refusal or neglect to answer questions; false answers

(a) Whoever, being over eighteen years of age, refuses or wilfully neglects, when requested by the Secretary, or by any other authorized officer or employee of the Department of Commerce or bureau or agency thereof acting under the instructions of the Secretary or authorized officer, to answer, to the best of his knowledge, any of the questions on any schedule submitted to him in connection with any census or survey provided for by subchapters I, II, IV and V of chapter 5 of this title, applying to himself or to the family to which he belongs or is related, or to the farm or farms of which he or his family is the occupant, shall be fined not more than $100.

(b) Whoever, when answering questions described in subsection (a) of this section, and under conditions or circumstances described in such subsection, willfully gives any answer that is false, shall be fined not more than $500.

(c) Notwithstanding any other provision of this title, no person shall be compelled to disclose information relative to his religious beliefs or to membership in a religious body."

TWO EXAMPLES OF ENACTMENTS

An international enactment or regulation is a good example of the international collaboration that promotes the conducting of an agricultural census. The regulation of the European Economic Community is provided below with these thoughts in mind.

As a country example, the Ministry of Rural Development of Togo, in the report to the President of the Republic on the matter of the bill concerning the General Census of Agriculture 1982, states that: "It is clearly of capital importance that Togo should have at its disposal a tool wherewith it will be able to map out, simply yet completely, the broad features of the agricultural sector in the different regions." A country's economic and social development can be secured only if the planners can be assured high quality information that permits a thorough understanding of the situation. In its 1982 decree Togo also formed the Technical Agricultural Census Committee with subcommittees at regional and local levels.

European Economic Community

Council Regulation (EEC) No. 218/78 on the organization of a survey on the structure of agricultural holdings for 1979/1980 (*19 December 1977*: *Official Journal of the European Communities*, No. L 35, 4 February 1978, p. 1) follows.

"The Council of the European Communities;

Having regard to the Treaty establishing the European Economic Community and in particular Article 43 thereof;
Having regard to the proposal from the Commission;
Having regard to the opinion of the European Parliament;
Whereas the Member States are preparing to carry out a survey as part of the next ten-yearly world agricultural surveys recommended by FAO and to be conducted sometime around 1980;
Whereas the results of this survey may be used for Community purposes if the reference period, the scope and the definitions are harmonized as part of a Community programme;
Whereas the structural trends of agricultural holdings are an important factor in determining the course to be followed by the common agricultural policy; whereas the series of surveys on the structure of holdings, the latest of which was organized under the Regulation (EEC) No. 3228/76, should be continued;
Whereas, in order to assess the technical and economic operation of the holding, the agricultural area utilized for farming should, in the case of combined crops, be allocated between such crops in proportion to the amount of land which the latter take up;
Whereas in order to facilitate the implementation of the provisions of this Regulation there should be close cooperation between the Member States and Commission, in particular via the Standing Committee for Agricultural Statistics set up by Decision 72/279/EEC;
Has adopted this Regulation:
1. Member States shall, between 1 April 1979 and 15 June 1980, in accordance with the FAO recommendation for a world census of agriculture, carry out a survey of the agricultural holdings in their territories (hereinafter referred to as "the survey").
2. 1. For the purposes of applying this Regulation:

(a) "agricultural holding" shall mean a single unit, both technically and economically, which has a single management and which produces agricultural products;

(b) "agricultural area utilized for farming" shall mean the total area taken up by arable land, permanent pasture and meadow, land used for permanent crops and kitchen gardens.

2. The survey shall cover:

(a) agricultural holdings where the agricultural area utilized for farming is one hectare or more;

(b) agricultural holdings where the agricultural area utilized for farming is less than one hectare, if they market a certain proportion of their products or if their standard gross production exceeds certain physical limits.

3. Member States shall include in their national questionnaires the questions necessary for obtaining the information relating to the characteristics listed in the Annex.

4. 1. In case of combined crops, the agricultural area utilized for farming shall be allocated between the various crops in proportion to the amount of land the latter take up.

2. The area used for secondary successive crops shall be recorded separately from the area used for farming.

5. The definitions relating to the characteristics listed in the Annex and to the regions and districts referred to in Article 8 shall be determined according to the procedure laid down in Article 12.

6. The survey shall be carried out as a general census. However, Member States may use surveys by random sampling for different parts of the list of characteristics.

The results obtained by random sampling shall be extrapolated.

7. Member States shall set out the results of the survey in the form of a schedule of tables drawn up in accordance with a Community outline. This outline shall be drawn up in accordance with the procedure laid down in Article 12.

8. 1. Member States shall prepare the tables of the Community schedule at national, regional and district levels.

In drawing up the Community outline of tables in accordance with Article 7, the Commission may decide that certain tables are not applicable in certain Member States at district level.

2. With the exception of the Netherlands, the results of the survey shall be broken down by less-favoured agricultural areas, within the meaning of Article 3 of Directive 75/268/EEC, or by groups of such areas and broken down by other agricultural areas or by groups of such areas. The Commission and the Member States shall together decide on the groupings of less-favoured agricultural areas on the one hand and of other agricultural areas on the other.

9. Member States shall:

(a) transcribe the results referred to in Article 8 on to magnetic tape in accordance with a programme which is standard for all Member States, the method and programme of transcription being drawn up in accordance with the procedure laid down in Article 12;

(b) submit the magnetic tapes referred to in (a) to the Statistical Office of the European Communities. They shall be submitted within 18 months at the latest of completion of the field work. Where all the results referred to in Article 8 cannot be submitted within the aforesaid period the Member States concerned and the Commission shall together fix a period, not exceeding 12 months, for the submission of the remaining tables.

10. The information referred to in Article 8 shall be communicated to the Statistical Office of the European Communities in such a form that the holdings concerned cannot be identified.

11. In cooperation with the Member States, the Commission shall publish the results contained in the Community schedule tables.

12. 1. Where the procedure laid down in this Article is invoked, the matter shall be referred to in Standing Committee for Agricultural Statistics (hereinafter referred to as 'the Committee') by its chairman, either on his own initiative or at the request of the representative of a Member State.

2. The Commission representative shall submit to the Committee a draft of measures to be taken. The Committee shall give its opinion on that draft within a time limit set by the chairman having regard to the urgency of the matter. Opinions shall be delivered by a majority of 41 votes, the votes of the Member States being weighted as provided in Article 148(2) of the Treaty. The chairman shall not vote.

3. The Commission shall adopt measures which shall take immediate effect. However, if these measures are not in accordance with the Committee's opinion, the Commission shall submit them forthwith to the Council; in that event, the Commission may defer application of the measures it has adopted for not more than one month from the date of their submission to the Council.

The Council, acting by a qualified majority, may take a different decision within a month.

13. 1. Member States shall supply the Commission, if necessary, with any information it may require of them in order to carry out the tasks covered by this Regulation.

2. The information collected by the Member States under the survey must be available in those Member States, as far as is technically possible, until the next general survey carried out under the FAO or at any Community level.

3. Further tables may be added to the schedule referred to in Article 7 in accordance with the procedure laid down in Article 12; in such cases the financial cost to the Member States shall be examined.
4. If the Commission undertakes further studies, the Member States shall as necessary and as far as possible provide the information requested by the Commission. This shall be done by joint agreement between the Commission and the Member State concerned, subject, in particular, to the necessary guarantee of statistical confidentiality.

This Regulation shall be binding in its entirety and directly applicable in all Member States."

Togo

Decree No. 82/166/RP prescribing the holding of a Census of Agriculture dated 7 June 1982 is as follows.

"The President of the Republic

Pursuant to Article 15 of the Constitution;

Pursuant to Decree Nos. 80-78 of 11 April 1980 establishing a General Directorate of Rural Development and organizing technical directorates under the Ministry of Rural Development;

On the advice of the Council of Ministers,

Hereby decrees:

1. A General Census of Agriculture is hereby organized throughout the national territory in 1982 in the form of a sample survey. This census shall form part of the World Census of Agriculture. The date and conditions governing operations shall be prescribed by decree of the Minister of Rural Development.

2. The General Census shall have as its main purpose to furnish the Government with objective information on the structure of agriculture and thus enable it to follow up

developments there and also to provide a sampling basis for all future statistical surveys in the rural sector.

3. For the purposes of coordination, control and carrying out of the General Census of Agriculture there are hereby appointed:

- a National Agriculture Census Technical Committee;
- Regional Agriculture Census Technical Committees, and
- Local Agricultural Census Technical Committees.

4. The terms of reference of the National Agricultural Census Technical Committee shall be:

- to conduct and control the operations of the Census of Agriculture;
- to prepare the budget for these operations;
- to determine ways and means of mobilizing the population so as to ensure the success of the Census of Agriculture;
- to secure the coordination of all bodies involved in the survey;
- to draft performance reports and the final report.

5. The National Agricultural Census Technical Committee shall consist of the following:

Chairman: the Director General of Rural Development;
Vice-Chairman: the General Secretary of the Home Office;
Members: the General Director of the Plan;
the General Secretary of Information;
the Director of Statistics and Data Processing;
the Regional Director of Agricultural Development;
the Director of Agricultural Surveys and Statistics;
the Director of the Togo Development Studies Company;
the Director of Economic Affairs;

the Director of the Higher School of Agronomy, the University of Benin;
the Director of the Cadastre;
the FAO experts.

The Secretariat of the National Technical Committee shall be provided by the National Director of the Census of Agriculture.

The National Technical Committee may co-opt any individual whose competence and experience may enlighten its deliberations.

6. The National Technical Committee shall be convened by its Chairman as need arises.

7. The Regional Technical Committee shall have the same terms of reference as the National Technical Committee and shall consist of the following:

Chairman: the Chief of the Region or the Senior Prefect of the Region;
Vice-Chairman: the Regional Director of Rural Development;
Members: all the Prefects of the Region;
- the Regional Chief of the Agricultural Statistics Service;
- the Regional Director of Statistics;
- the Regional Director of the Togo Press Agency.

The Secretariat shall be provided by the Regional Chief of the Agricultural Statistics Service.

8. The Regional Technical Committee shall be convened by its Chairman as need arises.

9. The Regional Directors of Rural Development shall be responsible for carrying out the field operations in accordance with the instructions of the National Agricultural Census Technical Committee. They shall be assisted in their tasks by the Regional Service Chiefs of Agricultural Statistics.

10. There is hereby appointed, within each prefecture, a local Agricultural Census Committee whose principal terms of reference shall be:

- to ensure due publicity for the survey within the respective prefectures by means of information campaigns and by mobilizing the population;
- to supply material and moral support to the personnel of the Census;
- to ensure the success of the operation.

11. Each local Committee shall consist of the following:

Chairman: the Prefect;
Vice-Chairman: the Regional Director of Rural Development;
Members: the Chairman of the Board of the Prefecture;
the Chief of the District;
the Regional Director of the Togo Press Agency;
the Regional Chief of the Agricultural Statistics Service;
the Regional Director of Statistics;
a Representative of the Sûreté nationale;
a Representative of the Gendarmerie nationale.

12. There is hereby appointed:

- by Ministerial Decree, a National Director of the Agricultural Census;
- by Ministerial Decree, a Financial Manager of the Agricultural Census.

13. The National Director shall be answerable to the National Agricultural Census Technical Committee:

- for the organization and performance, in the field of the General Census of Agriculture for the entire territory;
- for the processing, analysis and publication of the results;
- for drafting the final report on the Agricultural Census.

14. The Financial Manager shall provide the financial management of the Census of Agriculture. He shall be responsible both personally and in respect of his fortune for the funds at his disposal, which shall be paid into a special account with the Treasury. Financial management shall proceed and be audited according to the rules of the public accounts.

15. The Regional Directors of Rural Development shall for the Census of Agriculture employ the personnel of the Directorate of Agricultural Surveys and Statistics and any additional personnel hired or otherwise employed on a temporary basis.

16. All individuals and bodies corporate having an establishment within the National territory shall be required to cooperate with the personnel responsible for conducting the Census of Agriculture and to supply them, on a confidential basis, with any information required.

The confidentiality of such individually supplied information and secrecy shall be guaranteed by this Decree.

Any attempted falsification or wilful distortion of the required information shall render the person responsible liable to a penalty of from CFAF 3 000 to CFAF 20 000.

17. The Minister of Rural Development and the Minister of Internal Affairs shall be responsible for the enforcement of this Decree, which shall be published in the *Journal Officiel of the Republic of Togo*."

Chapter 6

The questionnaires

The importance of questionnaires in censuses and statistical surveys is summarized with the following words in the *Programme for the 1980 World Census of Agriculture:*

> In all censuses and statistical surveys a questionnaire is used to collect the information needed. In addition to informing the agricultural holders of what information is requested, the questionnaire also serves as the medium for recording the information obtained in a standardized manner.

The development of census questionnaires is one of the most important and exacting tasks in the preparation of a census. The quality of the enumeration depends largely on the enumerators and the questionnaire.

This chapter reviews the details of the questionnaires in the WCA. The first section presents the two techniques of obtaining census data: mail survey and interview techniques, the second section discusses the length of questionnaires and the third section summarizes question grouping and other technical aspects of questionnaires. Two examples of questionnaires are given in the last section.

MAIL SURVEY AND INTERVIEW

Census data are generally obtained by mail (self-enumeration) or interview (enumerator) techniques. In the developed countries where the educational level is high and/or in large holdings where farm accounts can be maintained, the mail technique can be used. In countries with a low level of literacy and with large numbers of

small holdings the only technique that can be used in agricultural censuses is the interview.

The Report on the 1970 World Census of Agriculture (FAO, 1977, p. 136) states:

> "The questionnaires used in self-enumeration included instructions on how to complete the questionnaire and/or there was an instruction leaflet accompanying the questionnaire. Definitions of various terms, concepts and instructions had to be given in order to enable the respondent to answer the questions correctly. Since there was no enumerator present for explanations, the questionnaires and/or the accompanying instruction leaflet had to be very carefully constructed. On the contrary, the questions on questionnaires to be filled out by enumerators were usually short and simple since the enumerators had gone through an extensive training and were familiar with the terms used and had practice in filling out sample questionnaires."

These factors indicate that in time, with development and progress, the mailing technique will gain importance. This trend has been discussed in Chapter 2.

But this general trend brings the problem of keeping the mail list up to date. For example, in the United States (United States, 1981, p. vii):

> "Evaluation studies of the 1969 and 1974 censuses, which were conducted primarily by mail, indicated that the administrative lists used to create the census mailing list were not adequate to ensure complete coverage in the census. Also, censuses prior to 1969, conducted by direct enumeration, had been found by evaluation studies (conducted since 1950) to be progressively less and less complete, as increased mobility of farm operators led to increases in the numbers of nonresident operators, operators farming on a part-time basis and operators farming two or more separate tracts."

In order to compensate for the loss of respondents and to make coverage more complete, the frame for the 1978 agricultural census

was an address file which was based on lists obtained from various sources: the Agricultural Stabilization and Conservation Service, the 1976 Internal Revenue Service form 1040F and 1040C files, the Business Master File of addresses reporting agricultural employees and lists of agricultural partnerships and corporations, as well as the in-scope and non-respondent lists from the 1974 Census of Agriculture (United States, 1983, p. 22).

Mail technique

The following information from an official publication of Australia on the annual integrated agricultural commodity census summarizes the case of that country as an example of the mail technique:

> "The basic source of Australian agricultural commodity statistics is the Agricultural Census, conducted at the end of March each year... A wide range of items is currently collected by mail in the census from 180 000 individual landholders. The items include area, production and varieties of crops, numbers of livestock, wool production, area of agricultural establishment, land usage, artificial fertilizer usage and the incidence of irrigation. The list of items collected has been developed over a long period and has been adjusted to suit changing conditions in the agricultural sector, necessitated by technological advancement, as well as to meet the needs of government, business and private users of statistics. For some commodities not harvested by 31 March, the census collection date, production data are collected on a specific supplementary questionnaire despatched at a later, more relevant time."

Items in Australia are therefore collected by mail using two sets of questionnaires: questionnaires and supplementary questionnaires.

Similar, but not identical, forms of questionnaires are used for the different states and territories of Australia (New South Wales,

Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern Territory and the Australian Capital Territory).

The questionnaire of New South Wales (Australia, 1981a) is eight pages long and contains 30 sections (preceded by A, B, C) as follows:

A. Description of holding
B. Structure of the business at 31 March 1981
C. Land vacated or acquired including changes in tenancies since 31 March 1980
1. Area of holding and land tenure at 31 March 1981
2. Residents on holding at 31 March 1981
3. Pastures
4. Production of hay, etc. from pastures — season 1980/81
5. Production of pasture seed — season 1980/81
6. Crops — season 1980/81
7. Wheat varieties
8. Cereal crop forecast — season 1981/82
9. Cereal grain held or consumed on holding
10. Hay and silage
11. Vegetables grown for sale for human consumption
12. Area of orchard trees (including nuts) at 31 March 1980/81
13. Orchard fruit intended for sale — season 1980/81
14. Other fruit intended for sale — season 1980/81
15. Area of grape vines at 31 March 1981
16. Artificial fertilizers used — season 1980/81
17. Irrigation — season 1980/81
18. Sheep and lambs at 31 March 1981
19. Wool production during year ended 31 March 1981
20. Stocks of unsold wool on holding at 31 March 1981
21. Lambing during year ended 31 March 1981
22. Lambing forecast — year ended 31 March 1982
23. Poultry
24. Cattle and calves at 31 March 1981
25. Calving and matings during year ended 31 March 1981

26. Pigs at 31 March 1981
27. Other livestock on holding at 31 March 1981
28. Sales of livestock from this holding during year ended 31 March 1981
29. Use of electricity and selected fuels on this holding during year ended 31 March 1981
30. Natural bush, scrub, forest and wetlands.

In supplementary questionnaires (Australia, 1981b) the following data are requested by the State of Victoria: apple and pear statistics; beekeeping statistics; hop statistics; maize and sunflower statistics; mushroom statistics; nursery statistics; potato statistics; tobacco statistics; vineyard statistics. Similar questions are used for the other states and territories. These supplementary questionnaires include a general explanation such as the following: "Because the harvesting period for apples and pears (potatoes, maize, sunflowers, etc.) extends beyond the end of March, you were requested to show only tree numbers data in the Agricultural Census form sent to you for completion in March and advised that particulars of production of these crops would be collected later by special circular." (Australia, 1981b).

Some countries use a combination of the interview and mail techniques in data collection, as shown in Chapter 2. One of these countries is Sri Lanka, which has an interesting practice in agricultural censuses. The "Instruction for filling in the Estate Schedule" notes that:

"Agriculture in Sri Lanka consists mainly of two sectors: the smallholding sector and the estate sector. In respect of the smallholding sector, the information is being collected through the interview method, i.e. an enumerator approaches each agricultural operator operating a smallholding and collects the relevant data in prescribed questionnaires. In the case of the estate sector the method of mailed questionnaire is followed."

The mailed questionnaires used for the estate sector are examined

in this section and the questionnaires used for the smallholding sector will be investigated in the next section.

The front page of the *Sri Lanka Census of Agriculture — 1982, Estate Schedule* offers the following explanation:

"Sir/Madam,

The Census of Agriculture 1982, which is carried out under the Census Ordinance Chapter 143 of legislative enactment, is an undertaking of national importance. Under the Census Ordinance it is obligatory for you to furnish the required information. Individual information will not be disclosed to any person.

The statistical information on the crops grown, livestock maintained, fertilizers used, etc. are being collected purely for formulation and implementation of various agricultural development plans.

After filling in the schedule according to instructions given at the end, please post this to the Govt. Agent of the District in which the Estate is located, on or before 31st July 1982. A self-addressed envelope is enclosed for the purpose.

Remember by giving your cooperation and filling in the schedule accurately you will be helping the Government in formulating sound plans for development and their evaluation.

Superintendent of Census"

The instructions mentioned in the above explanation are four pages long; detailed instructions of this nature are necessary for mail technique questionnaires.

The following sections are found in the estate schedule of Sri Lanka:

- Location of Estate
- Operator

  Age, sex, academic qualification of the operator. Status of the operator pertaining to the estate.
- Area

Total area of estate in acres or hectares excluding the area rented out or leased out to others.

- Tenure and land utilization of the estate
- Crops grown and/or livestock kept
  Major plantation crops; other permanent crops; temporary crops; livestock kept.
- Area under principal crops
  Tea; rubber; coconut; permanent crops; temporary crops.
- Livestock and poultry
  Cattle and buffaloes; goats, sheep and pigs; poultry.
- Use of fertilizer
  Fertilization on crops; use of insecticides, weedicides or fungicides on the estate.
- Irrigation facilities
  Irrigated area in the estate; number of windmills, tube-wells, wells with water pumps, wells with other devices in the estate.
- Population and employment
  Resident population of estate on 1 July 1982; resident and non-resident employees during June 1982.
- Agricultural implements and machinery owned by the estate
  Tractors; mammoties; ploughs; sprayers or dusters; threshers; irrigation pumps; winnowing fans; weeders; others (specify); lorries.

Interview technique

In the interview technique the responsibility of filling in the questionnaires rests with the enumerators. Thus, the training and preparation of enumerators is very important and generally the preparation of an enumerator's manual is necessary. Information and instructions for the enumerators must be given in the manual with sufficient detail and precision.

Trinidad and Tobago is one of the countries that used the

interview technique in the 1982 agricultural census. Some details of its approach are presented below.

Trinidad and Tobago has an *Enumerator's Manual* in addition to the *Editing and Coding Manual* and the *Supervisor's Manual* for the 1982 agricultural census. This 37-page manual (Trinidad and Tobago, 1982a) is composed of two parts: Part I — General Instructions; and Part II — Enumeration Procedures. Two interesting sections of Part I follow (as numbered in the manual):

"7. Some questions respondents may ask
- What is the census?
- Why is the census taken?
- Is census information confidential?

10. How to conduct successful interviews
- An interview is a conversation with a purpose
- Your manner of dress
- Your manner of approach
- How to handle difficult respondents
- Keep all appointments
- How to close an interview."

In the manual, of course, the satisfactory answers and the appropriate behaviour are explained.

In Part II of the manual, definitions and explanations on general procedures, enumeration and basic concepts are given, and ways of completing the census forms are shown. There are detailed instructions on the questionnaire form AC-1 (Trinidad and Tobago, 1982a, p. 16-36).

Questionnaire form AC-1, which is 34 pages long, includes the following sections (as numbered in the manual):

1. Holder
2. Population and employment
3. Holding
4. Permanent crops under cultivation, 1982
5. Permanent crop production and sales, 1981
6. Cultivation and production of temporary crops

7. Forest products
8. Cultivated grasslands, greenhouses and nurseries
9. Livestock
10. Agricultural machinery and equipment
11. Selected practices and facilities
12. Selected expenditure, 1981
13. Value of sales and marketing problems, 1981.

In particular, Sections 11, 12 and 13 should be highlighted: Section 11 on "Selected practices and facilities" is in four parts. In the first three parts (Parts A, B and C) the usual questions of these sections are asked. In Part D "particulars of loan outstanding as at December 31, 1981" are requested. The questions in this part are as follows (Trinidad and Tobago, 1982a):

(a) "As at December 31, 1981, did you have any outstanding loans concerning your agricultural operations?
(b) Please state the following particulars (amount borrowed, source of loan, duration, year taken, rate of interest, mode of payment) for each loan."

In Section 12 on "Selected expenditure, 1981" the holding's payments for inputs (rents; wages; purchase of feed, seed, fertilizers, chemicals, fuel; expenditure on repairs, maintenance, electricity, etc.) are asked for.

Section 13 on "Value of sales and marketing problems, 1981" has two questions:

"What was the gross value of sales of crop products (or livestock and livestock products; or poultry and poultry products) in 1981?
What were the three greatest problems which you faced in marketing your products in 1981?"

LENGTH OF QUESTIONNAIRES

The first subsection below discusses lengths of questionnaires. The second subsection presents various methods to be applied when the number of questions is large.

Different lengths of questionnaires

The importance of keeping questionnaires moderate in length is noted in *Taking agricultural censuses* (FAO, 1978, p. 31) as follows:

> "If the questionnaire is lengthy, the farmer, who at the outset is prepared to reply to the questions, after he has been interrogated for a certain time becomes gradually less cooperative and in the end even hostile and this results in unreliable data from him. Not only the farmer is affected adversely by the length of the questionnaire and the duration of the interview, but the enumerator also, since he becomes tired and records the data indifferently. It is, therefore, very important that the questionnaire should not be too lengthy. However, it is difficult to establish the ideal length of a questionnaire because this depends not only on the number of questions it contains, but also on their degree of complexity which is reflected in the length of time which the farmer needs to answer them."

First of all, it must be noted that all farmers do not have to answer all questions. For example, in the 1981 Census of Agriculture of Canada there are 134 questions, but as is stated in the brochure of the census, "On average, each farmer will answer only 42 of the 134 questions, only those applicable to his or her operation."

Practices concerning the length of census questionnaires vary from country to country. A questionnaire that is moderate in length is the most common, while some countries have very short questionnaires and others have detailed and long questionnaires.

Grenada's questionnaire is very short, with only two pages and nine questions. This questionnaire is provided later in the chapter as an example.

The questionnaires of American Samoa and Jamaica are given below as example questionnaires of moderate length.

American Samoa's questionnaire is four pages long (including

page four, the enumerator's record) and consists of the following parts and sections (as numbered in the document):

Part A Questionnaire identification
Part B Operator's name and mailing address
Section 1. Land in agriculture (eight questions)
Section 2. Vegetables and field crops
Section 3. Fruits, nuts and tree crops (with name of fruit and crops)
Section 4. Land use (five questions)
Section 5. Livestock and poultry (eight questions)
Section 6. Fishery (one question)
Section 7. Selected equipment and facilities used on this place (two questions)
Section 8. Operator characteristics (five questions)
Section 9. Enumerator's record.

Jamaica's questionnaire in the Census of Agriculture 1978 is ten pages long (including page ten on data control) and consists of the following sections:

Section 1. Identification of farm
Section 2. Identification of holder (12 questions)
Section 3. Characteristics of holder (four questions)
Section 4. Use of technical advice and credit facilities (four questions)
Section 5. Use of communication facilities (three questions)
Section 6. Farm characteristics (five questions)
Section 7. Farm location, size and occupancy characteristics: questions on acreage owned, acreage rented, acreage leased, acreage rent free, acreage squatted on, acreage of other methods of occupancy
Section 8. Land type and utilization: questions on crops in pure stand; crops in mixed stand; grassland; fallow; ruinate; woodland; buildings, roads, reservoirs, canals, etc.; other land

Section 9. Production: questions on various crops; livestock and poultry; other farming activities

Section 10. Machinery and equipment: two questions on various kinds of agricultural machinery and equipment

Section 11. Use of fertilizers and pesticides: questions on various crops to which fertilizers/pesticides or herbicides were applied.

The European Economic Community, in its Council regulation given earlier, requests that member states include in their national questionnaires the questions necessary to obtain a list of specific characteristics. This list, given in Chapter 5 can be taken as an example of a questionnaire of moderate length.

Norway's principal questionnaire is an example of the long, detailed questionnaire. Four questionnaire forms comprise the Norwegian Census of Agriculture and Forestry of 20 June 1979. The principal questionnaire is Form 1, which is 25 pages long and includes many sections.

Various methods in the case of a large number of questions

The following is from *Taking agricultural censuses* (FAO, 1978, p. 31):

"When, after carefully studying the subjects to be included and the corresponding questions, it is observed that the questionnaire is too lengthy, various possibilities may be considered. The first is to use a very simple questionnaire with basic items which may be applied to all farms. The questions to be included could be total area, cultivated area, area occupied by permanent crops, number of head of cattle, swine and/or sheep and/or goats according to the importance which each type of livestock has in the country. This basic questionnaire would really consist of a sort of list of holdings. The list would constitute a sampling framework on the basis of which the farms are chosen to which the other more extensive question-

naire, which includes the items suggested in the world census programme, will be applied. Moreover, the simple questionnaire allows for a series of important basic results to be obtained quickly."

In Sri Lanka the agricultural census is composed of two phases: the first phase is the collection of data related to the smallholding sector, and the second phase is the collection of data in the estate sector using the technique of a mailed questionnaire. This second phase was summarized earlier in this chapter.

The first phase in Sri Lanka (that of the smallholding sector) applies the advice of FAO cited above.

Smallholding sector. Census work as planned consists of two phases. The first phase consists of collection of data for the smallholding sector. In this sector, again, the work is done in two stages. In the first stage all the census units according to the 1981 population census are visited by the enumerators to find out whether there are any agricultural operators in the census units. For each agricultural operator in the census unit, the number of holdings he or she is operating are ascertained. For each agricultural holding information on the following items is gathered:

- characteristics of the operator: age, sex, educational attainments;
- ownership pattern;
- status of the operator;
- size of operational holding;
- area under important crops;
- irrigation;
- agricultural machinery and implements;
- livestock.

The data on the above items for agricultural holdings in the smallholding sector are collected on a complete count basis.

The second stage of the work in the smallholding sector is to

select ten percent of the holdings covered in the first stage. From the selected holdings data are gathered on the following items:

- population of operator's household;
- source of income of the operator's household;
- operator's main occupation;
- manner in which work on the holding is done;
- type of holdings;
- use of fertilizers and pesticides;
- land-use pattern and tenure of the holdings.

The estimates in respect of the above items are based on a ten percent sample.

Estate and large holding sector. In respect of the estate sector the data are gathered through a mailed questionnaire. As a part of the preparatory work, lists of estates and large holdings have been prepared and in respect of each estate and large holding comprehensive data are collected.

The second possibility in dealing with a large number of questions is to distribute them in two questionnaires (FAO, 1978, p. 31): one large and detailed and one short. The practice of Pakistan in the 1980 Census of Agriculture could be given as an example. "This questionnaire, used in the North-West Frontier (NWF), Punjab and Sind provinces, had two versions. The main questionnaire (Form 2) was spread over 8 pages and was meant for households reporting owned and/or rented land. For landless households a short questionnaire (Form 3) was used which contained all the questions of Form 2 except those relating to land and crops." (Pakistan, 1983, p. xxi).

The third possibility is to use different questionnaires for different regions of the country when these vary considerably in their crops and cropping practices. In this way certain items can be discarded completely from the questionnaire of one region, and others from those of other regions, thus reducing the length considerably in all regions.

The cases of Australia and Pakistan are good examples of this practice. As described above, similar forms of questionnaire are used for the different states and territories of Australia, but, because of this tailoring, the number of questions is nowhere very large. For example, there are 30 questions in the questionnaire for New South Wales and 24 questions for the Northern Territory. Questions on crops, sheep and lambs (wool) are more numerous and more detailed in New South Wales than they are in the Northern Territory. There is no section in the Northern Territory on "Natural bush, scrub, forest and wetlands", while in New South Wales this section is the subject of the 30th question.

In Pakistan, also, the questionnaire changes by province: "Two types of census questionnaires were used; one in the provinces of NWF, Punjab and Sind and the other in the Baluchistan Province. The main questionnaire in the provinces of NWF, Punjab and Sind was of white colour and had twelve parts as follows" (Pakistan, 1983, p. xxi-xxii):

- identification and status of holder
- area and fragmentation
- land use
- irrigation
- fruit trees and area under orchards
- crops
- use of manures, fertilizers and insecticides on important crops
- use of agricultural machines and employment of casual labour
- livestock and poultry
- investment for agricultural purposes and outstanding debt
- persons employed for agricultural work and family members
- agricultural machines and implements.

There were 129 main items plus a number of sub-items to some questions.

The four-page questionnaire used in Baluchistan Province was of light-green colour and had the following eight parts:

- identification and status of holder

- area and fragmentation
- land use
- irrigation
- fruit-trees and area under orchards
- crops
- livestock and poultry
- indebtedness, agricultural workers, and family members.

In all, there were 103 main items, plus a number of sub-items attached to most of the main items.

One way of coping with regional differences in agricultural practices is the use of specialized questionnaires. The need for specialized questionnaires is summarized as follows (FAO, 1977, p. 137):

> "Generally a basic questionnaire is prepared which contains a minimum programme in which all the holdings included in the census are expected to participate. In addition to this regular programme there are many aspects of agricultural activities on which it is not necessary to ask questions from every holding. Specialized questionnaires may be prepared for those holdings which tend to specialize, depending upon the location, climate, special agricultural and/or marketing situations, etc. Thus holdings may specialize in livestock, plant production, flower growing, fruit production, cultivation of olives, etc. These specialized questionnaires were not filled out for all the holdings but only for a certain number of them."

Norway is a good example of the use of specialized questionnaires (Norway, 1979a, p. 3-5). As is noted above, there are four questionnaire forms in Norway. The following persons must file returns on the types of forms indicated for them:

- All persons who are required to file returns for the complete enumeration must complete Form 1, the principal questionnaire.
- All persons mentioned below must complete both Form 1 and Form 2 (horticultural questionnaire):

- persons operating at least 300 m^2 of land under glass or plastics other than nursery gardens;
- persons operating at least two decares of field-grown vegetables;
- persons operating at least one decare of strawberry beds;
- persons operating at least one decare of raspberry bushes;
- persons with at least 50 fruit trees;
- persons with at least 50 bacciferous shrubs.

• All persons managing fox and/or mink farms must complete both Form 1 and Form 3 (questionnaire concerning fur-farming).

• Persons filing returns for the sample census must complete Form 4.

GROUPING OF QUESTIONS AND SOME OTHER POINTS

FAO has made the following suggestions on the sequence and grouping of questions in the questionnaire (FAO, 1978, p. 32).

> "Once it has been decided what subjects are to be included in the questionnaire, proper attention must be paid to their sequence, that is to say, they should be set out in logical order so that it is easy for the farmer to go on supplying the information requested. All the questions on one subject should be grouped together and enough space left between them so that they stand out distinctly and can be easily located."

The examples provided above and those that will be given below show that countries generally comply with these suggestions. The sequence of questions is logical and generally in the order advised by FAO.

Also, countries tend to use quite similar groups of questions, as shown in the above examples. In France the following groupings were used in the General Census of Agriculture 1979/1980 (France, 1980):

• Identification and status of holder

• Utilization of land

- Livestock
- Material and equipment
- Population and employment.

At first glance there appears to be no grouping of questions in the Household Questionnaire of the 1980 Census of Agriculture of Turkey (Turkey, 1983). However, a closer examination reveals that there is a similar grouping of questions here also. The sections are as follows:

- Identification of household
- Age, sex and occupational status of household head and household members
- Full-time employees in holding
- Use of land (irrigated, not irrigated, total)
- Land tenure
- Crops
- Livestock
- Fertilizers, irrigation, pesticides
- Agricultural equipment and machinery
- Information on seasonal workers.

A questionnaire often includes some key questions. A key question "is a question asked usually at the beginning of a new section or section grouping. The answer to this question determines which question to proceed with next" (FAO, 1977, p. 137). An example of this is the livestock part of Pakistan's questionnaire in the 1980 agricultural census. Questions numbered 52, 63, 74, 81, 86, 93 are key questions. For example, the wording of question 93 is:

"Does this household possess any poultry? No, Yes.
If 'No' skip to item 101."

Similar key questions are found in the 1978 Census of Agriculture of the United States. Section 12 of the Questionnaire Form 78 A1(N), for example, begins with the following sentences (United States, 1983, p. 136):

"Did you or anyone else have any cattle or calves on this place in 1978? Yes — Complete this section. No — Go to section 13."

The following advice is offered by FAO (FAO, 1978, p. 32):

"At times it is advisable to use questions which serve as a filter before introducing another question so as not to bias the informant. For example, the area on which fertilizers were used could be asked directly, but it is preferable to ask first whether fertilizers were used and then on how many hectares they were applied."

Section 23 of the Questionnaire Form 78 A1(A) of the 1978 Census of Agriculture of the United States begins with these sentences (United States, 1983, p. 132):

"Were any insecticides, herbicides, fungicides, nematicides, other pesticides, or other chemicals used in this place in 1978? Yes — Complete this section. No — Go to Section 24."

Turkey's questions 11 and 12 are as follows:

Have you used any fertilizers in the 1980 production year?
Yes — 1 No — 2
If yes;
Amount of fertilizer used, area fertilized by type of fertilizer.

Some countries use different colours for their questionnaires. For example, in the 1981 Census of Agriculture of Canada, the census questionnaire was of a light-brown colour with the answer areas left white. For the Republic of Korea, on the other hand, the questionnaire was white with the answer areas in light green.

In Pakistan's 1980 census the main questionnaire used in the North-West Frontier, Punjab and Sind provinces was in white and the four-page questionnaire used in the Baluchistan Province was light green. For the 1980 Census of Agriculture of Turkey, the household questionnaire was yellow, for large-scale agricultural holdings it was white and for the villages it was green.

The census questionnaire of Grenada

FARM CENSUS 1981

Farmer's code .....
(six digits)

1. Name of farmer/operator ..... M F
2. Mail address ..... Area code .....
   ..... Age .....
3. Farmer status: Full-time [1] Part-time [2]
4. a. What portion of your income comes from agriculture? 0-24% [1] 25-49% [3] 50-74% [2] Above 75% [4]

   b. What is your main non-farm source of income?

Shopkeeper	[1]	Taxi	[3]	Gov't	[5]	Private	[7]
Agri.worker	[2]	Trade	[4]	Fishing	[6]	Business (private)	[8]

5. Tenure:

Owner	[1]	Manager	[4]	Share crop	[6]
Own-rent	[2]	Famili owned	[5]	Landless	[7]
Renter	[3]				

6. a. Which of these enterprises do you grow for sale?

Cocoa	[1]	Vege-tables	[5]	L/stock small	[9]	Cotton	[13]
Nutmeg	[2]	Fruits	[6]	L/stock large	[10]	Peanuts	[14]
Bananas	[3]	Roots, tubers	[7]	Coconuts	[11]	Bees	[15]
Sugar cane	[4]	Peas, maize	[8]	Minor spices	[12]		

   b. Where do you sell non-export enterprises?

MNIB 1/	[1]	Traffickers	[2]	Central	[3]	Village	[4]

1/ MNIB: Marketing National Import Board.

		M	F
7.	Household farm labour		
	(a) No. of persons 16 years and over who live in the household	.....	.....
	(b) How many of them work full-time on the farm?	.....	.....
	(c) How many assist part-time on the farm?	.....	.....
	(d) How many of those who assist are employed full-time off the farm?	.....	.....

8. a. Land (in this district only)
(a) Total farm acreage .....
(b) Total acreage suitable for cropping .....
(c) Total acreage under cultivation .....

b. Which of these factors are the most problematic? (Select two at most)

Praedial Larceny	1	Extension help	4	Water	6	Disease	8
Planting material	2	Labour	5	Roads	7	Credit	9
Marketing	3						

9. Do you operate a farm in another district? Yes [1] No [2]

Name of enumerator ..... Specify .....

N. B. Farmer: Anyone who grows crops of livestock and sells part thereof (not all for home, family, gift or barter).

TWO EXAMPLES OF QUESTIONNAIRES

Two examples of census questionnaires are provided here: the census questionnaire of Grenada above, which is very short, and the "list of characteristics" to be covered in national questionnaires of the European Economic Community countries.

"List of characteristics" of the European Economic Community

According to the Council regulation given in the previous chapter, member states of the European Economic Community shall include in their national agricultural census questionnaires the questions necessary to obtain the information relating to the "List of Characteristics" given below (as numbered in the regulation):

A. Geographical situation of the holding
   01 District
   02 Less-favoured area — yes/no

B. Legal personality and management of the holding (on the day of the survey)
   01 Is the legal and economic responsibility of the holding assumed by a natural person? — yes/no
   02 If yes;
   is this person (the holder) also the manager? — yes/no
   03 Manager's agricultural training[1]
   — primary — yes/no
   — secondary — yes/no
   — higher — yes/no
   04 Are accounts kept for the holding? — yes/no

C. Type of tenure (in relation to the holder)
   Agricultural area utilized: — ha/are
   01 for owner farming
   02 for tenant farming
   03 for share farming or other modes

D. Arable land
   Cereals for the production of grain (including seed):
   01 Common wheat and spelt
   02 Durum wheat
   03 Rye
   04 Barley
   05 Oats
   06 Grain maize
   07 Rice
   08 Other cereals
   09 Dried vegetables (including seed and mixtures of cereals and dried vegetables)
   10 Potatoes (including early potatoes and seed potatoes)

[1] Optional for Denmark and the United Kingdom.

11 Sugar beet (excluding seeds)
12 Forage roots and tubers (excluding seeds)
13 Industrial plants (including seeds for herbaceous oil-seed plants; excluding seeds for fibre plants, hops, tobacco and other industrial plants) of which:
13a tobacco
13b hops
13c oil-seed and fibre plants
Fresh vegetables, melons, strawberries:
14 — outdoor, of which:
(a) open field
(b) market gardening
15 — under glass
Flowers and ornamental plants (excluding nurseries):
16 — outdoor
17 — under glass
18 Forage plants
18a temporary grass
18b other
19 Arable land seeds and seedlings (excluding cereals, dried vegetables, potatoes and oil-seed plants)
20 Other arable land crops
21 Fallow land

E. Kitchen gardens

F. Permanent pasture and meadow
01 Pasture and meadow, excluding rough grazings
02 Rough grazings[1]

G. Permanent crops
01 Fruit and berry plantations
02 Citrus plantations
03 Olive plantations
04 Vineyards, of which normally producing:

[1] Italy may merge heading 01 with heading 02.

04a quality wine
04b other wines
04c table grapes
05 Nurseries
06 Other permanent crops
07 Permanent crops under glass

H. Other land
01 Unutilized agricultural land (agricultural land which is no longer farmed, for economic, social or other reasons, and which is not used in the crop rotation system)
02 Woodland
03 Other land (land occupied by buildings, farmyards, tracks, ponds, quarries, infertile land, rock, etc.)[2]

I. Successive cropping, mushrooms, irrigation, greenhouses
01 Successive secondary non-fodder crops (excluding market garden crops and crops under glass)
02 Mushrooms[3]
03 Irrigated area[3]
04 Ground area covered by greenhouses in use[3]

J. Livestock (as of .....) (date to be determined) number of head
01 Equidae
Bovine animals:
02 Under one year old
one year old and over but under two years old
03 Male animals
04 Female animals:
two years old and over
05 Male animals
06 Heifers
07 Dairy cows

[2] The United Kingdom and Ireland may merge heading 03 with heading 01.
[3] Optional for Federal Republic of Germany.

08 Other cows
09 Sheep (all ages):
09a of which ewes[1]
10 Goats (all ages)
Pigs:
11 Piglets having a live weight of under 20 kg
12 Breeding sows weighing 50 kg and over
13 Other pigs
Poultry:
14 Broilers
15 Laying hens
16 Other poultry (ducks, turkeys, geese, guinea fowl)
17 Other livestock

K. Tractors, cultivators, machinery and equipment[1]

L. Farm labour force (in the 12 months preceding the day of the survey)

Only the main headings of Sections K and L are given here. The remaining parts of these sections are omitted.

[1] Optional for Federal Republic of Germany.

Chapter 7

Data-collection techniques

As already stated, the primary means of collecting data on agriculture are agricultural censuses and surveys that are conducted by mail or interview techniques. In addition, administrative records may be used as a source of data on agriculture. In recent years, the farm register system has also evolved and is used in developed countries.

This chapter considers these various techniques of data collection. The first section reviews the mail and interview techniques, while the register system and administrative records are the subjects of the second and third sections respectively. Administrative records are investigated in two subsections that detail the practices in socialist and other countries.

MAIL AND INTERVIEW TECHNIQUES

In the mail technique the questionnaire with explanatory notes is mailed to the holders. The questionnaire is filled in by the respondents and sent back. As explained in previous chapters, this technique is used mainly by developed countries.

The major problems arising more frequently when the mail technique is used are as follows (FAO, 1977, p. 153):

> "Two of the major problems encountered in using postal inquiry were non-response and incompleteness of coverage. Non-response arose from the absence of personal contact with the respondent which is obtained through the use of enumerators. In order to reduce non-response publicity campaigns were conducted before and during the census enumeration period. Other measures used were mailing a reminder card to

non-respondents or making a telephone call to the holder by a special telephone enumerator. Incompleteness existed in the census coverage largely because list frames did not originally contain all the holders' names or because the frames were out of date."

The disadvantages of the mail technique and the advantages of the interview technique (using enumerators) are well summarized in the following paragraph (Zarkovich, 1966, p. 242):

"The use of enumerators brings to the surveys more responses than it is generally possible to obtain with mail questionnaires. If the respondent is not interested in the survey, it is much easier for him to discard the questionnaire which he receives by post than to refuse to cooperate with an enumerator who comes to the house for that purpose. If the respondent is not able to understand the concepts and definitions used, the enumerator is there to put the questions in a language comprehensive to the respondent. If the respondent is not familiar with certain units of measurement or does not know how to express certain quantities in terms of these units, the enumerator's assistance is available to formulate the response. The enumerator will also be useful in eliminating misinterpretation of questions, reminding respondents of certain items that are easily forgotten, etc. Thus, the enumerators make it possible to achieve survey aims more efficiently than if the respondents are left to their own devices and their own interpretation of the survey."

The following paragraphs reveal the practices of the United States regarding mail and other surveys (FAO, 1979-1984, No. 14, p. 27):

"*Means of collection*

Current agricultural surveys are the responsibility of the Statistical Reporting Service of the Department of Agriculture. An indication of the number and kinds of surveys can be obtained from the '1970 Issuance Dates and Contents of Reports Released by the Crop Reporting Board'. Surveys

usually precede release dates by one to three weeks. Data are collected by four primary means: (i) voluntary mail surveys; (ii) probability mail surveys; (iii) enumerative surveys; and (iv) objective measurement surveys.

Traditionally, the voluntary mail survey has been the predominant means of collecting current information about agriculture. Questionnaires of the appropriate subject matter content are mailed directly to farmers, hatcheries, dairy plants and other enterprises with an enclosed, postage-paid return envelope. In most instances, questionnaires refer to the recipient's own operations although, occasionally, farmers and others having intimate knowledge of a locality or commodity are asked to give information relative to their own locality. Mailed questionnaires are used to collect information from farmers on crop acreage, yield, stocks, livestock, consumption, etc. and from various other types of enterprises concerning prices of commodities bought and sold by farmers, hatchery production, cattle on feed and stocks, to mention only a few items of data collected by this means. The voluntary mail survey averages only about 30 percent response and cannot be assumed to be random, thus affording no measure of precision of sample result.

Efforts to improve upon the voluntary mail survey for the collection of current agricultural information resulted in the development of probability mail surveys, enumerative surveys and objective measurement surveys. With the probability mail survey, questionnaires are mailed to a pre-selected sample of individuals or firms in the universe. Sample members who do not respond to the mailed questionnaire voluntarily within a certain time limit are interviewed by telephone or in person to obtain the desired information. This procedure provides the representativeness necessary for computing sampling precision and at the same time takes full advantage of the savings resulting from voluntary mail response.

There are two major enumerative surveys conducted in June and December each year. In these surveys, sample areas of land with boundaries identifiable both on the ground and on aerial photographs are selected with known probabilities. Trained interviewers visit these areas and obtain information from farm operators accounting for all agricultural activities in the sample areas. Estimates based on the enumerative surveys satisfy the precision requirements for national estimates. State-level estimates are less precise but can be used to corroborate State-level estimates derived from mail surveys.

The objective measurement surveys consist of a series of measurements of crops in sample plots in sample fields during the growing season. Enumerators visit the sample plots and obtain quantitative data by counting the blossoms, fruit and number of plants, and measuring the size and weight of fruit. Yield at harvest time is predicted by deducting expected harvesting loss or droppage (determined from prior analysis) from expected mature weight. Pre-harvest forecasts of yield and production are thus available on the basis of objective measurements rather than solely on the basis of the farmer's judgement."

As presented above, the interview technique is still used even in developed countries, generally along with the mail technique. In most of the developing countries, on the other hand, the interview is the only technique adopted because of unsatisfactory postal services and the low educational level in these countries.

Interview technique

In the interview technique, the enumerator visits the holdings and fills in the prepared questionnaire with the holder's response to the questions. Enumerators may also make some observations and measurements.

However, the interview technique is not without error. In some cases, "The enumerators become an additional source of error in

statistical data. It has been found that they often add something to the data they collect." (Zarkovich, 1966, p. 243).

Some important measures may be taken to improve the enumerator's work: first, enumerators must be selected for their appropriate qualities. "The qualities normally needed are: general education, resourcefulness, intelligence, tact, etc. Sometimes age is also very important" (Zarkovich, 1966, p. 284).

The important next step is the training of enumerators. In this training for the census, the preparation of an enumerator's manual is essential. Supervision of the work of enumerators is also necessary for a successful census. The *Programme for the 1980 World Census of Agriculture* offers the following propositions on these points:

> "It is important in every census to provide personnel instructions and training, with the aim of guidance of personnel, standardization of procedures and common understanding of all tasks.
>
> Instructions for enumerators presented in prepared manuals need to be in simple language and easy to understand. They must also be complete and provide guidance on all major and frequently encountered problems. They have to take into account the training and knowledge acquired by the personnel in past work. The preparation of instructions requires a high priority and is to be done by persons with a thorough knowledge of and experience in the subject matter, the design of the census, the characteristics of the agricultural holders and the psychology of both the data-collection personnel and the holders. Training should be carefully organized and outlined within an appropriate time schedule."

Good instructions and an adequate enumerators' training programme are paramount because the quality of the census data depends largely upon the enumerators. The following subjects are suggested for consideration for the training programme of enumerators:

- Why the census is taken and its importance.
- General information for the enumerator:
- His job
  His responsibility
  Dealing with holders and others
  Confidentiality of information.
- Objectives and nature of census:
  What information is to be collected
  How the census is organized
  How the census is to be taken.
- Definitions and procedures:
  Definitions and concepts that will be used
  Making appointments
  From whom to obtain information
  Techniques for conducting a good interview
  How to ask questions
  Making entries on questionnaires
  Ending an interview
  Checking questionnaires
  Calling back to obtain missing information
  Overcoming objections of holders to providing information
  Use of interpreters.
- Administrative instructions for the enumerator:
  Hours of work
  Absenteeism
  What enumerators are required to do on administrative matters.
  Required records on time and attendance.

Experience from many countries indicates that the preparation of an enumerator's manual on the subjects above is essential, to serve as both an instructional text and a reference guide during the enumeration. The enumerator's manual should contain detailed information on the procedures for conducting the enumeration, examples of completed questionnaires, tips on interview tech-

niques, illustrations of how to handle problems (such as an uncooperative holder), etc.

Special emphasis should be placed on the instruction and training of supervisors. In view of the importance of their role, they should go through an intensive training programme.

Supervision of the enumerators' work is essential for the success of any census. The presence of a supervisor and his or her inspection of the work of the enumerators help prevent carelessness and permit the detection of errors, which can thus be corrected while the enumeration is in progress. Supervisors must encourage the enumerators to perform acceptable work, to complete work assignments on time and to help promote holders' cooperation. Supervisors should keep records to follow the progress of enumeration and take appropriate action whenever the work is not being performed in accordance with a predetermined time schedule. Experience has demonstrated that good supervision is a worthwhile investment. One supervisor for a reasonable number of enumerators can be fully justified by the improvement in work quality and completion of the work according to the time schedule.

Enumerator's manuals of the countries that participated in the 1980 WCA cover subjects similar to those advised by FAO. This is shown below on the first page of the *Enumerator's Manual* of the Bahamas (Bahamas, 1978, p. i):

> "This manual is the guide for the enumerator for use and consultation during his training and during the interviews in the census enumeration. It contains explanations and instructions that the enumerator will need to discharge his duties efficiently. These instructions will tell him:
>
> (i) What rules and norms he should follow
>
> (ii) Whom to interview
>
> (iii) How to explain the objectives of the census
>
> (iv) How to conduct the interview and what questions to ask
>
> (v) How to answer questions of the respondents and remove their suspicions if any

(vi) How to make entries in the questionnaire
(vii) What type of problems he may expect to face and how to solve them, etc.

The enumerator should familiarize himself with this manual in such a way that he rarely feels the need to refer to it or consult it. The enumerator should have complete knowledge of all the concepts and definitions involved and as explained in this manual. He should carry out his work in the light of the explanations contained in this manual, and not on the basis of what he thinks and believes. In case of doubt he should always consult this manual or ask his supervisor for further clarifications."

Similar information can be observed in the *Enumerator's Manual* of Trinidad and Tobago, whose table of contents is as follows (Trinidad and Tobago, 1982a):

"Part I — General Instructions
(1) Your manual
(2) Your job
(3) Your pay
(4) Your hours of work
(5) Your training
(6) Your supervisor
(7) Some questions respondents may ask
- What is the census?
- Why is the census taken?
- Is census information confidential?
(8) Terms you must know
(9) Forms you will use
(10) How to conduct successful interviews
Part II — Enumeration Procedures
(1) General procedures
(2) What is enumeration?
(3) Basic definitions
(4) Probing for more details

(5) How to complete Form AC-3, 'List of Agricultural Households, Establishments and Institutions'
(6) How to complete Form AC-2, 'Screening Form'
(7) How to complete Form AC-1, 'Census Questionnaire' General rules
(8) Detailed instructions on completing the questionnaire — Form AC-1
(9) How to complete Form AC-4, 'Progress Report'."

Manuals of some countries offer suggestions for enumerators and interviews; some of these are given below as examples.

Jamaica. The following advice is offered to the enumerator regarding the approach to be used with the farmer (Jamaica, 1978, p. 6-7):

"As mentioned before, you (enumerator) and the respondent are strangers to each other. Yet you must approach the respondent and within a very short time gain his confidence and cooperation so that he will answer all the questions. Some farmers may be reluctant to give information in such depth as is required by the Census questionnaire. This may be due to various reasons. In most instances, however, the approach and conduct of the enumerators play a very important role in obtaining the farmer's response and cooperation. The first impression of your appearance and the first things you do and say are of vital importance in gaining this cooperation. So first you must be sure that your appearance is acceptable to the respondent and also to other people in the area in which you will be interviewing.

After coming face to face with the respondent, the first thing you should do is introduce yourself, if required, stating your name, the agency you are working for and what you want of the respondent. An introduction like this may be used:

Good (morning) sir/madam. I am an agricultural census enumerator engaged by the Department of Statistics and I

shall be happy if you would spare the time to answer some questions which I have been instructed to ask you. Here is my identification card which you may like to see.

You may then explain the purpose of the survey. At this point you should also mention the confidentiality of the information collected explaining that all information will be grouped together before publishing."

Suriname. The instructions of Suriname (Suriname, 1981a, p. 8-9) on how to ask the census questions are as follows:

"Ask the question in a straightforward manner. Do not be apologetic, because you are authorized by law to obtain the census information. Refusal by the holder will make him liable for penalty. Follow the instructions given below as guideline.

(a) Ask the questions in the exact manner as they appear in the questionnaire.

(b) Ask the question as worded if the question is already framed.

If you are to frame the question yourself, take care that the question is framed correctly stating the reference period for which the data are asked, the category or name of crop. For example, if the information is to be collected about the area harvested for paddy in the current season, the question framed will be:

"How many hectares of paddy did you harvest or expect to harvest in the current season? By current season I mean the period from August to December of the year 1981." The concept or definition of the current season had to be built into the main question or in a separate clause, immediately following the main question.

For all questions where data are to be collected as on November 1, 1981, the words November 1, 1981, will have to be added.

If the respondent does not understand the question, ask additional questions or give an explanation.

(c) Never ask a "leading question" such as: "Your family is the only one occupying or working on this holding?" The question may appear very easy but very often the respondent may have a tendency to say "yes", without taking the trouble to correct the enumerator.

(d) Never assume that you know the answer. Ask the question and help the respondent to give the answer if necessary.

(e) Ask all the questions in a natural tone. Do not display surprise, approval or disapproval at the respondent's reply, by the tone of your voice or facial expression. In case you find that the answer is wrong, bring his attention to the inconsistent answers and find out which answer is correct, without making him feel embarrassed by the wrong answer.

(f) Listen carefully. The respondent may answer several questions at once or contradict what he said before.

(g) Emphasize the importance of the census information; if the respondent seems reluctant to answer the questions, remind him that the information is confidential and it cannot be used for any other purpose.

(h) Complete all questions during the interview. If you wait till you go home to make some entries you may forget them.

(i) End the interview in a cordial manner."[1]

Northern Mariana Islands. The following instructions concerning a respondent's refusal to cooperate are given to the enumerators of the Northern Mariana Islands (United States, 1980b, p. 93-94):

"If a respondent refuses to be interviewed, or is reluctant to answer a specific question or group of questions, follow these guidelines:

---

[1] This quotation is almost identical to that in *The Report on the 1970 World Census of Agriculture* for Puerto Rico (FAO, 1977, p. 155-156).

(a) The Questionnaire Reference Book contains several sections on why each question is asked and how the information will be used. Study the Questionnaire Reference Book so that you will be able to respond quickly to respondents' questions.
(b) Tell the respondent that Federal law forbids you to reveal any information provided by him/her.
(c) Emphasize that census information about individuals cannot and will not be used for tax purposes or any other reasons. Only statistical totals are released.
(d) Always treat the respondent with respect. People find it difficult to refuse a good-humoured and friendly enumerator.

The best way to prepare yourself for reluctant respondents is to know your job — know why the census is being taken, and why the census is important to the community.

If a respondent refuses to answer either all or some of the questions, do the following:

(a) Ask the respondent to let you start asking questions. People who refuse to answer at first often find that there is nothing objectionable in the questionnaire once they hear the questions.
(b) Enter all the information about the household that can be obtained.
(i) If it is a partial refusal, obtain answers to as many questions as possible.
(ii) Make every effort to obtain at least "last resort" information for the household. Notify your crew leader if you cannot obtain "last resort" information from the occupant. Do not threaten respondents who refuse to answer questions with the mandatory provisions of the census law."

REGISTER SYSTEM

As its name implies, the register system establishes a detailed register of units engaged in agricultural activity. In Sweden "For the agricultural holdings the National Farm Register (LBR) means annual compulsory data reporting."

A farm register is also available in other developed countries (FAO, 1986b, p. 1, 2):

> "The coverage of farm registers varies from country to country. The common feature observed is that the registers do not include farms below a certain size limit. This minimum limit is defined differently in each country. For example the minimum limit is 0.25 statute acres of land in Ireland and US$1 000 worth of sales of products in the United States."

Presented below is information on the coding of farms and data registers (FAO, 1986b, p. 3, 4):

> "In all the countries where a farm register is kept, the farms are assigned identification numbers.... However, the scope of data kept in the register is not uniform. In some countries only a limited number of characteristics of holdings are recorded in the farm register. For example, in Austria the following information (in addition to identification number and address of holding) is available in the register: activity status (active or inactive), various surveys in which the holding is included, cooperative or not, burdened with usufruct or not. Other information on holdings is kept on the tapes of various surveys. In the United Kingdom the following basic items, in addition to identification number and address, are included in the registers of England, Wales, Scotland and Northern Ireland: total area of holding, whether a main or minor holding. In England and Wales additional information on whether the holding is above 1 000 standard man-days or whether the occupier also farms another holding is available in the register.
>
> In other countries more detailed data are included in the farm register. For example, in Switzerland information on legal

status, number of persons engaged and their activities, number of animals, land use, occupation of holder, altitude from sea level are also recorded.

In almost all countries the essential source of data for the farm register is the agricultural census. For example, in Italy the register is based on the 1982 census of agriculture. In Ireland and Malta, the register consists of the returns of the agricultural census. In Belgium the annual census of agriculture constitutes the base for the register. In some countries the agricultural census is supplemented by other sources. For example, in Canada certain specialized holdings such as honey and maple producers, greenhouse or nursery holdings are not covered in the agricultural census. These holdings are included in the Canadian Farm Register through other agricultural surveys. In Sweden the census of agriculture is carried out once every 3 to 5 years and it provides data on small farms (with less than 2 hectares of arable land) as well as large farms. During the years between censuses annual surveys are carried out to cover large farms. In Finland the register is based on the 1969 census of agriculture, and it is updated annually by means of questionnaires mailed to all holders."

Two examples of the farm register are given below.

Farm register system in Sweden

Swedish agriculture consists mainly of small- and medium-sized family farms with no or very little hired labour. Slightly more than 15 percent of the farms are fully held on lease; the others are either fully or partly owned. The basic category of farms in Swedish agricultural statistics consists of those approximately 115 000 farms which cultivate more than 2.0 hectares of arable land, irrespective of ownership.

The register of all agricultural enterprises (the farm register) was introduced by the National Central Bureau of Statistics (SCB) in 1968 (FAO, 1979-1984, No. 1, p. 35):

"When the National Farm Register (LBR) was set up in 1968, a detailed register of enterprises in agriculture and forestry was established. Since 1970 horticultural enterprises as well are included in the LBR....

The data collection varies from one year to the other, both respect to the enterprises which are to report data and in respect to the data reported. Every year data collection covers holdings with at least two hectares of arable land and holdings with large stocks of animals. In 1981 there is an agricultural census where forestry enterprises also are included (as in 1971 and 1976). Horticultural censuses have been carried out in 1972 and 1977 and will be next in 1982....

The LBR covers enterprises in agriculture, forestry, animal husbandry, fruit growing and horticulture. An enterprise (holding) consists of one or more real estates or parts of real estates.

In respect to the time interval between surveys, the enterprises in the LBR can be divided into the following groups:

(a) Enterprises with at least two hectares of arable land
(b) Enterprises with less than two hectares of arable land (including enterprises with no arable land), which include real estate assessed as agricultural real estate
(c) Enterprises with large stocks of animals. Enterprises which on the reference day or previously during the calendar year have or have had at least
    - 250 pigs or
    - 500 sheep (including lambs) or
    - 1 000 poultry (including chickens)
(d) Enterprises practising horticulture on a commercial basis. This category includes municipal gardens, institutions, etc. with horticulture covering at least 200 square metres under glass or plastic or at least 2 500 square metres open land.

Some enterprises in categories (c) or (d) are also included in categories (a) or (b).

Data are collected annually from enterprises in categories (a) and (c) and with longer intervals from enterprises in category (b). From enterprises in group (d) data are collected annually except during a year of agricultural census and the subsequent year, when a special horticultural census is performed in the spring of the year after the agricultural census.

The following data are collected annually:

(a) The holder's name, address, etc;
(b) Identification data of the real estates that are an integral part of the enterprise;
(c) The distribution of the total area on different types of land;
(d) The distribution of the area of arable land under different crops;
(e) The number of livestock;
(f) The number of people employed in the enterprise.

Forms with certain data pre-printed from the register are sent to the registered units. The data given by the farmer are to be based on the conditions at a specific day in June. The forms are returned to SCB for central checking and processing. In special cases, the Country Agricultural Boards give assistance in the work of collection and checking."[1]

The Farm Register is updated once a year through a data collection by mail, compulsory for all farms. Anyone who fails to submit data to the LBR can be fined. During the last years the SCB has requested legal action to be taken against farmers who have repeatedly failed to report data to the LBR (Sweden, 1981).

"The original objectives of the LBR were to achieve a continuous recording of all holdings and their production resources, and to provide a basis for statistics and for the calculations of compensation in the crop insurance system. More recent objectives are to use the collected data for price

[1] For more detailed information see *Information about the national Swedish farm register* (Sweden, 1981, p. 5).

control measures, e.g. potato price control and support to pig breeders.

The information collected is used as follows:

(a) As the basis for a register of all farms, to be used by the County Agricultural Boards as a source of information when implementing agricultural policy with regard to farm rationalization, extension work, etc.;

(b) To produce agricultural statistics; and

(c) To calculate compensations under the crop insurance schemes."

As from 1983 each farm in the register is classified according to type of farming. Similar to an earlier British system, this typology is based on the register data just mentioned, combined with standard figures for the labour requirements in hours per hectare for each crop or animal. Depending on the proportions of the total labour requirement referring to the various branches of farming, the individual farm may be classified as a crop farm, a pig farm, etc. There are three levels of specification with about 35 farm types at the most detailed level.

Farm register in Finland

The farm (or agricultural) register was introduced in Finland by the National Board of Agriculture in 1971. It included all agricultural enterprises with one hectare or more of arable land area. At the beginning it consisted of about 91 percent of all farms. In 1972, the agricultural register covered all farms, comprising about 285 000 units (except 2 000 farms which were in the 1969 Agricultural Census, but which were not identified in 1972). Basic information on all farms of the above-mentioned size is recorded annually on this register.

Forms with certain data pre-printed from the register are sent to the register units. The forms are returned to the National Board of Agriculture for processing.

Annual statistics include the number of farms, their ownership,

land usage, etc. Inquiries are made at regular intervals about the number of livestock, farm buildings, family size and composition, and other, more detailed data. In recent years changes in agricultural structure have also been monitored. Every ten years the farm register is supplemented by an agricultural census (Finland, 1985, p. 3).

The farm register is kept on magnetic tape and has been used from its inception as a foundation for different kinds of sample statistics. As the register is to be revised annually, it forms a basic list of farms of various sizes in different parts of the country, which is always up to date. The register is to be linked with other economic statistics with certain code numbers (FAO, 1979-1984, No. 1, p. 17).

ADMINISTRATIVE RECORDS

The economic structure and organization of agricultural production in countries with centrally planned economies make their administrative records especially important. Thus, the subject of administrative records will be investigated under two headings: one for countries with centrally planned economies, another for all other countries.

In countries with centrally planned economies

The cases of Hungary and Poland are given below to illustrate the system of data collection used in this group of countries.

Hungary. In Hungary agriculture is divided into three main farming types:

- State agriculture (state farms, agricultural enterprises, budget institutions);
- Cooperative agriculture (common farms and household plots of agricultural cooperatives);

- Complementary and individual farming (complementary plots of employees and members of non-agricultural cooperatives, individual peasant farms) (FAO, 1980c, p. 9).

The socialist reorganization of agriculture was completed in the early 1960s, and the socialist sector became predominant in Hungarian agriculture. In 1981, 70.2 percent of the gross production of agriculture stemmed from cooperatives, 19.5 percent from state farms and 9.6 percent from auxiliary and household plots.

In the course of development, the organizational structure of agriculture has taken on a particular character: besides large agricultural farms, small-scale production on very small areas, or even without any agricultural land, has developed. In 1981, 1 320 agricultural cooperatives, 130 state farms and 1.5 million small-scale producers carried on agricultural activity. The average productive land area of agricultural cooperatives was 3 886 ha, that of state farms 7 177 ha, while the average productive land area of small producers did not reach 0.5 ha. Besides the peasantry, all groups of the society take part in small-scale farming. Animal husbandry of small producers is of primary importance and constitutes an activity integrated into the large agricultural farms. The major part of feedstuffs, of herd stock and of young animals is provided by large agricultural farms. Small-scale production contributes to the food supply of the country, plays an important role in the export of certain products, and allows members of peasant and other households to make use of part-time work possibilities (Hungary, 1985).

The socialist organization of agriculture means that the number of data suppliers is relatively small and well organized. The questionnaires for periodical and annual returns to be collected are in book form, in the order of date of return. The pages of the completed questionnaires of the agricultural cooperatives and state farms are sent, for checking and processing, to the county managing offices of the Central Statistical Office (CSO). The data so collected provide a complete record of the entire activities of

large-scale agriculture. Major elements of statistical coverage are indicated in the following paragraphs.

Land area. The records on land area, by land use and quality grades of land, are kept by the National Geological and Cartographical Office, responsible for the cadastral survey of the country. Balance sheets of land area are prepared by land use, ownership and land tenure. In the spring of every year, the land area of the farms is indicated under the following headings: arable land, gardens, orchards, vineyards, meadows, pastures, forests, reeds, fish ponds and uncultivated area. The value of the land area in gold crowns is the index number of the quality of land.

The state farms and agricultural cooperatives prepare a yearly report about the use of land under their control, on 31 May. They supply data, by land use, on the common cultivated land, household plots leased out for their members, salary plots of their employees, etc. (FAO, 1979-1984, No. 8, p. 9).

Crop production.

- Sown area:
  The reports of the farms on the sown area, as at 31 May, specify 25 items under main cereals, industrial crops, potatoes, green fodder crops and vegetables. The sown area of all cultivated crops is given in the yearly report together with the harvest results.
- The farms prepare a preliminary report on the harvest data of the main cereals in August immediately after harvesting and that of the main crops harvested in autumn, in December. Reports of the sown area, production, and balance sheets of utilization of all cultivated crops are prepared at the end of the year. These also include data on vegetables cultivated under glass.
- Fruit and grape growing:
  Data on the area of planting and felling of market orchards and vineyards are to be reported twice a year, in autumn and spring. Planting of fruits and grapes is broken down by

variety and method of cultivation, respectively. The farms prepare a preliminary report in December on the production of the main fruits and grapes. The yearly report includes the production of market and other orchards and other vineyards.

Animal husbandry. Reports on livestock are prepared quarterly. Reports for the first three quarters include data on cattle, pigs and sheep, by age and sex, as well as summary data of chickens. The report for the last quarter of the year is similar in structure and includes data also on horses by age and sex and on poultry (chickens, guinea fowls, geese, ducks and turkeys).

The farms provide, once a year, a balance sheet account of changes in stock of cattle, pigs, sheep, horses and poultry (births, deaths, purchases, sales, processing, etc.). A separate report covers number of animals slaughtered, their weight, animal products and by-products, using the balance sheet method. This report includes also the number of days animals were kept on fodder, the average stock calculated by the number of days kept on fodder, fodder fed to animals, weight increase in total and the average weight increase per day for fattening cattle and pigs, roasting sheep and slaughter chicks (FAO, 1979-1984, No. 8, p. 10).

Employment. The labour questionnaires of the state farms cover the following items:

- Average number of the working staff, total wages and earnings by main groups of occupations, broken down by full-time and part-time workers.
- Working hours performed and wages of full-time workers by most important occupations, sex, specific groups of occupations, length of the weekly working time.
- Number of employees according to the labour law at the end of the year by sex and age; the yearly labour turnover.

State farms report quarterly, besides the uniform labour questionnaires, on numbers, wages, earnings and, once a year, on the working time performed in the main branches of agricultural activities.

Agricultural cooperatives supply labour data on the following categories: active and retired members (pensioners), family workers and permanent and part-time employees. They report quarterly on the wages paid from the share fund and on the number of worker-months. In the yearly labour questionnaires they supply data on numbers, earnings, working time, labour turnover, age by the main and specific groups of occupations.

State farms and agricultural cooperatives report on the qualification in non-physical occupations by specific groups of occupations every two years.

Other elements in Hungary's statistical coverage include:

- Investments, fixed assets
- Ancillary farming activities
- Marketing of agricultural commodities, prices
- Forestry.

Poland. The system of data collection in Poland is summarized in the following paragraphs (FAO, 1979-1984, No. 8, p. 23):

> "There exist two economy sectors in Polish agriculture: socialized and non-socialized. The socialized sector includes State agricultural holdings (together with their employees' plots of land), production cooperatives (together with their members' plots of land) and agricultural associations. The non-socialized sector includes private agricultural holdings of over 0.5 ha, private plots of 0.5 ha and under, as well as livestock owners who have no agricultural land. In 1977 the non-socialized covered 68.6 percent of agricultural land.
>
> Systems of data collection vary according to the sector and features surveyed. Data on socialized agricultural holdings are compiled on the basis of statistical reports which provide the most important data on agricultural and arable land area, crop area, livestock numbers, animal production, distribution of animal and crop production, number of tractors and machines, employment, etc.

The non-socialized agricultural holdings, however, do not submit any such reports. Thus, agricultural censuses, representative surveys, as well as data obtained from agricultural and horticultural correspondents of the Central Statistical Office (CSO), form the main source of information on these holdings."

In other countries

Some agricultural statistics are available as a by-product of the records kept by administrative agencies. The data in these administrative records are collected as part of, or incidental to, the operations of these administrative agencies. Examples of these agencies in Canada are the Canadian Dairy Commission, the Canadian Wheat Board, the Canadian Grain Commission, Canfarm and a number of marketing boards (Canada, 1979, p. 10). Tax figures on agricultural production, records on livestock slaughtered at slaughterhouses, legal documents issued as a result of the measurements made by cadastral surveying officers could also be taken as examples of administrative records (Economic and Social Commission for Western Asia (ESCWA), 1985, p. 13).

Some advantages of using administrative records to compile agricultural statistics are as follows: records can supply steady statistics on some agricultural activities, they are less costly, and they reduce the respondent burden. "They are in fact the only possible source of some data related to agriculture, such as data on prices, national accounts and budget, government agricultural projects, climatic conditions, agricultural education and foreign trade" (ESCWA, 1985, p. 14).

On the other hand, administrative records present some major limitations: "Definitions, time periods, coverage and quality of the data in general differ between sources. Some of the data contain serious biases" (Canada, 1979, p. 10a). Administrative records also provide incomplete coverage. For example, it is difficult to reach

an exact production figure using recorded tax figures on agriculture.

In view of the points mentioned above, it is acceptable that the administrative records be used as data on activities related to agriculture. However, care must be taken when using these data without refining them. These points are well summarized in the following two quotations:

> "Administrative records are used in the majority of the countries in the region (Western Asia) as a source of data on several aspects related to agriculture. In the most general terms, it may be said that the countries with mixed economies, such as Egypt, Iraq and Syria, produce a wide range of statistics from administrative records. However, the production of timely and accurate data from administrative records is subject to several factors such as the availability of a sound administrative system, well developed government agencies and properly organized statistical records." (ESCWA, 1985, p. 14).
>
> "The use of administrative records, therefore, cannot be considered as a practical alternative to the 1981 Census of Agriculture because there is not sufficient time to develop them as a coherent series, the costs involved would be substantially higher than for a census, and there would be a serious degradation of the quality of statistics produced compared to census data." (Canada, 1979, p. 10a).

Chapter 8

Use of sampling methods

The history of the sample survey is not long: its development is confined mainly to the present century. However, sampling methods are widely used today in every discipline and branch of science. It is, therefore, normal that sampling should be one of the important methods in agricultural censuses. In Chapter 2, above, the countries using sampling methods in their agricultural censuses were listed.

In this chapter, the sampling methods used by several countries in the 1980 WCA are examined. Before that, some general explanations of sampling and sample design are given. The objective of these explanations is to give a simple theoretical framework for the practices of countries in the 1980 WCA.

REASONS FOR USING SAMPLING METHODS

The principal advantages of sampling as compared with complete enumeration are summarized in the following paragraphs (Cochran, 1977, p. 1-2):

> "*Reduced cost.* If data are secured from only a small fraction of the aggregate, expenditures are smaller than if a complete census is attempted. With large populations, results accurate enough to be useful can be obtained from samples that represent only a small fraction of the population. In the United States the most important recurrent surveys taken by the government use samples of around 105 000 persons, or about one person in 1 240. Surveys used to provide facts bearing on sales and advertising policy in market research may employ samples of only a few thousand.

Greater speed. For the same reason, the data can be collected and summarized more quickly with a sample than with a complete count. This is a vital consideration when the information is urgently needed.

Greater scope. In certain types of inquiry highly trained personnel or specialized equipment, limited in availability, must be used to obtain the data. A complete census is impracticable; the choice lies between obtaining the information by sampling or not at all. Thus surveys that rely on sampling have greater scope and flexibility as regards the types of information that can be obtained. On the other hand, if accurate information is wanted for many subdivisions of the population, the size of the sample needed to do the job is sometimes so large that a complete enumeration offers the best solution.

Greater accuracy. Because personnel of higher quality can be employed and given intensive training and because more careful supervision of the field work and processing of results becomes feasible when the volume of work is reduced, a sample may produce more accurate results than the kind of complete enumeration that can be taken."

But complete enumeration plays an indispensable role in agricultural censuses. This is explained in the *Programme for the 1990 World Census of Agriculture* (FAO, 1986a, p. 11, 12):

"In a national statistical programme for food and agriculture, it is desirable to have the agricultural census carried out by complete enumeration, which fulfils all objectives of an agricultural census. It is possible to obtain statistics for every geographical, agro-ecological or administrative region, irrespective of size. This information is important for a comprehensive understanding of agricultural structure. A sample enumeration cannot provide estimates sufficiently precise for all regions. Complete enumeration also provides a frame with useful information for stratification. With such a frame, it is possible to design efficient surveys; it is also useful to identify certain

holdings with special features, such as holdings operated by women, holdings with fisheries as an ancillary activity, holdings with only rented land, etc. This information is extremely important for rural development programmes oriented toward specific target groups. A sample enumeration will not provide such a complete list of holdings with these special features. For successful implementation, prior information on holdings is not required for a complete enumeration, whereas prior information is essential for designing an efficient sample enumeration."

As is explained in the *Programme for the 1980 World Census of Agriculture:*

"Sample censuses have usually been taken when difficulties over funds, personnel, transport and the like have precluded a complete enumeration. The sample census is also a logical alternative when data with acceptable accuracy cannot be obtained without special precautionary measures during field work, such as physical measurements for obtaining areas and yields. In such circumstances a sample census may be more practical than complete enumeration. All large estates and plantations and other large holdings above a certain size should be enumerated, however, when a sample census is taken."

In view of this experience, it is perhaps best to adopt the following advice of the 1990 Programme (FAO, 1986a, p. 14): "Countries are urged to undertake the necessary research and preparatory studies before deciding on the most appropriate census methodology."

SAMPLE DESIGN

In this section the definitions and short descriptions of some sampling methods are given. The explanations are restricted to the methods used by countries in the 1980 WCA.

Simple random sampling. "Simple random sampling is a sampling scheme with the property that any of the possible subsets of n

distinct elements from the population of N elements is equally likely to be the chosen sample." (Kalton, 1983, p. 8). In the simple random sample there is only one type of sampling unit; every one of these units has the same probability of being included in the sample.

A way of selecting a simple random sample is to use a table of random numbers. Several random number tables are available, and a simple random sample is easily selected using these tables.

It is easy to compose a simple random sample by using tables of random numbers, but it is rather laborious when the population is large. In that case, the widely used method of systematic sampling provides a means of substantially reducing the effort required for sample selection. Systematic sampling is easy to apply, involving simply taking every k^{th} element after a random start.

Multistage random sampling. "In contrast to the simple random sampling design, where only one type of sampling unit is involved, the multistage random sampling design is characterized by a series of sampling stages. Each stage has its own unique sampling unit." (Gomez and Gomez, 1984, p. 540). In two-stage random sampling, simple random sampling would be applied twice: first to the primary sampling unit (for example, a village), and second to the secondary sampling unit (for example, holdings in the selected villages). Similarly, multistage random sampling includes, of course, three or more stages of random sampling.

Stratified random sampling. Usually one can obtain beforehand a certain amount of information on the census population. For example, administrative or geographic divisions of the country, different sizes of agricultural holdings or different professions of the people could be used as strata. The essence of stratification is to classify the population according to these strata or subpopulations.

"In stratified sampling the population of N units is first divided

into subpopulations of N1, N2, ..., N_i units, respectively. These subpopulations are nonoverlapping and together they comprise the whole of the population.... The subpopulations are called strata ... If a simple random sample is taken in each stratum, the whole procedure is described as stratified random sampling." (Cochran, 1977, p. 89).

Stratified multistage random sampling. Stratified multistage random sampling is the combination of multistage random sampling and stratified random sampling. "The common sampling design that can be recommended for a sample agricultural census would be a two-stage stratified sampling." (FAO, 1978, p. 103).

Multiphase sampling. "In two-phase, or double, sampling certain items of information are collected for an initial, or first-phase, sample; then further items are collected at the second phase from a subsample of the initial sample. The method may be extended to more phases (multiphase sampling), but for most purposes two phases suffice." (Kalton, 1983, p. 47).

Recommended applications of multiphase sampling are as follows (FAO, 1978, p. 104):

> "Occasionally, two-phase or multiphase sampling can be recommended. Here, for some basic items in agricultural census, like farm population, crop areas, land use, livestock numbers, etc. a large sample of holdings (or even all the holdings) can be selected from the sampled enumeration blocks within each stratum and only a small subsample (from the samples of holdings selected for basic items) can be selected for securing data on additional items, such as use of fertilizers, seeds, agricultural implements, breeds of animals, etc. These additional items are usually of a more complicated character and involve careful questioning of respondents... The procedure can be further extended in that a much smaller subsample can be selected from the subsample for additional items for

securing data on such items which require physical measurements."

PRACTICE IN SEVERAL COUNTRIES

Three examples for sample enumeration

As shown in Chapter 2, some countries apply the sampling method in agricultural censuses. Bangladesh, Fiji and the Yemen Arab Republic are among those countries that applied interesting sample designs for the 1980 WCA. It is useful to summarize the practices of these countries.

Bangladesh. The sample design of the Agricultural Census of Bangladesh 1977 is described below (Bangladesh, 1981, p. 5, 6):

"A stratified multistage sampling design was adopted for the 1977 census with Thanas (administrative units including group of Mouzas) as strata and Mouzas as primary sampling units and households as the ultimate sampling units. The Malaria Eradication Department maintained a list of Mouzas in the country showing the number of households in each Mouza as found in a survey conducted by that Department in 1976. It also maintained a sketch map of all the Mouzas. It was decided to use that list as the sampling frame.

Mouzas were first divided into three groups, viz. (i) Urban, (ii) Mouzas with no population and (iii) Others. Urban areas of the country i.e. the areas which were reported as located within the limits of Municipalities were excluded from the scope of the census.

For having a check a very small sample of Mouzas was selected among the Mouzas reported to have no population. From the remaining Mouzas a sample of 14 percent of the Mouzas was selected separately from each Thana with probability proportionate to the number of households in the Mouza. In all, 7 668 rural populated Mouzas were selected for the census operations. In addition, another 365 zero populated Mouzas were also

selected for checking whether the Mouza did in fact contain any households.

The enumerators were assigned the job of preparing the list households of the selected Mouzas. At the time of listing, the households were divided into three groups:

(i) Farm holdings
(ii) Livestock holdings
(iii) Other households

The second-stage sampling unit was drawn in the following manner:

Group (I)

Mouzas having total farm holdings	Sampling rate	Random start (number given)
1 to under 100	1 in 2	1 or 2
100 to under 500	1 in 3	1 or 2 or 3
500 and above	1 in 4	1 or 2 or 3 or 4

Group (II)

Mouzas having total livestock holdings	Sampling rate	Random start (number given)
Less than 10	All	—
10 and above	1 in 2	1 or 2

Households of group (iii) were beyond the scope of enumeration. Information was also collected from all the households for making an estimate of the number of households of landless agricultural labourers and of households possessing a bullock cart or a boat."

Fiji. Sample design of the Agricultural Census 1978 of Fiji is discussed under three headings (Fiji, 1981, p. 4-6):

- the "known commercial sectors", where a sample frame of farmers was available;
- the mataqali (traditional) sector, where a sample frame of farmers was not available, but could be compiled in the field;
- the minor sector, where a sample frame of farmers would involve extensive mapping and related work followed by compilation in the field.

Known commercial sectors. Five sectors comprise this part: sugar cane farms, plantations, animal production, irrigation and other crop farms. Within each sector, a one-stage probability sample was selected, stratified by province. For the sugar cane and other crop farm sectors, there was the following further stratification by size of farms:

- for sugar cane:
  farms under 15 acres (approx. 6 ha);
  farms of over 15 acres;
- for other crop farms:
  farms under 50 acres (approx. 20 ha);farms of over 50 acres.

There was also further stratification for other sectors.

The approximate sampling fraction in sugar cane farms was 5 percent in farms under 15 acres and 12.5 percent in farms of 15 acres or more.

With some plantations, in addition to the main cash crop farming carried out by the planter, there is "subsidiary" farming (mainly subsistence) carried out by tenant or employee households on land allocated by the planter. In such cases a subsample was selected of one subsidiary household in five.

Mataqali (traditional) sector. A two-stage sample design was employed using the koro (village) as the first stage and the household as the second stage. Koro is a more suitable first-stage sampling unit than the mataqali (clan) since the latter is sometimes very small and sometimes spread over more than one village.

"A list of Fijian villages (koro) was obtained from the Native Lands Commission, together with the membership of each koro

compiled in 1971. These were stratified by 3 size groups (in terms of membership) within each province and a 20% sample selected. Lists of farming household heads were then compiled within the sample koro and a 12.5% sample of these farmers (i.e. household heads) selected... Contemporary mataqali farming is carried out on an individual household basis, with the exception of the produce of coconut trees and certain other tree crops. A household is, therefore, almost always a farm operational unit. The enumeration of a sample of mataqali households was, therefore, sufficient to cover most food crops, while an enumeration of communally owned tree crops was attempted at the level of the constituent mataqali of the sample koro." (Fiji, 1981).

Minor sector. The remaining farms not covered by any of the above sectors presented the greatest difficulty in the sampling process. Basically the aim was to obtain a list of non-overlapping units of area (locality) of the smallest possible size and then to compile lists of farmers within a selected sample of these localities. A prerequisite of this exercise was that maps should be available showing the locality boundaries.

The obvious choice of area unit was the Enumeration Area (EA) as employed in the 1976 Census of Population. A ten percent sample of rural non-cane EAs was selected, stratified by province. A sample 25 percent of the farmers listed (in the sample EAs) was then selected. But as explained in the report on the 1978 Census of Agriculture in Fiji (Fiji, 1981, p. 5, 6), the construction of the minor sector sample was tedious and only achieved after several steps.

The above sectors take care of all farming activity which provides the main source of income to those engaged in it. There is, however, an element of cultivation engaged in by persons living on the periphery of the main towns, whose main source of income is a job or business in town but who supplement this with subsistence

cropping. It was felt to be of interest to determine how significant this semi-urban cultivation is in relation to total agriculture.

A sample of ten percent of semi-urban EAs was selected, stratified by province. Census maps were generally not available for semi-urban EAs, and land tenure maps were not relevant, so the compilation of lists of households cultivating subsistence plots was carried out in the field with the aid of verbal descriptions only of the EA boundary as used in the Population Census. A ten percent sample of these farming households within each EA was then selected.

Yemen Arab Republic. The agricultural census in the Yemen Arab Republic is summarized below (Yemen Arab Republic, 1983, p. 1, 2):

> "The first attempt to collect statistical data on the agricultural sector in Yemen Arab Republic was made in 1978 by conducting an agricultural census in the Dhamar province. The data were collected for the 1977/78 season directly from villages and from agricultural holders by the field enumerators. Since 1978 a series of agricultural censuses have been undertaken province by province in the following order:
>
> - Dhamar province (for 1977/78 season);
> - Hodeidah, Hajjah and Mahweet provinces (for 1978/79 season)
> - Taiz and Ibb provinces (for 1979/1980 season);
> - Sa'adah and Al-Beida provinces (for 1980/81 season);
> - Sana'a province (for 1981/82 season);
> - Ma'arib and Al-Jawf provinces (for 1982/83 season).
>
> The sampling method was used in these censuses because it was considered to be the cheapest and the most accurate method.
>
> The sample used is a stratified two-stage random sample. So, the construction of two frames was necessary for sample selection: (a) the frame of primary units, (b) the frame of holders.

Frame of primary units. This frame was prepared through preliminary field visits to each district in the Province. During these visits a list of villages with their population was obtained from the fiscal records in the district and was arranged geographically. Additional information on land tenure and irrigation was also collected to help in the stratification. After stratification and on the basis of the arranged list of villages, artificial primary units that were equal in size were constructed. The average size of each artificial unit was around 100 households (80-120). A unit comprised one complete village, a part of a village, or a group of villages.

A sample of these primary units was selected in the first stage of selection.

Frame of holders. In each of the sample primary units, a frame of holders was constructed by the enumerator, on the spot, prior to the survey. In Form No. C-1, the enumerators prepared a list of households according to information that they obtained from the headmen and responsibles of the villages in the primary unit. They also collected information on each household in order to find the holders and then to classify them into large, medium and small.

On the basis of this list, a second-stage sample of holders was selected for interview. The selection of sample holders was done in two stages.

First stage. In each stratum, a sample of primary units was selected from the frame of artificial primary units. Five percent (5%) of the units were selected in Dhamar, Hodeidah and Ibb provinces and ten percent (10%) of the units were in Hajjah, Mahweet and Taiz. The selection was done on the stratum level and by systematic random selection.

Second stage. After preparing the frame of holders in each selected primary unit, in the manner described above, the enumerator was instructed to select a sample of 20 percent of holders in each unit. This sample of holders was interviewed.

The selection was done by systematic random selection from the list of holders starting with the large holdings and continuing into the medium and then the small holdings.

The final sample size of holdings was about 1 percent of the holdings in each of Dhamar, Hodeidah and Ibb and around 2 percent of the holdings in each of Hajjah, Mahweet, Taiz, Sa'ada, Al-Beida, Sana'a, Ma'arib and Al-Jawf."

Two-stage and three-stage sample design

It seems that two-stage sample design is the dominant method of carrying out sample enumeration. In the 1960 WCA: "In almost all sample censuses (enumerations) carried out in or around 1960 the stratified two-stage sample design was used." (FAO, 1969, p. 80). "Most of the countries taking a sample census have applied a two-stage sample design with villages or enumeration areas as primary sampling units and agricultural holdings in selected villages as secondary sampling units." (FAO, 1977, p. 176). The following information is given in the second issue of the Census Bulletins relating to the 1980 WCA (FAO, 1979-1989, No. 2, p. 12): in sampling "The number of stages of selection was generally reported as two stages and names of the units in each stage were generally mentioned as village and holding (or holder in a few cases in African countries, or household in Asian countries)."

In addition to these instances, for the majority of the countries covered in this chapter, sampling is in two stages. Thus it could be said that two-stage sampling is the most frequently used method in sampling for agricultural censuses. However, there were also countries applying three stages in sampling. Two examples for two-stage and two examples for three-stage sample design are given below in the conclusion of this subsection.

Nepal. The sample design used for the census was stratified two-stage random sampling. A district was taken as the stratum. From each district 50 wards (administrative units) were selected as

primary sampling units and then the list of agricultural holdings was prepared in each selected ward to select sample holdings.

Togo. A two-stage sample design was carried out. The primary sampling unit was the village and the secondary sampling unit was the holding.

Niger. The 1980 census was carried out as a three-stage sample survey. The survey was limited to the traditional sector. The department of Agadez was excluded.

- For the first stage, the zones established for the 1977 demographic census were the basis for the selection of a ten percent sample.
- For each selected zone, three villages were randomly drawn. Thus, 852 villages were studied, out of the total of about 10 000 in the country.
- In each sample village, three to 15 holdings were selected, the exact number depending on the population of the village. The total number of holdings included in the sample was 2 878.

Pakistan. Different sample designs were used for different parts of the country. In major parts of the country a three-stage stratified sample was applied. The three stages used were patwar circle, village and household (Pakistan, 1983, p. xx, xxi):

- First-stage selection of patwar circles

  The number of patwar circles to be selected from each subdivision was determined keeping in view the number of enumerators which could be effectively trained and properly supervised, but also the inherent variance of the population with respect to items under study.
- Second-stage selection of mouzas

  It was decided to select two mouzas per selected patwar circle. The mouzas having very small probabilities of being selected

were merged together and treated as one mouza for sampling purposes.

- Third-stage selection of clusters of households
  A systematic selection of clusters of nearly 30 households each was made with equal probability from all the selected mouzas with the help of the list of households.

First- and second-stage units were selected with probabilities proportional to their measure of size (geometric mean of the number of households and cultivated acres). Third stage units (households) were selected with equal probabilities. In this manner, roughly nine percent of the total households were selected for enumeration.

Stratum of large and smallholdings

Countries generally use different methods for large holdings as compared to smallholdings. Typically, they enumerate the large holdings completely and apply sample enumeration for small-holdings.

Ethiopia. Ethiopia is an example of this practice. The census of 1976/77 covered all types of holdings in the country, i.e. private peasant holdings, state farms and cooperatives. Private peasant holdings were investigated on a sampling basis, while state farms and cooperatives were investigated by complete enumeration. Two regions (Eritrea and Tigrai) as well as nomadic areas were not covered.

Turkey. The practice in Turkey was somewhat different (Turkey, 1983, p. viii, xi, xiii). Holdings were divided into large-scale and small-scale agricultural holdings.

For small-scale agricultural holdings two different sample designs were used: one for places with populations of 5 000 or less and the other for places with populations of 5 001 and more.

- Sample design for settlements with populations of 5 000 or less: two-stage stratified random sampling was used. In the first stage, the settlements were selected and in the second stage, the holdings (households).
- Sample design for settlements with populations of more than 5 001: three-stage stratified random sampling was used. In the first stage, sample settlements were selected; in the second stage, blocks in sample settlements and in the third stage, agricultural holdings in these blocks.

The original intention was to enumerate completely all large-scale holdings. But when work on the frame was completed it became evident that the number of large-scale holdings was more than expected. Thus, only for very large holdings with the following characteristics was the method of complete enumeration applied: farms with at least 1 000 decares of irrigated land or at least 2 000 decares of barren land; farms engaged in animal husbandry with at least 200 head of cattle or at least 500 sheep or goats.

Large-scale agricultural holdings in the 1980 Agricultural Census are defined using the results of nationwide preparatory research. The following decisions were made: in agricultural regions 1, 3, 5, 6 and 9 holdings with at least 500 decares of irrigated land or 1 000 decares of non-irrigated land in the agricultural production year of 1980, and livestock holdings with 100 or more head of cattle and 300 or more sheep and goats were considered to be large-scale agricultural holdings. In other agricultural regions, agricultural holdings with at least 250 decares of irrigated land or 500 decares of non-irrigated land, used or not, in the agricultural production of 1980 were considered to be large-scale agricultural holdings. The definition of large livestock holdings was the same for all regions.

For holdings within the coverage of this latter definition but outside the "very large farms" definition above, sample enumeration was applied. The method used was simple random sampling. The sampling rate was one in ten.

United States. The experience of the United States is interesting in showing the importance of sampling in agricultural censuses. For the 1969 and 1974 censuses there was considerable undercoverage of small farms which tended to be not fully included in administrative lists. As explained below, to improve the coverage of the census in 1978, the sampling method, supplementing the mailout/mailback enumeration, was applied for smallholdings (United States, 1981, p. A-1, A-2):

"The 1978 Census of Agriculture was the first census to include a mailout/mailback enumeration supplemented by a thorough direct interview of all households in a sample of area segments. This combination list-direct enumeration sample approach was instituted to improve completeness of coverage for the US, region and State level agriculture census statistics. ...

For the 1969 and 1974 censuses, data were collected primarily by a self-enumeration, mailoutmailback procedure. This procedure was made possible by the availability of specialty lists and several administrative lists, including records from the prior agriculture census, from which a list of agriculture-related names and addresses was constructed. ...

The mail list for the 1978 census was comprised of all individuals, businesses and organizations that could be readily identified as being associated with agriculture. The list was assembled from the records of the 1974 census and administrative records of various government agencies, primarily the Internal Revenue Service and the US Department of Agriculture. The administrative lists used for 1978 were more accurate and extensive than those used for the 1974 and 1969 censuses. For 1978, most administrative lists were used in their entirety; whereas, for 1974 and 1969 some lists were sampled so that only selected records were included in the census mailing list.

Lists of large or specialized operations, such as nurseries, broiler growers, fish farms and livestock range and feedlot operations, which might not be identified in other administra-

tive records, were obtained from State and Federal agencies, trade associations and similar organizations. Lists of multi-establishment companies having one or more establishments (or locations) producing agricultural products or providing agricultural services were obtained from the 1974 census and updated using results of the 1976 and 1977 Company Organization Surveys conducted by the Economic Surveys Division of the Census Bureau....

When the evaluation survey conducted for the 1974 census confirmed the results of the evaluation survey for 1969 (i.e. an unacceptable number of midsize and a larger number of smaller farms were not included in the mail list), the decision was made to incorporate into the 1978 data collection procedures a direct enumeration area sample to provide the US, region and State level estimates of the number and statistical characteristics of farms found not to be included in the mail list. The effect of this combination mail list-direct enumeration sample approach has been to drastically reduce the number and effect of missed farms in totals.

The direct enumeration sample consisted of approximately 6 400 segments in "rural" areas (areas outside places with 2 500 or more population in 1970) in all States, except Alaska and Hawaii. The segments were created and selected using enumeration district maps and data from the 1970 Census of Population and Housing. In October and November 1978 enumerators visited each household in these segments to determine if anyone in the household was associated with an agricultural operation.... During the enumeration, each operator received an orange-coloured sticker and was instructed that if he/she received a census form in the mail, the form should not be filled but returned with the sticker attached indicating that a report had already been completed.

During office processing, a concentrated effort was made to match the direct enumeration sample returns to names and

addresses on the census mail list using the sticker returns, microfilm search of the mail file for all associated names, telephone calls to all cases that could be reached by phone and any other available information. Direct enumeration sample returns not matched to the census mail list after this extensive research comprise the sample representing farms not on the census mail list. Data from these unmatched direct enumeration sample returns were used to provide estimates at the US, region and State levels for farms not on the census mail list. For each State, these data have been tabulated and published as a "pseudo" county and are an integral part of the State totals. The direct enumeration sample estimates have not been included in individual county totals."

Hungary. The practice of Hungary should also be noted. In this country, complete enumeration of large-scale holdings was carried out, while data on small agricultural units were collected by a survey containing comparatively few questions.

Different sample design for different regions and sectors

It is sometimes necessary or useful to apply different sample designs for different regions of a country. For example, in Pakistan (Pakistan, 1983, p. xx):

"Different sample designs were evolved for different parts of the country depending upon the local conditions and the quantum of relevant information available for selecting a sample. Consequently, in major parts of the country comprising rural settled areas of NWF, Punjab and Sind provinces, a three-stage weighted and stratified sample was used whereas a single-stage weighted sample was used in rural settled areas of Baluchistan. In the rest of the country, comprising entire urban areas and unsettled rural and tribal areas, a single-stage systematic sample was used. Barring a few exceptions where the

sample was selected at district level, a separate sample was selected for each sub-division."

Suriname notes the following regarding the topic "Method of collection of data" (Suriname, 1981a, p. 3):

"The holdings situated in the coastal areas and the permanent holdings of bigger size in the interior are to be covered on 100 percent basis. The shifting cultivation holdings in the interior will be covered on sampling basis."

Thus it was proposed to use different methods in the different regions of Suriname (Suriname, 1981b, p. 2):

"The censuses of agriculture prior to the current (1981) census covered only the coastal plains by complete enumeration of all the holdings fulfilling certain conditions of minimum area and number of livestock and poultry. The interior areas were never covered. For the first time it is proposed to have a sample census of the interior areas after the completion of the complete enumeration of the coastal areas. Due to administrative reasons it cannot be held in the year 1981."

As is explained in detail above, in Fiji there were three sectors, namely, the commercial sector, the mataqali (traditional) sector and the minor sector (non-mataqali farms). In each sector, data were collected in different ways.

In Botswana two different sampling frames were used to obtain data, one for the traditional sector of farms and the other for the modern sector. In the traditional sector, using the auxiliary data from the Population Census, the entire communal area was divided into survey blocks which constituted the primary sampling units. For the modern sector a list of farms from the Establishment Register was used as frame. A two-stage probability sample design was adopted. Thus in Botswana the same sample design but different sampling frames were used for the traditional and modern sectors.

Two-phase sampling

Some practices in the Agricultural Census of 1976/77 of India are given below as an example of two-phase sampling (FAO, 1979-1984, No. 6, p. 17, 18):

"An agricultural census on a sample survey basis with 1976/77 as reference year was organized in the country (India) including Sikkim. The census comprised two phases, the main census and the input survey. The main census consisted of collection of data related to five principal characteristics, viz.:

(a) number and area of operational holdings according to different size classes;
(b) land utilization;
(c) cropping pattern;
(d) crop-wise and source-wise irrigated area; and
(e) tenancy particulars

These data were compiled by retabulation of information contained in the basic land records in those States which maintain comprehensive land records. Data on number and area operated (by different size classes) were compiled on a complete enumeration basis while data on other items were compiled from a sample of 20 percent of the villages. In States which did not have comprehensive land records, data were collected through sample surveys.

In the input survey, data on application of inputs, such as seeds, fertilizers, pesticides, etc. along with details of multiple cropping, inventory of agricultural machinery and livestock, were collected through a sample survey in a 2 percent sample of villages. While the main census was undertaken after the close of the agricultural year, the collection of data on inputs was attempted during the agricultural year itself at the end of the season to minimize recall lapse."

A second example of two-phase sampling is the practice of Thailand in the 1978 Census of Agriculture (FAO, 1979-1984, No. 13, p. 34):

"The census plan called for two phases of field operations. In the first phase, a complete listing of all households/dwelling units was prepared so as to obtain data on number of agricultural households and their elementary characteristics in each enumeration district. In the second phase, detailed interviewing was done to all those agricultural households/holdings possessing holding areas of 2 rais (0.32 ha) and more or with five or more cattle, swine, or with 100 or more poultry or with earnings of 5 000 bahts ($250) or more from farming during the last twelve months. For this, important census items were covered on a 100 percent enumeration basis whereas items of secondary importance were covered on a 25 percent sample enumeration basis."

The practice of Finland in the agricultural census of 1980 is another example of two-phase sampling:

- complete enumeration for holding, holder, population and land use;
- a stratified sample survey for cultivated area, production, livestock and machinery and equipment.

The practice in Sri Lanka in the smallholding sector, summarized in Chapter 6, is a further example of two-phase sampling. The "stages" in this sector could be taken as "phases."

Chapter 9

Data processing and tabulation

It is necessary to present the huge amount of data collected in agricultural censuses in table form. For this, data must be checked, corrected, summarized, classified and tabulated. In other words, data must be processed.

This chapter is on data processing. In the first section practices of some countries are given as examples. The second section analyses the tabulation of results of countries.

DATA PROCESSING

This section has two subsections. General and introductory information is given in the first subsection and the practices of some countries are summarized in the second subsection.

Introduction

When field enumeration is completed in agricultural censuses the phase of data processing begins. To collect the immense number of questionnaires, to compile them in a central organization such as the central bureau of statistics, to check the completeness and consistency of questionnaires, to check missing or inadmissible entries or totals, to handle the data manually or to code the responses in computers, to derive tables from the data and to secure consistency between tables is a lengthy, costly and complicated operation.

For this enormous job it is necessary to train competent professionals to perform the agricultural data processing and to have the contribution and collaboration of data-processing experts, statisticians, economists and planners. Adequate planning and

preparation are also important. Such planning and preparation should include hardware acquisition, personnel training, participation of data-processing experts in questionnaire design and in the writing of computer programmes prior to enumeration. Since the quantity of data to be processed is large, insufficient preparation may easily cause long delays in obtaining census results.

Very rapid development in the field of computers has altered the data-processing operations to a large extent. It is now possible to produce a large variety of tables on agricultural statistics using the data obtained in an agricultural census with the proper use of computers and practically all countries now have the possibility of access to them.

But manual processing or a combination of manual and computer processing was still appropriate for some countries in the 1980 WCA. The *Programme for the 1980 World Census of Agriculture* notes (FAO, 1976a, p. 67):

> "It is expected that almost all countries will use computers for processing the results of their 1980 national censuses of agriculture. Nevertheless, it is recommended that due consideration be given to the relative merits of manual processing in countries with low-cost labour and reliable staff or where the census is based on a small sample of agricultural holdings. Often a combination of manual and computer processing may be appropriate. Also, a number of preliminary data-processing operations may be undertaken manually by qualified field personnel in each administrative district or province in the country. These operations include preliminary editing of the questionnaires and the preparation of district or provincial totals for some of the more important census items."

Thus, in a seminar held 1-4 December 1984 in Iraq, it was stated that at the stage of development reached by most of the ESCWA countries, manual processing can still prove more efficient than electronic data processing for small surveys. In any case, data tabulation must not be postponed to the end of the data-collection

programme but must be done during, or by the end of, each data-collection stage for proper checking and monitoring of the data-collection process. The tabulations must be done manually or, alternatively, by using computers. In any case to optimize the use of computer facilities, microcomputers should be used in parallel with main frame computers (ESCWA, 1985).

Country practices

Sufficient information is not available on the data-processing practices actually used in the 1980 agricultural censuses. What is known are the plans of countries with respect to data processing while they were planning their censuses. The second issue of the Census Bulletins (FAO, 1979-1989) contains data on these plans. The information was collected through a questionnaire sent to countries. Table 27 presents the data-processing methods used by region. The second issue of the Census Bulletins contains the following information.

The question in this section (processing and tabulation) asked about which methods were used for processing and tabulating census data. The responses by region are summarized in the table. Almost all responding countries planned to use electronic computers or to apply a combination of electronic and manual processing. Only Peru and the Gambia reported that they planned to process and tabulate the census data manually. Bahrain planned to use electric equipment other than the computer. Out of the 24 countries that planned to use a combination of more than one method of processing, three countries (Chile, Poland and Yugoslavia) preferred a combination of electronic computer, electric equipment other than computer and manual processing. Suriname stated that the preliminary results were to be processed manually but that the computer was to be used for processing the final results. In addition to using the electronic computer for the main census, Japan reported the use of manual methods for processing

TABLE 27

Number of countries by region and by data-processing means utilized

Region	Means for processing census data			
	Computer	Electric equipment	Manual	Combination
Africa	5	—	1	9
Asia and the Pacific	8	—	—	5
Europe	11	—	—	5
Latin America and the Caribbean	10	—	1	4
Near East	7	1	—	—
North America	—	—	—	1
Total	41	1	2	24

data relating to agricultural establishments other than agricultural households (which were about 12 500 in 1975).

Fiji. The following describes the data-processing technique used by Fiji to process its sample census (Fiji, 1981, p. 3, 9):

(a) General

Data processing was undertaken partly manually, within the census section located at headquarters and partly electronically, within the Government's EDP Services Branch.

(b) Editing

Completed forms were first edited in the census section, during which checks were made on the following:

(i) Identification data

(ii) Completeness (e.g. if no crop field was recorded, an explanation from the enumerator would be required)

(iii) Consistency (e.g. if a farm had wage employees coded it must also have earnings data)

(iv) Summations (totals correctly added)

(v) Area measurements of fields correctly coded from diagrams

(vi) General reasonableness

(c) Computer validation

Computer validation programmes were written to print out error or warning notices resulting from the coding or key punching of wrong or suspect data. These validation programmes, therefore, served as a further edit of the coding in a more systematic manner than could be done manually, as well as an edit of key punching.

The validation programmes printed out error or warning notices caused by:

(i) Missing or wrong identification data

(ii) Incompleteness in the data of a particular farm or field (e.g. a farm has one of the forms missing, a field has the crop code missing)

(iii) Duplicate records, e.g. the same information for a particular farm or field has been entered twice

(iv) Inconsistency (e.g. the crop code for a particular field number differs between Forms Three and Four)

(v) Summation errors (e.g. wrong totalling of cattle or earnings)

(vi) Numbers lying outside an agreed range (e.g. livestock numbers on a non-commercial farm being higher than believed likely, number of months from planting to harvesting for a selected root crop being less than considered possible).

(d) Comprehensiveness of data file

When it was initially considered that validation had been completed, a tabulation of number of farms on tape, classified by agricultural sector and tikina (district), together with a listing of farm numbers on tape, was obtained from EDP. As a result of this tabulation and listing it was found that many sample farms were missing from tape. Investigation revealed two causes of this deficiency:

(i) Forms not submitted for key punching

(ii) Forms key punched but data not transferred to magnetic tape

Deficiency (i) was solved as follows:

a. Enumerators found the missing forms, which in some cases had been used to locate fields required for crop cutting, or were able to copy the data entered in note books on to fresh forms, or

b. In Cakaudrove and Eastern Division, where some farms had not been enumerated or the forms either lost in transit or destroyed by hurricane, the farms concerned had to be re-enumerated.

Deficiency (ii) was solved by key punching the forms again.

Pakistan. The following information on "Processing and Tabulation" summarizes the processing in the 1980 Census of Agriculture of Pakistan (Pakistan, 1983, p. xxvi, xxvii):

"The census data were processed on electronic computers by hiring computer time from other agencies while computer inputs were prepared in the office. On receipt of the census documents in the Agricultural Census Organization's Headquarters at Lahore, the work on the following phases involved in processing and tabulation of census data were started one after the other with a minimum possible time-lag.

a) Document control

A control section was established to collect and receive documents from the field, check them for complete inventory, keep in safe custody and issue them for various data-processing operations. For this purpose, it was first ensured that documents from all the selected mouzas, villages and urban wards were received. The forms were then actually counted and matched with the number of households for which data were available on Form 5. All cases of over- and under-receipt were thoroughly investigated and reconciled. The completed documents of each mouza/village/ward were placed in separate,

properly labelled kit bags showing the identification of area and the inventory of the documents contained therein. The kit bags, in turn, were placed in different shelves on which tehsil codes were marked. This arrangement facilitated the easy retrieval of documents. The Control Section issued documents for coding, editing, key punching and other operations involved in data processing and kept a meticulous record of the movement of all census documents through various stages of processing.

b) Coding

The census questionnaire was fully precoded but the area code was inserted manually. Besides, in case of households operating jointly, the number of partners were marked, after counting the partners listed on the concerned questionnaires. Further, the data (in different forms) were compared to eliminate the transcription errors. During this phase it was also ensured that no section of any questionnaire was left blank. These operations were performed in a Coding Section which was organized as part of the Control Section.

c) Manual editing

In the previous censuses and their pretests, it was established that only a few items could be programmed for fully automatic editing and correction and the rest had to be manually corrected by examining the original documents after the errors were detected and reported by the computer. But in view of the enormity of manual correction work, that arrangement proved extremely time consuming and expensive and often fraught with danger of mis-editing under pressure of high volume of work. Manual editing preceding computer editing proved to be helpful in reducing the correction work to be performed manually. Further, this arrangement also facilitated the key punching operation as illegible entries were made legible during editing.

Accordingly, the census returns were subjected to manual editing during which a number of checks, particularly relating to consistency of data, were applied and illegible entries were

clearly written to facilitate their key punching. This work was entrusted to Census Training Assistants who had already worked in the field and were well acquainted with the census concepts and inter-relationship of various items. Editing was done strictly in accordance with written instructions and all important decisions were taken at appropriate level in writing.

d) Punching and verification

The manually edited questionnaires were passed on to the punching and verification section. This section was equipped with two types of machines, the old IBM Card Punching Machines and Verifiers and new IBM Dual Data Stations using diskettes instead of cards. To transfer the data entered on diskettes to computer tapes, a Data Convertor was also installed within the office. In the case of cards, the card to tape operation had to be run on the computer itself. The data contained in one form was accommodated in eight card layouts using code controlled card fields to minimize the total number of cards required. Variable length records were generated on the tape to further curtail the expenditure on data processing.

e) Computer editing

A comprehensive computer editing programme was prepared and all census returns were checked in the computer. Besides the normal editing checks, range tests were included to identify punching errors, if any. Errors found in the record were exhibited on the print-outs. The error reports were passed on to a special section for corrections by examining the original documents. The corrections were inserted in the tape record of the original data and the corrected tape record was given a final editing run before bringing out the tabulation."

Sweden. In Sweden (Sweden, 1981, p. 11-15) the National Central Bureau of Statistics (SCB) mails questionnaires to holders who according to the National Farm Register (LBR) have to submit data. The regular form distribution is made sometime around

1 June. When the forms are returned to the SCB they are ticked off by computer.

- Pre-checking
  After the forms are ticked off they are pre-checked at the SCB. Forms without changes in the pre-printed data about the holder and the real estates and with the most important of the sections filled in are sent to punching after a check of the readability. Forms with changes in the holder and real estate sections are checked to see that the data are written in the right places and that they are complete. Subsequent to some coding the forms are punched. Incomplete forms are, as far as possible, cleared up at the SCB, but in some cases they are sent to the county agricultural boards for further examination.

  Forms stating that another person has acquired all the land parts of it are examined at the SCB. If the new person has not previously received a form, he is mailed one. When this form has been returned to the SCB, it is checked against that of the predecessor before being punched.
- Data registration (punching)
  The pre-checked forms are successively sent to the SCB data registration unit, where the data are coded on to magnetic tapes. An automatic check ensures that the identification number is correctly recorded.
- Computer and manual checking
  In the middle of August the SCB starts a computer check of the forms according to a special checking programme. This programme checks both new and changed data on the forms in respect to logical inconsistencies and incongruities. In addition the programme includes summation checks, controls of large values, incongruous values and unusual combinations of values and checks that all sections have been filled in. The controls partly take the form of comparisons with the corresponding values of the preceding year. In some cases computer corrections are made.

If the forms include incorrect or incompatible data, these are usually cleared up by the SCB. Normally the holder then is contacted by telephone, and at that contact the missing data can be collected as well. To some extent such forms are sent to the county agricultural boards for investigation.

TABULATION OF RESULTS

The *Programme for the 1980 World Census of Agriculture* proposed the following ten characteristics, at least one of which should be used as one of the two classification variables in cross-tabulations, the other classification variable being some other characteristic:

- Total area (or possibly area of agricultural land)
- Area of cropland (or possibly area of arable land)
- Normally irrigated area
- Size of holder's household
- Number of permanent workers
- Number of cattle
- Intensity of cultivation of arable land (ratio of the harvested arable land to total arable land)
- Legal status
- Land tenure
- Age of holder.

Naturally, for some cross-tabulations both of the classification variables are taken from the above list. Among these characteristics, total area has been used more often than any other characteristic as a classification criterion.

Table 28 shows the preference of countries among various types of criteria based on land. It can be noted that except for two countries (Cape Verde and Suriname) all countries have adopted a classification criterion. In Table 29, which summarizes Table 28, it is seen that there are differences between regions regarding the choice of type of land criteria. In Europe countries favour agricultural land, while more African countries use culti-

TABLE 28

Types of land criteria used by countries in cross-classifications

Region and country	Types of land criteria [1]						
	TL	PL	AL	CL	CU	LC	AR
Africa							
Botswana						x	
Cape Verde					x		
Central African Rep.					x		
Congo							
Ethiopia	x					x	
Kenya [2]	x						
Madagascar	x					x	
Malawi					x		
Mauritania					x		
Niger			x				
Reunion							
Rwanda	x					x	
Sierra Leone					x		
Togo							
Asia and the Pacific							
American Samoa	x						
Australia	x						
Bangladesh	x						
Fiji	x						
Guam	x						
India	x				x		
Japan				x			
Korea, Rep. of							
Nepal	x						
New Zealand	x						
Northern Mariana Is.	x						
Pakistan	x						
Philippines	x						
Sri Lanka	x						
Thailand	x						
Tonga	x						
Europe							
Austria		x					
Belgium			x				
Czechoslovakia			x				
Denmark			x				x
Finland							
France			x				
Germany, Federal Rep. of			x				
Hungary	x						
Ireland	x						
Italy	x						
Luxembourg			x				
Malta			x				
Netherlands			x				
Norway			x				
Poland	x						
Portugal		x					

TABLE 28 (cont.)

Types of land criteria used by countries in cross-classifications

Region and country	Types of land criteria [1]						
	TL	PL	AL	CL	CU	LC	AR
Spain	x						
Sweden							x
Switzerland					x		
United Kingdom			x				
Yugoslavia	x						
Latin America and the Caribbean							
Antigua and Barbuda	x						
Bahamas					x		
Belize	x						
Brazil	x						
French Guiana			x				
Grenada	x						
Guadeloupe			x				
Guatemala	x						
Jamaica	x						
Martinique			x				
Panama	x						
Paraguay	x						
Puerto Rico	x						
Suriname							
Trinidad and Tobago	x						
Uruguay	x						
Virgin Islands (US)	x						
Near East							
Bahrain	x						
Cyprus	x						
Israel	x						
Jordan	x						
Oman	x						
Saudi Arabia	x						
Turkey	x						
Yemen Arab Rep.	x						
North America							
Canada	x						
United States	x						

Notes: TL = Total land. PL = Productive land. AL = Agricultural land. CL = Cropland. CU = Cultivated land. LC = Land under crops. AR = Arable land.

[1] Cropland = Arable land plus land under permanent crops.
Land under crops = Land under temporary crops plus land under permanent crops.
cultivated land = Land under crops plus Cultivated meadows.
Agricultural land = Cropland plus land under permanent meadows.
Productive land = Agricultural land plus forest land.
Total land = Productive land plus all other land.

[2] In Kenya two land criteria are used:
for small farms: Land under crops.
for medium and large farms: Total land.

TABLE 29

Number of countries reporting by region and by type of land criteria used in cross-tabulations

Region	Type of land criteria						
	TL	PL	AL	CL	CU	LC	AR
Africa	4	—	1	—	5	4	—
Asia and the Pacific	14	—	—	1	1	—	—
Europe	6	2	10	—	1	—	2
Latin America and the Caribbean	12	—	3	—	1	—	—
Near East	8	—	—	—	—	—	—
North America	2	—	—	—	—	—	—
Total	46	2	14	1	8	4	2

Notes: TL = Total land. PL = Productive land. AL = Agricultural land. CL = Cropland. CU = Cultivated land. LC = Land under crops. AR = Arable land.

vated land for cross tabulations. In other regions total area is the criterion that is utilized.

It is important to note here that even if a country chooses total area (or some other characteristic) as the main classification variable, not all tables are produced utilizing that classification variable. Some cross tabulations are based on criteria other than the chosen main classification criterion. Furthermore, there are simple tables which do not require any cross tabulation. Among other classification criteria countries use livestock numbers, size of holder's household, legal status, land tenure and age of holder. Among the ten characteristics recommended as classification variables, "normally irrigated area" and "intensity of cultivation of arable land" are not used by countries as such. Number of permanent workers is used by a few countries as a classification variable (e.g. Austria, Denmark and Portugal).

The 1980 Programme recommended the following size classes in hectares for total area and for agricultural land:

Under 0.1

0.1 - 0.2

0.2 - 0.5
0.5 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 10.0
10.0 - 20.0
20.0 - 50.0
50.0 - 100.0
100.0 - 200.0
200.0 - 500.0
500.0 - 1 000.0
1 000.0 - 2 500.0
2 500.0 and over

The classes adopted by countries are shown in Table 30.

It can be seen in Table 30 that the size classes differ from country to country. In countries where small farms are numerous there are more classes in the lower end of the size scale, particularly in the following regions: Africa, Asia and the Pacific and the Near East. In countries with many large holdings the upper end of the size scale is more detailed. For example, Australia has the following size classes for holdings with 500 ha or more total land area: 500-749, 750-999, 1 000-1 999, 2 000-2 999, 3 000-3 999, 4 000-4 999, 5 000-9 999, 10 000-19 999, 20 000-29 999, 30 000-49 999, 50 000+. Countries using acres instead of hectares, have size classes whose limits are not round numbers. This is the result of conversion from acres into hectares.The 1980 Programme recommended the following size classes by number of cattle: 1-2, 3-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500+. However, size classes based on number of livestock are not uniform in all countries. Examples of size classes for various kinds of livestock in various countries are given below (countries are listed alphabetically by region).

TABLE 30

Size classes of holdings based on area

Region and country	Size classes (ha)
Africa	
Botswana	0.1-1, 1.1-2, 2.1-3, 3.1-4, 4.1-5, 5.1-6, 6.1-7, 7.1-8, 8.1-9, 9.1-10, 10.1-15, 15.1 +
Cape Verde	No size classification
Central African Rep.	-0.1, 0.1-0.2, 0.2-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5 +
Congo	-0.5, 0.5-1, 1-2, 2-3, 3 +
Ethiopia	-0.10, 0.11-0.50, 0.51-1.00, 1.01-2.00, 2.01-5.00, 5.01-10.00, 10.01 +
Kenya [1]	
Madagascar	-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000 +
Malawi	-0.5, 0.5-1, 1-2, 2-3, 3 +
Mauritania	-0.5, 0.5-1, 1-2, 2-4, 4-6, 6-10, 10-20, 20-40, 40 +
Niger	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10 +
Reunion	-0.25, 0.25-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-50, 50 +
Rwanda	-0.25, 0.25-0.5, 0.5-1, 1-2, 2 +
Sierra Leone	-0.5, 0.5-1, 1-2, 2-4, 4-6, 6 +
Togo	-0.25, 0.25-0.5, 0.5-1, 1-2, 2-3, 3 +
Asia and the Pacific	
American Samoa	-0.4, 0.4-1.2, 1.2-2.0, 2.0-3.2, 3.2-4.0, 4.0-8.1, 8.1-20.2, 20.2 +
Australia	-4, 5-9, 10-19, 20-29, 30-39, 40-49, 50-74, 75-99, 100-124, 125-149, 150-199, 200-249, 250-299, 300-399, 400-499, 500-749, 750-999, 1 000-1 999, 2 000-2 999, 3 000-3 999, 4 000-4 999, 5 000-9 999, 10 000-19 999, 20 000-29 999, 30 000-49 999, 50 000 +
Bangladesh	-0.2, 0.2-0.4, 0.4-0.6, 0.6-1, 1-3, 3 +
Fiji	-0.2, 0.2-0.5, 0.5-1, 1-2, 2-3, 3-5, 5-10, 10-20, 20-50, 50 +
Guam	-1, 1-3, 3-5, 5-10, 10-20, 20-50, 50 +
India	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50 +
Japan	-0.5, 0.5-1, 1-2, 2-3, 3-5, 5 +
Korea, Rep. of	-0.1, 0.1-0.2, 0.2-0.5, 0.5-1, 1-2, 2-3, 3 +
Nepal	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10 +
New Zealand	-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-400, 400-1 000, 1 000-2 000, 2 000 +
Northern Mariana is.	-0.4, 0.4-1.2, 1.2-2.0, 2.0-3.2, 3.2-4.0, 4.0-8.1, 8.1-20.2, 20.2 +
Pakistan	-0.5, 0.5-1, 1-2, 2-3, 3-5, 5-10, 10-20, 20-60, 60 +
Philippines	-0.5, 0.5-1, 1-2, 2-3, 3-5, 5-10, 10-25, 25 +
Sri Lanka	-0.4, 0.4-0.8, 0.8-1.20, 1.20-8, 8-12.1, 12.1-20.2, 20.2-40.5, 40.5 +
Thailand	-0.3, 0.3-0.6, 0.6-1, 1-2.4, 2.4-3.2, 3.2-4, 4.0-4.8, 4.8-9.6, 9.6-22.4, 22.4-40, 40 +
Tonga	-0.4, 0.4-1.20, 1.2-2, 2-2.8, 2.8-3.6, 3.6-4.5, 4.5-5.3, 5.3-6.1, 6.1-8.1, 8.1-20.3, 20.3 +
Europe	
Austria	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200 +
Belgium	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100 +
Czechoslovakia	-0.5, 0.51-50.0, 50.1-500, 500.1-1 000, 1 000.1-2 500, 2 500.1 +
Denmark	-5, 5-10, 10-20, 20-50, 50-100, 100 +
Finland	1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100 +
France	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100 +

TABLE 30 (cont.)

Size classes of holdings based on area

Region and country	Size classes (ha)
Europe (cont.)	
Germany, Federal Rep. of	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100+
Hungary	-0.5, 0.5-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Ireland	0.4-2, 2-4, 4-6.1, 6.1-12.1, 12.1-20.2, 20.2-40.5, 40.5-60.7, 60.7-80.9, 80.9-121.4, 121.4+
Italy	-1, 1-2, 2-5, 5-10, 10-20, 50+
Luxembourg	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100+
Malta	-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10+
Netherlands	-1, 1-5, 5-10, 10-20, 20-50, 50-100, 100+
Norway	0.5-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100+
Poland	0.5-2, 2-3, 3-5, 5-10, 10+
Portugal	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Spain	-0.2, 0.2-0.5, 0.5-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000+
Sweden	2.10-5.10, 5.1-10.1, 10.1-20.1, 20.1-50.1, 50.1-100.1
Switzerland	-0.51, 0.51-1.01, 1.01-2.01, 2.01-5.01, 5.01-10.01, 10.01-20.01, 20.01-50.01, 50.01-100.01, 100.01-200.01, 200.01+
United Kingdom	-0.5, 0.5-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500+
Yugoslavia	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Latin America and the Caribbean	
Antigua and Barbuda	-0.2, 0.2-0.4, 0.4-0.8, 0.8-2, 2-6, 6-10, 10-20, 20-40, 40+
Bahamas	-0.2, 0.2-0.4, 0.4-1.2, 1.2-2, 2-3, 3-4, 4-6, 6-12, 12-20, 20-40, 40-80, 80+
Belize	-0.4, 0.4-2, 2-20, 20+
Brazil	-1, 1-2, 2-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 000, 2 000+
French Guiana	-0.25, 0.25-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-50, 50+
Grenada	-0.2, 0.2-0.4, -0.4-0.8, 0.8-2, 2-4, 4-6.1, 6.1-10.1, 10.1-20.2, 20.2-40.5, 40.5+
Guadeloupe	-0.25, 0.25-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20+
Guatemala	0.04-0.7, 0.7-7.1, 7.1-45.2, 45.2-903.2, 903.2+
Jamaica	-0.4, 0.4-2, 2-4, 4-10, 10-20, 20-40, 40-81, 81-202, 202+
Martinique	-0.25, 0.25-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20+
Panama	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Paraguay	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Puerto Rico	-1.2, 1.2-3.9, 3.9-7.9, 7.9-19.7, 19.7-39.3, 39.3-68.8, 68.8-102.2, 102.2-196.5, 196.5-393.0, 393.0+
Suriname	No size classification
Trinidad and Tobago	-0.5, 0.5-1, 1-2, 2-5, 5-10, 10-50, 50-100, 100-200, 200-500, 500+
Uruguay	1-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Virgin Islands (US)	-1.2, 1.2-4, 4-8.1, 8.1-20.2, 20.2-40.5, 40.5-70.8, 70.8-105.2, 105.2-202.3, 202.3-404.7, 404.7+

TABLE 30 (cont.)

Size classes of holdings based on area

Region and country	Size classes (ha)
Near East	
Bahrain	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50+
Cyprus	-0.1, 0.1-0.3, 0.3-0.7, 0.7-1, 1-2, 2-3, 3-5, 5-10, 10-20, 20-67, 67-134, 134+
Israel	-0.5, 0.5-1, 1-2, 2-3, 3-5, 5-10, 10-20, 20-50, 50+
Jordan	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 500, 2 500+
Oman	0.01-0.49, 0.5-0.99, 1-1.99, 2-4.99, 5-9.99, 10-24.99, 25-49.99, 50-99.99, 100-199.99, 200-499.99, 500+
Saudi Arabia	-0.01, 0.1-0.2, 0.2-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-200, 200-500, 500+
Turkey	-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100-250, 250-500, 500+
Yemen Arab Rep.	-0.2, 0.2-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, 50-100, 100+
North America	
Canada	-1.2, 1.2-4, 4-28.3, 28.3-97.1, 97.1-161.9, 161.9-226.6, 226.6-307.6, 307.6-453.3, 453.3-647.5, 647.5+
United States	-4, 4-20.2, 20.2-28.3, 28.3-40.5, 40.5-56.7, 56.7-72.8, 72.8-89.0, 89-105.2, 105.2-202.3, 202.3-404.7, 404.7-809.4, 809.4+

Notes:

[1] Three sets of size classes are utilized in Kenya.
Small farms: -0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-8, 8+
Medium farms: -10, 10-20, 20-50, 50+
Large farms: -20, 20-50, 50-100, 100-200, 200-500, 500-1 000, 1 000-2 000, 2 000+

Cattle

Central Afr. Rep.	1-2, 3-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500+
Congo	1-5, 6-10, 11+
Kenya	1-5, 6-10, 11-20, 21-30, 31+
Thailand	1-2, 3-4, 5-19, 20-49, 50-99, 100+
Tonga	1-2, 3-4, 5-9, 10-19, 20-49, 50+
Austria	1-3, 4-6, 7-10, 11-20, 21-50, 51-100, 101+
Belgium	1-9, 10-19, 20-49, 50-99, 100-199, 200+
Netherlands	1, 2-4, 5-9, 10-19, 20-49, 50+
Portugal	1-2, 3-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500+

Belize	1-2, 3-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200+
Brazil	-10, 10-19, 20-49, 50-99, 100-199, 200-499, 500+
Paraguay	1-2, 3-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500+
Cyprus	-5, 5-9, 10-19, 20-39, 40-99, 100+
Israel	-5, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500+

Sheep

Congo	1-5, 6-10, 11+
Kenya	1-5, 6-10, 11-20, 21-30, 31+
Australia	1-99, 100-499, 500-999, 1 000-1 499,1 500-1 999, 2 000-2 999, 3 000-3 999, 4 000-4 999, 5 000-5 999, 6 000-6 999, 7 000-7 999, 8 000-8 999, 9 000-9 999, 10 000-14 999, 15 000-19 999, 20 000-49 999, 50 000+
Switzerland	1-5, 6-10, 11-25, 26-50, 51-100, 101+
Norway	1-19, 20-49, 50-99, 100-149, 150-199, 200+
Brazil	-10, 10-19, 20-49, 50-99, 100-199, 200+
Yemen Arab Rep.	1-4, 5-9, 10-19, 20-49, 50+.

Pigs

Congo	1-5, 6-10, 11+
Japan	-10, 10-49, 50-99, 100-499, 500+
Thailand	1-4, 5-19, 20-49, 50-99, 100-499, 500+
Germany, Fed. Rep.	1-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-399, 400-599, 600+
Italy	1-2, 3-9, 10-19, 20-49, 50-99, 100-499, 500+
Brazil	-10, 10-19, 20-49, 50-99, 100-199,, 200+

United States -10, 10-49, 50-99, 100-199, 200-499, 500+.

Some countries established size classes for more specific subcategories of livestock. For example, Australia has two separate sets of size classes by number of cattle:

- For meat cattle: 1-29, 30-49, 50-69, 70-99, 100-149, 150-199, 200-299, 300-399, 400-499, 500-699, 700-999, 1 000-1 499, 1 500-1 999, 2 000-4 999, 5 000-9 999, 10 000+.
- For milk cattle: 1-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89, 90-99, 100-124, 125-149, 150-174, 175-199, 200-249, 250+.

Norway has the following size classes by number of hens: 1-99, 100-499, 500-999, 1 000-1 999, 2 000-4 999, 5 000+.

The Yemen Arab Republic has used three size classes by number of cows: 1-2, 3-4, 5+.

Some types of livestock are used as classification criteria only in a few countries where they are relatively important: for example, Australia and the Central African Republic utilize size classes based on the number of beehives for some tables. Number of horses is a classification variable in Tonga and number of donkeys/mules is a classification variable in Botswana.

Chapter 10

Quality of census data

While much effort is made in an agricultural census to obtain accurate data, it is impossible to avoid errors completely. Therefore, it is very important to determine the presence and possible magnitude of errors and biases and minimize these for present or future agricultural censuses. This chapter details studies on the quality of census data and the practices of some countries in the 1980 WCA on this subject.

GENERAL EXPLANATION

The data collected in agricultural censuses must be of good quality. In the event that the data do not accurately reflect the facts, both a tremendous effort and a large amount of money will have been wasted. But in an activity such as an agricultural census the occurrence of error is unavoidable. Several sources of error are possible as outlined in the following paragraph (FAO, 1976a, p. 65, 66).

> "In all statistical surveys errors and biases arise from numerous sources. The census frame or list of holdings may be incomplete or inaccurate; the wording of questions may be ambiguous or misleading; enumerators may have their own opinion as to what the answers should be and thus influence the respondents; sometimes the respondents truly do not know the answers or cannot recall the information requested, and others may consciously give incorrect answers; the field work may be inadequately organized or supervised; the enumerators may lack specific training or unsatisfactory standards may have been used for their selection; mapping material may be inaccurate

and incomplete, possibly resulting in double enumerations and omissions; some holders may not provide information; some completed questionnaires may be lost; errors in editing, coding and keypunching the data are inevitable."

The following types of errors are likely to occur in a census of agriculture (FAO, 1986a, p. 86):

"– households or holdings are omitted during listing;
- failure to identify holder in household;
- failure to record data for all parcels in holdings, when some parcels are located in anthor locality;
- omission by holder, due to lapse in memory or for other reasons;
- failure to obtain correct area because actual area may not even be known to holder;
- land incorrectly identified due to misunderstanding of definition of land use;
- inaccurate crop areas where mixed, associated and successive cropping methods are used;
- failure to report livestock which is temporarily away on public or common pastures, or in transit outside holding;
- failure to report use of jointly owned agriculture machinery, etc."

The following paragraphs cover the most important points to be observed to keep the errors under control.

Enumerators. It is important to provide instruction and training for enumerators with the aim of guidance of personnel, standardization of procedures and common understanding of all tasks.

Supervisors. Special emphasis should be placed on the instructions and training of supervisors. Supervision of the enumerators' work is essential to the success of any census.[1]

[1] Supervisors should go through an intensive training programme. The topics

Pre-testing. Pre-testing is enumerating a limited number of holdings in order to collect evidence of the adequacy of various census procedures. The following characteristics of pre-testing should be pointed out:

- As its name implies, pre-testing is a prelude, that is, it is conducted before the agricultural census.
- Evidence is collected in pre-testing through interviews andor objective measurement techniques.
- Pre-testing alternative census methods, the questionnaire and the enumerators' instructions and training programme are vital.
- An agricultural census should not be undertaken without adequate pre-testing.
- Pre-testing may also involve pilot surveys. In view of their importance they can be considered under a separate heading.

Pilot surveys. Pilot surveys are designed with the intention to secure facts and data to build a rational agricultural census. They are small-scale but highly specialized surveys and should be an integral and essential part of the census research phase.

Quality checks. For the evaluation of data quality of an agricultural census it is necessary to conduct quality checks of the data in order to determine the presence and possible magnitude of errors and biases. These quality checks are conducted as sample surveys during the census enumeration or just after it. Further (Zarkovich, 1966, p. 22, 23):

> "Quality checks are divided into two broad categories. In the first of these we put various types of *post hoc* techniques and in the other the use of sampling methods. As the name implies, the *post hoc* techniques are used after the survey is over and

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suggested for supervisors' training programmes are given in the 1980 Programme (FAO, 1976a, p. 63).

data are already tabulated and published. These techniques can therefore be easily applied to data from very old surveys. *Post hoc* techniques do not require any field work related to units included in the survey. On the other hand, quality checks conducted by means of sampling methods essentially represent field surveys taken at a time which is not too far removed from the reference period of the main survey. Sample checks thus provide fresh information for a sample of units on characteristics being checked and this information is used as a yardstick to measure the quality of the main survey."

In the same book (Zarkovich, 1966, p. 24, 39) some of the most typical and most frequently used *post hoc* techniques are presented, and drawbacks of *post hoc* techniques and advantages of sampling methods are summarized.

In view of this, "Sampling methods are, indeed, of primary importance in the whole range of activities associated with the quality problem in census data" (FAO, 1976a, p. 66). As Zarkovich stresses "...the use of sampling methods (is) suitable for quality studies in all countries, including those that are at the initial stages of their statistical activities." (Zarkovich, 1966, p. 38).

In the remainder of this chapter the practices of some countries in the 1980 WCA related to reliability of census data will be summarized, with particular reference to supervisors and quality checks. As the subject of enumerators was discussed in Chapter 7, it will not be considered again. The subjects of supervisors, pre-testing, pilot surveys and quality checks are considered below in that order. Examples are given also of some countries' activities in the 1980 WCA relating to each of these subjects.

SUPERVISORS

The *Programme for the 1980 World Census of Agriculture* notes that: "Experience has demonstrated that good supervision is a worthwhile investment" and gives the following recommendations on supervision (FAO, 1976a, p. 63):

"The best supervision is usually achieved by working with the enumerator on the job. At the start of the enumeration the supervisor should be present at several interviews of each enumerator. By listening to and observing the interviews, the supervisor may detect deficiencies and take immediate remedial action. Subsequent visits should be organized on a regular pattern: the observation of at least one interview and the inspection of a prescribed sample of questionnaires for completeness and internal consistency. When the enumerator has completed one phase of his work in a locality, the supervisor needs to review his work, to ensure that he has accounted for all households, interviewed all the holders and properly completed questionnaires for all holdings; in cases of shortcomings in any of these respects, enumerators must complete the work satisfactorily."

Special supervisory attention should be given to omissions in the lists of holdings. Experiences in many countries indicate that a significant part of listing errors result from difficulties in identifying households along the borders of the enumeration area. If the map or sketch of the locality does not clearly distinguish boundaries by natural features, the supervisor will need to give special attention to checking the accuracy of listings on the perimeter of the enumeration area.

The practices of Jamaica and the Republic of Korea in the 1980 WCA are given below as examples of countries that adopted this advice. In the enumeration manual of Jamaica (Jamaica, 1978, p. 5) the following instruction is given to enumerators:

"*Quality control during field work*

To ensure that your work is well done, the supervisor will do the following during field work:

(a) Scrutinize in detail all the questionnaires you complete to check that each interview has been completed properly.

(b) "Spot-check" some of the sample addresses, i.e. visit these addresses to confirm that you visited the correct address

and interviewed the correct respondent or respondents.

(c) Reinterview some of the respondents already interviewed by you. Often this may be done in cases where you were unable to obtain the correct information.

(d) Meet with you either singly or in a group to discuss your performance and any difficulties which you might have. The supervisor will arrange where and when you will meet.

(e) Regularly report back to Headquarters about your performance during the field work.

In addition to the above, representatives from Headquarters will occasionally visit you in the field (or assemble several enumerators at a centre).

It should be noted that the Census Officer may decide to dismiss any interviewer at any time during the field work if his/her performance is not considered adequate for the high quality which this census demands."

The following passages describe the practices of the Republic of Korea for supervision (Korea, 1980, p. 17-20):

"Supervisors

To execute the various stages of census procedures like Enumeration District (ED) setting, training, publicity and supervision of field survey smoothly and effectively, qualified supervisors are needed and drawn from the government officials of both central and local organizations....

Supervision of census work

The appointed supervisors are in charge of evaluating, the setting of EDs, checking the accuracy of listings, inspecting the work of enumerators, and solving problems during the field survey, especially in the case of the refusal of respondents."

Some countries make a distinction between administrative and technical supervision. In a review report of the Bahamas the following information is given:

"The administrative supervision was entrusted to the Commissioners of the Islands and technical supervision was by the

professionals of the Ministry of Agriculture. The responsibilities of the Commissioners were:

- To receive the Census material from the Central Census Office for the enumerators who will work in his district and distribute the same among them.
- Collect back the census material from the enumerators after enumeration is over in the district and return it to Central Census Office.
- Financial control in his district.
- Study carefully the manual of instructions for the enumerators and be able to solve their problems locally.
- Publicity — distribution of publicity material and getting cooperation of the people.
- To complete census questionnaire in the case of isolated holdings where the enumerator may not be able to go.
- To keep watch over the progress of the enumeration and see that the enumerator's work is completed in scheduled time.
- To help recruit suitable enumerators where needed.
- To report to the Central Office any neglect on the part of enumerators.

The main responsibility of the Technical Supervisors was to see that the enumerators used correct concepts and definitions involved in the census of agriculture as laid down in the *Manual of Instructions for the Enumerators* (Bahamas, 1978).

The same distinction is made in Bangladesh (Bangladesh, 1981, p. 8):

"The administrative supervision and control which involved organizing the census work, such as, making training arrangement for enumerator, attendance of enumerators, etc., were entrusted to the officers of general administration at the district, subdivision and thana levels. However, the basic responsibilities of operational and technical supervision and control of field operation at the mouza level were entirely shouldered by the Census Supervisors and Statistical Assistants,

who worked under the guidance and control of the officers and senior staff of the Agricultural Census Organization. A control room was set up at the headquarters manned around the clock by a senior officer."

PRE-TESTING

Pre-testing questionnaire

Pre-testing the questionnaire is very important because the questionnaire is the basis of an agricultural census. The high quality of a questionnaire will secure the success of the census, as explained here (Zarkovich, 1966, p. 87):

"Designing questionnaires is sometimes considered an easy task that can readily and satisfactorily be performed at any moment in the preparations for a survey. In actual fact, the opposite is true. In many cases, and particularly in the absence of sufficient experience, the preparation of the questionnaire requires careful study, experimentation and testing of alternative drafts under different conditions. The consideration is therefore a very responsible task."

For the agricultural census of 1983/84, Bangladesh conducted the following pre-tests (Bangladesh, 1983, p. 21-24):

"*First pre-test.* The first pre-test was conducted from 22 August 1981 to 15 September 1981 with the following main objectives:

(a) To test the suitability and applicability of two sets of census questionnaires, namely, a short questionnaire and a long questionnaire;

(b) To test and verify the item coverage of questionnaires;

(c) To identify the questions which the respondents find difficult to answer;

(d) To assess the abilities of the respondent to provide information against items of the questionnaires;

(e) To test and examine the wordings, concepts, definitions and procedures;

(f) To estimate the time required for filling in the questionnaires and also for completing other phases of work of the census; and

(g) To provide materials for preparing revised questionnaires and detailed instructions for the enumerators....

The pre-test was carried out by four Deputy Directors — one in each of the four Divisions. Each Deputy Director covered one mouza in every district within the Division. They personally enumerated 20 agricultural holdings in each selected mouza through direct interviews with the respondents and filled in the two types of short questionnaires. On completion of the pre-tests they submitted written reports narrating their experiences which were studied and used for making necessary modification in the questionnaire, etc. for the second pre-test.

Second pre-test. The second pre-test was conducted with the particular aim to study the new methodology in agricultural census data collection and method of data processing for early publication of census results. The choice was to use the Optical Mark Reader (OMR) questionnaire for the full count agricultural census. The plan was that the OMR machine would directly read questionnaires and convert data on to tapes for immediate next stage processing through the computer. This system was emphasized because it eliminated the traditional time-consuming key punching and data conversion operation and produced print-outs of final tabulation of census results much faster and without errors of data conversion.

The design of the OMR questionnaire, as well as its form, contents, and arrangement for recording answers, and its operational feasibility in terms of understanding particularly by enumerators, were studied in the second pretest. The questionnaire contents mostly related to major agricultural activities and major identifying crops. The questionnaire was to be canvassed for every household in the mouza. ...

The long questionnaire was also tested in the field. The problems faced during field enumeration were noted for subsequent resolution."

The quotation below discusses "Studies, on survey items and pretest" in Japan (Japan, 1980, p. 10):

"(a) Studies on survey items, definitions and the classification of farm households

These studies were conducted in 1978 and 1979 by an agricultural census study group composed of researchers (men of learning and experience entrusted beforehand) and officials of the Ministry of Agriculture, Forestry and Fisheries. In these studies, organization-study meetings and conducting field surveys were often practised. The contents of the studies are as follows:

(i) It was considered to be necessary to revise survey items in response to changing circumstances for agriculture and various demands were made in various circles. On the other hand, an urgent task was to simplify the survey procedure and to increase efficiency. Studies were thus made as to the revision and quantity of survey items.

(ii) With changes in agriculture, some of the definitions concerning farm households, land or agricultural labour and relevant provisions become unsuitable and need to be revised. It becomes also necessary to make new provisions concerning the new phase. Studies were thus made for revising them.

(iii) A system of classification concerning management size, full-time and part-time, etc. were previously used to divide farm households by class and form. However ... some problems have arisen. It was thus necessary to study them, including the method of statistical presentation.

(b) Pretesting of the questionnaire

A pretest was conducted in 1979 jointly by the officials of the Ministry of Agriculture, Forestry and Fisheries, prefectural governments, the agricultural census study group and supporters, using a pretest questionnaire prepared on the basis of the studies made by the agricultural census study group, etc. for the purpose of ascertaining the problems in the survey and checking.

The pretest was conducted by interviewing farm households with the test questionnaire to study the degree of comprehension of survey supporters, accuracy of survey values, etc., with regard to the arrangement of survey items, comprehension of the objectives of survey items, expression of questions and instructions."

Internal consistency of a questionnaire could also be used as a check for the quality of data collected in an agricultural census. For example, the total area of the holding should not exceed the sum of the total areas recorded in the questionnaire for each of the five major classes of land use. The sum of irrigated and not irrigated areas should be equal to the total area.

This is the nature of the consistency checking in Trinidad and Tobago (Trinidad and Tobago, 1982b, p. 4):

"(a) Consistency checks

In this type of checking, the relationship between various entries is examined to ensure that entries are not in conflict. For example, in Section 3, the enumerator may have recorded the net acreage operated as say, "10 acres", but in Section 4, he may erroneously record 30 acres of cocoa under cultivation.

(b) Accuracy and reasonableness checks

Accuracy checks mainly involve checking of totals where recorded. For example, the acreage of clonal cocoa plus the acreage of all other cocoa in Section 4, should add up to 'total all cocoa'."

Measurement

Measurement, if properly done, is, of course, an important means of obtaining good quality data, and can be used in the pre-testing phase or during enumeration. But measurements are not without problems, especially when there are different enumerators and therefore a variety of methods of measurement which result in errors and biases.[1]

The majority of countries that participated in the 1980 WCA did not report the use of objective measurements in their agricultural censuses.[2] Only the countries in the Africa region and a few countries in Asia and the Pacific reported the use of measurement in the 1980 WCA.

In recent years remote sensing has gained some importance in measurement. Some countries now recommend its use. The following two recommendations are thus among the conclusions and recommendations of the seminar held on 1-4 December 1984 in Iraq by the ESCWA (ESCWA, 1985, p. 42):

"The participants recommend,

(a) using objective methods, including aerial photography and remote sensing, in the collection of agricultural statistics whenever possible ...

(b) using advanced methods of aerial photography in estimating the number of cattle in deserts and pastures, provided studies are made to determine the ownership of herds moving between neighbouring Arab countries."

But it seems that it is unrealistic to expect a great deal from remote sensing at present. In any case, this was not a widely used method in the 1980 WCA. The following paragraph clearly illustrates this point (Canada, 1979, p. 11):

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[1] For summary of these biases see *Quality of statistical data* (Zarkovich, 1966, p. 60-64).

[2] It should be pointed out that the measurements mentioned here are measurements made during the census and generally by enumerators.

"The use of remote sensing (aerial photography or satellite imagery) which has emerged as a potential vehicle for statistical estimation in recent years could be considered as an alternative to the Census for certain types of agricultural statistics. However, the information available is limited to what can be detected by these methods (land and crop areas) and the costs associated with this method at the present time make it an unrealistic alternative."

The practice of Turkey in the 1980 General Agricultural Census provides a good example of the components and phases of pre-testing (Turkey, 1983, p. xvi-xvii):

"Pilot studies for the 1980 General Agricultural Census

The 1980 General Agricultural Census Committee, taking into consideration the viewpoints of various organizations and experiences gained from the previous censuses, undertook pilot studies in certain settlements in order to collect basic information required for improving the census programme.

The first pilot studies were undertaken in Bursa and Erzincan provinces in July 1978. The questionnaires for households and villages were applied at two stages in 18 villages selected from Erzincan province for 28 days and in 21 villages selected from Bursa province for 23 days. The results of these pilot operations were used in the preparation of the census.

In order to define large agricultural holdings and to determine the kinds of crops, members of the agricultural census committee visited sample settlements in all agricultural regions in April and May 1979 and had discussions with the authorities of the related organizations.

Pilot studies on the census methodology and questionnaire were undertaken in six villages of Ankara province in 1979. Field work using objective methods was also undertaken in the same places."

The results from these pilot studies were significant to the decisions made regarding the scope, method, time reference and questionnaire of the census.

PILOT SURVEYS

It was noted above that pre-testing may also involve pilot surveys or pilot censuses. In *Census Bulletin* No. 2 the following observation is made (FAO, 1979-1989):

> "Countries were asked to state the purpose(s) for which the pilot or experimental census was or will be used if undertaken. The responses are given in the table below, indicating the number of countries in each region and the purpose of the pilot census [Table 31]. If the response to the questionnaire was left blank it has been interpreted that no pilot census was or will be undertaken. Almost all countries in the developing regions stated that they have or will carry out a pilot census. Out of the 16 countries that did not carry out the pilot census 10 were in Europe (Czechoslovakia, Denmark, Finland, Federal Republic of Germany, Ireland, Italy, the Netherlands, Poland, Sweden, the United Kingdom)."

Two examples of pilot censuses conducted prior to the main census are given below.

In Bangladesh the following pilot census was conducted in 1976 for the Agricultural Census of 1977 (Bangladesh, 1981, p. 4, 5):

> "On the direction of the Agricultural Census Committee a full-dress Pilot Census was conducted in May 1976 in selected mouzas under 16 thanas in 16 districts of the country. The main objectives of the Pilot Census were the following:
>
> (a) To examine the quality of the frame of the mouzas published by the Directorate of Land Records and Surveys.
>
> (b) To examine the suitability of the draft questionnaires under field conditions particularly from the point of view of responses of the cultivators to the questions asked and the time required to fill up the questionnaire.
>
> (c) To obtain estimates of the variance components.
>
> (d) To judge the ability of the proposed primary enumeration agency as well as the requirements of training and management.

TABLE 31

Number of reporting countries that planned a pilot census by region and by purpose of the pilot census

Purpose	Region						Total
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	
Testing lists	9	7	2	8	7	—	33
Testing questionnaires	13	9	6	14	6	—	48
Testing enumeration procedures	10	8	3	10	5	—	36
Testing training programme	9	8	—	12	5	—	34
Testing methods of data processing	7	7	5	10	2	1	32
Other purposes	8	5	1	3	—	—	17

(e) To develop a tabulation programme and the corresponding computer processing system.

An attempt was also made in the Pilot Census to examine the feasibility of collecting information regarding area under crops by two alternative methods. According to the first method information regarding areas under different crops in a farm holding was asked for the holding as a whole. In the second method information regarding utilization of land during the reference period was asked plot-by-plot. The second method was followed in a small sub-sample of the selected sample and canvassing of the alternative approach was entrusted only to the senior staff of the census organization.

A detailed report on the findings of the Pilot Census was published. The experience and results of the Pilot Census were utilized in designing and conducting the Agricultural Census."

It was decided to hold a pilot census in accordance with the recommendations of FAO for the 1981 Census of Agriculture in

Suriname. The objectives of this pilot census were as follows (Suriname, 1981b, p. 2, 3):

"(a) To assess the adequacy of the questionnaire to collect the desired information and also to find out the appropriateness of the language of the questions and holder's ability to provide the qualitative and quantitative answers to the Census questions.

(b) To identify the questions under realistic conditions for which desired information can or cannot be collected, including the bias of the farmers to answer certain questions.

(c) To find out the clarity of definitions, concepts and procedures to collect the data.

(d) The possibility of collection of data by moderately educated and experienced enumerators.

(e) To work out the time required to fill one questionnaire and estimate the requirements of staff and the budget.

(f) Time required to train the field staff including the supervisors.

(g) Adequacy of the proposed field organization to conduct the Census....

Keeping the objectives in view, it was decided to have the Pilot Census in 4 districts out of 8 districts in all. The 4 selected districts represent the cropping pattern and climatic conditions of the country and also comprise more than 90% of the cultivated area in the country.... It was decided to cover 50 holdings in each district to give a fairly good idea about the proposed census.

Organization of the pilot census

Each of the 4 selected districts for this purpose were put under the charge of 4 different supervisors, viz. Head of the Bureau of Agricultural Census, Deputy Head of the Bureau of Agricultural Census, the Statistician and the FAO advisor on Agricultural Statistics. The district agricultural officers and the

four supervisors from the Ministry of Agriculture worked as a team in each of the selected districts and gave separate reports on the Pilot Census. The programme extended for a week. On the first two days the training of the enumerators and supervisors selected for this purpose was completed. The third day was used for field training. The questionnaires were filled on the fourth and fifth days."

QUALITY CHECKS

FAO has made the following statement about the necessity for quality checks (FAO, 1978, p. 112):

"The agricultural census is a big operation. A large number of field enumerators and supervisors is employed for the collection of data. The size of the questionnaire becomes large as information is needed on a large number of characteristics of the operational holdings. Many of the items are not easily observable. The respondents in the case of the agricultural census are farmers who often are not educated and are neither quality nor quantity conscious. Cultivation practices vary considerably from region to region, particularly if the country is very large. All these factors affect the quality of data in different ways. Biases of varying order exist in the data, depending on the conditions under which the census is conducted. Bias in data collection exists irrespective of whether the census is based on a sample or on a complete enumeration. It is, therefore, necessary to exercise some kind of quality check on the data collection."

When should quality checks be conducted? "In recent statistical practice check surveys have usually been conducted after the original survey has already been made." (Zarkovich, 1966, p. 290). Thus, "The post-enumeration check through sample surveys is a very common practice studying the accuracy of the census results." (FAO, 1978, p. 115).

Census Bulletin No. 2 notes under the heading of "Post-Enumeration Survey" (FAO, 1979-1989, p. 15):

> "There were two questions in this section; one asked whether the post-enumeration survey was undertaken or not and the second enquired about the purpose for which it was carried out. The responses by region are summarized in the table below [Table 32]. In all, 37 countries had undertaken the post-enumeration survey and most of them reported more than one purpose for which it was undertaken. The two main purposes indicated by 29 countries were to estimate non-sampling errors and to check the quality of the data collected. Eleven countries also reported the checking of processing errors."

In the following pages the practices of four countries concerning post-enumeration surveys in the 1980 WCA are summarized.

Canada. In the 1981 Census of Canada under the heading"Methodology of the Evaluation" an interesting explanation is given of the post-enumeration quality check. The following passages are extracted from this publication (Canada, 1984, p. 11-17):

> "It is inevitable in an undertaking of the size and complexity of the census that errors will occur.
>
> The potential errors may be divided into two main classes, coverage, and response. Coverage errors occur when a census farm is missed or counted more than once, or a holding which does not belong to the universe of interest is included. For example, difficulties in locating and identifying agricultural holdings, or in interpreting the definition of a census farm, may result in over or under enumeration. The variety of types of organization under which holdings are operated may also cause problems in achieving coverage of the entire population of census farms.
>
> The second type, response error, occurs within the data for holdings which have been correctly included in the census. Errors may arise at the initial collection of the data or during

TABLE 32

Number of reporting countries that planned to conduct a post-enumeration survey by region and by purpose of the survey

Purpose	Region						Total
	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	Near East	North America	
To estimate non-sampling errors	9	7	2	7	3	1	29
To check data	9	7	4	7	2	—	29
To check processing errors	6	1	1	3	—	—	11
Other purposes	2	—	—	4	—	—	6

subsequent processing stages; potential sources include misinterpretation of a question by the respondent, partial or total non-response, or errors introduced during data capture, coding or other processing stages....

1981 Evaluation study. As in previous years, the quality of the 1981 Census of Agriculture was studied through comparison with alternate, independently-collected agricultural data. Two annual probability surveys conducted by Statistics Canada, which together produced estimates for the majority of the country, comprised the major sources of comparable data. For certain specific subject areas additional sources of information, such as administrative data or other Statistics Canada surveys, were also employed.

Methodology of the census and AES-FES. The two probability surveys which served as the basis for the evaluation study were conducted in July 1981, just one month after the census. The Farm Enumerative Survey (FES) covered the Prairie provinces plus the Peace River district of British Columbia, while the provinces of Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario and the non-Peace River area of

British Columbia were covered by the Agriculture Enumerative Survey (AES).

Data for the AES and FES were collected for a random sample of farms belonging to the universe of interest. The samples for the surveys were drawn from an area frame, supplemented by a list frame of farms which were major producers of certain important commodities. Data collection was performed by trained enumerators during a personal interview with the operator of each selected farm. Since data were obtained from only a sample of holdings, an estimation procedure was then required to scale the values up to the level of the entire population.

The survey estimates were subject to the same types of coverage and response errors as those from the census. However, due to the concentration on a smaller number of holdings, and the improved control of operations which would hence be possible, it is expected that these types of errors would have a lesser impact on the surveys. On the other hand, since the survey estimates were derived from a random sample, they are subject to sampling error. This reflects the fact that, if a different sample were selected for the survey, and were enumerated using the same data collection, capture and processing methods as for the original sample, different estimates would be obtained. Sampling error is a measure of the variation between the estimates obtained from the random sample and those which would be obtained if enumeration of the entire population took place. Census of Agriculture figures were not subject to sampling error as they were based on a 100% enumeration of the population and not on a sample.

Two major methods were employed for the comparison of the census and survey data.

(a) Macro-comparisons

For the major items of interest it was desired to compare census and survey estimates at the province and region levels...

The macro-level comparisons with the survey estimates provided an indication of possible overall biases in the census data. Further study was initiated when suggested by the results of preliminary tabulations.

(b) Micro-level match

In order to study census and survey response differences at the individual farm level, records from the two files were matched in a computerized linkage operation. The name, address and telephone number of the operator of each survey farm were used to identify the corresponding census record....

The micro-level match provided valuable insight into differences in response between the census and the surveys. However, some bias was introduced into the results by the existence of survey records for which the corresponding census record could not be located by the computer. Particular problems, such as differences in spelling of names and addresses and changes in operator between the census and survey dates, made a computer match impossible in many cases. In order to study the extent of non-matches which had resulted from difficulties in the computer match process, and for which corresponding census farm did in fact exist, the manual resolution of non-matches was initiated. Examination of the unmatched survey records which remained following the manual linkage operation provided information on coverage which could be beneficial in planning the 1986 Census of Agriculture."

Japan. For Japan the following information is provided (Japan, 1980, p. 14):

"(a) Post-census survey

This survey was conducted in July-August 1980. The survey was intended to check the accuracy of the results of the survey of farm households and to supplement them for effective and appropriate use of the survey results.

(i) The survey was conducted by the organization composed of the Ministry of Agriculture, Forestry and Fisheries, prefectural governments, municipalities and numerators.

(ii) As regards the objects of the survey, 1/100 survey districts were selected from the districts of farm households survey by random sampling and all farm households in these sample survey districts were covered by the survey.

(iii) The survey was conducted on February 1, 1980 (December 1, 1979 for Okinawa Prefecture) by numerators (selected, as a rule, from the supervisors for the 1980 census) by interviewing the farm households.

(iv) The questionnaires collected by enumerators were checked by municipalities and then sent to the prefectural governments for checking. They were then sent to the Ministry of Agriculture, Forestry and Fisheries.

(v) The Ministry then checked the questionnaires before conducting tabulation by computer."

Republic of Korea. The following extract details the post-enumeration survey conducted in the Republic of Korea (Korea, 1980, p. 24, 25):

"(a) Purpose and method of the post-enumeration survey is to evaluate the completeness (duplication or omission) of coverage and check the items covered in the Census. The survey is taken on the basis of the stratified multistage sampling method.

(b) Items to be covered

(i) For coverage check

a. Number of farm household, by type of farming

b. Duplication and omission of farm household from the census

c. Number of farm household moving in and out

(ii) For contents check (subheadings deleted)

a. Number of family members by age and sex

b. Employment
c. Land utilization
d. Livestock and poultry
e. Fruits."

Thailand. An FAO report presents the following on the post-enumeration survey in Thailand (FAO, 1979-1984, No. 13, p. 34):

"The census plan called for two phases of field operations. In the first phase, a complete listing of all households/dwelling units was prepared so as to obtain data on number of agricultural households and their elementary characteristics in each enumeration district. In the second phase, detailed interviewing was done to all those agricultural households/holdings possessing holding areas of 2 rais (0.32 ha) and more or with five or more cattle, swine, or with 100 or more poultry or with earnings of 5 000 bahts ($250) or more from farming during the last twelve months. For this, important census items were covered on a 100 percent enumeration basis whereas items of secondary importance were covered on a 25 percent sample enumeration basis.

After the two phases of the field operation which were completed at the end of April 1978 the National Statistical Office conducted a post-enumeration survey (PES) in about 5 per cent of the enumeration districts during the months of May and June so as to evaluate the quality of the census data. The main purpose of the post-enumeration survey was to measure the size and extent of the coverage-error and the content-error of the data at regional and national level. For this, two phases of the post-enumeration survey were adopted. The first phase involved a completely independent relisting of the households-//dwelling units in the sample areas by more experienced groups of field enumerators. The data obtained from the relisting (PES data) were matched against the result of the

census listing for the purpose of computing the gross coverage error as well as the net coverage error.

The second phase of the post-enumeration survey operation aimed at measuring the size and extent of the content-error through re-interviewing technique. For this, about 14 000 sample agricultural households were selected. The samples were selected only from those agricultural households which were matchable from the census listing and the post-enumeration survey listing so as to ensure comparability of the responses obtained through two different interviews."

Finally, it is instructive to study the following timetable for the 1980 agricultural census in Japan before closing the chapter (Japan, 1980, p. 7):

"*Plans carried out and future plans*

1977: Study on the implementation of the 1980 World Census of Agriculture and Forestry. Full-dress pre-test (conducted in February, 1978).

1978: Study and implementation of surveys necessary for determining the survey method, enumeration, survey items, definitions, classification of farm households, etc.

1979: February: Pre-test of the questionnaire.
May: Enactment of regulations for census taking in agriculture and forestry. First guidance meeting for prefectural governments.
July: Appointment of supervisors.
July-November: Survey districts set up; preparations carried out.
November: Appointment of enumerators.
December: Preparation of the listing sheet.

1980: February 1-15: Census conducted (Dec. 1-15, 1979 for Okinawa Prefecture).
February-May: Questionnaires checked.
April-June: Data on questionnaires transferred to punch cards.

June-October: Computer tabulation.
August: Post-census survey conducted.
November 28: First public announcement of the results.

1981: January-December:Preparation of various reports at prefectural and municipal levels.
June-October: Sampling survey conducted (dynamics of the agricultural structure, management structure by sector, agricultural employment structure).

1981 November - 1982 March: Preparation of various reports (results of general tabulation and sample tabulation), explanatory notes on the results of census.

1982 April - 1983 March: Preparation of distribution maps by municipality based on main indicators, cumulative census statistics, etc. Study on the 1985 census."

Chapter 11

The 1980 World Census of Agriculture in perspective

The most important features of the 1980 WCA and the *Programme for the 1990 World Census of Agriculture* are summarized in this chapter. In the first section the main features of the 1980 WCA, with particular emphasis on the differences of the 1980 from the 1970 WCA are explained. The second section considers briefly the chief problems after the 1980 WCA and their proposed solutions in the 1990 Programme.

THE MAIN FEATURES OF THE 1980 WCA

In considering the highlights of the 1980 WCA and determining its differences from the previous agricultural censuses one important fact should be noted: "The 1960, 1970 and 1980 Programmes have all brought refinements to the 1950 Programme. The refinements introduced at each succeeding programme were mostly in the direction of widening the scope of WCA" (Avralioglu, 1983, p. 39).

The *Report on the 1960 World Census of Agriculture* stresses the importance of sampling methods in agricultural censuses (FAO, 1969, p. 6).[1]

[1] This point is emphasized in a paper discussed by the FAO Statistics Advisory Committee of Experts (FAO, 1973, p. 2). Another important element in the 1960 WCA was the idea of Regional Programmes in addition to the basic World Programme.

"It will be seen from this brief presentation that the appearance of sampling methods on the scene of census methodology has been the main source of innovations in the 1960 censuses. In addition to the fact that sampling has made it possible for many countries to take their first census one has to recognize that it was basically due to sampling that the census methodology has become more flexible, more suitable to the conditions of the countries involved and more efficient. Sampling has made possible the utilization of broader census programmes either by collecting some data from a sample of holdings or by splitting up the programme and taking surveys of parts at different times. Sampling has also made possible a better quality of data. Sampling has also introduced the idea that data on different characteristics can be collected by different methods and even at different times. This is why in many countries area data were obtained through measurements, yield data with the help of crop cutting, and some other data at a time which was particularly suitable to reduce the memory lapses. In this way the use of sampling methods has opened the door to many deviations from the classical census methodology.

The Programme for the 1970 WCA has retained the content of the 1960 Programme.[1] However, it has elaborated in a more specific way the advantages of sampling methods and the areas of their uses. This contributed to the development of a flexible census methodology which has made possible census taking in countries where it would not have been possible otherwise. In addition, the use of sampling methods made possible better preparation of censuses on the basis of pretesting and the achievement of more accurate results on the basis of quality

[1] Comparison of the 1970 Programme with the 1960 Programme has been made in FAO, 1977, p. 16-18. The major change was the introduction of a new section that deals with a new concept, namely, the association of agricultural holdings with various other industries.

checks and the experimentation related to the choice of working methods." (FAO, 1973, p. 2).

The *Programme for the 1980 World Census of Agriculture* does not exclusively endorse the sampling method. The following extract (FAO, 1976a, p. 14) highlights the difference between the 1960 and 1980 programmes on this point.

> "The Programme for the 1980 WCA allows the countries to decide whether a complete enumeration of holdings, a sample census, or a combination of both is more suitable to their conditions and requirements. Countries are urged, however, to undertake the necessary research and preparatory studies for deciding on the most appropriate census methodology. A combination of complete enumeration and sampling may prove to be desirable in some countries, while a sample census may still be the most practicable method in many countries."

Another important element in the 1960 WCA was the idea of Regional Programmes in addition to the basic World Programme.

> "In the preparation of both the 1960 and the 1970 Programmes it was considered that, in addition to the World Programme, there should be a Regional Programme for each of the more important regions of the world." (FAO, 1974b, p. 19). However, "Experience in the 1970 Programme showed that most countries did not implement the special provisions included in their specific regional programmes. Accordingly, no such separate regional programmes are envisaged for the 1980 census." (Khamis and Alonzo, 1978, p. 2).

The FAO Statistics Advisory Committee of Experts made the following remarks on the draft programme for the 1980 WCA (FAO, 1975b, p. 1, 2):

> "There has been almost a consensus of views that the 1980 World Census Programme should be much more flexible than the preceding FAO decennial programmes. Statistical development, socio-economic conditions and statistical requirements differed considerably amongst countries. Also, differences

> amongst countries within small regions were so great that the idea of a regional programme appeared to have lost much of its merits....
>
> An increased measure of flexibility is also attained by abandoning the presentation of the list of items in the form of an expanded list and a short list. Only one list of items is presented in the 1980 Programme as a guide to countries supplemented by a brief indication of those items which are specially recommended or desirable for national and international purposes."

Thus, "Another priority in preparing the 1980 Programme was the introduction of greater flexibility, to allow countries more freedom in adapting the Programme to their own national requirements and conditions, as well as to provide data essential for international purposes." (FAO, 1976a, p. 3).

The 1980 Programme is organized into five chapters as compared with the two chapters of the 1970 Programme. One of the additional chapters, Chapter 2, "outlines the significant characteristics of agricultural censuses and draws attention to a number of important recent developments having a bearing on these characteristics. Some of these developments are new, and others have gained relevance during the last decade." (FAO, 1976a, p. 6). Chapter 2 thus details the holding; frequency, scope, coverage and methodology of census; the place of agricultural statistics; recent trends in data requirements on agricultural population and employment; registers of holdings; community statistics and classification and tabulation requirements.

The second additional chapter, Chapter 5, concerns "Guidelines for the taking of a Census of Agriculture." "Basic guidelines to be used in preparing and implementing a census of agriculture are briefly outlined in this chapter. The aim is to provide a checklist of the major aspects rather than an exhaustive treatment. These guidelines are mainly applicable to conditions prevailing in developing countries." (FAO, 1976a, p. 59). This chapter also

includes a number of points considered in the "Introduction" of the 1970 Programme.

The title of the third additional chapter is "Tabulation Programme." It was no longer suitable to give the tabulation programme under each section as in the 1970 Programme, so the tabulation programme for the 1980 Programme is given in a separate chapter. Avralioglu explains (Avralioglu, 1983, p. 12):

> "Because of the increased availability of computer facilities in many countries, the 1980 Census Programme proposed a much wider range of tabulations than previous programmes. It recommended that, in addition to total area of holding, other classification criteria should also be used in tabulating the results. It proposed 10 general tables for tabulating the holdings and their characteristics, each table being based on one of the various classification criteria."

An increase in the use of computer facilities was indeed evidenced. As noted in Chapter 10, almost all responding countries used electronic computers or a combination of electronic and manual methods for processing and tabulating census data in the 1980 WCA.

But the following warning must be recalled (FAO, 1974c, p. 5, 6):

> "The Committee (FAO Statistics Advisory Committee of Experts) was informed that over 90 percent of countries which participated in the 1970 WCA used the electronic computer and, hence, it would be expected that practically all the countries would be in a position to use a computer for the processing of the 1980 census. It appeared, however, that a number of countries were experiencing a long delay in the processing and the publication of final census results. This delay was attributed mainly to the lack of adequate preparations, the increasing requirements for detailed cross-tabulations, and the lack of qualified computer personnel. It was also noted that the processing of agricultural censuses often did not receive

sufficient priority. In an appreciable number of countries there were also difficulties and delays in printing."

Another point of difference is the importance the 1980 Programme gives to the register system, which was explained in Chapter 7. The 1980 Programme recognizes the importance of the register system as noted below (FAO, 1976a, p. 11):

"The register is particularly useful if it is combined with an adequate computer system for storing information and thus facilitating data retrieval, tabulation and analysis, as well as computer selection of samples for special surveys. The establishment of such registers is therefore considered very useful, but may not yet be feasible in most developing countries, especially where no relevant administrative regulations exist. ... The possible combination of data from a farm register or an annual census with data obtained from a decennial census of larger scope may be expected to provide a new stage in the future development of agricultural statistics."

Some important changes were made in the number and composition of sections in the 1980 Programme. The 1980 Programme has eight sections whereas the 1970 Programme had 11. Section 9 of the 1970 Programme (wood and fishery products) has not been pre-tested as a separate section in the 1980 Programme. Section 2 (holder) of the 1980 Programme was not a separate section in the 1970 Programme — it was in the first section of the 1970 Programme. Section 3 (population and employment) of the 1980 Programme replaces and combines Section 4 (employment in agriculture) and Section 5 (farm population) of the 1970 Programme. There is only one section, Section 8 (selected practices and facilities), in the 1980 Programme in place of three sections (7, 8 and 10) in the 1970 Programme.

Major changes have been introduced in Section 3 and Section 7 (machinery and equipment) of the 1980 Programme. "Type of holding" which was introduced in the 1970 Programme has been dropped in the 1980 Programme.

MAIN PROBLEMS AND PROPOSED SOLUTIONS OF THE 1990 PROGRAMME

In developing countries the agricultural census has been considered to be the main source of all types of agricultural statistics. Because of the increase in the demand for data, the scope of the WCA programme as the main source has become larger. This enlarged scope, and the larger questionnaires, had negative effects on the accuracy and quality of data.

This reduced accuracy was the main problem experienced in the 1980 WCA. The 1990 Programme proposes to solve this problem by: performing the census of agriculture as a component of the national system of agricultural statistics; limiting the scope of the agricultural census and using the census as a framework for other agricultural surveys. These points are explained below (Khamis and Alonzo, 1978, p. 3, 4):

> "The scope of national agricultural censuses has been gradually increased to include a number of characteristics which are not necessarily of a structural nature. Consultations with producers and users of data indicate that they need more data, particularly in the fields of agricultural population and employment (including part-time farming), community statistics, agricultural services and attributes of smallholdings, and that they tend to obtain them through the agricultural census ... The development of data-processing technology, with improvements in the quality and capacity of electronic computers and related software, and the development of sampling techniques that render obtaining data less costly, have encouraged this trend."

In countries with developed statistical systems, such benefits accruing from a census of agriculture are coupled with the use of the experiences gained in various surveys when planning the census. But in some (developing) countries that do not have adequate programmes for agricultural surveys, an agricultural census is the main source of all types of agricultural statistics. These countries have been trying to satisfy all their needs for agricultural statistics

through the decennial census. Accordingly, as the needs of data have increased, the scope of the censuses of agriculture has also become larger. This trend has made the agricultural census an expensive and long-term operation. In fact, in many developing countries external financial assistance has become essential to conduct a census of agriculture. Furthermore, in these countries the census results are not fully available for several years after the field work is completed.

Special mention must also be made here of the negative effects of the enlarged scope on the quality of data collected. Although sampling techniques help reduce the number of respondents, long questionnaires cause various errors. Even with an enlarged scope, it has not been possible to cover every topic of interest in a census of agriculture. For example, data needed for farm management studies and for the agricultural component of national accounts are not available in most developing countries. On the whole, the experiences of developing countries with agricultural censuses of greater scope have not produced a positive effect on the possible development of other sources of agricultural statistics.

A new and important recent development that follows from the increasing need for data, is the appearance of community statistics.

The census of agriculture is a "holdingwise" census. This means that it provides data on the various characteristics of agricultural holdings. It appears, however, that this information is not sufficient for planning purposes and for the preparation of measures to improve the standard of living. The census of agriculture provides data by small units on the areas of various crops, number of livestock, number of fruit trees, etc. and offers in this way a picture of the production capacity of these units. However, this information does not seem to be sufficient for a broader study of various aspects of the standard of living and for the planning of measures for the improvement of conditions. Thus, the census does not say if an agricultural market is available in the

community, what services can be counted upon by the farmers, if there is a school nearby, a pharmacy, a post office, etc.

The 1980 Programme offers the following approach on community statistics (FAO, 1976a, p. 12): "Countries are therefore encouraged to consider to what extent they can utilize the agricultural census operations for the purposes of collecting community data." However, "The Programme for the 1980 WCA does not enter into the details of community statistics."

There is no doubt that the collection of food and agricultural statistics is of vital importance. But the decennial census is not the only way to collect these statistics and in view of the ever-increasing need for data, the agricultural census cannot be used as the sole way of collecting agricultural data. Thus, the restriction of the purpose of the agricultural census and the use of other sources of data is a necessity.

The 1990 Programme, taking these points into consideration, encourages a limited scope for the agricultural census. With this limitation the narrowed "purposes of the census of agriculture as proposed in the 1990 WCA Programme are:

- (a) to collect data on those aspects of agricultural structure which change slowly over time;
- (b) to provide a frame for other agricultural surveys." (FAO, 1984b, p. 14).

The 1990 Programme proposes that the census of agriculture should be performed as a component of a national system of statistics. A national system of statistics is composed of subsystems, each of which has a different subject matter and one of which is agricultural statistics. A national system (or subsystem) of agricultural statistics is an interlinked set of data sources. The agricultural census is one of these sources, and additional sources include other agricultural surveys, administrative records and locality statistics.

Thus, in this proposal, the agricultural census is one source among others. However, it is a basic source, and countries could build their national systems of agricultural statistics using it as a base. This base could be used as a framework for the following agricultural surveys (ESCWA, 1985, p. 30):

"– Annual agricultural production surveys;
- Farm management survey;
- Rural household income expenditure survey;
- Food consumption survey;
- Survey on post-harvest losses;
- Survey on agricultural service establishments;
- Rural labour force survey;
- Soil survey;
- Livestock survey; and
- Survey on particular agricultural subjects and non-agricultural censuses or surveys."

In fact, previous programmes recognized and supported the integrated national system of food and agricultural statistics (FAO, 1969, p. 7): "The main feature of the 1960 censuses is probably the tendency towards an integration of censuses of agriculture and current statistics." The 1970 Programme stated (FAO, 1965, p. 1):

> "Agricultural censuses offer an excellent base and framework for planning surveys to secure agricultural statistics; its data can also be used as a bench mark and as supplementary information for improving the precision of current agricultural statistics. Technical and organizational training of the personnel required for carrying out the agricultural census can be exploited for the purpose of organizing other agricultural statistics. In countries where no statistical organization exists to collect agricultural statistics data, the trained census staff may be the nucleus for gradually developing a permanent agricultural statistical system."

The Programme for the 1980 WCA therefore emphasizes the

importance of ensuring that the planning and implementation of the agricultural census are fully utilized in preparing, implementing and improving all relevant components of the national integrated system for food and agricultural statistics and in the development of an adequate system for collecting, processing and disseminating information on food and agriculture (FAO, 1976a, p. 10).

However, the emphasis in the Programme for the 1980 WCA and other previous programmes of the WCA was always on the decennial census of agriculture and the recommendations for organizing other surveys, improving administrative records and developing locality level statistics contained in previous programmes were of a general nature only.

One necessary result of this approach of a national system of statistics is the simultaneous use of data collected through various sources. For this, uniformity in concepts, definitions and classification is essential. One of the basic aims of the 1990 Programme is to ensure "that concepts, definitions and classification criteria used in the census are harmonized with those used in other data sources, both agricultural and non-agricultural." (FAO, 1986a, p. 5).

Case studies

AFRICA

Ethiopia: 1976/77 Census of Agriculture

The 1976/77 Agricultural Sample Census was the first agricultural sample census conducted in Ethiopia and was called "The Small-Scale Agricultural Sample Census" to indicate that the size of the sample was determined to get national estimates of reasonable precision.

Preparation for the census started in the middle of 1974. Two agricultural sample surveys were conducted to pre-test the methodology and organization. The census was conducted after approval was obtained from the National Committee for Agricultural Census which was set up to give policy guidelines for its execution.

The census covered all types of holdings in the country, i.e. private peasant holdings, state farms and cooperatives.

Private peasant holdings were investigated on a sampling basis, while state farms and cooperatives were investigated by complete enumeration. Two regions, Eritrea and Tigrai, as well as nomadic areas were not covered.

The census covered the following topics: rural population and employment in agriculture; land utilization; area under crops; crop yield and crop production; livestock and poultry; agricultural machinery and equipment and selected practices and facilities.

Two-stage sampling was applied as follows:

- At the first stage one percent of PAs (Peasants' Associations) and 225 FAs (Farmer Associations) were selected with equal probability separately for each region. Before selection, PAs

were stratified into 14 strata and selected systematically with a random start in each region.

- At the second stage a complete list of holdings was prepared for each selected PA and holdings were stratified into two strata: holdings with cropland, and other holdings. From each FA, 20 percent of holdings were selected if the total number of holdings was not more than 150; 10 percent of holdings were selected if the total number of holdings was from 151 to 500 and 5 percent of holdings were selected if total number of holdings was above 500.

Holdings were selected systematically with a random start and proportionally to the total number of holdings in each stratum.

Fields for objective measurements were selected separately for each FA and crop systematically with a random start: 25 percent, 33.3 percent and 50 percent of the fields were sampled from selected holdings respectively depending on the type and frequency of crops.

Out of 225 selected PAs in 12 regions, 200 (or 88.9 percent) PAs were investigated from which 5 045 holdings were selected, but for different reasons 203 holdings were not covered, and only 4 812 holdings were interviewed. During the editing of questionnaires 68 holdings were rejected as wrongly done, and 4 744 holdings (or 85.2 percent of expected number of holdings from the 225 selected FAs) were accepted for final processing. For field area measurement 4 590 fields were selected and 3 994 fields (or 87 percent) were measured. During editing 121 fields were rejected as wrongly done, and 3 873 of the selected fields (or 84.4 percent) were accepted for final processing.

Crop-cutting experiments were conducted on 1 010 fields only instead of 1 530 fields selected for the purpose (i.e. 60 percent of the expected number of fields).

Togo: 1982/83 Census of Agriculture

Togo, with an area of 56 600 km^2, is divided into five economic regions which, in turn, are subdivided into 20 administrative districts. The total population was estimated by the United Nations at 2.7 million in 1980.

Previous censuses. There were two previous agricultural censuses in Togo.

1960 census. This sample survey was carried out in the Southern Regions in 1961-62 and in the Northern Regions in 1962-63 by the General Statistics Service. The country was divided into 33 agricultural zones, and, in each, primary sampling units of 1 000 inhabitants were formed by subdivision or grouping of villages numbered consecutively following a procedure laid down in advance in which every tenth unit was chosen. In each primary unit 16 or 17 holdings were selected as secondary sampling units for study. The sample covered 121 primary units and 2 032 secondary units.

1972/73 census. This sample survey related to a sample of 455 villages selected out of a total of about 3 140, and covered more than 2 300 holdings. The number of villages selected for each district was proportional to its population number. The survey was limited to the traditional sector and was designed to provide reliable data at the levels of the district, the region and the country as a whole.

For the purpose of yield estimation, a permanent subsample of five holdings was selected from each sample village. All the parcels of such holdings were subject to crop cutting each year: a plot of one metre by one metre was used for dense crops (rice for example); five metres by five metres for other annual crops and ten metres by ten metres for coffee, cocoa, etc.

The field work was carried out by the agricultural field staff assisted by temporary workers. It covered both the agricultural

seasons of 1972/73 in the Southern Regions. The Northern Regions have only one agricultural season.

1982/83 census. The information for 1972 was not suitable for recent planning. To obtain the necessary data the Government decided to take an agricultural census during the 1982/83 agricultural season within the FAO programme of the 1980 WCA.

Objectives. The agricultural census, in which about 3 300 holdings were visited, had multiple objectives:

- To have objective and accurate information on:
  - the structure of agricultural population (active and inactive);
  - the structure of traditional agricultural farming;
  - tenure of land;
  - land use;
  - cultivated area for main crops;
  - density and productivity of important crops;
  - machinery and equipment;
  - livestock.
- By using the results and criteria of the agricultural census, it would be possible to elaborate a typology of agricultural farming and to follow its evolution in successive plans. Apart from this, the results of the census would form a basis for the specific and localized surveys on, for example, utilization of manure, insecticides, pesticides, etc. and on the culture of certain important crops for some regions.
- The census could be used also for starting a register of villages.
- The main sample of the census could be renewed to collect current agricultural statistics on, for example, cultivated area or production.

Methodology. As in the previous censuses and surveys, in the agricultural census of 1982/83 a two-stage sample design was used. In the first stage, villages were selected with probability propor-

tional to their populations. The data of the general census of population and housing of November 1981 were taken as the basis for sampling. In the second stage, five holdings were selected from each sample village.

Organization. The legal decree of the agricultural census created the following committees:

- National Committee of Census
- National Technical Committee
- Regional Technical Committees
- Local Committees.

There were supervisors, controllers and enumerators in the regional bureaux. Several groups were put under the direction of supervisors. Each group was composed of four or five enumerators and one controller. The number of groups depended on the importance of the region. One of the groups was the "mobile group". The function of this group was to control the census operations.

ASIA AND THE PACIFIC

Fiji: 1978 Census of Agriculture

History. The first census of agriculture in Fiji was conducted in 1968 as a joint exercise between the government of Fiji and FAO. FAO provided an agricultural statistician to plan and organize the census, while general direction was given by a Census Committee consisting of members drawn from relevant government departments. The Department of Agriculture was responsible for the field enumeration.

The report was published as a government paper entitled "Report of the Census of Agriculture 1968".

In 1976 the Agricultural Census Committee was reconvened and recommended that a census of agriculture be held in 1978 for the following reasons:

- It would be ten years since the previous census of agriculture;

- 1978 was in the middle of Fiji's Seventh Development Plan 1976-1980, and the census would provide a review of progress during the Plan;
- there was a dire need for more accurate and up-to-date information on agriculture;
- the Census of Population then under way was expected to be available in 1977 as an input to the Census of Agriculture.

FAO was approached to provide the services of an agricultural statistician. The project commenced in September 1977 with the arrival of the agricultural statistician, the first six months being involved with preparatory work of sample design and listing of household heads. Direct field work (enumeration of crop areas, etc.) began in March 1978 and lasted through to December 1979. However, because forms from some areas got mislaid in transit, partly due to a cyclone, it was necessary to carry out re-enumeration through to May 1980.

Preliminary tabulations of crop areas, crop yields and livestock numbers were available in May 1980 and final tabulations in October 1980.

Aerial photography. Aerial photography was used for the main islands of Viti Levu, Vanua Levu, Taveuni and eight islands of the Eastern Division. Taveuni was flown by a Japanese team as part of a study of the timber industry and the other islands were flown by New Zealand Aerial Mapping. The flight height was 10 000 ft (approx. 3 050 m), rather high for identification of most low crops (e.g. vegetables).

The identification of crops photographed was done on the ground. Crop fields over three acres (approx. 1.2 ha) were mapped on the photographs and the area calculated. If a crop field under three acres was adjacent to other crops and the total area of cultivation was three acres or over, then this total area was calculated first and the component crop areas calculated on the basis of a percentage distribution estimated from ground inspec-

tion. Crop fields under three acres not adjacent to other crops or cultivated land under three acres were ignored. The areas were calculated using the dot grid method or a planimeter.

Aerial photographs have the advantage that they give a complete coverage of the islands flown. However, the method has limitations imposed by the scale of photography (1:20 000), and that is that crop areas less than three acres cannot be measured accurately. This, therefore, means that the method is particularly useful for crops like coconuts which are normally grown in large areas, but less useful for other crops grown in smaller areas.

Postal inquiry of animal production farms and copra plantations. It was hoped that commercial animal production farms and copra plantations would be able to respond to a postal inquiry and hence that information on livestock and poultry numbers could be obtained with 100 percent coverage from these sectors by the simple and economical method of direct mail.

Unfortunately the postal inquiry did not proceed as planned. First, it was possible to obtain full postal addresses for only a relatively small number of farms, so that locality livestock officers were required to deliver the postal forms to the others. And second, there was a very low response rate. As a result, it was necessary to issue five reminders in order to achieve a full response, and for the third and subsequent reminders the involvement of livestock officers and enumerators was required in filling in the forms and returning them to headquarters.

The third reminder was followed by an appeal to Divisional Veterinary Officers and Principal Agricultural Officers on 8 February 1979. The fourth reminder was followed by a warning to non-responding farmers broadcast over Radio Fiji in English, Fijian and Hindi in early May.

Success was thus ultimately obtained in achieving almost complete coverage of livestock in the animal production and plantation sectors, but not by the simple method of direct mail as hoped.

Land use. A sample of about 2 800 farms, or approximately 4 percent of the total, was selected for objective enumeration including area measurements of crop fields using survey equipment. For two minority crops – cocoa and ginger – supplementary samples were selected.

The study of land use involved the pooling of three data sources in the analysis of the sample census:

- area measurements using land survey methods;
- aerial photographs;
- the Lands Department and Native Lands Trust Board.

Knowledge of the total area of the sample farms is a prerequisite to a land-use study. For registered farms (i.e. those with a freehold title or lease) this information was obtained at the Lands Department and Native Lands Trust Board. For others (i.e. non-registered farms), however, total farm area had to be measured, and this proved to be the most difficult part of the census. Enumerators were required to estimate by eye whether the farm was more or less than three acres in size. If they estimated less than three acres, then they would carry out area measurements using methods described in the section below. If, however, they estimated more than three acres, then they would note that this was a farm whose area was to be determined from an aerial photograph. The next step was for the enumerator to mark in the boundary of the farm on the aerial photograph so that the area could be calculated by use of a planimeter and dot grid.

The areas of coconut fields over three acres were also calculated by means of aerial photographs, except in the case of the Taveuni plantation sector where it was necessary to rely on information supplied by the owner or manager.

Area measurement using land survey methods. Objective area measurements using land survey methods were taken of selected sample farms and coconut fields as described in the section above and for all other crop fields.

The areas of most land units required for enumeration on the ground were taken by measuring the sides of the component rectangles and triangles, using a measuring wheel or measuring tape, since measuring across a diagonal did not generally present a problem. With a few fields (very few), however, the diagonals could not be negotiated, and so a compass traverse around the boundary of the field was necessary. This applied mainly to mature cassava. The clinometer was used for the measurement of slope of fields on steep hillsides in order to calculate the horizontal projections of the areas of these fields.

Estimating crop yields by sample crop cutting. The yield of rain-fed rice, cassava, dalo, yams and ginger was estimated by selecting a sample of fields of each crop, stratified by variety, randomly selecting a plot on each sample field, and cutting and weighing the crop on the sample lot. The plot size used for rice and ginger was three metres by three metres and for root crops six metres by six metres where possible, otherwise three metres by three metres. For root crops compensation was offered to subsistence farmers in addition to returning the crop to them after weighing.

For irrigated rice, yield estimates were based on all fields belonging to the sample farms selected for area measurements. Marketed production figures were available from the Rewa Rice Company, and the rice padi kept by the farmers for their own consumption was weighed at their homes.

General note on objective methods of enumeration. As can be seen from the instructions for enumerators, it was intended to use objective methods of enumeration wherever possible. This applied particularly to the enumeration of farm and crop areas, crop yields and cattle numbers. However, in the case of cattle numbers it was not always practicable, particularly with the larger farms, for the

enumerator to undertake a count and it was then necessary to rely on advice provided by the farmer.

Pakistan: 1980 Census of Agriculture

The 1980 Census of Agriculture was the third decennial census in the country. The first two censuses in the same series were conducted in the years 1960 and 1972 respectively. After the 1972 census, implementation of a number of socio-economic measures in the shape of land reforms, growing use of chemical fertilizers and pesticides, introduction of hybrid varieties and improved seeds, employment of tractors and tractor-drawn implements and tube-wells, on the one hand and urbanization, salinity and water-logging, setting up of new industries and a host of other such factors, on the other hand, resulted in major changes in the structure of agriculture in the country. Consequently, the data collected during the previous census had become outdated underlining the need for a fresh census of agriculture in the country.

Objectives. The main objectives of the census were:

- to develop basic information on the structure of agriculture in the country;
- to provide detailed basic information about the agricultural resources of the country and the degree of their utilization and to find out the extent of acceptability of modern farming practices among the members of the farming community, for the purpose of regional, provincial and national development planning and research in the field of agriculture;
- to fulfil data needs of international agencies like the FAO which require the country information for a worldwide study of agricultural resources in order to formulate international policies in the matter of food and raw materials.

Legal basis. The Agricultural Census Act, 1958 (Act No. XLI of 1958) provided the necessary legal cover for the census operations.

The act makes it binding on the respondents to cooperate with the census enumerators and to furnish information on or with respect to items specified in the said Act. At the same time it assures the confidentiality of information supplied by the respondents. The provisions of the Act were widely publicized just before and during the census operations. Rumours about a possible land reform, the enforcement of Usher and the possibility of an agricultural tax posed problems in some cases, but the reluctance of such respondents to cooperate with the census enumerators was successfully overcome and no occasion arose for initiating legal action under the Census Act.

Census organization. The Agricultural Census Organization works as a department attached to the Statistics Division, Ministry of Planning and Development, with its headquarters in Lahore. For smooth execution of field operations and liaison with the provincial governments, one field office is located in each of the provinces, at Peshawar, Hyderabad and Quetta. However, in Punjab there is no separate field office as the headquarters office also takes care of duties of the field office.

After completion of the first census in 1960, the bulk of the staff of the Census Organization was disbanded and a small nucleus continued to look after the publication of census reports and other related work. In order to conduct the second Census of Agriculture in 1972, fresh recruitment was made. Before the termination of the scheme period of the 1972 census, the government decided to conduct a Livestock Census in 1975. Thus a good proportion of the staff recruited for the 1972 census was kept on for the 1975 Livestock Census. Also, some of the staff were transferred to the non-development budget in order to keep intact a Census Organization to look after the routine work and to initiate work on census projects. Consequently, for the 1980 Census of Agriculture, although some staff had to be recruited to supplement the staff working on the planning and preparatory phase, the additional

staff were recruited mainly to supervise the field work and data processing for the duration of the respective assignments.

Census pre-test. The Agricultural Census Organization has accumulated sufficient experience by conducting censuses and large-scale surveys in the field of agriculture. Yet – in view of the additions to the questionnaire to cater for additional demands of data users – improvement in the various facets of census methodology in the light of previous experience, changes in the environment and in human attitudes and the urge to improve further the quality of census data, necessitated the testing of the revised census plans. This exercise also provided useful qualitative and quantitative information required for planning the census and helped in training officers and staff in census-taking techniques.

The objectives of the pre-test were:

- to test the census questionnaire and other forms for their contents, wording of the questions, arrangement of the questions and the format of the questionnaire;
- to examine the suitability of methodology proposed for the census, including arrangements for enumeration and supervision of staff, type and duration of training required for enumerators and their trainers, movement of documents to and back from the field and mode of data collection;
- to determine the time required for the numbering and listing of households, for sample selection in the field and for enumeration;
- to examine if the "within-mouza" sample selection of the proposed design could be implemented by census officials while in the field;
- to examine the working of the estimation procedures, to study the sampling variability of various census items and to ascertain the data-processing requirements for the census.

In the pre-test, 11 subdivisions from all over the country representing different agricultural zones were deliberately chosen.

Seven mouzas and one urban ward were randomly selected from each of the 11 test areas. One of the seven selected mouzas in each test area was specified for preparing the list of cultivators with size of area operated both through interview method and by extraction from revenue records.

The census questionnaire used in the last census was enlarged by including additional items suggested by various organizations, while omitting some of the items on which meaningful data had not been collected during the last census, for use in the pre-test.

Some observations and conclusions from the pre-test were:

- An attempt to establish the correct size of the holding of each household at the time of listing not only required time and effort but was also fraught with many dangers, the most important of which was the inclination of the enumerator subsequently to stick to the area reported at the time of listing instead of relying on the detailed questioning involved in census enumeration.
- Of the total households selected for enumeration, nearly 30 percent were found to be without land. A short version of the main questionnaire, excluding questions on land and crops could be used for landless households.
- The enumerators did not find it difficult to enlist the cooperation of the respondents for pre-test work because of their contacts with the farming community, but some of the farmers misunderstood the purpose of the pre-test and considered it a step toward a new programme of agrarian reforms, a taxation proposal or a compulsory procurement of foodgrains. A publicity programme is essential before launching such an activity to dispel such fears from the minds of the respondents.
- The addition of new items in the 1972 census questionnaire had lengthened the questionnaire, which posed problems for the enumerators in taking the time required with the respondents. It was felt that most of the new questions were

either related to a very small proportion of the population or a similar reply was received from the majority of the respondents. For example, grazing land or a particular minor crop was reported in a limited number of areas. Again, most of the farmers reported their cultivated area as plain in non-hilly areas and otherwise in hilly areas. Similar was the case with perennial and non-perennial canal areas and areas lying uncultivated due to non-availability of water. Then there were details like the number of non-fruit-trees on the farm, age of individual household members, etc., which enumerators and respondents thought unrelated to the subject and to which they therefore attributed insufficient importance. The inclusion of such items not only failed to yield meaningful data but also affected the quality of other data and unduly lengthened the questionnaire. Therefore, only those items for which the need is fully established should be included in the questionnaire and meaningful data could be collected on them.

- It was observed that a computer edit of census data was necessary even though a comprehensive manual edit had been carried out. At the same time the manual edit was quite helpful as it took care of the enumeration and other errors as well as cases of poor legibility, facilitated the work of key punching and also reduced the number of faulty returns in the computer edit from about 40 percent to less than 10 percent.

Publicity. A congenial atmosphere and the cooperation of the respondents are very important factors for successful completion of any census or large-scale survey. In order to enlist the cooperation of the respondents, they should be informed about the objectives and importance of the census, their role in it, and, above all, the possible advantages they are likely to get from the project. This could be achieved through an appropriate, timely and intelligently conducted publicity programme. Such a programme was therefore

chalked out for the purpose. Accordingly, television, radio and national and regional newspapers were used to publicize the objectives and importance of the census. The various clauses of the Census Act, particularly those dealing with the confidentiality of the data collected, its use for development purposes only and the obligation of the respondents to supply correct data, were widely publicized. The programme was started about one month before enumeration began and was continued until it was finished. In this campaign, the Government Press Information Department and the Broadcasting Corporation of Pakistan were very helpful to the Census Organization.

Post-enumeration survey. Census taking is a gigantic operation. In spite of best efforts, because of financial and administrative limitations, some errors and shortcomings in census results are always expected. The census officials are themselves anxious to know the extent, nature and possible causes of such errors to find out the efficacy of the various arrangements made. Informed users of the census data are also interested in the quality of census data.

The quality of data from a sample census depends on the extent of sampling errors and non-sampling errors present in the results. Sampling errors can be estimated from the data of the census and have accordingly been worked out for important items included in the census. The incidence of non-sampling errors can be identified only through an independent checking of the census work immediately following the census enumeration.

Ideally, a post-enumeration survey (PES) should be based on physical verification of certain important items of the census. However, due to financial limitations it was not possible to undertake such an expensive exercise. Reinterview of the respondents by a different set of enumerators of a higher calibre was, therefore, undertaken.

The PES, therefore, emphasized mainly the question of completeness of listing and enumeration of households (coverage

check) which could be done in a completely objective manner. The area of the holdings was also checked (response variation), but complete objectivity in the method of getting correct acreage could not be introduced. Keeping in mind the working conditions and the possibility of producing meaningful results from the PES, it was decided to cover only settled areas in NWF, Punjab and Sind provinces.

The sample design, methodology and scope of the PES are given below.

Step 1. A three-stage sample was selected from each subdivision. Normally four patwar circles were selected systematically from each subdivision except for a few big subdivisions from which six patwar circles were selected. In the first stage 546 patwar circles were selected. In the second stage one of the two census mouzas from every selected patwar circle was selected at random.

Step 2. Two types of samples were selected at the third stage. With the help of a mouza sketch map, each selected mouza was divided into roughly equal sectors of about 100 households. One of the sectors was selected with a probability proportional to the number of households in a sector. Enumerators were directed to relist all households in the selected sector and number all the houses found without census marking. In addition to this coverage check, ten households from those enumerated in the census were selected at random for re-enumeration.

Step 3. Selected census training assistants (CTAs) were deputed for enumeration work and were posted at stations other than those at which they had worked in the census. Each CTA was assigned six to eight mouzas in two subdivisions. They did not have access to the census household lists for selected sectors or any other document.

Step 4. The relisting in selected sectors and re-enumeration of selected households were completed within two weeks.

Step 5. Subsequently, half of the subdivisions were selected randomly from pairs of adjoining subdivisions and in turn,

50 percent of the mouzas were selected from each of the selected subdivisions to reconcile and investigate the reasons for the differences, if any, in the census and PES enumerations.

Step 6. Census officers were deputed for the reconciliation survey. They collected the lists of households and original census questionnaires from the census office and the PES documents from the respective CTAs still in the field.

Step 7. The corresponding entries in the two sets of documents were matched, and the differences in listing and variation in responses were investigated by actually interviewing the households concerned.

Step 8. In the case of other PES households not selected for reconciliation, the data collected during the PES and census were matched in the office and the differences sorted out. These differences were checked with the results obtained from the reconciliation survey.

The findings of the PES are summarized below:

- All mouzas/dehs selected for the census had been correctly identified, and no mouza/deh was totally omitted from census enumeration.
- The census estimates of the number of households at country level were subject to gross underlisting of 2.1 percent.
- While some households were missed in the census, others which did not exist were also listed. Some farmers, mistaking the census operation for an inventory for distribution of land to the landless, exaggerated and inflated the number of households in a family. Consequently, some families which constituted single households got themselves listed as multiple households. The gross overlisting of households amounted to 0.7 percent.
- Considering under- and overlisting together, there was a net underlisting of 1.5 percent.
- In the case of agricultural households, there was a gross underlisting of 1.4 percent.

- Taking into account the gross over- and underlisting of agricultural households, there was a net underlisting of 1 percent.
- Owned area, operated area and cultivated area were underreported in the census up to the extent of 4.7 percent, 5.1 percent and 1 percent respectively. The extent of underreporting in uncultivated area was 22 percent.
- On the livestock side, cattle were underreported to the extent of 0.1 percent and buffaloes were overreported to the extent of 2 percent. Similarly, sheep were underreported up to 2.7 percent, whereas goats were overreported to the extent of 4.8 percent.

EUROPE

Norway: Census of Agriculture and Forestry, 20 June 1979

Justification for the census. Complete censuses of agriculture have been conducted approximately every tenth year since 1907. Complete censuses of forestry have previously been conducted in 1920-27, 1957 and 1967. The 1979 census encompassed both agriculture and forestry.

The main purpose of the census was to elucidate the production base (the resources) in agriculture. This applied both to the situation at the time of the census and to the development from one census to another. In addition, data were to be provided to illustrate certain conditions of operation and environment.

Public administration (both local and central), advisory services, research and planning departments, agricultural organizations and others would find these data useful.

The census was also a part of the worldwide census of agriculture being conducted around 1980.

Legal authorization for the census. In accordance with a resolution made by the Norwegian Parliament on 18 November 1977, the Ministry of Finance determined that a census of agriculture was to

be conducted in 1979. The agricultural board and forestry council in each municipality were to be jointly responsible for conducting the census in their municipality. In municipalities lacking a board of agriculture or forestry council, the mayor or person appointed by him/her was to be in charge of the census. The census was centrally organized by the Central Bureau of Statistics.

Persons required to file returns

Complete enumeration. All persons in a municipality fulfilling one or more of the following conditions were required to file returns for the census:

- persons owning at least 5 decares of agricultural land;
- persons owning at least 25 decares of productive forest area;
- persons operating at least 5 decares of agricultural land;
- persons operating at least 300 m^2 of land under glass or plastics other than nursery gardens;
- persons operating at least 2 decares of field-grown vegetables;
- persons operating at least 1 decare of strawberry beds;
- persons operating at least 1 decare of raspberry bushes;
- persons with at least 3 horses (including foals);
- persons with at least 10 head of cattle (including calves);
- persons with at least 200 pigs;
- persons with at least 1 000 hens;
- persons with fox and/or mink;
- persons with at least 20 beehives;
- persons with at least 50 fruit-trees;
- persons with at least 50 bacciferous shrubs.

Sample census. A sample was selected from all family units in the entire population. The following persons in the sample were obliged to file returns:

- Those owning a housing lot and/or cottage site, communal garden plot, parcel of land, domestic animal(s) or dog(s), and who are not required to file returns according to the items above.

- Those owning a cabin but not the cabin site.

Types of forms. Four types of forms were prepared for the census:

- Form 1. Principal questionnaire: to be completed by all units required to file returns for the complete enumeration.
- Form 2. Horticultural questionnaire.
- Form 3. Questionnaire concerning fur-farming.
- Form 4. Questionnaire for the sample census of small units.

Persons who were to file returns on the various types of forms. All persons required to file returns for the complete enumeration were obliged to complete Form 1. All persons mentioned in the fourth to eighth items inclusive and in the last two items above were obliged to complete both Form 1 and Form 2 (horticultural questionnaire). All persons managing fox and/or mink farms were obliged to complete both Form 1 and Form 3. Persons filing returns for the sample census were obliged to complete Form 4.

Completion and collection of the forms. The local Census Board in each municipality was to employ enumerators and was responsible for ensuring that all units required to file returns in their municipality did so. Forms for the complete enumeration were to be collected in the municipality in which the returns unit was located. The forms for the sample census were to be collected in the municipality in which the respondent resided. The enumerators were normally to fill in the forms and the respondents were required to supply the necessary information.

If respondents so desired, they were able to fill in the forms themselves, but the enumerator then had to verify that they were completed according to census instructions. The enumerators had to be meticulous in observing that the forms were completed correctly in cases in which the owner and the holder each completed a return on the same property.

Questionnaire. Several questions were included in each section of the "Principal Questionnaire". The sections were as follows, as numbered in the questionnaire (Norway, 1979b):

1. General information
2. Land areas, etc. owned by the respondent
3. Areas partitioned off the property or internally redisposed during the period from 21 June 1969 to 20 June 1979
4. Parts of the property which the respondent expects will be redisposed during the next five years
5. Conditions of operation on property owned by the respondent
6. The returns unit as source of net income
7. Manpower
8. Sex and civil status of the respondent
9. Vocational training as of 20 June 1979
10. Gross investments in 1978
11. Cottages, hunting, trapping and fishing
12. Stock of engine fuels; water supply
13. Draught capacity and machines
14. Agricultural land in operation and its utilization in 1979
15. Tenancy and leasing of agricultural areas
16. Number of domestic animals on 20 June 1979
17. Number of fruit trees and bacciferous shrubs
18. Agricultural buildings
19. Common pasture, silage, straw and potatoes
20. Fertilizing, liming, land levelling, draining, irrigation
21. Management plans and forest assessment
22. Productive forest area according to production capacity (site quality)
23. Areas of regeneration and recently planted areas
24. Sale of wood, wood ceded on usufruct, wood removed for own consumption, 1978
25. Administration and execution of logging operations in 1978
26. Modes of marketing of wood sold in 1978

27. Forest roads on the respondent's property
28. Other data.

Yugoslavia: 1981 Census of Agriculture

The 1981 census, which provided data on private holdings, was the first census of such a nature in Yugoslavia with three kinds of enumeration units: a person, a household or a household having an agricultural holding and a dwelling. Recent censuses of agriculture were carried out in 1960 and 1969, but the 1981 Census was a novelty in Yugoslav statistical practice with respect to methodology and mode of conducting.

A short history of the censuses of agriculture in Yugoslavia. Regular censuses of livestock have been carried out in Yugoslavia since the mid-nineteenth century together with the population censuses.In the period between the two world wars only two censuses were carried out: the census of livestock in 1921 and the census of agricultural holdings in 1931. The 1931 census was carried out within the WCA, and it had features of a general census of agriculture according to propositions contained in the world programme. In the period after the Second World War in total nine censuses of agriculture were carried out, and they were predominantly censuses of livestock. The census of agriculture in 1960 was the second general census of agricultural holdings in Yugoslavia. As far as its contents are concerned it can be compared with the preceding census of 1931 and with the one in 1969. Since censuses are very expensive statistical actions, it was not possible to conduct a census of agriculture around 1980. Therefore, the basic data on agriculture were collected within the 1981 census of population, household and housing. Actually it was an organizational and methodological merger of two censuses which had been carried out independently in the past: censuses of population and housing and censuses of agriculture. The linking of information obtained for enumeration units provided very useful

data but less information on agriculture compared with past censuses of agriculture.

Objective and essential features of the 1981 population, household and housing census. The main objective of the 1981 population, household and housing census was to collect information on population. Data on agricultural characteristics of households were collected through the responses to questions put to household members. Questions were on area of land owned and cultivated by household members; on livestock by kinds and categories; on number of poultry and beehives; on number and power of tractors and combines; as well as on whether household members had a business cooperation with an agricultural cooperative or with a social agricultural organization in 1980/81.

Legal basis for the census. For successful organization and conduct of the 1981 census "the Law on Population, Household and Housing Census 1981" was passed. It was a legal basis for the census, fixing a uniform content, the rights and obligations of the staff, as well as the rights and obligations of the respondents and their assignments in data collection. In order to provide a census budget for preparatory tasks "the Law on Budgeting for the Census of Population, Household and Housing 1981" was passed.

Timing and coverage of the census. The 1981 population, household and housing census, which furnished data on private holdings, was carried out from 1-15 April 1981. Data for social holdings, collected as of 31 December 1981, were obtained on the basis of reports for social holdings, and for holdings of individuals all the data, with the exception of those on cooperation, were collected as of the census day.

The census covered all agricultural holdings in the country, regardless of their size and location (urban or rural stratum). Agricultural holdings were identified through data on households.

The census covered all households in the territory of Yugoslavia.

Enumeration. Enumerators had to visit an enumeration district before 31 March in order to identify the district according to a sketch and a description of boundaries which they were given together with all other census material. Beginning on 1 April, enumerators visited each building, or dwelling, in their enumeration district, and enumerated dwellings, households and persons on the spot. In cases when there was nobody in a dwelling, or if there was not an adult person who was able to provide responses to the questions on census forms, enumerators were bound to revisit the household and enumerate the units. Enumeration was envisaged to be completed in 15 days at the most. After completing enumeration, the enumerator had to compile the first results for a given enumeration district on a control census form and hand it over with other census material to a communal instructor. During enumeration and after receiving census forms the communal instructor examined individually with each enumerator the census material, with particular attention to completeness of coverage. Communal instructors submitted the examined census material to a communal enumeration commission which, having received the material from all instructors, prepared the first census results for a given commune.

Questionnaire. The questionnaire of the 1981 population, household and housing census contained the following items regarding agriculture:

- whether or not the household cooperates with cooperative or government farms;
- area owned by household (total, cropland);
- operated area (total, cropland);
- number of livestock by type;
- number of tractors (one-axle, two-axle);
- number of combines.

LATIN AMERICA AND THE CARIBBEAN

The Bahamas: 1978 Census of Agriculture

Background information. Unlike many other developing countries the economy of the Bahamas is service-based. Tourism accounts for over 70 percent of the gross national product and generates a major source of foreign exchange. Banking and finance come as the second largest source of income for the Bahamas and industrial development is also important to the national economy. The greatest industrial activity is an oil refinery and petroleum transhipment terminal.

So far, agriculture has played a minor role in the national economy. The major part of the food supply is imported which is quite a heavy strain on foreign exchange. Unlike in other developing countries an overwhelming majority of the population is engaged in activities other than agriculture.

Objectives of the census of agriculture. The government had committed itself to the development of agriculture in the country. In fact, it had been said that the country would become self-sufficient by 1980. Therefore, the taking of a census of agriculture was considered essential to the country's understanding of its agricultural economy in relation to its total economy to provide basic data needed for planning development. This being the first census of agriculture in the country, and the labour resources being scarce, it was decided to keep the objectives and scope of the census as limited as possible, but at the same time to collect data on all basic aspects of agriculture which could be used with advantage by the planners in the immediate future.

Cartographic work. The Bahamas has good maps for all the islands to the scale 1:25 000. For some places maps are available even to the scale of 1:1 000. The available maps were used to demarcate the Enumeration Areas (EAs) and Census Districts (CDs) within the EAs.

The towns of Nassau and Freeport presented special problems. It was known that some farmers live in these towns, but it was not practicable to identify them in the usual way by paying visits to all households. Therefore, it was decided to demarcate boundaries of these towns arbitrarily on the map and within those areas a list of farmers was prepared from known sources. The principal sources used were the files in the office of the Department of Lands and Surveys and personal knowledge of the officers of the Ministry of Agriculture.

This being the first census of agriculture, no data were available for the determination of the EAs and the CDs. Use was made of the 1970 Census of Population and it was assumed that 80 percent of the population outside the towns of Nassau and Freeport were engaged in agricultural activities. On this basis, the country was divided into 57 EAs. For convenience of enumeration and better control of field work each EA was divided into CDs. The total number of CDs used was 374.

Preparation of census questionnaire and pre-tests. A census questionnaire was prepared at the early stages of the preparatory work for the census. It was extensively pre-tested in the islands of New Providence, Eleuthera, Exuma, Andros and Long Island.

A detailed manual of instructions was prepared for use by the field staff. This manual was printed at the Department of Statistics. Other auxiliary forms used in the census were duplicated in the Ministry of Agriculture.

Selection of field staff and their training. The census was conducted by direct interview with the holder by paid enumerators. For this purpose a team of enumerators and supervisors was prepared. The spread of the country over a large number of islands presented serious problems. During training the trainees had to be paid their subsistence allowance and transport from their island to the training centre and back. To keep the cost to the minimum,

the training was arranged at four islands — New Providence, Andros, Grand Bahama and Exuma. Some of the enumerators were teachers and their presence in Nassau during summer vacation was taken advantage of, especially in the case of persons from far-off islands like San Salvador, Mayaguana, Inagua, Cat Island and Acklins. This saved cost on their transport. A special plane was chartered to collect trainees from Abaco and Eleuthera at the training centre on Andros. The training course of each centre was of five days duration — four days in the classroom and one day for practice in the field. At the end of the course a test was taken by the trainees. Training was given to 58 candidates of which 48 were finally selected.

Census enumeration. The census data relates to the agricultural year 1977/78 (1 September 1977 to 31 August 1978). The training of the field staff was started on 20 August 1978 and completed on 15 September 1978. The work of the census enumeration was expected to finish by the end of October, but progress was much slower than expected. In some cases the work had to be redone and in others it had to be reassigned to another enumerator. Although the major part of enumeration was over by the end of December, it was completed in the entire country only by the end of February 1979. This delay considerably upset the schedule and necessitated extension of the project.

Publicity. The Statistics Act provides that it is obligatory for everybody to supply correct information required in the census. But best results are obtained only if there is full and willing cooperation on the part of the respondents. To achieve this end a comprehensive programme of publicity was carried out which started a few months before the start of the census enumeration and continued during the enumeration period. Suitable posters were distributed throughout the islands and explanatory leaflets were distributed to the farmers through their children in schools.

Radio broadcasts were made part of the morning and evening news for a number of months, soliciting cooperation from the farmers. The Director of Agriculture, the Deputy Director, Department of Statistics and the FAO Expert appeared on the Focus Programme on television and the Action Line on the radio. The FAO Expert also gave talks to the Rotary and Kiwanis clubs in Nassau on the subject of the agricultural census. It is felt that the people gave excellent cooperation in the census operations.

Processing of census data. All the census questionnaires were thoroughly edited and coded for processing by the computer. However, the final results of the census from the computer will only be available after some time. Therefore, manual tabulation has been done for some of the items included in the census and made available to the Ministry in the form of "Provisional Summary Results".

The processing of the census data was somewhat delayed. This was mainly due to the fact that, first, the computer of the Ministry of Finance serves the data-processing needs of all government institutions, and certain types of work such as preparation of budget and payrolls, etc. naturally receive high priority, and second, the programmers had no previous experience of processing the data from a census of agriculture.

Questionnaire. The questionnaire (Form CA-02) of the 1978 Census of Agriculture of the Commonwealth of the Bahamas is four pages long, with nine sections and 24 questions. The numbered sections of the questionnaire with some questions in some sections are given below:

- Section I Identification.
- Section II Characteristics of holder.
- Section III Holding.
- Section IV Land use and irrigated area.
- Section V Crops.

- Section VI Population and employment:
  - Members of the holder's household;
  - Number of permanent paid agricultural workers other than members of the holder's household;
  - Does the holder employ occasional hired agricultural workers?
- Section VII Livestock.
- Section VIII Agricultural machinery and selected practices:
  - Was any of the following machinery (tractors, sprayers, dusters, trucks, cars, jeeps) used on the holding for agricultural work in 1977/78?
  - Does the holding have any of the following facilities for irrigation of crops (boreholes, wells, pumps, windmills)?
  - Were worm medicines used on the livestock in 1977/78? If yes, indicate on which of the following species of animals. (Sheep, goats, pigs, poultry, other).
  - What mixed/associated/interplanted crops were grown on the holding? List the components in order of importance, and enclose the mixture-/association/interplantation in parenthesis.
- Section IX is for observation.

NEAR EAST

Turkey: 1980 Census of Agriculture

Objective. In an economy largely supported by agricultural production, such as Turkey's, reliable statistics which reflect the facts of national agricultural potential and structure are of great importance.

Agricultural censuses have been taken every ten years, in years

ending in zero. In the censuses, agricultural statistics have been collected which are related to the agricultural structure and potential of Turkey. Improved methods are being employed for obtaining more reliable and detailed statistics.

With statistics derived from the agricultural censuses it is possible to make international comparisons and to establish a benchmark for the evaluation of the country's yearly agricultural statistics. Census data are also being used to determine Turkey's agricultural policy.

All necessary agricultural statistics cannot be collected through agricultural censuses. For this reason, the collection of only basic agricultural statistics was the objective of the 1980 Census of Agriculture.

Legal grounds of agricultural censuses. The first agricultural census was taken in 1927 in accordance with Law No. 1152 dated 2 June 1927; the second census was taken in 1950, according to Law No. 5622 dated 23 March 1950. The 1963, 1970 and 1980 censuses were conducted in accordance with the "Law on the Establishment, Authority and Functions of the State Institute of Statistics" No. 53 dated 13 June 1962.

Preparatory work. Preparatory work on the 1980 Agricultural Census was launched on 20 June 1978 by the formation of a "Census of Agriculture Committee". The committee prepared an inventory of documents of the previous censuses and decided on the preparation of a timetable for the work to be carried out. After intensive studies the committee prepared the 1980 agricultural census programme. This programme gave high priority to the recommendations of FAO.

It was decided to avoid overloading the 1980 census questionnaire. However, utmost consideration was given to making the questionnaire simple and understandable by the households, as well

as to covering all necessary items both for national and international purposes.

Taking into consideration the recommendations of the advisory group and of State Institute of Statistics (SIS) experts, it was decided to conduct the 1980 Agricultural Census by the sampling method, as was the case for the 1963 and 1970 censuses of agriculture.

In the preparation of the 1980 census close cooperation was achieved with universities, related organizations and experts. Members of the FAO Turkish National Committee and other related organizations collaborated with the SIS. The views of the FAO advisory group on the preparation, pre-test and conduct of the census were taken into consideration.

Organization. To minimize the cost, to solve problems at the source and to obtain accurate results, a Provincial Agricultural Census Committee was formed in each province. The committee consisted of the Governor or the Governor's assistant, the Technical Director of Agriculture, the Director of the Veterinary Office, the Director of the Land Registration Office, the Chairman of the Chamber of Agriculture and the SIS representative.

In each province, attached to the Census Committee, an organizer, a controller and enumerators already working in the villages were employed. Organizers and controllers were selected from experienced SIS personnel. The census team consisted of two persons, one of which was from the SIS and the other from the local Directorate of Agriculture.

The Provincial Agricultural Census Committee's functions were:

- to set up a census bureau;
- to provide necessary machinery, equipment and office materials for census purposes;
- to set up a secretariat at the bureau and send reports to SIS on work in progress;

- to hold a press meeting a week prior to census day and to organize publicity;
- to organize training courses;
- to carry out the census work according to the instructions of the SIS;
- to provide the necessary means needed during census application;
- to form teams, to make plans for transportation, to solve the financial and administrative problems at the stage of field work.

The organizers' functions were:

- to check with the Provincial Census Committee to see how the census preparation work is going;
- to perform the training function;
- to make the timetable of the field work according to the agricultural census plan;
- to check the teams' work with the controller;
- to check the questionnaire in the field;
- to make work plans for the transportation means to be used for the census and for the personnel of the related organizations;
- to send the census report to the SIS when the census has been completed.

The controllers' functions were:

- to meet the teams and direct them to work;
- to check the questionnaires and to correct the errors; to inform the organizer about the irregularities in the field work; to convey the directives of the committee or the organizer to the team;
- to hand the questionnaires to the organizer after checking them thoroughly.

The census teams' functions were:

- to meet the members of the Provincial Agricultural Census Committee and the organizer and to attend the training courses;
- to prepare a work plan and let the organizer know about the dates of their visits to the villages;
- to explain about their work to the muhtar and village elders (ihtiyar heyeti);
- to fill in the village questionnaire first and then check the boundaries of the village on the map; then to check the consistency of the two measurements (one in the village questionnaire, second on the map);
- to fill in the list of the village households and check it with the village questionnaire; then to select the sample holdings from the list of the village households; to conduct interviews with the sample households and to fill in the questionnaires;
- to make a final check of the filled-in questionnaires; to correct errors, to fill in the blanks by reinterviewing the respondents;
- to deliver all questionnaires and other forms to the organizer.

Training programme. The 1980 training programme was conducted in two stages. First, the organizers and controllers were trained at the SIS. Then the trainers were selected from among these organizers and controllers, and, at the second stage, these trainers carried out the training courses for the enumerators in each province.

Training in the provinces took three days. The training programme was undertaken as follows:

- First day: introduction;
  general explanation;
  organization;
  explanation of the village questionnaire;
  topographic drawing.

- Second day: explanation of the village household list and selection of the samples;
  explanation of the household questionnaire, the importance of consistency and discussion.
- Third day: field work (pre-tests for the enumerators).

Post-enumeration quality control survey. After the completion of the implementation of the census in settlements of 5 000 or less inhabitants, 2 percent of the sample settlements were selected randomly and the census was repeated in these settlements with the same application principles but with more qualified interviewers. During the quality control activities, registered records and data related to the villages were also used. During the quality control survey an effort was made to recall the attention of the respondents to the conditions existing on the census day.

The results of the quality control were compared with the results of the census in the light of data provided by household and village questionnaires, and the differences between results were classified by settlement and households.

It was seen that differences in area sizes, in information on village and household questionnaires were negligible. Since the differences were sometimes positive, sometimes negative, it was impossible to say that there was an underreporting on the cultivated area, fallow land and vegetable fields.

There was consistency on the types of products declared at the two interviews. There were little differences in the numbers of animals. The data on the numbers of single-hoof animals were the same at the two interviews. Similarly, information on agricultural equipment was the same at the two interviews.

The differences in the information obtained from the two interviews relating to the number of trees and the cultivated area were quite large in comparison with the differences in other characteristics.

NORTH AMERICA

United States of America: 1978 Census of Agriculture

Agricultural censuses. The agricultural census was taken every ten years from 1840 to 1920. Since 1920 it has been taken every five years, in years ending with 4 and 9 except in 1978. Beginning with 1982, the schedule has been changed to years ending in 2 and 7 to coincide with the economic censuses. The census serves as a general purpose statistical tool. It provides benchmark data against which the current statistical series of the Statistical Reporting Service of the US Department of Agriculture and other public and private organizations may be checked. It is also the primary source of county data for agriculture.

The subject matter of the general census of agriculture remains more or less constant from one census to the next. The Census Bureau tries to achieve a balance between maintenance of comparability for major items measured in past censuses and a revision of content to keep abreast of rapidly changing patterns in agriculture.

Detailed inquiries for the general census are developed through extensive consultation with user groups. A census advisory committee made up of representatives of federal and state governments, farm organizations, agribusiness groups and universities advises on the content of census questionnaires and procedures.

Report forms. The Census Bureau recognizes the need to minimize both respondent burden and census cost by limiting the number of items for which data are requested to those most needed by users as the basis for current understanding and future planning. For the 1969, 1974 and 1978 mailout/mailback censuses, two report forms were used so as to minimize the reporting burden, particularly for smaller farms.

For 1978, the two report forms were a six-page report form (78-Al(A)) containing all the items asked in the census, and a five-page form (78-Al(N)). The last page of form (78-A1(N)) was filled in by sample holdings only.

Initial mailing. The report forms were distributed by post during the last week of December 1978 to all individuals, businesses and organizations on the mailing list. Approximately 4 241 000 forms were distributed initially.

From February to August 1979, additional forms were sent primarily to new tenants and successors identified during report form processing. Thus, the total mailing list for the 1978 Census of Agriculture consisted of 4 430 000 addresses.

An information sheet containing detailed instructions for completing the form was included with each report form. Additional special instructions were included with report forms sent to identifiable producers of poultry under contract, bees and honey, laboratory animals, feedlot operations and nursery and greenhouse products.

In an effort to provide additional help in completing reports, approximately 60 000 copies of a Farm Census Guide booklet were sent to county agricultural agencies and related institutions or businesses to whom farmers might turn for help. Included were rural banks, accountants, vocational agriculture instructors, and the following US Department of Agriculture county offices: Agricultural Stabilization and Conservation Service, Farmers Home Administration and Agricultural Extension Service. This guide contained descriptions and definitions for various items in more detail than the instructions included with each report form. Representatives of the above agencies graciously consented to assist farmers in completing their report forms if assistance was requested. In addition, the telephone number for the Jeffersonville, Indiana, processing office was provided in the original mailing in case the respondent requested assistance or had additional questions which were not covered in the instructions.

Follow-up procedures. The data-collection effort included seven follow-up letters to non-respondents, three of which were accompanied by a report form. To distribute the work loads evenly in

mailing, receipts and processing, the mailing list was divided into three groups for follow-up purposes. In late January, the first follow-up letter was sent to all non-respondents reminding them of the 15 February due date. The other reminders followed on a flow basis at three- to four-week intervals starting in late February and continuing into July.

In low-response areas additional efforts were made. State Commissioners of Agriculture were asked to issue supporting statements urging farmers to complete and return their reports. In early April 1979, non-respondents in about 300 counties with the lowest response rates were mailed an additional letter using simpler language in large print suggesting that if they needed help in completing their report, they could call collect to the Jeffersonville, Indiana, processing office.

From March to November 1979, telephone calls were made to non-respondents who were large (for most states, those with expected sales of US$80 000 or more) or were located in about 60 counties with low response. Data for large farms were obtained by telephone from secondary sources if the addressee could not be contacted or refused to provide information. Most of the non-response calls were made by the staff of the Jeffersonville, Indiana, processing office. However, calls to the larger and more complex operations were made by the Agriculture Division staff. Upon completion of data collection, all counties had response rates exceeding 75 percent of the final mailing list including additional addresses. The overall response rate for the 50 United States was 88 percent for all addresses and nearly 95 percent for addresses with a known history of farm operations. A significant proportion of the non-response cases was found not to have qualifying agricultural operations for 1978.

Data processing. All report forms were subjected to a clerical screening review, during which they were corrected to make them acceptable for keying on to magnetic tape. Farm operators

completing a non-sample form who reported sales or acres above the certainty level were sent correspondence requesting the additional sample data. Reports for special cases identified on the mailing list as producing specific products such as broilers or cattle were checked to ensure that the special item had been reported. Problem reports requiring special review or additional handling were referred to technical assistants, or if necessary, to statisticians for resolution. Report forms with sales or acreage above levels listed as State "must" were subjected to a more stringent precomputer review, including completeness checks for key basic data items. Reports from multi-unit operations and institutional and government-operated farms were reviewed and edited by statisticians. All farms with expected or reported sales of US$1 000 000 or more or 30 000 acres (12 150 ha) or more, all Alaska and Hawaii reports, selected multi-unit operations and other selected problem reports were reviewed by statisticians in the Agriculture Division. Omissions, inconsistencies and other problems that could not be resolved by reference to other information on the report were resolved by contacting the respondents by telephone or correspondence.

Data for each report form were subjected to a detailed item-by-item computer edit. The edit included comprehensive checks for consistency and reasonableness, corrected data found to be in error or inconsistent, supplied missing data based on similar size farms within the same county and assigned farm classification codes which were necessary for tabulating the data. Entries of large magnitude and significant computer-generated changes to the data were manually verified. Obvious errors such as reports of cotton or citrus in the Northern States were also identified and corrected.

Prior to publication of preliminary reports and Volume 1 reports, tabulated totals were reviewed by statisticians to identify remaining inconsistencies and potential coverage problems. Comparisons were made with historical census trends as well as current year state-level estimates published by the US Department of

Agriculture and other agencies as part of the coverage review. Selected report forms were reviewed and problem entries were either verified as being correct or the data were corrected.

Major changes in data collected. Unusually strong adverse reaction to the length and content of the 1974 census report form stimulated an intensive review and rejustification of all data inquiries accepted for collection on the 1978 census report form. Data users were requested to provide the Bureau with their data requirements, including the level of publication needed — county, state or national. Many items included on the 1974 report form were eliminated in the 1978 version. On the other hand, the following high priority new data items were added to the 1978 report form:

- set-aside acres in Federal Farm Program;
- Government Commodity Credit Corporation (CCC) loans for grain and cotton;
- direct sales to consumers;
- foreign ownership of farmland;
- greater detail on expenses for energy.

Publication. Publication of statistics collected in the census of agriculture ordinarily begins late in the year in which data are collected. Preliminary reports published for each county and state following the 1978 census contained totals for farms, farm acreage, farm operators, land in farms classified by use, land-use practices, equipment and facilities, expenditures, use of agricultural chemicals, poultry, livestock, poultry and livestock products, crops harvested including fruits and nuts and nursery and greenhouse products. A separate final report is issued for each state, Puerto Rico, Guam, the Virgin Islands, American Samoa and the Northern Mariana Islands, with totals for each county within a state. A United States report is also issued presenting totals for regions, geographic divisions and states. Special reports on census

coverage, census history and a series presenting data for supplementary surveys are published separately.

Other related censuses and surveys. Specific censuses and surveys were carried out on subjects of special interest:

- 1978 Census of agricultural services;
- 1978 Census of irrigation;
- 1978 Census of drainage;
- 1979 Farm and ranch irrigation survey;
- 1979 Farm energy survey;
- 1979 Farm finance survey;
- 1979 Census of horticultural specialties.

Annex

TRAINING PROGRAMMES ORGANIZED FOR THE 1980 WORLD CENSUS OF AGRICOLTURE

Bangladesh
National Demonstration Centre on Agricultural Census Techniques
Dacca, 15 November - 5 December 1978

Benin
Centre national de démonstration pour le recensement mondial de l'agriculture
Cotonou, 22 January - 10 February 1979

Central African Republic
Centre national de démonstration pour le recensement mondial de l'agriculture de 1980
Bougier, 7-27 September 1979

Congo
Centre national de démonstration
Brazzaville, 28 November - 16 December 1983

Costa Rica
Centro Nacional de Demostración para el Programa Censo Agropecuario Mundial 1980
San José, 5-30 November 1979

Ghana
National Demonstration Centre for Agricultural Census
Accra, 22 April - 9 May 1980

Iraq
Course in Agricultural Statistics
Baghdad, 17 November - 12 December 1979

Japan
Group Training Course in Agricultural Statistics
Tokyo, 4-17 September 1976

Jordan
National Demonstration Centre - Agricultural Census
Amman, 6-25 June 1981

Lesotho
1980 WCA National Demonstration Centre
Maseru, 4-22 February 1980

Peru
Centro Nacional de Demostración del Censo Agropecuario
Lima, 2-22 March 1981

Philippines
National Demonstration Centre for Agricultural Census
Manila, 3-22 November 1980

Sri Lanka
National Demonstration Centre 1980 WCA
Colombo, 30 November - 19 December 1981

Sudan

Agricultural Statistics National Demonstration Centre
Khartoum, 18 November - 15 December 1978

Thailand

National Seminar on Analysis, Evaluation and Use of Agricultural Census
Chiengmai, 7-11 March 1977.

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1982c. *Livestock, Australia 1980-81.* Canberra.

1982d. *Beekeeping, Australia 1980-81.* Canberra.

1982e. *Crops, Australia 1980-81.* Canberra.

1982f. *Fruit, Australia 1980-81.* Canberra.

1982g. *Viticulture, Australia 1980-81.* Canberra.

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