

CHAPTER IV

AGROECOLOGICAL AND SOCIOECONOMIC FEATURES OF STUDY AREA

4.1 Agroecological features

4.1.1 Climatic conditions

Kampong Thom province located in the Central Plain of Cambodia the annual rainfall and temperature were evenly distributed and had contributed to the adjustment of cropping calendar and crop planning of farmers. In Kampong Thom province the rainfall for the year 2001 exceeded 1,600 mm. The average temperature range from 25°C in January to 41°C in April, which was the hottest month (O'Brien, 1999). The dry season started from November to April and wet season generally started from May and continued up to October. Normally, short dry spell occurred between July and August for 15 days, which caused water shortage problem for farmers. When there was late rainfall, rice planting was also delayed and, hence, further reduction in yield.

Figure 4 showed the Six-year monthly average rainfalls in Kampong Thom province (1996 to 2001), the highest rainfall were recorded in September (253.5mm) and the lowest rainfall in January (2.2 mm).

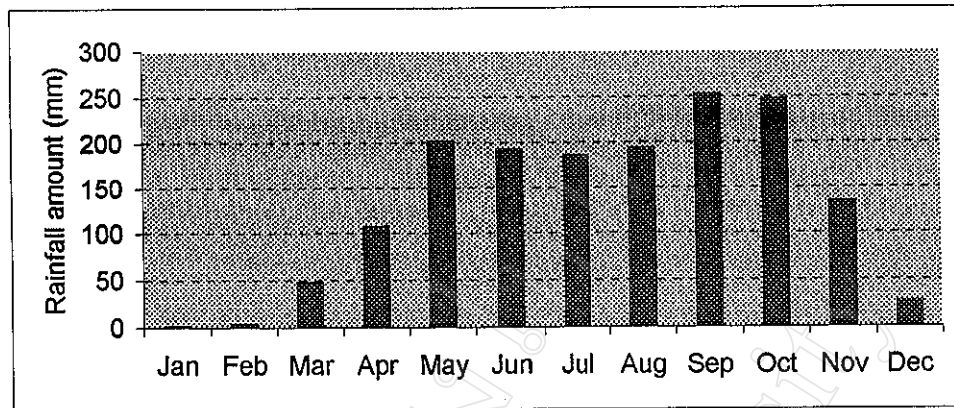


Figure 4. Six-year monthly average rainfalls in Kampong Thom province (1996 to 2001)

(Source: Meteorological office Kampong Thom province, April 2002)

4.1.2 Water availability

The surface irrigation was not available in the studied area except water from wells and small canal, which were constructed by the CWS project. Farmers in Salavisay commune used water from wells and canal to supply their farm production in dry season.

Ground water utilization for dry season in terms of crop production tended to be more attractive than that of any water resources. Since, amount of rainfall received during rainy season was in excess of 1,600 mm per annum with duration of about six months, to some areas could keep water for a longer time due to capacity of soil to retain water for use during dry season.

4.2 Socioeconomic environment

By the end of 1999, the CWS project had assisted in the formation 45 Self Help Groups (SHGs) in 23 target villages with 656 families including 341 women (Salavisay commune was one of this target area). The formation of these groups had been more process oriented and had given a lot of emphasis to the quality to the groups. Once these saving groups were formed they decided on the rules of membership, saving and interest on credit and some of the members were selected as

officers. The core activities of SHGs were saving and credit. CWS provided training to SHG members and also gave them working capital assistance (WCA) to provide additional incentive. The groups were not able to save enough if they did not get this support (CWS, 1999).

The project promoted farmer-to-farmer extension technology transfer. All farmers, including young, old, rich, poor, benefited from the farmer-to-farmer communication process. However, due to a sense of community, farmers helped each other. Farmer to farmer extension activities sometime result in loss of time, however such loss was not big and other family members could easily take care of the routine farm work during the short absence of farm labor.

The majority of farmers who were rainfed rice producers, had income supplementation from livestock and vegetable sales (Hunter *et al.*, 1998).

Farmers had three main methods of selling their products: directly to consumers, to middlemen who came to purchase in the village, and to wholesalers. The simplest channel was the direct selling from farmers to consumers in the village (except pig, farmers sold directly to traders or middlemen). In some instances farmers may take their product directly to market to sell to stall owners or consumers. However, this practice was usually restricted to farmers who were close to major markets. During period when prices were high, middlemen came to village to buy products from farmers in the field. During the negotiation, prices were fixed for the product and harvest and transport conditions were determined. Middlemen might harvest the products themselves and arranged transportation or the farmers might harvest it and arranged transport to a collection point from where the middlemen assumed ownership. During period when prices were low, middlemen did not come to farmers, because the margins they would get were too low. Farmers had to assume responsibility for harvesting, transporting and selling their products themselves. At this time, risks of no-sale or sale at a loss were high.

Farmers purchased agricultural inputs such as seeds, fertilizers and insecticides through local market namely Kampong Thom, which was located at a distance of 30 km from villages.

4.2.1 Education level

Education level was taken as an indicator of development and was integral part without which social and economic development could not be conceived of. The respondents were classified into 3 categories: illiterate group, primary group and secondary group.

Table 6 indicated that 83.3 percent and 55.6 percent of farmers in IFS-I and IFS-II, respectively, had attended primary school while 83.3 percent and 77.8 percent of farmers in IFS-III and IFS-IV, respectively, accounted for illiterate group. Therefore, the highest literacy of farmers in this area was found in IFS-I and IFS-II.

Table 6. Education of respondents

Farm type	Household classes						Total	
	Illiterate		Primary school		Secondary school		n	%
	n	%	n	%	n	%		
IFS-I	1	16.7	5	83.3	0	0	6	100
IFS-II	3	33.3	5	55.6	1	11.1	9	100
IFS-III	5	83.3	1	16.7	0	0	6	100
IFS-IV	7	77.8	2	22.2	0	0	9	100
Total	16	-	13	-	1	-	30	100

n-number of respondents

(Source: survey data, 2002)

4.2.2 Household members in family

A household member was defined as one living and sharing a common kitchen with the member of family. He or she might be the immediate family member or relatives or no relationship at all as long he or she permanently stayed in the house.

However, the terminology household and family were used interchangeable with similar meaning in this report. The average per household of family member of respondents was 6.2 (Table 7) and the household sizes range from three to ten.

Table 7. Number of household members in family of each farm type

Farm type	Household classes						Total		HH mean
	Small (1 to 3)		Medium (4 to 6)		Large (>6)		n	%	
	n	%	n	%	n	%			
IFS-I	1	16.7	3	50.0	2	33.3	6	100	5.8
IFS-II	0	0	4	44.5	5	55.5	9	100	6.7
IFS-III	0	0	5	83.3	1	16.7	6	100	6.0
IFS-IV	1	11.1	4	44.5	4	44.5	9	100	6.0
Total	2	-	16	-	12	-	30	-	6.2

n-number of respondents

(Source: survey data, 2002)

Table 7 indicated that the households in all farm types, the medium household size families appeared as major characteristics in the study area. The higher proportion of medium household size was found in IFS-I at about 50 percent and IFS-III was 83.3 percent. The households in IFS-II, the higher proportion of households in this group were large household size (55.5 percent), whereas, IFS-IV the higher proportion was found on medium and large household size (44.5 percent).

4.2.3 Family labor supplies and uses

In Cambodia there were two seasons, rainy season (March to October) and dry season (November to April). The major crop productions of farmers in the study area were during the rainy season, in this time farmer started to prepare their land and men played importance role in this time. But some households lack of male labor so women could do this work instead of men. And women also could or did many field tasks including planting seed, weeding, harvesting paddy. In the rainy season farmers used their labor less on their home garden because during this time they concentrated on their paddy fields. Normally, farmers used their labor on garden for the rest from

their paddy rice. For vegetable productions in two periods, from January to March and from May to July, the labor used for vegetable productions varies from household to household depended on number of family labor but for dry season vegetable, farmers spent more labor on farm productions than wet season vegetable. Women and children had the main roles in the harvesting seasons, as they collected and sold the products. The labor use of farmers in each farm type show in Table 8.

Table 8. Family labor (Man-day) distributions by each farm type

Farm type	On-farm	Off-farm	Others ^a	Total
IFS-I	203	12	7	222
IFS-II	207	42	2	251
IFS-III	130	59	0	189
IFS-IV	96	65	0	160

^a – farmer attend meeting, training course

(Source: survey data, 2002)

Table 8 indicated that households in IFS-I and IFS-II used family labor more on farm while households in IFS-III and IFS-IV used more on off-farm. Only households in IFS-I and IFS-II involved in capacity building, by training and meeting that supported by CWS organization. Off-farm labor including in village and town, labor were employed in village or they went to field collected the fuel wood and natural fish, whereas in town labor, farmers went to town especially during dry season after they harvested their paddy rice to look some employment for their family income. During this season mostly farmers in IFS-III and IFS-IV used their labor in town instead of on-farm work to get cash for their livelihood.

4.2.4 Land ownership and farm size

Land ownership

Farmers in study area owned their rice field lands and garden lands. In 1993, almost all people in this area amongst 350,000 Cambodian refugees were repatriated from the border under the auspices of the United Nation Transitional Authority in

Cambodia (UNTAC). This area was almost empty at that time. Only recently released from Khmer Rouge control, the whole area was surrounded by forest and strewn with land mines but at least there was space to built home and begin a new life (CWS, 2000). All families were provided rice field lands and garden lands by government. Furthermore, the land holding in this area was divided into two types rice field and village land. The land holding size of households in each farm type were shown in Table 9.

Table 9. Average area (ha HH⁻¹) of land holding size in each farm type

Farm type	Village land			Rice field land			Total land holding		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
IFS-I	0.4	0.8	0.6	1.5	2.2	1.9	2.1	3.0	2.4
IFS-II	0.2	1.0	0.4	0.8	3.3	1.8	1.1	3.6	2.2
IFS-III	0.1	0.5	0.3	1.0	3.0	1.8	1.4	3.1	2.1
IFS-IV	0.3	1.0	0.5	0.8	1.7	1.1	1.1	2.3	1.7

(Source: survey data, 2002)

Table 9 indicated that, the households in IFS-I had the highest average total land holding (2.4 ha HH⁻¹) while the households in IFS-II and IFS-III had average land holding of 2.2 ha and 2.1 ha, respectively, and the lowest of 1.7 ha in IFS-IV. However, the average rice field of households in each farm type was higher than average of village land. The village land consisted of house land and home garden land (vegetables, fruit crops, fish pond and other farm activities).

Land holding size

There was variation of landholding size in the study area, farmers in this area had land holding ranging from 1 ha to above 3 ha HH⁻¹, therefore it classified that: from 1 to 2 ha was the small land, from 2.1 ha to 3 ha was the medium land and above 3 ha was the large land.

Table 10 indicated that, mostly households in IFS-I had medium land-holding size at about 83.3 percent and large land size at 16.7 percent. For households in

IFS-II, 44.5 percent of households in this farm type had small land-holding size, 33.3 percent was medium size and 22.2 percent was the large size. Most households in IFS-III had small landholding size at about 66.6 percent, for medium and large size had 16.7 percent. Whereas, households in IFS-IV also had more small land holding size at about 66.7 percent and the medium size at about 33.3 percent.

Table 10. Land holding size (ha HH⁻¹) of households in each farm type

Land classification (ha)	IFS-I		IFS-II		IFS-III		IFS-IV	
	Freque ncy	%	Freque ncy	%	Freque ncy	%	Freque ncy	%
Small	0	0	4	44.5	4	66.6	6	66.7
Medium	5	83.3	3	33.3	1	16.7	3	33.3
Large	1	16.7	2	22.2	1	16.7	0	0
Total	6	100	9	100	6	100	9	100

(Source: survey data, 2002)

4.2.5 Gender in farming practices

In commercial vegetable farming, men were generally responsible in watering, land preparation and pesticide spraying, while women were more involved in planting/transplanting, weeding, harvesting and fertilizer application. Regarding to fuel wood collection, a survey showed that children and husbands were more involved than women. This might be linked to the fact that traveled distances for collecting fuel wood were getting bigger.

The majority of respondent interviewed were male who accounted for 60 percent of the sample (Table 11). Hence, most household heads were men and played major role in decision making in terms of agricultural activities. In Cambodian culture hardly ever a women has functioned, as the head of household as shown in Table 11, there was variation in the proportion of male and female head household of each farm type.

Table 11. Household heads by group of farmers in each farm type

Farm type	Female		Male		Total	
	n	%	n	%	n	%
IFS-I	2	33.3	4	66.7	6	100
IFS-II	2	22.3	7	66.7	9	100
IFS-III	3	50.0	3	50.0	6	100
IFS-IV	5	55.6	4	44.4	9	100
Total	12	40.0	18	60.0	30	100

n-number of respondents

(Source: survey data, 2002)

In terms of female category, the ratio was a bit higher in IFS-III indicating 50 percent and IFS-IV was 55.6 percent than in IFS-I and IFS-II were 33.3 percent and 22.3 percent, respectively (Table 11). However as a whole in IFS-I and IFS-II (or CWS-farmers), the proportion of male was higher as compared to female. Therefore, a gender had played an important role in IFS-III and IFS-IV (or non-CWS farmers), as more females were the heads of households.

4.3 Concept and activities of Church World Service (CWS) in Kampong Thom province

The Church World Service (CWS) was among the first non-government organization (NGOs) allowed to enter Cambodia after the fall of the Khmer Rouge in 1979. The goal of CWS is that: all Cambodians, and especially the rural poor and vulnerable, will develop the capacity to meet their own basic needs in a sustainable manner (CWS, 2000).

Rice yield in Kampong Thom was generally low. The CWS had been work in Kampong Thom since 1993 to improve rice production by enabling farmers to experiment with new farming techniques and new seed varieties. The CWS also trained farmers in this area on farming practice such as integrated pest management (IPM), vegetable growing, animal raising, compost making and proper used chemical fertilizers (CWS, 2000).

Based-on report of CWS in 1997, 1,600 families in Kampong Thom province received over 100 tons of rice, cooking oil and fish. The food was provided by World Food Program (CWS, 1997). This indicated that farmers up to 1997 in that area still faced food storage.

In 1999, for the first time after the inception of the project, food became more available. This showed a great improvement on food production in the communities. This could be partly attributed to the success of the project's food production intervention (CWS, 1999).

4.4 Salavisay study area

Salavisay, one of seven communes of Prasat Balang district, Kampong Thom province located in central Cambodia was the lowland area with a total population of 11,300 persons. The commune covered the agricultural area of 3,510 ha, belonging to 2,206 households (EOKT, 2000). The predominant farming systems were based on the cultivation of rainfed paddy, sometimes with small areas of other crops. The average agricultural land holding was 1.6 ha HH⁻¹. Generally, female-headed households lack adequate labor force during the peak periods and often sold their labor in exchange for return labor or draft animals to plough their land.

This area was important for cattle and buffalo production. Livestock productivity was low due to diseases, parasitism and poor nutrition. There had been some improvement in animal health services recently with the deployment of village livestock assistants (VLAs) who charged for their services (CWS, 1999). Crop productions of farmers in this area relied on rainfall in wet season and in dry season farmers used water from wells and small canal to supply crop productions.

4.4.1 Rice production

In Kampong Thom province the major reasons for low productivity of rice production were: poor soil fertility, unstable rainfall, lack of draft power, lack of labor, lack of quality seed and poor markets for rice.

The CWS project had assisted 99 farmers to test different varieties of high yielding rice seed to determine their local adaptability. The varieties IR-66 and CAR I, II, III showed well adapted to the soil conditions of Kampong Thom. The CWS trained 30 farmers to produce the improved seed. The CWS agriculture staff also encouraged farmers to grow green manure to increase the organic content of their soil (CWS, 1999).

All farmers of all farm types produced only wet season rice. Rainfed lowland fields were completely dependent upon the rainfall and run off for water supply. Farmers classified rice field based on topography as follow: high (Sre leu), middle (Sre kandal) and low (Sre kraom) fields. The water depth ranged from 15-20 cm for the high fields, 20-40 cm for the middle fields and 30-50 cm for the low fields. Farmers selected appropriate varietal group for each field level as follows: early duration variety (Srau sral) for high fields, medium duration (Srau kandal) for middle fields and late duration (Srau thgun) for the low fields.

Seedbed management

In Salavisay commune, the most predominant method of rice production was transplanting. Therefore, the main activity was the seedbed preparation. Area with a facility of controlling water would be selected for seedbed. The plot size ranged from 0.1 to 0.15 ha of rice field. The nursery area was often plowed and harrowed twice, and the interval between the first plowing and harrowing, and the second plowing and harrowing was normally 10 to 15 days.

The schedule of seedbed establishment depended upon the onset and amount of rainfall distribution. In the 2001 season, for example, rainfall started late, farmers had to postpone their seedbed preparation until June. The seeding rate varied from household to household depending upon the location of nursery and germination rate of seed, which ranges from 50 to 85 kg ha⁻¹.

Transplanting method

Before transplanting, seedling was uprooted and transplanted in the field. The field was well mixed with manure and DAP fertilizer.

The fields were plowed twice and harrowed one or twice. The first plowing was done to control the weeds. The second plowing was to further destroy the weed emerging after the first tillage operation and to get the field ready for transplanting. Transplanting was usually done with two to three seedlings hill⁻¹ for strong vigorous seedlings and four to six seedlings hill⁻¹ for less vigorous ones. The spacing for transplanting method was at 15 to 20 cm x 15 to 20 cm.

Fertilizer management

Two types of chemical fertilizer used in Salavisay commune, were urea (46.0.0) and DAT (18.46.0). Urea was mostly applied during transplanting time while DAP were applied both during transplanting and also as side dressing. However, the rate of application varied from farmer to farmer.

Variety use and management

In wet season, farmers used indigenous varieties and improved varieties to meet food consumption need in family.

There were three types of varieties found in Salavisay commune: short, medium, and early varieties. In order to ensure food security, farmers used all these types of varieties. If the first harvested failed by flood or drought, they would not lose the second and the third harvest.

Normally, the harvest time in this area started from October to November for short and medium maturing varieties, and from December to January for long-term maturing varieties.

4.4.2 Vegetable productions

Vegetables were short-term crops, which could be produced within 1.5 months and contributed a constant source of cash income for other living expense, and also made full use of land and family labor which were under use otherwise. Vegetables were the second majority crops after rice and per capita consumption of vegetables in Cambodia was about 35 kg (DOA, 1993). Farmers grew vegetables around homestead where water source was available during wet and dry seasons (DAO & CIDSE, 1997).

Vegetable production was the important enterprise for dry season. The CWS project had provided vegetable seeds to farmers including improve varieties of eggplant, yard long-beans, non-heading cabbage, cassava, taro, cucumber, tomato, chili, cabbage, pumpkin, tomato, bitter gourd, water convolvulus and other green vegetables. The farmers had adopted most of these varieties and had multiplied seeds for continued cultivation in the next year (CWS, 2000).

Types of vegetables and growing seasons

Farmers preferred to grow vegetables either in early wet season of May or in dry season from November, because of availability of water and soil moisture.

Farmers started growing vegetables along with wet season rice in early May with the onset of rain, which provided enough water for vegetable growth. The second growing season of vegetables started on November while there were some rain and soil was still moist. However, farmers who grew vegetables during this period required extra source of water such as pond or wells in order to support the total water requirement of the vegetables.

There were 17 types of vegetables grown in each farm type during the study period. However, the majority of farmers preferred to grow water convolvulus (73.3 percent) (Table 12), due to the fact that water convolvulus was used for several purposes including home consumption, market and pig feed.

Table 12. Types of vegetables grew in each farm type (2001)

Common name	Scientific name	Number of households growing	Percentage of households growing (%)	Growing period (months)
Eggplant	<i>Solanum melongena</i>	19	63.3	2-2.5
Non-heading cabbage	<i>Brassica oleracea</i>	7	23.3	1.5-2
Taro	<i>Colocasia esculenta</i>	1	3.3	2.5-3
Cucumber	<i>Cucumis sativus</i>	6	20.0	1.5-2
Tomato	<i>Lycopersicon esculentum</i>	4	13.3	3-4
Chili	<i>Capsicum frutescens</i>	5	16.7	2-2.5
Cassava	<i>Manihot esculenta</i>	1	3.3	5-6
Cabbage	<i>Brassica oleracea</i> <i>var. botrytis</i>	1	3.3	3
Pumpkin	<i>Cucurbita moschata</i>	15	50.0	2-3
Bottle gourd	<i>Lactuca lagenaria</i>	7	23.3	3-3.5
Sponge gourd	<i>Luffa cylindrical</i>	17	56.7	1.5-2
Water convolvulus	<i>Ipomoea aquatica</i>	22	73.3	1.5-2
Yard-long beans	<i>Vigna unguiculata</i>	7	23.3	2-3
Chinese radish	<i>Brassica var. longgipinatus</i>	1	3.3	1.5-2
Amaranth	<i>Amaranthus tricolor</i>	7	23.3	2
Wax gourd	<i>Benincasa charantia</i>	15	50.0	3.5-4
Ridge gourd	<i>Luffa acutangulas</i>	7	23.3	1.5-2

(Sources: survey data, 2002)

4.4.3 Fruit plantations

Fruit crops had been cultivated in a small-scale farming and the technical knew how to grow fruit crops came from farmers' own experience. However, almost fruit crops including mango, coconut, jackfruit were allow to grow for long time even it exceeded its economic life.

None of the fruit crop enterprises were treated as an economic enterprise during the survey time and most farmers grew for home consumption purpose. Table 13 showed the fruit crops of farmers in the study area.

Table 13. Types of fruit crops grew in each farm type (2001)

Common name	Scientific name	Number of household growing	Percentage of household growing (%)
Coconut	<i>Cocos nucifera</i>	20	66.7
Guava	<i>Psidium guajava</i>	6	20.0
Jack fruit	<i>Artocapus heterophyllus</i>	4	13.3
Mango	<i>Mangifera indica</i>	15	50.0
Banana	<i>Musa sepientum</i>	15	50.0
Orange	<i>Citrus sinensis</i>	1	3.3
Papaya	<i>Carica papaya</i>	14	46.7
Milk fruit	<i>Chrysophyllum cainito</i>	1	3.3
Wood apple	<i>Limnophila hayatae</i>	1	3.3

(Sources: survey data, 2002)

4.4.4 Livestock production systems

Livestock was an integral component of farming of the study area. A range of livestock species (buffalo, cattle, chicken, ducks and pigs) was kept by the farm households. Almost every household had a few heads of cattle and buffalo. As there was little use of chemical fertilizers, livestock keeping was considered essential for

maintaining soil fertility. Integrating livestock into the crop production systems had enabled farmers to maintain their animals as well as crop production.

The result of field survey in 2002 reported that the livestock and poultry suffered from disease every year. The problem was severe particularly from February to August. It also significantly affected on work productivity of draft animals especially for land preparation in rice production.

Small-scale animal production such as: pigs, chicken and ducks also suffered due to disease outbreak. Consequently, many farmers were forced to sell their pigs even before they reached the marketable size. The result from the survey also indicated that livestock/poultry production was the main enterprise contributing to income of farmers in each farm type. However, cattle and buffalo were rarely sold. Both animals were only raised for draft power purpose.

Pigs, which had high market value, could be sold easily. Therefore, farmers in each farm type rarely used their own pig for home consumption, but would buy pork from the market for consumption. Poultry enterprise was raised mainly for home consumption and surpluses were sold in the market.

Stock and draft animal

In tradition, livestock was kept for draft animals, which was commonly practiced in Cambodia farming activities. Cattle and buffaloes were raised extensively for producing draft power in land preparation for rice crop. Usually, pair of draft animals was used to pull ploughing implement, therefore household who owned only single or nil draft animal needed to share or rent animals from neighbors. Animal manure was used in rice field and vegetable land and some parts made into compost.

Table 14 indicated that the highest average of cattle production was found in IFS-I at about 7.1 heads HH^{-1} while IFS-II and IFS-III was 5.2 heads and 3.5 heads HH^{-1} , respectively, and the lowest was found in IFS-IV at 3.2 heads HH^{-1} . For buffalo production, the highest average was found in IFS-IV at about 1.2 heads HH^{-1} while

IFS-I and IFS-III was 0.7 heads and 1 head HH⁻¹, respectively, and the lowest was found in IFS-II at 0.4 heads HH⁻¹.

Pig and poultry productions

Rice bran was used as basic feed for pig in Cambodia. It made up to the other 50 percent of pig diets (Maclean, 1998). Pig waste was used as fertilizer vegetable productions and feed for fish aquaculture. There were found that the average of pig production of IFS-I, IFS-II and IFS-III was 2.7 heads, 1.4 heads and 1.2 heads HH⁻¹, respectively, and for IFS-IV was not pig production in farm (Table 14).

Poultry production had contributed significantly to farmer's income and home consumption. Practically, small-scale farmers raised poultry for home consumption and for marketing as well. The emphasis was on meat production. The chickens were raised on natural feed, by following them to seek their own food freely. No supplementary commercial feed was given. Table 14 indicated that the highest average of chicken production was found in IFS-II at about 32.8 heads HH⁻¹ while IFS-I and IFS-III were 29 heads and 21.7 heads HH⁻¹, respectively, and the lowest was found in IFS-IV at 11 heads HH⁻¹.

Ducklings were raised near homestead. After the rice harvest, the ducks were raised freely on rice fields until they were ready for market. Thus rice field provided value chain as feeding ground for ducks. There were found that the average of duck productions of IFS-I, IFS-II, IFS-III and IFS-IV was 9.7 heads, 11.7 heads, 12.2 heads and 4.1 heads HH⁻¹, respectively (Table 14).

4.4.5 Fish production

The survey conducted by UNICEF found that 87 percent of rural households were engaged in forage production for fish, crabs, shrimps, snails, frogs and green vegetables from rice fields (UNICEF, 1994).

The decline of productivity of rice-fishery, which seemed to have resulted from rural development increased. Therefore, this decline could be far reaching with

regards to the nutrient of subsistence farmers. In fish and other aquatic animal products, harvested from rice fields had significant importance to the diets and income of the farmers (Gregory and Guttman, 1996).

In the Salavisay commune, rice field, natural lake, pond and canal drainage were important sources of fish. Capture fishery was common occupation for farmers in the study area. The majority of natural fish captures take place in the rice field, canal drainage and family pond in the rainy season. In the dry season, farmers caught fish from family pond and natural lake.

มหาวิทยาลัยเชียงใหม่
Chiang Mai University

Table 14. The average livestock production (heads HH⁻¹) of each farm type

Livestock production	IFS-I			IFS-II			IFS-III			IFS-IV		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Chicken	10.0	60.0	29.0	10.0	50.0	32.8	5.0	40.0	21.7	4.0	18.0	11.0
Ducks	5.0	18.0	9.7	6.0	18.0	11.7	5.0	29.0	12.2	0	15.0	4.1
Pigs	2.0	5.0	2.7	1.0	2.0	1.4	0	3.0	1.2	-	-	-
Cattle	3.0	12.0	7.1	2.0	10.0	5.2	2.0	5.0	3.5	2.0	5.0	3.2
Buffalo	0	2.0	0.7	0	4.0	0.4	0	2.0	1.0	0	3.0	1.2