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An Economic Study of Types of Farming in the Chikugo Plain, Fukuoka Prefecture, Japan¹⁾

Kenji Cho

Introduction

Intensification of farming in Japan has played an important role not only in enlarging the size of farm business and in raising the level of farm income, but also in improving the efficiency in the use of family labor force. It was partly because the land was a scarce and valuable factor and the size of farm was very small in Japan, like in many other countries in Asia, and partly because the opportunity of profitable off-farm employment was limited, as a matter of fact, in many rural areas, and, as a result, the mobility of farm land was not high enough, too. In the studies of farm management in Japan, therefore, a stress has been placed upon the process of, and factors affecting the intensification of farming. To study the same subject seems to be equally important even on the present day when a rapid development has been taken place in the national economy of Japan and the saving of labor resource becomes more and more significant in every field of industry of the country.

Intensification of farming may be put forward in general by any of the following ways; (1) to increase the yields of crops and to make higher the level of land use ratio, (2) to substitute more intensive crops for less intensive ones and to expand the acreage of intensive crops, (3) to feed livestock or to do processing of farm products in addition to growing crops, and to increase the rates of production in those additional enterprises, and (4) to increase the size of livestock or processing enterprise combined with growing crops.

The actual process of intensification of farming in a certain area, therefore, is accompanied by changes in types of cropping or types of farming from less intensive to more intensive ones on the one side. On the other side, it requires of course the input of an increased amount of labor as well as capital on a given size of farm place. Labor forces and capital available on farms as well as the size and basic conditions of land seem to be the principal factors which affect the development of farming along the course of intensification of types of farming. It should be noted that the intensification of farming could not be successfully advanced with a mere increase of the amount of input of family labor on small farms as it is often believed.

The present paper intends to deal with types of farming in connection with intensification of small-sized farms in the Chikugo Plain where highly intensive types of farming has long been practiced, and, as a result, a relatively high level of farm income has been attained by farm families who work with only a small size of paddy field on the average.

Location and characteristics of the area studied: Describing the location and some characteristics of the area studied briefly, it was located in the southern part of

1) Contribution from the Department of Agricultural Economics, Faculty of Agriculture, Kyushu University.

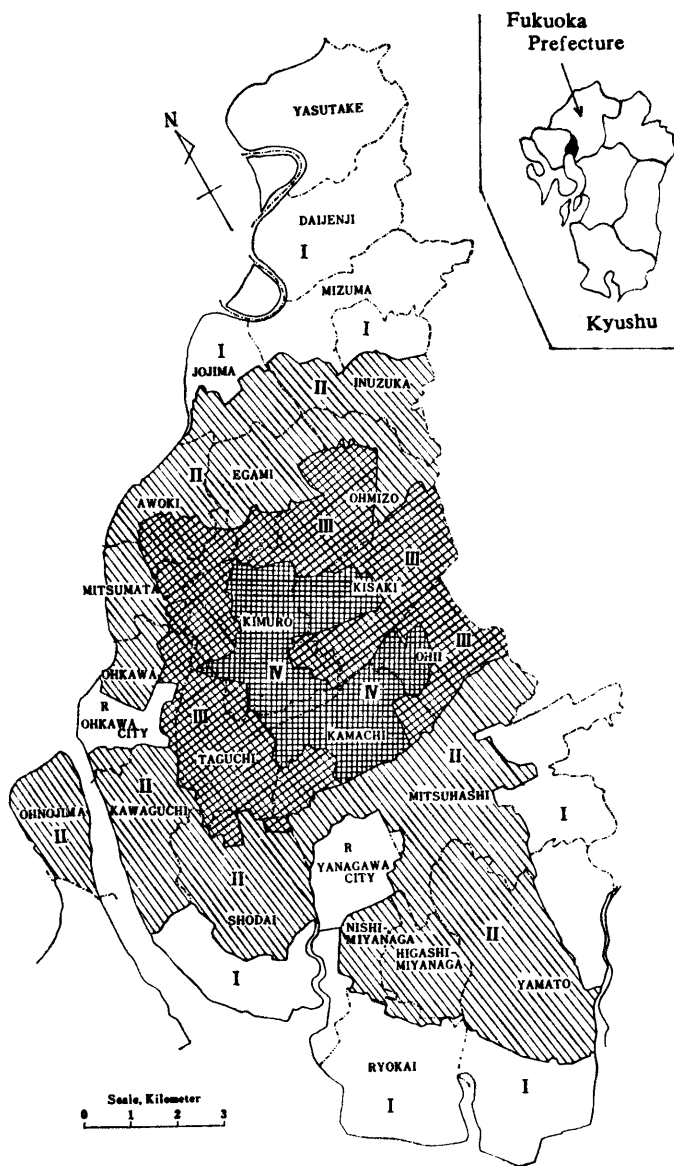


Fig. 1. Location and Land Class Map of the Chikugo Plain Area, Fukuoka Prefecture, Japan.

* Roman numerals show each land class. The higher the numeral the better the condition of land in this case. Because of a strong similarity of both land classes III and IV, these both classes of land are combined together in the present study.

Fukuoka Prefecture on northern Kyushu (Figure 1). The area delimited in the present study consisted of 26 villages and townships, and covered 385 hamlets in total. According to the 1960 Census of Agriculture, it contained 16,004 farms and covered 10,280 hectares of arable land. Of the total arable land, 95 percent or more was in paddy field; the remaining part, mostly the land retained as garden to grow vegetables for home use. The land consisted of alluvial soil in all areas and the soil texture was

mostly clay and clay loam of a highly productive nature. Irrigation facilities were available to all paddy fields. The central part of the plain, especially the area covered by land classes III and IV (see Figure 1) contained a dense network of wide creeks, and the creeks were used as the source of irrigation water, while the rest of the area drew its irrigation water from rivers. During winter growing season, the surface of water in the creeks was usually deep from the surface of field so that the drainage condition of paddy field in winter time was better in those area where creeks run. On the other side, however, creeks kept plenty water even in winter growing season so that farmers who plan to grow mat-rushes could easily obtain enough water from them with irrigation pumps. It was one of the reasons why the production of mat-rushes concentrated in the central part of the plain.

Practically rice was the predominant crop raised during the summer season, and it was the primary source of farm income on most farms. Sources of farm income of the secondary importance in the area were wheat, mat-rushes and processed rushmats, milk, eggs, and hogs. Though each of these crops or enterprises, aside from rice-and-wheat, was found more or less in every land class, the relative importance of each of these activities differed much with land class. According to the preliminary classification of types of farms basing on the data aquired from 1960's Census, mat-rushes was of the greatest importance in land classes II and III-IV, and the processing of rushmats, the highest importance in land class III-IV; livestock and the processing of rice-straw were relatively important in land classes I and II, but the number of farms with those enterprises were not many (see Table 1).

Because of intensive use of land and relatively high yields of crops, the amount of farm income per unit of land as well as per farm was relatively high in the area. Some of other characteristic features of the farming in the area were the small size of farm, the high price of land, and the dense proliferation of farm machinery. Farm size averaged only 0.65 hectare per farm in 1960. Of the total farms, 45 percent were less than 0.5 hectare in size, while the farms of 1.0 hectare or more numbered only 21 percent. Average land price was approximately ¥ 400,000 per 0.1 hectare in 1964, though it varied from ¥ 300,000 up to ¥ 600,000 depending on land class and the prevailing type of farming within each area. The number of power machinery owned and used on every 100 farms in the plain in 1960 was, on the average, 58 power-tillers, 65 power-threshing machines, 89 irrigation pumps, and so forth.

Purpose of the study: As for the Chikugo Plain, the Department of Agricultural Economics, Kyushu University had previously made a series of researches under the direction of Professor Isowo Iwakata since 1949. Many subjects were studied in two typical villages selected from a central part of the plain. The subjects studied through actual researches were farm mechanization, customary usage of irrigation water in connection with land conditions, farm consolidation, use of family labor forces, and so forth. The results of these researches were published in Japanese bulletins of the Department.

The purposes of the researches conducted by the Department stated above were so far as the present author understands, first to acquire exact knowledge about the actual process of intensification of farming in the area, and second to make clear the factors which stimulated or retarded the process of development of farming toward intensification.

Like the previous researches mentioned above, the present study also concerned with the intensive farming in the Chikugo Plain. However, the present one dealt with it from the aspect of types of farming. It was based on an analytical method of farm income survey as explained later, while descriptive methods were employed and a stress was rather placed upon the physical and technological aspects of farming in the

previous researches. In addition to the above, the present one was based on an economic land classification,¹⁾ which was completed by Shigeyoshi Ueno and others in advance the present survey. The work of land classification covered the whole part of the Plain, and it provided the present author with a concrete base upon which he may study the relative profitableness of different types of farming particularly in relation with land conditions.

More specifically, the purpose of the present work was to compare returns of farming on different types of farms and to study the factors which affected profitableness of farming in relation with land class and size of farm so as to be able to determine the effects of types of farming of different levels of intensity on the successfulness of farming under the varying conditions of size of farm and land class.

It might be able to hope that the product of this sort of farm management survey for an advanced farming area would be useful for the future development of farming in the area studied as well as in less advanced areas having similar basic conditions with those in the studied area.

Classification of Types of Farming and Data Used

Classification of types of farming: For a study of this sort, definition of type of farming is the first subject to be questioned. A type of farming often refers to the kind of enterprise which brings in a major portion of the total value of products on a unit farm. In processing and analyzing Farm Household Accounts, the Ministry of Agriculture of Japan, for instance, has defined types of farming according to the kind of enterprise that brought in 50 percent or more of the total farm receipts per farm. Some other bases on which types of farming may be classified are the degree of intensity of farming, the degree of specialization of farming, the requirements for maintenance of soil fertility, etc. However, in the present study of types of farming in a plain paddy field area where rice-and-wheat²⁾ was the general type of cropping practiced common over the years and was also the primary source of farm income on most farms, the term type-of-farming was used to mean the combination of rice-wheat, as the most general enterprise, with that enterprise which was next in importance and which contributed considerably to farm earnings.

According to the combination of the types of enterprise stated above, the farms in the Chikugo Plain Area were classified into nine different categories. They were (1) rice-wheat farms, (2) rice-wheat-and-rush farms, (3) rice-wheat-and-rushmat-processing farms, (4) rice-wheat-and-ricestraw-processing farms, (5) rice-wheat-and-dairy farms, (6) rice-wheat-and-poultry farms, (7) rice-wheat-and-hog farms, (8) rice-wheat-and-vegetable farms, and (9) miscellaneous farms.

Of these nine categories, first three types of farms which were the most important ones in the area were taken for comparison in the present paper.³⁾ The definition of the three types of farms were as follows; (1) rice-wheat farms were those exclusively

- 1) The result of this work is published by the Department in 1969 as an English Bulletin No. 4 entitled "A Study of Economic Land Classification in the Chikugo Plain Area, Fukuoka Prefecture, Japan".
- 2) Rice-and-wheat is the general type of crop sequence that has been extensively practiced for many years in the Chikugo Plain, as in most other plain paddy field areas in the southern part of Japan. Since the recent diversification of types of farming in those areas has started from rice-and-wheat farming, these two ordinary crops are considered as a single enterprise in classifying the types of enterprise combination.
- 3) A number of records were secured from rice-wheat-and-dairy and rice-wheat-and-poultry farms in land classes I and II too, but the both types of farms were excluded from the present paper in order to avoid a lengthy interpretation.

given over to rice-wheat production, and which had not any enterprise from which farmers obtained income of a considerable importance; (2) rice-wheat-and-rush farms were those which raised mat-rushes to 0.2 hectare per farm or more over and above that for growing rice-and-wheat with the gross income obtained from the sale of mat-rushes accounted for about one half or more of the total gross farm income derived from all sources other than rice-and-wheat; and (3) rice-wheat-and-rushmat-processing farms were those which had at least a set of rushmat-processing machine that was operated fully during the season, and those with the gross income obtained from the sale of processed rushmats accounted for one half or more of the total gross farm income derived from all enterprises other than rice-and-wheat.

Before the actual income survey was begun, a preliminary study of types of farming in the area was made, chiefly drawn from the information acquired from the original blanks of the 1960's Census for the area. The number of each type of farms classified basing on the census data is given by size of farm and land class in Table 1.

The percentage of farms belonging to rice-wheat farms was higher in the lower land classes and also higher on smaller farms than on larger ones within each land class; that is, rice-wheat farms accounted for 65 percent of the total farms in land class I, while only 46 percent and 23 percent were in land classes II and III-IV respectively. By size of farm, rice-wheat farms accounted for 54 percent of the small-sized farms in land class II, as compared to 31 and 23 percent respectively on the medium-sized and large-sized ones in the same land class.

Table 1. Number of farms by type of farming, Chikugo Plain, 1954.

	Size of farm (0.1 hectare)			
	5.0-9.9	10.0-12.9	13.0 and over	Total
Land class I:	percent	percent	percent	percent
Rice-wheat farms	73.7	63.9	48.1	65.2
Rice-wheat-and-ricestraw-processing farms	6.2	14.1	8.8	8.6
Rice-wheat-and-rush farms	3.7	1.5	23.9	8.3
Rice-wheat-and-rushmat-processing farms	0.3	—	—	0.2
Rice-wheat-and-dairy farms	1.6	2.0	1.7	1.7
Rice-wheat-and-poultry farms	2.8	5.5	3.4	3.5
Miscellaneous farms and others ¹⁾	11.7	13.0	14.1	12.5
Total number of farms	642	255	295	1,192
Land class II:	percent	percent	percent	percent
Rice-wheat farms	54.3	31.1	22.5	45.6
Rice-wheat-and-ricestraw-processing farms	19.8	33.5	36.5	24.9
Rice-wheat-and-rush farms	7.3	12.2	17.0	9.7
Rice-wheat-and-rushmat-processing farms	1.2	2.1	1.7	1.5
Rice-wheat-and-dairy farms	1.2	2.7	1.7	1.5
Rice-wheat-and-poultry farms	3.0	3.2	4.3	3.3
Miscellaneous farms and others	13.1	15.2	16.3	13.3
Total number of farms	638	188	166	942
Land class III-IV:	percent	percent	percent	percent
Rice-wheat farms	29.2	10.8	8.8	22.5
Rice-wheat-and-ricestraw-processing farms	7.0	13.0	16.8	9.7
Rice-wheat-and-rush farms	25.8	28.3	24.4	26.0
Rice-wheat-and-rushmat-processing farms	21.7	31.2	35.3	25.6
Rice-wheat-and-dairy farms	0.4	0.7	1.7	0.7
Rice-wheat-and-poultry farms	1.2	1.4	1.7	1.3
Miscellaneous farms and others	14.7	14.6	11.3	14.2
Total number of farms	488	138	119	745

1) As the farms in the categories of rice-wheat-and-hog farms and rice-wheat-and-vegetable farms were only a little in number, they were included in this group.

Of the types of farms other than rice-wheat and miscellaneous farms, those types which composed a high percentage of the number of farms were rice-wheat-and-ricestraw-processing farms and rice-wheat-and-rush farms in land class II, and rice-wheat-and-rush and rice-wheat-and-rushmat-processing farms in land class III-IV. The farms with a livestock enterprise were distributed more frequently in land classes I and II, but they accounted for only a several percent of the total farms in each of the lower land classes.

The two types of farms which made up the highest percentage of farms in the highest land class were rice-wheat-and-rush and rice-wheat-and-rushmat-processing farms. These both types of farms covered more than one half of the total farms in the area belonging to land class III-IV.

The percentage of various intensive types of farms other than rice-wheat speciality farms increased on the whole as the number of land class increased, and it also increased with size of farm.

Data used and the year studied: For the present study a number of farm business records were secured from farmers by staff members and graduate students of the Department during the summer in 1965.

In the process of selecting the surveyed farms, first one-third of the total hamlets were sampled for each land class, and next the farms were selected at random from a set of lists of individual farms in the sampled hamlets segregated by economic land class, size of farm, and by type of farming. Such information in the sampling lists of individual farms as the size of farm, the area of mat-rushes, the number of rushmat processing machines being operated, the number of livestock kept, and so forth were checked closely in each hamlet before doing the final sampling of the farms to be enumerated.

The survey record contained the beginning and ending inventories of farm assets, the amount of labor used for the year, data for production, a series of receipts and expenses for the year beginning on April 1, 1964 and ending on April 1, 1965, and some other relevant information on farm business factors. The number of records finally used in the following analysis totaled 255, as given in Table 2.

Table 2. Number of records used in the study.

Type of farms by land class	Size of farm (hectare)			
	0.51-0.90	0.91-1.30	1.30 and over	Total
Rice-wheat farms :				
Land class I	15	15	15	45
Land class II	15	15	15	45
Rice-wheat-and-rush farms :				
Land class II	15	15	15	45
Land class III-IV	15	15	15	45
Rice-wheat-and-rushmat-processing farms :				
Land class III-IV	25	25	25	75

In an economic study which aims to determine relative profitableness of different types of farming, the crop yields and price situation of different kinds of crops and products in the year studied are of special interest because of yearly fluctuation.

Table 3 indicates the yields of main crops, the prices received by farmers for various crops and products, and the prices paid for feed and fertilizer in the area for the period 1959-1964.

Referring to the production rates and prices of main crops and products included in the three types of farms taken for the present analysis, the production rates of rice

Table 3. Crop yields, prices of crops and products, and prices of feed and fertilizer, Chikugo Plain, 1959-1964.

Commodity	1959	1960	1961	1962	1963	1964	
						Price or yield	Index 1959-63 =100
Yields of crops (per 0.1 ha.):	kg	kg	kg	kg	kg	kg	
Rice	440	499	485	495	526	525	107
Wheat	259	301	296	369	161	232	84
Mat-rushes	1,212	1,242	1,191	1,136	1,804	1,216	109
Prices of products:	¥.	¥.	¥.	¥.	¥.	¥.	
Rice (per 60 kg.)	3,991	4,007	4,262	4,695	5,163	5,685	129
Wheat (per 60 kg.)	2,006	1,974	1,979	2,012	2,079	2,081	103
Mat-rushes (per 10 kg.)	427	600	960	933	1,072	487	61
Onions (per 10 kg.)	110	241	284	250	452	170	64
Rush-mat (per sheet)	130	160	229	228	246	199	73
Rice-straw-bag (per piece)	34	33	31	32	29	28	88
Milk (per 10 kg.)	305	308	319	339	349	399	123
Eggs (per 10 kg.)	1,950	1,820	1,779	1,881	1,960	1,718	92
Prices of materials:	¥.	¥.	¥.	¥.	¥.	¥.	
Sulphate of Ammonia (per 40 kg.)	829	832	819	813	806	793	97
Wheat bran (per 30 kg.)	697	726	788	805	799	807	106

- 1) Yields of rice and wheat are from Annual Statistics of Agriculture and Forestry, Statistics Bureau in Fukuoka.
- 2) Yield of mat-rushes is from Outlook Report by Fukuoka Prefecture.
- 3) Prices of products other than mat-rushes, rushmats, and the prices of feed and fertilizer are from Statistics of Prices and Wages, Statistics Bureau, Ministry of Agriculture and Forestry.
- 4) Prices of mat-rushes and rushmats are from Outlook Report by Fukuoka Prefecture. But the prices for 1964 is based on the survey data obtained by study.

and mat-rushes per 0.1 hectare were 7 percent and 9 percent higher than the averages for the preceding five years, while the yield of wheat per 0.1 hectare was 16 percent lower than the average for the last five year. Rice and wheat were the crops for which price supporting programmes of the government were in effect, and the prices of them had an upward trend. The prices received by farmers for mat-rushes and processed rushmats were unusually low in the year studied. Compared with the averages for the preceding 5-year period, the prices of these products in 1964 were only 61 percent and 73 percent respectively.

It would be apparent, therefore, that the figures presented and analyzed in the following part of the present paper regarding to profitableness of farming on different types of farms should be much increased on those types of farms with mat-rushes or rushmat-processing enterprise, if the actual results in the year studied were modified by the average prices received for the last 5-year period.

Returns of Farming on Different Types of the Medium-sized Farms in Land Classes I, II, and III-IV

An analysis is made in the present section for the medium-sized farms which were sampled from those having operated with paddy field ranging from 0.9 to 1.3 hectares per farm. The average area of paddy field was 1.1 hectare per farm independent to type of farm or land class in this section.

Table 4 indicates a summary of financial results and some of the important farm business factors of each type of the medium-sized farms. Comparing net farm family earnings per farm or the residual after deducted farm expenses from gross farm family earnings including farm privileges at the start of the analysis, it increased from the

Table 4. Summary of financial results and some farm business factors on different types of the medium-sized farms in land class I, II, and III-IV, Chikugo Plain, 1964.

Item	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush-farms	Rice-wheat and rush farms	Rice-wheat and-rushmat-processing farms
	¥.	¥.	per farm ¥.	¥.	¥.
Gross farm family earnings	693,540	748,570	953,340	930,450	1,341,150
Farm expenses	223,020	224,420	276,890	246,230	576,790
Farm family earnings	470,520	524,150	676,450	684,220	764,360
Size of farm (ha.)	1.1	1.1	1.1	1.1	1.1
Working capital (1,000 yen)	710	709	1,002	932	1,187
Farm labor (day)	525	480	596	587	762

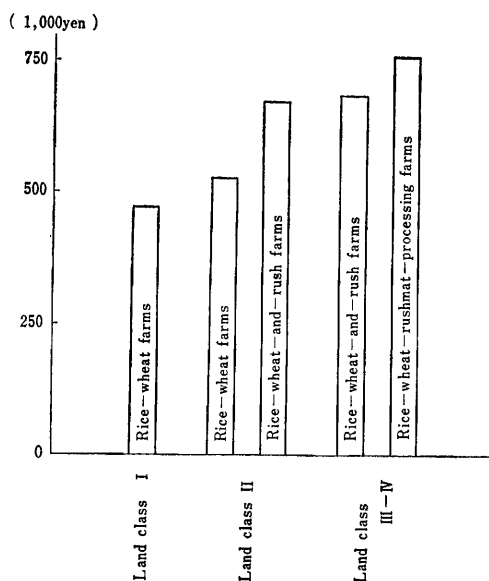


Fig. 2. Farm family earnings per farm.

lowest on rice-wheat farms in land class I, next to rice-wheat farms in land class II, third to rice-wheat-and-rush farms in land class II, fourth to rice-wheat-and-rush farms in land class III-IV, and then to the highest on rice-wheat-and-rushmat-processing farms in land class III-IV (Table 4 and Figure 2). The amount of net earnings per farm on rice-wheat-and-rushmat-processing farms in the highest land class was one and three-fifths times of that on rice-wheat farms in the lowest land class.

GROSS FARM FAMILY EARNINGS AND INTENSITY OF FARMING

The level of net farm family earnings per farm seemed to be primarily affected by the level of total gross farm family earnings per farm. The amount of total gross farm family earnings per farm increased from the lowest on rice-wheat farms in the lowest land class to the highest on rice-wheat-and-rushmat-processing farms in the highest land class, as it was exactly the case in the amount of net farm family earnings per farm (Table 5).

Comparing the amount of farm receipts or commercial income by sources, eighty five percent or more of the total farm receipts on rice-wheat farms in land classes I

Table 5. Gross farm family earnings per farm on different types of farms of the medium-sized in land classes I, II and III-IV, Chikugo Plain, 1964.

Source	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush-farms	Rice-wheat and rush-farms	Rice-wheat and-rushmat-processing farms
	per farm, thousand yen				
Gross farm income	550.8	606.5	800.7	806.3	1,213.4
Farm receipts	549.5	606.5	800.7	806.3	1,213.4
Grops	499.5	558.2	720.7	738.4	575.0
Rice	412.3	465.1	516.9	526.3	525.9
Wheat and barley	53.1	65.6	62.1	53.8	42.1
Mat-rushes	18.0	20.6	135.4	154.2	5.5
Vegetables and others	16.0	6.8	6.3	4.1	1.4
Processed products	40.2	42.0	48.7	29.4	606.4
Livestock and livestock products	6.4	2.3	22.6	29.2	24.2
Miscellaneous	3.4	4.1	8.7	9.4	6.9
Net increase in inventory value	1.4	...	...	...	0.9
Farm privileges	142.7	142.1	152.6	124.2	127.8
Gross farm family earnings	693.5	748.6	953.3	930.5	1,341.2
Gross farm income	79.4%	81.0%	84.0%	86.7%	90.5%
Farm privileges	20.6	19.0	16.0	13.3	9.5

and II were those which obtained from rice and wheat; and only fifteen percent or less were from other sources of which the product of rice straw processing occupied a major portion. In comparison with farm receipts per farm on rice-wheat farms in land class I, the same type of farms in land class II had a little larger amount of farm receipts per farm. It was due to that the latter had increased yields of crops and a relatively higher ratio of winter cropping (see Table 6).

The amount of farm receipts per farm on rice-wheat-and-rush farms in land classes II and III-IV was about one and one-half times of that of rice-wheat farms in land class I. The larger receipts on the former type of farms was partly due to increased yields of rice and other crops and higher ratio of winter cropping, but it was largely the result of greater receipts obtained from the sale of a very intensive, commercial crop, i. e., mat-rushes. This type of farms raised mat-rushes amounting to 0.23 hectare per farm in land class II and 0.31 hectare per farm in land class III-IV (Table 6), and made the receipts exceeding that on rice-wheat farms in land class I by about ¥250,000 per farm in both land classes (Table 5). The larger amount of farm receipts stated above as for rice-wheat-and-rush farms in higher land classes were attributable primarily to favourable conditions of land on the one hand, and, on the other hand, to the intensive use of land.

On rice-wheat-and-rushmat-processing farms in land class III-IV, practically all mat-rushes produced on the farm was used as material on the farm. As a result, the receipts from crops were ¥163,000 less per farm than those on rice-wheat-and-rush farms in the same land class. That amount deficient on farms with a rushmat processing enterprise was nearly equal to the amount of receipts obtained from mat-rushes on farms without a processing enterprise. Instead of a lesser amount of receipts from crops, the average farm with a rushmat-processing enterprise sold processed rushmats to the amount of ¥606,400 per farm, so that the total gross farm income exceeded that on rice-wheat-and-rush farms by about ¥407,000 per farm.

When mat-rushes which was raised on the farm but used directly as material for

Table 6. Yields of crops, area of crops raised, and other factors indicating the level of intensity of farming.

Item	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush-farms	Rice-wheat and rush-farms	Rice-wheat and-rushmat-processing farms
Yields of crops :		kilograms, per 0.1 hectare			
Rice	499	574	589	592	593
Wheat	230	242	259	263	255
Mat-rushes	...	...	1,208	1,178	1,210
Area of crops raised :		per farm, 0.1 hectare			
Rice	10.9	11.0	10.9	10.9	10.9
Wheat and naked barley	6.5	7.4	6.5	5.7	5.2
Mat-rushes	0.4	0.5	2.3	3.1	3.5
Vegetables and others	0.7	0.7	0.9	0.3	0.5
Total	18.5	19.6	20.6	20.0	20.1
Total land use ratio (%)	168.2	178.1	187.3	181.7	181.8
Value of all crops produced per 0.1 hectare ¹⁾	¥. 58,300	¥. 64,620	¥. 72,750	¥. 75,710	¥. 79,780
		per 0.1 hectare			
Capital investment ²⁾	¥. 64,500	¥. 64,400	¥. 83,800	¥. 84,700	¥. 107,800
Farm expenses	20,275	20,402	25,172	22,385	52,440
Labor input ³⁾	day 48	day 44	day 54	day 53	day 69

1) This includes the estimated value of home-raised mat-rushes used as material for processing on the farm.

2) Sum of the capital in working assets and circulating capital.

3) This includes hired labor.

processing was valued at the average price that was received by farmers who sold mat-rushes, and this estimated value of mat-rushes was added to the total receipts from crops, then, the sum was moderately greater on rice-wheat-and-rushmat-processing farms (see Table 6). It may be said, therefore, that the greater amount of farm receipts per farm on this type of farms with a rushmat processing enterprise in the highest land class was partly a result of a still larger receipts from crops owing to a still larger area of mat-rushes per farm and higher yields of crops per unit of land, and partly a result of an additional income obtained from the sale of processed rushmats which were the produce of the increased size of farm business along the line of processing activity.

If it is true that a considerable part of mat-rushes used as material in rushmat processing enterprise had to be raised on the home farm in order to run the rushmat processing enterprise profitably in the area and the additional working capital needed for processing activity had to depend on farmers' own accumulation, then, the greater receipts obtained on rice-wheat-and-rushmat-processing farms in the highest land class were also attributable to the favourable land conditions in the area covered by land class III-IV. Better conditions of land enabled the farmers within the area to use land intensively and to attain better yields of crops. This will explain why the farms with a rushmat processing activity has being concentrated in land class III-IV.

CASH FARM EXPENSES AND DEPRECIATION COSTS

Cash farm expenses: Of the various items of cash expenditures on both crop types

Table 7. Itemized farm expenses per farm on different types of farms of the medium-sized in land classes I, II, and III-IV, Chikugo Plain, 1964.

Item	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush farms	Rice-wheat and rush farms	Rice-wheat and-rushmat-processing farms
Cash farm expenses :	yen	yen	yen	yen	yen
Fertilizer	42,510	43,560	56,070	57,130	56,740
Hired labor	24,230	24,890	26,070	29,840	54,800
Chemicals	12,300	13,460	14,490	11,730	14,500
Seed and materials for crops	9,300	11,680	17,040	14,760	15,640
Materials for processing	1,200	4,430	5,100	1,940	251,390
Gas, oil and electricity	9,060	11,250	13,530	10,150	18,010
Custom work	3,510	4,380	1,340	650	3,950
Threshing	4,030	4,050	3,630	4,180	5,030
Irrigation fee	7,850	8,850	13,640	11,950	16,490
Repairs and small tools bought	11,770	17,340	17,290	10,000	14,440
Miscellaneous	22,650	8,490	20,800	20,780	22,450
Total	148,410	152,380	189,000	173,110	473,440
Depreciation :					
Farm buildings	16,580	15,910	24,410	19,990	21,150
Machinery and equipment	58,030	56,130	63,480	53,130	82,200
Livestock	...	...	...	...	...
Total	74,610	72,040	87,890	73,120	103,350
Total farm expenses	223,020	224,420	276,890	246,230	576,790
Composition of cash and non-cash expenses :	percent	percent	percent	percent	percent
Cash farm expenses	67	68	68	70	82
Depreciation	33	32	32	30	18
Total farm expenses	100	100	100	100	100

of farms, i. e., rice-wheat and rice-wheat-and-rush type farms, fertilizers, wages of hired labor, and chemicals were the most important three items in terms of the amount of value per farm; and materials used for crops, gas and oil, irrigation fee, and machinery repairs were the next most important items for which a fairly large amount of cash disbursement was made during the year. The sum of the expenses spent for these three leading items on both crop types of farms accounted for more than one-half of the total cash farm expenses.

On farms with a rushmat-processing activity in land class III-IV, however, beside the expenses for those items above mentioned, the largest share of cash expenditure was spent for purchased mat-rushes and other processing materials. The cash expenditures for processing materials made up for 53 percent of the total cash expenses on rushmat-processing type farms (Table 7).

Since mat-rushes required a heavy application of fertilizer and brought forth additional payments for materials and irrigation fee, the expenses per farm for those items on rice-wheat-and-rush and rice-wheat-and-rushmat-processing farms were much larger than those on rice-wheat speciality farms. The total expenses for fertilizers, seed and materials for crops, and irrigation fee totaled about ¥ 83,800 or ¥ 86,800 per farm on rice-wheat-and-rush farms in land classes II and III-IV and ¥ 88,900 per farm on rice-wheat-and-rushmat-processing farms in land class III-IV, as compared with ¥ 64,100 per farm on rice-wheat farms in land class II (Table 7).

Wages paid for hired labor were more or less the similar amount which varied only from ¥ 24,200 to ¥ 26,100 per farm on rice-wheat farms in land classes I and II and rice-wheat-and-rush farms in land class II, though it was slightly larger on rice-

wheat-and-rush farms in land class III-IV, probably due to a little larger area of mat-rushes per farm. On rushmat-processing farms in land class III-IV, however, wages paid for hired labor were nearly twice as much as those on rice-wheat-and-rush farms within the same land class. Some of the farms with a rushmat-processing activity used hired helps in the processing enterprise as well as for growing crops (Table 7).

There seemed to be no consistent pattern in the amount of cash expended for chemicals, gas and oil, machinery repairs, and so forth between types of farms or land classes.

Though the amount of cash farm expenses as the whole increased with intensity of type of farms and with land class, the ratio of cash farm expenses to gross farm family earnings was lower on more intensive types of farms in higher land classes except for rice-wheat-and-rushmat-processing farms on which a great amount of cash was expended for purchased mat-rushes. The ratio mentioned above was 17 or 18 percent on rice-wheat-and-rush farms in land classes II and III-IV, 20 percent on rice-wheat farms in land class II, compared with 21 percent on rice-wheat farms in land class I (Table 8).

Table 8. Ratio of cash farm expenses, depreciation, and total farm expenses to the total amount of gross farm family earnings on different types of the medium-sized farms.

Item	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush farms	Rice-wheat and rush farms	Rice-wheat and-rushmat-processing farms
Ratio of cash farm expenses to gross farm family earnings	21%	20%	18%	17%	35%
Ratio of depreciation costs to gross farm family earnings	11	10	8	7	8
Ratio of total farm expenses to gross farm family earnings	32	30	26	24	43
Ratio of cash farm expenses to total farm expenses	67%	68%	69%	70%	82%
Ratio of depreciation costs to total farm expenses	33	32	31	30	18

Depreciation costs of fixed assets: The total annual depreciation of fixed assets averaged a little over ¥ 70,000 per farm on rice-wheat farms in both land classes and rice-wheat-and-rush farms in land class III-IV, about ¥ 83,000 per farm on rice-wheat-and-rush farms in land class II, and ¥ 103,000 on rice-wheat-and-rushmat-processing farms in land class III-IV (Table 7). With a slight irregularity, the total depreciation costs per farm was larger on more intensive types of farms in higher land classes.

The annual depreciation was of course closely related to the average inventory value of fixed assets. However, as shown in Table 9, the average value of machinery and equipment used for growing crops and hauling, which largely affected the annual amount of depreciation costs per farm, was equally about ¥ 200,000 per farm on every type of farms. It suggested that the medium-sized farms in the area were equipped with an almost equal amount of value of machinery and equipment used for crop growing and hauling independent to type of farm or land class. And it also implied that the larger amount of capital invested in fixed working assets on intensive types of farms in higher land classes was utilized more economically than that on less intensive types of farms in lower land classes.

Due to the factor above mentioned, the ratio of depreciation costs to gross farm

Table 9. Working capital per farm and percentage distribution of it in each type of asset on different types of the medium-sized farms in land class I, II, and III-IV, Chikugo Plain, 1964.

Item	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush farms	Rice-wheat and rush farms	Rice-wheat and-rushmat-processing farms
per farm, thousand yen					
Working capital:					
Farm buildings	363.4	395.2	641.3	621.2	657.1
Machinery and equipment I ¹⁾	226.4	193.4	218.5	194.2	183.7
Machinery and equipment II ²⁾	44.5	46.4	47.5	41.1	139.2
Livestock	3.7	—	—	—	3.5
Circulating capital	72.0	73.5	94.9	75.2	202.7
Total	710.0	708.5	1,002.2	931.7	1,186.2
Percentage distribution of working capital:					
	percent	percent	percent	percent	percent
Farm buildings	51	56	64	67	55
Machinery and equipment I	32	27	22	21	16
Machinery and equipment II	6	7	5	4	12
Livestock	1	—	—	—	—
Circulating capital	10	10	9	8	17
Total	100	100	100	100	100

1) Machinery and equipment used for growing crops and for hauling.

2) Machinery and equipment used in processing enterprise.

family earnings decreased with intensity of type of farm; that is, the ratio was 10 percent on rice-wheat farms in land class II, 8 and 7 percent on rice-wheat-and-rush farms respectively in land classes II and III-IV, and 8 percent on rice-wheat-and-rushmat-processing farms in land class III-IV, while 11 percent were on rice-wheat farms in land class I (Table 8).

The ratio of depreciation costs to the total farm expenses also decreased as the intensity of type of farms increased with land class (Table 8). It suggested that the turnover of capital was faster on more intensive types of farms in better land classes.

To sum up, the total amount of farm expenses per farm increased, of course, with the level of intensity of type of farms. However, the ratio of farm expenses to gross farm family earnings decreased with the intensity of type of farms and with land class except for rice-wheat-and-rushmat-processing farms. The larger farm expenses on intensive types of farms in higher land classes did not offset the greater amount of gross farm family earnings but left much larger amount of net farm family earnings on more intensive types of farms in higher land classes.

LABOR USED AND NET FARM FAMILY EARNINGS PER UNIT LABOR

Labor used: It is already stated that farm family earnings including farm privileges were larger on more intensive types of farms in higher land classes. However, increased earnings on highly intensive types of farms were obtained with the input of much increased amount of labor per farm.

The number of days of all farm labor used to operate the medium-sized farm for the year or the level of intensity of labor input ranked from the lowest on rice-wheat farms, next to rice-wheat-and-rush farms, and the highest on rice-wheat-and-rushmat-processing farms. That is, the total farm labor per farm averaged 525 and 480 days on rice-wheat farms in land classes I and II respectively; in comparison with the

Table 10. Farm labor used and farm family earnings per unit labor of family on different types of farms in the medium-sized, Chikugo Plain, 1964.

Types of farms	Land class I	Land class II		Land class III-IV	
	Rice-wheat farms	Rice-wheat farms	Rice-wheat and rush farms	Rice-wheat and rush farms	Rice-wheat and-rushmat-processing farms
Number of labor days per farm:	day	day	day	day	day
Full-time family labor	416	380	534	527	675
Part-time family labor	90	80	40	39	45
Hired labor	19	20	22	21	42
Total farm labor	525	480	596	587	762
Percent of labor days by source:	%	%	%	%	%
Full-time family labor	79.3	79.2	89.6	89.8	88.6
Part-time family labor	17.1	16.7	6.7	6.6	5.9
Hired labor	3.6	4.1	3.7	3.6	5.5
Total farm labor	100.0	100.0	100.0	100.0	100.0
Number of family workers per farm:					
Full-time family workers	2.0	1.7	2.3	2.2	2.8
Part-time family workers	1.7	2.1	1.5	0.6	0.8
Total	3.7	3.8	3.8	2.8	3.6
Number of labor days per full-time farm family worker:	day	day	day	day	day
On the farm	208	223	232	240	241
Off-the-farm	24	31	35	34	14
Total	232	254	267	274	255
Farm family earnings per day labor of family	¥.	¥.	¥.	¥.	¥.
	930	1,140	1,180	1,210	1,060
Farm family earnings per full-time farm family worker a year	198,800	270,200	281,700	296,700	259,900
Amount of working capital per day labor	¥.	¥.	¥.	¥.	¥.
	1,350	1,480	1,680	1,590	1,560

above number of labor days in land class II labor days on rice-wheat-and-rush farms in land classes II and III-IV exceeded by 71 and 62 days per farm respectively, and those on rice-wheat-and-rushmat-processing farms, by 237 days per farm (Table 10).

Of the total farm labor days, hired labor made up only a small percent on every type of the medium-sized farms. Most works on the farm were done by operator and his families. However, rice-wheat farms which required the smallest number of labor days per farm depended to a relatively strongly on part-time farm family workers who engaged in farming only a part of the year. The number of farm labor days supplied by part-time family workers on rice-wheat farms was 90 and 80 days per farm in land classes I and II respectively, or about 17 percent of the total farm labor days; while it accounted for only 6 percent or so on each of the other both types of intensive farms (Table 10).

Contrary to the labor done by part-time family workers, the number of labor days worked by full-time farm family workers, who worked 150 days or more on the farm for a year, accounted for approximately 90 percent of the total farm labor days on types of farms other than rice-wheat ones, while this fell to 80 percent on rice-wheat farms. The greater number of days of family labor employed on more intensive types of farms in higher land classes was mostly the result of labor offered by full-time

farm family workers.

In accordance with the number of labor days done by full-time workers, relatively many families were in farming as full-time workers on more intensive types of farms. That is, the number of them averaged 2.0 and 1.7 on rice-wheat farms in land classes I and II respectively, 2.3 and 2.2 on rice-wheat-and-rush farms in land classes II and III-IV respectively, and 2.8 on rice-wheat-and-rushmat-processing farms in land class III-IV (Table 10).

It indicated, in other words, that intensive types of farms provided the family members with much greater volume of productive work on the farm, and then, almost all of the working members of the family were enabled to be employed on the farm even in the medium-sized in the area. Contrary to the above, a reverse could be said as for the medium-sized rice-wheat farms in lower land classes. Many of rice-wheat farms in the medium-sized farms were part-time farms in reality.

Net farm family earnings per unit labor: Since the amount of labor used on the farm varied much with type of farm, net farm family earnings on different types of farms should be compared further on a unit-labor-basis.

Figures presented in the lower part of Table 10 indicates farm family earnings per day labor of the family and farm family earnings per full-time farm family worker a year. The latter was obtained by subtracting the value of farm labor done by part-time farm family workers estimated at a rate of 810 yen a day¹⁾ from the total farm family earnings per farm and then by dividing the remaining part of value by the number of full-time farm family workers per farm.

As shown in the table, both figures of net earnings stated above were higher on more intensive types of farms in higher land classes with an exception for rice-wheat-and-rushmat-processing farms.

Taking for net farm family earnings per day labor of the family, it was somewhat higher on rice-wheat-and-rushmat-processing farms compared with those on rice-wheat farms in land class I; however, it was 10 to 12 percent lower than those on other crop types of farms in land classes II and III-IV (see Table 10). It suggested that the profitability of labor used in a rushmat-processing enterprise on the medium-sized farms was not necessarily higher than that of labor used in crop enterprises in land class II or III-IV.

Apart from the question of profitability of labor in a rushmat-processing enterprise, the fact that farm family earnings per unit labor was generally higher on more intensive types of farms in higher land classes seemed to be partly attributed to the fact that the intensive types of farms in higher land classes were not merely labor intensive in nature but they were intensive in the use of both factors, i. e., labor and capital, so that man labor on more intensive types of farms in higher land classes was equipped with a relatively large amount of working capital. It is indicated in terms of working capital per day labor in Table 10.

The amount of net farm family earnings per unit labor varied somewhat more by type of farms when it was compared basing on a per-man-per-year basis. It was due to that the number of labor days per full-time farm family worker a year was considerably larger on more intensive types of farms and, at the same time, it was larger in better land classes. Referring to this point a little in detail, the average full-time farm family worker on both types of farms in land classes III-IV worked for 240 or 241 days a year on his own farm, while only an average 208 days a year were on

1) The rate used in the valuation of unpaid labor done by part-time family labor was actual average wage rate that was received by part-time family workers in off-farm jobs in the area in 1964.

rice-wheat farms in land class I. The reason why the full-time workers on rice-wheat farms, especially in land class I, engaged in farm work for a relatively small number of days a year may be explained by the uneven distribution of farm work throughout the year and by the relatively small volume of productive farm work that was provided to family workers; and the reverse may be said as for intensive types of farms in higher land classes.

Returns of Farming on Different Types of Farms in Varying Sizes of Farm in Land Classes I, II, and III-IV

Summary of farm family earnings per farm: The conclusions given for the medium-sized farms in the previous section regarding to farm family earnings per farm by types of farms seemed to be equally adaptable for the small-sized and the large-sized farms.

As indicated in Table 11, farm family earnings per farm increased with intensity of types of farms and, at the same time, with land class in every size of farm. However the differences in the amount of farm family earnings per farm between different types of farms were smallest in the small-sized, intermediate in the medium-sized, and largest in the large-sized.

Table 11. Farm family earnings per farm on different types of farms in the small-sized, the medium-sized, and the large-sized, Chikugo Plain, 1964.

	Small-sized farms	Medium-sized farms	Large-sized farms
Size of farm	ha. 0.70	ha. 1.10	ha. 1.55
Land class I:	¥.	¥.	¥.
Rice-wheat farms	309,690	470,520	649,740
Land class II:			
Rice-wheat farms	322,090	524,150	754,860
Rice-wheat-and-rush farms	394,130	676,450	882,890
Land class III-IV:			
Rice-wheat-and-rush farms	441,250	684,220	938,460
Rice-wheat-and-rushmat-processing farms	516,420	764,360	1,122,950

Comparing the amount of farm family earnings per farm on a given type of farms within each land class, it increased with size of farm. In this case, the difference in the amount of net earnings above mentioned between sizes of farms was smallest on the least intensive type of farms, i.e., rice-wheat farms in land class I and largest on the most intensive type of farms, i.e., rice-wheat-and-rushmat-processing farms in land class III-IV. In other words, farm family earnings per farm increased more largely on more intensive types of farms in higher land classes with the increase in size of farm.

In the present section, comparisons of the results will be made chiefly between sizes of farms and attentions will be paid upon the factors which affected the phenomenon stated above.

GROSS FAMILY EARNINGS AND FARM EXPENSES

Gross farm family earnings per farm: Gross farm family earnings including both gross farm income and farm privileges are summarized inclusively in Table 12. With only an exception for rice-wheat-and-rushmat-processing farms, gross farm family

Table 12. Summary of gross farm family earnings on different types of farms in the small-sized, the medium-sized and the large-sized, Chikugo Plain, 1964.

	small-sized farms	Medium-sized farms	Large-sized farms
Rice-wheat farms in land class I:		per farm	
Gross farm income from	¥.	¥.	¥.
Rice, wheat and barley	277,730	465,440	713,700
All others ¹⁾	33,680	85,370	99,360
Farm privileges	120,560	142,730	142,650
Gross farm family earnings	431,970	693,540	955,710
Rice-wheat farms in land class II:			
Gross farm income from			
Rice, wheat and barley	303,750	530,750	804,950
All others	41,280	75,770	127,840
Farm privileges	117,790	142,050	144,820
Gross farm family earnings	462,820	748,570	1,077,610
Rice-wheat-and-rush farms in land class II:			
Gross farm income from			
Rice, wheat and barley	259,890	579,020	839,720
All others	174,720	221,720	253,300
Farm privileges	117,870	152,600	153,540
Gross farm family earnings	553,480	953,340	1,246,560
Rice-wheat-and-rush farm in land class III-IV:			
Gross farm income			
Rice, wheat and barley	326,070	580,100	865,260
All others	195,130	226,200	267,180
Farm privileges	106,370	124,150	142,970
Gross farm family earnings	627,570	930,450	1,275,410
Rice-wheat- and-rushmat-processing farms in land class III-IV:			
Gross farm income from			
Rice, wheat and barley	325,240	568,100	852,070
All others	533,870	645,380	753,860
Farm privileges	109,710	127,770	155,120
Gross farm family earnings	968,820	1,341,150	1,761,050
Gross farm family earnings:		per 0.1 hectare	
Land class I:	¥.	¥.	¥.
Rice-wheat farms	61,700	63,000	61,700
Land class II:			
Rice-wheat farms	66,100	68,100	69,500
Rice-wheat-and-rush farms	79,000	86,700	80,400
Land class III-IV:			
Rice-wheat-and-rush farms	89,600	84,600	82,300
Rice-wheat-and-rushmat-processing farms	138,300	121,900	110,000

1) Includes the receipts from mat-rushes, processed rushmats, vegetables, livestock and livestock products, and so on.

earnings per farm on every type of farms increased almost proportionally with size of farm, and, consequently, gross farm family earnings per 0.1 hectare on a given type of farms came to nearly the same amount on every size of farm. A proportional increase of gross farm family earnings per farm with size of farm was due to that the yields of rice and other major crops per unit of land on the large-sized farms were equally good as compared with those on the small-sized ones (Table 13), and the receipts from sources other than rice-and-wheat also increased with size of farm (Tables 14 and 15).

It will be seen in Table 16 that the average area of mat-rushes per farm on both types of rice-wheat-and-rush and rice-and-wheat-and-rushmat-processing farms increased with size of farm, and, at the same time, with land class. Comparing the area of this

highly intensive, commercial crop by variety, the average area of early maturing variety was relatively large on rushmat-processing farms as compared with farms without a processing activity; and it was relatively large on small-sized farms on a given type

Table 13. Average yields of rice, wheat and mat-rushes per 0.1 hectare and crop yield index on different types of farms in the small-sized, the medium-sized, and the large-sized in land classes I, II, and III-IV, Chikugo Plain.

	Small-sized farms	Medium-sized farms	Large-sized farms
Yield of rice per 0.1 ha.:	kilogrammes		
Land class I:			
Rice-wheat farms	500	499	509
Land class II:			
Rice-wheat farms	562	574	568
Rice-wheat-and-rush farms	566	589	581
Land class III-IV:			
Rice-wheat-and-rush farms	590	592	584
Rice-wheat-and-rushmat-processing farms	592	593	599
Yield of wheat per 0.1 ha.:	kilogrammes		
Land class I:			
Rice-wheat farms	252	230	225
Land class II:			
Rice-wheat farms	250	242	255
Rice-wheat-and-rush farms	263	259	259
Land class III-IV:			
Rice-wheat-and-rush farms	257	263	253
Rice-wheat-and-rushmat-processing farms	249	255	256
Yield of mat-rushes per 0.1 ha.:	kilogrammes		
Land class II:			
Rice-wheat-and-rush farms	1,180	1,210	1,210
Land class III-IV:			
Rice-wheat-and-rush farms	1,170	1,180	1,170
Rice-wheat-and-rushmat-processing farms	1,220	1,210	1,190
Crop yield index ¹⁾			
Land class I:			
Rice-wheat farms	94	90	90
Land class II:			
Rice-wheat farms	100	100	101
Rice-wheat-and-rush farms	103	105	103
Land class III-IV:			
Rice-wheat-and-rush farms	103	105	104
Rice-wheat-and-rushmat-processing farms	104	104	104

1) Crop yield index is in this case the aggregated index number of the three major crops, that is, rice, wheat and mat-rushes.

Table 14. Average area of crops per farm on different types of farms of the small-sized, the medium-sized, and the large-sized in land classes I, II, and III-IV, Chikugo Plain, 1964.

Land classes and types of farms	Small-sized farms		Medium-sized farms		Large-sized farms	
	Area	Percent	Area	Percent	Area	Percent
Land class I:	0.1 ha.		0.1 ha.		0.1 ha.	
Rice-wheat farms:						
Rice	7.0	100.0	10.9	99.1	15.5	100.0
Wheat and barley	4.9	70.0	6.5	59.1	11.5	74.2
Mat-rushes	0.2	3.0	0.4	3.6	0.6	3.9
Vegetables	0.8	11.0	0.6	5.5	0.8	5.2
Others	0.2	3.0	0.1	0.9	0.2	1.3
Total	13.1	187.0	18.5	168.2	28.6	184.6

Land classes and types of farms	Small-sized farms		Medium-sized farms		Large-sized farms	
	Area	Percent	Area	Percent	Area	Percent
Land class II:	0.1 ha		0.1 ha		0.1 ha	
Rice-wheat farms:						
Rice	7.0	100.0	11.0	100.0	15.5	100.0
Wheat and barley	4.9	70.0	7.4	67.3	9.6	61.9
Mat-rushes	0.7	10.0	0.5	4.5	1.2	7.7
Vegetables	0.3	4.0	0.4	3.6	0.7	4.5
Others	0.1	2.0	0.3	2.7	0.3	1.9
Total	13.0	186.0	19.6	178.1	27.3	176.0
Rice-wheat-and-rush farms:						
Rice	6.9	99.0	10.9	99.1	15.5	100.0
Wheat and barley	4.1	59.0	6.5	59.1	10.3	66.5
Mat-rushes	2.1	30.0	2.3	20.9	3.1	20.0
Vegetables	0.3	4.0	0.8	7.3	0.6	3.9
Others	...	...	0.1	0.9	0.1	0.6
Total	13.4	192.0	20.6	187.3	29.6	191.0
Land class III-IV:						
Rice-wheat-and-rush farms:						
Rice	6.9	99.0	10.9	99.0	15.4	99.4
Wheat and barley	3.0	43.0	5.7	51.8	9.9	63.9
Mat-rushes	2.6	37.0	3.1	28.2	3.2	20.6
Vegetables	0.2	3.0	0.3	2.7	0.4	2.6
Others	...	...	...	...	...	...
Total	12.7	182.0	20.0	181.7	28.9	186.5
Rice-wheat-and-rushmat-processing farms:						
Rice	7.0	100.0	10.9	99.1	15.1	97.4
Wheat and barley	2.6	37.0	5.2	47.3	7.3	47.0
Mat-rushes	3.2	46.0	3.5	31.8	4.3	27.7
Vegetables	0.3	4.0	0.3	2.7	0.4	2.6
Others	...	...	0.1	0.9	...	...
Total	13.1	187.0	20.1	181.8	27.1	174.7

Table 15. Land use ratio and gross receipts from crops per 0.1 hectare on different types of farms of the small-sized, the medium-sized, and the large-sized in land classes I, II, and III-IV, Chikugo Plain, 1964.

Land classes and types of farms	Small-sized farms	Medium-sized farms	Large-sized farms
Land use ratio:	Percent	Percent	Percent
Land class I:			
Rice-wheat farms	187	168	185
Land class II:			
Rice-wheat farms	186	178	176
Rice-wheat-and-rush farms	192	187	191
Land class III-IV:			
Rice-wheat-and-rush farms	182	182	187
Rice-wheat-and-rushmat-processing farms	187	182	175
Gross farm receipts from crops per 0.1 ha.:	yen	yen	yen
Land class I:			
Rice-wheat farms	58,890	58,300	58,150
Land class II:			
Rice-wheat farms	64,340	64,620	65,390
Rice-wheat-and-rush farms	72,510	72,750	73,530
Land class III-IV:			
Rice-wheat-and-rush farms	82,530	75,710	75,710
Rice-wheat-and-rushmat-processing farms	85,380	79,780	79,430

Table 16. Average area of mat-rushes per farm by variety.

	Small-sized farms		Medium-sized farms		Large-sized farms	
	Area	Percent	Area	Percent	Area	Percent
Rice-wheat-and-rush farms in land class II:	0.1 ha.		0.1 ha.		0.1 ha.	
Total area of mat-rushes per farm	2.1	100	2.3	100	3.1	100
Early maturing variety	0.3	14	0.2	9	0.1	3
Ordinary variety	1.8	86	2.1	91	3.0	97
Rice-wheat-and-rush farms in land class III-IV:						
Total area of mat-rushes per farm	2.6	100	3.1	100	3.2	100
Early maturing variety	0.5	19	0.4	13	0.3	9
Ordinary variety	2.1	81	2.7	87	2.9	91
Rice-wheat-and-rushmat-processing farms in land class III-IV:						
Total area of mat-rushes per farm	3.2	100	3.5	100	4.3	100
Early maturing variety	0.6	19	0.5	14	0.6	14
Ordinary variety	2.6	81	3.0	86	3.7	86

Table 17. Amount of mat-rushes produced, purchased, and processed in the year, cash expenses for processing, and other factors relating to rushmat-processing on different sized of rushmat-processing farms in land class III-IV, Chikugo Plain, 1964.

	Small-sized farms	Medium-sized farms	Large-sized farms
Number of processing machinery per farm	2.2	3.2	3.3
Mat-rushes acquired:	kg.	kg.	kg.
Mat-rushes produced in the year ¹⁾	3,900	4,230	5,120
Mat-rushes purchased in the year	4,810	4,950	4,910
Mat-rushes on hand at the beginning of the year	170	20	260
Total	8,880	9,200	10,290
Distribution of mat-rushes:	kg.	kg.	kg.
Mat-rushes processed in the year ²⁾	8,120	8,920	9,060
Mat-rushes sold in the year	50	50	150
Mat-rushes on hand at the end of the year	710	230	1,080
Total	8,880	9,200	10,290
Purchased mat-rushes processed in the year ³⁾	4,050	4,670	3,680
Expenses spent for:	¥.	¥.	¥.
Mat-rushes processed in the year	179,020	190,330	170,030
Strings and other materials	58,480	61,060	59,600
Total	237,500	251,390	229,630
Receipts from processed rushmats per farm (yen)	493,330	600,130	653,880
Proportion of cash expenses to receipts (%)	48	42	35
Receipts per kilogram of mat-rushes processed (yen)	61	67	72
Proportion of the farm raised mat-rushes to the total mat-rushes processed in the year (%)	48	47	59
Average price of mat-rushes purchased (yen, per kilogram)	44	41	46

- 1) The year studied covers the period beginning on June 1, 1963 and ending on June 1, 1964 in the case of mat-rushes.
- 2) It is conditioned that the mat-rushes produced on the farm are used entirely in the year, and that the mat-rushes which are carried forward to the next year are entirely a part of those which are purchased from others. The value of the part of mat-rushes carried forward to the next year is not included in farm expenses in the year studied.
- 3) This is only the part of purchased mat-rushes used in processing in the year, and the part of purchased mat-rushes those carried forward to the next year was excluded.

of farms within each land class.

The early maturing variety of mat-rushes is usually harvested in the middle of June. This is one month earlier than the usual harvesting time of the ordinary one. The mat-rushes of early maturing variety is usually sold out or processed into mats immediately after the harvest. The yield of early maturing mat-rushes per unit of land is about 20 percent lower in general than that of the ordinary one. But sometimes the farmers did enjoy a good price for that crop harvested in early season or for the processed rushmats made of that early harvested mat-rushes. Moreover, it is also the common practice on the processing farms that the cash received from the sale of rushmats made of that early harvested ones is expended to pay for purchased mat-rushes as material. To grow early maturing mat-rushes to a reasonable extent, therefore, seems to be important not only to make the seasonal distribution of farm work even, but also to reduce the risk of seasonal price fluctuation and to get cash income at the right time when it is particularly needed to purchase material advantageously.

Receipts from rushmats on processing farms in land class III-IV increased from ¥ 493,300 in the small-sized, to ¥ 600,100 in the medium-sized, and then, to ¥ 653,900 in the large-sized (Table 17). However, the increase in the amount of receipts from processed rushmats was relatively small in comparison with the increase in size of

Table 18. Farm expenses per farm on different types of farms of the small-sized, the medium-sized, and the large-sized farms in land classes I, II, and III-IV, Chikugo Plain, 1964.

Item	Small-sized farms		Medium-sized farms		Large-sized farms	
	Amount of value	Percent	Amount of value	Percent	Amount of value	Percent
Rice-wheat farms in land class I:	yen		yen		yen	
Cash farm expenses:						
Fertilizer	29,720	24.3	42,510	19.1	64,000	20.9
Hired labor	11,760	9.6	24,230	10.9	43,570	14.2
Chemicals	7,520	6.2	12,300	5.5	16,800	5.5
Seed and materials for crops	2,800	2.3	9,300	4.1	12,950	4.2
Materials for processing	1,780	1.5	1,200	0.5	4,460	1.5
Gas, oil and electricity	5,780	4.7	9,060	4.1	13,670	4.5
Custom work	6,650	5.4	3,510	1.6	...	...
Threshing	2,770	2.3	4,030	1.8	5,360	1.7
Irrigation fee	6,620	5.4	7,850	3.5	12,180	4.0
Repairs and small tools bought	9,280	7.6	11,770	5.3	13,860	4.5
Miscellaneous	4,520	3.7	22,650	10.2	10,320	3.4
Total	89,200	73.0	148,410	66.6	197,170	64.4
Depreciation	33,080	27.0	74,610	33.4	108,800	35.6
Total farm expenses	122,280	100.0	223,020	100.0	305,970	100.0
Rice-wheat farm in land class II:	yen		yen		yen	
Cash farm expenses:						
Fertilizer	29,650	21.1	43,560	19.4	64,030	19.8
Hired labor	14,970	10.6	24,890	11.1	45,530	14.1
Chemicals	8,030	5.7	13,460	6.0	22,650	7.0
Seed and materials for crops	7,810	5.5	11,680	5.2	14,290	4.5
Materials for processing	770	0.5	4,430	2.0	1,130	0.4
Gas, oil and electricity	4,040	2.9	11,250	5.0	12,350	3.8
Custom work	9,010	6.4	4,380	2.0	1,380	0.4
Threshing	2,570	1.8	4,050	1.8	7,040	2.2
Irrigation fee	6,600	4.7	8,850	3.9	14,710	4.6
Repairs and small tools bought	11,240	8.0	17,340	7.7	20,950	6.5
Miscellaneous	5,500	4.5	8,490	3.8	14,140	4.3
Total	100,190	71.2	152,380	67.9	218,200	67.6
Depreciation	40,540	28.8	72,040	32.1	104,550	32.1
Total farm expenses	140,730	100.0	224,420	100.0	322,750	100.0

Item	Small-sized farms		Medium-sized farms		Large-sized farms	
	Amount of value	Percent	Amount of value	Percent	Amount of value	Percent
(Continued)						
Rice-wheat-and-rush farms in land class II:	yen		yen		yen	
Cash farm expenses:						
Fertilizer	36,140	22.7	56,070	20.5	77,900	21.4
Hired labor	4,420	2.8	26,070	9.6	50,860	14.0
Chemicals	9,550	6.0	14,490	5.3	21,290	5.9
Seed and materials for crops	11,330	7.1	17,040	6.2	22,410	6.1
Materials for processing	830	0.5	5,100	1.9	2,970	0.8
Gas, oil and electricity	7,480	4.7	13,530	5.0	15,580	4.3
Custom work	7,290	4.6	1,340	0.5	4,130	1.1
Threshing	3,210	2.0	3,630	1.3	6,150	1.7
Irrigation fee	8,800	5.5	13,640	5.0	18,050	5.0
Repairs and small tools bought	8,870	5.6	17,290	6.3	33,170	9.1
Miscellaneous	10,120	6.3	20,800	7.6	5,860	1.6
Total	108,040	67.8	189,000	69.2	258,370	71.0
Depreciation	51,310	32.2	87,890	30.8	105,300	29.0
Total farm expenses	159,350	100.0	276,890	100.0	363,670	100.0
Rice-wheat-and-rush farms in land class III-IV:	yen		yen		yen	
Cash farm expenses:						
Fertilizer	35,020	18.8	57,130	23.2	72,500	21.5
Hired labor	11,070	5.9	29,840	12.1	52,310	15.5
Chemicals	8,660	4.6	11,730	4.8	19,390	5.8
Seed and materials for crops	10,650	5.7	14,760	6.0	19,620	5.8
Materials for processing	4,580	2.5	1,940	0.8	2,200	0.7
Gas, oil and electricity	10,020	5.4	10,150	4.1	17,390	5.2
Custom work	1,000	0.5	650	0.2	...	...
Threshing	3,840	2.1	4,180	1.7	7,850	2.3
Irrigation fee	10,790	5.8	11,950	4.9	19,770	5.9
Repairs and small tools bought	6,840	3.7	10,000	4.1	15,110	4.4
Miscellaneous	25,570	13.7	20,780	8.4	12,740	3.8
Total	128,040	68.7	173,110	70.3	238,880	70.9
Depreciation	58,280	31.3	73,120	29.7	98,070	29.1
Total farm expenses	186,320	100.0	246,230	100.0	336,950	100.0
Rice-wheat-and-rushmat-processing farms in land class III-IV:	yen		yen		yen	
Cash farm expenses:						
Fertilizer	43,320	9.6	56,740	9.8	75,560	11.8
Hired labor	17,330	3.8	54,800	9.5	58,740	9.2
Chemicals	9,050	2.0	14,500	2.5	17,560	2.8
Seed and materials for crops	12,680	2.8	15,640	2.7	19,160	3.0
Materials for processing	237,500	52.5	251,390	43.6	239,630	37.6
Gas, oil and electricity	14,930	3.3	18,010	3.1	20,240	3.2
Custom work	1,720	0.4	3,950	0.7	...	...
Threshing	3,290	0.7	5,030	0.9	7,930	1.2
Irrigation fee	11,600	2.6	16,490	2.9	21,710	3.4
Repairs and small tools bought	12,780	2.8	14,440	2.5	24,030	3.8
Miscellaneous	10,910	2.4	22,450	3.9	18,620	2.9
Total	375,110	82.9	473,440	82.1	503,180	78.9
Depreciation	77,290	17.1	103,350	17.9	134,920	21.1
Total farm expenses	452,400	100.0	576,790	100.0	638,100	100.0

farm. As a result, total gross farm family earnings per 0.1 hectare on this rushmat-processing type farms decreased as the size of farm increased (see Table 12). It was probably due to a limited supply of labor forces which could be utilized for rushmat processing activity.

Of the total gross farm family earnings per farm, the amount of farm privileges which was chiefly consisted of rice consumed on the farm varied little by size of farm or by type of farming (see Table 12). The amount of farm privileges per farm seemed

to depend primarily on the size of families per farm which also varied only a little by size of farm or by type of farming. It should be noted, therefore, that the proportion of the part of commercial income of the total gross farm family earnings increased with size of farm or with intensity of type of farming. In other words, it indicated that the larger the size of farm or the higher the degree of intensity of type of farming, the higher the rate of commercialization of farming.

Farm expenses: Itemized farm expenses per farm are summarized in Table 18. What is indicated in the table is that the larger the size of farm, the larger the farm expenses per farm; and the higher the level of intensity of type of farming, the larger the farm expenses per farm.

Taking for cash farm expenses, the annual expenses for most items increased almost proportionally with size of farm except for some items including those connecting with mat-rushes and rushmat-processing enterprise.

A few exceptions were wages paid for hired labor and fee for custom works. Wages paid for hired labor per farm on the large-sized farms were considerably larger than those on the small-sized or medium-sized ones. In the case of rice-wheat farms in the lowest land class, for example, wages for hired labor were ¥ 43,600 per farm on the large-sized farms; this amount of value was nearly four times greater than those on the small-sized ones. Contrary to wages for hired labor, fee paid for custom works was a relatively large on the small-sized farms. In the case of rice-wheat farms in the lowest land class, fee for custom works averaged ¥ 6,650 per farm in the small-sized, ¥ 3,510 per farm in the medium-sized, and no expense was paid at all in the large-sized. It indicated that the small-sized farms which were poorly equipped depended relatively strongly on custom works.

Since the most items of cash farm expenses increased nearly proportionally with

Table 19. Farm expenses per 0.1 hectare on different types of farms in the small-sized, the medium-sized, and the large-sized in land classes I, II, and III-IV, Chikugo Plain, 1964.

Land classes and types of farms	Small-sized farms	Medium-sized farms	Large-sized farms
Land class I:	yen	yen	yen
Rice-wheat farms:			
Cash farm expenses	12,740	13,490	12,720
Depreciation costs	4,730	6,780	7,020
Total farm expenses	17,470	20,270	19,740
Land class II:			
Rice-wheat farms:			
Cash farm expenses	14,310	13,850	14,080
Depreciation costs	5,790	6,550	6,750
Total farm expenses	20,100	20,400	20,830
Rice-wheat-and-rush farms:			
Cash farm expenses	15,430	17,180	16,670
Depreciation costs	7,330	7,630	6,790
Total farm expenses	22,760	24,810	23,460
Land class III-IV:			
Rice-wheat-and-rush farms:			
Cash farm expenses	18,290	15,740	15,410
Depreciation costs	8,330	6,650	6,330
Total farm expenses	26,620	22,390	21,740
Rice-wheat-and-rushmat-processing farms:			
Cash farm expenses	53,250	43,040	31,820
Depreciation costs	11,040	9,400	8,700
Total farm expenses	64,290	52,440	40,520

Table 20. Ratio of farm expenses to gross farm family earnings on different types of farms in the small-sized, the medium-sized, and the large-sized in land classes I, II, and III-IV, Chikugo Plain, 1964.

Land classes and types of farms	Small-sized farms	Medium-sized farms	Large-sized farms
Ratio of cash farm expenses to gross farm family earnings:	percent		
Land class I:			
Rice-wheat farms	20.6	21.4	18.7
Land class II:			
Rice-wheat farms	21.6	20.4	20.2
Rice-wheat-and-rush farms	19.5	19.8	20.7
Land class III-IV:			
Rice-wheat-and-rush farms	20.4	18.6	18.7
Rice-wheat-and-rushmat-processing farms	38.7	35.3	29.5
Ratio of depreciation costs to gross farm family earnings:	percent		
Land class I:			
Rice-wheat farms	7.7	10.8	11.4
Land class II:			
Rice-wheat farms	8.8	9.6	9.7
Rice-wheat-and-rush farms	9.3	8.8	8.4
Land class III-IV:			
Rice wheat-and-rush farms	9.3	7.9	7.7
Rice-wheat-and-rushmat-processing farms	8.0	7.7	7.9
Ratio of total farm expenses to gross farm family earnings:	percent		
Land class I:			
Rice-wheat farms	28.3	32.2	30.1
Land class II:			
Rice-wheat farms	30.3	30.0	29.9
Rice-wheat-and-rush farms	28.8	28.6	29.1
Land class III-IV:			
Rice-wheat-and-rush farms	29.7	26.5	26.4
Rice-wheat-and-rushmat-processing farms	46.7	43.0	37.4

size of farm, then, the total cash farm expenses per 0.1 hectare of arable land on each type of farms except for rice-wheat-and-rushmat-processing farms came to a similar amount on each size of farms (Table 19); and the ratio of cash farm expenses to the total gross farm family earnings on the same type of farms within a given land class varied little by size of farm or rather decreased to a moderate extent with sized of farm. Taking for rice-wheat-and-rush farms in land class III-IV, as an example, the ratio was 20 percent in the small-sized and 19 percent in the medium-sized and in the large-sized (Table 20).

On rice-wheat-and-rushmat-processing farms in the highest land class, the ratio of cash farm expenses was about 39 percent in the small-sized, 35 percent in the medium-sized, and only 29 percent in the large-sized. The lower ratio of cash farm expenses on large-sized farms was attributed to that the relative weight of rushmat-processing enterprise in the total farm business on a unit farm was smaller on larger farms on the one hand, and, on the other hand it was attributed to that the percentage of the home raised mat-rushes used for processing in the year was higher on larger farms and the receipts from processed rushmats per kilogramm of mat-rushes used for processing were also somewhat higher on larger farms (see Table 17). Farmers on the large-sized rushmat-processing farms seemed to be running their processing businesses relatively more profitably.

Annual depreciation costs per farm are indicated inclusively in Table 18 presented in a preceeding page. The amount of depreciation costs also increased as the size of

farm increased without regard to types of farms or land class. However, the total depreciation costs per 0.1 hectare on a given type of farms were approximately same on each size of farm or slightly decreased as the size of farm increased with an exception for rice-wheat farms in land class I (Table 19).

Comparing the depreciation costs per 0.1 hectare on rice-wheat farms in lower land classes, they increased with size of farm (Table 19). It was exclusively due to an increase of depreciation cost of machinery and equipment with size of farm. The small-sized farms which were poorly equipped with machinery had a relatively small amount of depreciation cost of machinery and equipment which consisted of a major part of the total depreciation costs, while large-sized rice-wheat farms which were equipped well with power machinery had a considerably larger amount of depreciation cost for that type of fixed assets; that is, the depreciation cost of machinery and

Table 21. Working capital per farm and percentage distribution by item.

Land classes and types of farms	Small-sized farms		Medium-sized farms		Large-sized farms	
	Amount of value	Percent	Amount of value	Percent	Amount of value	Percent
	yen		yen		yen	
Land class I:						
Rice-wheat farms:						
Farm buildings	269,500	58	363,400	51	438,500	54
Machinery and equipment I ¹⁾	143,900	31	226,400	32	214,600	26
Machinery and equipment II ²⁾	9,400	2	44,500	6	71,800	9
Livestock	2,900	1	3,700	1	2,400	—
Circulating capital	39,500	8	72,000	10	97,200	11
Total working capital	465,200	100	710,000	100	824,500	100
Land class II:						
Rice-wheat farms:						
Farm buildings	274,000	60	395,200	56	608,600	59
Machinery and equipment I	127,700	28	193,400	27	242,400	25
Machinery and equipment II	7,900	2	46,400	7	53,000	5
Livestock	...	—	...	—	10,400	1
Circulating capital	49,100	10	73,500	10	111,700	10
Total working capital	458,700	100	708,500	100	1,026,100	100
Rice-wheat-and-rush farms:						
Farm buildings	339,500	58	641,300	64	743,500	61
Machinery and equipment I	177,600	31	218,500	22	281,300	23
Machinery and equipment II	8,000	2	47,500	5	60,700	5
Livestock	...	—	...	—	...	—
Circulating capital	54,300	9	94,900	10	128,700	11
Total working capital	579,400	100	1,002,200	100	1,214,200	100
Land class III-IV:						
Rice-wheat-and-rush farms:						
Farm buildings	368,700	57	621,200	67	757,100	63
Machinery and equipment I	166,100	26	194,200	21	254,700	21
Machinery and equipment II	42,400	7	41,100	4	64,400	5
Livestock	1,500	—	—	—	3,300	—
Circulating capital	63,000	10	75,200	8	125,700	11
Total working capital	641,700	100	931,700	100	1,205,200	100
Rice-wheat-and-rushmat-processing farms:						
Farm buildings	405,500	47	657,100	55	894,100	54
Machinery and equipment I	131,900	15	183,700	16	314,800	19
Machinery and equipment II	134,300	16	139,200	12	202,100	12
Livestock	—	—	3,500	—	2,700	—
Circulating capital	186,200	22	202,700	17	247,800	15
Total working capital	857,900	100	1,186,200	100	1,661,500	100

1) Machinery and equipment used for growing crops and for hauling.

2) Machinery and equipment used in dairy and processing enterprises.

equipment on the large-sized rice-wheat farms averaged a little over ¥ 90,000 per farm, or somewhat over four and one second times as large as that on the small-sized rice-wheat ones (see Table 18).

Depreciation costs per 0.1 hectare on types of farms other than rice-wheat farms, however, decreased with size of farm in both land classes II and III-IV. A relatively large depreciation costs per 0.1 hectare on farms in the small-sized was due to that the intensive types of farms were frequently equipped with power machinery even in the small-sized and they also had a large buildings relative to the given size of small farm (see Tables 18 and 19).

In any way, the amount of annual depreciation costs per farm or per unit of land was in correspond with the amount of capital invested in various types of working assets. The amount of working capital per farm by type of asset is shown in Table 21. That the amount of working capital per unit of land decreased with size of farm and that the ratio of annual depreciation costs to the total gross farm family earnings also decreased with size of farm especially on more intensive types of farms in higher land classes indicated that the efficiency in the use of capital assets was higher on large-sized intensive types of farms.

FARM LABOR AND FARM FAMILY EARNINGS PER UNIT OF LABOR

Farm labor per farm: Greater amount of farm family earnings per farm on larger farms or on more intensive types of farms was obtained with the input of larger amount of labor per farm. Then, returns of farming on different types of farms with varying size of farm are analyzed in the following part of this section on the basis of per-unit-labor.

As indicated in Table 22, the number of labor days used on the farm for the year was much larger on larger farms or on more intensive types of farms. Though the number of days of hired labor per farm increased to a moderate extent with size of farm, hired labor accounted for only 4 or 5 percent of the total labor used for the year even on large-sized intensive types of farms. Most part of the farm works in the area was done by family members, especially by those members who were in farming on their own farms as full-time workers. The percentage of labor done by full-time farm family workers accounted for 85 percent or more on the large-sized farms or on highly intensive types of farms in higher land classes. The percentage mentioned above was higher on those farms which required much increased amount of labor per farm (Table 22).

As expected from the foregoing, the average number of full-time farm family workers per farm was relatively many on large-sized farms or on more intensive types of farms in higher land classes. That is, the number of them averaged 2.7 or somewhat more on every type of farms in the large-sized or on rice-wheat-and-rushmat-processing farms in the medium-sized, while only 1.2 men were in farming as full-time workers on the small-sized rice-wheat farms in land classes I and II (Table 23).

It will be apparent that many kinds of key operations on the farm require at least two men for a greater efficiency and the demand for man labor at the time during busy seasons exceeds a maximum supply of labor which could be done by one man even on the small-sized farms of lower level of intensity. It was probably one of the reasons why small-sized farms, especially those of rice-wheat farms, which had only 1.2 men of full-time workers per farm on the average, paid a relatively small amount of net farm family earnings to a day labor of the family as it is mentioned later.

Another point to be mentioned regarding to the number of full-time farm family workers per farm is that the average number of all family members who were in the

Table 22. Number of farm labor days per farm on the small-sized, the medium-sized, and the large-sized farms of different types of farms, Chikugo Plain, 1964.

Land classes and types of farming	Small-sized farms		Medium-sized farms		Large-sized farms	
	Number of labor days	percent	Number of labor days	percent	Number of labor days	percent
Land class I:	days		days		days	
Rice-wheat farms:						
Full-time family labor ¹⁾	235	68.3	416	79.3	642	87.7
Part-time family labor ²⁾	100	29.1	90	17.1	58	7.9
Hired labor	9	2.6	19	3.6	32	4.4
Total farm labor	344	100.0	525	100.0	732	100.0
Land class II:						
Rice-wheat farms:						
Full-time family labor	256	69.6	380	79.2	622	87.6
Part-time family labor	100	27.1	80	16.7	55	7.7
Hired labor	12	3.3	20	4.1	33	4.7
Total farm labor	368	100.0	480	100.0	710	100.0
Rice-wheat-and-rush farms:						
Full-time family labor	395	84.2	534	89.6	705	88.6
Part-time family labor	71	15.1	40	6.7	52	6.5
Hired labor	3	0.7	22	3.7	39	4.9
Total farm labor	469	100.0	596	100.0	796	100.0
Land class III-IV:						
Rice-wheat-and-rush farms:						
Full-time family labor	432	84.2	527	89.8	645	85.9
Part-time family labor	74	14.5	39	6.6	67	8.9
Hired labor	7	1.3	21	3.6	39	5.2
Total farm labor	513	100.0	587	100.0	751	100.0
Rice-wheat-and-rushmat-processing farms:						
Full-time family labor	551	90.8	675	88.6	746	88.7
Part-time family labor	43	7.1	45	5.9	53	6.3
Hired labor	13	2.1	42	5.5	42	5.0
Total farm labor	607	100.0	762	100.0	841	100.0

- 1) Labor done by full-time family workers who are defined as those worked 150 days or more a year on the home farm.
- 2) Labor contributed by part-time family workers who worked less than 150 days a year on the home farm.

age ranging from 16 up to 60 years old after deducted those in school was 3.3 to 3.5 men per farm almost independent to size of farm or type of farms in the area, and, therefore, the proportion of full-time farm family workers per farm to the total number of family workers stated above was one-third or so on less intensive type of small-sized farms and, on the contrary, it was approximately four-fifths on types of farms in the large-sized or on rice-wheat-and-rushmat-processing farms in the medium-sized. This means that the former groups of farms were primarily part-time farms; and the latter, the full-time ones in the area.

Farm labor per 1.0 hectare: Though the total number of labor days per farm increased on every type of farms as the size of farm increased, labor days per 0.1 hectare rather decreased with size of farm as given in Table 24.

The decrease in the number of labor days per 0.1 hectare was relatively more striking on farms with rushmat-processing enterprise. It was chiefly because the size of processing enterprise increased but a little and, at the same time, the number of total labor days per farm also increased only a little with size of farm.

Table 23. Number of farm family workers per farm on the small-sized, the medium-sized, and the large-sized farms of different types of farms, Chikugo Plain, 1964.

Land classes and types of farms	Small-sized farms	Medium-sized farms	Large-sized farms
Full-time workers :	men	men	men
Land class I :			
Rice-wheat farms	1.2	2.0	2.8
Land class II :			
Rice-wheat farms	1.2	1.7	2.7
Rice-wheat-and-rush farms	1.8	2.3	2.9
Land class III-IV :			
Rice-wheat-and-rush farms	2.0	2.2	2.7
Rice-wheat-and-rushmat-processing farms	2.3	2.8	2.9
Part-time workers :	men	men	men
Land class I :			
Rice-wheat farms	1.6	1.7	0.8
Land class II :			
Rice-wheat farms	1.7	2.1	0.9
Rice-wheat-and-rush farms	1.4	1.5	0.7
Land class III-IV :			
Rice-wheat-and-rush farms	1.0	0.6	1.1
Rice-wheat-and-rushmat-processing farms	0.9	0.8	0.8

Table 24. Number of labor days per 0.1 hectare

	Small-sized farms	Medium-sized farms	Large-sized farms
Land class I :	days	days	days
Rice-wheat farms	49	48	47
Land class II :			
Rice-wheat farms	53	44	46
Rice-wheat-and-rush farms	67	54	51
Land class III-IV :			
Rice-wheat-and-rush farms	73	53	48
Rice-wheat-and-rushmat-processing farms	87	69	54

The number of farm labor days per 0.1 hectare on rice-wheat farms in land class II and rice-wheat-and-rush farms in land classes II and III-IV decreased considerably with size of farm. On the latter type of farms in land class II, for instance, it averaged 67 days in the small-sized, 54 days in the medium-sized, and 51 days in the large-sized; and in this case, average gross farm family earnings per 0.1 hectare was ¥ 79,000 in the small-sized, ¥ 86,700 in the medium-sized and ¥ 80,400 in the large-sized (see Table 12). It suggested that farm labor was more efficiently used on larger farms.

The number of labor days per 0.1 hectare on rice-wheat farms in land class I, however, did not clearly decreased with size of farm. It seemed to indicate that the efficiency in the use of family labor was not necessarily higher on larger farms in the lowest land class where the conditions of land was relatively unfavourable and the farms were relatively poorly equipped with machinery on the average.

Farm family earnings per unit labor of the family: Table 25 indicates farm family earnings per day labor of the family. In spite of that a much increased amount of family labor was used on more intensive types of farms or on larger farms, the level of net earnings per unit labor of the family was higher in general on more intensive types of farms or on larger farms.

Comparing the level of farm family earnings per day of the family labor between sizes of farms on each type of farms in a given land class first, it was higher on larger

Table 25. Farm family earnings per day labor of the family and farm family earnings per full-time farm family worker a year on different types of farms in land classes I, II, and III-IV, Chikugo Plain, 1964.

	Small-sized farms	Medium-sized farms	Large-sized farms
Per day labor of the family :	¥.	¥.	¥.
Land class I :			
Rice-wheat farms	920	930	930
Land class II :			
Rice-wheat farms	910	1,140	1,120
Rice-wheat-and-rush farms	850	1,190	1,170
Land class III-IV :			
Rice-wheat-and-rush farms	870	1,120	1,320
Rice-wheat-and-rushmat-processing farms	870	1,090	1,340
Per full-time farm family worker a year ¹⁾ :	¥.	¥.	¥.
Land class I :			
Rice-wheat farms	190,600	198,800	215,300
Land class II :			
Rice-wheat farms	200,900	270,200	263,100
Rice-wheat-and-rush farms	187,000	281,800	289,900
Land class III-IV :			
Rice-wheat-and-rush farms	190,600	296,700	327,500
Rice-wheat-and-rushmat-processing farms	209,400	260,000	353,100

- 1) The value of unpaid part-time farm family labor which was valued at the rate of 810 yen a day was deducted from the total farm family earnings per farm, and the remainder was divided by the average number of full-time farm family workers per farm.

farms. However, the difference in the amount of net earnings per day labor on the large-sized and the small-sized farms was very small on less intensive ricewheat farms in land classes I and II, and, on the contrary, it was considerably larger on intensive types of farms in land class III-IV. In other words, net earnings per day labor increased more strikingly with size of farm on highly intensive types of farms in higher land classes, while the amount of them did not increase or increased but a little with size of farm on less intensive type of farms in lower land classes (Table 25).

Taking for different types of farms in each size of farm, the level of net earnings per day labor of the family became higher as the degree of intensity of types of farms increased with land class both in the medium-sized and in the large-sized. An exception was the medium-sized rice-wheat-and-rushmat-processing farms in land class III-IV.

As already stated in the previous section, the level of net earnings per day labor of the family on that processing type farms in the medium-sized was not higher but somewhat lower than that on the other types of medium-sized farms in land classes II and III-IV. Rushmat-processing type farms in the large-sized, however, earned the highest net earnings per day labor among various types of farms in the large-sized. Contrary to the cases stated above for farms in the medium-sized and in the large-sized, net earnings per day labor of the family on types of farms in the small-sized were deficient on highly intensive types of farms in higher land classes; that is, they were on the average ¥ 920 on rice-wheat farms in land class I, while ¥ 870 on both types of intensive farms in land class III-IV (Table 25).

It was interesting that the average farm family earnings per day labor of the family on types of farms in the small-sized were close to the average wage rate that was actually received by full-time farm family workers in off-farm jobs in the area

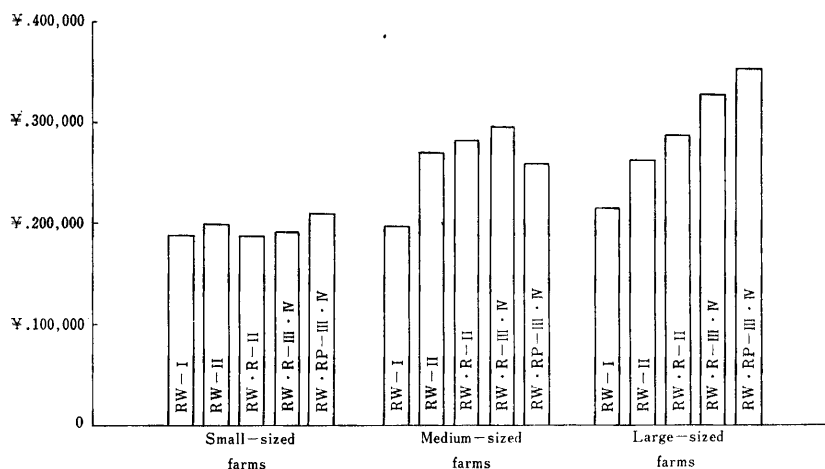


Fig. 3. Farm family earnings per full-time farm family worker a year.

- * RW-I.....Rice-wheat farms in land class I
 RW-IIRice-wheat farms in land class II
 RW·R-IIRice-wheat-and-rush farms in land class II
 RW·R-III·IV.....Rice-wheat-and-rush farms in land class III·IV
 RW·RP-III·IV ...Rice-wheat-and-rushmat-processing farms in
 land class III·IV

during slack seasons. It suggested that a competitive relationship existed in the distribution of farm family labor into farm and off-farm jobs and the net returns of farming which were compared with wage rates in off-farm jobs were not labor income or labor earnings but farm family earnings which are the mixed income earned by both factors, i. e., family labor and farm capital including the capital invested in land.

Consequently it might be possible to say that the highly intensive type of farming in the small-sized in the area would become unreasonable if the wage rates in off-farms jobs in the area increased beyond the present level of net farm family earnings per day labor of the family.

Once again, however, the level of net farm family earnings per day labor of the family went up along intensification of farming on farms in the large-sized in the area.

As already mentioned in the last part of the preceding section, average number of labor days worked by a full-time farm family worker a year varied much by type of farming owing to the difference in the pattern of seasonal distribution of labor requirement and to the difference in the volume of farm business on different types of farms. In general a full-time worker on more intensive types of farms or on larger farms accomplished more numerous number of days of farm labor for the year; in other words, they were employed more efficiently on the farm throughout the year. Therefore net earnings expressed on a basis of per-man per-year would be a better indication with which to compare relative profitability of different types of farming with varying size of farm, especially in the places where uneven distribution of farm labor throughout the year is a significant subject to be adjusted.

Because of a full-time farm family workers on more intensive types of farms or on larger farms were employed more efficiently for the year, the differences in the amount of farm family earnings per full-time worker a year between types of farms or between sizes of farms were greater than the differences in the amount of farm family earnings per day labor of the family (see Table 25). That is, taking for large-

sized rice-wheat farms in land class I and large-sized rice-wheat-and-rushmat-processing farms in land class III-IV, net earnings per full-time worker a year on the latter exceeded by 64 percent over those on the former; as compared with the above percentage, the excess was 44 percent in the case of net earnings per day labor of the family. Between sizes of farm on rice-wheat-and-rushmat-processing farms in land class III-IV, for example, net earnings per full-time worker a year on the large-sized farms exceeded by 68 percent above those on the small-sized ones, while 54 percent were the excess in the case of net earnings per day labor of the family (Table 25).

Farm Family Labor Earnings

Farm family earnings are the combined returns to family labor and farm capital invested in land and working assets. In the present study connecting with types of farming in varying land classes, the amount of working capital per farm differed much by type of farming and the average land value per 0.1 hectare also varied widely by land class. Table 26 shows how largely the amount of farm capital per farm differed by type of farms, by land class, and by size of farm. A wide difference in the amount of farm capital per farm on different types of farms in a given size of farm was

Table 26. Farm capital per farm and average land value per 0.1 hectare.

Land classes and types of farms	small-sized farms	Medium-sized farms	Large-sized farms
Farm capital per farm :	per farm, thousand yen		
Land class I :			
Rice-wheat farms :			
Capital in land	2,012	3,207	4,004
Working capital	465	710	840
Total	2,477	3,917	4,844
Land class II :			
Rice-wheat farms :			
Capital in land	2,546	3,820	5,317
Working capital	459	709	1,036
Total	3,005	4,529	6,353
Rice-wheat-and-rush farms :			
Capital in land	2,677	3,805	5,751
Working capital	579	1,002	1,214
Total	3,256	4,807	6,965
Land class III-IV :			
Rice-wheat-and-rush farms :			
Capital in land	3,457	5,335	7,907
Working capital	642	932	1,205
Total	4,099	6,267	9,112
Rice-wheat-and-rushmat-processing farms :			
Capital in land	3,696	5,602	8,395
Working capital	858	1,186	1,662
Total	4,554	6,788	10,057
Average land value :	per 0.1 hectare, thousand yen		
Land class I :			
Rice-wheat farms	287	292	258
Land class II :			
Rice-wheat farms	364	347	343
Rice-wheat-and-rush farms	382	346	371
Land class III-IV :			
Rice-wheat-and-rush farms	494	485	510
Rice-wheat-and-rushmat-processing farms	528	509	542

Table 27. Farm family labor earnings per farm and per unit of labor on different types of farms in land classes I, II, and III-IV, Chikugo Plain, 1964.

	Small-sized farms	Medium-sized farms	Large-sized farms
Farm family labor earnings per farm :	¥.	¥.	¥.
Land class I :			
Rice-wheat farms	185,850	274,690	407,550
Land class II :			
Rice-wheat farms	171,850	297,710	437,390
Rice-wheat-and-rush farms	231,310	440,090	534,650
Land class III-IV :			
Rice-wheat-and-rush farms	240,780	370,880	482,840
Rice-wheat-and-rushmat-processing farms	288,750	424,930	564,130
Farm family labor earnings per day labor of the family :			
Land class I :			
Rice-wheat farms	550	540	580
Land class II :			
Rice-wheat farms	480	650	650
Rice-wheat-and-rush farms	500	770	710
Land class III-IV :			
Rice-wheat-and-rush farms	480	660	680
Rice-wheat-and-rushmat-processing farms	490	610	710
Farm family labor earnings per full-time farm family worker a year :			
Land class I :			
Rice-wheat farms	40,400	100,900	128,800
Land class II :			
Rice-wheat farms	75,700	137,000	145,500
Rice-wheat-and-rush farms	96,600	177,300	169,800
Land class III-IV :			
Rice-wheat-and-rush farms	90,400	154,200	158,700
Rice-wheat-and-rushmat-processing farms	110,400	138,700	179,700

largely a result of a wide variation in the price of land. In comparison with land value in land class I, the land was valued on the average about 20 to 30 percent more in land class II and about 70 to 100 percent higher in land class III-IV (Table 26). Under the circumstance stated above, the farm family earnings were not a satisfactory, analytical measure to test the level of earnings of farm family labor.

Farm family labor earnings were derived by subtracting interest on the total farm capital from farm family earnings. Though the interest on farm capital was a hypothetical cost which was not actually paid by farmers themselves, farm family labor earnings seemed to represent the net returns from farming to all family labor and they also seemed to be one of the best suitable measure with which we may study relative profitableness of different types of farms located in varying land classes.

Table 27 indicates farm family labor earnings per farm and per unit of labor on different types of farms with varying size of farm. In this case, the rate of interest charged on the total farm capital was 5 percent. Comparing farm family labor earnings per farm on an equal type of farms by size of farm, they were larger on the medium-sized farms than those on the small-sized ones, and they were still larger on the large-sized farms than those on the medium-sized ones (see Figure 4). The amount of labor earnings per farm on rice-wheat farms in land class I, for instance, averaged ¥185,900 in the small-sized, ¥274,700 in the medium-sized, and ¥407,600 in the large-sized (Table 27).

When the amount of labor earnings per farm was compared by type of farms in

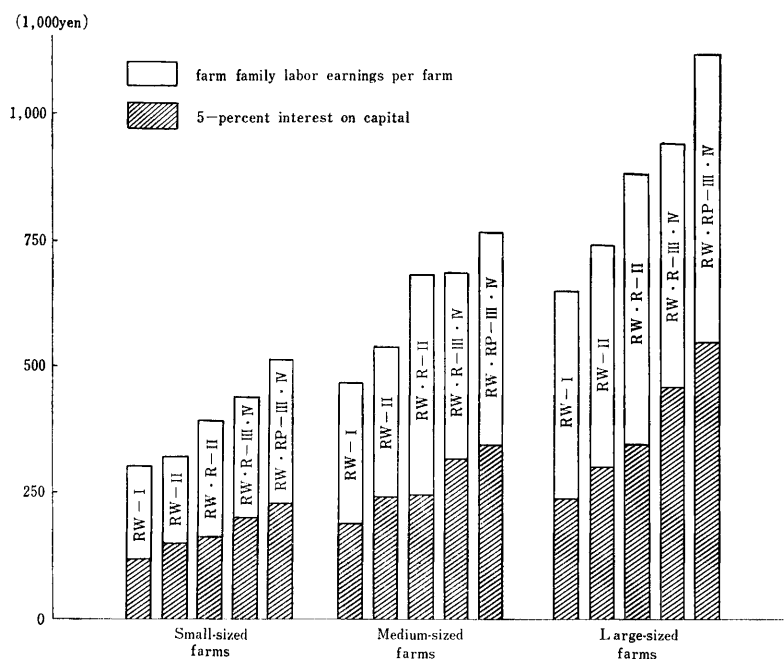


Fig. 4. Farm family labor earnings per farm and interest on capital per farm

- * RW-I.....Rice-wheat farms in land class I
 RW-II.....Rice-wheat farms in land class II
 RW·R-II.....Rice wheat-and-rush farms in land class II
 RW·R-III·IV.....Rice-wheat-and-rush farms in land class III·IV
 RW·RP-III·IV.....Rice-wheat-and-rushmat-processing farms in land class III·IV

each size of farm, then, roughly speaking, it increased with the level of intensity of type of farming. Taking for farms in the large-sized, for instance, labor earnings per farm averaged ¥ 407,600 on rice-wheat farms in land class I, ¥ 437,400 on rice-wheat farms in land class II, ¥ 534,700 on rice-wheat-and-rush farms in land class II, ¥ 482,800 on rice-wheat-and-rush farms in land class III-IV, and ¥ 564,100 on rice-wheat-and-rushmat-processing farms in land class III-IV (Table 27 and Figure 4). The type of farms which brought to the highest labor earnings per farm was rice-wheat-and-rushmat-processing farms in the highest land class; rice-wheat-and-rush type farms in the intermediate land class brought to the next highest; and rice-wheat farms in the lowest land class was the type which earned the lowest (see Figure 4).

The amount of labor earnings per farm on a similar type of farms was somewhat larger, within the extent of land classes I and II, in a higher land class; that is, labor earnings per farm on large-sized rice-wheat farms in land class II, as an example, earned approximately ¥ 30,000 more than those on the similar type of farms in the large-sized in land class I. However, it was not true beyond the extent of land classes I and II. The amount of labor earnings per farm on large-sized rice-wheat-and-rush farms in land class III-IV, as an example, was deficient compared with those on the similar type of farms in the large-sized in land class II. It was certainly due to an extremely high price of land in land class III-IV (Table 27 and Figure 4).

A great amount of interest on farm capital including the capital invested in land cut off the larger farm family earnings on that type of farms growing mat-rushes in land class III-IV. In other words, the increased part of farm family earnings in land

class III-IV, where a relatively high yields of crops were obtained common over the area and a majority of farmers within the area raised highly intensive commercial crop, i. e., mat-rushes on a high percentage of land, forced up the value of land within the area or turned itself into rent through the competition of farmers for acquiring additional land.

Though the interest on farm capital largely cut off a considerable part of farm family earnings per farm on farms in land class III-IV, labor earnings per farm on the large-sized rice-wheat-and-rushmat-processing farms in land class III-IV still exceeded those on the large-sized rice-wheat-and-rush farms in land class II where the amount of interest that was deducted from farm family earnings was only about two-thirds of that on farms in land class III-IV (see Figure 4). It suggested that an extremely high land value in land class III-IV did not necessarily shared off in the form rent all of the increased part of farm family earnings but left a part of them as returns to labor when the farms having adopted highly intensive type of farming, i. e., rice-wheat-and-rushmat-processing type farming on larger size of farm in that highest land class.

The result stated above was but for farms in the large-sized. On farms in the medium-sized, however, both types of farms in land class III-IV including rice-wheat-and-rushmat-processing farms earned a lesser amount of labor earnings per farm compared with those on rice-wheat-and-rush farms in land class II. Rice-wheat-and-rushmat-processing farms in the small-sized earned somewhat larger amount of labor earnings per farm compared with those on the small-sized rice-wheat-and-rush farms in land class II; however, the total amount of labor used on the farm for the year was much larger on the former type of farms.

Referring to the amount of labor earnings per unit labor on each type of farms in a given land class, it increased strikingly between the small-sized and the medium-sized and it tended to be the same between the medium-sized and the large-sized with an exception for rice-wheat-and-rushmat-processing farms in land class III-IV (see Table 27).

Between types of farms in each farm size, labor earnings per unit labor increased, within the extent of land classes I and II, with the level of intensity of type of farming and land class. But it was not true beyond the extent of land class II. Labor earnings per unit labor on both intensive types of farms were somewhat lower than those on rice-wheat-and-rush farms in land class II. Once again, rice-wheat-and-rushmat-processing farms in the large-sized were exceptional. Those farms earned somewhat more labor earnings per full-time farm family worker a year than the large-sized rice-wheat-and-rush farms especially in land class II where the price of land was relatively low.

From the foregoing analysis, it may be said that the intensification of type of farming on large-sized farms is relatively more profitable and will bring more prosperity to farm people.