COOK ISLANDS 2011
CENSUS OF AGRICULTURE & FISHERIES







COOK ISLANDS GOVERNMENT
MINISTRY OF AGRICULTURE

Cook Islands
Census of Agriculture and Fisheries
2000

This report documents the Cook Islands 2011 Census of Agriculture and Fisheries. It contains the analysis of the main findings and seven (7) sets of tables providing information collected during the Census. More detailed information can be obtained from either of the agencies listed below.

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Message from the Minister

As Minister for Agriculture, National Environment Service, and the Business Trade and Investment Board, I have great pleasure in presenting the information contained in this report on the Cook Islands Census of Agriculture 2011.

This census is showing huge changes in agricultural activity in the country. There is a major decline in horticulture subsistence and commercial production. This corresponds with population trends that are revealed in the 2011 Census of Population. Another factor affecting horticulture production on Rarotonga is less arable land as expansion in the tourism industry makes it a more attractive sector to capitalize on. Therefore, intensive economic and social changes in our country over the past 20 or so years has changed the way we sustain our food security needs, importing more and growing less.

The information contained in this document will serve to better assist our planners in designing policies necessary to address our food security and nutritional requirements, also guide us towards a healthier lifestyle. We can only address our current and future needs through team effort, not working as individual agencies as has too often been the case.

I extend to the people of the Cook Islands, the primary beneficiaries of the findings of the census, my sincere appreciation for their cooperation in providing the necessary information to our census staff, and hope we can utilise the information contained within to reverse this negative change.

Sincere thanks to FAO for the financial and technical support for this project. I wish to thank, in particular, the services and expertise of David Marshall who was also involved in the previous censuses, and has seen this changing trend in agriculture.

Finally, many thanks to all the hard-working staff whom in some way or another invested time and professionalism in the census. Special thanks also goes to all those who assisted with the collection of additional data, after the census proper, to improve the findings of this report.

Hon. Kiriau Turepu

Minister for Agriculture, National Environment Service and Business Trade Investment Board

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COOK ISLANDS GOVERNMENT

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FOOD AND AGRICULTURE ORGANIZATION (FAO)

1. Financial support
2. David Marshall - Census consultant
3. Kevin Hosking - Data processing
4. Jairo Castano - Project technical officer
5. Madeline Kare & Elizabeth Potoru - Preliminary data processing, post-enumeration survey

CENSUS STAFF

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3. Moekopu Vogel, Ngametua Kino, Madeleine Kare, Twin Ruarangi, Maki Toko, - Re-enumeration of Aitutaki
4. Maru Willie & Banabas Henry - assisting with the Census of Agriculture and Fisheries enumeration in the northern group
5. All census Supervisors and their Enumerators, as listed in Annex 4.

FOREWORD

This report presents the main findings of the Census of Agriculture 2011 (CoA 2011) which was the third such census of agriculture to be conducted in Cook Islands. The CoA 2011 was conducted at the same time as the Census of Population and Dwellings in November 2011 (CoPD 2011). This was the first time the two censuses had been conducted as an integrated exercise. The key issue such an approach sought to address, was the high cost of data collection in the Northern Group of Islands where transport costs were a major factor. It was also recognised that other cost savings and efficiencies could be gained by conducting the two censuses at the same time and the resultant database would be far richer since the datasets could be combined, for analytical purposes, through the household number.

The report is arranged in 3 sections. The first section outlines the methodology used and the integration of the census of agriculture with the census of population and dwellings. The second section presents the main findings of the census of agriculture presenting comparisons with previous censuses to illustrate how the sector has changed over time. The third section analyses additional data on the agricultural sector captured as part of the Census of Population and Dwellings 2011.

The census impacted on every household in the country and without the support from the public it could not have been realised. We would like to thank all those farmers and households that contributed so willingly to this Census as well as the team of enumerators that collected the information. Thanks also go to the staff of the Ministry of Agriculture who acted as supervisors and coordinators and the staff of the Statistics Office who provided technical guidance and the overall coordination of the joint census programme. The data processing was carried out by Mr. Kevin Hosking, Statistics Division and technical support was provided by the Food and Agriculture Organization of the United Nations (FAO), for which the Government is extremely grateful.

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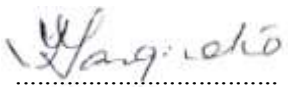
Dr. Mat Purea

Secretary,
Ministry of Agriculture



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Ms. Taggy **Tangimetua**

Government Statistician,
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SECTION 1: BACKGROUND AND METHODOLOGY

Background

1.1 The Cook Islands consists of 15 islands with a land area of 237 square kilometres scattered over 2 million square kilometres of the South Pacific Ocean. The islands are split geographically into the Northern Group and the Southern Group. The main island, and seat of Government, is Rarotonga in the Southern Group. It is also the single largest island with a land area of 67 square kilometres and a resident population of 10,572 (CoPD 2011). Other islands in the Southern Group have good transport and communications links and all lie within 150 nautical miles of Rarotonga. The Northern Group, on the other hand, with a combined population of 1,112 persons (CoPD 2011) are not only physically very small but lie some considerable distance from Rarotonga, the furthest being Penrhyn some 737 nautical miles away. Here transport and communications links are much less developed than for the Southern Group making census and survey taking that much more difficult.

1.2 For the country as a whole, tourism is the single most important economic sector though much of the tourist industry is focused on Rarotonga and to a lesser extent Aitutaki. Agriculture, though small in terms of its contribution to GDP (3%), remains an important sector in terms of food production and food security. It is also important in terms of employment and as a means of livelihood, especially on the more remote islands.

1.3 A significant feature of the Cook Islands is the migratory movement of the population. Cook Islanders are also New Zealand citizens and can move freely between the two countries. It is estimated that some 60,000 persons of ethnic Cook Islands Maori descent currently live in New Zealand, about 4 times as many as are currently living in the Cook Islands. These family ties facilitate the migration of Cook Islanders to New Zealand and many young persons are drawn there for education and employment opportunities. This has resulted in a sharp decline in the population of the more remote islands, particularly in the Northern Group but also Mangaia, Atiu, and Mauke in the Southern Group, where the population has roughly halved over the last 25 years (1986-2011). Even on Aitutaki the resident population has declined over this period and it is only Rarotonga that has had a relatively stable resident population at around 10,000.

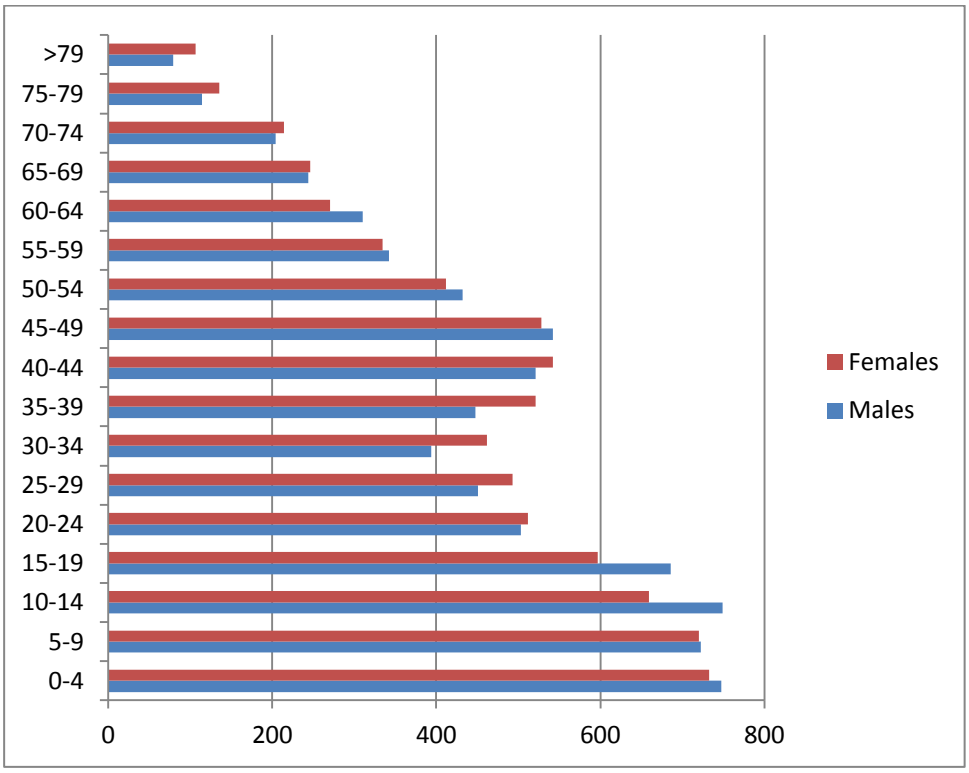
Table A: Resident Population by Island 1986, 1991, 2001 and 2011

Island	1986	1991	2001	2011
Rarotonga	8,972	9,967	9,424	10,572
Aitutaki	2,281	2,252	1,743	1,771
Mangaia	1,224	1,176	739	562
Atiu	954	1,000	600	468
Mauke	685	622	469	300
Mitiaro	273	244	226	189
Palmerston	66	49	48	60
Pukapuka	761	670	662	451
Nassau	119	102	72	73
Manihiki	466	655	497	238
Rakahanga	281	261	158	77
Penrhyn	497	501	351	213
Suwarrow	6	10	1	-
COOK ISLANDS	**16,593**	**17,518**	**14,990**	**14,974**

Source: Cook Islands Statistics Office

1.4 The Age-Sex distribution of the resident population, as determined in the CoPD 2011, illustrates the impact of outward-migration at the younger ages, particularly amongst the males, starting with 15-19 year age group taking advantage of wider education opportunities overseas and then followed by the 20-29 year age group looking for further education or employment opportunities overseas. It is not until the age of 40 that the distribution returns to normal.

Figure 1: Age-Sex Distribution of Resident Population by Age Group 2011



Source: Cook Islands Statistics Office, CoPD 2011

1.5 The period 1986-2011 has also witnessed a significant increase in the number of visitor arrivals from 30,000 in 1986 to 113,000 in 2011 resulting in considerable new employment opportunities in the tourism industry. This period has also seen a steady increase in imported foodstuffs, up from NZ$10.3 million in 1986 to NZ$33 million in 2011, and the dietary shift away from local produce to imported foodstuffs. With almost full employment and a steady flow of remittances, interest in subsistence production has greatly diminished over the years and this is reflected in the latest census data.

1.6 The first Census of Agriculture (CoA) in the Cook Islands was conducted in 1988 and the second in 2000. Both censuses were supported technically by FAO. The Cook Islands also has a long history of population census taking at 5-yearly intervals in years ending in 1 and 6. Traditionally the Census of Population and Dwellings (CoPD) has included questions on agricultural activity at the household level, types of crops grown, livestock numbers, farm machinery and involvement in fishing and pearl farming activities. Section 3 of this report looks at data collected in the CoPD 2011 related to agricultural, fishing and pearl farming activities.

Census Approach

1.7 In considering the approach to be adopted for the CoPD 2011, the need to also conduct a census of agriculture was recognised and a decision taken, in line with FAO recommendations, to integrate the two censuses. The questionnaires used for the CoA 2000 and the CoPD 2006, related to agriculture, were reviewed and efforts made to avoid duplication. In particular, the question on the numbers of livestock kept by the household was dropped from the CoPD as this data was being collected in the CoA. Likewise, information on machinery and equipment was dropped from the CoA as this was being collected in the CoPD. Questions on the extent of involvement in agricultural activity at the household level were maintained in both censuses as was the extent of involvement in fishing and pearl farming. This provided a useful coverage check for the CoA, in particular, although it was noted that there were definitional differences between the two censuses especially related to flower cultivation which was considered an agricultural activity in the CoPD but not in the CoA. At the individual level, data on labour inputs was recorded in the CoA by age and sex but other data at the individual level has then to be obtained through linkages to the CoPD through the person and household number.

1.8 The approach adopted to the data collection was to have two separate teams of supervisors and enumerators, one for the CoPD and another for the CoA. The MoA was responsible for the CoA team while the Cook Islands Statistics Office (CISO) was responsible for the CoPD team. Training for the CoA was carried out in a number of locations, prior to the fieldwork. This training was scheduled as a single session of a few hours and focused on the completion of the census forms. This was in contrast to the training for previous census where training of trainers and supervisors was first organised over 3 days. This was followed by the training of the enumerators, again over 3 days. The very short duration of the training of supervisors and enumerators for the CoA 2011 adversely impacted on the quality of the fieldwork which was sub-standard in many areas.

1.9 Both censuses used the statistical Enumeration Area (EA) for the allocation of households and work areas. In each Census District, the CoPD was first conducted. The list of households engaged in agriculture and fishing in each EA was then passed to the CoA team which then visited these households to complete the CoA.

1.10 For the Northern Group the two census teams travelled together on the police patrol boat. The two census teams also worked very closely together to help each other out and to complete the fieldwork within the time allocated for each island. For the Southern Islands, the fieldwork for the two censuses was less integrated although lists of households engaged in agricultural and fishing activities, identified in the CoPD, were made available to the CoA teams. In total, 19 supervisors and 83 enumerators were used.

1.11 Despite the best efforts of the organisers, the fieldwork for the CoA got delayed. The CoPD enumerated the population on 1 December 2011, however, much of the fieldwork for the CoA was carried out after that date and very quickly got caught up in the festive season. A review of the coverage in January 2012, EA by EA, identified significant under-enumeration in a number of EAs and especially those on Rarotonga. Using the lists of households engaged in agriculture and fishing activities from the CoPD, the worst affected EAs were identified and the enumerators went back to interview the households that had not been visited.

1.12 Prior to this 'mopping-up' exercise the enumerators were re-trained on how the census questionnaires should be completed as well as on the main concepts and definitions. Clarification was provided on the classification of households into the four categories: non-agricultural, minor

agricultural, subsistence and commercial as it had been noted that many households with just one or two fruit trees had been treated as non-agricultural rather than minor agricultural and in fact many had not even been visited as non-agricultural households did not need to be visited.

1.13 Following the data collection exercise, the forms were checked, edited and coded and prepared for 'scanning'. Scanning technology for data capture was used in the CISO for the first time for the CoPD 2011 and the CoA 2011. The data processing exercise for the CoPD was completed first and then followed by the data processing exercise for the CoA. The length and complexity of the CoA forms made the later exercise much more time consuming and virtually all records had to be edited. The data capture and data cleaning exercise for the CoA took the best part of 12 months, including the adjustments following the re-enumeration of Aitutaki. Tabulation also proved to be challenging because of the need for considerable internal computation of areas and numbers of plants. The final database was then split up into a number of smaller databases designed for each set of tables. The tabulation was done using Microsoft excel and ACCESS.

Data Quality

1.14 In interpreting the results of the CoA, account needs to be taken of the fact that households classified as having no agricultural or fishing activities in the CoPD were excluded from the CoA, especially on Rarotonga. Other definitional differences between the two censuses should also be noted. The CoPD defined agricultural activity as crops, livestock and floriculture whereas the CoA definition was primarily crops. Livestock and poultry raising was treated separately in the CoA and flower growing was only included in the CoA if it was a commercial activity or was carried out in conjunction with food crop activities.

Table B: Resident Population and Number of Households by Level of Agricultural Activity

Location of Household	Total Resident Population	Total Number of Households	Level of Agricultural Activity			
			No Agriculture	Subsistence Only	Subsistence and Commercial	Commercial Producers
Rarotonga	**10,572**	**3,154**	**1,056**	**1,860**	**215**	**23**
(percent)		*100*	*33*	*59*	*7*	*1*
Other Southern Islands	**3,290**	**939**	**152**	**638**	**141**	**8**
(percent)		*100*	*16*	*68*	*15*	*1*
Northern Islands	**1,112**	**279**	**38**	**238**	**3**	**-**
(percent)		*100*	*14*	*85*	*1*	-
COOK ISLANDS	**14,974**	**4,372**	**1,246**	**2,736**	**359**	**31**
(percent)		*100*	*28*	*63*	*8*	*1*

Source: Cook Islands Statistics Office CoPD 2011

1.15 The CoPD had 4 categories of agricultural activity, namely: Subsistence only, Commercial only, Subsistence and Commercial and No agriculture. For those engaged in agricultural activity a further breakdown was collected, namely: vegetables, fruit, flowers and other. The CoA also had 4 categories but for crop growing only, namely, non-agricultural, minor agricultural, subsistence and commercial. The differences in these classifications and the types of agriculture included make comparisons difficult, however, it is useful to evaluate the two sets of data and draw conclusions as to the extent of agricultural activity in the Cook Islands from these two sources.

1.16 Table B shows the level of agricultural activity of households as recorded in the CoPD 2011. 28 percent of households were recorded as having no-agriculture, 63 percent as subsistence only, 8 percent as subsistence and commercial and 1 percent as commercial. In terms of crops grown, the CoPD 2011 recorded 31 percent of households growing vegetables, spices and herbs, 43 percent as growing fruit and tree crops, 35 percent as growing flowers and 3 percent other (see Table C). Unlike in previous censuses, and because the CoA was being conducted at the same time as the CoPD, no information was collected in the CoPD to separately identify how many households were engaged in raising livestock and poultry.

1.17 In evaluating the CoPD 2011 data, it is also useful to make some comparisons with the data from the CoPD 2006. This showed 48 percent of households as non-agricultural, 49 percent as subsistence and 3 percent as commercial (Rarotonga 59 percent non-agricultural, 38 percent subsistence and 3 percent commercial). This would 'prima facie' imply that the proportion of households engaged in agriculture has risen quite markedly between 2006 and 2011. Some of this increase is explained by flower growing, a relatively new activity with some 1,524 households engaged in this activity in 2011. However, the general consensus was that agricultural activity (crops and livestock was on the decline, especially on Rarotonga.

Table C: Resident Population and Number of Households by Types of Crops Grown

Location of Household	Total Resident Population	Total Number of Households	Households growing Crops			
			Vegetables, Spices, Herbs	Fruit and Tree Crops	Flowers	Other
Rarotonga	**10,572**	**3,154**	**881**	**1,325**	**1,094**	**43**
(percent)			*28*	*42*	*35*	*1*
Other Southern Islands	**3,290**	**939**	**340**	**431**	**341**	**83**
(percent)			*36*	*46*	*36*	*9*
Northern Islands	**1,112**	**279**	**123**	**126**	**89**	**1**
(percent)			44	45	32	0
COOK ISLANDS	**14,974**	**4,372**	**1,344**	**1,882**	**1,524**	**127**
(percent)			*31*	*43*	*35*	*3*

Source: Census of Population and Dwellings 2011

1.18 The CoA 2011 also had 4 categories of agricultural activity but these were different to those used in the CoPD 2011. The four categories were: Non-agricultural, minor agricultural, subsistence and commercial. Non-agricultural was determined in terms of crops only; minor agricultural was a category of households growing very small quantities of crops defined as less than 64 sq.m. of garden crops and/or less than 20 fruit trees; subsistence households were evaluated as growing more than the minimum quantities grown by minor agricultural households but not selling any produce; commercial households were growing more than the minimum quantities and also selling their agricultural produce. Commercial agricultural enterprises, outside the household sector, were also included in the CoA 2011.

1.19 Table D summarises the results of the CoA 2011 by level of agricultural activity. From this it can be seen that number of households enumerated was 2,334 compared to 4,372 in the CoPD 2011 a difference of 2,038 households of which 1,883 were on Rarotonga. This difference was, in theory, households with no agricultural activity but only 1,246 such households were recorded in total in the

CoPD 2011 and 252 of these were also recorded in the CoA 2011 so only the difference of 994 households can be assumed to be non-agricultural leaving 1,044 households still to be accounted for.

Table D: Number of Households, by Level of Agricultural Activity and Location of Household

Location of Household	Number of Households (CoPD 2011)	Assumed Non Agricultural	Level of Agricultural Activity (CoA 2011)			
			Non Agricultural	Minor Agricultural	Subsistence Only	Commercial
Rarotonga	3154	1,883	39	659	333	240
Percent		*60*	*1*	*21*	*11*	*8*
Other Southern Islands	939	141	97	77	450	174
Percent		*15*	*10*	*8*	*48*	*19*
Northern Islands	279	14	21	166	78	-
Percent		*5*	*8*	*59*	*28*	*-*
COOK ISLANDS	**4372**	**2038**	**157**	**902**	**861**	**414**
Percent		***47***	***4***	***21***	***20***	***9***

Source: Census of Agriculture 2011

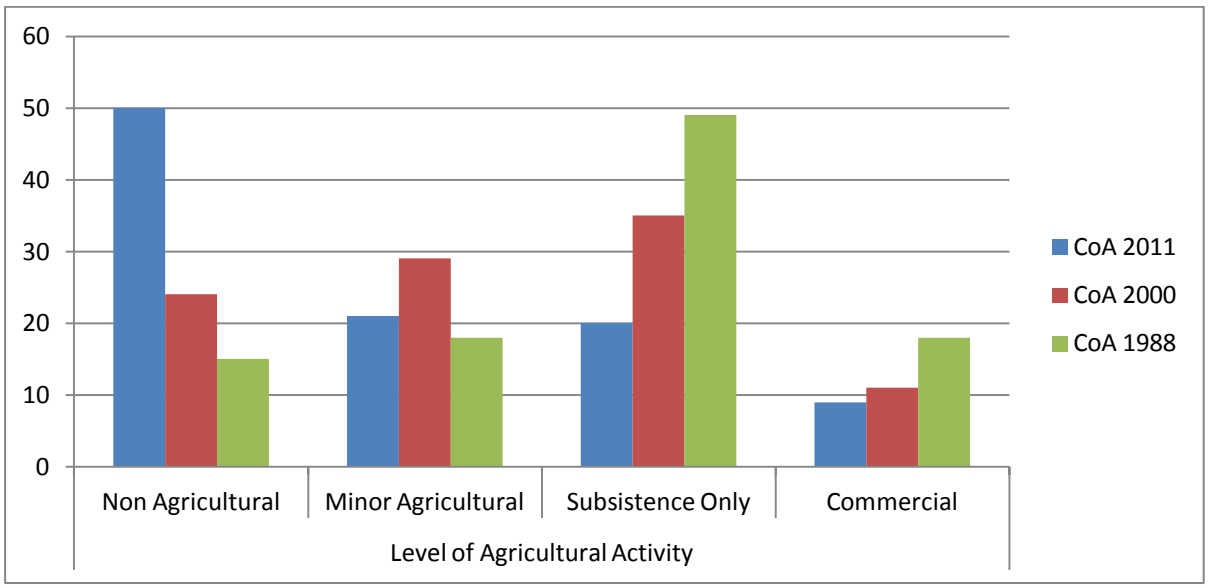
1.20 To a large extent this difference is due to differences in the definition between the two censuses of an agricultural and a non-agricultural household. Looking at the two groups of households selling produce (CoPD - subsistence & commercial plus commercial and CoA - commercial) we see a good correlation of 390 households in the CoPD and 414 in the CoA. The biggest group in the CoPD was subsistence with 2,736 households in this category compared to 1,763 (minor agriculture households plus subsistence) in the CoA, a difference of 973. This much higher figure in the CoPD is due in part to the treatment of flower growing as an agricultural activity in the CoPD, an activity practised by 1,524 households (35% of all households). While some of these households would be engaged in other agricultural activities, and thus included in the CoA definition of an agricultural household, for many of these households this was their only agricultural activity and they would not have been included in the CoA. In addition, livestock and poultry raising was considered as an agricultural activity in the CoPD but was not included in the CoA definition. This would also account for another significant group of households treated as agricultural in the CoPD but non-agricultural in the CoA. (livestock was covered in the CoA but not included in the definition of agricultural activity. Some 1,595 households were recorded as keeping livestock in the CoA).

1.21 Another comparison is to look at the data from the previous census of agriculture CoA 2000 and the previous census of population and dwellings CoPD 2001. These two censuses showed a reasonably good correlation across all categories. Non-agricultural 24 percent and 31 percent; Subsistence 64 percent and 66 percent; Commercial 12 percent and 4 percent (CoA and CoPD respectively. Going back still further to the first census of agriculture CoA 1988 we find 15 percent of households classified as non-agricultural, 67 percent as minor agricultural/subsistence and 18 percent selling part or all of their agricultural production.

1.22 While the proportion engaged in some form of subsistence agriculture, however small, remained fairly constant between 1988 and 2000, the proportion of non-agricultural households increased from 15 to 24 percent and the proportion of households selling part or all of their production fell from 18 to 12 percent showing a marked decline in the intensity of agricultural production, a trend one would expect to have seen continuing between 2000 and 2011. However, the CoPD 2011 recorded only 28 percent of households as non-agricultural, a smaller percentage than that recorded in

CoPD 2001 (31%), implying that proportionately fewer households were non-agricultural and thus there had been an uptake in agricultural activity over this period. The CoA 2011, on the other hand, shows the proportion of households selling part or all their agricultural produce at 10 percent (down from 12 % in 2000 and 18 % in 1988) while the proportion of households engaged in minor or subsistence agricultural activities was 38 percent (down from 64% in 2000 and 67% in 1988). The number of non-agricultural households in C0A 2011 (by calculation assuming all households not interviewed were non-agricultural) is estimated at 2,195 or 50 percent. This figure is considerably higher than the estimate from the CoPD 2011 of 28 percent and higher than the trend between 1988 and 2000 would project (around 35%).

Figure 2: Percentage of Households by Level of Agricultural Activity 1988, 2000 and 2011



1.23 A Post Enumeration Survey (PES) was carried out in selected EAs on Rarotonga and Aitutaki to evaluate some of the key data items. The results for Rarotonga showed a good correlation between the census fieldwork and the PES on agricultural activity. Both the CoA and the PES showed a much lower degree of agricultural activity than the CoPD. The data in terms of Households enumerated/ Households engaged in agriculture were 206/144; 81/81; 211/67 (CoPD, CoA and PES respectively). This confirms that (1) only households engaged in agriculture were enumerated in the CoA, and (2) the CoA only considered 56 percent of the households classed as agricultural in the CoPD as agricultural in the CoA (81 out of 144). For Aitutaki, the PES showed a much higher proportion of households engaged in agriculture than the CoA and even higher than the CoPD. In view of this large difference, and the known under-coverage on Aitutaki, a re-enumeration of Aitutaki was organised.

1.24 The conclusion on the evaluation of the census of agriculture data quality is, that while by no means perfect, the data does accurately reflect the trends in agricultural activity since the last census of agriculture in 2000 and provides good estimates of the structure of the agricultural sector at the time of the census. The other conclusion is that the results of the CoA 2011 and the CoPD 2011, as they relate to agricultural activity, are not comparable due to definitional differences.

SECTION 2: THE MAIN FINDINGS OF THE CENSUS OF AGRICULTURE

2.1 As described in the section on the methodology, some 2,334 households and agricultural enterprises were enumerated in the Census of Agriculture (CoA) 2011 out of 4,372 households existing in Cook Islands at that time (CoPD 2011). In terms of the level of agricultural activity, defined in terms of crop production, 157 households were identified as having no agricultural activity although it should be noted that of these,148 kept livestock. All the households not enumerated in the CoA are assumed to be non-agricultural bringing this total to 2,195. 902 households were classified as having minor agricultural activity, 861 households were engaged in subsistence crop production and 414 households and agricultural enterprises were engaged in commercial crop production (producing crops for sale). Table E shows the number and percent of households by agricultural activity for the three censuses of agriculture in 1988, 2000 and 2011.

Table E: Number and Percent of Households, by Level of Agricultural Activity CoA 2011, 2000 and 1988

Census	Total Number of Households	Level of Agricultural Activity			
		Non Agricultural	Minor Agricultural	Subsistence Only	Commercial
CoA 2011	4,372	2,195	902	861	414
(percent)		*50*	*21*	*20*	*9*
CoA 2000	3,646	893	1056	1289	408
(percent)		*24*	*29*	*35*	*11*
CoA 1988	3,170	475	560	1,567	568
(percent)		*15*	*18*	*49*	*18*

2.2 Comparisons between the three censuses show a steady decline in commercial and subsistence agricultural activity and a rise in households reporting non-agricultural activity. These figures for the Cooks Islands are heavily influenced by the situation on Rarotonga, home to 71 percent of the resident population and the bulk of the tourists. On Rarotonga, the proportion of non-agricultural households was 61 percent with a further 21 percent classified as minor agricultural households. This compares with 25 percent of households classified as non-agricultural and 8 percent as minor agricultural on the other Southern Islands group. For the Northern Islands only 12 percent of households were classified as non-agricultural with 60 percent classified as minor agricultural households and 28 percent as subsistence though the differentiation between minor agricultural households and subsistence households for the Northern Islands should, for the most part be ignored, as many of the minor agricultural households had sufficient numbers of fruit trees to classify them as subsistence households. This highlights the fact that the move away from agriculture is most visible on Rarotonga while the change is far less dramatic on the other islands.

2.3 One particular feature of the agricultural activity in the Cook Islands is the level of commercial and semi-commercial activity. This has fallen from 18 percent of households in 1988 to only 9 percent in 2011. What is noticeable, however, is that this reduction has been on islands where commercial production in specific crops such as bananas on Aitutaki and pineapples on Atiu has come and gone. On Rarotonga, while specific export crops such as pawpaw have also come and gone, demand for local produce from both the resident population as well as from the hotels and restaurants,

has maintained a small but important commercial sector. In 1988, of the 568 commercial/semi-commercial farmers, 238 were on Rarotonga. 25 years later the total number has dropped to 414 but there were still 238 commercial/semi-commercial farmers on Rarotonga. So while it is clear that agricultural activity at the household level has declined significantly over the 25 years (1986-2011) due to the changing life style, the aspirations of the youth and the increasingly cash economy, demand for local produce is still very visible and provides a livelihood for a small but relatively stable number of farmers on Rarotonga.

Land Area, Land Tenure and Land Use

2.4 The location, area (acres or sq.m.), land tenure and land use of each parcel was recorded as was the number of months the parcel had been in continuous use or left fallow. This was the section of the forms most likely to capture the actual area of the parcel as opposed to a land area code used elsewhere on the forms. However, even here there was some confusion as to whether or not numbers entered in the 'acres' column was actually an area or a code. Because this area data was fundamental to the whole analysis of the crop data as well as to the other analysis related to land area, at the editing stage, an evaluation was made of the area code for the holding entered in Section II of the Household Form and the Total Area of the Holding entered in the header of the Holding Form. Through this information it was possible to come up with a meaningful physical area for each parcel of land.

2.5 The total area of holdings was estimated at 1,489 acres down from 2,543 acres in 2000 and 6,435 acres in 1988. The estimate of the area of holdings in 2011 is under-reported, particularly in the Northern Islands, where many households were classified as minor agricultural households but in fact qualified as a subsistence household through the number of trees owned. Despite this caveat, the decline in the area of holdings is consistent with the decline in the number of agriculturally active households.

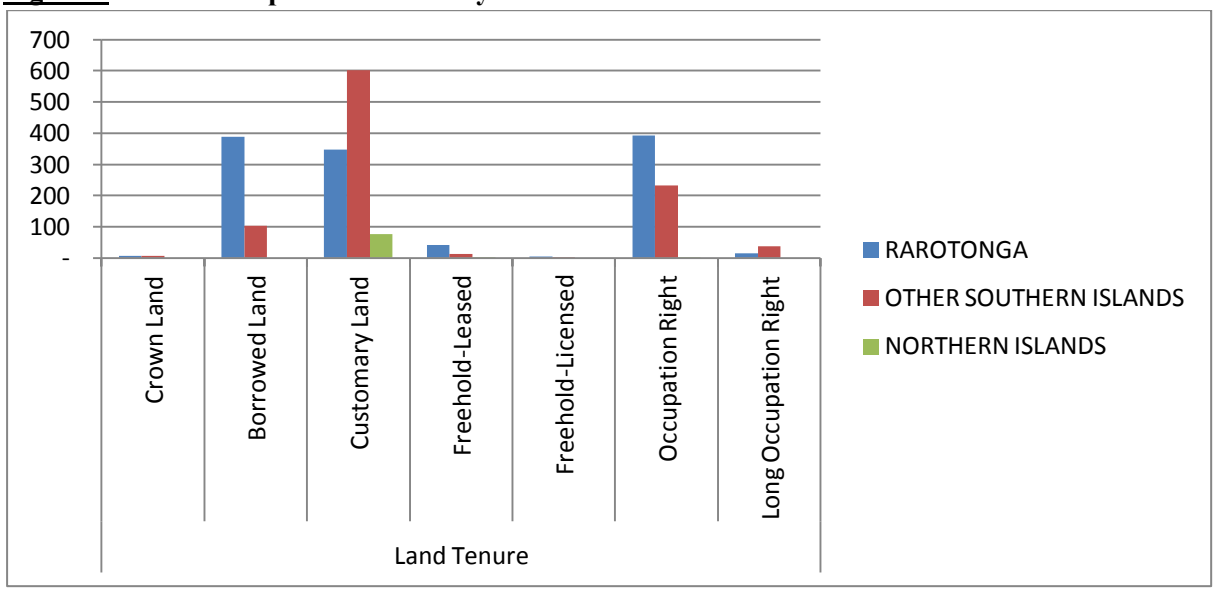
Table F: Holding and Parcel Characteristics 2011, 2000, 1988

Census Year	Number of Holdings	Number of Parcels	Area of Holdings/ Parcels (acres)	Parcels per Holding	Average Holding Size (acres)	Average Parcel Size (acres)
2011	1269	2458	1489	1.9	1.2	0.6
2000	1721	3467	2543	2.0	1.5	0.7
1988	2188	6399	6435	2.9	2.9	1.0

2.6 The number of holdings has declined from 2,188 in 1988 to 1,721 in 2000 and 1,275 in 2011 while the average holding size has also declined from 2.9 acres in 1988 to 1.5 acres in 2000 and 1.2 acres in 2011.

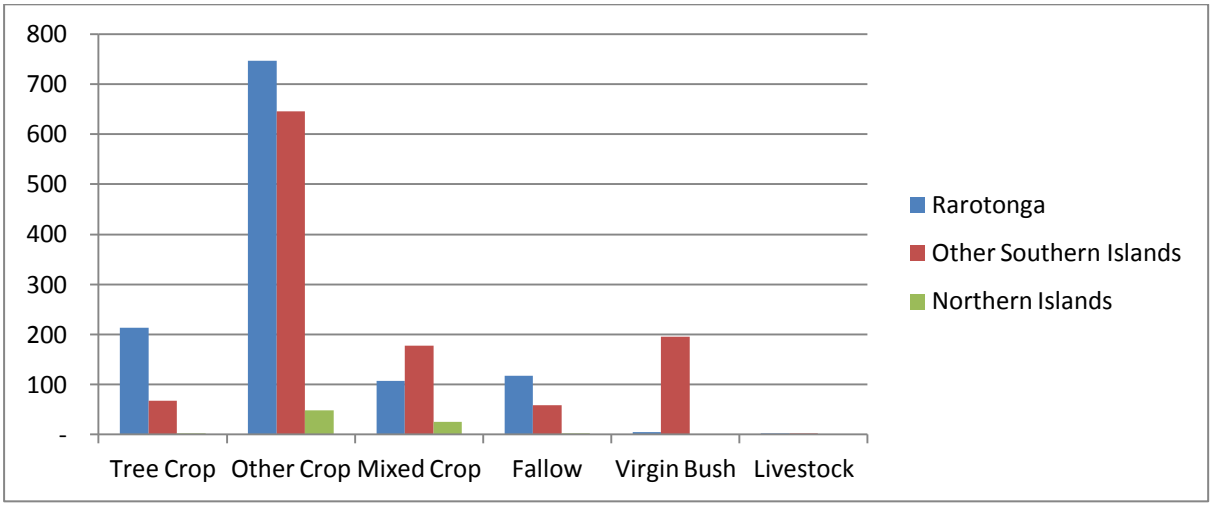
2.7 In terms of land tenure, customary land was the most common type of land tenure, particularly outside Rarotonga. Borrowed land was common on Rarotonga as was 'occupation rights'.

Figure 3: Number of parcels of land by Land Tenure.



2.8 In terms of land use, other crops (interpreted as root and vegetable crops) were the dominant land use category with over half the land parcels in this category (1,441 parcels with an area of 616 acres). Some 283 parcels (188 acres) were classified as under tree crops and a further 310 parcels

Figure4: Number of Parcels by Land Use



under mixed crops (129 acres). In interpreting this data it is interesting to consider the data on crops growing on the holdings with 322 acres of tree crops growing in parcels which compares with the land use area under tree crops and mixed crops of 317 acres. What does not hold up so well to comparison, however, is the 616 acres of 'other crops' in the land use category, assumed to be vegetables and root crops, which compares with only 340 acres of such crops recorded. One explanation is the large area of fallow land within the parcels recorded at the time of the census.
Fallow land accounted for 180 parcels (95 acres) and a large area (439 acres) of virgin bush was recorded, mainly on Aitutaki, land that had returned to virgin bush due to lack of cultivation.

2.9 A similar pattern of land use was seen in 2000 although almost no land under virgin bush was recorded.

2.10 Information on the length of continuous use of parcels in use was considered to include parcels used for tree crops, other crops, mixed crops and livestock while land not in use was considered to include fallow land, virgin bush, land under non-agricultural use and not stated/unknown use. The average continuous period of use for land in use was 12-months.

Crops

2.11 The Census was designed to capture crop data based on the method of growing. For agricultural holdings, comprising subsistence and commercial farmers, the majority of crops were grown in parcels belonging to a holding either as a single or mixed crop or as a scattered crop (usually comprising coconuts or fruit trees). Crops, again especially coconuts and fruit trees growing on the parcel boundaries, around the house or elsewhere outside the parcels of land were also considered. In addition, in order to make an estimate of the area of each crop harvested on an annual basis, data was collected on vegetable and root crops planted and already harvested within the 12 months prior to the census on the land belonging to the holding.

2.12 The data for these four categories is presented in Tables 3.1-3.19 in terms of the number of plantings, numbers of plants and area:

(1) For crops growing in parcels other than scattered crops, the area was calculated by taking the total area of the parcel and applying the proportion of plot area to parcel area to get the plot area. The number of plants was estimated by applying the crop density factor or plants/acre shown at Annex. Tables 3.1-3.7 refer.

(2) For crops planted as a scattered crops in the parcel, the number of plants was summarised and the area was calculated by dividing the number of plants by the plants/acre (see Annex 2). However, it should be noted that of the 410 such plantings recorded only 201 provided the number of plants. The data has, therefore been pro-rated upwards by the factor of total number reporting a crop/number providing number of plants X number of plants reported by crop and by island. Tables 3.8-3.13 refer.

(3) For crops planted as scattered crops outside the parcel, the number of plants/trees has been summarised and the area calculated using the planting densities (see Annex 2).

(4) For crops planted and already harvested in parcels in the 12 months prior to the census day, the number of plants has been used in all cases since the data on area (acres or square metres) was not considered reliable due to the use of area codes. Tables 3.23 refer

2.13 As well as crops grown by households that had a holding, crops were also recorded for 'minor agricultural households' defined as households with small numbers of trees/plants. In the event some households in the Northern Islands, that should have been classified as 'subsistence' and therefore would have had a holding and parcel forms, were classified as minor agricultural households since data on numbers of plants were available but not land area. Account should be taken of this when analysing the data from the Northern Group.

2.14 Minor Households had only two categories of crops namely, crops currently growing and crops planted and already harvested in the 12 months prior to the census day. In both cases the

number of plants was used and not the area which was recorded as a code. The area estimates were made using the plant density factors (see Annex 2).

2.15 Crops growing in parcels, other than scattered crops was by far the single most important method of planting for vegetables and root crops. While some tree crops are grown in plantations (pawpaw, banana, nono, citrus and coconut) many are grown around the house or as scattered trees around the property. The census found that for many tree crops, the scattered trees made up the majority of the fruit trees. Minor agricultural households also contributed a significant number of avocado, banana, breadfruit, citrus, coconut, mango and pawpaw trees.

2.16 As well as the crops growing at the time of the census, efforts were made to estimate the vegetable and root crops that had been planted during the 12 months prior to the census and already harvested. By including this category, estimates of the annual area planted could be made. This was done both for crops grown in parcels as well crops grown by minor agricultural households. A classic example of such a crop would be lettuce which has a growing cycle of less than 2 months. While some 34,350 plants were recorded as being in the ground at the time of the census, only 17,397 plants had already been harvested. This would appear to be a gross under-estimate of the area planted to lettuce in 2011. An alternative method of estimation would be to take the number of plants in the ground at the time of the census and then apply a factor for each crop based on the average number of crop cycles each year. For lettuce this might be 4 and so the total number of plants would be 4 X 34,450. The important concept is that the figures of plants/trees in the ground at the time of the census would equate to the annual area for most tree crops but would be anunder-estimation for vegetables and to a lesser extent for root crops.

2.17 Tables 3.26 and 3.27 summarise the area and number of plants for selected crops for the year 2011 by method of growing. The total area was estimated at 2,028 acres of which 1,406 acres was inside parcels. In this regard, it should be noted that the total area in parcels was estimated at 1,489 acres (table 2.4 refers). The lower figure calculated based on the summation of the plot data is due to some 200 plot records that could not be matched to the holding records. This accounts for the difference of 83 acres. Also of note is the fact that some 539 acres were recorded as fallow, virgin bush, livestock or non-agricultural parcels under the land use classification, yet the analysis by plot shows this as 795 acres. In reality many parcels classified as under crops have plots of land within them that are fallow whilst some area classified as fallow have small areas of crops or scattered trees on them. To illustrate this we note that 180 parcels were recorded as fallow parcels under the land use classification yet 1,642 plots of fallow land, within parcels, were recorded in the census.

2.18 While comparison with earlier censuses has limitations, mainly due to the different plant densities used in the calculations of single crop equivalent areas based on the numbers of plants and trees, it is still useful to look at the trends in table. The cropped area in parcels has declined quite dramatically over the 25 years. These crops are typically vegetables and root crops but also include significant areas of banana, nono, orange, and papaw. This downward trend follows the similar trend in the number of households engaged in subsistence/commercial activities. The area of coconuts and fruit trees grown as scattered crops has not declined so markedly reflecting the fact that many such trees growing 25 years ago are still bearing. Many households, previously classified as subsistence are now only classified as minor agricultural households as their level of activity declines. With the increase in size of this group compared to 1988, it is not surprising to see the area of crops grown also increasing though this is distorted to some extent by the inclusion of a number of such households in the Northern Islands that should have been classified as subsistence. The area of plants already harvested in the crop year has declined very considerable, much more than would have been expected

indicating that some under-reporting may have taken place. An area of about 150 acres would have been in line with expectations based on previous censuses.

Table G: Annual Crop Area by Method of Planting

Census Year	Single/Mixed Crops in Plots	Scattered Trees	Minor Agricultural Households	Plants Already harvested	Total Annual Cropped Area
2011	611	794	210	59	1,674
2000	1,818	689	160	427	3,094
1988	4,389	1,369	73	934	6,765

2.19 The tables on crops provide a breakdown by Island. Here it is useful to look at the average area per household growing at the time of the census (excludes crops planted and already harvested) in terms of food security. Tables 3.21, 3.26, 3.27 refer.

2.20 The tables on crops provide data on the size of plantings in terms of numbers of plants and area. For vegetables, the vast majority of plots are less than one quarter of an acre though for tree crops, as one would expect, areas are larger. Melons, cassava, and taro-wet raised are amongst the crops grown in larger plot sizes.

2.21 The census also asked about the proportion of the crop for sale. These data highlight the fact that the majority of the crops produced are consumed at home. However, certain crops such as tomatoes, melons and pineapples, as well as some tree crops are regularly marketed.

2.22 Although more than 150 different crops were recorded, many of these were grown by only a handful of farmers and in small quantities. For this reason only the major crops have been shown separately in the tables following the practice in 2000. Details on other crops grown is available from the Ministry of Agriculture on request.

Labour

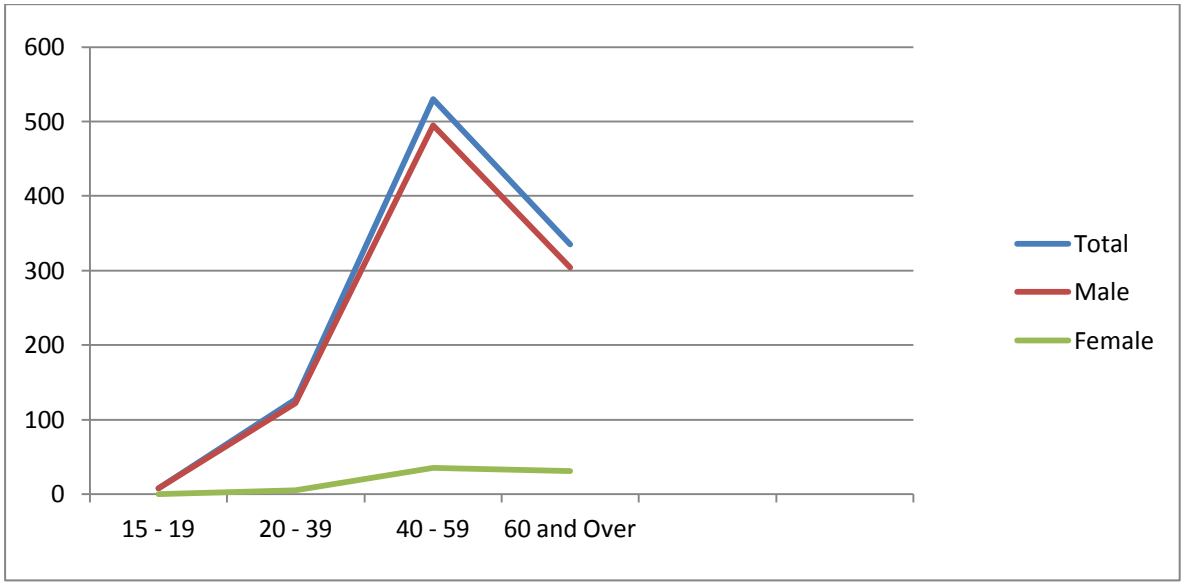
Household Members (table 2.11)

Table H: Holding Operators by Age-Group and Sex

	15 - 19	20 - 39	40 - 59	60 and Over
Total	8	127	530	335
Male	8	122	495	304
Female	0	5	35	31

2.23 As with the previous censuses, the CoA 2011 collected information on labour inputs to agriculture. As the 'operator' was not separately identified, for the analysis, the operator has been assumed to be the first person listed on the form. For each person working on the holding, the age and sex were recorded as well as the status (household/non-household member), type (paid/non-paid), average hours worked per week, wages per month, any benefits received and whether the person had another job (full-time, part-time or none).

Figure 5: Holding Operators by Age-Group and Sex



2.24 Table and Figure provide details of the holding operators by age-group and sex. The operators were predominantly male (93%) and the greatest concentration were found in the 40-59 age-group (53%) and the 60 and over age-group (34%). Only 13 percent of operators were found to be under 40 years of age.

2.25 The census identified 543 unpaid household members. This group had a somewhat different profile to the operators being generally younger and with a more equal gender balance. The percentage under 40 and over 40 were roughly the same as were the percentage male and the percentage female.

2.26 Only 35 paid household members were recorded of which 22 were male and 13 female. The paid household members were predominantly aged under 40 years.

Non-household members (table 2.12)

2.27 The number of non-household members working on the agricultural holdings was 83. This group comprised 30 operators (36%), 35 paid workers (42%) and 18 unpaid workers (22%). The group was male dominated (87%) and young males aged 20-39 dominated the paid workers (63%).

Other paid job

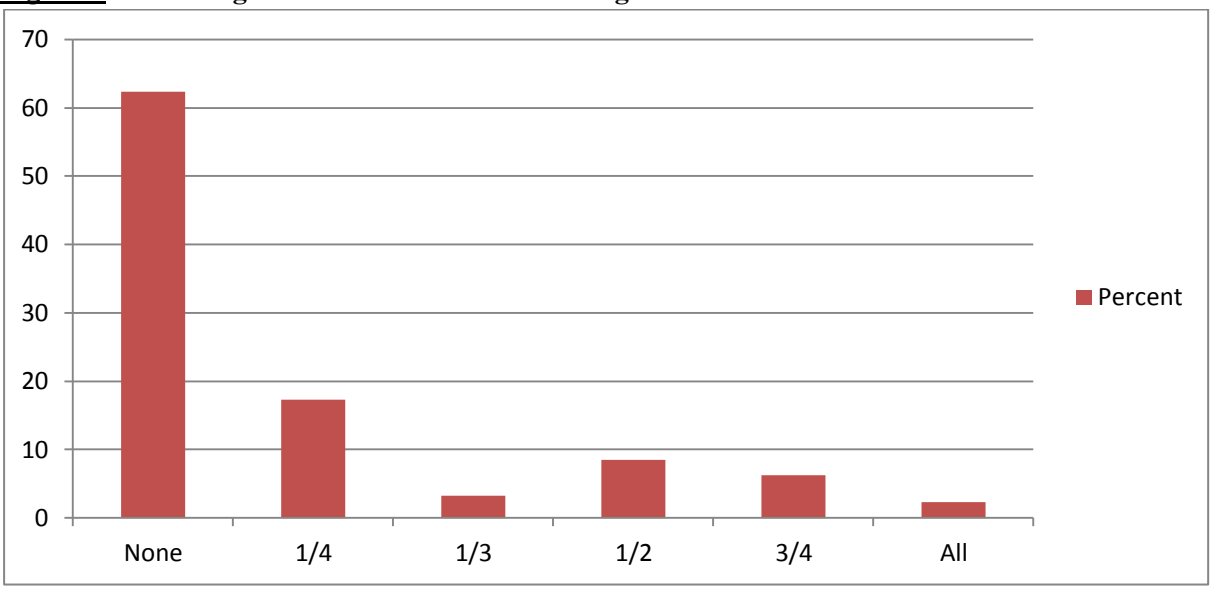
2.28 Among the operators, 49 percent had no paid job, 36 percent had a full-time job and 15 percent had a part-time job. For the paid workers, 71 percent had no other paid job, 16 percent had a full-time job and 13 percent had a part-time job. For the unpaid workers, 60 percent had no paid job, 27 percent had a full-time job and 13 percent had a part-time job.

Figure 6: Percentage of persons working on the holding by work status and other job

Agricultural Income and Loans

2.29 Over 60 percent of agriculturally active households generated no income from their agricultural activities. 17 percent generated about one quarter of the household's income from agriculture, 18 percent generated between one third and three quarters of their income from

Figure 7: Percentage of household income from agriculture



agriculture while only 2 percent generated all their income from agriculture. Looked at in the context of the level of agricultural activity, 861 households were classified as subsistence only while 414 were classified as semi-commercial/commercial on the basis that they had sold agricultural produce in the 12 months prior to the census. The income data is consistent with this classification with 438 households reported as generating an income from agriculture. If the two categories generating the smallest proportion of income (1/4 and 1/3) are considered as 'occasional' sellers there were 199 households for whom agriculture was the main source of household income (1/2 or more).

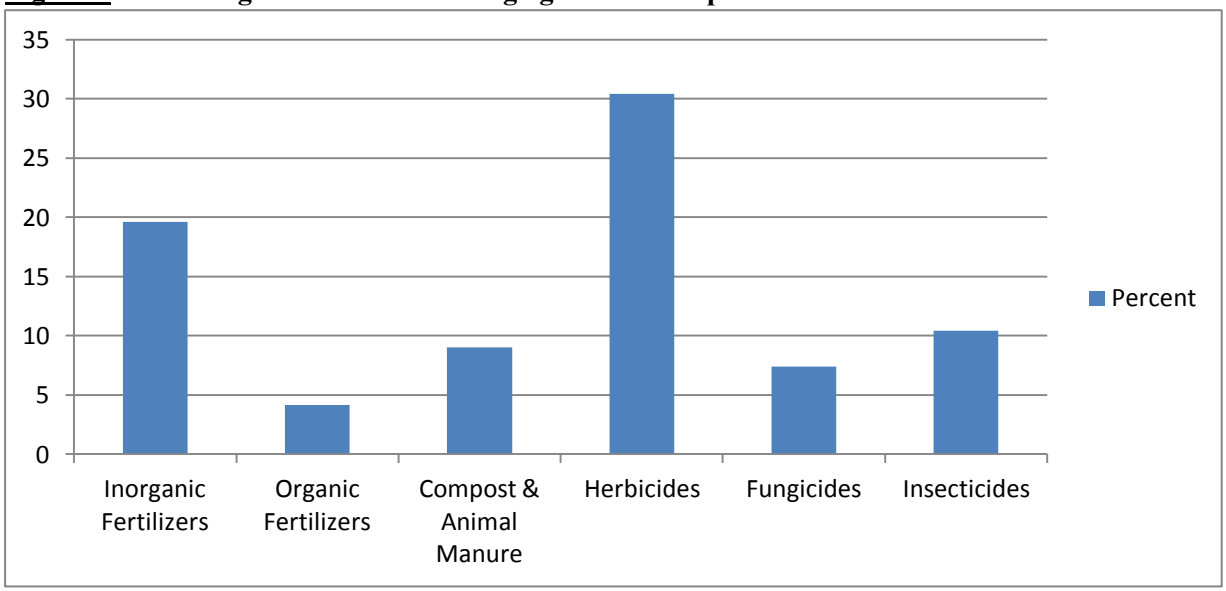
Agricultural Loans

2.30 Only 34 households were recorded as having an agricultural loan although it should be noted that 161 households did not respond to the question (not stated). As with the question on agricultural income, where 113 households did not respond, questions related to finances are not always well received by respondents and the not stated are difficult to interpret. The number with loans could, therefore be higher and information should be sought from the banking industry to confirm this data.

Agricultural Inputs

2.31 The use of agricultural inputs are an indicator of the level of technical development of the agricultural sector. 30 percent of households used herbicides and 20 percent used inorganic fertilizers while 13 percent of households used organic fertilizers or compost/animal manure.

Figure 8: Percentage of households using agricultural inputs



Improved planting materials (Table 1.8)

2.32 The census sought to assess the use of improved planting materials. 104 households were found to be using improved/hybrid vegetable seeds, 22 households were each using improved taro and cassava stock, 29 households were using improved/hybrid water melon seeds and 34 households improved planting material for other fruit crops.

Other agricultural activities (Table 1.9)

2.33 It was recognised that there were a number of other agricultural activities that were not fully covered by the census. These included bee keeping, hydroponic crop production, floriculture and handicrafts. The information collected, however, only relates to agriculturally active households and, therefore, does not reflect the full extent of these activities as all but hydroponics could be practised by other households. In particular, floriculture was covered extensively in the CoPD 2011 where 1,524 households were found to be engaged in growing flowers (see table 8.9). The CoA 2011 recorded 4 agriculturally active households keeping bees, 6 engaged in hydroponics, 9 in floriculture and 12 making handicrafts.

Livestock

2.34 As part of the census of agriculture, households were asked whether they kept any livestock or poultry. Of the 2,334 households interviewed, 1,595 households were recorded as keeping livestock or poultry. Table 2 shows the breakdown of households keeping livestock or poultry by the level of agricultural activity for Rarotonga, other Southern Islands and the Northern Islands group.

2.35 The data shows that livestock and poultry keeping is typically associated with crop growing. Of the 1,595 households recorded as keeping livestock or poultry, 1,447 or 91 percent were also engaged in crop growing. Only 148 households were recorded as keeping animals but not growing any crops (non-agricultural households). For CoA 2000 some 1,977 households were recorded as keeping livestock while for CoA 1988 the figure was 2,305 households. In terms of the percentages of households keeping livestock and poultry, this has declined from 73 percent in CoA1988 to 54 percent in CoA 2000 and 36 percent in CoA 2011. Again, this hides the considerable difference between Rarotonga and the other islands. On Rarotonga, only 22 percent of households were recorded as keeping livestock while on the other islands it was 74 percent.

2.36 The number s of livestock kept are shown in Table I. A comparison with the CoA 2000 and the CoPD 2006 shows that the number of pigs has declined from 15,876 to 14,145 and 13,951 (2000, 2006 and 2011 respectively). For goats a small but significant increase is seen over the three censuses from 3,595 to 4,066 and 4,388. For chickens the respective numbers were 24,277, 30,611 and 34,427. However, not too much should be read into changes in the poultry numbers since these are notoriously difficult to collect and a wide margin of error must be assumed. In particular, it is known that the CoA 2000 under-reported the number of chickens on Aitutaki.

Table I: Number of Livestock, by Type of Livestock and Island

Location of Household	Type of Livestock Kept					
	Cattle	Horses	Goats	Pigs	Chickens	Ducks
RAROTONGA	**185**	**4**	**1,211**	**5,219**	**12,549**	**193**
OTHER SOUTHERN ISLANDS	**55**	**9**	**3,177**	**6,739**	**18,421**	**98**
Aitutaki	-	-	675	1,889	9,000	57
Mangaia	2	8	1,179	1,782	2,782	41
Atiu	11	1	790	1,512	2,611	-
Mauke	42	-	434	1,013	2,711	-
Mitiaro	-	-	99	543	1,317	-
NORTHERN ISLANDS	**-**	**-**	**-**	**1,993**	**3,457**	**-**
Palmerston	-	-	-	7	150	-
Pukapuka	-	-	-	586	2,077	-
Nassau	-	-	-	59	351	-
Manihiki	-	-	-	886	490	-
Rakahanga	-	-	-	182	354	-
Penrhyn	-	-	-	273	35	-
COOK ISLANDS	**240**	**13**	**4,388**	**13,951**	**34,427**	**291**

Fishing Activities and Pearl Farming

2.37 Data on household involvement in fishing activities and pearl farming was collected in both the CoPD 2011 and the CoA 2011. Table J shows the results from both censuses. The higher number of households engaged in fishing activities on Rarotonga in the CoPD 2011, to a large part, reflects the higher number of households visited in the CoPD (3,154) compared to the CoA (1,270). The differences are less for the Other Southern Islands and the Northern Islands but again, reflect the higher number of households enumerated. For the above reasons, it can be concluded that the data on household fishing activities is more comprehensively covered by the CoPD than the CoA. Persons interested in fishing activities should, therefore, also consult the report on the CoPD 2011, as it relates to these activities. A summary analysis of the CoPD 2011 data on fishing activities is presented in Section 3.

2.38 Of the 930 households reported as engaged in fishing activities in the CoA 2011, 664 (71%) were engaged in subsistence activities with the remainder (29%) selling all or part of the catch (table 1.31). Hook and line was the most common method of fishing followed by 'gill and other net', collecting of shells and trolling (table 1.32). In terms of where the fishing activities took place, the reef was the most common site, both inside and outside, followed by the lagoon. Very little freshwater fishing took place (table 1.33).

2.39 The 930 households engaged in fishing activities had 353 motorised boats between them with an average length of 4.8 metres and an average engine size of 31.6 HP. In addition, 23 non-motorised boats were recorded with an average length of 3.2 metres. Again it should be noted that the CoPD 2011 recorded 321 canoes and 593 motorised boats.

Table J: Number of Households Engaged in Capture Fishing and Pearl Farming Activities, by Location of Household

Location of Household	Total Households (CoPD 2011)	Engaged in Capture Fishing		Engaged in Pearl Farming	
		CoPD 2011	CoA 2011	CoPD 2011	CoA 2011
RAROTONGA	**3154**	**951**	**198**	**17**	**1**
OTH. SOUTHERN	**939**	**661**	**538**	**-**	**-**
Aitutaki	482	307	245	-	-
Mangaia	170	140	116	-	-
Atiu	137	92	75	-	-
Mauke	92	73	60	-	-
Mitiaro	58	49	42	-	-
NORTHERN	**279**	**243**	**194**	**42**	**34**
Palmerston	13	11	6	-	-
Pukapuka	101	88	73	-	-
Nassau	13	13	9	-	-
Manihiki	78	70	67	38	34
Rakahanga	21	18	13	3	-
Penrhyn	53	43	26	1	-
COOK ISLANDS	**4372**	**1855**	**930**	**59**	**35**

Pearl Farming

2.40 Information on households engaged in pearl farming was collected in both the CoPD 2011 and the CoA 2011. The CoPD 2011 recorded 59 such households, of which 17 were on Rarotonga, compared to 35 in the CoA 2011. As pearl farming was carried out only on Manihiki at the time of the census, it must be assumed that the 21 households on other islands reporting such activity must all work on farms on Manihiki and this explains, to a large extent, the difference between the two sets of data. For this reason, the data from the CoA 2011 is considered reliable and is presented in this report.

2.41 The number of pearl farms has declined dramatically since CoA 2000 where 182 such farms were recorded. During the same period, the number of Pearl Farm Lines has decreased from 1,682 to 1,059 while the number of Spat Collector Lines has decreased from 735 to 456. The fact that the decline in lines has not been proportionately as great as that of the number of farms, implies some consolidation in the industry and an increase in average farm size measured in terms of numbers of lines. In CoA 2000 the average pearl farm had 9 farm lines and 3 spat collector lines. In CoA 2011 this has increased to 41 farm lines and 13 spat collector lines.

2.42 In terms of numbers of shells, this has declined from 2,604,444 in CoA 2000 to 889,221. More significantly, optimism in the industry has also declined quite markedly. In CoA 2000, pearl farmers saw the industry expanding quite rapidly and forecast that the number of shells to be seeded would be 3,340,820 in 3 years time and 6,645,730 in 5 years time. The CoA 2011 forecast only envisaged that some 761,000 shells would be seeded in 3 years time and 953,000 in 5 years time. Furthermore of the 35 pearl farms enumerated, only 22 provided such forecasts implying that the number of farms would continue to decline.

The main reason for the decline in pearl farming was the outbreak of disease in 2000/2001, which affected as much as 60 percent of the stock, and falling prices due to the increased production of black pearls in world markets.

SECTION 3: DATA FROM THE CENSUS OF POPULATION AND DWELLINGS 2011

3.1 In designing the questionnaires for the Census of Population and Dwellings and the Census of Agriculture, the opportunity presented itself for some rationalisation on data items to be collected. Traditionally, the CoPD has collected a set of data related to agriculture, fishing and pearl farming including the level of household activity, livestock numbers and machinery and equipment. All these data items were also included in the last CoA. A decision was taken to continue to collect information on the level of household involvement in the three activities in both censuses for quality control purposes. Data on 'location of fishing activity' and 'numbers of boats and fishing equipment owned by the household' were also included in both censuses. Data on livestock was dropped from the CoPD 2011 and only collected in the CoA 2011. Data on machinery and equipment was dropped from the CoA 2011 and maintained in the CoPD 2011. Data on the consumption of coconuts for human and animal consumption was moved from the CoA to the CoPD as non-agricultural households also consume such coconuts and the CoPD was considered the better instrument to collect such data.

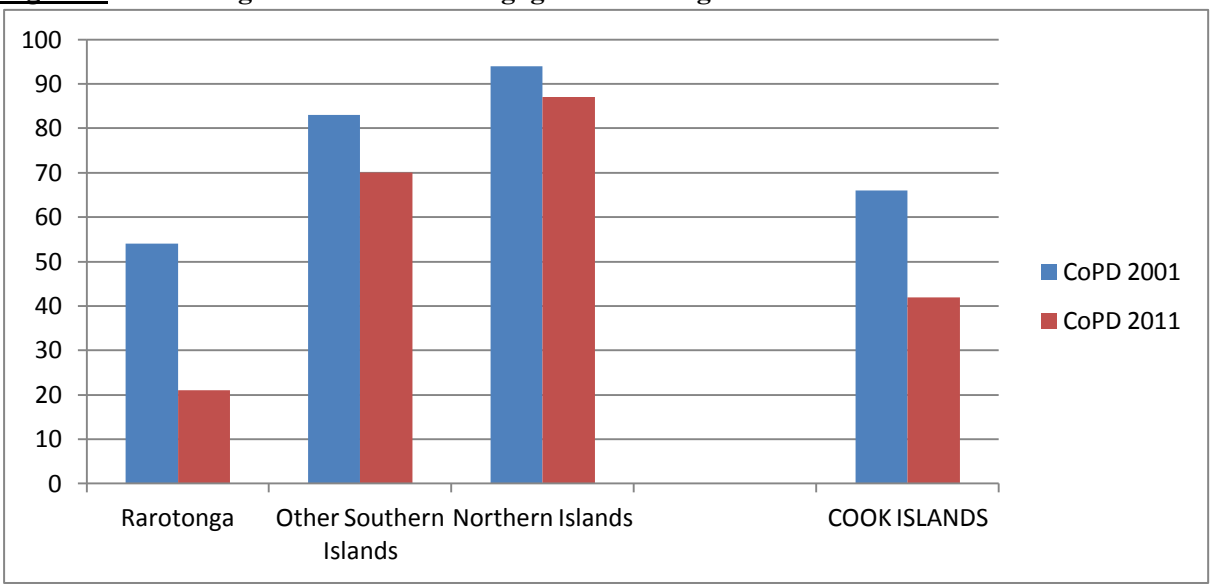
3.2 A comparison of the data from the two sources as they relate to the level of agricultural, fishing and pearl farming activity at the household level has already been discussed in Sections 1 and

2. As far as fishing activity was concerned, the CoA under-reported the number of households involved in fishing activities, particularly on Rarotonga, as only agriculturally active households were visited. The data from the CoPD 2011 on fishing activity is, therefore considered the more comprehensive and reliable.

Fishing Activity

3.3 The CoPD 2011 identified 1,855 households, or 42 percent of all households, engaged in fishing activities of which 1,649 were subsistence activities, 36 subsistence/commercial activities and 170 commercial activities (the CoA identified 930 households engaged in fishing activities from the much smaller number of households visited). While the overall participation was 42 percent, this hides a considerable variation between Rarotonga, the other Southern Islands and the Northern Islands

Figure 9: Percentage of Households Engaged in Fishing Activities CoPD 2001 and CoPD 2011



namely 21 percent, 70 percent and 87 percent respectively. Compared to earlier years, the CoPD 2001 recorded 66 percent of households engaged in fishing activities with 54 percent on Rarotonga, 83 percent on the other Southern Islands and 94 percent on the Northern Islands. These data highlight the decline in fishing activity at the household level, particularly on Rarotonga.

3.4 The most common place for fishing was found to be 'inside the reef or lagoon' with 56 percent of fishing households indicating this preference. 38 percent gave 'both in and outside the reef or lagoon' as their preference while 6 percent fished only 'outside the reef'.

3.5 In terms of the numbers of fishing equipment owned by the household, the most common item was the 'fishing rod (imported)' with 2,853 units of equipment recorded. This was followed by the fishing net (1,598 units) and spear gun (1,367 units). 321 canoes were recorded, 593 boats and 615 outboard motors.

Consumption of Coconuts

3.6 Information on the use or consumption of coconuts has traditionally been collected as part of the census of agriculture. In 2011, as the CoA did not cover all households, and was limited to those households engaged in agricultural activities, the CoPD was determined to be the more appropriate census to collect data on the consumption of coconuts.

3.7 Table 8.10 of the CoPD 2011 (attached at annex to this report) provides details of coconut consumption for human consumption, for feeding livestock and other uses, by Island. Some 67 percent of households were recorded as using coconuts for human consumption at an average weekly rate of 10 coconuts per household. 38 percent used coconuts for feeding animals at an average weekly rate of 75 coconuts while only 3 percent of households used coconuts for other uses at an average weekly rate of 48 coconuts.

3.8 The figures both in terms of percentage of households using coconuts as well as the weekly averages were lowest on Rarotonga and highest in the Northern Islands (see Figure 10). Comparing the use of coconuts in 2011 with 1988 and 2000 we find that in 1988, 82 percent of households used coconuts for human consumption at an average weekly rate of 16 coconuts while for livestock some 63 percent of households used coconuts for feeding livestock at an average weekly rate of 64 coconuts. In 2000, only 52 percent of households were recorded as using coconuts for human consumption at an average weekly rate of 13 coconuts while for livestock, 39 percent of households were recorded as using coconuts for feeding livestock at an average weekly rate of 90 coconuts. The conclusion is that while the use of coconuts is declining both for human consumption and for livestock feed, a significant proportion of households still use coconuts for both purposes and in quite large numbers. The total consumption of coconuts for human consumption in a year was estimated at 1,532,440 coconuts (2,947 households using 10 coconuts per week for 52 weeks). For feeding livestock, the estimated annual consumption was 6,415,500 coconuts and for 'other uses' the annual consumption was estimated at 292,032 coconuts. The total annual consumption was estimated at 8,239,972 coconuts highlighting the importance of the coconut to the Cook Islands.

Table K: Percent of households using coconuts by type of use

Census Year	% Households for Human Consumption	% Households for Livestock	% Households for Other Uses
2011	67	38	3
2000	52	39	n.a.
1988	82	63	n.a.

Figure 10: Percentage of Households Using Coconuts for Human Consumption, Feeding Animals and Other Uses

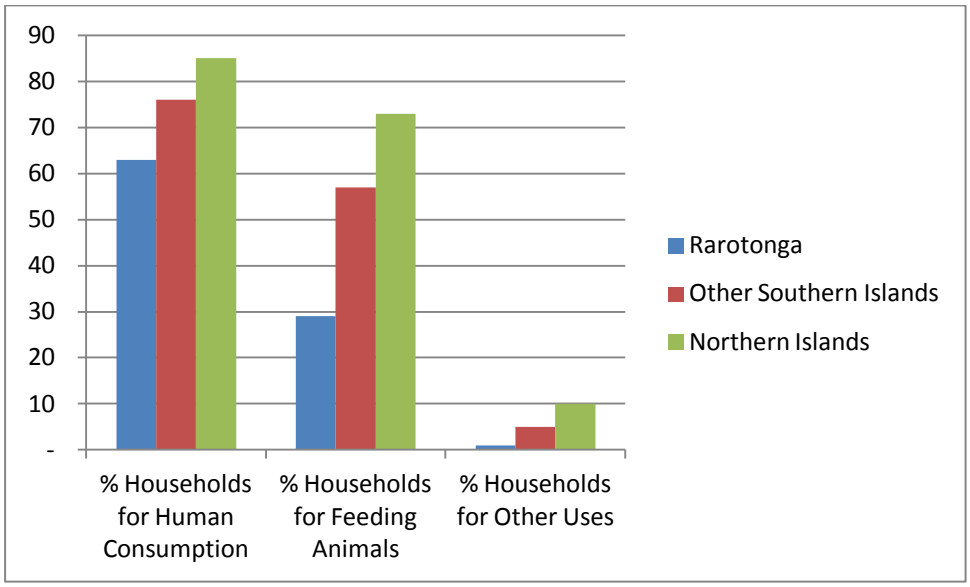


Figure 11: Average Weekly Consumption of Coconuts by Use.

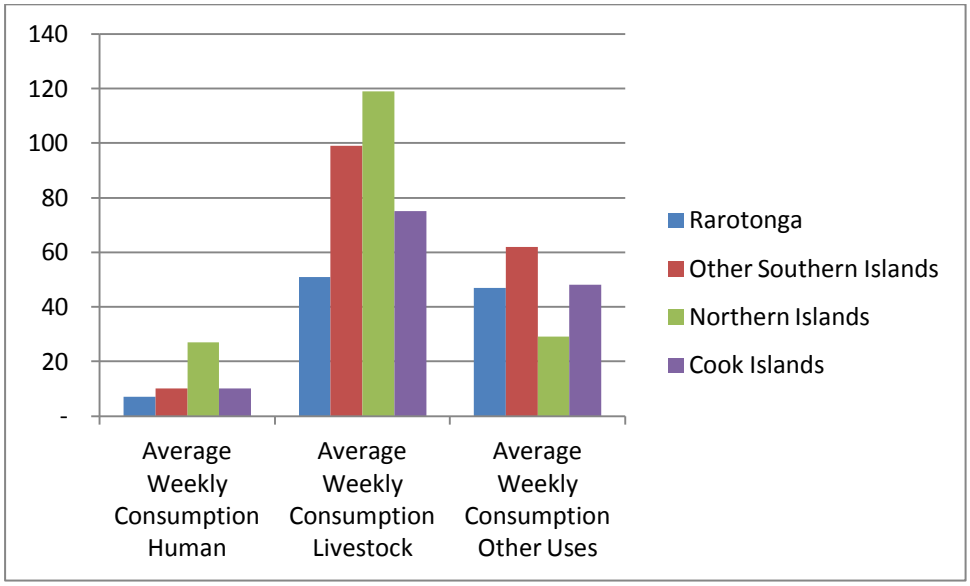


Table L: Average weekly consumption of coconuts by type of use

Census Year	Average Weekly Consumption Human	Average Weekly Consumption Livestock	Average Weekly Consumption Other Uses
2011	10	75	48
2000	13	90	n.a.
1988	16	64	n.a.

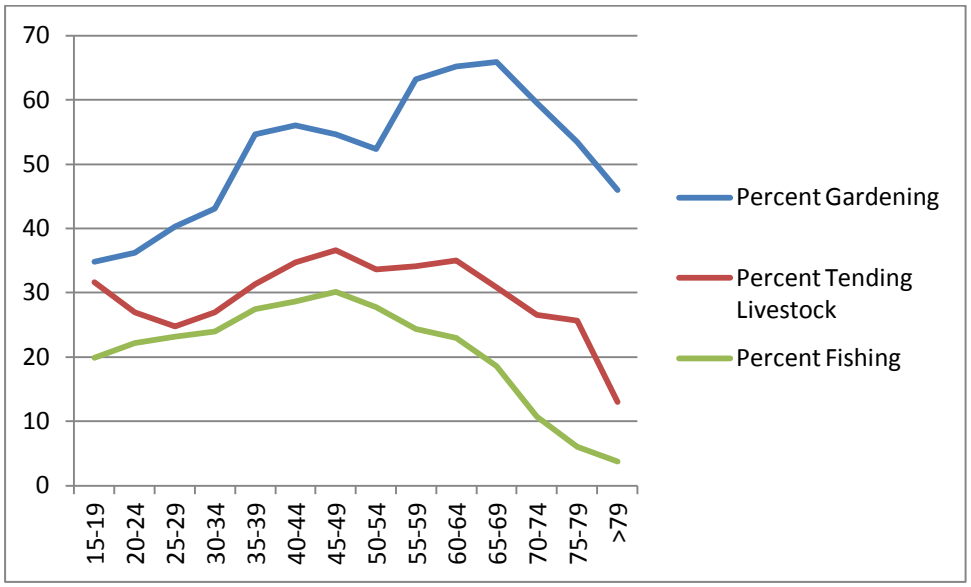
Farm Equipment

Table 8.13 of the CoPD 2011 provides data, at the household level, of farm equipment owned. The most common item was the Grass Cutter followed by the Motor Mower, Chainsaw and Knapsack Sprayer. Some 224 Tractors were also recorded and 212 Rotary Hoes.

Unpaid Work

The CoPD 2011 collected information from all persons aged 15 years and over on unpaid work carried out in the four weeks prior to the census (the month of November 2011). Tables 4.11 and 4.12 of the CoPD 2011 provide the data and are attached as an annex to this report. Three categories are of particular interest namely gardening, tending livestock and fishing. Table 4.12 shows the number of residents engaged in the three categories in an unpaid capacity by age-group and sex. Figure presents a summary of this data. By the age of 35, more than 50 percent of the resident population are engaged in gardening and this remains an unpaid activity carried out by more than half the population until the age of 75 and peaking in the 65-69 years age group at 66 percent. Tending livestock and fishing are typically the activities of a younger age group both peaking in the 45-49 years age group at 37 percent and 30 percent respectively.

Figure 12: Percent of Resident Population, aged 15 years and over, engaged in Gardening, Tending Livestock and Fishing as an Unpaid Activity



Source: Cook Islands Statistics Office, CoPD 2011

It is interesting to note the variation between islands as shown in Table 4.11 of the CoPD 2011 and summarised below. The pattern is consistent with the other data and reflects the lower rates of activity on Rarotonga, especially with fishing.

Table M: Percentage of Resident Population, aged 15 years and Over, Engaged in Gardening, Tending Livestock and Fishing as an Unpaid Activity

Island	Percent Gardening	Percent Tending Livestock	Percent Fishing
Rarotonga	47	23	14
Aitutaki	55	38	36
Mangaia	69	65	61
Atiu	68	56	39
Mauke	70	75	60
Mitiaro	64	67	64
Palmerston	51	69	71
Pukapuka	35	38	44
Nassau	79	82	63
Manihiki	37	62	69
Rakahanga	71	66	69
Penrhyn	42	34	62
Total	**50**	**31**	**23**

Source: Cook Islands Statistics Office, COPD2011

Table 1.1: Number of Households, by Level of Agricultural Activity and Location of Household

Location of Household	Total Number of Households	Level of Agricultural activity				Agriculturally Active
		Non Agricultural	Minor Agricultural	Subsistence Only	Agricultural production primarily for sale	
RAROTONGA	**1,271**	**39**	**659**	**333**	**240**	**573**
Kiikii-Ooa-Pue	114	7	71	15	21	**36**
Tupapa-Maraerenga	38	-	18	12	8	**20**
Takuvaine	62	2	16	36	8	**44**
Tutakimoa-Teotue	17	-	8	4	5	**9**
Avatiu-Ruatonga-Panama	110	8	57	38	7	**45**
Nikao-Panama	190	1	151	20	18	**38**
Ruaau-Arerenga-Arorangi	197	10	81	91	15	**106**
Akaoa-Betela-Arorangi	46	-	30	9	7	**16**
Murienua-Arorangi	111	-	59	15	37	**52**
Titikaveka	234	2	130	38	64	**102**
Ngatangiia	59	2	18	15	24	**39**
Matavera	93	7	20	40	26	**66**
						-
OTHER SOUTHERN ISLANDS	**798**	**97**	**77**	**450**	**174**	**624**

Aitutaki	420	27	62	260	71	**331**
Mangaia	141	27	4	76	34	**110**
Atiu	111	17	9	46	39	**85**
Mauke	81	21	1	41	18	**59**
Mitiaro	45	5	1	27	12	**39**
						-
NORTHERN ISLANDS	**265**	**21**	**166**	**78**	**-**	**78**
Palmerston	14	-	14	-	-	**-**
Pukapuka	97	15	25	57	-	**57**
Nassau	13	-	3	10	-	**10**
Manihiki	78	3	73	2	-	**2**
Rakahanga	13	1	4	8	-	**8**
Penrhyn	50	2	47	1	-	**1**
						-
COOK ISLANDS	**2,334**	**157**	**902**	**861**	**414**	**1,275***
* Includes 6 holdings for which no holding or parcel record was recorded						

CENSUS TABLES

- The census tables are presented in seven Table Sets relating to details for households, holdings, parcel, livestock, fishing, pearl farming, and census of population and dwellings 2011.

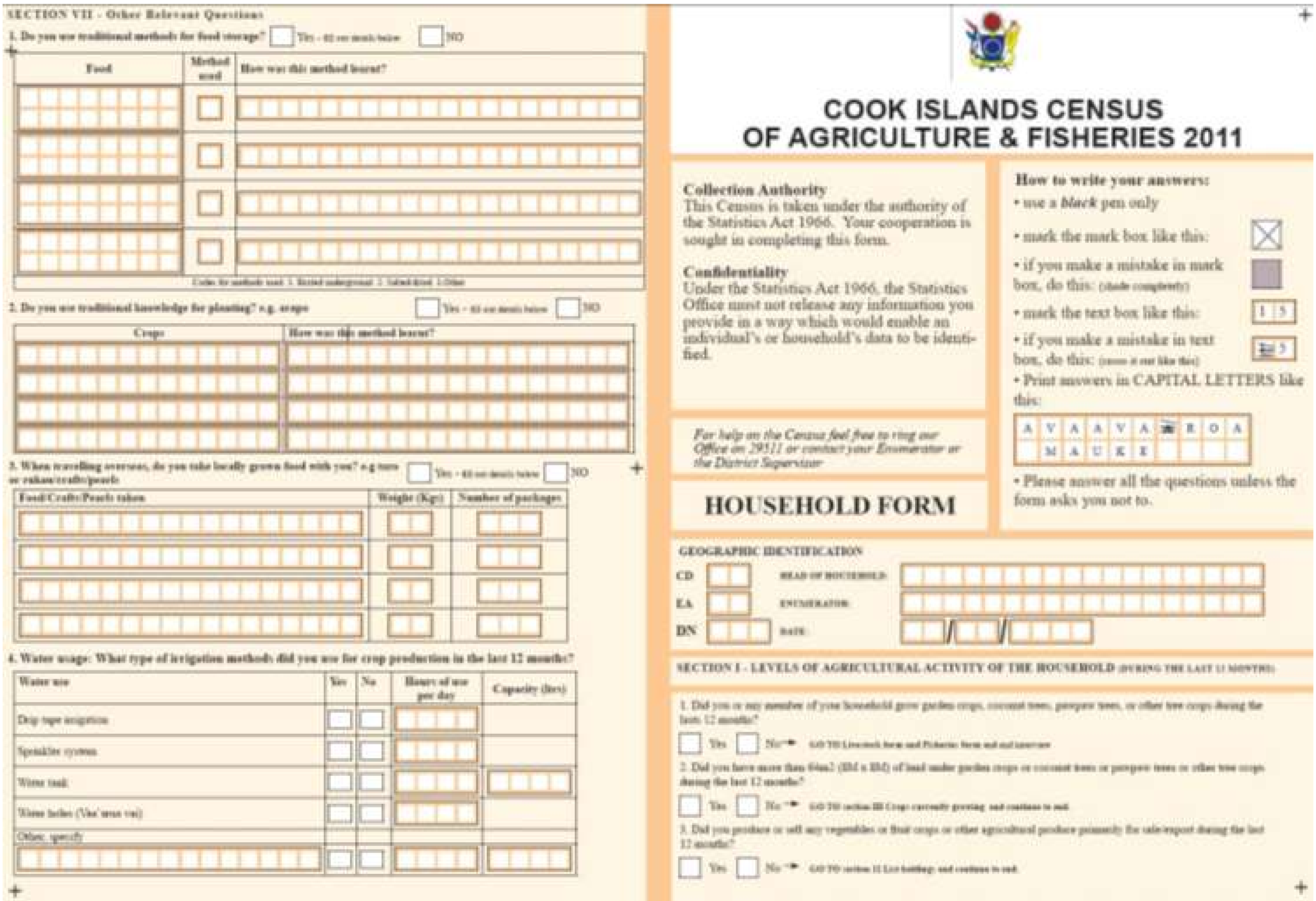
- Users requiring more detailed information than is presented in this report should contact the Ministry of Agriculture, Rarotonga.

ANNEX 1

Sample Questionnaires

Five questionnaires were used to capture the information pertaining to agricultural, fishing, and pearl farming activities of the household.

Household Form: This was completed for all households covered in the enumeration to determine the involvement of the household in agricultural and fishing, or pearl farming activities.


COOK ISLANDS CENSUS OF AGRICULTURE & FISHERIES 2011

HOUSEHOLD FORM

Collection Authority
This Census is taken under the authority of the Statistics Act 1966. Your cooperation is sought in completing this form.

Confidentiality
Under the Statistics Act 1966, the Statistics Office must not release any information you provide in a way which would enable an individual's or household's data to be identified.

For help on the Census feel free to ring our Office on 29511 or contact your Enumerator or the District Supervisor

How to write your answers:
- use a *black* pen only
- mark the mark box like this:
- if you make a mistake in mark box, do this:
- mark the text box like this:
- if you make a mistake in text box, do this:
- Print answers in CAPITAL LETTERS like this:
- Please answer all the questions unless the form asks you not to.

GEOGRAPHIC IDENTIFICATION

CD

EA

DN

SECTION I - LEVELS OF AGRICULTURAL ACTIVITY OF THE HOUSEHOLD

SECTION VII - Other Relevant Questions

Water use	Yes	No	Hours of use per day	Capacity (litres)
Drip tape irrigation				
Sprinkler system				
Water tank				
Water holes (Vai' ana vai)				
Other, specify				

SECTION II - LIST OF AGRICULTURAL HOLDINGS (That the household was engaged in during the last 12 MONTHS)

List the different agricultural holdings that the household is engaged in. (Sole operator, family or other group operations - each combinations forms a different holding)

Check for parcels adjacent to the house, follow land and parcels with abandoned crops)

Holding Number	Name(s) of operators	Total Area (insert code)	Number of separate parcels	Location (District)
1	2	3	4	5

Code for total area (acres): 1. less than 1/4 2. 1/4-1/2 3. 1/2-1 4. 1-2 5. 2-3 6. 3-4 7. 4-5 8. >5

SECTION III - CROPS CURRENTLY GROWING AND / OR HARVESTED

List the crops currently growing and / or harvested during the last 12 months by type.

Estimate the area of each crop in square metres (m2) or the number of trees / plants

Name of Crops currently growing	Total Area (in Acres)	Number of Plants / trees	Name of Crops planted and / or Harvested	Total Area (in Acres)	Number of Trees / plants
1	2	3	4	5	6

Code for total area (acres): 1. less than 1/4 2. 1/4-1/2 3. 1/2-1 4. 1-2 5. 2-3 6. 3-4 7. 4-5 8. >5

SECTION IV - PROPORTION OF HOUSEHOLD INCOME FROM AGRICULTURE

1. What was the proportion of your household total income (in kind or cash) usually derived from agricultural activities during the last 12 months? (Note that "in kind" means agricultural products that were produced and consumed by the household for the last 12 months or maybe, the wages received in terms of agricultural products by any member employed in own household or other households holding. Indicate below which proportion.

1. About 1/4 ☐ 2. About 1/3 ☐ 3. About 1/2 ☐ 4. About 3/4 ☐ 5. All ☐ 6. None ☐

SECTION V - LOANS BY HOUSEHOLD FOR AGRICULTURE PURPOSES (during the last five years)

1. Did you obtain any loan for your households agricultural activities?

☐ Yes ☐ No

2. What was your main source of loan that you used for your households agricultural activities?

☐ Bank of Cook Islands ☐ Other Commercial bank ☐ Small Business loan ☐ Other Sources

SECTION VI - FERTILIZERS, AGRICULTURAL CHEMICALS, IMPROVED VARIETIES AND SELECTED AGRICULTURAL ACTIVITIES (during the last 12 months)

1. Did you or your household use/apply any of the following on any of the crops grown?

	YES	NO	Quantity Used	Unit
a) Inorganic fertilizers				Kgs
b) Organic fertilizers				Kgs
c) Compost & animal manure				Kgs
d) Agricultural chemicals i.e herbicides/Weedicides				Litres or Kgs
Fungicides				Litres or Kgs
Insecticides				Litres or Kgs

2. Did you or your household use improved varieties?

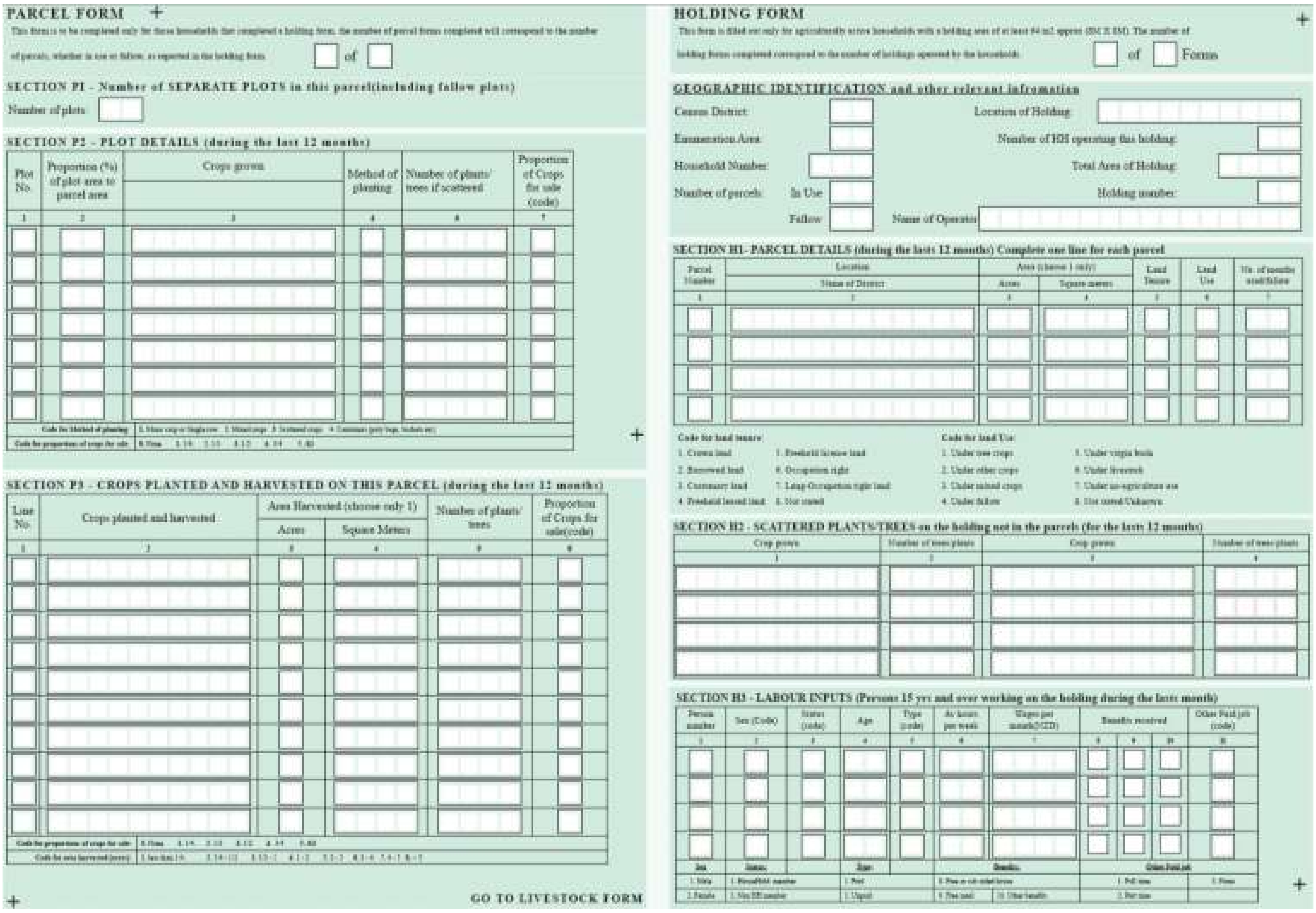
Improved varieties	From where?

From where code: 1. Ministry of Agriculture 2. Private sector 3. Personal

3. Did you or your household engage in any of the following selected agricultural activities? (Indicate with a cross your answer)

	YES	NO	
a) Bee keeping for honey production			if yes, how many hives
b) Hydroponics (crop production? (if yes use holding from)			
c) Floriculture (if yes use holding from)			
d) Handicrafts e.g. carving, basket making etc			

Parcel Form: This was reported only for those households which have a holding. The number of parcel forms completed corresponded to the number of parcels, either in use or fallow or virgin bush.



PARCEL FORM

of

SECTION P1 - Number of SEPARATE PLOTS in this parcel(including fallow plots)

Number of plots

SECTION P2 - PLOT DETAILS (during the last 12 months)

Plot No.	Proportion (%) of plot area to parcel area	Crops grown	Method of planting	Number of plants/ trees if scattered	Proportion of Crops for sale (code)

SECTION P3 - CROPS PLANTED AND HARVESTED ON THIS PARCEL (during the last 12 months)

Line No.	Crops planted and harvested	Area Harvested (choose only 1)		Number of plants/ trees	Proportion of Crops for sale(code)
		Acres	Square Meters		

GO TO LIVESTOCK FORM

HOLDING FORM

of Forms

GEOGRAPHIC IDENTIFICATION and other relevant information

Census District | Location of Holding
Enumeration Area | Number of HH operating this holding
Household Number | Total Area of Holding
Number of parcels: In Use | Holding number
Fallow | Name of Operator

SECTION H1- PARCEL DETAILS (during the lasts 12 months) Complete one line for each parcel

SECTION H2 - SCATTERED PLANTS/TREES on the holding not in the parcels (for the lasts 12 months)

SECTION H3 - LABOUR INPUTS (Persons 15 yrs and over working on the holding during the lasts month)

PARCEL FORM

This form is to be completed only for those households that completed a holding form. the number of parcel forms completed will correspond to the number of parcels, whether in use or fallow, as reported in the holding form. ☐ of ☐

SECTION P1 - Number of SEPARATE PLOTS in this parcel(including fallow plots)

Number of plots ☐

SECTION P2 - PLOT DETAILS (during the last 12 months)

Plot No.	Proportion (%) of plot area to parcel area	Crops grown	Method of planting	Number of plants/ trees if scattered	Proportion of Crops for sale (code)
1	2	3	4	5	7
Code for Method of planting	1. Mono crop in Single row 2. Mixed crops 3. Scattered crops 4. Continuous (poly bags, broken etc)				
Code for proportion of crops for sale	0. None 1. 1/4 2. 1/2 3. 1/2 4. 3/4 5. All				

SECTION P3 - CROPS PLANTED AND HARVESTED ON THIS PARCEL (during the last 12 months)

Line No.	Crops planted and harvested	Area Harvested (choose only 1)		Number of plants/ trees	Proportion of Crops for sale(code)
		Acres	Square Meters		
1	2	3	4	5	6
Code for proportion of crops for sale	0. None 1. 1/4 2. 1/2 3. 1/2 4. 3/4 5. All				
Code for area harvested (acres)	1. less than 1/4 2. 1/4-1/2 3. 1/2-1 4. 1-2 5. 2-3 6. 3-4 7. 4-5 8. >5				

GO TO LIVESTOCK FORM

PARCEL FORM

This form is to be completed only for those households that completed a holding form. the number of parcel forms completed will correspond to the number of parcels, whether in use or fallow, as reported in the holding form. ☐ of ☐

SECTION P1 - Number of SEPARATE PLOTS in this parcel(including fallow plots)

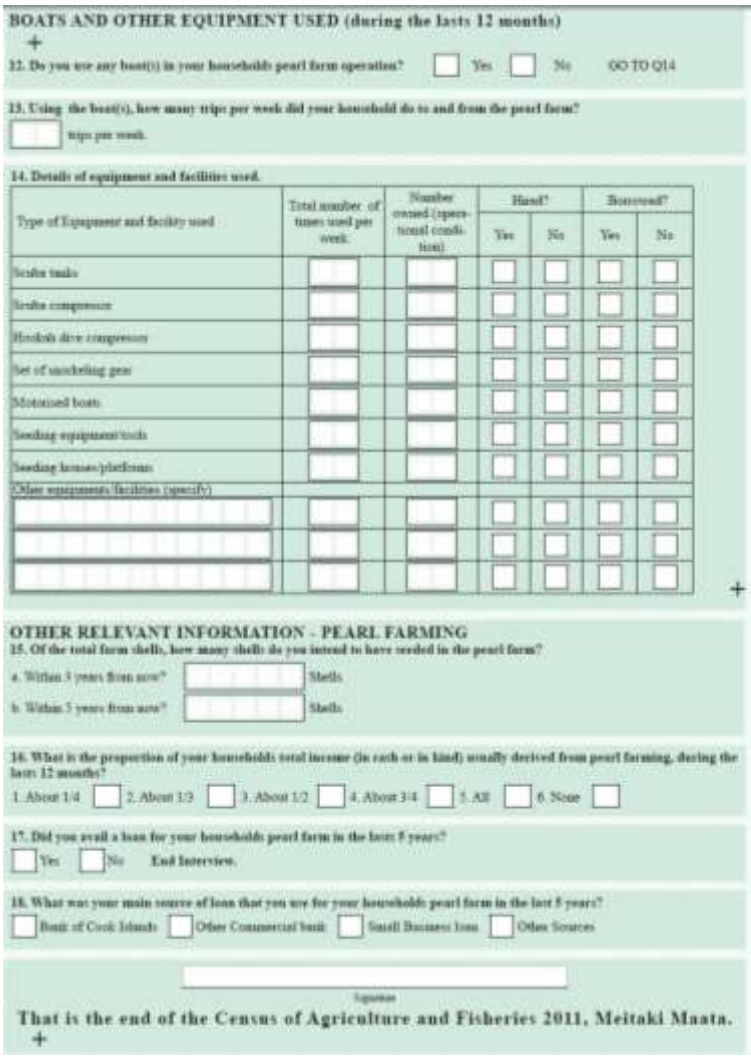
Number of plots ☐

SECTION P2 - PLOT DETAILS (during the last 12 months)

SECTION P3 - CROPS PLANTED AND HARVESTED ON THIS PARCEL (during the last 12 months)

GO TO LIVESTOCK FORM

Livestock Form: This was completed for those households engaged in the raising of livestock, regardless of whether it is for subsistence, semi-commercial, or commercial purposes.



BOATS AND OTHER EQUIPMENT USED (during the lasts 12 months)

12. Do you use any boat(s) in your household's pearl farm operation? ☐ Yes ☐ No GO TO Q14

13. Using the boat(s), how many trips per week did your household do to and from the pearl farm?

☐ trips per week.

14. Details of equipment and facilities used.

Type of Equipment and facility used	Total number of times used per week	Number owned (operational condition)	Hired?		Borrowed?	
			Yes	No	Yes	No
Scuba tanks						
Scuba compressor						
Hookah dive compressor						
Set of snorkeling gear						
Motorized boats						
Seeding equipment/tools						
Seeding houses/platforms						
Other equipments/facilities (specify)						

OTHER RELEVANT INFORMATION - PEARL FARMING

15. Of the total farm shells, how many shells do you intend to have seeded in the pearl farm?

a. Within 3 years from now? Shells

b. Within 5 years from now? Shells

16. What is the proportion of your household's total income (in cash or in kind) usually derived from pearl farming, during the lasts 12 months?

1. About 1/4 ☐ 2. About 1/3 ☐ 3. About 1/2 ☐ 4. About 3/4 ☐ 5. All ☐ 6. None ☐

17. Did you avail a loan for your household's pearl farm in the last 5 years?

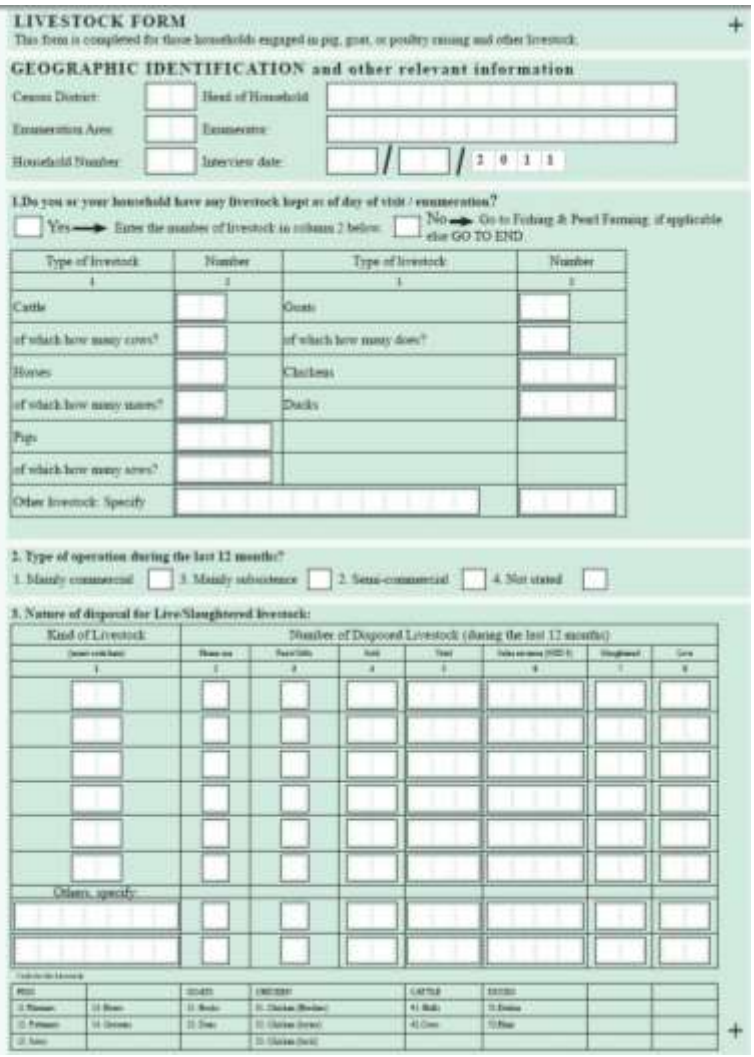
☐ Yes ☐ No **End Interview.**

18. What was your main source of loan that you use for your household's pearl farm in the last 5 years?

☐ Bank of Cook Islands ☐ Other Commercial bank ☐ Small Business loan ☐ Other Sources

Signature

That is the end of the Census of Agriculture and Fisheries 2011, Meitaki Maata.



LIVESTOCK FORM

This form is completed for those households engaged in pig, goat, or poultry raising and other livestock.

GEOGRAPHIC IDENTIFICATION and other relevant information

Census District: Head of Household:

Enumeration Area: Enumerator:

Household Number: Interview date: / / 2011

1.Do you or your household have any livestock kept as of day of visit / enumeration?

☐ Yes → Enter the number of livestock in column 2 below. ☐ No → Go to Fishing & Pearl Farming, if applicable else GO TO END.

Type of livestock	Number	Type of livestock	Number
1	2	3	4
Cattle		Goats	
of which how many cows?		of which how many does?	
Horses		Chickens	
of which how many mares?		Ducks	
Pigs			
of which how many sows?			
Other livestock: Specify			

2. Type of operation during the last 12 months?

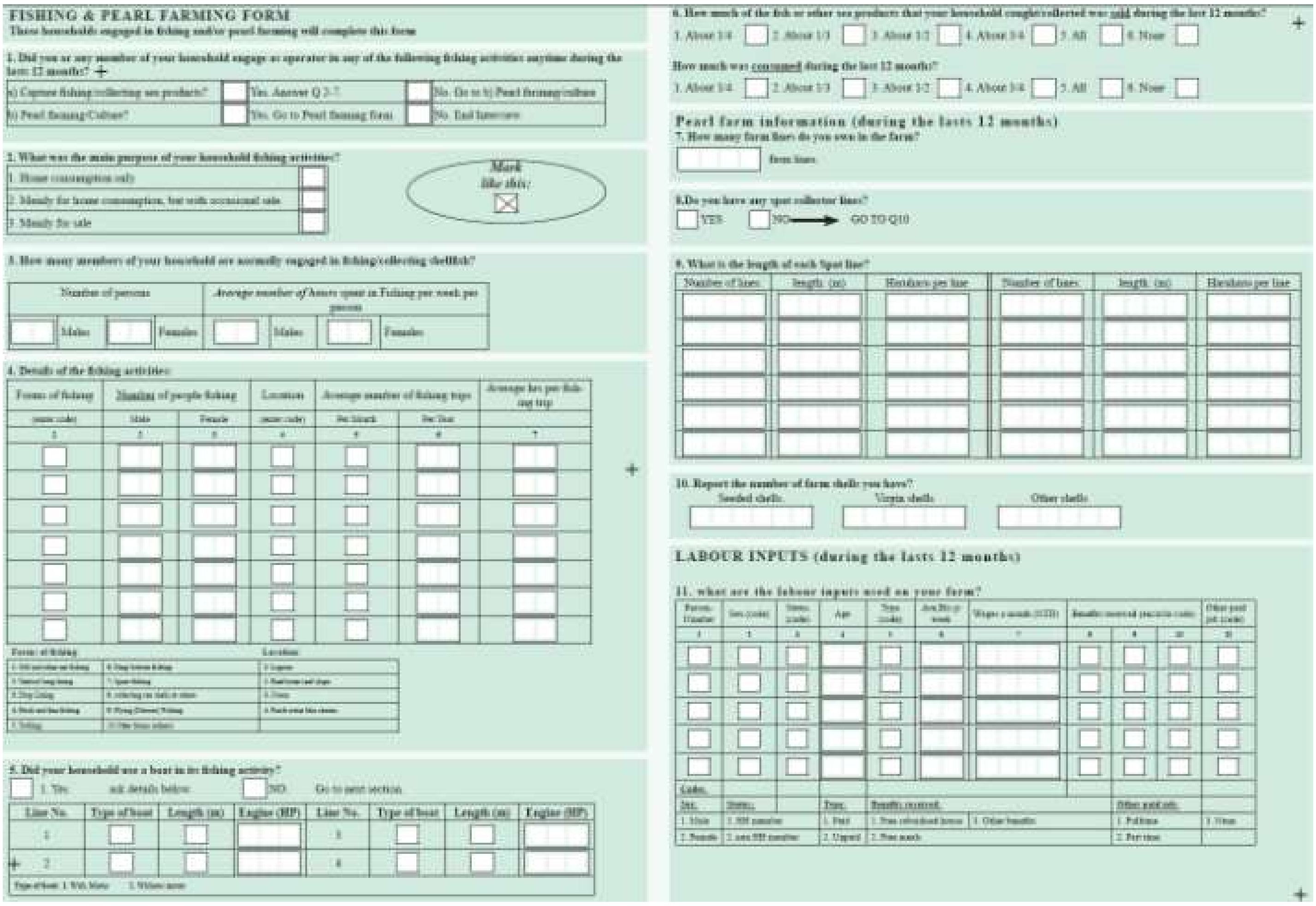
1. Mainly commercial ☐ 3. Mainly subsistence ☐ 2. Semi-commercial ☐ 4. Not stated ☐

3. Nature of disposal for Live/Slaughtered livestock:

Kind of Livestock	Number of Disposed Livestock (during the last 12 months)						
1	2	3	4	5	6	7	8
Others, specify:							

Fishing Form: This was completed for those households engaged on fishing activities, regardless of whether it is for subsistence, semi-commercial, or commercial purposes.

Pearl Farming Form: This was completed only for those households engaged in pearl farming activities.


FISHING & PEARL FARMING FORM

Pearl farm information (during the lasts 12 months)

8.Do you have any spat collector lines?

YES NO GO TO Q10

10. Report the number of farm shells you have?

Seeded shells Virgin shells Other shells

LABOUR INPUTS (during the lasts 12 months)

ANNEX 2

CROP INFORMATION

The following table lists all crops identified separately in the census. Crops were categorized by type (root, fruit, vegetable, herb/spice, ornamental/flowers, timber, and rare fruit/nut). Crop density based on current standard spacing as recommended by the Ministry of Agriculture is provided in the last two columns.

Code	Name, crop	Name, type/other	Name(s), maori	Name, botanical	Area/Plant (m^2)	Plants/acre 2011
ROOT CROPS						
1	Cassava		Maniota	*Manihot esculenta*	0.4	10118
2	Cocoyam/Xanthosoma		Tarua/Tarotarua	*Xanthosoma sagittifolium*	0.7	5781
3	Taro	Taro, dryland	Taro maro	*Colocasia esculenta*	0.6	6745
4	Taro	Taro, wet/flooded	Taro vai	*Colocasia esculenta*	0.25	16188
5	Taro	Taro, wet/raised	Taro pai	*Colocasia esculenta*	0.25	16188
6	Giant Taro		Kape	*Alocasia maccrohiza*	1.5	2698
7	Giant Swamp Taro		Puraka	*Cyrtosperma merkusii*	2.25	1799
8	Ginger			*Zingiber officinale*	0.3	13490
9	Potato	Potato, Irish	Pitete	*Solanum tuberosum*	0.25	16188
10	Sweet Potato		Kumara/Kuara	*Ipomoea batatas*	0.25	16188
11	Tumeric		Renga	*Curcuma domestica*	0.3	13490
12	Yam	African yam	U'i apirika	*Dioscorea rotundata*	0.6	6745
13	Yam	Pacific yam	U'i tamoe	*Dioscorea nummularia*	4	1012
14	Yam	Sweet yam	U'i venevene	*Dioscorea esculenta*	0.6	6745
15	Yam	Winged Yam	U'i toka/U'i parai	*Dioscorea alata*	0.6	6745
FRUIT/TREE CROPS						
16	Avocado	Avocado	Apuka	*Persea americana*	90	45
17	Banana	Cavendish	Amoa/Kina	*Musa spp.*	6	675
18	Banana	Ladyfinger	Mario/Tiki	*Musa spp.*	6	675
19	Banana/Plantain	Cooking	Tarua/Tarotarua/Mangaro/ Maori/Utu	*Musa spp.*	8	506
20	Breadfruit	Breadfruit	Kuru	*Artocarpus altilis*	100	40
21	Carambola	Starfruit	Raparapa	*Averrhoa carambola*	36	112
22	Cashewnut			*Anacardium occidentale*	49	83
23	Chestnut	Polynesian chestnut	I'i	*Inocarpus fagiferus*	100	40
24	Citrus	Grapefruit	Anani	*Citrus paradisi*	24	169
25	Citrus	Kaffir	Anani	*Citrus hystrix*	24	169
26	Citrus	Lemon	Remene	*Citrus limon*	24	169
27	Citrus	Lime	Tiporo	*Citrus aurantifolia*	24	169
28	Citrus	Mandarin	Anani papaa	*Citrus reticulata*	24	169
29	Citrus	Pummelo	Anani	*Citrus maxima*	24	169
30	Citrus	Tangerine	Anani	*Citrus reticulata*	24	169
31	Citrus	Sweet orange/Navel	Anani	*Citrus sinensis*	24	169

32	Coconut		Akari/Nu/Niu	*Cocos nucifera*	24	169
33	Cocoa		Koko	*Theobroma cacao*	49	83
34	Coffee		Kaope	*Coffea arabica*	12	337
35	Custard apple	African pride	Kataraapa	*Annona spp.*	49	83
36	Custard apple	Soursop	Kataraapa	*Annona muricata*	49	83
37	Custard apple	Sweetsop	Tapotapo/ Naponapo	*Annona squamosa*	49	83
38	Granadilla	Giant granadilla	Maratini	*Passiflora macrocarpa*	6	675
39	Guava		Tuava	*Psidium guajava*	49	83
40	Ice-cream bean		Koko	*Inga edulis*	90	45
41	Jaboticaba			*Myrciaria cauliflora*	49	83
42	Jackfruit	Jackfruit	Kuru papaa	*Artocarpus heterophyllus*	90	45
43	Kava		Kava maori	*Piper methysticum*	6	675
44	Loquat		Koata	*Eriobotrya japonica*	49	83

Code	Name, crop	Name, type/other	Name(s), maori	Name, botanical	Area/Plant (m^2)	Plants/ acre 2011
45	Lychee/Litchi			*Litchi chinensis*	64	63
46	Macadamia			*Mcadamia integrifolia*	64	63
47	Malayapple		Kaika	*Syzygium malaccense*	81	50
48	Mango		Vi	*Mangifera indica*	90	45
49	Morinda	Indian mulberry	Nono	*Morinda citrifolia*	20	202
50	Passionfruit	Passionfruit	Parapotini	*Passiflora edulis*	6	675
51	Papaw/Papaya	Papaw – solo	Nita/Vi puaka	*Carica papaya*	6	675
52	Papaw/Papaya	Papaw – other	Nita/Vi puaka	*Carica papaya*	6	675
53	Pineapple	Ripley Queen	Ara tara	*Ananas comosus*	0.16	25294
54	Pineapple	Smooth Cayenne	Ara vai'i	*Ananas comosus*	0.16	25294
55	Pineapple	Supersweet	Ara ou	*Ananas comosus*	0.16	25294
56	Pomegranate		Remuna	*Punica granatum*	20	202
57	Sapodilla			*Manilkara zapota*	30	135
58	Spondias	Hog plum	Vikavakava	*Spondias cytherea*	90	45
59	Starapple			*Chrysophyllum cainito*	90	45
60	Surinam cherry		Venevene	*Eugenia uniflora*	49	83
61	Tamarind		Tamereni	*Tamarindus indicus*	90	45
62	Tawa	Oceanic lychee	Tava	*Pometia pinnata*	90	45
VEGETABLE CROPS						
63	Asparagus			*Asparagus officinalis*	1.2	3373
64	Bean	Bean, climbing	Pi potopoto	*Phaseolus vulgaris*	0.24	16863
65	Bean	Bean, dwarf	Pi potopoto	*Phaseolus vulgaris*	0.24	16863
66	Bean	Bean, snake	Pi roroa	*Phaseolus vulgaris*	0.24	16863
67	Bele		Rukau viti	*Abelmoschus esculentus*	3	1349
68	Broccoli			*Brassica oleracea var. italic*	0.25	16188
69	Brussels sprouts			*Brassica oleracea var. gemmifera*	0.25	16188
70	Cabbage	Cabbage, Chinese	Pinapi	*Brassica chinensis*	0.25	16188

71	Cabbage	Cabbage, head,/English	Kapati	*Brassica oleracea var. capitata*	0.25	16188
72	Capsicum	Pepper, hot	Oporo	*Capsicum frutescens*	4	1012
73	Capsicum	Pepper, sweet		*Capsicum annuum*	0.6	6745
74	Carrot			*Daucus carota*	0.015	269800
75	Cauliflower			*Brassica oleracea var. botrytis*	0.25	16188
76	Celery			*Apium graveolens*	0.16	25294
77	Choko			*Sechium edule*	0.6	6745
78	Courgette/Zucchini	Marrow		*Cucumis pepo*	0.6	6745
79	Eggplant		Uarao puakanio	*Solanum melongena*	0.9	4497
80	Kang Kong			*Ipomoea aquatica*	0.6	6745
81	Lettuce		Tarati	*Lactuca sativa*	0.24	16863
82	Melon	Honeydew/Musk	Mereni	*Cucumis melo*	1.5	2698
83	Melon	Rock	Mereni	*Cucumis melo*	1.5	2698
84	Melon	Water	Mereni	*Citrullus lanatus*	1.5	2698
85	Okra			*Hibiscus esculentus*	0.72	5621
86	Onion		Oniani	*Allium cepa*	0.02	202350
87	Parsley			*Petroselinum crispum*	0.19	21300
88	Peanut	Groundnut	Aratita	*Arachis hypogaea*	0.6	6745
89	Pumpkin	Crown	Mautini	*Cucurbita pepo*	2.4	1686

Code	Name, crop	Name, type/other	Name(s), maori	Name, botanical	Area/Plant (m^2)	Plants/ acre 2011
90	Pumpkin	Buttercup	Mautini	*Cucurbita pepo*	1.2	3373
91	Pumpkin	Butternut	Mautini	*Cucurbita pepo*	1.2	3373
92	Pumpkin		Mautini maori	*Cucurbita maxima*	2.4	1686
93	Radish			*Raphanus sativus*	0.015	269800
94	Rukau	Taro		*Colocasia esculenta*	0.72	5621
95	Silverbeet	Swisschard		*Beta vulgaris*	0.6	6745
96	Snowpeas	Chinese peas	Pi	*Pisum sativum*	0.24	16863
97	Spinach			*Basella alba*	0.5	8094
98	Spring onions		Oniani rau	*Allium cepa var. cepa*	0.015	269800
99	Sweet corn		Kaoni	*Zea mays*	0.72	5621
100	Tomato	Cocktail/cherry	Tomato	*Solanum lycopersicon*	0.6	6745
101	Tomato	Fresh	Tomato	*Solanum lycopersicon*	0.6	6745
HERB & SPICE CROPS						
102	Basil		Miri kai	*Ocimum basilicum*	0.6	6745
103	Cardamom			*Elletaria cardamomum*	2	2024
104	Clove			*Syzygium aromaticum*	8	506
105	Chive			*Allium schoenoprasum*	0.015	269800
106	Coriander			*Coriandum sativum*	0.015	269800
107	Curry leaf			*Murraya koenigii*	2	2024
108	Dill		Taretare	*Anetheum graveolens*	0.25	16188
109	Galangal			*Alpinia galangal*	2	2024

110	Lemongrass		Ti varani	*Cymbopogon citrates*	2	2024
111	Nutmeg			*Myristica fragrans*	30	135
112	Oregano			*Origanum vulgare*	0.3	13490
113	Rocket			*Hesperis matronalis*	0.06	67450
114	Rosemary			*Rosmarinus officinalis*	0.3	13490
115	Sage			*Salvia officinalis*	0.3	13490
116	Mint	Spearmint	Miriti	*Mentha spicata*	0.25	16188
117	Vanilla		Vanira	*Vanilla fragrans*	3	1349
118	Watercress		Toatoa	*Rorippa nasturtium – aquatica*	0.3	13490
FLOWERING & ORNAMENTAL PLANTS						
119	Alpinia			*Alpinia purpurata*	0.36	11242
120	Anthurium			*Anthurium spp.*	2	2024
121	Heliconia			*Heliconia spp.*	2	2024
122	Orchids			*Orchid spp.*	1	4047
IMPORTANT TIMBER TREES						
123	Miro	Portia	Miro	*Thespesia populnea*	81	50
124	Sandalwood		Ai	*Santalum newcaledonicum*	20	202
125	Tamanu	Pacific laurel	Tamanu	*Callophyllum inophyllum*	100	40
126	Tou		Tou	*Cordia subcordata*	100	40

Code	Name, crop	Name, type/other	Name(s), maori	Name, botanical	Area/Plant (m^2)	Plants/ acre 2011
RARE FRUIT AND NUT CROPS						
127	Abiu			*Pouteria caimito*	30	135
128	Canarium	Pili nut	Mape	*Canarium indicum*	81	50
129	Canistel	Sapote		*Pouteria campechiana*	49	83
130	Chempadek		Kuru papa'a	*Artocarpus integer*	49	83
131	Dragonfruit/Pitaya	White flesh		*Hylocereus undatus*	3	1349
132	Dragonfruit/Pitaya	Red flesh		*Hylocereus polyrhizus*	3	1349
133	Durian			*Durio zibenthinus*	81	50
134	Edible barringtonia			*Barringtonia edulis*	49	83
135	Kwaimuk			*Artocarpus anisophyllus*	30	135
136	Longan			*Euphoria longana*	81	50
137	Long Kong			*Lansium domesticum*	49	83
138	Mangosteen	Mangosteen, purple		*Garcinia mangostana*	81	50
139	Mangosteen	Mangosteen, yellow		*Garcinia dulcis*	81	50
140	Matisia			*Matisia cordata*	81	50
141	Miracle fruit			*Synsepalum dulcificum*	4	1012
142	Peanut butter tree			*Bunchosia argentea*	24	169
143	Rambutan			*Nephelium lappaceum*	81	50
144	Rollinia			*Rollinia deliciosa*	81	50
145	Sapote	Sapote, pink		*Pouteria sapota*	81	50

146	Sapote	Sapote, ross		*Pouteria campechiana*	49	83
147	Santol			*Sandocricum koatjape*	64	63

ANNEX 3

DEFINITIONS OF TERMS & CONCEPTS

Household Related

Agriculturally Active Household: This refers to a household whose level of agricultural activity was neither subsistence only, subsistence with cash cropping or commercial producers.

Commercial: - The level of agricultural activity where a household's main purpose for agricultural production is to have their produce sold locally or for export.

Household: Based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living, a household may be either

- A one person household, that is, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household; or
- A multi-person household, that is, a group or two or more persons living together who make common provision for food or other essentials for living. They may be related or unrelated persons or a combination of both. They may live in one house or in one or more than one house.

Minor Agricultural: The level of agricultural activity where a household has only very few crops defined as no more than 64m^2 (8m x 8m) of land under garden crops or no more than 10 coconut trees or any other no more than 10 bearing other tree crops.

Operator: The person exercising the management control over the operation of the agricultural holding. Where the holding is being operated by a single household the head of the household is in most cases the operator. A holding can also have more than one operator.

Subsistence Only: The level of agricultural activity where a household produces crops for own use.

Subsistence with Cash Cropping/Semi-Subsistence: The level of agricultural activity where a household's main purpose for agricultural production is to feed it-self but some crops or surplus crops are sold.

Farm Related

Holding: An economic unit of agricultural production under **single management** comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, size, or location. Single management may be exercised by **either** an individual or household; jointly by two or more individuals or households; by a clan or by a tribe. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more enumeration or census areas, providing the parcels share the same production means utilized by the holding, such as labour, farm buildings or machinery.

Inorganic Fertilizers: Manufactured mineral substances applied either directly to soil; through the leaves, or irrigation water, to supply plants/crops with the necessary nutrients.

Examples include Nitrophoska Blue or Perfekt, N-P-K mixes, urea, ammonium sulphate, superphosphate, nitrosol.

Organic Fertilizers: Materials of organic origin, either natural or processed, that can be used as sources of plant nutrients.

Parcel: Any piece of land entirely surrounded by other land, water, road, forest etc. not forming part of this holding, A parcel may consist of one or more plots adjacent to each other.

Plot: A part or whole of a parcel on which a specific crop or crop mixture is cultivated. A plot can also be fallow land or land waiting to be planted.

Hydroponics: Refers to crop production in soil-less medium**.**

Floriculture: Refers to cultivation of flowering and ornamental plants including Alpinia (flowering ginger), Anthuriums, Gingers, Heliconias, and Orchids.

Compost: A mixture of decaying organic matter, as from leaves and manure (animal) used to improve soil structure and provide nutrients.

Insecticides: A chemical substance used to kill insects.

Fungicides: A chemical substance that inhibits or kills the growth of fungi.

Herbicides or Weedicides: A chemical substance used to inhibit or kill the growth of weeds.

Land Related

Crown Land: Any land which has not been alienated from the Crown for a subsisting estate in fee simple, other than Native land. Examples of such land types include the main road, schools, hospitals, government premises, beaches, and usually inaccessible lands such as the interior of Rarotonga.

Borrowed Land: Land belonging to another household or person that the borrower has borrowed for use usually on a temporary basis. Terms of the agreement are between the two parties concerned, such agreements are usually verbal in nature and not legally-binding.

Customary Land: Alias Native land, Native Freehold land, is a land which, being vested in the Crown, is held by Natives or the descendants of Natives under the Native customs and usage in the Cook Islands. Customary land is not investigated by the land court but is being looked after and handled by the Natives.

Freehold Leased Land: Freehold land which is obtained through a land court contract by which one party (lessor), usually in consideration of rent, conveys land to another (lessee) for a specified time period.

Freehold Licensed Land: Freehold land belonging to another household or person that the borrower has borrowed for use usually on a temporary basis. Terms of the agreement are between the two parties concerned; i.e. It need not go through the land court.

Occupation Right: The operator has an exclusive right to use a piece of land, such right being obtained through the land court system of the Cook Islands.

Long-occupation Right Land: Alias vested order; that is, if any person or persons has lived on Crown or Customary land without any right for 20 years or more, such person(s) can apply to the land court for a right to occupy the same land indefinitely.

Crop Related

Mixed Crop: Refers to "two or more crops" which are interplanted over a plot in a regular pattern such as rows. Sometimes there are a few scattered plantings of other crops but not considered to be part of the mixed crop.

Single Row: Refers to "one crop" planted over a plot in a regular pattern of "single rows". If there are a few scattered trees or plants of different crops within the plot, the plot is still considered to be single rows.

Double Rows: Refers to "one crop" planted over a plot in a regular pattern of "double rows". If there are a few scattered trees or plants of different crops within the plot, the plot is still considered to be double rows.

Scattered Crop: Refers to trees or plants, which have not been planted with any uniform method of spacing over a plot. Important timber trees including; Miro, Tamanu, Tou shall also be recorded.

Tree Crops: Trees bearing edible fruits or nuts. The economic lifespan of such trees vary significantly, at more than five years.

Livestock Related

Pigs

- Weaners – Piglets separated from the sow. Their live weight is less than 24Kg.
- Growers – Pigs from 3-months after weaning. Their live weight ranging from 20-40Kg.
- Fatteners – Middle aged pigs. Their live weight ranging from 40Kg.
- Sows – Adult female pigs that has given birth at least once.
- Boars – Adult male pigs. Their live weight is over 40Kg.

Goat

- Buck – Adult male goat.
- Doe – Adult female goat.

Chicken

- Chicken (broilers) – Refers to chicken raised for meat and not for eggs.
- Chicken (layers) – Refers to chicken raised for laying eggs.
- Chicken (local) – Refers to chickens of local breed (moa kainga).

Cattle

- Bulls – Adult male cattle.
- Cows – Adult female cattle.

Horse

- Mare – Adult female horse.
- Stallion – Adult male horse.

Ducks

- Drakes – Refers to male ducks.
- Hens – Refers to female ducks.

Fishing Related

Collecting/Gleaning Sea Products (Angota): Method of fishing using limited equipment and gear for gathering seafood like clams (paua), sea urchins (avake/atuke), sea cucumbers (rori), turban snails (ariri), octopus, crabs etc. It is usually done in the lagoon and on the reef during low tide.

Gill and other Net Fishing (Kupenga): Gill nets are used to catch a number of different reef fish in a lagoon or along the reefs edge. Other netting includes scoop nets, cast nets etc.

Vertical Long Lining (Tukutuku pouto): A fishing method that involves setting-out a large number of short-lines carrying hooks, which are attached to a longer main line at regular intervals. The short-lines are suspended horizontally at a predetermined depth with the help of surface floats.

Drop Lining (I'i): Method of fishing usually done by dropping a baited hook to great depths to catch deep-sea fish such as grouper, snapper and pelagic fish like tuna, wahoo, barracuda, marlin etc.

Hook and Line Fishing (I'i): One of the oldest methods for catching fish. It is considered an environmentally friendly method as it catches primarily target species, and causes minimal damage to the surrounding environment.

Trolling (Tavere): Method of deep-sea fishing where baited or artificial hooks are trolled behind an outboard motor boat.

Deep Bottom Fishing (I'i): Method of fishing used in catching tuna and other pelagic fishes in large quantities.

Spear Fishing (Titia): Method of fishing using either a home-made spear or spear gun for catching fish among coral reefs, in the lagoon, or beyond the reef.

Flying Fishing (Rama Maroro): A method of fishing using a scooping net to catch maroro. This type of fishing is normally done at night.

Pearl Related

Farm Lines: The main lines used to hang cultured black pearl oysters.

Spat Collector Lines: The lines used to hang spat collectors or devices used to for the collection of oyster larva.

Seeded Shells: These are cultured black lip pearl oysters which have a nucleus inserted

into their gonads to generate black pearls.

Virgin Shells/Unseeded Shells: These are black lip pearl oysters which are not yet ready for nucleus insertion.

Seeding Equipment: These are equipment used for the insertion of the nucleus into the gonads of the black lip oysters.

Seeding Houses: Shelter used for black pearl seeding activities. It is also used for the cleaning of pearl shells.

Diving Related

Scuba Tanks: These contain compressed-air and used with a breathing apparatus to assist deep-sea divers stay underwater for extended periods.

Scuba Compressor: Equipment used to fill the scuba tanks with compressed air.

Hookah Dive Compressor: The use of a small air compressor which is located at the surface, or on the boat. Air is delivered to the diver via a floating air hose.

Motorised Boats: Small-type boats with an engine to assist with movement on the water. Also known as "outboard motor" boats.

ANNEX 4

CENSUS FIELD STAFF

Twelve (12) census trainers, seventeen (17) supervisors, and ninety-one (91) enumerators were involved in the census undertaking. Trainers were selected from the Ministry of Agriculture and the Statistics Office of the Ministry of Finance and Economic Management. Most of the supervisors and enumerators on all islands were recruited from government ministries and were required to conduct the census after regular hours. William Wigmore and Moe Tutira of the Ministry of Agriculture travelled to the Northern Islands on the police patrol boat "Te Kukupa" to conduct the census in the islands of Palmerston, Nassau, Rakahanga, and Penrhyn with the assistance of recruited personnel from the respective islands. They trained the supervisors and enumerators on Pukapuka and Manihiki in the conduct of the census.

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