

## CHAPTER VI

### FOOD SECURITY ANALYSIS

#### 6.1 Household rice production in each farm type

Rice was the main staple food crop of people in all farm type. The secondary products of rice such as rice bran was used as feed for fish culture, pig and duck productions and the remaining importance of the products of rice crop as assess by the household heads (which assessment, of course, would vary among individual households) and rice straw was important source of forage for animal during the dry season when animal feed was scarce.

Table 31 indicated that the highest of average rice area per household was found in IFS-I at about 1.9 ha while IFS-II and IFS-III was 1.8 ha and the lowest was found in IFS-IV was 1.1 ha but farmers in IFS-II received output of rice higher than farmers in other farm types. But IFS-I received the highest in terms of economic returns at US\$ 146.1 while IFS-II and IFS-III received US\$ 136 and US\$ 67, respectively, and the lowest was found in IFS-IV at about US\$ 33.

The farmers in IFS-I and IFS-II received higher rice output and economic return than farmers in IFS-III and IFS-IV. They were more knowledgeable and used more inputs than IFS-III and IFS-IV. In addition, productivity of IFS-I households was less variable than others three types as shown by lowest CV value.

Table 31. Average rice production (HH<sup>1</sup>) of households in each farm type

Items	IFS-I (n=6)	IFS-II (n=9)	IFS-III (n=6)	IFS-IV (n=9)
Total average land area (ha)	1.9	1.8	1.8	1.1
Average output (kg)	2,819.7	2,885.3	1,802.4	1,067.8
Gross return (US\$)	285.5	292.2	182.5	108.1
Input costs (US\$)	139.5	156.2	115.6	75.4
Economic returns (US\$)	146.1	136.0	67.0	33.0
CV for production (%)	19.0	46.6	51.0	62.6

n: number of households

### 6.1.1 Rice yield differences

Rice yield varied with the agro-ecological conditions during the growing season and it varied from one household to one household within group of households in each farm type.

In 2001, among households in each farm type, the gap between the highest and the lowest yield (ha<sup>-1</sup>) was reported as 147 kg for IFS-I, 115 kg for IFS-II, 480 kg for IFS-III and 445 kg for IFS-IV (Table 32). Farmers in IFS-I and IFS-II applied more inputs than farmers in IFS-III and IFS-IV (Table 17), and furthermore farmers in IFS-I and IFS-II were supported by CWS organization on capacity building especially on technical knowledge of farming practices, so they had better knowledge of farming practices than farmers in IFS-III and IFS-IV which led to higher gaps among IFS-III and IFS-IV, and narrower in IFS-I and IFS-II.

Table 32. Rice yield ( $\text{kg ha}^{-1}$ ) differences for each farm type, in year 2001

Items	IFS-I (n=6)	IFS-II (n=9)	IFS-III (n=6)	IFS-IV (n=9)
Gap	147	115	480	445
Max	1,628	1,703	1,280	1,180
Min	1,481	1,588	800	735

n: number of households

### 6.1.2 Farm performance of rice production

This analysis focused on the performance indicators of rice production such as manure application, economic returns and its productivity.

Figure 6 showed the comparison analysis of the farm performance indicators of rice production ( $\text{ha}^{-1}$ ) for each IFS farm type. A method of comparison analysis of the sustainability of rice production for each farm type was to use sustainability webs as shown in this Figure. There were three categories of farming practices (manure application on rice field, rice productivity and economic returns of rice  $\text{ha}^{-1}$ ) on individual spines. Each spine was calibrated from zero at the origin to 60 percent furthest from the origin, so the further the web was from the origin the better the system.

In terms of nutrient cycling farmers in IFS-II applied manure ( $\text{ha}^{-1}$ ) 42 percent higher than other farm types while farmers in IFS-I, IFS-III and IFS-IV applied 31 percent 12 percent and 15 percent, respectively.

The productivity of rice, the highest proportion was found on IFS-II at about 32 percent while IFS-I, IFS-III and IFS-IV were 30 percent, 21 percent and 18 percent, respectively. And the highest economic return was found on farmers in IFS-I at 35 percent while IFS-II and IFS-III received 34 percent and 18 percent, respectively, and the lowest proportion was IFS-IV at 13 percent.

Based on farm performance indicators of rice production, the farm of IFS-I and IFS-II were more sustainable than other two farm types (IFS-III and IFS-IV).

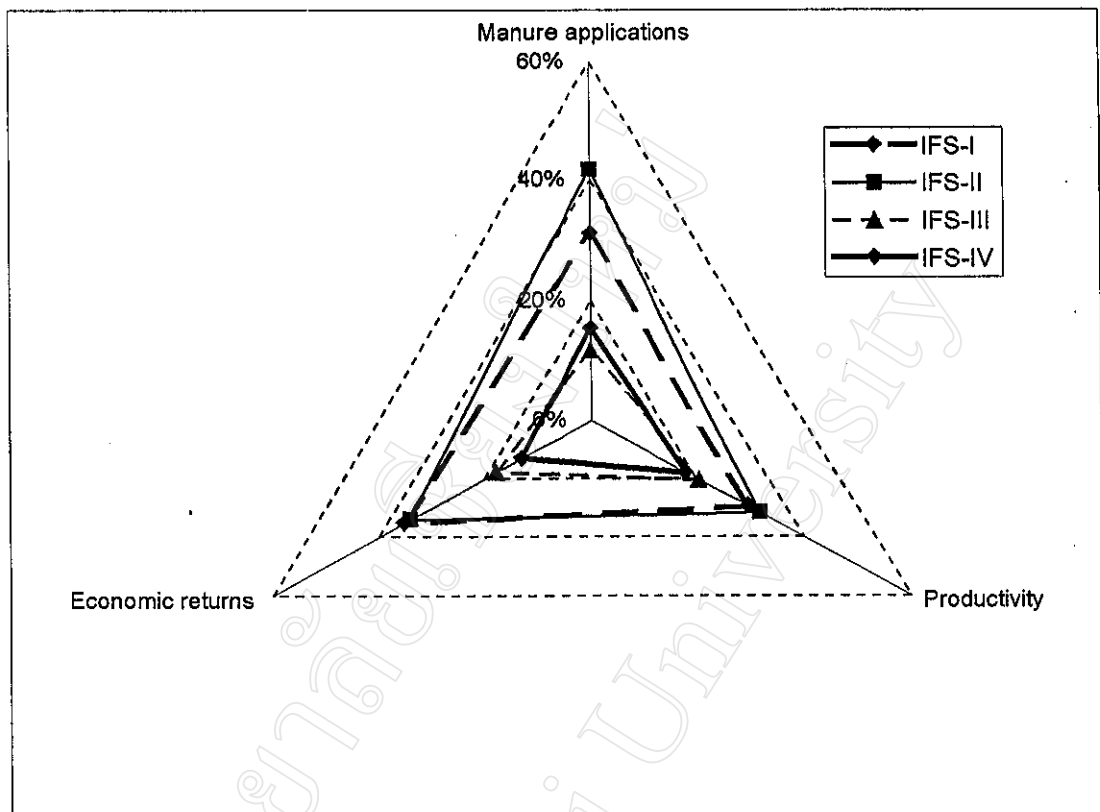


Figure 6. Farm performance indicators of rice production

## 6.2 Whole farm income analysis of each farm type

The net income of each farm household derived from all farm enterprises was associated with land area planted with rice.

The resulting aggregated values of all productions on each farm type were shown as total farm income.

Table 33 indicated that, there was variation in average annual net income from each enterprise of households in each farm type. All farm types, rice provided higher incomes to household than other enterprises. The households in IFS-I and IFS-II received higher incomes from agricultural activities than households in IFS-III and

IFS-IV. The households in IFS-I and IFS-II, their annual income relied on on-farm activities while households in IFS-III and IFS-IV relied more on off-farm incomes.

Table 33. Average on-farm and off-farm incomes (US\$ HH<sup>-1</sup>) for households in each farm type

Items	IFS-I	IFS-II	IFS-III	IFS-IV
Rice	146.1	136.0	67.0	33.0
Vegetables	68.0	42.0	6.2	14.1
Fruit crops	6.6	3.1	0	2.1
Chicken	36.3	39.7	17.6	8.0
Ducks	10.6	13.5	11.1	3.7
Pigs	24.7	24.8	6.5	0
Fish	45.0	12.5	9.1	7.2
<b>Total on-farm income</b>	<b>337.3</b>	<b>271.6</b>	<b>117.5</b>	<b>68.1</b>
<b>Off-farm income</b>	<b>11.0</b>	<b>27.7</b>	<b>19.0</b>	<b>38.8</b>
<b>Total whole farm income</b>	<b>348.3</b>	<b>299.3</b>	<b>136.7</b>	<b>107.4</b>

### 6.3 Food security of households in each farm type

#### 6.3.1 Present food security analysis

Food security for Cambodian farmers means how much rice they have in hand after harvested and how long will the harvested amount feed them. It is estimated that each person consume 160 kg year<sup>-1</sup> of white rice (CIAP, 1993), with a milling recovery of 60 percent, a person would need about 267 kg year<sup>-1</sup> of paddy rice. Allowing, 10 percent harvest loss and storage losses of 15 percent, each person would need 334 kg year<sup>-1</sup> of paddy rice.

Therefore, based on average family size in a household of IFS-I, IFS-II, IFS-III and IFS-IV as 5.8, 6.7, 6 and 6, respectively, so households in each farm type needed 1,947 kg, 2,238 kg, 2,004 kg and 2,004 kg of rice, respectively, for annual consumption. Based on average rice production of households in each farm type were

2,820 kg, 2,885 kg, 1,802 kg and 1,068 kg, respectively (Table 34 and Table 35), in 2001, households in IFS-I and IFS-II had average rice surplus 873 kg and 647 kg HH<sup>-1</sup>, respectively (Table 34) while households in IFS-III and IFS-IV lack of rice consumption.

Off-farm incomes also contributed to food security. So based on price US\$ 0.1 kg<sup>-1</sup> of paddy rice, households in IFS-III and IFS-IV could afford 190 kg and 388 kg HH<sup>-1</sup>, respectively. So, households in this farm type still lack of food consumption annually estimated around 12 kg and 548 kg HH<sup>-1</sup>, respectively (Table 35).

Therefore, in year 2001, households in IFS-I and IFS-II was food secured while households in IFS-III and IFS-IV faced with food shortage.

Table 34. Average production consumption (HH<sup>-1</sup>) of rice for households in IFS-I and IFS-II

Farm type	Average member (family <sup>-1</sup> )	Average rice production (kg farm <sup>-1</sup> )	Average rice consumption (kg)	Average rice surplus (kg)
IFS-I	5.8	2,820	1,947	873
IFS-II	6.7	2,885	2,238	647

Table 35. Average production consumption (HH<sup>-1</sup>) of rice for households in IFS-III and IFS-IV

Farm type	Average member (family <sup>-1</sup> )	Average rice production (kg farm <sup>-1</sup> )	Average rice consumption (kg)	Average rice from off-farm incomes (kg)	Average production need (kg)
IFS-III	6	1,802	2,004	190	-12
IFS-IV	6	1,068	2,004	388	-548

### 6.3.2 Future food security analysis

The future food security of households in each farm type was based on rice production in present and future potential production. Assumed that the land area of rice production would still be the same in future but the population would increase, so the productions should increase amount of their land. Figure 7 showed that based on populations in IFS-II were higher than other farm types so the present and future food demands were also high.

The present rice production of each farm type was calculated at 16,863 kg, 26,320 kg, 11,660 kg and 9,270 kg per whole farm for IFS-I, IFS-II, IFS-III and IFS-IV, respectively, (Appendix L) and the future rice demands of households in IFS-I, IFS-II, IFS-III and IFS-IV were calculated at 15,030 kg, 25,718 kg, 15,364 kg and 23,046 kg per whole farm, respectively (Appendix M).

Therefore, in present the households in IFS-I and IFS-II already had food surplus at about 1,833 kg and 602 kg per whole farm, respectively, if compared with food demands in 2010, while households in IFS-III and IFS-IV should afford 3,704 kg and 13,776 kg per whole farm, respectively, (Appendix M) for their food security in year 2010. So farmers in IFS-III and IFS-IV would have to improve their production systems to increase yields.

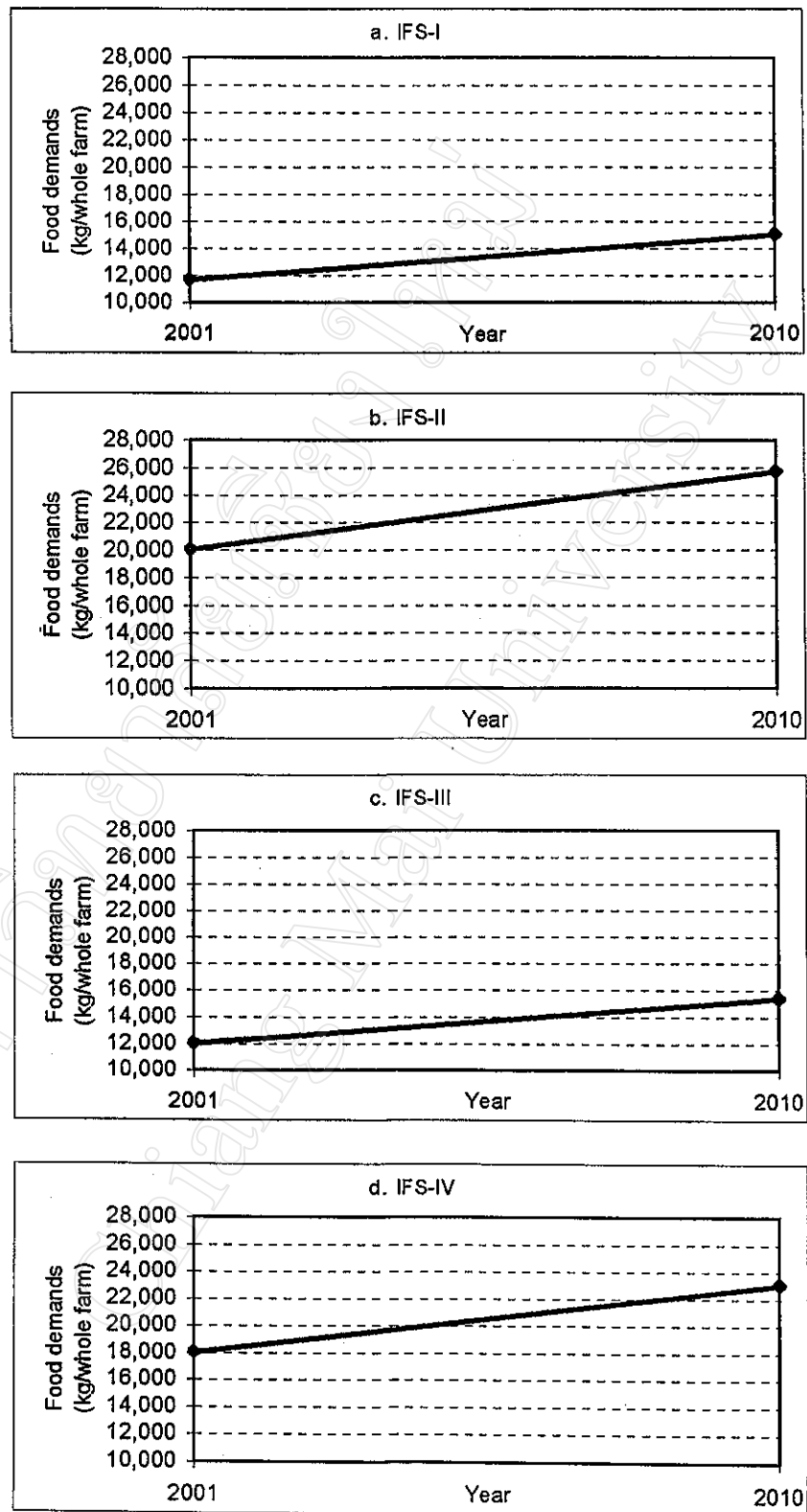


Figure 7. Total food demand in present and future of households in each farm type