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日本の基幹的農作物米の中心的産地である平地稲作地域における生産条件

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The Production Conditions of the Rice Producing Flatlands That Make Up the Majority of Japan's Principal Growing Districts for the Country's Primary Crop of Rice

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Abstract: The purpose of this paper is to positively clarify the possibilities for continued production in the flatland agricultural regions of agricultural communities. The study is based upon the agricultural knowledge of the future successors, and takes into consideration such factors as land, capital, and labor.

It is clear that Japan's core agricultural activity, wet-land rice production, is in jeopardy, not only in the mountainous regions where it is said that the geographical location and production conditions are unsuitable, but also in the flatland areas.

Keywords: collective crop rotation; community agriculture; fundamental rice paddy preparation; block rotation

Introduction

Sixty percent of Japan consists of mountainous regions. Only 14% of Japan's land area is flatland suitable for agriculture. Agricultural activities are not only carried out in flatland areas, but also on hills, plateaus, and mountainous regions. In 2001, the total land area used for agricultural cultivation was 4.79 million hectares. According to documents of the Council for Food, Agriculture and Rural Areas that pertain to future agricultural land use, there is a decreasing trend in land being used for agricultural purposes. By 2010, the total land area utilized in agricultural activities is expected to fall to 3.96 million hectares. Flatlands, ideal for agricultural production, are also suitable for commerce, industry, and housing. Flatland areas are often adjacent to urban areas and the growth of the labor market has seen a worsening in the extent to which agricultural activities are relegated from one's principal occupation to a secondary business activity.

In rural households where agriculture has been relegated to a secondary business, the majority of agricultural work is carried out in an intensive fashion on days off. While farmers individually own agricultural machinery, the machinery is often a mismatch for the scale of the agricultural activities; and thus the cost of maintaining such machinery is paid for from income

gained from activities outside of agriculture. Already there are instances where, rather than individual rural households managing their individual plots, the community manages all of the land as one farming entity. In a communally run farm, mechanization and crop rotation, once the domain of individual farmers, are carried out by the community. One of the merits of such a system is that the amount of receivable crop rotation subsidies increases.

In 2002, the government purchase price for rice was 14,295/60kg. The price of rice has not risen in recent years. There are a number of factors contributing to the breakdown of the ways in which agricultural land is used. Among these factors are increasing numbers of farmers taking on other jobs due to Japanese agricultural incomes having reached a ceiling, the fact that members of agricultural households who should take over the business are employed in different industries, and the shortage of farm labor in agricultural regions. The severity of this situation is especially apparent in mountainous regions where the average age of the population is increasing as younger members of the communities move to the cities (Tokumi Odagiri, 1994; Shinichi Shoganji, 2002)1).

In the argument relating to the structure of agricultural production in grain producing districts alone, the general opinion is that farmland management is increasingly difficult because of the aging of the labor

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force. To counter this, the scale of agriculture needs to be increased in order to make it easier to attract people to support and continue the agricultural activities. Using census documents and flatland in the Hokuriku District as an example, Toshiyuki Yoshida (Toshiyuki Yoshida, 2003) ascertains that from a land and labor point of view it will be difficult for rice production to advance beyond current levels. By converting capital assets from individual ownership to group or corporate ownership, the scale of production can be increased through increases in work efficiency. There is, however, the danger of a small group being burdened with a disproportionate amount of land and agricultural work. It can be said that in recent years there has been insufficient effective research on the production conditions with regards to the management of farms in flatland agricultural regions. In other words, there has been insufficient research on the ideal land use for individual management structures²⁾.

This study focuses on the northerly plains in Iwate Prefecture³⁾. This area represents a typical flatland rice-producing region. The purpose of this paper is to clarify the possibilities of continued production in the flatland agricultural regions. Additionally, the paper focuses upon clarifying factors that will stabilize the production systems for Japan's core crop, rice. In order to do so, the paper will clarify the types of agricultural management systems that are appropriate for individual

farmers. It takes into account the existence of the Kawashiri Agricultural Business union, which has created a system whereby the community as whole is entrusted with agricultural work. Furthermore, considering the current labor-force situation and in order to understand the circumstances surrounding the direction in which land use is heading, and how that relates to the ability of individual farmers to work, this paper investigates the ideal agricultural land use for individual farmers at this time. Based upon the relations between management scale, manpower, and machinery use, the paper will clarify the way in which mechanization can be most suitably applied. Furthermore, using the results of surveys of the Kawashiri Agricultural Business union and its members, this paper will examine the production conditions of flatland agricultural regions considering manpower, management scale, and mechanization.

Table 1. Number & Percentage of Full-time and Part-time Farmers in Mizuzawa City.
(Unit : households, %)

	1980	1985	1990	1995	2000
Total Number	3,676	3,549	3,400	3,244	2,519
Full-time	238	263	301	299	256
Part-time type I	904	782	419	448	294
Part-time type II	2,534	2,504	2,680	2,497	1,969
Full-time	6.5	7.4	8.9	9.2	10.2
Total Part-time	93.5	92.6	91.1	90.8	89.8
Part-time Type I	24.6	22.0	12.3	13.8	11.7
Part-time Type II	68.9	70.6	78.8	77.0	78.2

Source: Agricultural Census

Table 2. Scale of cultivation land area in Mizuzawa City and the number and percentage of agricultural product sales.

(Unit : Households, %)

	1980		1985		1990		1995		2000	
	Number	%	Number	%	Number	%	Number	%	Number	%
Exceptions	5	0.2	4	0.1	10	0.4	6	0.2	4	0.2
0.3~0.5	552	17.7	534	17.9	503	17.7	440	16.3	408	16.2
0.5~1.0	978	31.4	950	31.8	938	33.0	912	33.8	907	36.0
1.0~1.5	730	23.5	682	22.8	646	22.7	599	22.2	553	22.0
1.5~2.0	493	15.8	470	15.7	397	14.0	400	14.8	318	12.6
2.0~2.5	240	7.7	216	7.2	209	7.3	171	6.3	168	6.7
2.5~3.0	52	1.7	70	2.3	69	2.4	77	2.9	70	2.8
3.0~5.0	52	1.7	50	1.7	55	1.9	74	2.7	65	2.6
5.0~7.5	11	0.4	14	0.5	18	0.6	13	0.5	17	0.7
7.5~10.0	—	—	—	—	—	—	1	0.0	3	0.1
10.0~15.0	—	—	—	—	—	—	3	0.1	3	0.1
greater than 15.0ha	—	—	—	—	—	—	2	0.1	3	0.1
(unit: 10,000)										
No sales	302	8.2	281	7.9	33	1.2	50	1.9	126	5.0
less than 50	940	25.6	894	25.2	559	19.6	407	15.1	626	24.9
50~100	683	18.6	631	17.8	678	23.8	694	25.7	655	26.0
100~200	1,004	27.3	894	25.2	895	31.5	736	27.3	673	26.7
200~300	470	12.8	497	14.0	366	12.9	429	15.9	238	9.4
300~500	207	5.6	248	7.0	200	7.0	229	8.5	115	4.6
500~700	27	0.7	40	1.1	41	1.4	75	2.8	31	1.2
700~1000	17	0.5	16	0.5	29	1.0	34	1.3	24	1.0
1000~1500	3	0.1	21	0.6	20	0.7	22	0.8	10	0.4
1500~2000	23	0.6	9	0.3	12	0.4	3	0.1	7	0.3
2000~3000	—	—	4	0.1	5	0.2	10	0.4	7	0.3
Greater than 3000	—	—	14	0.4	7	0.2	9	0.3	7	0.3

Source: Same as table 1

Note 1) : 「-」 no results

Note 2) : There are no figures for self sufficient farmers in the 2000 Agriculture and Forestry census, data prior to this has been abridged.

The Current State of Agricultural Production of Mizusawa City's Flat Farmland

Table 1 shows the number of agricultural households in Mizusawa City, which is located in the northern flatlands of Japan. The households are separated into those conducting agriculture on a full-time basis and those for whom agriculture is a secondary business. As can be seen by the figures in this table, the number of farm households in the area is decreasing with time. By 2000, the number of households had reached 2519. By breaking down the information contained in the table, we can see that the number of full-time farmers between 1990 and 1995 was approximately 300. Following this period, the figure drops to around 250. The number of part-time farmers has also decreased from 93.5% in 1980 to 89.8% in 2000. The reason for this decrease in farm household numbers and households involved in part-time agriculture is thought to be attributed to people permanently leaving agriculture. The reason there are so many part-time farmers in Mizusawa City is the presence of large-scale home appliance manufacturers both in the city itself and in the surrounding districts. The sub-contracting businesses that are annexed to this industry represent readily accessible secondary employment for farmers.

Looking at the number and percentage of farm households, categorized by scale of operation in Table

2, it can be seen that the number of farms that fall into the less than 1.5ha category is more than 70%. The number of households falling into the less than 1.0ha category is in itself greater than 50%. There are a great number of small-scale plots in the area and very few large-scale production sites. Because there is an increasing trend toward small-scale farms in Mizusawa City, there is no increase in the scale of farm units.

In Mizusawa City where there is a wide range of farm management sizes, the number of agricultural households that return over 30 million yen annually is less than 1%, while those returning less than 3 million yen annually total more than 80%. Of that 80%, 40% of the households return less than 2 million yen annually. Because the size of the farms is small, once the running expenses have been deducted, the actual income from the farm unit is very low. In order to balance the household budget it is necessary to take on secondary employment.

Looking at the income from a 10a block in Mizusawa City as shown in Figure 1, there is a decreasing trend in agricultural incomes throughout the nation. The difference between incomes in 1990 and in 2000 was 12,663 yen. In this ten-year period a gap of more than 10,000 yen opened. Not taking into account 1993, where low temperatures and lack of sunshine hours in Iwate Prefecture caused poor yields, the income from a 10a block in the prefecture over this

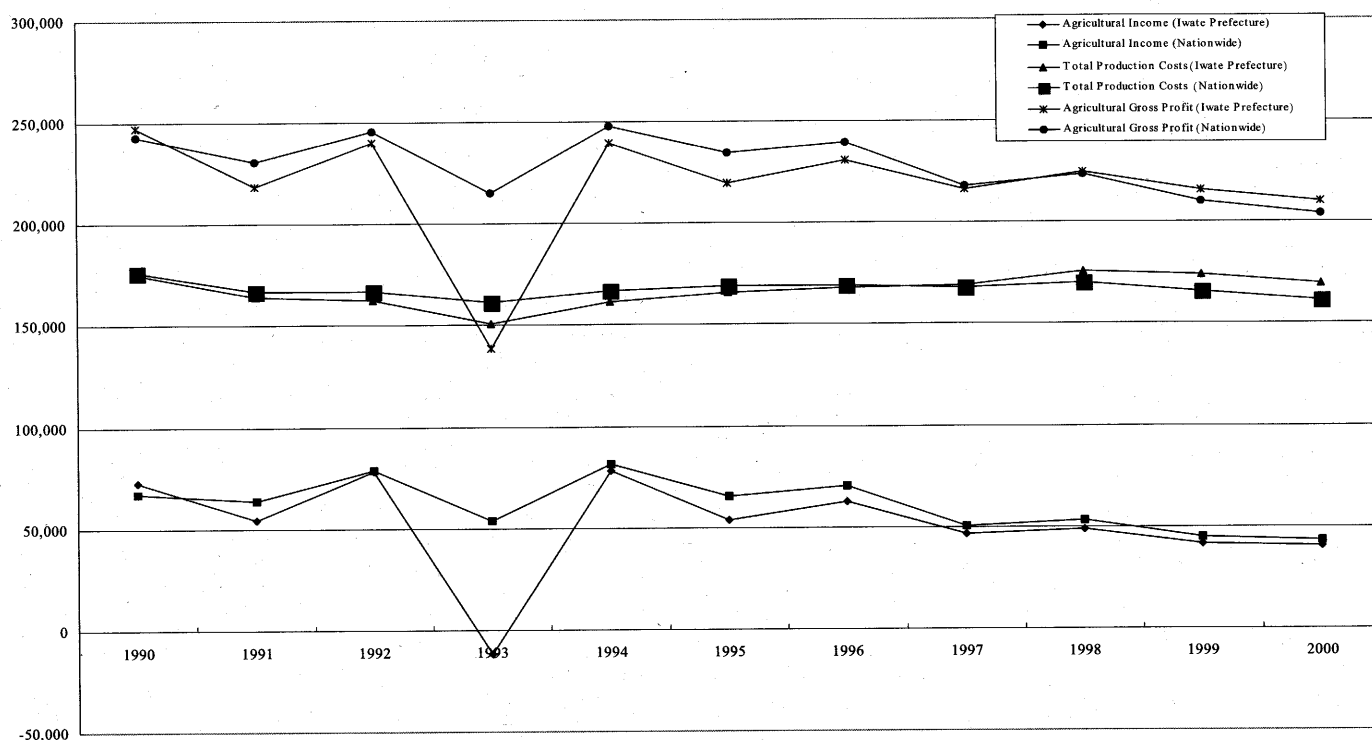


Figure 1. Changes in Agricultural Income and Production Costs.

Source: Ministry of Agriculture and Forestry "Production Costs for Rice and Wheat Crops".

Note) : 1990~1993 shows all surveyed agricultural households, 1994 on shows selling farmers only.

ten-year period decreased 32,149 yen. Compare this figure to the national figure and it can be seen that agricultural incomes in Iwate Prefecture have significantly decreased. The fact that expenses related to agricultural production over this ten-year period have not vastly changed, compounded with the continuing low price for rice, means the returns from a 10a block are steadily decreasing.

In Mizusawa City, a city where a large number of farmers undertake secondary employment, how are individual farmers responding to agricultural production? Table 3 shows the agricultural machinery being employed for production by individual farmers. The number of individual farmers who have bought expensive rice and barley air driers and head feeding combine harvesters has risen. Such purchases make it possible for them to conduct all the necessary agricultural work themselves. The number of tractors being used has risen from 15ps to between 15-30ps. Because individual farmers have purchased rice transplanters, the instances of outsourcing work such as plowing, puddling and leveling, and transplanting have decreased. In addition to this, due to the progression of land readjustment, the plowing and transplanting of large fields with small-scale machinery has become ineffective. Farmers who are also employed in other jobs must carry out agricultural work on their days off. Thus, to increase the efficiency of their work they bought larger more efficient machinery. This is the reason why the individual ownership of agricultural machinery has progressed to its current level.

Although Mizusawa City has many part-time farmers, by looking at the age brackets for the agricultural population, it can be seen that there are very few farmers under the age of 39. In 1980, only 14.9% of all farmers fell into this age bracket. By 2000, this number had fallen to 10.1%. In 1980, there were 610 farmers aged 70 and over. By 2000, this number had risen to

1567. The percentage of farmers aged 70 and over in 1980 was 11.8% but had risen to 40% by 2000. Because there are few young people working in agriculture, there are fewer people available to take responsibility for core agricultural production in the future. In the coming years, agricultural production will center around these few.

Agricultural Business union Structure

The Kawashiri Agricultural Business union was established in 1995 with rice paddy infrastructure activities as its prime motivator, and the premise that rice production work, previously carried out by individual farmers, should be the work of the entire community. Considering the ageing of the population and the stagnant rice prices, the Kawashiri Agricultural Business union undertook an infrastructural role. Due to the practice of undertaking secondary employment in order to maintain agricultural machinery among individual farmers who have their own equipment, the organization set itself the task of establishing a joint use system for agricultural machinery. The rice paddy infrastructural activities that this report is concerned with are leadership development with land readjustment⁴). The establishment of the business union was based on examples in the neighboring Kanegasaki Town whose Kanegasaki Community Agricultural Business union had undertaken community farm management in conjunction with rice paddy infrastructural activities. Based on this business union, established in around 1967 with the participation of all households, and as a result of discussions with the leaders within Kawashiri, it was possible, following the completion of infrastructure improvement, to amalgamate readjusted land into 1ha blocks through the participation of all households. This was done to increase the work efficiency on the block rather than taking into consideration the individual ownership of small-scale plots that make up the 1ha blocks. Such consideration would have decreased work efficiency as each individual farmer worked their own plot. The Kawashiri Agricultural Business union consists of 33 households in a community where secondary employment has become the main focus of farmers, and agriculture is now a secondary priority. The business union was established with the core premise that better, more efficient production would be possible by enacting a system of community-wide participation in joint farm work activities.

The operational goal of the agricultural business union is the receipt of mechanized work, joint farm

Table 3. Number of Agricultural Machines Owned.

	(Unit : households)				
	1980	1985	1990	1995	2000
Powered Plow · Agricultural Tractor	2,151	3,032	3,214	2,374	2,797
less than 15ps	690	713	633	560	436
15~30	827	1,068	1,394	1,532	1,568
greater than 30ps	9	37	54	64	117
Powered Prevention Machinery	693	918	983	1,264	887
Ride-on Air Sprayer	—	14	18	45	45
Powered Rice Transplanter	1,975	1,804	2,000	1,980	1,818
Binder	432	2,212	2,306	2,180	1,660
Head Feeding Combine Harvester	347	418	615	708	868
Rice & Wheat Air Dryer	347	546	584	597	600

Source : Same as table 1

Note) : 「-」 = no results

work operations, and communal crop rotation⁵). The reason for setting these tasks as operational goals is that, due to rice paddy infrastructure improvement, one farm unit has become 1ha, and thus, balancing the cost of machinery needed to work such-sized farms is difficult for individual farmers who have until now worked relatively small-scale farms⁶).

The management scale of farm units in Kawashiri Village is considered very small for farmers who wish to utilize land-intensive forms of agriculture. Furthermore, prior to infrastructure reforms, farm machinery being used did not match the scale for which it was employed. The purchase of this machinery was not made out of agricultural income, but rather, the shortfall was made up for out of income from secondary employment. However, with farm unit size increased to 1ha, the capacity of individually owned farm equipment and work efficiency was not sufficient to complete the work required in the farmer's days off.

It became difficult to carry out the necessary work on a large-scale farm using machinery whose capacity was more suited to small-scale farm units. Therefore, in the fall of 1996 with the resolution to carry out farm work as a community, a five-stage type of combine harvester was purchased. This began the mechanization process needed to improve productivity. Although the amount of work entrusted to the business union was small, in 1997 a 115ps tractor was bought and used for plowing and puddling and leveling work. In 1998, the purchase of an eight-stage type of rice transplanter saw the level of mechanization reach the stage it is currently at.

The agricultural business union has four machine operators to carry out the main work associated with rice cultivation, namely, plowing, puddling and leveling, transplanting, and reaping. The content of the work and the number of people that are needed to carry out the work are as follows;

Of the work activities listed previously, plowing can be done by a single person. Puddling and leveling on the other hand is different. This operation must be carried out after the field has been watered, and thus, it takes another person to confirm this or the work cannot be carried out effectively. Because of this and so as to complete work set by the business union in a timely fashion, puddling and leveling work is always carried out by an operator and at least one other person. For transplanting, peripheral work such as transporting the seedbeds to the planting area, adding fertilizer, and transporting the empty seedbeds back from the planting area is necessary. So that the work

can continue without interruption, the operator needs an additional four people to help.

For reaping work, in addition to the operator, somebody must record which fields the unhulled rice transported to the rice center has come from and a further two workers are needed for the actual transporting of the unhulled rice.

Previously, individual farmers carried out this work on their own farms. Now, because the work on the Kawashiri community's large-scale farm unit is being undertaken in this fashion, the total time required for rice paddy preparation and harvest work is now 2,734 hours. That extrapolates to approximately seven hours per 10a block. Because rice paddies are not influenced by the weather, the work can be carried out during the cultivation season according to the work plan determined by the business union members. Because this is a structured system of agriculture that is centered around the operators, work can be carried out year round. Total hours of work required for crop rotation fields is 417 hours or approximately 4 hours per 10a block.

Compared to paddy rice, the work hours needed for crop rotation are much shorter but, by not employing a thorough management system, the system invites a reduction in yield quality. In the case of wheat reaping, should it rain, the heads will begin to germinate and thus, in such cases, workers must respond accordingly and work quickly. Because the work is influenced by weather conditions, it is difficult to carry out necessary tasks in a planned manner. A work system whereby labor is carried out on days off, as is the case of somebody employed in another job, is not sufficient. Work schedules must be organized in accordance to the crops and the state in which they are. Crop rotation within the business union is carried out by members who are normally at home during the day.

Crop rotation is also not simply the work of the individual. Infrastructural improvements provided the catalyst for a shift to group crop rotation involving the entire community. Because the task of crop rotation moved from an individual operation to a group operation, the amount of subsidies available also increased. Group crop rotation is divided into three separate blocks within the community. A set area is designated for each block and crop rotation is carried out over a three-year period on a one-cycle block rotation system. The blocks and Shinjo Farm Work Trust Adjustment Union, a trust adjustment organization, carried out adjustment of opinions among three communities in Shinjo district. As a result of this, as

shown in Figure 2, the Kawashiri Community block divisions were devised.

Within this, the planned schedule for the first rotation is that Block 1 will carry out crop rotation between 1995 and 1998, Block 2 between 1998 and 2001, and the final rotation in the schedule will be carried out by Block 3 between 2001 and 2003. Due to this schedule, there are entire farms owned by individuals that are subject to crop rotation. The business union has guaranteed farmers in this situation a return that is equal to what they would have received if they had produced a rice crop. The cultivation work carried out on a farm designated for crop rotation is not carried out by the farm owner but rather by the business union. Furthermore, because it is understood that the community as a unit coordinates such activities, the work activities are carried out by all the business union members rather than being left to an individual⁷⁾.

Case Study Administration Content and Land Use

Present Condition of Survey Administration

Outline of Survey Administration

Of the 33 households in Kawashiri Village, 25 farmers were surveyed. Full-time farmers were identified as workers aged 60 and over who had retired from their jobs. The fact that they were at home during the work day resulted in their becoming full-time farmers. There were no full-time farmers who fell into younger age categories. Of the part-time farmers, three households were self-employed in secondary businesses, and while the remainder of those surveyed were employed in regular jobs. Secondary employment for farmers is very common in Kawashiri Village, and of those households surveyed for the scale of annual agricultural produce sales, 56% fell into the 1 million yen to 2.99-million-yen range. Forty percent of the total households surveyed reported annual produce sales of less than 0.99 million yen. Within this figure, three households are included that produce solely for their own consumption and thus their annual sales are zero. Looking at the scale of cultivatable land being managed by each household, only two households managed greater than 500a. Four

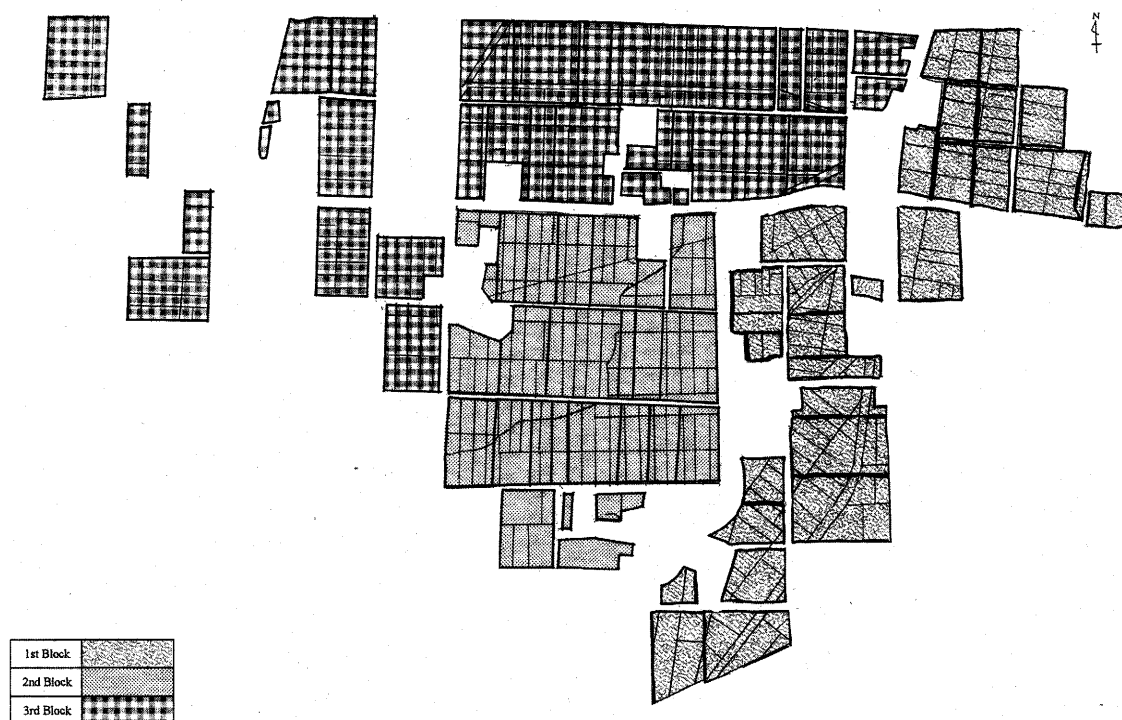


Figure 2. The field in the Kawashiri colony and the zoning sketch.
Source : Iwate prefecture's date and Survey results

households managed between 100a and 149a, six households managed between 150a and 199a, and five households managed between 200a and 249a. These categories made up 64% of the total households surveyed. Kawashiri Village is a small community with very small farm units for the development of land-intensive agriculture.

Looking at the man days invested in Kawashiri Village where the predominant farm unit is between 100a - 249a, it can be seen that of the 25 households surveyed eight invested more than 200 man days. The remainder all invested 199 days or less with eight of those households investing 49 man days or less. The predominance of secondary employment among farmers in Kawashiri is widespread, and thus, the agricultural work can only be carried out on days off. Of those farm units surveyed, three had two or more male full-time workers aged under 65, sixteen of the total households had no full-time workers on the farm, and three had a full-time male worker aged under 65. This illustrates the difficult situation in which farms in Kawashiri find themselves with regards to stable agricultural production. Table 4 shows the separate age categories into which the agricultural work force in Kawashiri falls. There are ten male workers and seven female workers aged 65 and over.

Table 4. Age of Agricultural Worker Population.

Male			Female		
Number	%		Number	%	
1	3.4	greater than 75yrs	2	8.3	
4	13.8	70~74yrs	3	12.5	
5	17.2	65~69yrs	2	8.3	
4	13.8	60~64yrs	6	25.0	
2	6.9	55~59yrs	3	12.5	
3	10.3	50~54yrs	2	8.3	
5	17.2	45~49yrs	3	12.5	
0	0.0	40~44yrs	1	4.2	
2	6.9	35~39yrs	1	4.2	
1	3.4	30~34yrs	0	0.0	
0	0.0	25~29yrs	1	4.2	
2	6.9	20~24yrs	0	0.0	
0	0.0	less than 20yrs	0	0.0	

Source : Survey results

What is especially significant about this data is that there are no workers aged 25 to 29 nor are there any aged 40 to 44 years. These age groups would normally represent likely successors to farm businesses, and thus, it is apparent that there is a shortage of candidates to continue agricultural activities in the future.

The total cultivatable land area in this case study was 4812.3a. Of this area, 3,137.5a consisted of rice paddies (65.2%), while alternative crop rotation land area utilized 1,629.8a (33.9%). So long as the alternative crop

rotation system being used in Kawashiri Village does not change, this ratio will remain as it is, and each individual farmer will be allocated his appropriate share.

Family Structure and Work Status

Table 5 shows the family structure and work status of the surveyed households. Farm households are generally thought of as large families. However, in flatland rice producing regions such as the focus of this study, the nuclear family structure is prominent and families with fewer family members are common. Of those households surveyed, eight had more than five family members living under the same roof. Ten of the surveyed households reported that all family members in the house were involved in running the farm. Sixty percent of the farm units reported that family members living under the same roof did not participate in the running of the farm. Looking at data of employment outside of agriculture, all those surveyed that were under age 60 were employed in some type of non-agricultural work. Generally, those surveyed who were aged 60 and over had retired, and because securing non-agricultural employment is difficult, they remained at home and became full-time farmers⁸).

The total number of days spent on agriculture in the case study area is 3,997, which extrapolates to 75.4 days per person. While labor-saving measures in paddy rice production are advanced when compared to other agricultural produce, in the case of Kawashiri Village, the 100 day mark has been broken. This means that there are significant labor-saving measures in place. At present the capital equipment of the case study farm units is dependent upon the agricultural business union, and thus, there are no individuals who own their farm machinery. Furthermore, because joint work efforts have become the norm, when there is work that needs to be done, workers from the business union are assigned the task, and each individual farmer is required to participate.

In Kawashiri Village the tasks of plowing, puddling and leveling, transplanting, and reaping are a part of the business union's joint work program, and business union members carry out these tasks as they are assigned to them. This is much more efficient than individuals managing large-scale farm units themselves.

Looking at the ages of the farm workers in this case study we see that the percentage of workers aged 60 and over is high. They account for 63.5% of the total days spent in agricultural work in the community, and represent 50.9% of the agricultural work force. In contrast, the number of young people working in agriculture in Kawashiri Village is very low. Workers aged

Table 5. Current Circumstances of Families and Workers in Case Study Farm Units.

(Unit : age, people, days)

Farm Unit #	Age of Head of Household	Family members living in household	Family Structure	Number of Farm Workers	Total Number of Farm Work Days	Non-agricultural workers	Type of Non-agricultural Work
1	49	5	House head / wife, house head's mother, Eldest son & daughter	1	20	House head / Eldest son	Painting Industry · Local city company
2	48	6	House head / wife, +Parents+2 children	2	180	House head / wife	Part-time · Local city company
3	52	7	House head / wife, +Parents+Eldest son · 2nd son · 3rd son	4	220	House head / wife / Eldest son / 2nd son	Interior decorating · Hotel · Local city company
4	66	2	House head / wife	2	200	House head	Agricultural Co-op Mutual Aid Organisation
5	73	5	House head / wife, +Eldest daughter+2 grandchildren	5	80	Eldest daughter / grandchild	Local city company
6	48	4	House head / wife, + Parents	4	470	House head	Civil Servant
7	47	3	House head / wife, +house head's mother	3	30	House head	Race horse trainer
8	54	2	House head+Father	1	40	House head	Self employed
9	65	2	House head / wife	2	37	House head	Local city company
10	59	3	House head / wife, +Eldest son	3	175	House head+Eldest son	Local city company · non-profit organisation
11	65	2	House head / wife	2	0		Non-profit organisation
12	63	3	House head+house head's mother+ daughter	1	240	Daughter	Civil Servant
13	56	3	House head+house head's mother	2	150	House head	
14	68	5	House head / wife+2nd daughter+2nd son and wife	1	35	2nd son	Local city company
15	66	2	House head / wife+house head's mother	2	70		
16	52	3	House head / wife+house head's mother	1	100	House head	Local city company
17	70	2	House head / wife	1	100		
18	74	6	House head / wife+Eldest son and wife +2 children	2	470	Eldest son	Civil Servant
19	64	4	House head / wife+Eldest son and wife	4	295	Eldest son and wife	Local city company · day care center
20	51	3	House head+house head's parents	2	115	House head	Construction
21	46	5	House head / wife+house head's parents / Eldest son	4	250	House head / wife+ house head's parents+ eldest son	Construction
22	63	6	House head / wife+house head's parents / Eldest son and wife	2	240	Eldest son	Non-profit organisation
23	62	2	House head / wife	2	300		
24	62	2	House head / wife	3	190	House head	Civil Servant
25	52	4	House head / wife+house head's mother +child	2	90	House head	Local city company

Source : Same as Table 4

between 20 and 39 account for 4.0% of the days and represent 13.2% of the work force.

The State of Land Use

Table 6 shows the state of land use in Kawashiri Village. As is shown in the table, of the households surveyed, two were renting land in order to expand the scale of their farm unit. Because there is no thought of changing from part-time to full-time farming, the way in which the land is currently being used will not change.

While the reason behind the decision is now lost, the second farm unit listed in the table began to rent land soon after the end of WWII. The 17th farm unit in the table rents 66% of the 600a that make up their farm. However, the owner of the farm is now 70 years

old and has nobody to take over the farm. Thus, it will become increasingly difficult to maintain this scale of farm in the coming years. The majority of farming in Kawashiri Village is carried out on privately owned land.

Administrative Structure of Farm Units

Profit Structure

Table 7 shows the profitability of the farm units in this study. As is shown in the table, the 2nd farm unit makes the largest gross profit from agriculture at 3.22 million yen. There are seven households that produce solely for their own consumption and do not sell any produce. Those farm units whose agricultural gross profit is zero and who are not producing solely for

Table 6. Current State of Land-use Among Surveyed Farmers.
(Unit : a)

Farm unit #	Land holdings	Cultivation land unit	Rice Paddy	Crop Rotation	Rented land	Leased out land
1	110.0	40.0	40.0	0.0	0.0	70.0
2	220.0	265.0	265.0	0.0	45.0	0.0
3	74.1	74.1	49.6	24.5	0.0	0.0
4	194.0	257.0	146.5	47.5	0.0	0.0
5	130.0	130.0	104.0	26.0	0.0	0.0
6	130.0	130.0	130.0	0.0	0.0	0.0
7	123.0	123.0	0.0	123.0	0.0	0.0
8	184.0	184.0	0.0	184.0	0.0	0.0
9	37.7	37.7	10.6	27.1	0.0	0.0
10	185.2	185.2	157.4	27.8	0.0	0.0
11	40.6	40.6	10.0	30.6	0.0	0.0
12	227.2	227.2	31.8	195.4	0.0	0.0
13	151.3	151.3	151.3	0.0	0.0	0.0
14	22.9	22.9	21.1	1.8	0.0	0.0
15	152.0	152.0	149.0	3.0	0.0	0.0
16	138.1	138.1	89.8	48.3	0.0	0.0
17	205.0	600.0	300.0	300.0	395.0	0.0
18	234.0	234.0	229.3	4.7	0.0	0.0
19	191.2	191.2	99.6	91.6	0.0	0.0
20	50.0	50.0	50.0	0.0	0.0	0.0
21	700.0	700.0	385.0	315.0	0.0	0.0
22	225.0	225.0	213.8	11.3	0.0	0.0
23	240.0	240.0	168.0	72.0	0.0	0.0
24	210.0	210.0	178.5	31.5	0.0	0.0
25	159.0	159.0	109.7	49.3	0.0	0.0

Unit : Same as table 4

their own consumption are currently designated as alternative crop rotation units and thus are unable to produce paddy rice crops. Thus their agricultural gross profit is zero. As previously stated, the amount of subsidies allotted to a farm unit designated for alternative crop rotation is calculated based on actual production

area. Even if the entire farm is designated for alternative crop rotation, the farmer is guaranteed an income equivalent to what would have been received from a rice crop. Illustrating the difficult times facing rice cultivation at present, five of the households surveyed are returning losses from their agricultural activities.

Of these five households, three households have been designated for alternative crop rotation and so are receiving subsidies. These three households receiving subsidies are not making a loss on their activities. The remaining two households however, have not been designated for alternative crop rotation and are making a loss. These two farm units consist of less than 50a of land each, and the harvested rice is primarily for their own consumption. Thus, it is difficult for them to make a living from agricultural income alone. Supposing that these two households sold all the rice they harvested rather than share it among family and friends, the income received from these sales would total less than 300,000 yen. Such a small return would do little to change the situation.

Because of the low agricultural incomes, the majority of the surveyed households find it difficult to make a living from agriculture alone and are forced to rely upon non-agricultural incomes. Eleven of the households surveyed had a greater than 50% dependency on non-agricultural income. The smaller the scale of the farm unit, the greater the dependency on non-

Table 7. Farm Unit Profitability.

(unit : kg, ¥10,000, %)

Farm unit #	Rice Paddy Harvest Volumes	Agriculture Gross Profit	Farm unit costs	Agriculture Income	Non-agricultural Income	Crop rotation subsidies	Household Income	Dependency of non-agricultural income
1	1,380	33	36	-3	500	0	497	101
2	13,500	322	239	83	630	0	713	88
3	2,040	49	45	3	350	272	626	56
4	3,812	91	64	27	500	702	1,229	41
5	5,514	131	102	30	0	290	319	0
6	7,800	186	117	69	800	0	869	92
7	0	0	0	0	500	1,370	1,870	27
8	0	0	0	0	400	2,050	2,450	16
9	517	12	10	3	800	302	1,105	72
10	7,800	186	152	34	645	310	988	65
11	480	0	9	-9	0	407	398	0
12	1,121	27	25	1	350	782	1,134	31
13	7,953	190	136	53	616	0	669	92
14	1,081	12	19	-7	0	20	13	0
15	8,020	187	134	53	0	34	86	0
16	4,851	146	80	66	0	539	604	0
17	4,936	137	121	16	0	3,342	3,358	0
18	11,164	261	211	51	400	52	503	80
19	4,785	105	90	16	500	1,020	1,536	33
20	1,469	35	45	-10	180	0	170	106
21	14,400	250	282	-32	2,650	3,509	6,128	43
22	10,800	257	180	77	350	125	553	63
23	8,100	193	144	49	0	802	851	0
24	9,420	225	189	36	600	351	986	61
25	8,400	200	139	62	0	549	611	0

Source: same as table 4

Table 8. Future Intentions of Case Study Farm Units.

Unit Number	Future Farm Unit Scale	Future Outlook for Farm Unit Scale	Successors attitude towards agriculture	Intended heir
1	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Eldest son
2	Expand present scale	Professional farmer	Both parents and children undecided	Eldest son
3	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Eldest son
4	Maintain present scale	Focus on agricultural activities	Parent will work farm, children undecided	Eldest son
5	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Eldest son
6	Maintain present scale	Focus on non-agricultural activities	Undecided	Eldest son
7	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Eldest son
8	Maintain present scale	Focus on non-agricultural activities	Both parents and children undecided	Other
9	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Eldest son
10	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Eldest son
11	Maintain present scale	Focus on non-agricultural activities	Both parents and children undecided	Eldest son
12	Reduce current scale	Leave agriculture	Both parents and children undecided	Already succeeded to eldest son
13	Maintain present scale	Focus on non-agricultural activities	Both parents and children undecided	Eldest son
14	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Divide amongst children
15	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Eldest son
16	Maintain present scale	Focus on non-agricultural activities	Both parents and children undecided	Eldest son
17	Maintain present scale	Focus on non-agricultural activities	Undecided	Will leave to anyone willing to continue the farm
18	Maintain present scale	Focus on agricultural activities	Parent and children motivated	Eldest son
19	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Eldest son
20	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Divide amongst children
21	Maintain present scale	Focus on non-agricultural activities	Parent and children motivated	Eldest son
22	Maintain present scale	Focus on agricultural activities	Both parents and children undecided	Eldest son
23	Expand present scale	Professional farmer	Parent and children motivated	Eldest son
24	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Eldest son
25	Maintain present scale	Focus on non-agricultural activities	Parent will work farm, children undecided	Divide amongst children

Source : Same as Table 4

agricultural income tends to become. A deeper look at the households whose dependency on non-agricultural income is zero shows that making a living purely from agriculture and alternative crop rotation subsidies is, in reality, impossible. It is possible that the farm units whose dependency on non-agricultural income is zero are, in fact, receiving financial support and allowances from dependents that are now living away from the farm. It is from support such as this that they are making a living. In the case of farmers aged 65 and over, they entrust their farms to their children when they become eligible to receive their pension. However, while farmers aged 65 and over have in essence entrusted farm operations to their children and are receiving pensions, their children are not actually

running the farm. Instead, the farmers continue to manage the farm while they receive their pensions.

Intentions for the Future Administration of the Farm Units in Kawashiri Village

Table 8 shows the future intentions those surveyed have for their respective farm units. Two of the households surveyed intend to expand their agricultural operations in the future. One household reported that they intend to reduce the scale of their agricultural operations.

The remainder of the households surveyed reported that they intend to maintain their farm operations at current levels. In addition to this, the table shows that there is intent among those surveyed to increase their

level of non-agricultural work. In the beginning, due to the formation of large-scale farms and an increase in work efficiency, it was anticipated that management scale would be expanded and there would be a shift from part-time to full-time agriculture. However, despite the increase of cultivation area, the price of rice is not expected to increase past present prices. This is compounded by the fact that in many cases those younger members of farm households who would have taken over the farm have left to take up other work, and it is not conceivable that they will return home to take up farming. Because of these factors, agriculture in the future cannot be guaranteed a work force; and thus, farmers are forced to maintain the farm units at their present scale.

The Kawashiri Agricultural Business union allocates the work on the community farm among its members; and so, despite the advancing age of the farmers and their farm hands in this case study, maintaining the agricultural land of the village at its present levels is not such a large task.

Actual State of Individual Farmers in Kawashiri Village

From the 25 households in this sample, three were selected and surveyed as to their opinions on land and labor⁹).

Farm unit 4 said that while it is difficult to cultivate rice without the help of machinery because of the size of his property, if he were to own the machinery personally, the machinery would be underutilized. He would have to increase the use of the machinery by taking on other work in order to use the machinery to its capacity. His current situation whereby he is employed in another job and carries out farm work on his days off is better for his household because it returns a higher income. Because he is employed elsewhere, he is dependent upon the business union's joint work system for plowing, puddling and leveling, transplanting, and reaping. So, rather than expanding the scale of his farm, he is trying to maintain this system. With regard to labor share on farm unit 4, the farmer's eldest son, who should be the successor to the property, has found other employment and participates in the joint work program of the business union.

The thinking of the owner of farm unit 10 with regard to land use is that land outside the Kawashiri Village area should be accumulated for the expansion of farming activities. In line with this, farm equipment should be purchased individually and used exclusively by that individual farmer for his own farm activities. But looking beyond that, he holds that entrusting the

land to the business union and taking on different employment would be better for the region's agriculture. As an individual farmer, working outside of agriculture enables him to secure a more stable income; and thus, this present state of land use is desirable. With regard to the state of labor on unit 10, the farmer's eldest son who was to take over the farm is employed in a different job but still plays a role in the business union's joint work system by taking his turn in the scheduled work.

The head of farm unit 25 is an operator, one of the core workers in the agricultural business union. He carries out his responsibilities as an operator while at the same time he is also employed in another job. Because he is an operator for the business union, he is required to do agricultural work during the week also. In such cases he takes paid leave from his job and carries out his business union duties. The reason he became an operator for the business union is that when the infrastructure improvements were carried out, ten people in their 40's from the Shinjo District that includes Kawashiri Village were needed. He was one of the four people recommended from Kawashiri Village. Although they were in their 40's when the infrastructure improvements were carried out, they are now in their 50's, and thus, they now need to start nurturing the next generation of operators.

Conclusion

In the area used for this case study, the constant low price for rice in recent years has brought about a farm administration that is not intent on large-scale operations, nor are there any farmers who have specialized and corporatized agriculture. With this state of affairs in mind, the following four points can be concluded.

In areas where there is stable secondary employment such as in this case study, there is no attempt to move towards large-scale farming through the accumulation of land. Even if there was, the price of rice is unstable and low, meaning that farmers can make a higher more stable income in non-agricultural work. Thus, they have moved towards sustaining their own small-scale farms at their present level. The agricultural business union takes responsibility for the administration of individual farmers' land. The business union holds the capital equipment; and because individual farmers do not administer their land themselves, there is no need for individual capital equipment. Thus, there are fewer cases of individual farmers with

surplus equipment. The second point is that, in the case in question, those supporting the agricultural industry are not young members of the community. Rather, they are elderly members of the community who have already retired from their jobs. There are four machine operators on the business union's roll who form the core of the business union's operations. The operators are all engaged in other employment in addition to their business union activities and having them become professional operators is a difficult task. Because the operators cannot carry out agricultural work during the week, the elderly retirees of Kawashiri Agricultural Business union have to provide support for the operators. The third point is that younger members of the community who would be the successors of the village farms do not hold agriculture in high regard. One of the factors contributing to a lower awareness exhibited toward agriculture by the would-be successors is the current low standard of rice prices. Such low prices make it difficult for successors to make final decisions as to their futures in agriculture. In Japan's typical rice-producing areas, the fact that the intentions of the next generation of agricultural leaders are not yet settled has left the continuity of the agricultural labor force in a rather uncertain predicament. The fourth point is that the next generation of core agriculturalists is not yet guaranteed. At present, the ages of the four members who have become the area's core agrarians average in their 50's. While this in itself does not pose a major threat at the moment, for the sake of continuity in agricultural productivity, there is a need to begin nurturing the next generation of agricultural leaders. The reason for this need is that without a next generation of agricultural leaders, the work system that currently forms the basis of farm administration in the village will become impossible to maintain.

While the flatland rice-producing belts are now increasingly seen as supporting Japan's rice-producing industry, this paper has pointed out the fact that these areas too are facing dire circumstances. Toshiyuki Yoshida (2003) reported the same findings in the rice producing regions of Hokuriku. In the region that Yoshida focused upon in his study, there is a large-scale corporation that has accumulated farmland in the region and is implementing collective production adjustment. Through this they are stabilizing the management of rice production. Looking deeper into the typical agricultural administration structure of the village in this case study, we see that there is no core of young agriculturalists involved in full-time farming and a

majority of the farm unit workers have specialized in their respective secondary jobs. However, the voluntary structure of the agricultural business union that has been started in the village, in which the entire village participates, has settled the direction land use in the village will take. Based on this, a farm work plan was formed and tasks allocated to capable members of the business union. Through this, the state of the community agriculture is being maintained. In short, this is not a community farm administration that is actively making attempts to advance agriculture as with other administrations that have been detailed in existing research. Rather, it is an agricultural administration whose goal is the preservation of farmland. When comparing the way in which Kawashiri Agricultural Business union has structured itself as opposed to other village agriculture administrations, there is a tendency to look at Kawashiri in a negative light. However, should they have not adopted this structure and equipment investment, and crop rotation been left to the individual, then quite possibly there would have been an overabundance of agricultural machinery in the village. Furthermore, with regard to alternative crop rotation, lack of subsidies would have made crop rotation an unfavorable option for individual farmers; and their individual responses from a regional perspective would not have resulted in the most effective utilization of the land resources. In cases such as Kawashiri Village where the entire community carries out alternative crop rotation, fields designated for rotation can be grouped and, rather than fixing which fields are to be rotated, the rotation can be carried out in blocks. Because of this, the rotation rice paddies are not fixed fallow land and more rotation subsidies can be received because it is a group effort. Moreover, when it comes time to rotate the crop produced on the land, the owners of the land are still eligible to receive the same income, as they would have if they had produced a rice crop. The agricultural administration system being used by the agricultural business union in this case study is one way in which rice paddy agriculture can be carried out.

From the results of this study, it can be seen that Japan's core agricultural crop, rice, is facing difficult times not only in the mountainous regions but also in the flatland regions. At present, rice paddy administration is being carried out with institutional business establishment subsidies and nationwide compensation. However, in regions in which there are no administrations that aspire to farmland accumulation, individual farm units are largely concerned with maintaining the

status quo. Community agricultural administration does not result in an overabundance of agricultural machinery on individually administered farm units but business union ratively works towards maintaining large-scale farms. It is an effective form of farm administration for regions where there is substantial stable secondary employment and the desire of the farm units is maintaining the status quo.

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- 1) The problem of abandoned cultivation land in mountainous regions has been discussed from a number of different angles. Among these discussions Tokumi Odagiri. (1994) and Kenichiro Nagahama. (2003) deserve particular mention. Shinichi Shoganji (2002) is cited for his structural look at recent agricultural land problems.
- 2) According to the Ministry of Agriculture, Forestry and Fisheries (2002), there are examples of authorized farmers being gathered together to farm previously abandoned farm land allowing the status of the land to be recorded as cultivated land. While there are examples of this approach in mountainous regions, there are no such examples in flatland areas.
- 3) According to the national census, as of October 1st, 2000, the total number of workers aged 15 years and older employed in primary, secondary, and tertiary industries was 2,831, 9,887, and 19,733, respectively. While unrelated to this paper, before the emancipation of agricultural land, the standard area of farm units for the main household was 2ha, and 50a for branch families. In other words, the present scale of farm units is the same as in the past. Moreover, the present state of agriculture can be largely attributed to the Agricultural

District Industrialization Law that saw the promotion of factory establishment in rural areas in the latter half of the 1960's. Because of this movement many individual farmers chose to secure employment at these factories to augment agricultural incomes rather than expand the size of their farms.

- 4) Benefit principle for assistant industry is 10% and payment by beneficiary is 188 million yen, but 75.2 million yen as farm field maintenance aid will be advanced redemption if high productivity agricultural intensive project is accomplished. Therefore, as a result, beneficiary will pay 112.8 million yen out of the 188 million yen. However, regarding the farm field maintenance project, the payment by beneficiary has been reduced to approximately 10,000 yen per 10 acres because JA (Japan Agricultural Cooperatives) branches sold farm fields and cities bought farm roads to change them to municipal roads.
- 5) Transcribe from the Kawashiri Agricultural Business union Outline.
- 6) Income from 10a blocks that primarily produced paddy rice in the fiscal year 2000 was 40,323 yen in Iwate Prefecture compared to 54,352 for the rest of the country. According to the household income and expenditure survey carried out in 2000, disposable income (for working households other than those involved in agriculture) was 5,673,876 yen. The guidelines of these surveys were different, and thus, a straight comparison cannot be made; but, in order for agricultural households nationwide to make the same income, they would need farm units of greater than 13ha, while farmers in Iwate Prefecture would need farm units of greater than 14ha. The basis for this comparative result comes from the Ministry of Agriculture, Forestry and Fisheries' publication "Rice, Wheat and Barley Production Costs", and the Management and Coordination Agency's "Household Census".
- 7) Kawashiri Village, is located in the plains in the northern area of Mizusawa City. The village itself is built on flat, open land. The entire village is reformed agricultural land and none of the surrounding land is used for urban development. In actual fact, this paper should have focused on capital, labor, and land, but due to the fact that individual farmers have no capital equipment, the paper only considers labor and land. The operator of farm unit 15 in this paper is the chairman of the agricultural business union and was interviewed for the purpose of ascertaining the structure and set-up of the business union. The rotation crops used

include wheat, barley and also some soybeans.

- 8) There were three cases of people in this age group who were working in agriculture. All three were subject to special retirement conditions due to their positions as a company director, an association director, and a special civil servant.
- 9) The reasons these three households were singled out are: 1) One of the households is an operator and is therefore a central figure in the business union; 2) None of the three hold the same view on farm unit succession; 3) Their views as to what should be done with regards to farm-unit scale are the same as the general Kawashiri Business union consensus in that the scale should be kept at its present level; and 4) All three farm units are over 150a in size and were chosen randomly from the survey.

References

- Food, Agriculture, Agrarian Villages Fundamental Challenges Investigation Committee Periodical., 1998. Food, Agriculture, Agrarian Villages Fundamental Challenges Investigation Committee Reference Material, pp.13-17 (in Japanese).
- Hiroshi Higashiyama., 2002. Preparation of Large-Scale Farm Units and Requirements of Regional Farm Unit System Formation - A Case Study of the Taka Area of Haramachi City, Fukushima Prefecture, 2002 Journal of Rural Economics, 157-162 (in Japanese).
- Kenichiro Nagahama., 2003. Core Form of Regional Resource Management, Nihonkeizai-hyohronsyu, 214pp (in Japanese).
- Koh Kikuchi., 1997. A study of the change of the Farm Management and the Land-use in the Provinces City—The Focus of the Farmer at Toyano Area in Niigata City—, 1997 Journal of Rural Economics, 80-85 (in Japanese).
- Ministry of Agriculture, Forestry and Fisheries., 2002. Food, Agriculture, Agrarian Village Report-Fiscal Year 2001, Agriculture and Forestry Statistical Association, p152 (in Japanese).
- Natsuki Kanazawa., 1985. Agrarian Household Policy Concept, Natsuki Kanazawa, Agrarian Households and Policy, Chikyu Publishing, pp.283-316 (in Japanese).
- Shinichi Shoganji., 2002. Fundamental Structure of Japanese Agriculture in the 21st Century-Analysis of the 2000 Agriculture Census, Agricultural Statistical Association, 319pp (in Japanese).
- Tokumi Odagiri., 1994. Problems of Mountainous Areas in Japanese Agriculture, Agriculture and Forestry

Statistical Association, 251pp (in Japanese).

Toshiyuki Yoshida., 2003. Changes in Rice Policy and Agricultural Co-operatives and Producers - The Strategies and Problems of Paddy Rice Farm Unit Management Multi-lateralization, Rural Culture Association, 328pp (in Japanese).

日本の基幹的農作物米の中心的産地である 平地稲作地域における生産条件

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摘 要

本稿の目的は集落営農によって平地農業地域の生産継続の可能性を土地、資本、労働に加え農業後継者の農業に対する意識をもとに実証的に解明することである。

日本の基幹的な農業である水稲作は、一般に立地条件や生産条件で条件不利地と言われる中山間地域だけでなく平地地域においても厳しい状況に立たされていることが理解できる。