3. OBJECTIVES, SCOPE AND METHODOLOGY

3.1 OBJECTIVES

The overall objective was to improve the flow of reliable and timely statistical information on the agricultural sector through the conduct of the 2009 National Agriculture Census (NAC).

3.2 IMMEDIATE OBJECTIVES

To conduct the 2009 NAC to provide a benchmark as an objective criteria for planning and policy decisions in sustainable agricultural and rural development.

To strengthen and improve the on-going Fiji Agriculture Statistics System (FASS) to generate key agricultural data on a regular basis using the results of the 2009 NAC as the benchmark and the dissemination of this statistical information in the form of regular reports

3.3 ACTIVITIES

Activity 1 - MSF (digital ASF and LSF) constructed to conduct the 2009 NAC and ready to be used in strengthening and improving the actual on-going FASS.

Activity 2 - Sample designed and selected to collect data of 2009 NAC and to be used as the base to select sub-samples for the permanent agricultural surveys.

Activity 3 - Census instruments prepared (questionnaires, manuals and tabulation plan for the 2009 NAC).

Activity 4 - 2009 NAC data collected and approximately 120 national staff trained in all aspects of data collection activities related to the 2009 NAC.

Activity 5 - Clean data base containing raw census data available on a computer through a data processing system capable of efficiently processing the census survey data;

Activity 6 - 2009 NAC results disseminated in a widespread fashion through an improved data dissemination system.

Activity 7 - Permanent staff (6) and contracted assistants (21) on-the-job trained in all aspects of agricultural statistics including-the construction and maintenance of MSF (ASF and LSF) list and area sampling frames; the design of sample surveys for agricultural statistics using MSF (ASF and LSF) methodology; data collection techniques; data processing, analysis and dissemination

Activity 8 - Medium-term plan formulated to strengthen the actual on-going FASS, including proposals to strengthen the institutional structures

3.4 SCOPE

The questions used in the 2009 NAC were based on previous census questions (to facilitate comparisons) and on internationally recommended questions (FAO) addressing the issues of globalization of markets, food security, poverty and gender equality. The categories of the questions were the following:

i. **General Characteristics of the Farm:** Farmer (Holder): identification (name of farm/farmer), race, age, education, legal status and land tenure.
ii. **Information on Farm Household Members:** Name of family member, age, highest level of education, main economic activity and participation of member in agricultural tasks.
iii. **Distribution of Land Use:** Total Area (Land within and outside segment, distribution according to crop types, pastures, forests and non-agricultural land)
iv. **Temporary Cops:** planted and harvested areas/dates (in pure and interplanted stands), use of inputs, production during census year and sales in census year.
v. **Permanent Crops:** areas planted, irrigated and productive age; age and number of planted and bearing trees (in pure, mixed, interplanted and associated stands), production on census year and sales in census year.
vi. **Sugarcane:** Variety and condition, crop age, area under sugarcane/harvested and production in tonnes.
vii. **Scattered Plants:** Number of trees and vines (planted and bearing).
viii. **Types of Pastures:** pasture type and area.
ix. **Floriculture:** Flower type, area, and amount sold equivalence in dollars (total).
x. **Livestock and Poultry:** cattle number by sex, age and breed (commercial dairy and beef, and subsistence dairy and beef), numbers sold or slaughtered during census year; **Other livestock –** sheep, goats, pigs and horses (age and sex) **Apiculture –** number of hives, production, amount sold and equivalence in dollars; **Poultry –** numbers (non-industrial) in the farm **Aquaculture –** number of fish ponds, amount harvested and sales,
xi. **Milk Production:** by volume, distribution and sales.
xii. **Employment in the Total Farm:** number by sex without remuneration or with remuneration by cash, kind or both cash and kind;
xiii. **Machinery and Farm Equipment:** by number and type
xiv. **Farm Management in the Total Farm**: mode of transportation for farm access, use of various practices and interaction with Department of Agriculture staff.

The questionnaire was designed and tested by the staff of the Agricultural Statistics Unit and training manuals were prepared for supervisors and enumerators. A Pilot Census was carried out in several locations to evaluate the content and layout of the questionnaires and the completeness of the census documents. The questionnaire and training materials were updated as the result of the Pilot Census.

3.5 METHODOLOGY

Census Design

The survey design used the multiple sampling frame methodology. This methodology combines the advantages of an area frame (complete coverage) and a list frame (rare commodities and large and special farms). In the 2009 NAC, it was expected to provide reliable results at district level for most tables, although results for smaller districts might not be possible. In addition, a small island strategy (SIS) was used where complete enumeration of villages occurred within some districts.

The underlying basis for an area frame sample is to select small areas (in this case, one square kilometer – 100 hectares) that represent the entire area of interest. To improve the efficiency of the sample, the entire country was stratified (or characterized) by the intensity of agriculture. The stratification split the country into areas of high intensity agriculture, medium intensity agriculture, low intensity agriculture, forest areas, peri-urban areas and urban areas/non agricultural areas. The overall sample size was limited by the resources available; it was determined to use a ten percent sample of "agricultural land" as determined during the stratification process.

Initially the Fiji Bureau of Statistics (FIBOS) enumeration areas (EAs) for the 2007 Population and Housing Census were used for stratum identification. Subsequently it was determined that re- stratification of whole EAs and subdivision of other EAs would be more efficient. In many of the FIBOS EAs, farms were present only in small pockets; the uniformity of agriculture in the EA, one of the strengths of the stratification, did not exist. These EAs were, first, reviewed for the presence of natural pine forest and natural reserves. After these areas were removed, the remainder of the EA was divided into one square kilometer grids before the sampling process occurred. After the grids were selected, the Land Use Section of the DOA prepared maps using detectable boundaries "around the grid". It was not possible for segments to retain the gridlines as boundaries because they seldom were along recognizable boundaries; however, it was possible to approximate 100 hectares in that general area.

A farm can consist of land areas that are separated by physical boundaries or by land use patterns; these are called tracts. The method of data collection was to account for each tract inside the segment, but, also to collect information about areas outside the segment for farms with tracts both inside and outside. If a segment boundary splits an existing tract, it is divided into one tract inside the segment and one tract outside the segment. The percentage of the farmland inside the segment is used as a weighting factor for the farm in the expansions.

One of the limitations of area frame samples is the accurate expansion of rare or concentrated (non- uniform) variables – such as poultry houses or large dairy or beef farms. The list frame sample, developed from the knowledge and experience of DOA Animal Health and Production Division and Extension Division staff, was expanded as data collection occurred and there was better awareness of large and specialized farms. Data were collected from all of these farms. It should be noted that shortly before the beginning of data collection, a severe outbreak of brucellosis occurred and some culling took place.

Three levels of data presentation were identified for tabulation of the data of the National Agriculture Census 2009 (NAC 2009). The first is tables and expansions at district level; the second is tables and expansions at provincial and national level; the third is tables and (estimates) for special variables.

The census data were collected at farm level, at tract level, at crop level and at animal/ poultry level. Information about households and their demographics were also collected. One priority area has been the role of gender in agriculture in Fiji. A special section of the

census questionnaire was targeted at identifying these roles and highlighting any special differences. These data also have been broken out by age group.

Stratification Procedures and ASF Construction

Accurate land stratification for the 2009 NAC was essential; it was necessary to estimate the percentage of agriculture land use. Initially the stratification was made for each of the Fiji Islands Bureau of Statistics (FIBOS) enumeration areas (EAs).

TABLE 1. 2009 NAC OF FIJI: DEFINITION OF THE STRATIFICATION BY ACTUAL LAND USE

STRATUM	DEFINITION IN WORDS	ESTIMATED % OF AREA	SM SIZE (km^2)
10	Areas cultivated from 70 to 100 % by temporary, and/or permanent crops.	70-100 Crops	1
20	Areas cultivated from 30 to 69 % by temporary, and/or permanent crops.	30-69 Crops	1
30	Areas cultivated from 10 to 29 % by temporary, and/or permanent crops.	10-29 Crops	1
40	Areas covered from 91% to 100% by improved pastures and unimproved native pasture (grazing lands).	91-100 Pastures	1
50	Areas covered totally by natural forest.	100 Forest	1
55	Areas covered with planted forest (Pine and Hardwood)	100 Forest	No Census
60	Non-Agricultural land	100 Non Agriculture	No Census
70	Urban and Peri-Urban areas	100 Cities, Towns	No Census
75	Small Island Districts with a few villages.	Village-scale Farming	Any Size
85	Special small areas cultivated by crops located only in few places and List of important farms like big cattle or coconut farms, where their boundaries were possible to be drawn on maps (LSF Farms).	Special and Complete Farms	Any Size

The estimated percentage of land use considered many components of agricultural production as well as socio-economic data of the farm and farmer. The stratification found in Table 1 was used to select samples for various multiuse or general purpose surveys.

The census estimates were requested at national, divisional, provincial and also tikina levels. The 15 provinces including Rotuma Island were the main focus of the tabulation. Consequently, the entire country was divided into strata according to the intensity of land use for agriculture. They were further subdivided into sub-strata according to specific land

use. This sub-stratification technique guaranteed the sample allocation for priority and special crops. Another stratum was created for special farms including large commercial and freehold farms.

A total of 1,602 existing EAs from the 2007 population census were overlaid on the ASF topographic maps scale 1:50,000 in preparation for stratification activities according to land use. Each EA was classified into one of the strata keeping the same geographical identification codes as those used in the population census. The percentage of area under crops, pastures, forest, etc. (land use) of each EA was estimated by field observation to check that each EA was classified in the right stratum and sub-stratum.

Photo Enlargement Preparation

The selected segments (SM)-complete and incomplete grids-were transferred from topographic maps onto 1994 contact aerial photographs scale 1:24,000. Photo-enlargements with scale around 1:6-7,000 were acquired from the Air Survey Section of the Department of Lands.

Land Use Photo interpreters assisted in the preparation of photo-enlargements for the field work. Selected SMs were transferred from the contact photographs into photo-enlargements with help of topographic maps containing the ASF. Permanent physical boundaries were delineated as close as possible around the perimeter of complete and incomplete grids.

The SM boundaries had to be permanent physical features which could be positively identified by enumerators in the field. Boundaries, ranked in order of their acceptability, were given to photo interpreters; paved highways, secondary all-weather roads, railroads, local farm path roads, rivers, streams, creeks, permanent drainage and irrigation canals were top-ranked boundaries; field boundaries, lines of trees, power lines, fences, small gullies, and ridges were ranked as second category boundaries. The area of a SM was to be the same as the area of the grid, 100 ha.

The area of each SM on the photo enlargement was calculated through the use of the GIS system. Each enlargement contained the north indication, EA identification number (Division/ Province/Tikina and EA Number), stratum, sub-stratum, SM Number, area in km^2, scale of enlargement, flight number, year of the photograph and the equivalence of 1 cm^2 in hectares. This identification and SM boundaries were delineated using red china markers. The main topographic features and their names were highlighted on the photo enlargement using blue color for hydrographic features, such as rivers and creeks; on the topographic maps the red color was used for roads, path, etc. Also the SM identification was written on the back of the photo enlargement. Then the photo enlargement was laminated with thin plastic. The enumerators used permanent marking pens to delineate the tract boundaries of the farms.

Optimum Size of the Segment(SM)

"Size of segment"(SM) is a general term. It could refer, for example, to the land area of a SM, to the number of farms in a SM, to the number of households in a SM, to the amount of cultivated land, or to the number of cattle. However, in the ASF construction in Fiji, size of SM refers to the total land area of a SM.

Several related factors were taken into consideration when the sizes of SMs were defined. These factors included: sampling variance, costs, difficulty in determining boundaries, topographic details on available mapping and photography materials and the methods of associating the reporting units (farms) with one and only one segment. It is difficult to isolate each of these factors because they can affect each other.

Cost considerations have often given rise to strong intuitive impressions that favour sampling units (SMs) that are larger than they should be. This conclusion evidently comes from the fact that, for a given cost, more farms can be included in the sample when the sampling units (SMs) are large. But empirical results of many surveys have indicated a very large loss in sampling efficiency when area sampling units (SMs) have a large number of reporting units (farms). It was determined, because of the available cartography, that 1 km^2 grids should be the size of SM in all strata.

The choice of a reporting unit is important, because it establishes the point of reference to associate crops, livestock and other variables with a unique SM. The farm was the reporting unit in the 2009 NAC.

Relationship of Reporting Units (farms) with SMs

Rigorous application of MSF methodology requires that each sample SM can be divided into tracts and that all land within the SM be carefully accounted for as illustrated in Figure 3.1, below. This documentation is necessary to minimize coverage error.

In order to know all characteristics of a farm, it is valuable to collect information, not only from the tracts that are inside the SM, but also from the tracts outside of the SM that belonging to that farm. There are three approaches to collect these data: Closed, Weighted, and Open Segment Methods.

a) Closed-Segment Method

The idea is to collect data on specific items or activities within the boundaries of the sample SMs. Data are only collected about the tracts located inside the boundaries of a selected SM. For example, if information on land use is required, data are collected on the use of all land within the boundaries of each sample SM. If information about cattle is wanted, information is collected about all cattle within the boundaries of the selected SM at the time of the interview.

b) Open-Segment Method

The general idea of the open-segment method is to formulate practical rules that associate every farm in the population with one and only one SM. To do this a unique reference point called "HEADQUARTERS" is defined and located for each farm. A farm then belongs to the SM in which its headquarters is located. In most cases the headquarters is defined through the farmer's household. But when there is not a household in the farm the definition and location of the headquarters is more difficult.

c) Weighted-Segment Method

The weighted-segment method calls for collecting data from every farm that is within or partly within a selected SM. All data for the farm are collected and weighted by the percent of the entire farm that is within the SM. This method is considered most appropriate for the census.

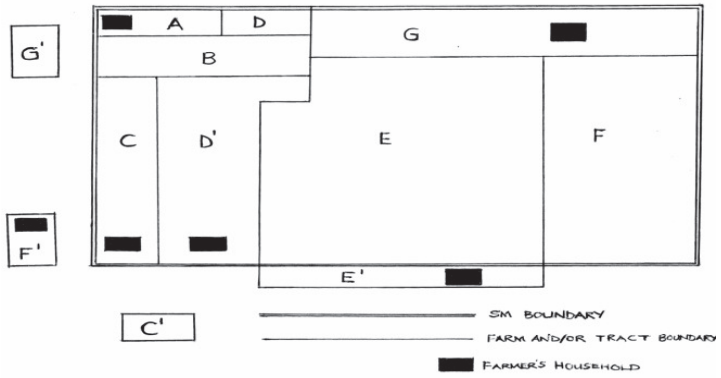

Fig 3.1

DESCRIPTION OF FIGURE 3.1

TRACT	FARM	DESCRIPTION
A	1	Tract A is an entire farm. The farmer lives on his farm
B	2	Tract B is a farm, but the farmer does not live on his farm or inside the SM. He lives in the city of Suva, where the 2009 NAC enumerator will not go.
CC'	3	Tract C is a nonfarm tract. That is, non-agricultural operations are performed within it. But, agricultural operations are conducted in tract C'. Two brothers work the land of farm No 3. One brother lives on the tract C and the other lives outside this SM (in another SM). According to previously defined rules that designate one person as the "farmer" of a farm, the brother living in tract C is the farmer who helps operate the farm although he lives in another SM.
DD'	4	Tract D and D' are composed of parcels of land at two locations within the SM. It is operated by one person who lives in the SM and has no land outside the SM.
EE'	5	Tracts E and E' compose farm number 5. This is an example of a SM boundary crossing a farm and dividing the farm into two tracts. The farmer lives in tract E'.
FF'	6	Tract F is part of farm number 6. The remainder of the farm is tract F' located a few kilometers away from this SM. The farmer lives outside the SM in F'.
GG'	7	Tracts G and G' are part of the farm number 7. The farmer lives inside the SM and in tract G.

Example:

The closed-segment of the figure 3.1 is composed of eight tracts. Farm information would be collected only for the tracts A, B, C (even if it is a non-farm tract), D, D', E, F, and G.

With reference to figure 3.1 farms numbered 1 (A), 3 (CC'), 4 (DD') and 7 (GG') will be assigned by the open-segment method when the headquarters is the household.

In the weighted segment method information would be collected for all tracts of farms numbered 1(A), 2(B), 3(CC'), 4(DD'), 5(EE'), 6(FF'), and 7(GG') in 7 questionnaires.

THE WEIGHTED SM METHOD WAS APPLIED IN 2009 NAC USING THE FARM LAND INSIDE THE SELECTED SM DIVIDED BY THE FARM TOTAL LAND (INSIDE PLUS OUTSIDE) AS THE WEIGHTING FACTOR.

4. THE CENSUS ACTIVITIES

TRAINING

Comprehensive training programmes were organized for national staff in all aspects of 2009 NAC procedures, including MSF construction, data collection/interview techniques, processing, analysis, publication and dissemination and the Fiji Agricultural Statistics System (FASS).

A group of 13 project staff (contracted) and six photo interpreters received on-the-job training on all the activities of updating and digitizing areas for frame construction including geo referencing and preparation of photo enlargements for use during the field data collection.

The training for the census field staff was organized at two levels. The first, for the Supervisors, was conducted in Suva from 21st -25th September 2009 and was attended by 32 senior staff from Extension, Animal Health and Production, Land Use and Quarantine Divisions. The programme of the course was: 3 days (8 hours per day) of classroom training covering different definitions and concepts with the Field Team Manual; one day of field practice (using cartography, aerial photography, questionnaires and auxiliary forms) and one day for evaluation of completed questionnaires in the classroom, discussing field errors and problems. FAO Staff and Experts conducted the training assisted by Project counterparts from the Agricultural Statistics Unit.

In the second level of training, a total of 119 Enumerators attended three separate courses conducted prior to data collection. These participants included Department of Agriculture locality field officers and project enumerators contracted for the census data collection. Three training centres were used for the enumerators selected from the Extension, Animal Health and Production, Land Use and Quarantine Divisions, including project staff: Suva (34 enumerators for Central Division and 27 for Eastern Division), Lautoka (20 enumerators for Western Division) and Labasa (38 enumerators for Northern Division). These courses were conducted from 29th September - 3rd October 2009; the programme was the same as for the field supervisors' course. Coordinators and Supervisors of each division undertook the role of Instructors during the training programme. FAO Staff and Experts and the Agricultural Statistics Unit counterparts coordinated the activities of three training centers.

Two training courses were organized in data processing; one for manual editing and coding for 13 staff and the second, for data entry (using Microsoft ACCESS) and computer validation (using the Statistical Package for Social Sciences (SPSS)) for 10 staff. The Field Team manual and the Coding, Editing and Data Processing manual were used in these training courses. Three staff have been trained in the use of SPSS software.

Ten staff received on-the-job training to conduct the coverage analysis and the statistical analysis of the census results. Ten staff were trained in the operation of the Fiji Agricultural Statistics System (FASS).

The statistical and data processing capabilities of the local staff were greatly enhanced by the training programme. The effectiveness of the training programme was reflected in the smooth execution of most census activities, which proceeded without major problems.

Census Data Collection

The publicity to promote the 2009 NAC started in February 2009. The Information and Communication Division of the Department of Agriculture conducted the census promotion through TV interviews and radio broadcasts in three languages: English, Fijian (iTaukei), and Hindustani. In addition to the brochure on the census objectives, a second brochure described the census methodology, farm activities, data requirements and uses were printed and distributed at Government offices in all provinces in the country. Other census news was published in all newspapers in different languages. A census poster was also printed in three languages and distributed around the country. The cooperation of the farmers was exceptional.

The field operation was undertaken at division level. A total of 129 Enumerators were placed in 26 field teams (9 in Central Division, 8 in Western Division, 4 in Northern Division and 5 in Eastern Division). Each field team had 4 or 5 enumerators, one field supervisor, one vehicle and one driver. A fleet of 30 vehicles from the Department of Agriculture was used where possible; most of the transportation in Eastern Division was provided by a Fiji Navy vessel, a Fisheries Division vessel and by Inter island ferries. The Principal Agricultural Officer (PAO) of each division was responsible for overall management together with the support of divisional administrative and finance personnel. The technical coordination and quality control activities were conducted by the supervisors and project counterparts. Ten photo interpreters played an important role in the field organization helping the enumerators to locate the SMs and to identify their physical boundaries on the field.

Two questionnaires, NAC 1 and NAC 3, were used to record information about the segments from the sample. The NAC 1 itemized all tracts inside the segment and all associated farm tracts outside the segments. The NAC 3 documented the nonfarm tracts inside the segment. Enumerators were required to fill out these questionnaires; during the interview process the main questionnaire (NAC 2) was used. Neither the NAC 1 nor NAC 3 was necessary for List Frame farms.

Data collection started on 6th October, 2009 with 119 fulltime enumerators. It was expected that data collection would be completed within two months; however only one division [Central] managed to achieve this timeline. The other three divisions encountered difficult field situations, including Cyclone Tomas, which further extended data collection until the 3rd week of December 2009. However, data collection in the Yasawa Group [Western Division] was not completed until February 2010 due to the impact of Cyclone Mick.

Three different versions of the National Agricultural Census 2009 questionnaire were used for collection of information about agricultural farms. The first version was circulated and used during the first month of data collection. Typographical errors were corrected and additional codes were inserted in the subsequent versions, although the content of the questionnaire remained the same.

Census data collection was conducted more or less within the allocated time frame (45 working days). The massive participation of all Department of Agriculture technical and administrative divisions, assured the success of census field work. More than 120 personnel, 30 vehicles and boats worked full time during three calendar months. It is the first time that all Divisions in the Department of Agriculture had participated in the census data collection.

Quality Control

Intensive quality control programmes were undertaken during the first three weeks of the census data collection in the four Divisions of the country. Divisional quality control teams were tasked with the responsibility of monitoring and evaluating the responses during interviews, ensuring that good quality data and information would be obtained from the farmer/respondent at farm level. Stringent procedures and instructions were put in place for all census teams to follow strictly in order to minimize field errors during interviews. These measures were necessary and critical in order to obtain data that would provide reliable and consistent estimates for the different types of farming systems within the agriculture sector of the country. This activity was conducted with success during the census data collection contributing to the effectiveness of the data collection around the country.

Questionnaire Processing

After a prioritized order of data collection from the provinces, the questionnaires were received at the Agricultural Statistics Unit in batches. Unique questionnaire numbers were assigned by the data processing administrator and recorded in a management system designed to prevent duplicate numbers and to coordinate the collection and processing of the three types of questionnaires. The questionnaire numbers consisted of province, district and a sequence number starting with an initial value assigned previously to each of the segments.

The editing and coding process for a total of 9,341 NAC 2 questionnaires containing farm data started in mid November 2009. Four persons managed the archives of census

materials (questionnaires, cartography and photo-enlargements, etc.). Eleven coders were contracted and trained using the Field Team Manual and the Coding, Editing and Data Processing Manual. One table head checked the manual editing and coding. Data entry activities were conducted by ten data entry operators beginning in early December.

Data Entry System

Three separate databases were developed in Microsoft ACCESS to capture the NAC 1, NAC 2 and NAC 3 information. The system used ID information assigned during the encoding process to uniquely identify each segment in the NAC 1 and NAC 3 and each questionnaire in the NAC 2. The design closely resembled the look and flow of the printed questionnaires to ease data entry and to minimize data entry errors. The NAC 2 questionnaire contained the following categories of data:

Chapter 1: ID information and farm/farmer characteristics
Chapter 2: Farm and farmer information
Chapter 3: Household data and task participation
Chapter 4: Land use data at tract level
Chapter 5: Temporary crop data at tract level
Chapter 6: Permanent crop data at tract level
Chapter 7: Sugarcane crop data at tract level
Chapter 8: Scattered trees, pastures and floriculture at tract level
Chapter 9: Cattle, Small Livestock, Apiculture, Aquaculture, Poultry
Chapter 10: Farm Employment
Chapter 11: Machinery and Farm Equipment
Chapter 12: Farmer practices and interaction with extension

The three Microsoft ACCESS systems contained data entry pages that corresponded to the questionnaire layouts. Range checks were used for some variables and drop-down boxes with the category choices were provided for other variables. Default data values were set to facilitate data entry and to eliminate missing values.

In Table 2 below the distribution of the sample and the number of farmers enumerated in those segments is listed. The total number of segments is equal to the sum of farm segments (segments containing farms), non-farm segments (segments with no farms) and LSF segments (segments that were part of an LSF farm). The number of farms is the sum of SIS farms, LSF farms and ASF farms.

Data Cleaning

Consistency checks were also carried out in the ACCESS databases. Queries were designed to identify data entry and coding errors. Data were entered into 15 provincial databases (including Rotuma Island) which were combined into four divisional databases. The LSF database was kept separate, but combined in SPSS for tabulation and analysis.

TABLE 2. Distribution of the NAC 2 Questionnaires

Province	Districts	Small Island Farms	LSF Farms	Total Segments	Segs * in LSF Farms	Farm Segs	Non-farm Segs	ASF farms	Total Farms
Ba	8	688	105	209	0	101	108	998	1,791
Bua	3	0	12	100	2	53	45	341	353
Cakaudrove	8	42	36	228	7	99	122	711	789
Kadavu	4	0	0	47	0	28	19	233	233
Lau	14	479	6	26	2	18	6	160	645
Lomaiviti	6	151	1	34	0	23	11	262	414
Macuata	5	20	23	187	3	96	88	827	870
Nadroga	8	349	131	201	4	70	127	565	1,045
Naitasiri	5	0	57	156	0	67	89	667	724
Namosi	3	0	10	57	1	18	38	148	158
Ra	4	0	27	102	0	49	53	558	585
Rewa	4	253	4	15	1	9	5	201	458
Serua	2	24	5	71	1	18	52	247	275
Tailevu	5	9	47	88	4	51	33	736	792
Rotuma	7	209	0	0	0	0	0	0	209
	86	2,224	464	1,521	25	700	796	6,654	9,341

*** The enclosed area of some sample segments were part of (entirely within) list frame farms and, thus, were considered neither a farm segment nor a non-farm segment**

Preparations for Data Analysis

The data collected during the NAC 2009 were analyzed in IBM SPSS. SPSS datasets were created from the Microsoft ACCESS databases to represent the original data and the data to be used for analysis. Because of the many-to-one relationships with the farm, different ACCESS tables had to be processed in separate SPSS datasets, summarized to farm level and merged. The ACCESS tables contained the following information:

- Chapter 1: ID information and farm/farmer characteristics
- Chapter 2: *confidential farm and farmer information not included in census datasets*
- Chapter 3: Household data and task participation
- Chapter 4: Land use data at tract level
  - Land use data at farm level with size of farm*
- Chapter 5: Temporary crop data at tract level
  - Temporary crop data at farm level (in ha)*
- Chapter 6: Permanent crop data at tract level
  - Permanent crop data at farm level (in ha)*
- Chapter 7: Sugarcane crop data at tract level
  - Sugarcane crop data at farm level (in ha)*

- Chapter 8: Scattered trees, pastures* and floriculture
- Chapter 9: Cattle
    - Small Livestock
    - Apiculture
    - Aquaculture
    - Poultry
- Chapter 10: Farm Employment
- Chapter 11: Machinery and Farm Equipment
- Chapter 12: Farmer practices and interaction with extension

* Conversions to hectares were required when the questionnaire data were acres.

The SPSS databases contained the following information after integration of ID information with chapter data; farm expansion factors were calculated and added to each database.

Chapter 1 with Chapter 3: segment and stratum with household member task data.

Chapter 1 with Chapter 4 segment and stratum with land use data, form of farm tenure

Chapter 1 with Chapter 5 segment and stratum with temporary crop data

Chapter 1 with Chapter 6 and Chapter 8 segment and stratum with permanent crop data and scattered trees

Chapter 1 with Chapter 7 segment and stratum with sugarcane data

Chapter 1 with Chapter 9 segment and stratum with livestock data

Chapter 1 with Chapter 10/11/12 segment/stratum with chapter data (originally included with Chapter 1).

Preparation and development of the census databases was the responsibility of the FAO National Data Processing Consultant with technical advice provided by the FAO Expert in Data Processing. As an input to the strengthening of the data processing resources of the Agricultural Statistics Unit, the Department of Agriculture acquired eight HP Compaq compatible microcomputers and a backup server system while FAO donated six computers, one laptop and two laser jet printers, an A4 scanner and specialized software (SPSS, Arc GIS, Norton Internet Security).

5. ANALYSIS OF AGRICULTURE CENSUS DATA

Introduction

Based on the 2009 Census, there are 65,033 farms in Fiji. Because of rounding-off for farm category variables, some of the tables may have a slightly different total. The number of farms in 2009 is 32% less when compared with the 95,400 farms from the 1991 Census. The average size per farm has declined to 3.9 hectares from 6.2 hectares in 1991.