Steering Committee for the Agricultural Census

Agricultural Census Office

LAO AGRICULTURAL CENSUS, 1998/99

HIGHLIGHTS

Vientiane, February 2000

PREFACE

This report presents the first results of the Lao Agricultural Census, 1998/99. It highlights the major findings of the census, featuring commentary and graphical presentations, as well as some summary tables showing data from the range of topics covered by the census. This report is available in Lao and English as separate documents. More detailed census results will be released during 2000.

The Lao Agricultural Census, 1998/99 was the first agricultural census undertaken in Lao PDR and covered all 141 districts in the country. The census was undertaken in two parts: a complete enumeration of all 798,000 households in Lao PDR to collect some basic data about agriculture, and a sample survey of households to collect more detailed information. This report presents results of the sample component of the census.

The sample component was undertaken using strict random sampling procedures. First, a sample of villages was selected. Then, in each sample village, a sample of households was selected for interview in the census. There were 42,028 sample households (5.3 percent of all households) in 2,454 sample villages (22 percent of all villages). The census data collection was undertaken in February and March 1999. Data were collected in respect of the 1998 wet season and 1998/99 dry season. Further information on the census methodology is given in Chapter 3.

The census was undertaken under the overall control of the Agricultural Census Steering Committee, which comprised representatives of the State Planning Committee (SPC) and the Ministry of Agriculture and Forestry (MAF), according to the Prime Minister's Decree No. 21 of 9 September 1997. The Agricultural Census Office, with staff from MAF and the National Statistics Centre (NSC) of SPC, was established to implement the census.

I would like to thank all those who have contributed to the success of the census; in particular, those members of the public chosen to participate in the census, without whose support and co-operation the census would not have been possible. The Agricultural Census Office is also appreciative of the material and financial support provided for the census by the Swedish International Development Agency (Sida), and the technical assistance provided through its executing agency, Statistics Sweden.

Bounthavy SISOUPHANTHONG

Director
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Vientiane, February 2000

LAO PEOPLE'S DEMOCRATIC REPUBLIC

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CHAPTER 1
SUMMARY OF FINDINGS

CENSUS RESULTS IN BRIEF

Agricultural holdings	
No. of households ('000)	798
No. of agricultural holdings ('000)	668
No. of land holdings ('000)	647
Farm population ('000)	4,058
Average household size	6.1
Area of holdings	
Area of holdings ('000 ha)	1,048
Average area of holding (ha)	1.62
Holdings by area of holding (%)	
• Less than 1 ha	36
• 1-2 ha	36
• 2 ha and over	27
Average parcels per holding	2.1
Average parcel size (ha)	0.77
Land use (% of land)	
Temporary crops	73
Left fallow	11
Permanent crops	8
Forest	5
Other land	2
Land tenure	
Land tenure (% of land)	
• In owner-like possession	97
• Other land	3
Percent of holdings renting land (%)	5
Land clearance (% of land)	
Cleared in last year	18
Cleared 2-3 years ago	11
Other	71
Rice cultivation	
Wet season lowland, 1998 ('000 ha)	481
Wet season upland, 1998 ('000 ha)	199
Dry season, 1998/99 ('000 ha)	56
Rice growers by land type (%)	
• Lowland only	58
• Upland only	30
• Both lowland and upland	12
Glutinous rice (% of rice area)	93
Improved varieties (% growers)	30
Other crops (% of holdings growing crop)	
Vegetables	36
Maize	24
Cassava	11
Sugar cane	3
Fruit trees (% of holdings growing crop)	
Mango	23
Coconut	17
Banana	17
Jackfruit	11
Tamarind	11

Use of inputs (% of holdings)	
Mineral fertilizers	28
Organic fertilizers	33
Pesticides	11
Livestock ('000 of animals)	
Cattle	944
Buffaloes	992
Pigs	1,036
Goats	94
Other livestock	40
Poultry ('000 of birds)	
Chickens	9,669
Ducks	1,351
Other poultry	195
Percent of holdings with livestock	
Cattle	31
Buffaloes	48
Pigs	49
Local chickens	73
Average animals per holding	
Cattle	4.5
Buffaloes	3.1
Pigs	3.2
Local chickens	19.3
Herd structure: cattle & buffaloes (%)	
Adult males	31
Adult females	60
Calves	10
Use of vaccination (% of holdings)	
Cattle	36
Buffaloes	48
Pigs	8
Use of farm machinery (% of holdings)	
Tractor	21
Water pump	4
Fishing (% of holdings)	
Aquaculture facilities	8
Other fishing	71
Farm labour	
Farm occupations (% of adults)	92
Holdings with outside labour (%)	26
Farming systems of ethnic groups	
Percent of holdings keeping pigs	
• Lao	38
• Phutai	52
• Khmu	64
• Hmong	73
• Leu	54
Sale of farm produce (% of holdings)	
Main purpose for sale	6
Sold some produce	35

General characteristics of agricultural holdings *(Tables 1-3)*

In 1999, there were 798,000 private households in Lao PDR. Of these, 668,000 were agricultural holdings; that is, they operated 0.02 ha or more agricultural land, or kept 2 or more cattle/buffaloes, 5 or more pigs/goats/sheep, or 20 or more poultry. Only 50% of households in Vientiane Municipality were agricultural holdings, compared with over 90% in most other provinces.

Some 647,000 of the agricultural holdings were land holdings; that is, they operated 0.02 ha or more agricultural land. The other 21,000 only had livestock.

Most agricultural holdings are primarily subsistence farmers: 94% of holdings in Lao PDR produce mainly for their own consumption. The most market-oriented farming is in Champasack where 20% of holdings produce mainly for sale.

Many farm households do market some of their farm produce, especially those living near the larger towns and in border areas. In all, 35% of holdings sell some farm produce. In Champasack, 60% of holdings sell some produce, compared with only 12% in Attapeu.

Figure 1: Sale of farm produce, 1998/99

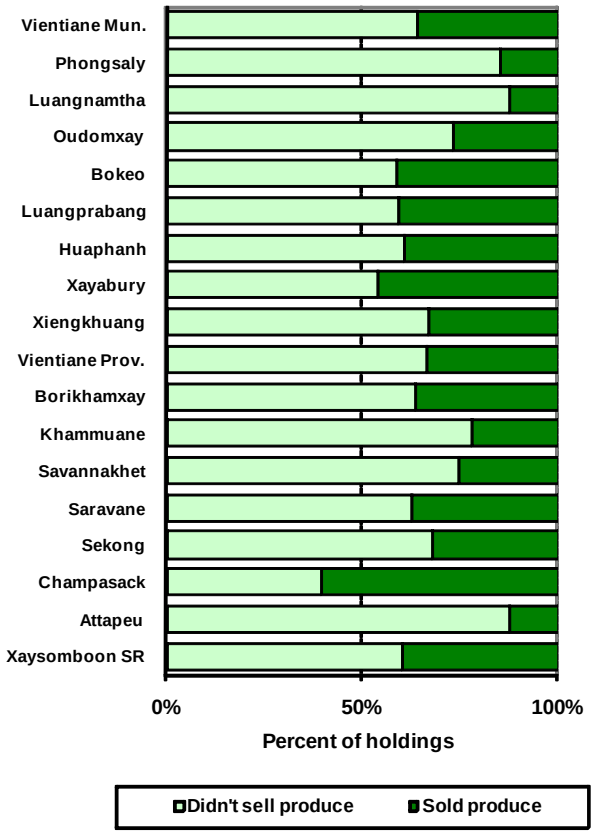
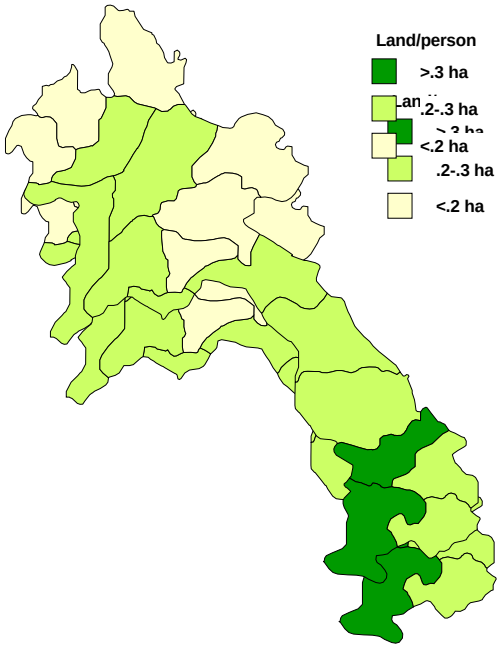


Figure 2: Agricultural land per person, 1998/99



Agricultural land *(Tables 2, 4-10)*

In 1998/99, the average size of land holding in Lao PDR was 1.62 ha. This includes fallow land and non-agricultural land. Farm sizes are high in some northern provinces, such as Oudomxay and Luangprabang, because of land left fallow under rotating shifting cultivation systems. For the country as a whole, 36% of land holdings have less than 1 ha of land; 27% have 2 ha or more land.

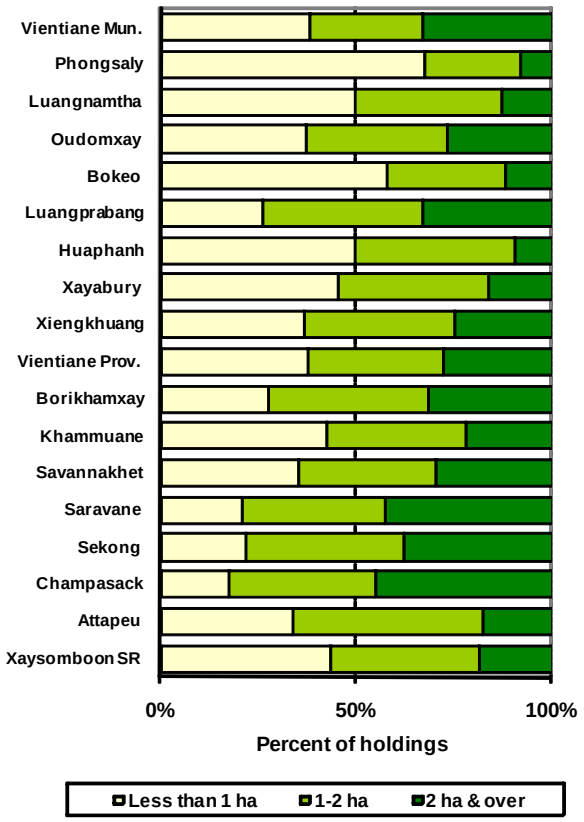
Potentially, most provinces have sufficient agricultural land to be self-sufficient in food production. For the farm population in Lao PDR, there is an average of 0.24 ha of agricultural land per person. The most vulnerable provinces are Phongsaly (0.14 ha per person) and Huaphanh (0.16 ha per person).

The distribution of land in Lao PDR is reasonably equitable. There is not much difference between provinces. In Oudomxay, the largest 20% of land holdings have 55% of the land; the same group in Saravane has 45% of the land. In Oudomxay, the smallest 50% of land holdings have 20% of the land;

in Saravane, this group has 25% of the land.

A typical land holding in Lao PDR consists of one or two separate land parcels. Only 5% of land holdings have five or more parcels. The average parcel size is 0.77 ha. Land is most fragmented in Huaphanh, where there is an average of 3.2 parcels per holding with an average parcel size of 0.34 ha. It is least fragmented in Attapeu (1.5 parcels per holding).

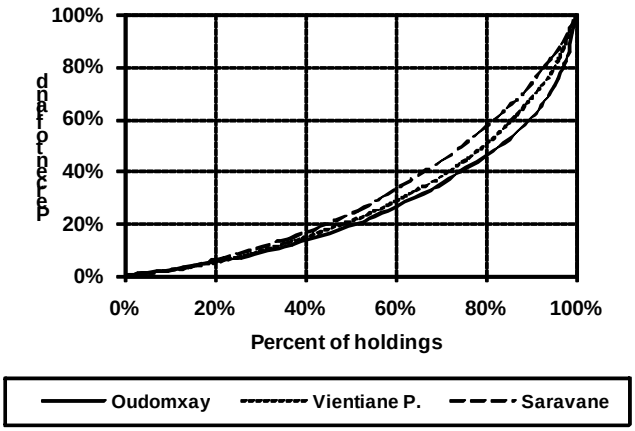
Figure 3: Farm size distribution, 1998/99



Almost 97% of agricultural land in Lao PDR is operated under "owner-like" tenure; that is, it has been operated without interruption for many years or under perpetual or long-term lease. Only 5% of farm households rent in land; a third of these have no other land. Most households renting land do so under share cropping arrangements (63%); the rest pay rent in cash, labour or through other means. Land rental is most common in Vientiane Municipality where 20% of farm households rent in some agricultural land.

There are 877,000 ha of arable land in Lao PDR; that is, land able to be used for growing temporary crops. 13% of arable land was left fallow in 1998/99, mainly in upland areas. In Luangprabang, 28,000 ha were left fallow in 1998/99.

Figure 4: Land concentration, 1998/99



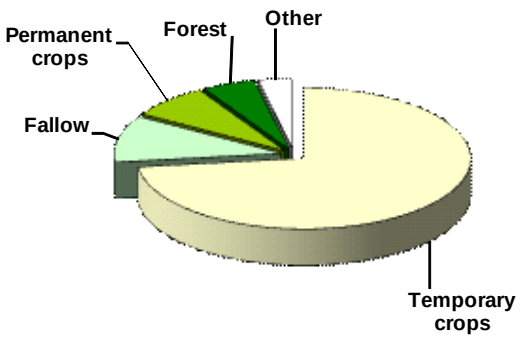
For every 100 ha of arable land in Lao PDR in 1998/99, 87 ha was cropped and 91 ha of crops were grown. Thus only about 5% of arable land was double cropped.

As well as arable land, there are 81,000 ha of land under permanent crops. The largest areas under permanent crops are in Champasack (38,000 ha) and Saravane (11,000 ha), much of it coffee plantations.

A fifth of all agricultural land in Lao PDR in 1998/99 had been cleared for crop cultivation within the previous year. Land clearance is highest in the northern provinces because of slash and burn cultivation in upland areas. In Phongsaly and Huaphanh, well over half the agricultural land had been cleared in the previous year. In Xiengkhuang, a quarter of newly cleared land in 1998/99 was used for growing crops other than rice.

Crops *(Tables 1, 12-19)*

Figure 5: Land use, Lao PDR, 1998/99

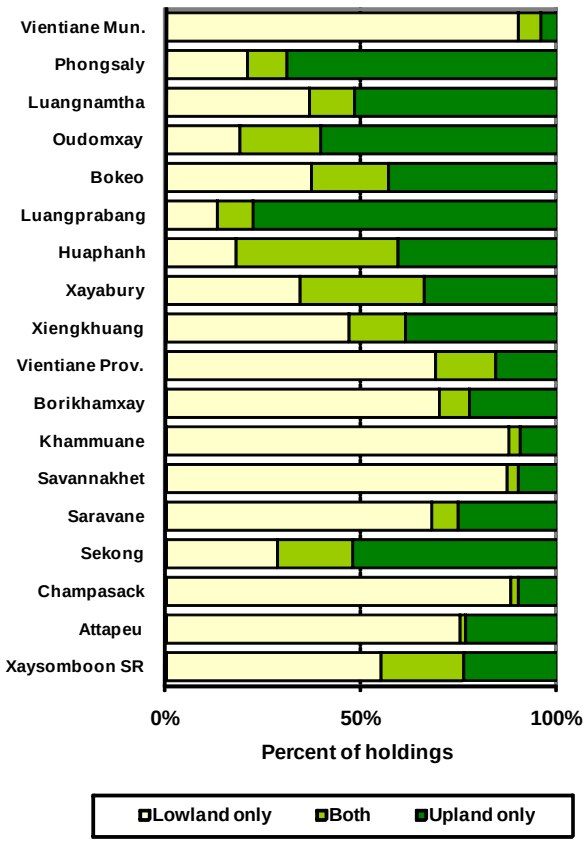


The predominant crop around the whole of Lao PDR is rice: 614,000 agricultural holdings grow rice, 77% of all households in the country.

The total area of rice planted in 1998/99 was 735,000 ha: 481,000 ha of wet season lowland rice, 199,000 ha of upland rice, and 56,000 ha of dry season rice. The most important rice growing provinces are Savannakhet (113,000 ha) and Champasack (94,000 ha).

Upland rice is the main crop in the north of the country, especially in Phongsaly, Luangnamtha, Oudomxay and Luangprabang provinces. A mix of lowland and upland rice is grown in Bokeo, Huaphanh, Xayaboury, Xiengkhuang, Sekong and Xaysomboon Special Region. Lowland rice is predominant in the other provinces. In all, 70% of rice growers in Lao PDR planted lowland rice in 1998/99, and 42% planted upland rice; 74,000 (12% of rice growers) planted both lowland and upland rice. Most upland rice is in Luangprabang (41,000 ha) and Oudomxay (26,000 ha).

Figure 6: Rice cropping system, 1998/99



Dry season rice plantings have increased in recent years following heavy investment in irrigation facilities. In the 1998/99 dry season, 93,000 holdings planted rice, 15% of all rice growers in the country. Dry season rice is most common in Vientiane Municipality, where 54% of rice growers planted the crop in 1998/99. In the other main rice growing provinces along the Mekong, less than 20% of rice growers planted a dry season crop in 1998/99.

Over 90% of rice grown in Lao PDR is of the glutinous variety. Non-glutinous rice is most common in Phongsaly and Luangnamtha where it represents nearly a third of the rice crop.

In 1998/99, local varieties accounted for 71% of rice planted in Lao PDR. Improved varieties were most widely used in Vientiane Municipality (69% of rice growers) and Savannakhet (59% of rice growers).

For most farmers, other temporary crops are of only minor importance, often grown as a secondary crop in small plots or as a crop mixture. Maize is the most common and is grown around the country: 24% of holdings in Lao PDR grew maize in 1998/99.

Vegetable crops are also common, usually planted in small kitchen gardens on river banks. In 1998/99, 36% of holdings grew some vegetables. Vegetable growing is common in some northern provinces: more than half the holdings in Phongsaly, Luangprabang, Xayaboury and Xiengkhuang grew vegetables in 1998/99. The most commonly grown vegetables around the country are chilli, cabbage, cucumber, onion and eggplant. The types of vegetables grown are similar throughout the country.

Of the other temporary crops, sugar cane (23,000 growers), groundnut (21,000 growers), and tobacco (18,000 growers) are grown around the country. There are 19,000 sesame growers, mainly in the north, and 9,000 cotton growers, mainly in Huaphanh, Xayaboury and Savannakhet.

Coffee is the most important permanent crop, mainly grown on the Bolaven Plateau. There are 24,000 coffee growers, with 41,000 ha of coffee planted. Fruit trees are common, but are usually only scattered trees, rather than plantations. The most common fruit trees are mango, banana, jackfruit and tamarind. There are 1.4 million mango trees in Lao PDR and about the same number of tamarind trees.

Figure 7: Dry season rice growers, 1998/99

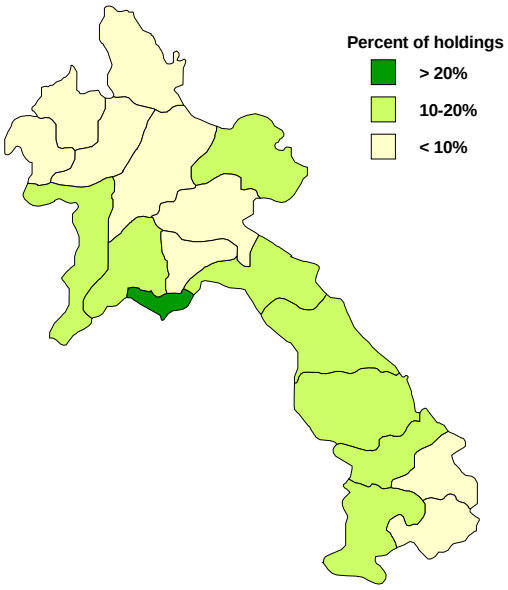


Figure 8: Sugar cane growers, 1998/99

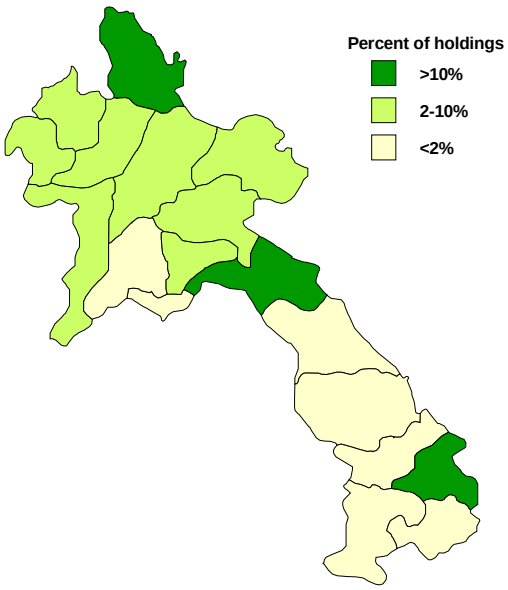


Figure 9: Cotton growers, 1998/99

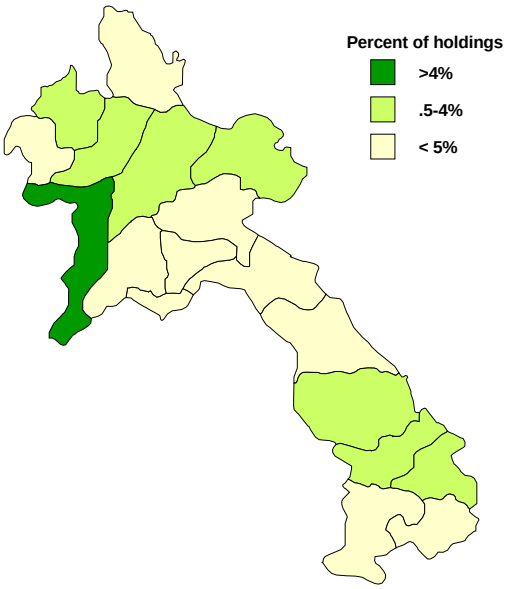
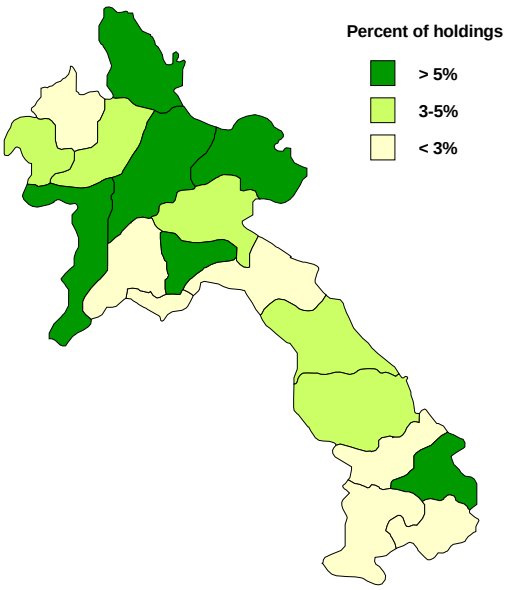


Figure 10: Pineapple growers, 1998/99



Livestock *(Tables 1, 22-29)*

In 1999, there were 944,000 cattle, 992,000 buffaloes, 1,036,000 pigs and 94,000 goats in Lao PDR.

Buffaloes are commonly kept for use as draught animals, especially in the south. In 1999, 48% of holdings in Lao PDR had buffaloes. In Savannakhet, 68% had buffaloes, compared with 34% in Luangprabang and 38% in Bokeo. Buffalo numbers may be declining because of increasing farm mechanization: in Vientiane Municipality, where use of farm machinery is highest, only 18% of holdings had buffaloes. The average buffalo herd size was 3.1. Two-thirds of buffaloes are aged three years or over; amongst these, there are 2.5 females for every male. Calves make up only 6% of buffalo numbers.

Although there are nearly as many cattle as buffaloes in Lao PDR, cattle raising is less common. Only 31% of holdings in Lao PDR had cattle in 1999. The average cattle herd size was 4.5, higher than for buffaloes. Cattle raising is more common in the south: 49% of Savannakhet holdings have cattle, compared with only 20 percent in Luangprabang. Nearly two-thirds of cattle are aged two years or more; amongst these, females outnumber males by three to one. Calves make up only 13 percent of cattle numbers.

Figure 11: Holdings with pigs, 1999

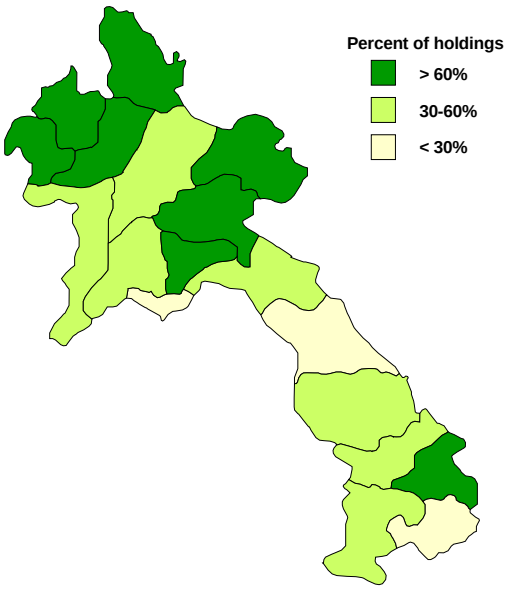


Figure 12: Cattle herd structure, Lao PDR, 1999

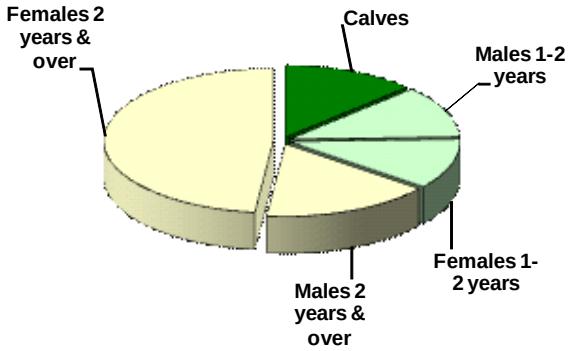


Figure 13: Buffalo herd structure, Lao PDR, 1999

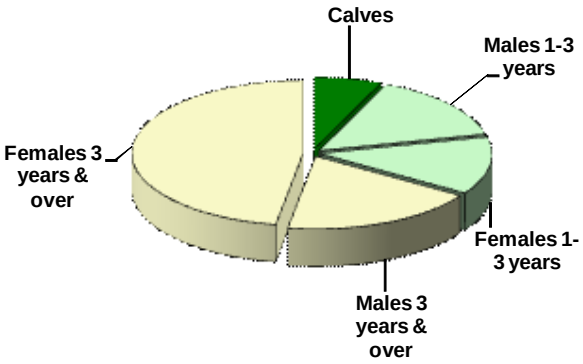
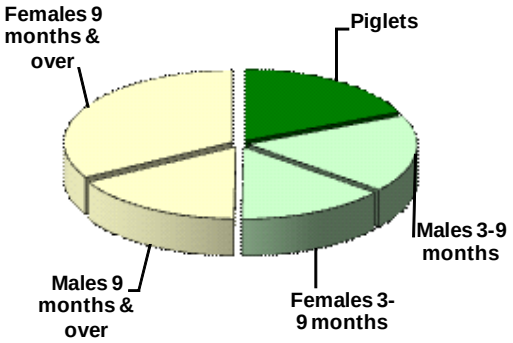


Figure 14: Pig herd structure, Lao PDR, 1999



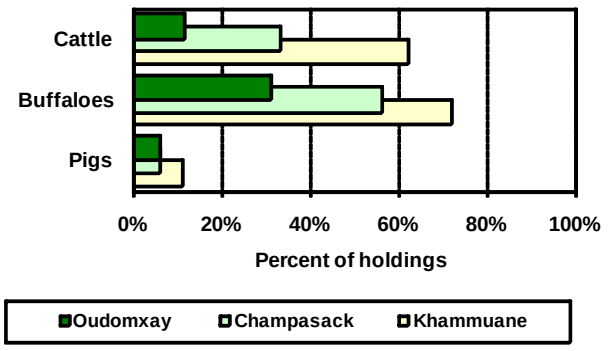
Pig raising is most prevalent in the north. Two-thirds of farm households in Phongsaly, Luangnamtha, Oudomxay and Bokeo raise pigs. In Huaphanh, more than 80% raise pigs. The average number of pigs kept in 1999 was 3.2. Over 60% of those raising pigs keep only one or two pigs; only 5% have 10 or more pigs. Pigs aged 3-9 months make up 32 percent of all pigs in the country. Piglets account for only 18 percent of pig numbers.

Many households raise some poultry; in 1999, 73% of farm households kept chickens and 29% kept ducks. There were 9.7 million chickens, 1.4 million ducks and 195,000 other poultry – mainly turkeys and geese. The chicken numbers include 290,000 commercial chickens, most of them in Vientiane Municipality.

A third of those raising cattle vaccinated their animals in 1998/99, compared with a half for buffaloes. Vaccination is less common in the north: in Oudomxay, only 12% vaccinated their cattle, compared with 63% in Khammuane.

The vaccination rate for pigs is very low: only 8% of households raising pigs vaccinated them in 1998/99. In the north, vaccination was most common in Bokeo and Luangprabang, and least common in Phongsaly and Huaphanh.

Figure 15: Vaccination of livestock, 1998/99



Inputs and machinery *(Tables 20-21, 31)*

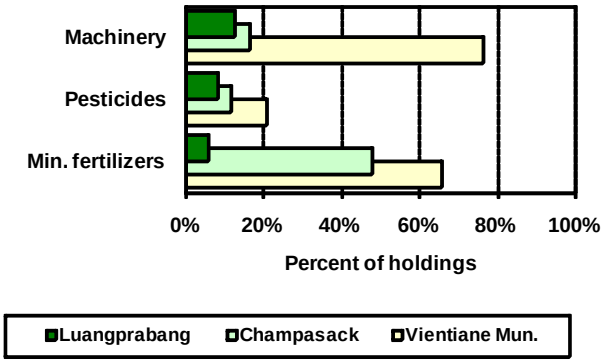
Mineral fertilizers are not widely used in Lao PDR. In 1998/99, only 28% of farm households used mineral fertilizer. Two-thirds of holdings in Vientiane Municipality and half the holdings in Savannakhet and Champasack used mineral fertilizer; fewer than 10% did so in the northern provinces.

Mineral fertilizer is often used in conjunction with organic fertilizers such as manure: 65% of those using mineral fertilizer also used organic fertilizer. Overall, only 33% of holdings use organic fertilizer; 57% use no fertilizer at all.

For rice, mineral fertilizer is often used in conjunction with improved seeds. Of those rice growers using improved seeds in 1998/99, 67% applied some mineral fertilizer, compared with only 12% of those using a local variety.

Only 11% of holdings used pesticides in 1998/99. Pesticide use is highest in Vientiane Province and Vientiane Municipality.

Figure 16: Use of inputs and machinery, 1998/99



Farms in Lao PDR are generally not highly mechanized: only 29% used farm machinery in 1998/99. The most mechanized farms are in Vientiane Municipality, where 77% used farm machinery, and 67% used a tractor. Use of farm machinery is rare in upland farming in the north. It is also not common in the main rice producing provinces in the south: only 21% of Savannakhet farmers and 17% of Champasack farmers used farm machinery in 1998/99.

Farmers in the south of the country rely more on draught animals than their more mechanized counterparts in the central provinces. Two-thirds of farmers in Savannakhet and Champasack use draught animals, compared with only 11% in Vientiane Municipality.

Forestry and fishing *(Tables 9, 32-33)*

Fishing is an important secondary activity for many farm households as a source of extra income or to supplement the family's food supply. In all, 56,000 holdings in Lao PDR have some aquaculture facilities, usually pond fish culture. The total area under aquaculture is 6,400 ha. One in three holdings in Huaphanh have some aquaculture facilities.

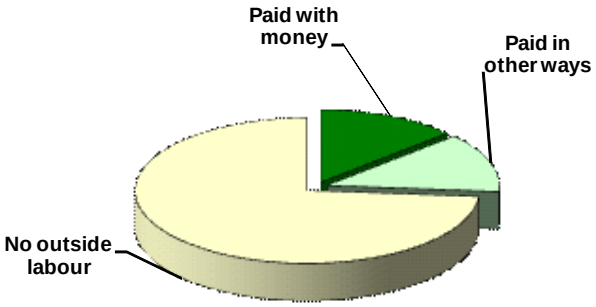
Over 70% of farm households in Lao PDR engage in fishing other than aquaculture: 41% fish in rivers, 37% in lakes, 19% in rice fields, and 15% in swamps or seasonal floodplains. Fishing is widespread around the country: in Phongsaly in the far north, 75% of farm households fish; in Attapeu in the far south, 82% of farm households fish.

Forestry is not yet an important activity on agricultural holdings. In 1999, forest land on agricultural holdings amounted to only 54,000 ha - 5% of the area of holdings. Only 8% of agricultural holdings have some forested land.

Farm labour *(Tables 37-41)*

Most farm labour is provided by household members. Only 26% of farm households used outside labour in 1998/99. In the north, most farmers employ farm labourers on a labour exchange basis, rather than for payment in cash: in Oudomxay, only 15% paid farm labourers in cash. In the centre and south, payment in cash is more common: in Savannakhet, 73% paid in cash. Payment with farm produce is not common.

Figure 17: Use of outside labour, Lao PDR, 1998/99



The demand for outside labour is highest at the time of planting and harvesting the main rice crop: June-August and November-December. In upland areas, labour is needed in March-May to help with land preparation. In areas with dry season rice, there is also a demand for labour in January and February.

Over 90% of people living in farm households have a farming occupation. In Phongsaly, Luangnamtha and Oudomxay provinces, 97% of farm household members are farmers.

Both men and women work on the family farm: of those aged 15 years and over, 92% of men and 91% of women work on the family farm. Farm work is seasonal and does not usually provide "full-time" work: only 18% of household farm workers work 9-12 months a year on the family farm; 30% work for less than half the year. Caring for livestock usually requires only a small amount of time each day.

Farm systems of different ethnic groups *(Table 42)*

The farming systems of the different ethnic groups reflect their locality and culture.

The Lao Loum, such as the Lao and Phutai, live along the Mekong River valley and its lower tributaries. They are mainly lowland rice farmers, and grow most of the dry season crops. They are more highly mechanized than other ethnic groups and make more use of mineral fertilizer.

The Lao Theung, such as the Khmu, live at middle altitudes and are mainly upland rice farmers using traditional farming practices. They raise pigs and chickens: 64% of Khmus have pigs; 75% have chickens.

The Lao Sung, such as the Hmong, live in higher altitudes and mainly grow upland rice and maize. They raise cattle, pigs and chickens: 54% of Hmongs have cattle, 73% have pigs and 80% have chickens.

Lao Loum farmers often live closer to large urban centres and the markets in Thailand and therefore tend to be more market-oriented. Almost 40% of Lao Loum farm households sell some farm produce, compared with 31% of Khmu farmers, 24% of Hmong farmers, and only 7% of Kor farmers.

CHAPTER 2
OUTPUT TABLES

Notes on the tables

(i) The data presented in the tables are subject to sampling errors**.**

(ii) There may be minor discrepancies between sums of component items and totals because of rounding.

(iii) The symbol "-" in a table means that the figure is nil or negligible (less than one half of the unit indicated).

CHAPTER 3
TECHNICAL NOTES

1. CENSUS METHODOLOGY

Scope of the census

The Lao Agricultural Census, 1998/99, covered the whole of Lao PDR, including urban areas in Vientiane and elsewhere. The census covered only agricultural activities of private households, carried out on their own or in partnership with other households. Agricultural activities undertaken by government organisations, businesses, etc. were excluded. People living in accommodation units, such as hostels, were also excluded.

The main statistical unit for the census was the agricultural holding, defined as an economic unit of crop and livestock production under single management (see later for definition).

Sample and complete enumeration

The census was undertaken in two parts: a complete enumeration of all agricultural holdings in Lao PDR to collect some basic data about agriculture, and a sample survey of agricultural holdings to collect more detailed information. This report presents results of the sample component of the census.

Sample design and selection

The sample was selected using two-stage sampling: a sample of villages was first selected, and then a sample of households was selected in each sample village. Agricultural holdings were identified by asking each sample household about their crop and livestock activities.

In most districts, a sample of 18 villages was taken, with an average of 18 households selected in each sample village – approximately 320 sample households (or 300 sample agricultural holdings) in each district. A smaller sample was taken in districts containing few villages or households. Approximately 400 households were sampled in the mainly urban districts of Vientiane Municipality.
In each district, the sample of villages was selected using stratified systematic probability proportional to size (PPS) sampling. The list of villages was created by updating the villages in the 1995 Population Census. Villages were divided into urban and rural strata, with rural strata being sampled more heavily than urban strata because of their agricultural importance. The number of households from the 1995 Population Census was used as the size measure for PPS sampling. Villages were ordered geographically for the sample selection. Where household information from the 1995 Population Census was unavailable, such as newly created villages, equal probability sampling was used.

The sample of households in each sample village was selected using stratified systematic random sampling. A list of all households in each village was prepared, with help from the village head. The households were divided into two strata based on the village head's knowledge about whether the household had 0.02 ha or more of agricultural land.

Altogether, 2,454 villages were selected in the sample. There were 42,028 sample households, or 37,846 agricultural holdings. The sample sizes for each province are shown in Table A.

Topics covered

The census was developed based on the guidelines given in *FAO Statistical Development Series No.5: Programme for the World Census of Agriculture 2000* (FAO 1996), taking into account the circumstances in Lao PDR. Extra emphasis was given to data on rice, because of its importance in Lao agriculture.

Reference period

The reference period for most data collected in the census was the 1998/99 agricultural year, covering the 1998 wet season (May-October 1998) and the 1998/99 dry season (November 1998-April 1999). Livestock data refer to the day of enumeration.

Census operations

The census data collection was undertaken from 22 February to 19 March 1999. Some 1,200 enumerators were used for the sample component, and 2,200 enumerators were used for the complete enumeration component. The enumerators were government staff from districts, including teachers. Ten-day training courses were held for enumerators. Field supervisors, appointed from SPC and MAF, trained the enumerators, supervised the field operations, and checked the completed census questionnaires.

Census questionnaires were returned to NSC in Vientiane for computer processing.

Table A: Lao Agricultural Census, 1998/99: Sample Size by Province

Province	No. of districts	No. of villages	No. of sample villages	No. of sample households	No. of sample holdings
Vientiane Municipality	9	490	145	3,202	1,846
Phongsaly	7	613	126	2,093	2,042
Luangnamtha	5	431	89	1,501	1,412
Oudomxay	7	776	126	2,187	2,100
Bokeo	5	371	83	1,299	1,200
Luangprabang	11	1,162	193	3,309	3,135
Huaphanh	8	854	144	2,315	2,274
Xayaboury	10	551	171	2,898	2,770
Xiengkhuang	7	507	119	1,886	1,811
Vientiane Province	10	529	177	3,163	2,854
Borikhamxay	6	413	104	1,666	1,540
Khammuane	9	799	162	2,819	2,510
Savannakhet	15	1,541	270	4,585	4,179
Saravane	8	722	144	2,540	2,371
Sekong	4	248	69	1,123	1,076
Champasack	10	907	180	3,055	2,497
Attapeu	5	208	84	1,354	1,243
Xaysomboon Special Region	5	129	68	1,033	986
TOTAL	141	11,251	2,454	42,028	37,846

2. DEFINITIONS OF TERMS

A household is a group of people making common arrangements for food, shelter and other acts of daily living. A household usually consists of relatives such as a husband, a wife, children and parents, but sometimes includes unrelated people such as live-in household or farm workers.

An agricultural holding (sometimes referred to as a holding or a farm household) is an economic unit of agricultural production under single management, comprising all livestock raised and all agricultural land operated, regardless of ownership. The Lao Agricultural Census covered only those units that either:

(i) operated 0.02 ha or more of agricultural land in the 1998 wet season or the 1998/99 dry season; or
(ii) were raising 2 or more cattle or buffaloes, 5 or more pigs or goats, or 20 or more poultry at the time of the census.

Only household units were included in the census. Agricultural activities of businesses, government organizations, etc. were excluded.

Usually, an agricultural holding is the same as a household, but sometimes it consists of two or more households operating as a partnership.

A land holding is an agricultural holding that operated 0.02 ha or more of agricultural land in the reference year. A livestock holding is an agricultural holding that is not a land holding.

Household size is the number of persons who usually live in the household. Farm population is the number of members of households operating agricultural holdings.

Purpose of production of the agricultural holding refers to how farm produce from the holding was used; in particular, whether any produce was sold, bartered or used for home consumption, as well its main use.

Agricultural land is land used for growing any temporary or permanent agricultural crops in the 1998 wet season or the 1998/99 dry season, or land

temporarily fallow during that period.

Area of holding is the area of all agricultural and non-agricultural land operated by the agricultural holding. Non-agricultural land includes forest land, fish ponds, grazing land and wasteland, but excludes the household's house and surrounds. A livestock holding has zero area of holding.

To operate land means to have management control over growing crops or other activities on that land. Thus, an agricultural holding covers land owned and operated by the holding, as well as land operated by the holding but rented from someone else. Land owned by the holding but rented out to someone else is excluded. Land operated by a holding includes land in the village in which the household lives, as well as land operated by that household in other villages, districts or provinces.

A land parcel is any piece of land entirely surrounded by land, water, forest, road, etc. not forming part of that holding. A land holding consists of one or more parcels.

Land tenure refers to whether land is owned, rented or operated on another basis. Owned land means land owned outright or in owner-like possession, such as land under perpetual or long-term lease, land operated without interruption for many years, or land given to a household under certain land use conditions. Rented land means land rented from someone else - usually for a limited period - for cash or in-kind remuneration such as a share of the produce or exchange of labour. Other land includes squatter land, land not authorized for cultivation, or land borrowed from someone else. An agricultural holding may have land of different tenure types.

Land use refers to the main use of the agricultural holding's land during the 1998 wet season and the 1998/99 dry season. Where permanent and temporary crops are grown as a mixture, the predominant crop is taken. Land under water during the wet season, but used for growing crops during the dry season, is assigned to temporary crops.

Arable land is land that has been cleared and is capable of being used for growing temporary crops. Arable land includes land on which temporary crops were grown in the 1998 wet season or the 1998/99 dry season, as well as fallow land. Arable land does not include land under permanent crops.

Fallow land is land normally used for growing temporary crops, but not so used during the 1998 wet season and the 1998/99 dry season. Land left idle for more than five years is not fallow. Land cultivated on a two- or three-year rotating basis is fallow if it was not cultivated during the reference year. Land abandoned altogether under shifting cultivation is not fallow.

Temporary crops are crops with a less than one-year growing cycle. Land used for temporary crops refers to land on which temporary crops were grown during the reference year, whereas area of temporary crops planted refers to the total area of all crops planted during the reference year. These two concepts are not the same: the area of temporary crops planted may be greater than the area under temporary crops because of double cropping. For mixed crops - that is, crops grown at the same time in a field as a mixture or inter-planted - the sum of the areas of the crops is the same as the area of the field. Crops grown in a particular season means that the main growing period for that crop was in that season. Crop area refers to planted area, not harvested area. Scattered temporary crops are those not planted in a systematic manner or sufficiently densely to permit the area to be measured, or less than 100 square metres in area.

Rice data are shown by season, land type, variety and rice type. Land type refers to whether it is lowland or upland. Upland rice is that grown under dry land conditions, including land permanently cultivated as well as shifting cultivation. Variety refers to whether it is local or improved. Improved varieties are those that MAF has released as high yielding varieties or that farmers have acquired from Thailand, or elsewhere, believing them to be high yielding varieties. Rice type refers to whether the rice is glutinous or non-glutinous.

Permanent crops are crops with a greater than one-year growing cycle, such as fruit and nut trees, bananas, coffee, tea and cardamom. Data on permanent crops refer to the crops present on the day of enumeration. Permanent crops are grown either in a compact plantation or scattered. A compact plantation is where the trees/plants are planted in a systematic manner or sufficiently densely to permit the area to be measured. Scattered permanent crops are those not in a compact plantation or less than 100 square metres in area.

Grazing land is land used for grazing livestock,

including cultivated and naturally grown pastures, and permanent and temporary pasture land. The reference period is the day of enumeration.

Forest land includes natural and planted timber tracts that have, or will have, value as wood, timber, other forest products, or for protection. The reference period is the day of enumeration.

Other land under land use (Table 9) includes land under water, land occupied by buildings or roads, wasteland, and other uncultivated land. The reference period is the day of enumeration.

Land clearance refers to clearing land in preparation to begin cultivating agricultural crops, or re-clearing land for cropping after it has been left uncultivated for a long time.

Cultivation intensity is the sum of the area of all temporary crops planted divided by the area of arable land, expressed as a percentage. For example, 1 ha of land used for growing 1 ha of wet season rice and 0.5 ha of dry season rice has a cultivation intensity of 150%.

Fertilizers are substances used to provide nutrients to crops, and are described as mineral or organic. Mineral fertilizers are manufactured substances. Organic fertilizers are substances of organic origin, either natural or processed, such as animal manure and compost. Data on fertilizers refer to their use during the reference year.

Pesticides are substances used for controlling or eliminating pests that affect crops or livestock, including insecticides, fungicides, fumigants, herbicides and rodenticides. Data on pesticides refer to their use during the reference year.

Livestock refers to animals and poultry raised mainly for agricultural purposes. To raise livestock means to have primary responsibility for looking after the animals on a long-term basis and to make day-to-day decisions about their use. Livestock numbers refer to those present on the day of enumeration. Average animals per holding is the average for those holdings with the particular type of animal (not the average for all holdings).

Use of vaccination means administering an animal with a substance to control or eliminate disease. The reference period is the 1998/99 agricultural year. Vaccination is shown as being used even if only some animals of the given type had been vaccinated, or if the vaccination was not up-to-date.

Agricultural machinery used refers to use of machinery for agricultural purposes during the reference year, regardless of ownership. Machinery means farm equipment driven by electricity, petrol/diesel engines, batteries, wind or water, as well as equipment used with such devices (such as tractor-driven ploughs). It does not include hand or animal operated equipment such as animal-pulled ploughs and hand sprayers.

Aquaculture is the raising of fish in captivity, as opposed to natural fishing in rivers, lakes, etc. Aquaculture data refer to facilities present on the day of enumeration. Other fishing refers to all fishing other than aquaculture undertaken during the reference year.

The agricultural holder is the person exercising management control over the operations of the agricultural holding.

A person's main occupation is the economic activity he/she spent most time on during the reference year. It refers to work done in paid employment, on the family farm, or in a business or profession. Occupation is shown only for those who are economically active; that is, it excludes students, the unemployed, home-makers, retirees, and those who are too old or too sick to work.

Outside labour means the employment of people, other than household members, to do agricultural work on the holding during the reference year. Type of payment refers to how outside labourers are paid. A holding may have more than one payment method.

Ethnic group refers to the ethnic group of the agricultural holder.

3. RELIABILITY OF DATA

The census data presented in this report are based on a sample and are therefore subject to sampling errors. Because of the sample design used, sampling errors on provincial and national estimates are generally quite small.

Data from the census may not be consistent with data from other sources because:

- The census covers only the household sector.
- Data for a province refer to land operated, or animals raised, by households living in the province, not the land or animals located within the province.
- Area data exclude the land of those households who do not have 0.02 ha or more agricultural land. This has little effect on crop-related data, but may affect forestry and aquaculture data.
- Crop area was not collected where crops were grown in plots of less than 100 square metres, such as small kitchen gardens.
- The census livestock data refer to the number of animals on the day the household was enumerated in the census: between 22 February and 19 March 1999.
- The census only covers livestock raised by agricultural holdings; this excludes households with just a few animals and little or no agricultural land.

TECHNICAL NOTES

1. METHODOLOGY

Scope of the census

The Lao Agricultural Census, 1998/99, covered the whole of Lao PDR, including urban areas in Vientiane and elsewhere. The census covered only the agricultural activities of private households, carried out on their own or in partnership with other households. Agricultural activities undertaken by government organisations, businesses, etc. were excluded. People living in accommodation units, such as hostels, were also excluded.

The main statistical unit for the census was the agricultural holding, defined as an economic unit of crop and livestock production under single management (see later for definition).

Sample and complete enumeration

The census was undertaken in two parts: a complete enumeration of all agricultural holdings in Lao PDR to collect some basic data about agriculture, and a sample survey of agricultural holdings to collect more detailed information. This report presents results of the sample component of the census.

Sample design and selection

The sample was selected using two-stage sampling: a sample of villages was first selected, and then a sample of households was selected for inclusion in the census in each sample village. Agricultural holdings were identified by asking each sample household about their crop and livestock activities. In most rural districts, over 90 percent of households were agricultural holdings.

In most districts, a sample of 18 villages was taken, and about 18 households were selected in each sample village. Thus, about 320 sample households (or about 300 sample agricultural holdings) were sampled in each district. A smaller sample was taken in districts containing few villages or households. In the predominantly urban districts of Vientiane Municipality, about 400 households were sampled.

In each district, the sample of villages was selected using stratified systematic probability proportional to size (PPS) sampling. The list of villages was created by updating the villages from the 1995 Population Census. Villages were divided into urban and rural strata, with rural areas being sampled more heavily than urban areas because of their agricultural importance. Systematic PPS sampling was used in each stratum, with the number of households from the 1995 Population Census as the size measure and a geographical ordering of villages. Where household information from the 1995 Population Census was unavailable, such as newly created villages, equal probability sampling was used.

The sample of households in each sample village was selected using stratified systematic random sampling. In each village, the enumerator prepared a list of all households, with help from the village head. The households were divided into two strata based on the village head's assessment of whether or not the household had 0.02 ha or more of agricultural land. Households were listed geographically in each stratum and the sample was selected using systematic random sampling.

Altogether, 2,468 villages were selected in the sample. The total number of sample households was 42,000, or 37,000 agricultural holdings. The sample sizes by province are shown in Table A.

Table A: Lao Agricultural Census, 1998/99: Sample Size by Province

Province	No. of districts	No. of villages	No. of sample villages	No. of sample households	No. of sample holdings
Vientiane Municipality	9	489	145		
Phongsaly	7	611	126		
Luangnamtha	5	443	90		
Oudomxay	7	789	126		
Bokeo	5	379	86		
Luangprabang	11	1,182	197		
Huaphanh	8	859	144		
Xayabury	10	559	171		
Xiengkhuang	7	511	122		
Vientiane Province	10	530	177		
Borikhamxay	6	465	106		
Khammuane	9	801	162		
Savannakhet	15	1,543	270		
Saravane	8	726	144		
Sekong	4	254	70		
Champasack	10	906	180		
Attapeu	5	208	84		
Xaysomboon Special Region	5	129	68		
TOTAL	142	11,384	2,468		

In each district, the sample of villages for area measurement was selected as a random sub-sample of six sample villages (four or five if there were fewer sample villages). The sample of households for area measurement was a one in four random sub-sample of the sample households.

Topics covered

The census questionnaires and statistical concepts used in the census were developed based on the guidelines given in *FAO Statistical Development Series No.5: Programme for the World Census of Agriculture 2000* (FAO 1996), taking into account the circumstances in Lao PDR. Extra emphasis was given to data on rice, because of its importance in Lao agriculture.

The primary reference period for the data collected in the census was the 1998/99 agricultural year, covering the 1998 wet season (May-October 1998) and the 1998/99 dry season (November 1998-April 1999). Livestock data refer to the day of enumeration.

Census operations

The census data collection was undertaken from 22 February to 19 March 1999. Almost 1,200 enumerators were used (as well as the 2,200 used for the complete enumeration component). The enumerators were government staff from the district, including teachers. Ten-day training courses were held to teach enumerators how to do the census data collection. Field supervisors, appointed from the State Planning Commission and the Ministry of Agriculture and Forestry, trained the enumerators, supervised the field operations, and checked the completed census questionnaires.

Census questionnaires were returned to the National Statistics Centre in Vientiane for processing. Data on the questionnaires were entered into the computer, computer checks on the data were made, and output tables were produced.

2. DEFINITIONS OF TERMS USED IN THE TABLES

A household is a group of people making common arrangements for food, shelter and other acts of daily living. A household usually consists of relatives such as a husband, a wife, children and parents, but sometimes includes unrelated people such as live-in household or farm workers. Household size is the number of persons who usually live in the household.

An agricultural holding (often referred to as a holding) is an economic unit of agricultural production under single management, comprising all livestock raised and all agricultural land operated, regardless of ownership. The Lao Agricultural Census, 1998/99 covered only those units that either:

(i) operated 0.02 ha or more of agricultural land in the 1998 wet season or the 1998/99 dry season; or
(ii) were raising 2 or more cattle or buffaloes, 5 or more pigs, or 20 or more poultry at the time of the census.

Only household units were included in the census. Agricultural activities undertaken by businesses, government organizations and other bodies were excluded.

Usually, an agricultural holding is the same as a household, but sometimes it consists of two or more households operating as a partnership. Status of holding refers to whether the holding is operated by a single household or by a partnership.

Purpose of production of the agricultural holding refers to how farm produce was used; in particular, whether any produce was sold, bartered or used for home consumption, as well as the main use of the farm produce.

Type of holding refers to whether the agricultural holding is a land holding or a livestock holding. A land holding is a holding that operated 0.02 ha or more of agricultural land in the 1998 wet season or the 1998/99 dry season. A livestock holding is a holding that is not a land holding; that is, it did not operate 0.02 ha or more of agricultural land, but raised 2 or more cattle or buffaloes, 5 or more pigs, or 20 or more poultry.

Agricultural land is all land that was used for growing any temporary or permanent agricultural crops in the 1998 wet season or the 1998/99 dry season, or that was temporarily fallow during that period.

Area of holding is the area of all agricultural and non-agricultural land operated by the agricultural holding. Non-agricultural land includes forest land, fish ponds, grazing land and wasteland, but excludes the household's house and surrounds. Non-agricultural land refers to land at the time of the census. A livestock holding has zero area of holding.

To operate land means to have management control over the growing of crops or other activities on that land. Thus, area of holding includes land owned and operated by the agricultural holding, as well as land operated by the holding but rented from someone else. However, it excludes land owned by the holding but rented out to someone else. Land operated by a holding includes land in the village in which the household lives, as well as land operated by that household in other villages, districts or provinces.

A parcel is any piece of land of one land tenure type entirely surrounded by land, water, forest, road, etc. not forming part of that holding. A land holding consists of one or more parcels. Two adjoining pieces of land of different tenure types are considered as two parcels.

Land tenure refers to whether land is owned, rented or operated on another basis. Owned land means land owned outright or in owner-like possession, such as land under perpetual or long-term lease, land operated without interruption for many years, or land given to a household on condition that it is used for personal agricultural purposes. Rented land means land rented from someone else (usually for a limited period) for cash or in-kind remuneration such as a share of the produce or exchange of services. Other land includes all land not owned or rented, such as squatter land, land not authorized for cultivation, or land borrowed from someone else. An agricultural holding may have land of different tenure types.

Land use refers to the main use of the agricultural holding's land during the 1998 wet season and the 1998/99 dry season. If permanent and temporary crops are grown as a mixture, the predominant crop is taken. Land under water during the wet season but used for growing temporary crops during the dry season is assigned to temporary crops.

Arable land is land that has been cleared and is capable of being used for growing temporary crops. Arable land includes land actually used for growing temporary crops in the 1998 wet season or the 1998/99 dry season, as well as fallow land. Arable land does not include land under permanent crops.

Fallow land is land normally used for growing temporary crops, but not so used during the 1998 wet season and the 1998/99 dry season. Land left idle for more than five years is not fallow. Land cultivated on a two- or three-year rotating basis is fallow if it was not cultivated in 1998 wet season and the 1998/99 dry season. Land abandoned altogether under shifting cultivation is not fallow.

Temporary crops are crops with a less than one-year growing cycle. Land used for temporary crops in the land use tables refers to land on which temporary crops were planted in the 1998 wet season or the 1998/99 dry season. Area of temporary crops in the crop tables refers to the

area of crops planted in those two seasons. These two concepts are not the same: the area of temporary crops planted may be greater than the area under temporary crops because of double cropping. For mixed crops (that is, crops grown at the same time in a field as a mixture or inter-planted), the sum of the areas of the crops is the same as the area of the field. Crops grown in a particular season means that the main growing period for that crop was in that season. Crop area refers to planted area, not harvested area. Scattered temporary crops are those not planted in a systematic manner or sufficiently densely to permit the area to be measured, or are planted in a field of less than 100 square metres.

Rice data are shown according to land type, variety, rice type and maturity. Land type refers to whether it is lowland or upland. Upland refers to rice grown under dry land conditions, and includes land cultivated each year as well as shifting cultivation. Variety refers to whether it is local or improved. Improved varieties are those that the Ministry of Agriculture and Forestry has released as high yielding varieties or that farmers have acquired from Thailand or elsewhere, believing them to be high yielding varieties. Rice type refers to whether the rice is glutinous or non-glutinous. Maturity refers to whether is the growing period is short (about three months), medium (about four months) or long (about five months).

Permanent crops are crops with a greater than one-year growing cycle, including fruit and nut trees, bananas, coffee, tea and cardamom. Data on permanent crops refer to the crops present on the day of enumeration. Permanent crops are grown either in a compact plantation or scattered. A compact plantation of permanent crops is where the trees/plants are planted in a systematic manner or sufficiently densely to permit the area to be measured. Scattered permanent crops are permanent crops not in a compact plantation. Crops planted in a field of less than 100 square metres are considered as scattered.

Temporary and permanent crops are shown in the tables classified by crop type. The classification is not a botanical one, but based on the main use of the crop. Thus, cabbages grown for human consumption are shown under “Vegetables”, whereas cabbages grown for animal feed are shown under “Other crops”. Crop data are shown in the tables for the main crop groups (rice, other cereals, roots and tubers, legumes, industrial crops, vegetables, other crops), as well as for specific crop types.

Grazing land is land used for the grazing of livestock, including cultivated and naturally grown pastures, and permanent and temporary pasture land. The reference period is the day of enumeration.

Forest land includes natural or planted timber tracts that have, or will have, value as wood, timber, other forest products or for protection. It includes forest tree nurseries and areas of bamboo. The reference period is the day of enumeration.

Other land in the land use tables includes land under water, land occupied by buildings, roads, land used for ornamental gardens, wasteland and other uncultivated land. The reference period is the day of enumeration.

Irrigation means purposely providing land with water, other than rain, for growing crops and includes both Government irrigation schemes and other informal methods of irrigation. Uncontrolled flooding of cropland by overflowing rivers is not irrigation. Data on irrigation refer to the 1998 wet season and the 1998/99 dry season.

Clearance of land refers to preparing land for the cultivation of agricultural crops.

Cultivation intensity is the sum of the areas of all temporary crops planted divided by the area of arable land, expressed as a percentage. For example, 1 ha of land used for growing 1 ha of wet season rice and 0.5 ha of dry season rice has cropping intensity of 150%.

Fertilizers are described as either mineral or organic. Mineral fertilizers are manufactured substances (usually through an industrial process) to supply nutrients to crops. Organic fertilizers are substances of organic origin, either natural or processed, used to provide nutrients to crops. The most common types of organic fertilizer are animal manure and compost. Data on fertilizers refer to their use in the 1998 wet season and the 1998/99 dry season.

Pesticides are substances used for controlling or eliminating pests that affect crops or livestock. They include insecticides, fungicides, fumigants, herbicides and rodenticides. Data on pesticides refer to their use in the 1998 wet season and the 1998/99 dry season.

Livestock refers to all animals and poultry raised mainly for agricultural purposes. To raise livestock means to have primary responsibility for looking after farm animals on a long-term basis and to make day-to-day decisions about their use. The number of livestock refers to the number of animals being raised by the agricultural holding on the day of enumeration.

Draught animals are those animals - usually cattle, buffaloes, horses and mules - used for ploughing, threshing, pulling carts, carrying loads, lifting water, and any other crop-related work on the holding in the 1998 wet season or the 1998/99 dry season.

Use of vaccination means administering an animal with a substance to control or eliminate disease during the 12 months prior to the census. Vaccination is shown as being used for a given type of animal even if only some animals of that type had been vaccinated or if the vaccination was not up-to-date.

Agricultural machinery used refers to whether the given machinery was used for agricultural purposes during the 1998 wet season or the 1998/99 dry season. Machinery used may or may not be owned by the agricultural holding. Machinery means farm equipment driven by electricity, petrol/diesel engines, batteries, wind or water, or equipment used with such devices (such as tractor-driven ploughs). It does not include hand or animal operated equipment such as animal-pulled ploughs and hand sprayers. Agricultural machinery owned refers to whether the holding owned any of the given type of machinery on the day of enumeration.

Aquaculture is the raising of fish in captivity, as opposed to natural fishing in rivers, lakes, etc. Aquaculture data refer to facilities present on the day of enumeration. Other fishing refers to all fishing other than aquaculture. Data on other fishing refer to activities undertaken by the holding in the 12 months prior to the census.

The agricultural holder is the person exercising management control over the operations of the agricultural holding.

An economically active person is one whose main activity during the previous 12 months involved doing economic work, such as working on the family farm, working in a paid job, running a family business, etc. A person is not economically active if he/she was not mainly engaged in economic work during the previous year (such as students, retired persons and home-makers).

A person's main occupation is the activity he/she spent most time on during the previous 12 months.

Work on own holding means any agricultural work done on the household's own holding during the 1998 wet season and the 1998/99 dry season, including cultivating, sowing, weeding or harvesting of crops, and looking after livestock. A person may do work on the holding even though his/her main occupation is not an agricultural worker.

Off-holding work is any economic work, other than work on own holding, undertaken in the 12 months prior to the census. Paid agricultural work means farm work on someone else's holding, for which the person received some direct payment in the form of money or farm produce. It does not include farm labour provided free or work done in exchange for labour. Non-agricultural work is any economic work other than paid agricultural work, including work in a paid non-agricultural job and work in a family business. A person may do both paid agricultural and non-agricultural work.

Unpaid agricultural work means farm work undertaken on someone else's holding in the 12 months prior to the census, including work in exchange for labour and labour provided free.

Duration of crop work means the number of months during the 1998 wet season and the 1998/99 dry season in which the person did any crop-related work on the holding, regardless of the number of hours or days of work done. Duration of livestock work is the average daily time spent on livestock activities.

Outside labour means the employment of people, other than household members, to do paid or unpaid agricultural work on the holding during the 1998 wet season and the 1998/99 dry season. Type of payment refers to how outside labourers were paid. A holding may have more than one type of payment method.

General notes on the tables

The data presented in the tables are subject to sampling errors**.** There may be minor discrepancies between sums of component items and totals because of rounding. The symbol "-" in a table means that the figure is nil or negligible (less than one half of the unit indicated).

3. COMPARABILITY OF DATA WITH OTHER SOURCES

Land and crop area data given in the tables may not be consistent with data from other sources because:

- The census only covers the household sector.

- Land and crop data in the census for a district or province refer to the land operated by households living in the district or province, not the land located within the district or province.
- Sometimes, a piece of land is operated by one household in the wet season and another household in the dry season and is therefore counted twice in the area data.
- Area data exclude the land of those households who do not have 0.02 ha of agricultural land or sufficient livestock to be included in the census. This should have little effect on crop-related data. However, it could affect data on non-agricultural land, such as forests and fish ponds, because a household may have a large area of such land but no agricultural land or livestock.
- Crop area data exclude scattered crops and crops grown in very small plots (less than 100 square metres). Many households grow vegetables or other crops on very small plots, and therefore this could be significant.

Data on livestock numbers given in the tables may not be consistent with data from other sources because:

- The census only covers the household sector.
- Livestock data in the census for a district or province refer to the animals raised by households living in the district or province, not the animals in the district or province.
- The census livestock data refer to the number of animals on the day the household was enumerated in the census: some time between 22 February and 19 March 1999.
- The census only covers livestock raised by agricultural holdings; this excludes households with just a few animals and little or no agricultural land.