FARMING PROGRAM (1)

I. METHOD OF FRAMING FARMING PATTERNS

1) In framing farming patterns, we assumed a farm mechanization adoptable at the present stage based upon the current cultivation system, and worked on its estimate.

2) Our assumption of productivity is based on the instances of the existing farms and their experimental achievements, etc., supposing that the enforcement of land consolidation and improvement of irrigation and drainage will enable us to anticipate a stable amount of yields after several years.

3) This farm mechanization which aims at high productivity adopts the method of a large-size mechanization integrated work system based upon heavy-duty tractors and combines. We adopted cropdusting from an airplane for spraying agricultural chemicals over paddy fields.

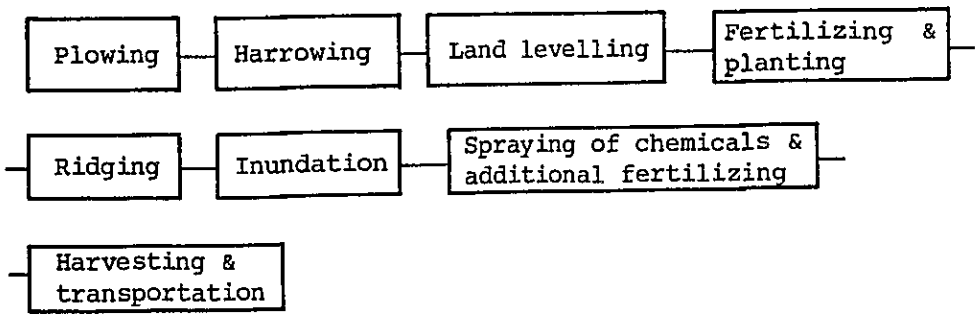
(1) A premise for the farm mechanization

We assumed the number of workable days and workable hours of machinery by considering the climatic conditions such as rainfall, etc.

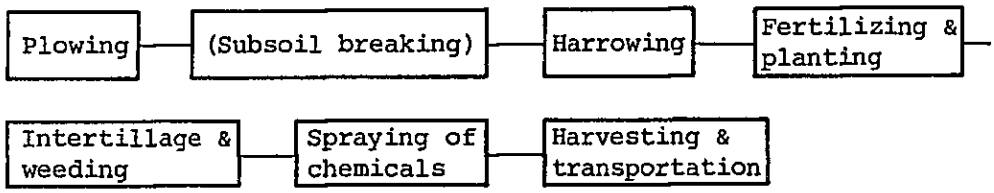
As to the introduction of tractors, etc., we discussed about the planting period which falls at the peak of work. Examining the efficiency of their employment, we decided their introduction by area scale as shown in the attached table. (Table 4-1-1, Table 4-1-2)

(2) Out-line of the mechanized work system

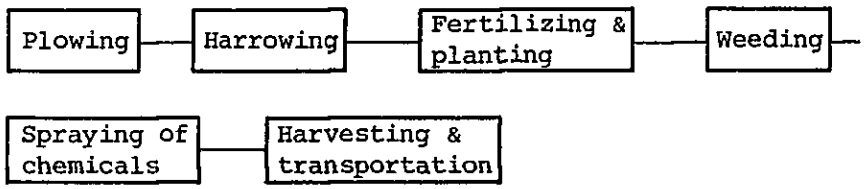
1) Direct sowing culture of paddy rice on well drained paddy field



2) Soybean cultivation



3) Wheat cultivation



(3) The contents of cultivation techniques by farm product are offered in 4-1-3.

Table 4-1-1 Workable Hours in Planned Working Season

	Working hours per day			Workable days in planned season				Workable hours
	Working hours	Actual working rate	Actual working hours	Seeding season		Rate of working days	Workable days	
				Season month	Optimum season range days			
Paddy rice	10	70	7.0	10 ∿ 11	40	60	24	168
Soybeen	10	70	7.0	10 ∿ 11	*30	60	18	126
Wheat	10	70	7.0	5 ∿ 6	30	70	20	140

Note: 1. In order to examine introduction units of tractor, this table is made up on the base of seeding season with peak workng hours.

2. *Optimum season range of soybean seeding is usually 40 days, however in this case it is 30 days considering overlapping with transportation of wheat of winter crop.

Table 4-1-2-ⓐ Using Hours of Required Machine for Working in Planned Area (Harrowing, Fertilizing, Seeding)

Crops	Managing scale (ha)	Type and units of tractor	Works	Machine		Machine using hours/ha	Working times	Working area	Required hours			Utilization efficiency	Remarks
				Name	Units				Whole required hours	Required hours/unit	Amount of work (hour)		
Paddy rice	25	Tractor 45 rp: 1 unit	Harrowing Land levelling Fertilizing seeding	Disc harrow Leveler Fertilizer applier, seeder	1 1 1	1.5 1.0 2.5	1 2 1	25 25 25	37.5 50.0 62.5	37.5 50.0 62.5	150.0	89.3	
	50	90 rp: 1 unit	"	"	1 1 1	0.7 0.45 1.4	1 2 1	50 50 50	35.0 45.0 70.0	35.0 45.0 70.0	150.0	89.3	
	100	80 rp: 1 unit	"	"	1 1 1	0.75 0.5 1.5	1 2 1	40 40 40	30.0 40.0 60.0	30.0 40.0 60.0	130.0 148.1(avarage)	88.2	
		100 rp: 1 unit	"	"	1 1 1	0.67 0.4 1.3	1 2 1	60 60 60	40.2 48.0 78.0	40.2 48.0 78.0	166.2		
	150	70 rp: 1 unit	"	"	1 1 1	1.0 0.75 2.0	1 2 1	30 30 30	30.0 45.0 60.0	30.0 45.0 60.0	135.0		
		80 rp: 1 unit	"	"	1 1 1	0.75 0.5 1.5	1 2 1	50 50 50	37.5 50.0 75.0	37.5 50.0 75.0	162.5 152.8(average)	91.0	
		120 rp: 1 unit	"	"	1 1 1	0.6 0.3 1.1	1 2 1	70 70 70	42.0 42.0 77.0	42.0 42.0 77.0	161.0		
	250	80 rp: 1 unit	"	"	1 1 1	0.75 0.5 1.5	1 2 1	40 40 40	30.0 40.0 60.0	30.0 40.0 60.0	130.0 153.3(avarage)	91.2	
		120 rp: 3 units	"	"	3 3 3	0.6 0.3 1.1	1 2 1	210 210 210	126.0 126.0 231.0	42.0 42.0 77.0	161.0		
	400	80 rp: 3 units	"	"	3 3 3	0.75 0.5 1.5	1 2 1	120 120 120	90.0 120.0 180.0	30.0 40.0 60.0	130.0 147.7(average)	87.9	
		120 rp: 4 units	"	"	4 4 4	0.6 0.3 1.1	1 2 1	280 280 280	168.0 168.0 168.0	42.0 42.0 77.0	161.0		
	500	80 rp: 2 units	"	"	2 2 2	0.75 0.5 1.5	1 2 1	80 80 80	60.0 80.0 120.0	30.0 40.0 60.0	130.0 153.3(average)	91.2	
		120 rp: 6 units	"	"	6 6 6	0.6 0.3 1.1	1 2 1	420 420 420	252.0 252.0 462.0	42.0 42.0 77.0	161.0		

Notes: 1. This table is made up in order to examine units and utilization of tractor in seeding season.
2. Utilization efficiency is calculated by (required hours/workable hours × 100(%)). However, workable hours are 168 hr for paddy rice, 126 hr for soybean and 140 hr for wheat. (Note 1. and 2. apply to wheat and soybean)
3. For paddy rice, only once harrowing just before seeding is considered among 3 times. However, leeway is given to utilization as harrowing may be twice in seeding season depending upon restriction by meteorological conditions.

Table 4-1-2-ⓑ Using Hours of Required Machine for Working in Planned Area
(Harrowing, Fertilizing, Seeding)

Crops	Managing scale (ha)	Type and units of tractor	Works	Machine		Machine using hours/ha	Working times	Working area	Required hours			Utilization efficiency	Remarks
				Name	Units				Whole required hours	Required hours/unit	Amount of work (hour)		
Soybean and wheat	25	Tractor 45 rp: 1 unit	Harrowing	Disc harrow	1	1.0	2	18.75	37.5	37.5	70.3	55.8	
			Fertilizing seeding	Fertilizer applier, seeder	1	1.75	1	18.75	32.8	32.8			
	50	70 rp: 1 unit	"	"	1	0.75	2	37.5	56.25	56.25	112.5	89.3	
			"	"	1	1.5	1	37.5	56.25	56.25			
	100	45 rp: 1 unit	"	"	1	1.0	2	33.0	66.0	66.0	123.8	99.2	
			"	"	1	1.75	1	33.0	57.75	57.75	125.0(avarage)		
		70 rp: 1 unit	"	"	1	0.75	2	42.0	63.0	63.0	126.0		
			"	"	1	1.5	1	42.0	63.0	63.0			
	150	70 rp: 1 unit	"	"	1	0.75	2	42.0	63.0	63.0	126.0	96.2	
			"	"	1	1.5	1	42.0	63.0	63.0	121.2(average)		
		110 rp: 1 unit	"	"	1	0.375	2	70.0	52.5	52.5	122.5		
			"	"	1	1.0	1	70.0	70.0	70.0			
	200	70 rp: 2 units	"	"	2	0.75	2	80.0	120.0	60.0	120.0	96.2	
			"	"	2	1.5	1	80.0	120.0	60.0	121.2(average)		
		110 rp: 1 unit	"	"	1	0.375	2	70.0	52.5	52.5	122.5		
			"	"	1	1.0	1	70.0	70.0	70.0			

Table 4-1-3-ⓐ Details of Cultivation Techniques by Crops

(1) Paddy rice

Works	Details of cultivation technique	Optimum work season	Machine	Required materials per ha
(1) Plowing	1 time plowing by disc plow, Depth 10 ∿ 20 cm	September	Disc plow	-
(2) Harrowing	2∿3 times plowing by disc harrow Last harrowing is performed just before seeding for weeding and control of diseases and insect damage.	Late Sep. ∿ middle Oct.	Disc harrow	
(3) Land levelling	2 times by leveler	same as above	Leveler	
(4) Fertilizing seeding	Simultaneous work (additional fertilizing is performed by aeroplane). Additional fertilizing is performed by 3 times.	Middle Oct. ∿ middle Nov.	Fertilizer applier, seeder	Compound fertilizer 150 kg/ha Urea 50∿60 kg/ha Seeds 100∿150 kg/ha
(5) Ridging	Ridge is formed along contour.	Late Oct. ∿ late Nov.	Ridger	
(6) Weeding	Application of herbicide	Early Nov. ∿ late Dec.	by aeroplane	2.4 D 1.0∿1.5 ℓ/ha or Satanil-E 6∿9 ℓ/ha
(7) Control of disease and insect damage	Control is performed 2∿3 times against	Middle Nov. ∿ late Jan.	same as above	Dipterex 1.0∿1.5 ℓ/ha Sumithion 1.0 ℓ/ha Kitazin 1.0 ℓ/ha
(8) Harvest, transportation	Harvesting by large size combine, Joint works of combine and tractor, Direct transportation from field to storing and drying facilities	Early Mar. ∿ middle Apr.	Combine, Trailer	
(9) Water management		Late Oct. ∿ middle Feb.		

Table 4-1-3-ⓑ Details of Cultivation Techniques by Crops

(2) Soybean

Works	Details of cultivation technique	Optimum work season	Machine	Required materials per ha
(1) Plowing	1 time plowing by disc plow plowing depth 15 ∿ 25 cm Plowing may be omitted for 2 crop system Subsoil crushing is performed every 2∿4 years. Plowing depth 30∿50 cm	Late Sep. ∿ middle Oct.	Disc plow Subsoiler	
(2) Harrowing	2 times disc harrowing	same as above	Disc harrow	
(3) Fertilizing seeding	Simultaneous work, No fertilizer (residual effort of wheat), Seed disinfection (4% of amount of seeds), Inoculation of leguminous bacteria	Middle Oct. ∿ middle Nov.	Fertilizer applier, sowing seeds	Seeds 60∿100 kg/ha Dithane 200∿500 g Leguminous bacteria 200 g/ha
(4) Intertillage weeding	Intertilage 2 times Herbicide application 1 time	Early Dec. ∿ middle Jan.	Cultivator Power sprayer	Cencor 1 kg/ha or Blazer 1.0 ℓ/ha
(5) Control of diseases and insect damage	2∿4 times for green caterpillar, stinkbug	Early Nov. ∿ middle Feb.	Power sprayer	Sevin 200∿400 cc/ha Azourin 200∿400cc/ha (2 times) Metasystox 200∿400 cc/ha
(6) Harvest, transportation	Harvesting by large size combine Joint works of combine and trailer, Direct transportation from field to storing and drying facilities	Early Mar. ∿ middle Apr.	Combine, Trailer	

Table 4-1-3-ⓒ Details of Cultivation Techniques by Crops

(3) Wheat

Works	Details of cultivation technique	Optimum work season	Machine	Required materials per ha
(1) Plowing	Disc plowing 1 time, Plowing depth 15 ∿ 25 cm Plowing may be omitted depending upon the time of harvesting season of soybean. Plowing depth 30∿50 cm	Middle Apr. ∿ middle May	Disc plow	
(2) Harrowing	Disc harrowing 2 times	same as above	Disc harrow	
(3) Fertilizing seeding	Simultaneous work, All basal fertilizing, Seed disinfection (4% of amount of seeds)	Middle May ∿ early Jun.	Fertilizer applier, sowing seeds	Compound fertilizer Dithane 200∿500 g Seeds 100∿150 kg/ha
(4) Weeding	Application of herbicide (1 time)	Early Jun. ∿ middle Jun.	Power sprayer	2.4 D 1.0∿1.5 ℓ/ha
(5) Control of disease and insect damage	2 4 times for midew, rust, mold, plant louse	Early Jul. ∿ late Aug.	same as above	Metesystox 200∿500cc/ha Topzin 200∿400 cc/ha
(6) Harvest, transportation	Harvesting by large size combine, Joint works of combine and trailer, Direct transportation from field to storing and drying facilities	Late Sep. ∿ middle Oct.	Combine, Trailer	

II. PRODUCTION COST COMPUTATION METHOD

1. Estimation basis of gross income

(1) The standard amount of yields per ha at the stable time in farming is as follows:

Paddy (unhulled rice)	5,000 kg
Soybean	2,000 kg
Wheat	1,600 kg

(2) Prices per kg are based on the recent ones.

(Reference)

Transition of the Prices of Farm Products

	Paddy (GS/kg)	Soybean (GS/kg)	Wheat (GS/kg)	Remarks
1977	18	25	25	
1978	27	20	22	
1979	28	25	22	
1980	27	19	24	
1981	26	28	26	
1982	32	25	35	
1983	-	30	45	
5 year average	28	27	30	
3 year "	28.2	28	35	
2 year "	29	28	40	
(Reference)				
Production cost kg(t)				
Production cost	21.35	20.43	24.88	
Standard profit	7.47	7.15	8.71	
Total	28.82	27.58	33.59	
(Amount of crops per ha)	3000 kg	2000 kg	1600 kg	

(Notes) 1. Prices of farm products by year is based on: "Banco Central del Paraguay" (1983, no. 19)

2. Production cost per kg(t) is based on: "Cuentas Culturales" (MAG 1981∿82)

2. Precondition for production cost estimation

(1) Material expenses are based on the recent prices

(2) Out of the work expenses, the computation of machinery utilization expenses is based on the following items:

Fixed charges	Depreciation
	Repairing charges
	Garage charges
	Capital interest and others
Fluctuating expenses	Fuel expenses
	Lubricant expenses
	Labor wages

1) Out of the fixed charges, the computation of depreciation, repairing charges and garage charges was done by setting up the annual mean ratio of fixed charges of each machine, in an attempt at simplifying the calculation.

Capital interests and others which are to be summed up collectively are not calculated here.

2) Fluctuating expenses are computed according to the following methods. Labor wages, which are summed up collectively in the labor expenses of production cost, are not calculated here.

① Calculation formula

Fluctuating expenses = Fuel expenses + Lubricant expenses

Fuel expenses = Fuel consumption volume per hour × Fuel cost

Lubricant expenses = Fuel expenses × 0.3

② Fuel consumption volume per hour is based on the following list. (Average volume in each work)

Tractor		Combine	
45 HP	4 ℓ/hr	95 Hp	12 ℓ/hr
75 "	7 "		
80 "	9 "		
90 "	10 "		
100 "	11 "		
110 "	12 "		
120 "	13 "		

③ Computation of airplane charges

Operation charge @1,500 Gs/ha × 8 times = 12,000 Gs/ha
(Including a pilot and a flagman)

Movement of the airplane @60,000 Gs/within hr × 8 times ÷ 100 ha = 4,800 Gs/ha

Total 16,800 Gs/ha

3) Out of work expenses, labor expenses are computed by assuming an operator's wage as 200 Gs/hr and a laborer's wage as 100 Gs/hr.

(3) Rent of land is 2,000 Gs/ha which is calculated by referring to "Cuentas Culturales" (MAG, 1981∿82).

(4) We summed up 1,000 Gs/ha for irrigation expenses based on our assumption.

(5) The computation of capital interest is based on the following production cost survey method of MAG.

Total cost (the 1st production cost) × 0.7 × 1/2 (6 months) × 18.1%

III. COMPUTATION OF THE FARMERS' ECONOMIC BALANCE

1. As to paddy, soybean and wheat, we computed it by multiplying each area of land by scale to "Production cost/ha". As to beef cattle, we computed it upon the basis of "Economic Balance Estimate by Scale".

(1) We employed the following method in calculating agricultural income from the results of production cost:

Agricultural income = Gross income - (the 1st production cost + Irrigation cost - Family labor cost)

(2) The calculation of family labor cost was supposed from the Labor Supply and Demand Plan. It is as follows.

Family labor cost = Total labor cost - (total labor cost × Employment labor ratio)

$$\text{Employment labor cost} = \frac{\text{Employed labor hoursly scale}}{\text{Total labor hours}} \times 100\ (\%)$$

2. Non-farming income are estimated by assuming that the farmers are engaged in the work other than agriculture during the period of season off.

3. Tax and other public impositions are based on the mean value (3%) of "Farmers' Economic Survey in the Migrated Lands (Individual Cases)"

4. Household expenses are computed by multiplying the number of household members (6 persons) to family expenses per household member (108,426 Gs/person) in the "Farmers' Economic Survey in the Migrated Lands (Individual cases)". 5,096,000 ÷ 47 persons = 108,426 Gs/person

Table 4-1-4 offers the results of computation made according to the above method.

Estimation of Production Cost of Paddy Rice per ha

(Unit:GS)

Mechanized work system / Scale of farming / Primary production cost		25 ha	50 ha	100 ha	150 ha	250 ha	400 ha	500 ha
Yield per ha	kg	5000	5000	5000	5000	5000	5000	5000
Price per kg	GS	28.2	28.2	28.2	28.2	28.2	28.2	28.2
Gross income per ha	GS	141,000	141,000	141,000	141,000	141,000	141,000	141,000
Gross profit — Work cost — Seeds cost		10,400	10,400	10,400	10,400	10,400	10,400	10,400
Fertilizer cost		15,050	15,050	15,050	15,050	15,050	15,050	15,050
Herbicide cost		2,400	2,400	2,400	2,400	2,400	2,400	2,400
Agricultural chemical cost		8,850	8,850	8,850	8,850	8,850	8,850	8,850
Other material cost		-	-	-	-	-	-	-
Subtotal		36,700	36,700	36,700	36,700	36,700	36,700	36,700
Material cost — Cost of mechanical operation		52,861	48,300	48,414	43,362	43,814	44,016	43,814
Cost of cropdusting		16,800	16,800	16,800	16,800	16,800	16,800	16,800
Labor cost (family labor cost)		9,070 (8,101)	6,550 (5,074)	6,519 (2,989)	6,574 (2,215)	6,134 (1,338)	5,939 (909)	6,134 (669)
Subtotal		78,731	71,650	71,733	66,736	66,748	66,755	66,748
Total		115,431	108,350	108,433	103,436	103,448	103,455	103,448
Land rent		2,000	2,000	2,000	2,000	2,000	2,000	2,000
Water utilization cost		1,000	1,000	1,000	1,000	1,000	1,000	1,000
Capital interest		7,313	6,864	6,869	6,553	6,553	6,554	6,553
Secondary production cost total		125,744	118,214	118,302	112,989	113,001	113,009	113,001
Net income per ha		15,256	22,785	22,698	28,011	27,999	27,991	27,999
Net income rate (%)		10.8	16.2	16.1	19.9	19.9	19.9	19.9

Details of Material Cost per ha

(Paddy rice)

Item / Cost item	Material name	Quantity	Unit price	Amount of money	Remarks
Seeds cost	Seeds	130 kg	80 GS/kg	10,400 GS	
Fertilizer cost	Compound fertilizer	150 kg	70 GS/kg	10,500	
	Urea	50 kg	91 GS/kg	4,550	
	Total			15,050	
Herbiside cost	2.4 D	3.0 ℓ	800 GS/ℓ	2,400	2 times (1.5ℓ × 2)
Agriculture chemical cost	Dipterex	1.5 ℓ	1,500 GS/ℓ	2,250	1 time
	Sumithion	2.0 ℓ	1,500 GS/ℓ	3,000	2 times (1.0ℓ × 2)
	Kitazin	2.0 ℓ	1,800 GS/ℓ	3,600	2 times (1.0ℓ × 2)
	Total			8,850	
Other material cost				-	
	All total			36,700	

Calculation of Machine Using Expenditure for Paddy Rice

Paddy rice, managing scale 25 ha

(1)	Plowing	@ 7,427 GS/ha × 25 ha	= 185,675 GS
(2)	Harrowing	@ 8,240 GS/ha × 25 ha	= 206,000 "
(3)	Land levelling	@ 5,822 GS/ha × 25 ha	= 145,550 "
(4)	Fertilizing, seeding	@ 7,885 GS/ha × 25 ha	= 197,125 "
(5)	Ridging	@ 5,159 GS/ha × 25 ha	= 128,975 "
(6)	Harvesting	@ 14,111 GS/ha × 25 ha	= 352,775 "
(7)	Transportation	@ 4,217 GS/ha × 25 ha	= 105,425 "
	Total		1,321,525 "
			(52,861 GS/ha)

Paddy rice, managing scale 50 ha

(1)	Plowing	@ 6,887 GS/ha × 50 ha	= 344,350 GS
(2)	Harrowing	@ 7,186 GS/ha × 50 ha	= 359,300 "
(3)	Land levelling	@ 4,211 GS/ha × 50 ha	= 210,550 "
(4)	Fertilizing, seeding	@ 6,930 GS/ha × 50 ha	= 346,500 "
(5)	Ridging	@ 3,718 GS/ha × 50 ha	= 185,900 "
(6)	Harvesting	@ 14,111 GS/ha × 50 ha	= 705,550 "
(7)	Transportation	@ 5,337 GS/ha × 50 ha	= 266,850 "
	Total		2,419,000 "
			(48,300 GS/ha)

Note: For machine using expenditure per ha by machines, see attached tables. (This note apply to other tables.)

Paddy rice, managing scale 100 ha

(1)	Plowing	@	7,566 GS/ha	× 40 ha	= 302,640 GS	
		@	6,333 GS/ha	× 60 ha	= 379,980 "	
(2)	Harrowing	@	7,603 GS/ha	× 40 ha	= 304,120 "	
		@	7,012 GS/ha	× 60 ha	= 420,720 "	
(3)	Land levelling	@	4,887 GS/ha	× 40 ha	= 195,480 "	
		@	3,710 GS/ha	× 60 ha	= 222,600 "	
(4)	Fertilizing,	@	7,361 GS/ha	× 40 ha	= 294,440 "	
	seeding	@	6,621 GS/ha	× 60 ha	= 397,260 "	
(5)	Ridging	@	4,079 GS/ha	× 40 ha	= 163,160 "	
		@	3,521 GS/ha	× 60 ha	= 211,260 "	
(6)	Harvesting	@	14,111 GS/ha	× 100 ha	= 1,411,100 "	
(7)	Transportation	@	5,606 GS/ha	× 40 ha	= 224,240 "	
		@	5,240 GS/ha	× 60 ha	= 314,400 "	
	Total				4,841,400 "	
					(48,414 GS/ha)	

Paddy rice, managing scale 150 ha

(1)	Plowing	@	8,425 GS/ha	× 30 ha	= 252,750 GS	
		@	6,380 GS/ha	× 50 ha	= 319,000 "	
		@	5,499 GS/ha	× 70 ha	= 348,930 "	
(2)	Harrowing	@	9,132 GS/ha	× 30 ha	= 273,960 "	
		@	6,451 GS/ha	× 50 ha	= 322,550 "	
		@	6,829 GS/ha	× 70 ha	= 478,030 "	
(3)	Land levelling	@	6,452 GS/ha	× 30 ha	= 193,560 "	
		@	4,074 GS/ha	× 50 ha	= 203,700 "	
		@	3,300 GS/ha	× 70 ha	= 231,000 "	
(4)	Fertilizing,	@	8,384 GS/ha	× 30 ha	= 251,520 "	
	seeding	@	6,135 GS/ha	× 50 ha	= 306,750 "	
		@	5,992 GS/ha	× 70 ha	= 419,440 "	
(5)	Ridging	@	4,471 GS/ha	× 30 ha	= 134,130 "	
		@	3,394 GS/ha	× 50 ha	= 169,700 "	
		@	4,077 GS/ha	× 70 ha	= 285,390 "	
(6)	Harvesting	@	9,953 GS/ha	× 150 ha	= 1,492,950 "	
(7)	Transportation	@	5,289 GS/ha	× 30 ha	= 158,670 "	
		@	4,731 GS/ha	× 50 ha	= 236,550 "	
		@	5,567 GS/ha	× 70 ha	= 389,690 "	
	Total				6,504,270 "	
					(43,362 GS/ha)	

Paddy rice, managing scale 250 ha

(1)	Plowing	@	7,566 GS/ha × 40 ha =	302,640 GS
		@	5,499 GS/ha × 70 ha × 3 =	1,154,790 "
(2)	Harrowing	@	7,603 GS/ha × 40 ha =	304,120 "
		@	6,829 GS/ha × 70 ha × 3 =	1,434,090 "
(3)	Land levelling	@	4,887 GS/ha × 40 ha =	195,480 "
		@	3,300 GS/ha × 70 ha × 3 =	693,000 "
(4)	Fertilizing,	@	7,361 GS/ha × 40 ha =	294,440 "
	seeding	@	5,992 GS/ha × 70 ha × 3 =	1,258,320 "
(5)	Ridging	@	5,606 GS/ha × 40 ha =	224,240 "
		@	4,077 GS/ha × 70 ha × 3 =	856,170 "
(6)	Harvesting	@	11,616 GS/ha × 125 ha × 2 =	2,904,000 "
(7)	Transportation	@	4,079 GS/ha × 40 ha =	163,160 "
		@	5,567 GS/ha × 70 ha × 3 =	1,169,070 "
	Total			10,953,520 "
				(43,814 GS/ha)

Paddy rice, managing scale 400 ha

(1)	Plowing	@	7,566 GS/ha × 40 ha × 3 =	907,920 GS
		@	5,499 GS/ha × 70 ha × 4 =	1,539,720 "
(2)	Harrowing	@	7,603 GS/ha × 40 ha × 3 =	912,360 "
		@	6,829 GS/ha × 70 ha × 4 =	1,912,120 "
(3)	Land levelling	@	4,887 GS/ha × 40 ha × 3 =	586,440 "
		@	3,300 GS/ha × 70 ha × 4 =	924,000 "
(4)	Fertilizing,	@	7,361 GS/ha × 40 ha × 3 =	883,320 "
	seeding	@	5,992 GS/ha × 70 ha × 4 =	1,677,760 "
(5)	Ridging	@	5,606 GS/ha × 40 ha × 3 =	672,720 "
		@	4,077 GS/ha × 70 ha × 4 =	1,141,560 "
(6)	Harvesting	@	10,946 GS/ha × 134 ha × 3 =	4,400,292 "
(7)	Transportation	@	4,079 GS/ha × 40 ha × 3 =	489,480 "
		@	5,567 GS/ha × 70 ha × 4 =	1,558,760 "
	Total			17,606,452 "
				(44,016 GS/ha)

Paddy rice, managing scale 500 ha

(1)	Plowing	@	7,566 GS/ha × 40 ha × 2 =	605,280 GS
		@	5,499 GS/ha × 70 ha × 6 =	2,309,580 "
(2)	Harrowing	@	7,603 GS/ha × 40 ha × 2 =	608,240 "
		@	6,829 GS/ha × 70 ha × 6 =	2,868,180 "
(3)	Land levelling	@	4,887 GS/ha × 40 ha × 2 =	390,960 "
		@	3,300 GS/ha × 70 ha × 6 =	1,386,000 "
(4)	Fertilizing,	@	7,361 GS/ha × 40 ha × 2 =	588,880 "
	seeding	@	5,992 GS/ha × 70 ha × 6 =	2,516,640 "
(5)	Ridging	@	5,606 GS/ha × 40 ha × 2 =	448,480 "
		@	4,077 GS/ha × 70 ha × 6 =	1,712,340 "
(6)	Harvesting	@	11,616 GS/ha × 125 ha × 4 =	5,808,000 "
(7)	Transportation	@	4,079 GS/ha × 40 ha × 2 =	326,320 "
		@	5,567 GS/ha × 70 ha × 6 =	2,338,140 "
	Total			21,907,040 "
				(43,814 GS/ha)

(Attached Table)

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 25 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price					Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
								Fuel	Lubricating oil	Wages			
		(1,000 GS)	(GS)	(hr)	(ha)	(hr)	(GS)	(GS)	(GS)		(GS)	(GS)	(GS)
Tractor	1	2000	373,600	15.5		(387.5)	964	-	-		-		
Disc plow	1	300	69,450	3.5	25	87.5	794	280	84		1158	2122	7427
Disc harrow	1	250	56,550	4.5	"	112.5	503	280	84		867	1831	8240
Leveler	1	350	79,170	2.0	"	50.0	1583	280	84		1947	2911	5822
Fertilizer applier, seeder	1	500	114,100	2.5	"	62.5	1826	280	84		2190	3154	7885
Ridger	1	350	79,170	1.5	"	37.5	2111	280	84		2475	3439	5159
Combine	1/4	1875 (7500×1/4)	311,813	1.5	"	37.5	8315	840	252		9407	9407	14111
Trailer	1	250	55,600	1.5	"	37.5	1483	280	84		1847	2811	4217

Notes: 1. Annual fixed expenditure is calculated by multiplying purchase price by fixed expenditure rate (Attached Table).
2. As wages are summed up to wages in production cost, it is omitted machine using expenditure in this table.
(These notes apply to soybean and wheat.)

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 50 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	Fixed expenditure (GS)	Changeable expenditure Fuel (GS)	Lubricating oil (GS)	Wages	Total (GS)	Expenditure per hour (GS)	Expenditure per ha (GS)
Tractor	1	4000	747,200	8.5		(425)	1758	-	-	-	-	-	-
Disc plow	1	450	104,175	1.8	50	90.0	1158	700	210		2068	3826	6887
Disc harrow	1	350	79,170	2.1	"	105.0	754	700	210		1664	3422	7186
Leveler	1	400	90,480	0.9	"	45.0	2011	700	210		2921	4679	4211
Fertilizer applier, seeder	1	700	159,740	1.4	"	70.0	2282	700	210		3192	4950	6930
Ridger	1	350	79,170	0.8	"	40.0	1979	700	210		2889	4647	3718
Combine	1/2	3750 (7500×1/2)	623,625	1.5	"	75.0	8315	840	252		9407	9407	14111
Trailer	1	300	66,720	1.5	"	75.0	890	700	210		1800	3558	5337

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 100 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
							Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	(GS)	Fuel (GS)	Lubricating oil (GS)	Wages	(GS)	(GS)	(GS)
Tractor (80 rp)	1	3500	653,800	9.05		(362)	1806	-	-	-	-	-	-
Disc plow	1	400	92,600	2.0	40	80.0	1158	630	189		1977	3783	7566
Disc harrow	1	300	67,860	2.25	"	90.0	754	630	189		1573	3379	7603
Leveler	1	400	90,480	1.0	"	40.0	2262	630	189		3081	4887	4887
Fertilizer applier, seeder	1	600	136,920	1.5	"	60.0	2282	630	189		3101	4907	7361
Ridger	1	350	79,170	0.8	"	32.0	2474	630	189		3293	5099	4079
Trailer	1	300	66,720	1.5	"	60.0	1112	630	189		1931	3737	5606
Tractor (100 rp)	1	4500	840,600	8.0	(60)	(480)	1751	-	-	-	-	-	-
Disc plow	1	500	115,750	1.6	60	96.0	1206	770	231		2207	3958	6333
Disc harrow	1	400	90,480	2.0	"	120.0	754	770	231		1755	3506	7012
Leveler	1	400	90,480	0.8	"	48.0	1885	770	231		2886	4637	3710
Fertilizer applier, seeder	1	800	182,560	1.3	"	78.0	2341	770	231		3342	5093	6621
Ridger	1	350	79,170	0.8	"	48.0	1649	770	231		2650	4401	3521
Trailer	1	300	66,720	1.5	"	90.0	741	770	231		1742	3493	5240
Combine	1	7500	1,247,250	1.5	100	150.0	8315	840	252		9407	9407	14111

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 150 ha) 1/2

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	Fixed expenditure (GS)	Changeable expenditure Fuel (GS)	Lubricating oil (GS)	Wages	Total (GS)	Expenditure per hour (GS)	Expenditure per ha (GS)
Tractor (70 rp)	1	3000	560,400	11.3		(339)	1653	-	-	-	-	-	-
Disc plow	1	350	81,025	2.5	30	75.0	1080	490	147		1717	3370	8425
Disc harrow	1	300	67,860	3.0	"	90.0	754	490	147		1391	3044	9132
Leveler	1	400	90,480	1.5	"	45.0	2011	490	147		2648	4301	6452
Fertilizer applier, seeder	1	500	114,100	2.0	"	60.0	1902	490	147		2539	4192	8384
Ridger	1	350	79,170	0.8	"	24.0	3299	490	147		3936	5589	4471
Trailer	1	250	55,600	1.5	"	45.0	1236	490	147		1873	3526	5289
Tractor (80 rp)	1	3500	653,800	9.05		(452.5)	1445	-	-	-	-	-	-
Disc plow	1	400	92,600	2.0	50	100.0	926	630	189		1745	3190	6380
Disc harrow	1	300	67,860	2.25	"	112.5	603	630	189		1422	2867	6451
Leveler	1	400	90,480	1.0	"	50.0	1810	630	189		2629	4074	4074
Fertilizer applier, seeder	1	600	136,920	1.5	"	75.0	1826	630	189		2645	4090	6135
Ridger	1	350	79,170	0.8	"	40.0	1979	630	189		2798	4243	3394
Trailer	1	300	66,720	1.5	"	75.0	890	630	189		1709	3154	4731

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 150 ha) 2/2

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	Fixed expenditure (GS)	Changeable expenditure Fuel (GS)	Lubricating oil (GS)	Wages	Total (GS)	Expenditure per hour (GS)	Expenditure per ha (GS)
Tractor (120 rp)	1	5000	934,000	7.05		(493.5)	1893	-	-	-	-	-	-
Disc plow	1	500	115,750	1.25	70	87.5	1323	910	273		2506	4399	5499
Disc harrow	1	400	90,480	1.8	"	126.0	718	910	273		1901	3794	6829
Leveler	1	450	101,790	0.6	"	42.0	2424	910	273		3607	5500	3300
Fertilizer applier, seeder	1	800	182,560	1.1	"	77.0	2371	910	273		3554	5447	5992
Ridger	1	500	113,100	0.8	"	56.0	2020	910	273		3203	5096	4077
Trailer	1	300	66,720	1.5	"	105.0	635	910	273		1818	3711	5567
Combine	1	7500	1,247,250	1.5	150	225.0	5543	840	252		6635	6635	9953

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 250 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	Fixed expenditure (GS)	Changeable expenditure Fuel (GS)	Lubricating oil (GS)	Wages	Total (GS)	Expenditure per hour (GS)	Expenditure per ha (GS)
Tractor (80 rp)	1	3500	653,800	9.05		(362)	1806	-	-	-	-	-	-
Disc plow	1	400	92,600	2.0	40	80.0	1158	630	189		1977	3783	7566
Disc harrow	1	300	67,860	2.25	"	90.0	754	630	189		1573	3379	7603
Leveler	1	400	90,480	1.0	"	40.0	2262	630	189		3081	4887	4887
Fertilizer applier, seeder	1	600	136,920	1.5	"	60.0	2282	630	189		3101	4907	7361
Ridger	1	350	79,170	0.8	"	32.0	2474	630	189		1931	3737	5606
Trailer	1	300	66,720	1.5	"	60.0	1112	630	189		3293	5099	4079
Tractor (120 rp)	1	5000	934,000	7.05		(493.5)	1893	-	-	-	-	-	-
Disc plow	1	500	115,750	1.25	70	87.5	1323	910	273		2506	4399	5499
Disc harrow	1	400	90,480	1.8	"	126.0	718	910	273		1901	3794	6829
Leveler	1	450	101,790	0.6	"	42.0	2424	910	273		3607	5500	3300
Fertilizer applier, seeder	1	800	182,560	1.1	"	77.0	2371	910	273		3554	5447	5992
Ridger	1	500	113,100	0.8	"	56.0	2020	910	273		3203	5096	4077
Trailer	1 (3)	300	66,720	1.5	"	105.0	635	910	273		1818	3711	5567
Combine	1 (2)	7500	1,247,250	1.5	125	187.5	6652	840	252		7744	7744	11616

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 400 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	Fixed expenditure (GS)	Changeable expenditure Fuel (GS)	Lubricating oil (GS)	Wages	Total (GS)	Expenditure per hour (GS)	Expenditure per ha (GS)
Tractor (80 rp)	1	3500	653,800	9.05		(362)	1806	-	-	-	-	-	-
Disc plow	1	400	92,600	2.0	40	80.0	1158	630	189		1977	3783	7566
Disc harrow	1	300	67,860	2.25	"	90.0	754	630	189		1573	3379	7603
Leveler	1	400	90,480	1.0	"	40.0	2262	630	189		3081	4887	4887
Fertilizer applier, seeder	1	600	136,920	1.5	"	60.0	2282	630	189		3101	4907	7361
Ridger	1	350	79,170	0.8	"	32.0	2474	630	189		1931	3737	5606
Trailer	1 (3)	300	66,720	1.5	"	60.0	1112	630	189		3293	5099	4079
Tractor (120 rp)	1	5000	934,000	7.05		(493.5)	1893	-	-	-	-	-	-
Disc plow	1	500	115,750	1.25	70	87.5	1323	910	273		2506	4399	5499
Disc harrow	1	400	90,480	1.8	"	126.0	718	910	273		1901	3794	6829
Leveler	1	450	101,790	0.6	"	42.0	2424	910	273		3601	5500	3300
Fertilizer applier, seeder	1	800	182,560	1.1	"	77.0	2371	910	273		3554	5447	5992
Ridger	1	500	113,100	0.8	"	56.0	2020	910	273		3203	5096	4077
Trailer	1 (4)	300	66,720	1.5	"	105.0	635	910	273		1818	3711	5567
Combine	1 (3)	7500	1,247,250	1.5	134	201.0	6205	840	252		7297	7297	10946

Base of Calcultion of Machine Using Expenditure

(Paddy rice, managing scale 500 ha)

Machine			Annual fixed expenditure	Machine using hours/ ha	Annual working area	Annual machine using hours	Expenditure per hour				Expenditure of tractor operation		
							Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
Kind	Units	Purchase price (1,000 GS)	(GS)	(hr)	(ha)	(hr)	(GS)	Fuel (GS)	Lubricating oil (GS)	Wages	(GS)	(GS)	(GS)
Tractor (80 rp)	1	3500	653,800	9.05		(362)	1806	-	-	-	-	-	-
Disc plow	1	400	92,600	2.0	40	80.0	1158	630	189		1977	3783	7566
Disc harrow	1	300	67,860	2.25	"	90.0	754	630	189		1573	3379	7603
Leveler	1	400	90,480	1.0	"	40.0	2262	630	189		3081	4887	4887
Fertilizer applier, seeder	1	600	136,920	1.5	"	60.0	2282	630	189		3101	4907	7361
Ridger	1	350	79,170	0.8	"	32.0	2474	630	189		1931	3737	5606
Trailer	1 (2)	300	66,720	1.5	"	60.0	1112	630	189		3293	5099	4079
Tractor (120 rp)	1	5000	934,000	7.05		(493.5)	1893	-	-	-	-	-	-
Disc plow	1	500	115,750	1.25	70	87.5	1323	910	273		2506	4399	5499
Disc harrow	1	400	90,480	1.8	"	126.0	718	910	273		1901	3794	6829
Leveler	1	450	101,790	0.6	"	42.0	2424	910	273		3607	5500	3300
Fertilizer applier, seeder	1	800	182,560	1.1	"	77.0	2371	910	273		3554	5447	5992
Ridger	1	500	113,100	0.8	"	56.0	2020	910	273		3203	5096	4077
Trailer	1 (6)	300	66,720	1.5	"	105.0	635	910	273		1818	3711	5567
Combine	1 (4)	7500	1,247,250	1.5	125	187.5	6652	840	252		7744	7744	11616

Attached Table

Table of Annual Fixed Expenditure Rate of Farming Machine

Use	Machine	Annual fixed expenditure rate				Fixed expenditure rate (total)	Remarks
		Depreciation	Repair cost	Garage cost	Capital interest		
		(%)	(%)	(%)		(%)	
Tractor	Passenger tractor	11.25	7.00	0.43		18.68	
Tillage, land preparation	Disc plow	18.00	4.00	1.15		23.15	
	Rotary	18.00	6.25	0.62		24.87	
	Disc harrow	18.00	4.00	0.62		22.62	
	Limsor	18.00	2.00	3.29		23.29	
	Land leveller	18.00	4.00	0.62		22.62	
	Ridger	18.00	4.00	0.62		22.62	
	Subsoiler	18.00	2.00	1.20		21.20	
	Cultivator	18.00	4.00	0.62		22.62	
	Ridger	18.00	4.00	0.62		22.62	
Fertilization, sowing seeds	Fertilizer applier, seeder	18.00	4.00	0.82		22.82	
	Planter	18.00	4.00	0.82		22.82	
Control	Power spray	18.00	4.00	0.45		22.45	
Harvesting	Combine	11.25	5.00	0.38		16.63	
Transportation	Trailer	18.00	2.00	2.24		22.24	

Note 1. This annual fixed expenditure rate is a percentage of multiplying annual fixed expenditure by purchase price of machine. However, capital interest etc is omitted because appropriated in lump sum.

2. This annual fixed expenditure rate is calculated as follows.

(1) Depreciation: $\frac{\text{Purchase price - residual price (10\%)}}{\text{life}} \div \text{Purchase price}$

(However, the life is 8 years for tractor and combine, 5 years for others)

(2) Repair cost: 1) This coefficient of repair cost is determined by performing overall judgement on the base of machine using records in Japan, refering to foregin records.

2) Coefficient of repair cost is calculated by multiplying repair cost required until renewal of the machine by the life of machine.

(3) Garage expense: Coefficient of garage expense is calculated as follows, which is used to charge garage expense on each machine.

$$\text{Coefficient of garage expense} = \frac{\text{Annual required expenditure of garage per } m^3 \times \text{Area Required for machine housing } (m^2)}{\text{Purchase price of machine}} \times 100$$

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 25 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	
Plowing	Disc plow	3.5	3.5	-	3.5	
Harrowing	Disc harrow	4.5	4.5	-	4.5	
Land levelling	Land levaler	2.0	2.0	-	2.0	
Fertilization, sowing seeds	Fertilizer applier, seeder	2.5	2.5	7.5	10.0	
Ridging	Redger	1.5	1.5	1.5	3.0	
Top dressing						Aeroplane use
Weeding						
Control						
Water management					(20.0)	
Harvesting	Combine	1.5	1.5	7.5		
Transportation	Trailer	1.5	1.5		10.5	
					(20.0)	
Total		17.0	17.0	16.5	33.5	

(Calculation of labor cost)

1. Per 25 ha

Operator	@200GS/hr × 17hr/ha × 25ha × 1.4	=	119,000GS
Laborer	@100GS/hr × 16.5hr/ha × 25ha × 1.4	=	57,750 "
	@100GR/hr × 20.0hr/ha × 25ha	=	50,000 "
	Total		226,750 "

2. Per ha 226,750GS ÷ 25ha = 9,070GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 50 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	
Plowing	Disc plow	1.8	1.8	-	1.8	
Harrowing	Disc harrow	2.1	2.1	-	2.1	
Land levelling	Land leveler	0.9	0.9	-	0.9	
Fertilization, sowing seeds	Fertilizer applier, seeder	1.4	1.4	4.2	5.6	
Ridging	Ridger	0.8	0.8	0.8	1.6	
Top dressing						
Weeding						Aeroplane use
Control						
Water management					(20.0)	
Harvesting	Combine	1.5	1.5			
Transportation	Trailer	1.5	1.5	7.5	10.5	
					(20.0)	
Total		10.0	10.0	12.5	22.5	

(Calculation of labor cost)

1 Per 50 ha

Operator @200GS/hr × 10.0hr/ha × 50ha × 1.4 = 140,000GS

Laborer { @100GS/hr × 12.5hr/ha × 50ha × 1.4 = 87,500 "
@100GS/hr × 20.0hr/ha × 50ha = 100,000 "

Total 327,500 "

2. Per ha 327,500GS ÷ 50ha = 6,550GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 100 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	Note: Loaded area (per unit)
Plowing	Disc plow (a)	2.0	2.0	-	2.0	(a) 80HP (40ha) (1 unit)
	" (b)	1.6	1.6	-	1.6	
Harrowing	Disc harrow (a)	2.25	2.25	-	2.25	(b) 100HP (60ha) (1 unit)
	" (b)	2.0	2.0	-	2.0	
Land levelling	Land leveler (a)	1.0	1.0	-	1.0	(c) (100ha)
	" (b)	0.8	0.8	-	0.8	
Fertilization, sowing seeds	Fertilizer applier, seeder (a)	1.5	1.5	4.5	6.0	
	" (b)	1.3	1.3	3.9	5.2	
Ridging	Ridger (a)	0.8	0.8	0.8	1.6	
	" (b)	0.8	0.8	0.8	1.6	
Top dressing						Aeroplane use
Weeding						
Control						
Water management					(20.0)	
Harvesting	Combine (c)	1.5	1.5	(c)		
Transportation	Trailer (a)	1.5	1.5			
	" (b)	1.5	1.5	7.5		
Total (a)		9.05	9.05	5.3	(20.0) 36.05	
(b)		8.0	8.0	4.7		
(c)		1.5	1.5	7.5		

(Calculation of labor cost)

1. Per 100 ha

Operator
- (a) @200GS/hr × 9.05hr/ha × 40ha × 1.4 = 101,360GS
- (b) @200GS/hr × 8.0hr/ha × 60ha × 1.4 = 134,400 "
- (c) @200GS/hr × 1.5hr/ha × 100ha × 1.4 = 42,000 "

Laborer
- (a) @100GS/hr × 5.3hr/ha × 40ha × 1.4 = 29,680 "
- (b) @100GS/hr × 4.7hr/ha × 60ha × 1.4 = 39,480 "
- (c) @100GS/hr × 7.5hr/ha × 100ha × 1.4 = 105,000 "
- (d) @100GS/hr × 20.0hr/ha × 100ha × 1.4 = 200,000 "

Total 651,920 "

2. Per ha 651,920GS ÷ 100ha = 6,519GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 150 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	Note: Loaded area (1 unit)
Plowing	Disc plow (a)	2.5	2.5		2.5	(a) 70HP (30ha) (1 unit)
	" (b)	2.0	2.0		2.0	
	" (c)	1.25	1.25		1.25	(b) 80HP (50ha) (1 unit)
Harrowing	Disc harrow (a)	3.0	3.0		3.0	
	" (b)	2.25	2.25		2.25	(c) 120HP (70ha) (1 unit)
	" (c)	1.8	1.8		1 8	
Land levelling	Land leveler (a)	1.5	1.5		1.5	(d) (150ha)
	" (b)	1.0	1.0		1.0	
	" (c)	0.6	0.6		0.6	
Fertilization, sowing seeds	Fertilizer applier seeders (a)	2.0	2.0	6.0	8.0	
	" (b)	1.5	1.5	4.5	6.0	
	" (c)	1.1	1.1	3.3	4.4	
Ridging	Ridger (a)	0.8	0.8	0.8	1.6	
	" (b)	0.8	0.8	0.8	1.6	
	" (c)	0.8	0.8	0.8	1.6	
Top dressing						
Weeding						
Control					(20.0)	
Water management						
Harvesting	Combine (d)	1.5	1.5	(d)7.5		
Transportation	Triler (a)	1.5	1.5			
	" (b)	1.5	1.5			
	" (c)	1.5	1.5			
Total (a)		11.3	11.3	6.8	(20.0) 52.6	
(b)		9.05	9.05	5.3		
(c)		7.05	7.05	4.1		
(d)		1.5	1.5	7.5		

(Calculation of labor cost)

1. Per 150 ha

Operator
- (a) @200GS/hr × 11.3hr/ha × 30ha × 1.4 = 94,920GS
- (b) @200GS/hr × 9.05hr/ha × 50ha × 1.4 = 126,700 "
- (c) @200GS/hr × 7.05hr/ha × 70hr × 1.4 = 138,180 "
- (d) @200GS/hr × 1.5hr/ha × 150hr × 1.4 = 63,000 "

Laborer
- (a) @100GS/hr × 6.8hr/ha × 30ha × 1.4 = 28,560 "
- (b) @100GS/hr × 5.3hr/ha × 50ha × 1.4 = 37,100 "
- (c) @100GS/hr × 4.1hr/ha × 70ha × 1.4 = 40,180 "
- (d) @100GS/hr × 7.5hr/ha × 150ha × 1.4 = 157,500 "
- @100GS/hr 20.0hr/ha × 150ha × 1.4 = 300,000 "

Total 986,140 "

2. Per ha

986,140GS ÷ 150ha = 6,574GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 250 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	Note: Loaded area (per unit)
Plowing	Disc plow (a)	2.0	2.0		2.0	
	" (b)	1.25	1.25		1.25	(a) 80HP (40ha) (1 unit)
Harrowing	Disc harrow (a)	2.25	2.25		2.25	(b) 120HP (70ha) (3 units)
	" (b)	1.8	1.8		1.8	
Land levelling	Land leveler (a)	1.0	1.0		1.0	(c) Combine (125ha) (2 units)
	" (b)	0.6	0.6		0.6	
Fertilization, sowing seeds	Fertilizer applier seeder (a)	1.5	1.5	4.5	6.0	(d) (250ha)
	" (b)	1.1	1.1	3.3	4.4	
Ridging	Ridger (a)	0.8	0.8	0.8	1.6	
	" (b)	0.8	0.8	0.8	1.6	
Top dressing						
Weeding						
Control						
Water management					(20.0)	
Harvesting	Combine (c)	1.5	1.5			
Transportation	Trailer (a)	1.5	1.5	(d) 7.5		
	" (b)	1.5	1.5			
Total (a)		9.05	9.05	5.3	34.5	
(b)		7.05	7.05	4.1		
(c)		1.5	1.5	-		
(d)		-	-	7.5		

(Calculation of labor cost)

1. Per 250 ha

Operator
- (a) @200GS/hr × 9.05hr/ha × 40ha × 1.4 = 101,360GS
- (b) @200GS/hr × 7.05hr/ha × 70ha × 3 × 1.4 = 414,540 "
- (c) @200GS/hr × 1.5hr/ha × 125ha × 2 × 1.4 = 105,000 "

Laborer
- (a) @100GS/hr × 5.3hr/ha × 40ha × 1.4 = 29,680 "
- (b) @100GS/hr × 4.1hr/ha × 70ha × 3 × 1.4 = 120,540 "
- (c) @100GS/hr × 7.5hr/ha × 250ha × 1.4 = 262,500 "
- @100GS/hr × 20.0hr/ha × 250ha = 500,000 "

Total 1,533,620 "

2. Per ha 1,533,620GS ÷ 250ha = 6,134GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 400 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	Note: Loaded area (per unit)
Plowing	Disc plow (a)	2.0	2.0		2.0	
	" (b)	1.25	1.25		1.25	(a) 80HP (40ha) (3 units)
Harrowing	Disc harrow (a)	2.25	2.25		2.25	
	" (b)	1.8	1.8		1.8	(b) 120HP (70ha) (4 units)
Land levelling	Land leveler (a)	1.0	1.0		1.0	
	" (b)	0.6	0.6		0.6	(c) Combine (125ha) (3 units)
Fertilization, sowing seeds	Fertilizer applier seeders (a)	1.5	1.5	4.5	6.0	(d) (40ha)
	" (b)	1.1	1.1	3.3	4.4	
Ridging	Ridger (a)	0.8	0.8	0.8	1.6	
	" (b)	0.8	0.8	0.8	1.6	
Top dressing						
Weeding						
Control						
Water management					(20.0)	
Harvesting	Combine (c)	1.5	1.5	(d) 7.5		
Transportation	Trailer (a)	1.5	1.5			
	" (b)	1.5	1.5			
Total (a)		9.05	9.05	5.3	(20.0) 34.5	
(b)		7.05	7.05	4.1		
(c)		1.5	1.5	-		
(d)		-	-	7.5		

(Calculation of labor cost)

1. Per 400 ha

Operator
- (a) @200GS/hr × 9.05hr/ha × 40ha × 3 × 1.4 = 304,080GS
- (b) @200GS/hr × 7.05hr/ha × 70ha × 4 × 1.4 = 552,720 "
- (c) @200GS/hr × 1.5hr/ha × 134ha × 3 × 1.4 = 168,840 "

Laborer
- (a) @100GS/hr × 5.3hr/ha × 40ha × 3 × 1.4 = 89,040 "
- (b) @100GS/hr × 4.1hr/ha × 70ha × 4 × 1.4 = 160,720 "
- (d) @100GS/hr × 7.5hr/ha × 400ha × 1.4 = 300,000 "
- @100GS/hr × 20.0hr/ha × 400ha = 800,000 "

Total 2,375,400 "

2. Per ha 2,375,400GS ÷ 400ha = 5,939GS

Base of Calculation of Labor Cost per ha

Paddy rice, managing scale 500 ha

Works	Machine	Working hours per ha				Remarks
		Machine using hours	Persons		Total labor hours	
			Operator	Laborer		
		hr	hr	hr	hr	Note: Loaded area (per unit)
Plowing	Disc plow (a)	2.0	2.0		2.0	
	" (b)	1.25	1.25		1.25	(a) 80HP (40ha) (2 units)
Harrowing	Disc harrow (a)	2.25	2.25		2.25	(b) 120HP (70ha) (6 units)
	" (b)	1.8	1.8		1.8	
Land levelling	Land leveler (a)	1.0	1.0		1.0	(c) Combine (125ha) (4 units)
	" (b)	0.6	0.6		0.6	
Fertilization, sowing seeds	Fertilizer applier seeders (a)	1.5	1.5	4.5	6.0	(d) (500ha)
	" (b)	1.1	1.1	3.3	4.4	
Ridging	Ridger (a)	0.8	0.8	0.8	1.6	
	" (b)	0.8	0.8	0.8	1.6	
Top dressing						
Weeding						Aeroplane
Control						
Water management					(20.0)	
Harvesting	Combine (c)	1.5	1.5			
Transportation	Trailer (a)	1.5	1.5	(d) 7.5		
	" (b)	1.5	1.5			
Total (a)		9.05	0.05	5.3	(20.0) 34.5	
(b)		7.05	7.05	4.1		
(c)		1.5	1.5	-		
(d)		-	-	7.5		

(Calculation of labor cost)

1. Per 500 ha

Operator
- (a) @200GS/hr × 9.05hr/ha × 40ha × 2 × 1.4 = 202,720GS
- (b) @200GS/hr × 7.05hr/ha × 70ha × 6 × 1.4 = 829,080 "
- (c) @200GS/hr × 1.5hr/ha × 125ha × 4 × 1.4 = 210,000 "

Laborer
- (a) @100GS/hr × 5.3hr/ha × 40ha × 2 × 1.4 = 59,360 "
- (b) @100GS/hr × 4.1hr/ha × 70ha × 6 × 1.4 = 241,080 "
- (d) @100GS/hr × 7.5hr/ha × 500ha × 1.4 = 525,000 "

@100GS/hr × 20.0hr/ha × 500ha = 1,000,000 "

Total 3,067,240 "

2. Per ha 3,067,240GS ÷ 500ha = 6,134GS

Estimation of Soybean Production Cost per ha

(Unit: GS)

Item \ Mechanized work system			25 ha	50 ha	100 ha	150 ha	200 ha	Remarks
Profit cost	Yield per ha		kg 2,000	kg 2,000	kg 2,000	kg 2,000	kg 2,000	
	Price per kg		GS 28	GS 28	GS 28	GS 28	GS 28	
	Gross profit per ha		GS 56,000	GS 56,000	GS 56,000	GS 56,000	GS 56,000	
Primary production cost	Material cost	Seeds cost	5,200	5,200	5,200	5,200	5,200	
		Fertilizer cost	-	-	-	-	-	
		Herbicide cost	5,000	5,000	5,000	5,000	5,000	
		Agricultural chemical cost	2,760	2,760	2,760	2,760	2,760	
		Other material cost	-	-	-	-	-	
		Subtotal	12,960	12,960	12,960	12,960	12,960	
	Work cost	Machine using cost	36,847	33,547	31,028	28,904	32,505	
		Labor cost (family labor cost)	5,285 (5,285)	5,315 (5,315)	4,843 (3,850)	3,570 (2,603)	3,822 (2,167)	
		Subtotal	42,132	38,862	35,871	32,474	36,327	
Total			55,092	51,822	48,831	45,434	49,287	
Ground rent			1,000	1,000	1,000	1,000	1,000	
Capital interest			3,490	3,283	3,093	2,878	3,122	
Secondary production cost Total			59,582	56,105	52,924	49,312	53,409	
Net profit per ha			Δ3,582	Δ105	3,076	6,688	2,591	
Net profit rate (%)			Δ6.4	Δ0.2	5.5	11.9	4.6	

Details of Material Cost per ha

(Soybean)

Item / Cost item	Material	Quantity	Unit price	Amount of money	Remarks
Seeds costs	Seeds	80 kg	60 GS/kg	4,800 GS	
	Dithane	300 g	900 GS/1,000 g	270	Seed disinfection
	Leguminous bacteria	200 g	65 GS/100 g	130	
	Total			5,200	
Fertilizer cost					Non fertilizer
Herbicide cost	Blazer	1.0 ℓ	5,000 GS/ℓ	5,000	1 time
Agricultural chemical cost	Sevin	0.4 ℓ	1,600 GS/ℓ	640	1 time
	Azodrin	0.8 ℓ	1,900 GS/ℓ	1,520	2 times (0.4 ℓ × 2)
	Metasystox	0.4 ℓ	1,500 GS/ℓ	600	1 time
	Total			2,760	
Other material cost				-	
	All Total			12,960	

Calculation of Machine Using Cost for Soybean

Soybean, managing scale 25 ha

(1)	Plowing	@5,376GS/ha × 18.75ha = 100,800GS	
(2)	Harrowing	@3,522GS/ha × 18.75ha = 66,038 "	
(3)	Fertilization, Sowing seeds	@4,197GS/ha × 18.75ha = 78,694 "	
(4)	Intertillage	@4,186GS/ha × 18.75ha = 78,488 "	
(5)	Weeding	@2,052GS/ha × 18.75ha = 38,475 "	
(6)	Control	@5,076GS/ha × 18.75ha = 95,175 "	
(7)	Harvesting	@9,694GS/ha × 18.75ha = 181,763 "	
(8)	Transportation	@2,744GS/ha × 18.75ha = 51,450 "	
		Total 690,883 "	(per ha) 36,847GS

Soybean, managing scale 50 ha

(1)	Plowing	@4,110GS/ha × 37.5ha = 154,125GS	
(2)	Subsoil breaking	@5,325GS/ha × 12.5ha = 66,563 "	
(3)	Crushing, readjustment	@2,723GS/ha × 37.5ha = 102,113 "	
(4)	Fertilization, seeding	@3,339GS/ha × 37.5ha = 125,213 "	
(5)	Intertillage	@3,024GS/ha × 37.5ha = 113,400 "	
(6)	Weeding	@1,958GS/ha × 37.5ha = 73,425 "	
(7)	Elimination (of plant diseases and harmful insects)	@4,683GS/ha × 37.5ha = 175,613 "	
(8)	Harvesting	@9,679GS/ha × 37.5ha = 362,963 "	
(9)	Transportation	@2,256GS/ha × 37.5ha = 84,600 "	
		Total 1,258,015 "	(per ha) 33,547GS

Note: For machine using expenditure per ha by machines, see attached.

Soybean, managing scale 100 ha

(1)	Plowing	@4,214GS/ha × 33ha =	139,062GS
		@3,555GS/ha × 42ha =	149,310 "
(2)	Subsoil breaking	@3,957HG/ha × 25ha =	98,925 "
(3)	Harrowing	@2,662GS/ha × 33ha =	87,846 "
		@2,363GS/ha × 42ha =	99,246 "
(4)	Fertilization, seeding	@2,963GS/ha × 33ha =	97,779 "
		@2,913GS/ha × 42ha =	122,346 "
(5)	Intertillage	@3,040GS/ha × 33ha =	100,320 "
		@2,631GS/ha × 42ha =	110,502 "
(6)	Weeding	@1,825GS/ha × 75ha =	136,875 "
(7)	Control	@4,155GS/ha × 75ha =	311,625 "
(8)	Harvesting	@9,680GS/ha × 75ha =	726,000 "
(9)	Transportation	@1,971GS/ha × 33ha =	65,043 "
		@1,958GS/ha × 42ha =	82,236 "
		Total	2,327,115 "

(per ha)
31,028GS

Soybean, managing scale 150 ha

(1)	Plowing	@3,948GS/ha × 42ha	= 165,816GS	
		@2,894GS/ha × 70.5ha	= 204,027 "	
(2)	Subsoil breaking	@3,531GS/ha × 37.5ha	= 132,413 "	
(3)	Harrowing	@2,598GS/ha × 42ha	= 109,116 "	
		@1,903GS/ha × 70.5ha	= 134,162 "	
(4)	Fertilization, seeding	@3,149GS/ha × 42ha	= 132,258 "	
		@2,760GS/ha × 70.5ha	= 194,580 "	
(5)	Intertillage	@2,867GS/ha × 42ha	= 120,414 "	
		@2,591GS/ha × 70.5ha	= 182,666 "	
(6)	Weeding	@2,765GS/ha × 42ha	= 116,130 "	
		@2,009GS/ha × 70.5ha	= 141,635 "	
(7)	Control	@5,451GS/ha × 42ha	= 228,942 "	
		@4,692GS/ha × 70.5ha	= 330,786 "	
(8)	Harvesting	@6,909GS/ha × 112.5ha	= 777,263 "	
(9)	Transportation	@2,154GS/ha × 42ha	= 90,468 "	
		@2,710GS/ha × 70.5ha	= 191,055 "	
			3,251,731 "	(per ha) 28,904

Soybean, managing scale 200 ha

(1)	Plowing	@4,065GS/ha × 40ha × 2 units	= 325,200GS	
		@2,878GS/ha × 70ha	= 201,460 "	
(2)	Subsoil breaking	@3,296GS/ha × 50ha	= 164,800 "	
(3)	Harrowing	@2,681GS/ha × 40ha × 2 units	= 214,480 "	
		@1,895GS/ha × 70ha	= 132,650 "	
(4)	Fertilization, seeding	@3,258GS/ha × 40ha × 2 units	= 260,640	
		@2,751GS/ha × 70ha	= 192,570 "	
(5)	Interrillage	@2,963GS/ha × 40ha × 2 units	= 237,040 "	
		@2,581GS/ha × 70ha	= 180,670 "	
(6)	Weeding	@2,880GS/ha × 40ha × 2 units	= 230,400 "	
		@2,009GS/ha × 70ha	= 140,630 "	
(7)	Control	@5,628GS/ha × 40ha × 2 units	= 450,240 "	
		@4,668GS/ha × 70ha	= 326,760 "	
(8)	Harvesting	@9,680GS/ha × 75ha × 2 units	= 1,452,000 "	
(9)	Transportation	@2,221GS/ha × 40ha × 2 units	= 177,680 "	
		@2,693GS/ha × 70ha	= 188,510 "	
			4,875,730 "	(per ha) 32,505GS

(Attached Table)

Base of Calculation of Machine Using Expenditure

(Soybean, wheat, managing scale 25 ha)

Machine			Annual fixed expenditure	Machine using hours per ha		Annual working area	Annual machine using hours	Expenditure per hour					Expenditure of tractor operation	
Kind	Unit	Purchase price						Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
									Fuel	Lubricating oil	Wages			
		thousand GS	GS		hr	ha	hr	GS	GS	GS		GS	GS	GS
Tractor (45 HP)	1	2,000	186,800	Soybean Wheat	15.5 12.25		Soybean 290.6 Wheat 229.8	Soybean 643 Wheat 813						
Disc plow	1	300	34,725		3.5	18.75	65.6	529	280	84		893	Soybean 1,536 Wheat 1,706	5,376 5,971
Disc harrow	1	250	28,275		2.0	18.75	37.5	754	280	84		1,118	" " 1,761 1,931	" 3,522 3,862
Fertilization, seeding	1	400	45,640		1.75	18.75	32.8	1,391	280	84		1,755	" " 2,398 2,568	4,197 4,494
Cultivator	1	180	40,716	Soybean	2.0	18.75	37.5	1,086	280	84		1,450	Soybean 2,093	4,186
Power sprayer	1/2	175	19,644	Soybean "	1.0 4.0	18.75	18.8 17.0	1,045 262	280	84		1,409 626	" 2,052 1,269	2,052 5,076
(")	1/2	175	19,644	Wheat "	1.0 3.0	18.75	18.8 56.3	1,045 349	280	84		1,409 713	Wheat 2,222 1,526	2,222 4,578
Trailer	1	250	27,800	Soybean	1.25	18.75	23.4	1,188	280	84		1,552	Soybean 2,195	2,744
(")	1	250	27,800	Wheat	1.0	18.75	18.8	1,479	280	84		1,843	Wheat 2,656	2,656
Combine	1/4	1,875	155,906	Soybean	1.25	18.75	23.4	6,663	840	252		7,755	Soybean 7,755	9,694
(")	1/4	1,875	155,906	Wheat	1.0	18.75	18.8	8,293	840	252		9,385	Wheat 9,395	9,385

Base of Calculation of Machine Using Expenditure

(Soybean and wheat, managing scale 50 ha)

Machine			Annual fixed expenditure	Machine using hours per ha	Annual working area	Annual machine using hours	Expenditure per hour					Expenditure of tractor operation	
							Fixed expenditure	Changeable expenditure			Total		
Kind	Unit	Purchase price						Fuel	Lubricating oil	Wages		Expenditure per hour	Expenditure per ha
		thousand GS	GS	hr	ha		GS	GS	GS		GS	GS	GS
Tractor (70 HP)	1	3,000	280,200	Soybean 15.0 Wheat 12.5		Wheat 487.5 Soybean 393.75	Soybean 575 Wheat 712						
Disc plow	1	350	40,513	2.5	37.5	93.75	432	490	147		1,069	Soybean 1,644 Wheat 1,781	4,110 4,453
Disc harrow	1	300	33,930	1.5	37.5	56.25	601	490	147		1,240	Soybean 1,815 Wheat 1,952	2,723 2,928
Subsoiler	1	200	21,200	3.0	12.5	37.5	563	490	147		1,200	Soybean 1,775 Wheat 1,912	5,325 5,736
Fertilization, seeding	1	500	57,050	Soybean 1.5	37.5	56.25	1,014	490	147		1,651	Soybean 2,226 Wheat 2,363	3,339 3,545
Cultivator	1	200	45,240	Soybean 1.5	37.5	56.25	804	490	147		1,441	Soybean 2,016	3,024
Power sprayer	1/2	350	39,288	Soybean 0.75 3.0	37.5	28.1 112.5	1,398 349	490	147		2,035 986	Soybean 2,610 1,561	1,958 4,683
(")	1/2	350	39,288	Wheat 0.75 2.25	37.5	28.1 84.4	1,398 465	490	147		2,035 1,102	Wheat 2,747 1,814	2,060 4,082
Trailer	1	250	27,800	Soybean 1.25	37.5	46.88	593	490	147		1,230	Soybean 1,805	2,256
(")	1	250	27,800	Wheat 1.0	37.5	37.5	741	490	147		1,378	Wheat 2,090	2,090
Combine	1/2	3,750	311,813	Soybean 1.25	37.5	46.88	6,651	840	252		7,743	Soybean 7,743	9,679
(")	1/2	3,750	311,813	Wheat 1.0	37.5	37.5	8,315	840	252		9,407	Wheat 9,407	9,407

Base of Calculation of Machine Using Expenditure

(Soybean, wheat, managing scale 100 ha)

Machine			Annual fixed expenditure	Machine using hours per ha		Annual working area	Annual machine using hours	Expenditure per hour					Expenditure of tractor operation	
Kind	Unit	Purchase price						Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
									Fuel	Lubricating oil	Wages			
		thousand GS	GS		hr	ha	hr	GS	GS	GS		GS	GS	GS
Tractor (45 HP)	1	2,000	186,800	Soybean Wheat	10.5 8.25		Soybean Wheat	346.5 272.25	Soybean Wheat	539 686				
Disc plow	1	300	34,725		3.5	33.0	115.5	301	280	84		665	Soybean Wheat	1,204 1,351	4,214 4,729
Disc harrow	1	250	28,275		2.0	33.0	66.0	428	280	84		792	Soybean Wheat	1,331 1,478	2,662 2,956
Fertilization, seeding	1	400	45,640		1.75	33.0	57.75	790	280	84		1,154	Soybean Wheat	1,693 1,840	2,963 3,220
Cultivator	1	180	40,716	Soybean	2.0	33.0	66.0	617	280	84		981	Soybean	1,520	3,040
Trailer	1	250	27,800	Soybean	1.25	33.0	41.25	674	280	84		1,038	Soybean	1,577	1,971
(")	1	250	27,800	Wheat	1.0	33.0	33.0	842	280	84		1,206	Wheat	1,892	1,892
Tractor (70 HP)	1	3,000	280,200	Soybean Wheat	15.0 12.5		Soybean Wheat	702.75 573.0	Soybean Wheat	399 489				
Disc plow	1	350	40,513		2.5	42	105	386	490	147		1,023	Soybean Wheat	1,422 1,512	3,555 3,780
Disc harrow	1	300	33,930		1.5	42	63	539	490	147		1,176	Soybean Wheat	1,575 1,665	2,363 2,498
Subsoiler	1	200	21,200		3.0	25	75	283	490	147		920	Soybean Wheat	1,319 1,409	3,951 4,227
Fertilization, seeding	1	500	57,050		1.5	42	63	906	490	147		1,543	Soybean Wheat	1,942 2,032	2,913 3,048
Cultivator	1	200	45,240	Soybean	1.5	42	63	718	490	147		1,355	Soybean	1,754	2,631
Power sprayer	1	700	78,575	Soybean	0.75 3.0	75	56.25 225.0	1,397 349	490	147		2,034 986	Soybean	2,433 1,385	1,825 4,155
(")	1	700	78,575	Wheat	0.75 2.25	75	56.25 168.75	1,397 466	490	147		2,034 1,103	Wheat	2,523 1,592	1,892 3,582
Trailer	1	250	27,800	Soybean	1.25	42	52.5	530	490	147		1,167	Soybean	1,566	1,958
(")	1	250	27,800	Wheat	1.0	42	42.0	662	490	147		1,299	Wheat	1,788	1,788
Combine	1	7,500	623,625	Soybean	1.25	75	93.75	6,652	840	252		7,744	Soybean	7,744	9,680
(")	1	7,500	623,625	Wheat	1.0	75	75.0	8,315	840	252		9,407	Wheat	9,407	9,407

Base of Calculation of Machine Using Expenditure

(Soybean, wheat, managing scale 150 ha)

Machine			Annual fixed expenditure	Machine using hours per ha		Annual working area	Annual machine using hours		Expenditure per hour					Expenditure of tractor operation		
Kind	Unit	Purchase price							Fixed expenditure	Changeable expenditure			Total			
										Fuel	Lubricating oil	Wages				
		thousand GS	GS		hr	ha		hr	GS	GS	GS		GS		GS	GS
Tractor (70 HP)	1	3,000	280,200	Soybean Wheat	12.0 9.5		Soybean Wheat	504 399	Soybean 556 Wheat 702							
Disc plow	1	350	40,513		2.5	42.0		105	386	490	147		1,023	Soybean Wheat	1,579 1,725	3,948 4,313
Disc harrow	1	300	33,930		1.5	42.0		63	519	490	147		1,176	Soybean Wheat	1,732 1,876	2,598 2,817
Fertilization, seeding	1	500	57,050		1.5	42.0		63	906	490	147		1,543	Soybean Wheat	2,099 2,245	3,149 3,368
Cultivator	1	200	45,240	Soybean	1.5	42.0		63	718	490	147		1,355	Soybean	1,911	2,867
Power sprayer	1	700	78,575	Soybean	0.75 3.0	42.0		31.5 126	2,494 624	490	147		3,131 1,261	Soybean	3,687 1,817	2,765 5,451
(")	1	700	78,575	Wheat	0.75 2.25	42.0		31.5 94.5	2,494 831	490	147		3,131 1,468	Wheat	3,833 2,170	2,875 4,883
Trailer	1	250	27,800	Soybean	1.25	42.0		52.5	530	490	147		1,167	Soybean	1,723	2,154
(")	1	250	27,800	Wheat	1.0	42.0		42.0	662	490	147		1,299	Wheat	2,001	2,001
Tractor (110 HP)	1	4,500	420,300	Soybean Wheat	9.25 7.5		Soybean Wheat	602.7 479.3	Soybean 697 Wheat 877							
Disc plow	1	400	46,300		1.25	70.5		88.1	526	840	252		1,618	Soybean Wheat	2,315 2,495	2,894 3,119
Disc harrow	1	350	39,585		0.75	70.5		52.9	748	840	252		1,840	Soybean Wheat	2,537 2,717	1,903 2,038
Subsoiler	1	300	31,800		1.5	37.5		56.3	565	840	252		1,657	Soybean Wheat	2,354 2,534	3,531 3,801
Fertilization, seeding	1	600	68,460		1.0	70.5		70.5	971	840	252		2,063	Soybean Wheat	2,760 2,940	2,760 2,940
Cultivator	1	250	56,550	Soybean	1.0	70.5		70.5	802	840	252		1,894	Soybean	2,591	2,591
Power sprayer	1	700	78,575	Soybean	0.5 2.0	70.5		35.25 141.0	2,229 557	840	252		3,321 1,649	Soybean	4,016 2,346	2,009 4,692
(")	1	700	78,575	Wheat	0.5 1.5	70.5		35.25 105.75	2,229 743	840	252		3,321 1,835	Wheat	4,198 2,712	2,099 4,068
Trailer	1	300	33,360	Soybean	1.25	70.5		88.1	379	840	252		1,471	Soybean	2,168	2,710
(")	1	300	33,360	Wheat	1.0	70.5		70.5	473	840	252		1,565	Wheat	2,442	2,442
Combine	1	7,500	623,625	Soybean	1.25	112.5		140.6	4,435	840	252		5,527	Soybean	5,527	6,909
(")	1	7,500	623,625	Wheat	1.0	112.5		112.5	5,543	840	252		6,635	Wheat	6,635	6,635

Base of Calculation of Machine Using Expenditure

(Soybean, wheat, managing scale 200 ha)

Machine			Annual fixed expenditure	Machine using hours per ha		Annual working area	Annual machine using hours		Expenditure per hour					Expenditure of tractor operation	
Kind	Unit	Purchase price							Fixed expenditure	Changeable expenditure			Total	Expenditure per hour	Expenditure per ha
										Fuel	Lubricating oil	Wages			
		thousand GS	GS		hr	ha		hr	GS	GS	GS		GS	GS	GS
Tractor (70 HP)	1	3,000	280,200	Soybean Wheat	12.0 9.5		Soybean Wheat	480 380	Soybean 584 Wheat 737						
Disc plow	1	350	40,513		2.5	40		100	405	490	147		1,042	Soybean 1,626 Wheat 1,779	4,065 4,448
Disc harrow	1	300	33,930		1.5	40		60	566	490	147		1,203	Soybean 1,787 Wheat 1,940	2,681 2,910
Fertilization, seeding	1	500	57,050		1.5	40		60	951	490	147		1,588	Soybean 2,172 Wheat 2,323	3,258 3,488
Cultivator	1	200	45,240	Soybean	1.5	40		60	754	490	147		1,391	Soybean 1,975	2,963
Power sprayer	1	700	78,575	Soybean	0.75 3.0	40		30 120	2,619 655	490	147		3,256 1,292	Soybean 3,840 1,876	2,880 5,628
(")	1	700	78,575	Wheat	0.75 2.25	40		30 90	2,619 873	490	147		3,256 1,510	Wheat 3,993 2,247	2,995 5,056
Trailer	1	250	27,800	Soybean	1.25	40		50	556	490	147		1,193	Soybean 1,777	2,221
(")	1	250	27,800	Wheat	1.0	40		40	695	490	147		1,332	Wheat 2,069	2,069
	(2)	10,600													
Tractor (110 HP)	1	4,500	420,300	Soybean Wheat	9.25 7.5		Soybean Wheat	617.5 495	Soybean 681 Wheat 849						
Disc plow	1	400	46,300		1.25	70		87.5	529	840	252		1,621	Soybean 2,302 Wheat 2,470	2,878 3,088
Disc harrow	1	350	39,585		0.75	70		52.5	754	840	252		1,846	Soybean 2,527 Wheat 2,695	1,895 2,021
Subsoiler	1	300	31,800		1.5	50		75	424	840	252		1,516	Soybean 2,197 Wheat 2,365	3,296 3,548
Fertilization, seeding	1	600	68,460		1.0	70		70	978	840	252		2,070	Soybean 2,751 Wheat 2,919	2,751 2,919
Cultivator	1	250	56,550	Soybean	1.0	70		70	808	840	252		1,900	Soybean 2,581	2,581
Power sprayer	1	700	78,575	Soybean	0.5 2.0	70		35 140	2,245 561	840	252		3,337 1,653	Soybean 4,018 2,334	2,009 4,668
(")	1	700	78,575	Wheat	0.5 1.5	70		35 105	2,245 748	840	252		3,337 1,840	Wheat 4,186 2,689	2,093 4,034
Trailer	1	300	33,360	Soybean	1.25	70		87.5	381	840	252		1,473	Soybean 2,154	2,693
(")	1	300	33,360	Wheat	1.0	70		70	477	840	252		1,569	Wheat 2,418	2,418
Combine	1	7,500	623,625	Soybean	1.25	75		93.75	6,652	840	252		7,744	Soybean 7,744	9,680
(")	1	7,500	623,625	Wheat	1.0	75		75.0	8,315	840	252		9,407	Wheat 9,407	9,407

Calculation of Labor Expenditure per ha

Soybean, managing scale 25 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	
Plowing	Disc plow	3.5	3.5	-	3.5	(Note) Loaded area 18.75 ha
Subsoil breaking	Subsoiler	-	-	-	-	
Harrowing	Disc harrow	2.0	2.0	-	2.0	
Fertilization seeding	Fertilizer applier, seeder	1.75	1.75	1.75	3.5	
Intertillage	Cultivator	2.0	2.0	-	2.0	
Weeding	Power sprayer	1.0	1.0	-	1.0	
Elimination (of plant diseases and harmful insects)	Power sprayer	4.0	4.0	-	4.0	
Harvesting	Combine	1.25	1.25	1.25	2.5	
Transportation	Trailer	1.25	1.25	1.25	2.5	
Total		16.75	16.75	4.25	21.0	

(Calculation of labor expenditure)

1. Per 25ha

Operator 200Gs/hr × 16.75hr/ha × 18.75hr × 1.4 = 87,938Gs

Laborer 100Gs/hr × 4.25hr/ha × 18.75ha × 1.4 = 11,156Gs

Total: 99,094Gs

2. Per ha 99,094Gs ÷ 18.75ha = 5,285Gs

Soybean, managing scale 50 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area 37.5ha
Plowing	Disc plow	2.5	2.5		2.5	* 12.5ha
Subsoil breaking	Subsoiler	3.0	* 3.0		3.0	
Harrowing	Disc harrow	1.5	1.5		1.5	
Fertilization seeding	Fertilizer applier, seeder	1.5	1.5	1.5	3.0	
Intertillage	Cutivator	1.5	1.5		1.5	
Weeding	Power sprayer	0.75	0.75		0.75	
Elimination (of plant diseases and harmful insects)	power sprayer	3.0	3.0		3.0	
Harvesting	Combine	1.25	1.25	1.25	2.5	
Transportation	Trailer	1.25	1.25	1.25	2.5	
Total		3.0 13.25	* 3.0 13.25	3.5	3.0 16.75	

(Calculation of labor expenditure)

1. Per 50 ha

Operator { 200Gs/hr × 13.25hr/ha × 37.5ha × 1.4 = 139,125Gs
200Gs/hr × 3.0hr/ha × 12.5ha × 1.4 = 10,500Gs

Laborer 100Gs/hr × 13.25hr/ha × 37.5ha × 1.4 = 49,688Gs

Total 199,313Gs

2. Per ha 199,313Gs ÷ 37.5ha = 5,315Gs

Soybean, managing scale 100 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area (per unit)
Plowing	Disc plow	(a) 3.5 (b) 2.5	3.5 2.5	- -	3.5 2.5	(a) 45HP(1 unit) (33 ha)
Subsoil breaking	Subsoiler	- 3.0	- * 3.0	- -	- 3.0	(b) 70HP(1 unit) (42 ha)
Harrowing	Disc plow	(a) 2.0 (b) 1.5	2.0 1.5	- -	2.0 1.5	(c) (75 ha) * (25 ha)
Fertilization seeding	Fertilizer applier, seeder	(a) 1.75 (b) 1.5	1.75 1.5	1.75 1.5	3.5 3.0	
Intertillage	Cultivator	(a) 2.0 (b) 1.5	2.0 1.5	- -	2.0 1.5	
Weeding	Power sprayer	- (c) 0.75	- 0.75	- -	- 0.75	
Elimination (of plant diseases and harmful insects)	Power sprayer	- (c) 3.0	- 3.0	- -	- 3.0	
Harvesting	Combine	(c) 1.25	1.25	1.25	2.5	
Transportation	Trailer	(a) 1.25 (b) 1.25	1.25 1.25	1.25 1.25	2.5 2.5	
Total		(a) 10.5 (b) 8.25 (c) 5.0 * 3.0	10.5 8.25 5.0 3.0	3.0 2.75 1.25 -	13.5 11.0 6.25 3.0	

(Calculation of labor expenditure)

1. Per 100 ha

Operator
- (a) 200Gs/hr × 10.5hr/ha × 33ha × 1.4 = 97,020Gs
- (b) 200Gs/hr × 8.25hr/ha × 42ha × 1.4 = 97,020Gs
- (c) 200Gs/hr × 5.0hr/ha × 75ha × 1.4 = 105,000Gs
- * 200Gs/hr × 3.0hr/ha × 25ha × 1.4 = 21,000Gs

Laborer
- (a) 100Gs/hr × 3.0hr/ha × 33ha × 1.4 = 13,860Gs
- (b) 100Gs/hr × 2.75hr/ha × 42ha × 1.4 =16,170Gs
- (c) 100Gs/hr × 1.25hr/ha × 75ha × 1.4 =13,125Gs

Total: 363,195Gs

2. Per ha 363,195Gs ÷ 75ha = 4,843Gs

Soybean, managing scale 150 ha

Works	Machine	Working hour per ha				Pemarks
		Machine working hours (hr)	Persons		Total working hours (hr)	(Note) Loaded area (per unit)
			Operator (hr)	Laborer (hr)		
Plowing	Disc plow	(a) 2.5 (b) 1.25	2.5 1.25		2.5 1.25	(a) 70 HP(1 unit) (42 ha)
Subsoil breaking	Subsoiler	- 1.5	- * 1.5		1.5	(b) 110 HP(1 unit) (70.5 ha)
Harrowing	Disc harrow	(a) 1.5 (b) 0.75	1.5 0.75		1.5 0.75	(c) (11.25 ha)
Fertilization seeding	Fertilizer applier, seeder	(a) 1.5 (b) 1.0	1.5 1.0	1.5 1.0	3.0 2.0	* (37.5 ha)
Intertillage	Cultivator	(a) 1.5 (b) 1.0	1.5 1.0		1.5 1.0	
Weeding	Power sprayer	(a) 0.75 (b) 0.5	0.75 0.5		0.75 0.5	
Elimination (of plant diseases and harmful insects)	Power sprayer	(a) 3.0 (b) 2.0	3.0 2.0		3.0	
Harvesting	Combine	(c) 1.25	1.25	1.25	2.5	
Transportation	Trailer	(a) 1.25 (b) 1.25	1.25 1.25	1.25 1.25	2.5 2.5	
		(a) 12.0 (b) 7.75 (c) 1.25 * 1.5	12.0 7.75 1.25 1.5	2.75 2.25 1.25 -	14.75 10.0 2.5 1.5	

(Calculation of labor expenditure)

1. Per 150 ha

Operator
- (a) 200Gs/hr × 12.0hr/ha × 42 ha × 1.4 = 141,120Gs
- (b) 200Gs/hr × 7.75hr/ha × 70.5 ha × 1.4 = 152,985Gs
- (c) 200Gs/hr × 1.25hr/ha × 112.5 ha × 1.4 = 39,375Gs
- (d) 200Gs/hr × 1.5hr/ha × 37.5 ha × 1.4 = 15,750Gs

Laborer
- (a) 100Gs/hr × 2.75hr/ha × 42 ha × 1.4 = 16,170Gs
- (b) 100Gs/hr × 2.25hr/ha × 70.5 ha × 1.4 = 14,063Gs
- (c) 100Gs/hr × 1.25hr/ha × 112.5 ha × 1.4 = 14,063Gs

Total: 401,672

2. Per ha 401,672Gs ÷ 112.5 ha = 3,570Gs

Base of Calculation of Labor Expenditure per ha

Soybean, managing scale 200 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area (per unit)
Plowing	Disc plow	(a) 2.5 (b) 1.25	2.5 1.25		2.5 1.25	(a) 70 HP(2 units) (40ha) (b) 110 HP(1 unit) (70ha)
Subsoil breaking	Subsoiler	- 1.5	- * 1.5		 1.5	(c) Combine(2 units) (75ha)
Harrowing	Disc harrow	(a) 1.5 (b) 0.75	1.5 0.75		1.5 0.75	* (50ha)
Fertilization seeding	Fertilizer applier, seeder	(a) 1.5 (b) 1.0	1.5 1.0	1.5 1.0	3.0 2.0	
Intertillage	Cultivator	(a) 1.5 (b) 1.0	1.5 1.0		1.5 1.0	
Weeding	Power spray	(a) 0.75 (b) 0.5	0.75 0.5		0.75 0.5	
Elimination (of plant diseases and harmful insects)	Power spray	(a) 3.0 (b) 2.0	3.0 2.0		3.0 2.0	
Harvesting	Combine	(c) 1.25	1.25	1.25	2.5	
Transportation	Trailer	(a) 1.25 (b) 1.25	1.25 1.25	1.25 1.25	2.5 2.5	
Total		(a) 12.0 (b) 7.75 (c) 1.25 * 1.5	12.0 7.75 1.25 1.5	2.75 2.25 1.25 -	14.75 10.0 2.5 1.5	

(Calculation of labor expenditure)

1. Per 200ha

Operator
- (a) 200Gs/hr × 12.0hr/ha × 40ha × 2 units × 1.4 = 268,800Gs
- (b) 200Gs/hr × 7.75hr/ha × 70ha × 1.4 = 151,900Gs
- (c) 200Gs/hr × 1.25h/ha × 75ha × 2 units × 1.4 = 52,500Gs
- * 200Gs/hr × 1.5hr/ha × 50ha × 1.4 = 21,000Gs

Laborer
- (a) 100Gs/hr × 2.75hr/ha × 40ha × 2 units × 1.4 = 30,800Gs
- (b) 100Gs/hr × 2.25hr/ha × 70ha × 1.4 = 22,050Gs
- (c) 100Gs/hr × 1.25hr/ha × 75ha × 2 units × 1.4 = 26,250Gs

2. Per ha 573,300 ÷ 150ha = 3,822Gs

Estimation of Wheat Production Cost per ha

(Unit: GS)

Cost item \ Mechanized work system			25ha	50ha	100ha	150ha	200ha	Remarks
Gross profit		Yield per ha	1,600kg	1,600kg	1,600kg	1,600kg	1,600kg	
		Price per kg	40Gs	40Gs	40Gs	40Gs	40Gs	
		Gross profit per ha	64,000Gs	64,000Gs	64,000Gs	64,000Gs	64,000Gs	
Primary production cost	Material cost	Seed cost	8,670	8,670	8,670	8,670	8,670	
		Fertilizer cost	9,100	9,100	9,100	9,100	9,100	
		Herbicide cost	1,200	1,200	1,200	1,200	1,200	
		Argicultural chemical cost	2,620	2,620	2,620	2,620	2,620	
		Other material cost						
		Subtotal	21,590	21,590	21,590	21,590	21,590	
	Work cost	Machine using cost	33,173	30,477	28,145	25,934	29,506	
		Labor cost (family labor cost)	4,235 (4,235)	3,570 (3,570)	3,941 (3,133)	2,912 (2,123)	3,080 (1,746)	
		Subtotal	37,408	34,077	32,086	28,846	32,586	
Total			58,998	55,667	53,676	50,436	54,176	
Ground rent			1,000	1,000	1,000	1,000	1,000	
Capital interest			3,737	3,527	3,400	3,195	3,432	
Secondary production cost total			63,735	60,194	58,076	54,631	58,608	
Net profit per ha			265	3,806	5,924	9,369	5,392	
Net profit rate (%)			0.4	5.9	9.3	14.6	8.4	

Details of Material Cost per ha

(Wheat)

Item / Cost item	Material	Quantity	Unit price	Amount of money	Remarks
Seed cost	Seeds	120kg	70Gs/kg	8,400Gs	
	Dithane	300g	900Gs/1,000g	270	Seed disinfection
	Total			8,670	
Fertilizer cost	Compound fertilizer	130kg	70Gs/kg	9,100	
Herbicide cost	24D	1.5ℓ	800Gs/ℓ	1,200	
Agricaltural chemical cost	Metasystox	1.0ℓ	1,500Gs/ℓ	1,500	2 times (0.5 × 2)
	To p Zin	0.4kg	1,400Gs/0.5kg	1,120	1 time
	Total			2,620	
Other material cost				-	
	All total			21,590	

Calculation of Machine Using Expenditure for Wheat

Wheat, managing scale 25 ha

(1)	Plowing	ⓐ	5,976Gs/ha ×	18.75ha =	112,050Gs
(2)	Harrowing	ⓐ	3,862Gs/ha ×	18.75ha =	72,413Gs
(3)	Fertilization, seeding	ⓐ	4,494Gs/ha ×	18.75ha =	84,263Gs
(4)	Weeding	ⓐ	2,222Gs/ha ×	18.75ha =	41,663Gs
(5)	Control	ⓐ	4,578Gs/ha ×	18.75ha =	85,838Gs
(6)	Harvesting	ⓐ	9,385Gs/ha ×	18.75ha =	175,969Gs
(7)	Trnasportation	ⓐ	2,656Gs/ha ×	18.75ha =	49,800Gs
				Total:	621,996Gs
				(per ha)	33,173Gs

Wheat, managing scale 50 ha

(1)	Plowing	ⓐ	4,453Gs/ha ×	37.5ha =	166,988Gs
(2)	Subsoil breaking	ⓐ	5,736Gs/ha ×	12.5ha =	71,700Gs
(3)	Harrowing	ⓐ	2,928Gs/ha ×	37.5ha =	109,800Gs
(4)	Fertilization, seeding	ⓐ	3,545Gs/ha ×	37.5ha =	132,938Gs
(5)	Weeding	ⓐ	2,060Gs/ha ×	37.5ha =	77,250Gs
(6)	Control	ⓐ	4,082Gs/ha ×	37.5ha =	153,075Gs
(7)	Harvesting	ⓐ	9,407Gs/ha ×	37.5ha =	352,763Gs
(8)	Transportation	ⓐ	2,090Gs/ha ×	37.5ha =	78,375Gs
				Total:	1,142,889Gs
				(per ha)	30,477Gs

(Note) For machine using expenditure per ha by machines, see a attached

Wheat, managing scale 100 ha

(1)	Plowing	ⓐ	4,729Gs/ha × 33ha =	156,057Gs
		ⓐ	3,780Gs/ha × 42ha =	158,760Gs
(2)	Subsoil breaking	ⓐ	4,227Gs/ha × 25ha =	105,675Gs
(3)	Harrowing	ⓐ	2,956Gs/ha × 33ha =	97,548Gs
		ⓐ	2,498Gs/ha × 42ha =	104,916Gs
(4)	Fertilization, seeding	ⓐ	3,220Gs/ha × 33ha =	106,260Gs
		ⓐ	3,048Gs/ha × 42ha =	128,016Gs
(5)	Weeding	ⓐ	1,892Gs/ha × 75ha =	141,900Gs
(6)	Control	ⓐ	3,582Gs/ha × 75ha =	268,650Gs
(7)	Harvesting	ⓐ	9,407Gs/ha × 75ha =	705,525Gs
(8)	Transportation	ⓐ	1,892Gs/ha × 33ha =	62,436Gs
		ⓐ	1,788Gs/ha × 42ha =	75,096Gs
			Total:	2,110,839Gs

(per ha)
28,145Gs

Wheat, managing scale 150 ha

(1)	Plowing	ⓐ 4,313Gs/ha × 42ha	= 181,146Gs
		ⓐ 3,119Gs/ha × 70.5ha	= 219,890Gs
(2)	Subsoil breaking	ⓐ 3,801Gs/ha × 37.5ha	= 142,538Gs
(3)	Harrowing	ⓐ 2,817Gs/ha × 42ha	= 118,314Gs
		ⓐ 2,038Gs/ha × 70.5ha	= 143,679Gs
(4)	Fertilization, seeding	ⓐ 3,368Gs/ha × 42ha	= 141,456Gs
		ⓐ 2,940Gs/ha × 70.5ha	= 207,270Gs
(5)	Weeding	ⓐ 2,875Gs/ha × 42ha	= 120,750Gs
		ⓐ 2,099Gs/ha × 70.5ha	= 147,980Gs
(6)	Control	ⓐ 4,883Gs/ha × 42ha	= 205,086Gs
		ⓐ 4,068Gs/ha × 70.5ha	= 286,794Gs
(7)	Harvesting	ⓐ 6,635Gs/ha × 112.5ha	= 746,438Gs
(8)	Transportation	ⓐ 2,001Gs/ha × 42ha	= 84,042Gs
		ⓐ 2,442Gs/ha × 70.5ha	= 172,161Gs
		Total:	2,917,544Gs
		(per ha)	25,934Gs

Wheat, managing scale 200 ha

(1)	Plowing	ⓐ 4,448Gs/ha × 40ha × 2 units	=	355,840Gs
		ⓐ 3,088Gs/ha × 70ha	=	216,160Gs
(2)	Subsoil breaking	ⓐ 3,548Gs/ha × 50ha	=	177,400Gs
(3)	Harrowing	ⓐ 2,910Gs/ha × 40ha × 2 units	=	232,800Gs
		ⓐ 2,021Gs/ha × 70ha	=	141,470Gs
(4)	Fertilization, seeding	ⓐ 3,488Gs/ha × 40ha × 2 units	=	279,040Gs
		ⓐ 2,919Gs/ha × 70ha	=	204,330Gs
(5)	Weeding	ⓐ 2,995Gs/ha × 40ha × 2 units	=	239,600Gs
		ⓐ 2,093Gs/ha × 70ha	=	146,510Gs
(6)	Control	ⓐ 5,056Gs/ha × 40ha × 2 units	=	404,480Gs
		ⓐ 4,034Gs/ha × 70ha	=	282,380Gs
(7)	Harvesting	ⓐ 9,407Gs/ha × 75ha × 2 units	=	1,411,050Gs
(8)	Transportation	ⓐ 2,069Gs/ha × 40ha × 2 units	=	165,520Gs
		ⓐ 2,418Gs/ha × 70ha	=	169,260Gs
			Total:	4,425,840Gs
			(per ha)	29,506Gs

Calculation of Labor Expenditure per ha

Wheat, managing scale 25 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	
Plowing	Disc plow	3.5	3.5	-	3.5	(Note) Loaded area 18.75 ha
Subsoil breaking	Subsoiler	-	-	-	-	
Harrowing	Disc harrow	2.0	2.0	-	2.0	
Fertilization seeding	Fertilizer applier, seeder	1.75	1.75	1.75	3.5	
Weeding	Power sprayer	1.0	1.0	-	1.0	
Control	Power sprayer	3.0	3.0	-	3.0	
Harvesting	Combine	1.0	1.0	1.0	2.0	
Transportation	Trailer	1.0	1.0	1.0	2.0	
Total		13.25	13.25	3.75	17.0	

(Calculation of labor expenditure)

1. Per 25 ha

   Operator 200Gs/hr × 13.25hr/ha × 18.75ha × 1.4 = 69,563Gs

   Laborer 100Gs/hr × 3.75hr/ha × 18.75ha × 1.4 = 9,844Gs

   Total 79,407Gs

2. Per ha 79,407Gs ÷ 18.75ha = 4,235Gs

Wheat, managing scale 50 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area 37.5ha
Plowing	Disc plow	2.5	2.5	-	2.5	* 12.5ha
Subsoil breaking	Subsoiler	3.0	* 3.0	-	3.0	
Harrowing	Disc plow	1.5	1.5	-	1.5	
Fertilization seeding	Fertilizer applier, seeder	1.5	1.5	1.5	3.0	
Weeding	Power sprayer	0.75	0.75	-	0.75	
Control	Power sprayer	2.25	2.25	-	2.25	
Harvesting	Combine	1.0	1.0	1.0	2.0	
Transportation	Trailer	1.0	1.0	1.0	2.0	
Total		3.0 10.5	3.0 10.5	- 3.5	3.0 14.0	

(Calculation of labor expenditure)

1. Per 50 ha

   Operator { 200Gs/hr × 10.5hr/ha × 37.5ha × 1.4 = 110,250Gs
   { 200Gs/hr × 3.0hr/ha × 12.5ha × 1.4 = 10,500Gs

   Laborer 100Gs/hr × 3.5hr/ha × 37.5ha × 1.4 = 13,125Gs

   Total 133,875Gs

2. Per ha 133,875Gs ÷ 37.5ha = 3,570Gs

Wheat, managing scale 100 ha

Works	Machine	Persons				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area (per unit)
Plowing	Disc plow	(a) 3.5 (b) 2.5	3.5 2.5	- -	3.5 2.5	(a) 45HP(1 unit) (33ha) (b) 70HP(1 unit) (42ha)
Subsoil breaking	Subsoiler	3.0	* 3.0	-	3.0	(c) (75ha)
Harrowing	Disc harrow	(a) 2.0 (b) 1.5	2.0 1.5	- -	2.0 1.5	* (25ha)
Fertilization seeding	Fertilizer applier, seeder	(a) 1.75 (b) 1.5	1.75 1.5	1.75 1.5	3.5 3.0	
Weeding	Power sprayer	(c) 0.75	0.75	-	0.75	
Control	power sprayer	(c) 2.25	2.25	-	2.25	
Harvesting	Combine	(c) 1.0	1.0	1.0	2.0	
Transportation	Trailer	(a) 1.0 (b) 1.0	1.0 1.0	1.0 1.0	2.0 2.0	
Total		(a) 8.25 (b) 6.5 (c) 4.0 * 3.0	8.25 6.5 4.0 3.0	2.75 2.5 1.0 -	11.0 9.0 5.0 3.0	

(Calculation of labor expenditure)

1. Per 100 ha

Operator
- (a) 200Gs/hr × 8.25h/ha × 33ha × 1.4 = 76,230Gs
- (b) 200Gs/hr × 6.5hr/ha × 42ha × 1.4 = 76,440Gs
- (c) 200Gs/hr × 4.0hr/ha × 75ha × 1.4 = 84,000Gs
- * 200Gs/hr × 3.0hr/ha × 25ha × 1.4 = 21,000Gs

Laborer
- (a) 100Gs/hr × 2.75hr/ha × 333ha × 1.4 = 12,705Gs
- (b) 100Gs/hr × 2.5hr/ha × 42ha × 1.4 = 14,700
- (c) 100Gs/hr × 1.0hr/ha × 75ha × 1.4 = 10,500

Total 295,575Gs

2. Per ha 295,575Gs ÷ 7.5ha= 3,941Gs

Wheat, managing scale 150 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area (per unit)
Plowing	Disc plow	(a) 2.5 (b) 1.25	2.5 1.25	- -	2.5 1.25	(a) 70HP(1 unit) (42 ha) (b) 110HP(1 unit) (70.5 ha)
Subsoil breaking	Subsoiler	1.5	* 1.5	-	1.5	(c) (112.5 ha)
Harrowing	Disc harrow	(a) 1.5 (b) 0.75	1.5 0.75	- -	1.5 0.75	* (37.5 ha)
Fertilization seeding	Fertilizer applier, seeder	(a) 1.5 (b) 1.0	1.5 1.0	1.5 1.0	3.0 2.0	
Weeding	Power sprayer	(a) 0.75 (b) 0.5	0.75 0.5	- -	0.75 0.5	
Control	Power sprayer	(a) 2.25 (b) 1.5	2.25 1.5	- -	2.25 1.5	
Harvesting	Combine	(c) 1.0	1.0	1.0	2.0	
Transportation	Trailer	(a) 1.0 (b) 1.0	1.0 1.0	1.0 1.0	2.0 2.0	
Total		(a) 9.5 (b) 6.0 (c) 1.0 * 1.5	9.5 6.0 1.0 1.5	2.5 2.0 1.0 -	12.0 8.0 2.0 1.5	

(Calculation of labor expenditure)

1. Per 150 ha

Operator
- (a) 200Gs/hr × 9.5hr/ha × 42ha × 1.4 = 111,720Gs
- (b) 200Gs/hr × 6.0hr/ha × 70.5ha × 1.4 =118,440Gs
- (c) 200Gs/hr × 1.0hr/ha × 112.5ha × 1.4= 31,500Gs
- * 200Gs/hr × 1.5hr/ha × 37.5ha × 1.4 = 15,750Gs

Laborer
- (a) 100Gs/hr × 2.5hr/ha × 42ha × 1.4 = 14,700Gs
- (b) 100Gs/hr × 2.0hr/ha × 70.5ha × 1.4 = 19,740Gs
- (c) 100Gs/hr × 1.0hr/ha × 112.5ha × 1.4= 15,750Gs

Total 327,600Gs

2. Per ha 327,600Gs ÷ 112.5ha = 2,912Gs

Base of Calculation of Labor Cost per ha

Wheat, managing scale 200 ha

Works	Machine	Working hour per ha				Remarks
		Machine working hours	Persons		Total working hours	
			Operator	Laborer		
		(hr)	(hr)	(hr)	(hr)	(Note) Loaded area (per unit)
Plowing	Disc plow	(a) 2.5 (b) 1.25	2.5 1.25	- -	2.5 1.25	(a) 70HP(2 units) (40 ha) (b) 110HP(1 unit) (70 ha)
Subsoil breaking	Subsoiler	1.5	* 1.5	-	1.5	(c) Combine(2 units) (75 ha)
Harrowing	Disc harrow	(a) 1.5 (b) 0.75	1.5 0.75	- -	1.5 0.75	
Fertilization seeding	Fertilizer applier, seeder	(a) 1.5 (b) 1.0	1.5 1.0	1.5 1.0	3.0 2.0	
Weeding	Power sprayer	(a) 0.75 (b) 0.5	0.75 0.5	- -	0.75 0.5	
Control	Power sprayer	(a) 2.25 (b) 1.5	2.25 1.5	- -	2.25 1.5	
Harvesting	Combine	(c) 1.0	1.0	1.0	2.0	
Transportation	Trailer	(a) 1.0 (b) 1.0	1.0 1.0	1.0 1.0	2.0 2.0	
Total		(a) 9.5 (b) 6.0 (c) 1.0 * 1.5	9.5 6.0 1.0 1.5	2.5 2.0 1.0 -	12.0 8.0 2.0 1.5	

(Calculation of labor expenditure)

1. Per 200 ha

Operator
- (a) 200Gs/hr × 9.5hr/ha × 40ha × 2 units × 1.4 = 212,800Gs
- (b) 200Gs/hr × 6.0hr/ha × 70ha × 1.4 = 117,600Gs
- (c) 200Gs/hr × 1.0hr/ha × 75ha × 2 units × 1.4 = 42,000Gs
- * 200Gs/hr 1.5hr/ha × 50ha × 1.4 = 21,000Gs

Laborer
- (a) 100Gs/hr × 2.5hr/ha × 40ha × 2 units 1.4 = 28,000Gs
- (b) 100Gs/hr × 2.0hr/ha × 70ha × 1.4 = 19,600Gs
- (c) 100Gs/hr × 1.0hr/ha × 75ha × 2 units 1.4 = 21,000Gs

Total 462,000Gs

2. Per ha 462,000Gs ÷ 150ha = 3,080Gs

Economic Investigation on Migrated Farmers (Individual Cases)

Scale		25 ha	50 ha		100 ha	150 ha		300 ha	(Reference) 6 families average
Migration place		Chavez	Fram	Chavez	Chavez	Fram	Chavez	Chavez	1
Investigation year		1982.8	1982.8	1982.8	1982.8	1982.8	1982.8	1982.8	1
Investigated farmer		A	B	C	D	E	F	G	1
Number of family members		10	7	7	7	10	6	6	7.8
Cropping condition	Soybean	30 ha	53 ha	50 ha	90 ha	163 ha	160 ha	330 ha	91
	Wheat	10 ha	50 ha	50 ha	115 ha	135 ha	160 ha	330 ha	87
	Others	-	Sericulture, pig breeding	-		-	-	-	-
Farming income		698	1,297	1,838	4,706	5,769	6,752	15,911	3,510
Farming gross income		2,450	6,643	4,584	9,571	14,703	13,893	31,920	8,641
Managing cost		1,752	5,346	2,746	4,865	8,934	7,141	16,009	5,131
Income out of farming		286	130	910	-	-	-	-	568
Income out of farming		286	130	1,500	-	-	-	-	666
Expenditure out of farming		-	-	590	-	-	-	-	98
Farmer's income		984	1,427	7,748	4,706	5,769	6,752	15,911	4,078
Taxes		45	180	95	70	200	68	1,000	110
House keeping cost		876	800	800	960	700	960	1,200	849
Farmer's economic leeway		63	447	1,853	3,676	4,869	5,274	13,711	3,119

Data (1) Economic investigation on migration farmers (investigation terms Sep. 1981 ∿ Aug. 31, 1982) Encalnacion Branch, JICA

(2) Reference shows simple average value except farmers with managing scale 300 ha together with industrial under taking.

Table 4-1-4-ⓐ Summary of Farmer's Economy

1. Paddy Rice-grazing Rotation System

Item \ Scale	25 ha	50 ha	100 ha	150 ha	250 ha	400 ha	500 ha
Number of family members (persons)	6	6	6	6	6	6	6
Number of workers occupied with farming (persons)	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Planted area (ha)	25	50	100	150	250	400	500
Farmer's income	1,221	2,327	4,162	6,876	11,237	17,806	22,138
Farming income	995	2,186	4,162	6,876	11,237	17,806	22,138
Farming gross income	4,289	8,568	17,137	25,706	42,843	68,548	85,683
{ Paddy rice	3,525	7,050	14,100	21,150	35,250	56,400	70,500
{ Beef cattle	759	1,518	3,037	4,556	7,593	12,148	15,183
Farming expenditure	3,294	6,382	12,975	18,830	31,606	50,742	63,545
{ Paddy rice	2,708	5,214	10,644	15,333	25,778	41,418	51,890
{ Beef cattle	586	1,168	2,331	3,497	5,828	9,324	11,655
Income out of farming	226	141	-	-	-	-	-
Income out of farming	226	141	-	-	-	-	-
Expenditure out of farming							
Taxes	37	70	125	206	337	534	664
Income such as working away from home, present, aids etc.							
Disposable income	1,184	2,257	4,037	6,670	10,900	17,272	21,474

(Note) This table is made up as follows

(1) For farming income, paddy rice, soybean and wheat are calculated by multiplying Estimation of production cost per ha by scale area each, and beef cattle is calculated by multiplying Estimation of economic income and expenditure by scales by scale area.

ⓐ Farming cost is calculated by deducting family work cost from cost total (Primary production cost + water cost).

(2) Income out of farming is estimated regarding works out of farming during leisure season for farming.

(3) Taxes and charges is average (3%) in Economic investigation on migration farmers (Individual cases).

Table 4-1-4- ⓑ Summary of Farmer's Economy

2. Soybean and Wheat Rotation System

Item \ Scale	25 ha	50 ha	100 ha	150 ha	200 ha	
Number of family members (persons)	6	6	6	6	6	
Number of workers occupied with farming (persons)	1.8	1.8	1.8	1.8	1.8	
Planted area (ha)	18.75	37.5	75	112.5	150	
Farmer's income	619	1,027	1,965	3,247	3,067	
Farming income	289	802	1,835	3,247	3,067	
Farming gross income	2,250	4,500	9,000	13,500	18,000	
Soybean	1,050	2,100	4,200	6,300	8,400	
Wheat	1,200	2,400	4,800	7,200	9,600	
Farming expenditure	1,961	3,698	7,165	10,253	14,933	
Soybean	934	1,744	3,374	4,818	7,068	
Wheat	1,027	1,954	3,791	5,435	7,865	
Income out of farming	330	225	130	-	-	
Income out of farming	330	225	130	-	-	
Expenditure out of farming						
Taxes	19	31	59	97	92	
Income such as working away from home, present, aids etc.						
Disposable income	600	996	1,906	3,150	2,975	

Household Expense Index and Household Expenses of Worker (per Person a Year)

Asuncion 1980 = 100

Year	Food and drink expenses	Housing expenses	Clothing expenses	Others	Total
1964	24.4	34.2	31.8	23.9	26.4
1965	25.6	35.5	31.9	24.6	27.4
1966	26.3	36.1	32.7	25.7	28.2
1967	25.9	35.8	32.7	28.6	28.6
1968	25.9	36.1	33.0	29.1	28.8
1969	26.4	37.1	34.5	29.6	29.4
1970	25.9	37.0	35.0	29.7	29.2
1971	28.1	37.6	35.3	30.3	30.6
1972	31.2	38.5	36.6	34.1	33.5
1973	38.0	41.2	38.6	34.4	37.7
1974	47.4	51.5	46.6	44.3	47.2
1975	49.6	56.2	52.7	47.6	50.4
1976	51.7	58.0	55.8	50.2	52.7
1977	57.5	62.6	60.0	53.6	57.6
1978	64.9	66.6	67.0	57.7	68.7
1979	84.1	81.5	82.5	75.7	81.7
1980	100.0	100.0	100.0	100.0	100.0
1981	110.4	120.2	111.8	113.4	114.0
1982	114.3	130.3	118.3	124.1	121.7
1983					
Jan.	123.9	133.6	132.1	136.8	130.7
Feb.	124.8	134.1	133.6	137.9	131.6
Mar.	125.3	134.6	134.8	139.0	132.3
Apr.	124.2	134.2	135.1	139.2	131.9
May	125.5	133.9	135.4	140.0	132.8
Jun.	132.5	134.8	138.8	140.7	135.8
Jul.	134.5	135.1	140.4	147.7	138.7
Aug.	140.1	135.8	145.8	149.7	142.0
Sep.	143.6	135.9	149.8	151.9	144.2
Oct.	144.7	136.0	154.1	153.6	145.5
1963/64	6,131	2,358	1,320	2,510	12,319
1965	6,433	2,448	1,324	2,584	12,786
1966	6,608	2,489	1,357	2,699	13,159
1967	6,508	2,468	1,357	3,004	13,346
1968	6,508	2,489	1,370	3,056	13,439
1969	6,634	2,558	1,432	3,109	13,719
1970	6,608	2,551	1,453	3,119	13,626
1971	7,061	2,593	1,465	3,182	14,279
1972	7,840	2,655	1,519	3,582	15,632
1973	9,548	2,841	1,602	3,613	17,592
1974	11,910	3,551	1,934	4,653	22,025
1975	12,463	3,875	2,188	4,999	23,518
1976	12,991	3,999	2,316	5,273	24,591
1977	14,448	4,316	2,491	5,630	26,878
1978	16,282	4,592	2,781	6,060	32,057
1979	21,132	5,619	3,425	7,951	38,124
1980	25,127	6,895	4,151	10,503	46,663
1981	27,740	8,295	4,641	11,910	53,196
1982	28,720	8,984	4,911	13,034	56,789
1983	33,145	9,294	5,811	15,088	63,718
Jan.	(31,132)	(9,212)	(5,483)	(14,368)	(60,989)
Feb.	(31,358)	(9,246)	(5,546)	(14,484)	(61,409)
Mar.	(31,484)	(9,281)	(5,596)	(14,599)	(61,735)
Apr.	(31,208)	(9,253)	(5,608)	(14,620)	(61,548)
May	(31,534)	(9,232)	(5,620)	(14,704)	(61,968)
Jun.	(33,293)	(9,294)	(5,762)	(14,777)	(63,368)
Jul.	(33,796)	(9,315)	(5,828)	(15,513)	(64,722)
Aug.	(35,203)	(9,363)	(6,052)	(15,723)	(66,261)
Sep.	(36,082)	(9,370)	(6,218)	(15,954)	(67,288)
Oct.	(36,359)	(9,377)	(6,397)	(16,133)	(67,895)

Data: Banco Central del PARAGUAY

Household Expenses of Farmer (Annual)

Scale	Number of family member			Household expenses				Others	Total	Household expenses per person
	≥12 year old	≤12 year old	Total	Food and drink expenses	Education expenses	Health and sanitation expenses	Clothing expenses			
6ha	3	-	3	216,000	15,000	40,000	30,000	-	301,000	100,333
10ha	4	2	6	204,000	30,000	60,000	80,000	-	374,000	62,000
14ha	10	4	14	360,000	30,000	48,000	70,000	95,500	603,500	43,107
14ha	8	2	10	120,000	40,000	100,000	70,000	-	330,000	33,000
12.5ha	4	8	12	96,000	25,000	20,000	60,000	-	201,000	16,750
18ha	4	-	4	100,000	-	345,000	50,000	-	495,000	123,750
25ha	4	2	6	180,000	2,400	90,000	100,000	-	372,400	62,067
26ha	3	6	9	120,000	25,000	100,000	40,000	5,000	290,000	32,222
28ha	5	4	9	96,000	90,000	40,000	60,000	-	286,000	31,778
34ha	10	-	10	180,000	120,000	15,000	120,000	10,000	445,000	44,500
75ha	11	3	14	240,000	130,000	70,000	222,000	-	662,000	47,286
360ha	7	-	7	240,000	-	80,000	60,000	-	380,000	54,286

Sourse: Eu Base A Encuesta A Producto Agricola, 1983 MAG

FARMING PROGRAM (2)

I. LABOR PLAN FARMING METHOD

1. Arrangement of cultivation management hours

We worked on the cultivation management hours by farm product and by area scale. It is based on the period suitable for growing standard types (medium-maturing variety). We computed the working hours per average ha by way of weighting required hours and working area per machine that is to be employed, and then dividing it by area. We used it in an attempt at simplifying the computation of working hours by area scale.

For instance, calculation of hours required for slowing a paddy field of which area scale is 100 ha is done in the following way:

Tractor 80 HP 2.0 hr/ha × Working area 40 ha = 80 hr
Tractor 100 HP 1.6 hr/ha × Working area 60 ha = 96 hr

(80 hr + 96 hr) ÷ 100 ha = 1.76 hr/ha

(The same method applies to the different types of work.)

Table 4-1-5 indicates the cultivation management hours worked out in this way.

2. Supply-demand conditions of labor and machinery

(1) Supply-demand condition of labor

1) Cases of individual management

① We worked on the excess and deficiency of family labor force and required labor force by farm product and by area scale.

② The computation of family labor force which becomes the premise in examining excess and deficiency was done by the following assumption, which was made on the basis of the standard size of a household consisting of 6 members in 5 towns and villages concerning the development.

a. We assumed the workable members in the household labor to be 2 persons, and their capacity to be 1.0 in case of man and 0.8 in case of woman.

b. The number of workable days per month is based on the number of workable days calculated from "Meteorological data (1971~1980) of the

Yacyreta Observatory, Meteorological Department, Ministry of National Defence.

c. We computed the monthly volume of working hours, on the supposition that the actual working hours consist of 7 hours per day. (Refer to the Attached Table.)

The "Supply-demand Conditions of Labor" computed upon the abovementioned basis are offered in the Table 4-1-6. Table 4-1-7 indicates the supply-demand conditions of labor during the cultivation period.

2) Regions for development

① Case of 5 towns and villages

a. We worked on the excess and deficiency of regional labor force and required labor force. Here we disregarded the required labor force involving the existing agriculture and beef cattle breeding.

b. In calculating the required labor force, we first assumed Area A as representing soybean-wheat with the area scale of 150 ha and Area B as representing paddy with the area scale of 150 ha, and computed it by multiplying the number of management bodies to them. (Table 4-1-8)

c. We postulated the number of management bodies from the following formulae.

Area A: Soybean-wheat with the area scale of 150 ha

Cultivated acreage (26,820 ha - 1,200 ha (dairy farm))
÷ 150 ha ≒ 171 management bodies (farmers)

Area B: Paddy with the area scale of 150 ha

Cultivated acreage (79,880 ha × 1/2) ÷ 150 ha
≒ 266 management bodies (farmers)

d. In computing the regional labor force which becomes the premise in examining its excess and deficiency, we did it firstly by multiplying the employment population ratio in Paraguay (40%) to 20,838 persons which constitute the population of the concerned 5 towns and villages in 1982, then by multiplying the population ratio of the agricultural and livestock industries (45%) to it. (Refer to the Attached Table.)

② Case of 2 departments

a. We worked on the excess and deficiency of labor force and required labor force in Itapua Department and Misiones Department.

b. As to the rest of places, we computed by applying the same method used for the calculation of 5 towns and villages. (Table 4-1-9)

(2) Supply-demand conditions of machine

1) We worked on the excess and deficiency of workable volume of machines and the required volume of workable machines and the required volume of workable machines by farm production and by area scale.

2) Computation of the workable volume of machines which becomes the premise in examining its excess and deficiency was done by multiplying the actual working hours per day to the number of workable days per month.

Table 4-1-10 offers the supply-demand conditions of machine computed by this method.

3) The workable volume of machines in the area is computed by multiplying the number of management bodies in Area A and Area B to the monthly workable volume of machines for cultivating paddy and soybean-wheat in the area scale of 150 ha, and by adding them up.

4) The workable volume of required machines is computed by multiplying the number of management bodies in Area A and Area B to the required workable volume per management body for cultivating paddy and soybean-wheat in the area scale of 150 ha. (Table 4-1-11)

Attached Table Working Hours per ha (Base of Calculation)

(Paddy rice)

Managing scale 25 ha
Managing scale 50 ha
Managing scale 100 ha
} Same as the required hours per ha.

Item	Calculation	Mechanical power	Man power
		hr	hr
	(Mechanical power and man power)		
Plowing	(a) 80HP 2.0hr/ha × 40ha = 80hr		
	(b) 100HP 1.6 × 60 = 96		
	Total 176hr/100ha	1.76'	1.76'
Harrowing	(a) 2.25 × 40 = 90		
	(b) 2.0 × 60 = 120		
	Total 210/100	2.10'	2.10'
Land levelling	(a) 1.0 × 40 = 40		
	(b) 0.8 × 60 = 48		
	Total 88/100	0.88'	0.88'
Fertilization, seeding	(Mechanical power)		
	(a) 1.5 × 40 = 60		
	(b) 1.3 × 60 = 78		
	Total 138/100	1.38'	5.52'
	(Man power) 1.38 hr × 4 person = 5.52		
Ridging		0.8'	1.6'
Water management			20
Harvesting		1.5'	10.5'
Transportation		1.5'	

Paddy rice

Managing scale 150 ha

Item	Calculation	Mechanical power	Man power
	(Mechanical power and man power)	hr	hr
Plowing	(a) 70HP 2.5hr/ha x 30ha = 75hr		
	(b) 80HP 2.0 x 50 = 100		
	(c) 120PH 1.25 x 70 = 87.5		
	Total 262.5/150	1.75'	1.75'
Harrowing	(a) 3.0 x 30 = 90		
	(b) 2.25 x 50 = 112.5		
	(c) 1.8 x 70 = 126		
	Total 328.5/150	2.19'	2.19'
Land levelling	(a) 1.5 x 30 = 45		
	(b) 1.0 x 50 = 50		
	(c) 0.6 x 70 = 42		
	Total 137/150	0.91'	0.91'
Fertilization, seeding	(Mechanical power)		
	(a) 2.0 x 30 = 60		
	(b) 1.5 x 50 = 75		
	(c) 1.1 x 70 = 77		
	Total 212/150	1.41'	5.65'
	(Man power)		
	(a) 6.0 x 30 = 180		
	(b) 4.5 x 50 = 225		
	(c) 3.3 x 70 = 231		
	Total 636/150		
	(Man power)		
	1.41 hr x 4 person = 5.65		
Ridging		0.8'	1.6'
Water management			20'
Harvesting		1.5'	10.5'
Transportation		1.5'	

Paddy rice

Managing scale 250 ha

Item	Calculation	Mechanical power	Man power
		hr	hr
	(Mechanical power and man power)		
Plowing	(a) 80 rp 2.0hr/ha × 40ha = 80		
	(b) 120 rp 1.25 × 70 × 3 = 262.5		
	Total 342.5/250	1.37'	1.37'
Harrowing	(a) 2.25 × 40 = 90		
	(b) 1.8 × 70 × 3 = 378		
	Total 468/250	1.87'	1.87'
Land levelling	(a) 1.0 × 40 = 40		
	(b) 0.6 × 70 × 3 = 126	0.66'	0.66'
	Total 166/250		
	(Mechanical power)		
Fertilization, seeding	(a) 1.5 × 40 = 60		
	(b) 1.1 × 70 × 3 = 231		
	Total 291/250	1.16'	4.66'
	(Man power)		
	1.16hr × 4 person = 4.66		
Ridging		0.8'	1.6'
Water management		-	20'
Harvesting		1.5'	10.5'
Transportation		1.5	

Paddy rice

Managing scale 400 ha

Item	Calculation	Mechanical power	Man power
		hr	hr
	(Mechanical power and man power)		
Plowing	(a) 80PH 3 units 2.0hr/ha × 40ha × 3 units = 240hr		
	(b) 120PH 4 units 125 × 70 × 4 = 350		
	Total 590/400	1.48'	1.48'
Harrowing	(a) 2.25 × 40 × 3 = 270		
	(b) 1.8 × 70 × 4 = 504		
	Total 774/400	1.94'	1.94'
Land levelling	(a) 1.0 × 40 × 3 = 120		
	(b) 0.6 × 70 × 4 = 168		
	Total 288/400	0.72'	0.72'
Fertilization, seeding	(Mechanical power)		
	(a) 1.5 × 40 × 3 = 180		
	(b) 1.1 × 70 × 4 = 308		
	Total 488/400	1.22'	4.88'
	(Man power)		
	1.22hr × 4 person = 4.88 hr		
Ridging		0.8'	1.6'
Water management		-	20'
Harvesting		1.5'	10.5'
Transportation		1.5'	

Paddy rice

Managing scale 500 ha

Item	Calculation	Mechanical power	Man power
		hr	hr
Plowing	(Mechanical power and man power) (a) 80HP 2 units 2.0hr/ha × 40ha × 2 units = 160hr (b) 120HP 6 units 1.25 × 70 × 6 = 525 Total 685/500	1.37'	1.37'
Harrowing	(a) 2.25 × 40 × 2 = 180 (b) 1.8 × 70 × 6 = 756 Total 936/500	1.87'	1.87'
Land levelling	(a) 1.0 × 40 × 2 = 80 (b) 0.6 × 70 × 6 = 252 Total 332/500	0.66'	0.66'
Fertilization, seeding	(Mechanical power) (a) 1.5 × 40 × 2 = 120 (b) 1.1 × 70 × 6 = 462 Total 582/500 (Man power) 1.16 hr × 4 person = 4.66 hr	1.16'	4.66'
Ridging		0.8'	1.6'
Water management		-	20'
Harvesting		1.5'	10.5'
Transportation		1.5'	

(Soybean)

Managing scale 25 ha
Managing scale 50 ha
Managing scale 100 ha
} Same as the required hours per ha

Item	Calculation	Mechanical Power	Man power
		hr	hr
Plowing	(Mechanical power and man power) (a) 45HP 1 unit 3.5hr/ha × 33ha = 115.5hr (b) 70HP 1 unit 2.5 × 42 = 105 Total 220.5/75	2.94'	2.94'
Subsoil breaking	3.0 hr ÷ 4 years = 0.75 hr		
Harrowing	(a) 2.0 × 33 = 66 (b) 1.5 × 42 = 63 Total 129/75	1.72'	1.72'
Fertilization, seeding	(Mechanical power) (a) 1.75 × 33 = 57.75 (b) 1.5 × 42 = 63 Total 120.75/75 (Man power) 1.61 hr × 2 person = 3.22 hr	1.61'	3.22'
Intertillage	(a) 2.0 × 33 = 66 (b) 1.5 × 42 = 63 Total 129/75	1.72'	1.72'
Weeding		0.75'	0.75'
Control		3.0'	3.0'
Harvesting		1.25'	2.5'
Transportaion		1.25'	2.5'

Soybean

Managing scale 150 ha

Item	Calculation	Mechanical power	Man power
		hr	hr
	(Mechanical power and man power)		
Plowing	(a) 70HP 1 unit 2.5hr/ha × 42ha		
	= 105 hr		
	(b) 110HP 1 unit 1.25 × 70.5		
	= 88.125		
	Total 193.13/112.5	1.72'	1.72'
Subsoil breaking			
Harrowing	(a) 1.5 × 42 = 63		
	(b) 0.75 × 70.5 = 52.875	1.03'	1.03'
	Total 115.88/112.5		
	(Mechanical power)		
Fertilization, seeding	(a) 1.5 × 42 = 63		
	(b) 1.0 × 70.5 = 70.5		
	Total 133.5/112.5	1.19'	2.37'
	(Man power)		
	1.19 hr × 2 person = 2.37 hr		
Intertillage	(a) 1.5 × 42 = 63		
	(b) 1.0 × 70.5 = 70.5		
	Total 133.5/112.5	1.2'	1.2'
Weeding	(a) 0.75 × 42 = 31.5		
	(b) 0.5 × 70.5 = 35.25		
	Total 66.75/112.5	0.59'	0.59'
Control	(a) 3.0 × 42 = 126		
	(b) 0.5 × 70.5 = 141		
	Total 267/112.5	2.40'	2.40'
Harvesting		1.25'	2.50'
Transportation		1.25'	2.50'

Soybean

Managing scale 200 ha

Item	Calculation	Mechanical power	Man power
	(Mechanical power and man power)	hr	hr
Plowing	(a) 70HP 2 units 2.5hr/ha × 40ha × 2 unit = 200hr		
	(b) 110HP 1 unit 1.25 × 70 = 87.5		
	Total 287.5/150	1.92'	1.92'
Subsoil breaking		0.4'	0.4'
Harrowing	(a) 1.5 × 40 × 2 = 120		
	(b) 0.75 × 70 = 52.5		
	Total 252.5/150	1.68'	1.68'
	(Mecahnical power)		
Fertilization, seeding	(a) 1.5 × 40 × 2 = 120		
	(b) 1.0 × 70 = 70		
	Total 190/150	1.27'	2.54'
	(Man power) 1.27 hr × 2 person = 2.54		
Intertillage	(a) 1.5 × 40 × 2 = 120		
	(b) 1.0 × 70 = 70		
	Total 190/150	1.27'	1.27'
Weeding	(a) 0.75 × 40 × 2 = 60		
	(b) 0.5 × 70 = 35		
	Total 951/150	0.63'	0.63'
Control	(a) 3.0 × 40 × 2 = 240		
	(b) 2.0 × 70 = 140	2.53'	2.53'
	Total 380/150		
Harvesting		1.25'	2.50'
Transportation		1.25'	2.50'

(Wheat)

Managing scale 25 ha
Managing scale 50 ha
Managing scale 100 ha
} Same as the required hours per ha

Item	Calculation	Mechanical power	Man power
	(Mechanical power and man power)	hr	hr
Plowing	(a) 45HP 1 unit 3.5hr/ha × 33ha = 115.5 hr		
	(b) 70HP 1 unit 2.5 × 42 = 105 hr		
	Total × 220.5/75	2.94'	2.94'
Harrowing	(a) 2.0 × 33 = 66		
	(b) 1.5 × 42 = 63		
	Total 129/75	1.72'	1.72'
Fertilization, seeding	(Mechanical power)		
	(a) 1.75 × 33 = 57.75		
	(b) 1.5 × 42 = 63		
	Total 120.75/75	1.61'	3.22'
	(Man power)		
	1.61 hr × 2 person = 3.22 hr		
Weeding		0.75'	0.75'
Control		2.25'	2.25'
Harvesting		1.0'	2.0'
Transportation		1.0'	2.0'

Wheat

Managing scale 150 ha

Item	Calculation	Mechanical power	Man power
	(Mechanical power and man power)	hr	hr
Plowing	(a) 70HP 1 unit 2.5hr/ha × 42ha		
	= 105 hr		
	(b) 110HP 1 unit 1.25 × 70.5		
	= 88.125		
	Total 193.13/112.5	1.72'	1.72'
Harrowing	(a) 1.5 × 42 = 63		
	(b) 0.75 × 70.5 = 52.875		
	Total 115.88/112.5	1.03'	1.03'
	(Mechanical power)		
Fertilization, seeding	(a) 1.5 × 42 = 63		
	(b) 1.0 × 70.5 = 70.5		
	Total 133.5/112.5	1.19'	2.37'
	(Man power)		
	1.19 hr × 2 person = 2.38 hr		
Weeding	(a) 0.75 × 42 = 31.5		
	(b) 0.5 × 70.5 = 35.25		
	Total 66.75/112.5	0.59'	0.59'
Control	(a) 2.25 × 42 = 94.5		
	(b) 1.5 × 70.5 = 105.75		
	Total 200.25/112.5	1.8'	1.8'
Harvesting		1.0'	2.0'
Transportation		1.0'	2.0'

Wheat

Managing scale 200 ha

Item	Calculation	Mechanical power	Man power
	(Mechanical power and man power)	hr	hr
Plowing	(a) 70HP 2 units 2.5hr/ha × 40hr		
	× 2 units = 200 hr		
	(b) 110HP 1 unit 1.25 × 70 = 87.5		
	Total 287.5/150	1.92'	1.92'
Harrowing	(a) 1.5 × 40 × 2 = 120		
	(b) 0.75 × 70 = 52.5		
	Total 172.5/150	1.15''	1.15'
	(Mechanical power)		
Fertilization, seeding	(a) 1.5 × 40 × 2 = 120		
	(b) 1.0 × 70 = 70		
	Total 190/150	1.27'	2.54'
	(Man power)		
	1.27 2 person = 2.54		
Weeding	(a) 0.75 × 40 × 2 = 60		
	(b) 0.5 × 70 = 35		
	Total 95/150	0.63'	0.63'
Control	(a) 2.25 × 40 × 2 = 180		
	(b) 1.5 × 70 = 105		
	Total 285/150	1.9'	1.9'
Harvesting		1.0'	2.0'
Transportation		1.0'	2.0'

Table 4-1-5-ⓐ Working Hours of Cultivation Management

(Managing scale 25 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		3.5	3.5															2.5	2.5	1.0	1.0							
	Harrowing	Disc harrow		4.5	4.5																	3.0	3.0	1.5	1.5					
	Land levelling	Leveller		2.0	2.0																			2.0	2.0					
	Fertilizing, seeding	Tracter (seeder)		2.5	10.0																			1.0	4.0	1.5	6.0			
	Ridging	Ridger		1.5	3.0																					1.5	3.0			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5						1.0		0.5																		
	Total		per ha	17.0	53.5	-	4.0	-	4.0	2.0	7.0	1.0	3.5							2.5	2.5	4.0	4.0	4.5	11.5	3.0	13.0	-	4.0	
			per 25 ha	426	1338	-	100	-	100	50	175	26	88							63	63	100	100	112	287	75	325	-	100	

Note: M.P. = Mechanical Power
H.P. = Man Power

Working hours is calculated by multiplying (Required hours × Working area) for each machinery by scale area.

(This note applyes to other tables)

Table 4-1-5-ⓑ Working Hours of Cultivation Management

(Managing scale 50 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.8	1.8															1.3	1.3	0.5	0.5							
	Harrowing	Disc harrow		2.1	2.1																	1.4	1.4	0.7	0.7					
	Land levelling	Leveller		0.9	0.9																			0.9	0.9					
	Fertilizing, seeding	Tracter (seeder)		1.4	5.6																			0.6	2.4	0.8	3.2			
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5						1.0		0.5																		
	Total		per ha	10.0	42.5		4.0		4.0	2.0	7.0	1.0	3.5							1.3	1.3	1.9	1.9	2.2	8.0	1.6	8.8	-	4.0	
			per 50 ha	500	2125	-	200		200	100	350	50	175							65	65	95	95	110	400	80	440	-	200	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-© Working Hours of Cultivation Management

(Managing scale 100 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.76	1.76															1.3	1.3	0.46	0.46							
	Harrowing	Disc harrow		2.1	2.1																	1.4	1.4	0.7	0.7					
	Land levelling	Leveller		0.88	0.88																			0.88	0.88					
	Fertilizing, seeding	Tracter (seeder)		1.38	5.52																			0.6	2.4	0.78	3.12			
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5						1.0		0.5																		
	Total		per ha	9.92	42.36	-	4.0	-	4.0	2.0	7.0	1.0	3.5							1.3	1.3	1.86	1.86	2.18	7.98	1.58	8.72	-	4.0	
			per 100 ha	992	4236	-	400	-	400	200	700	100	350							130	130	186	186	218	798	158	872	-	400	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓓ Working Hours of Cultivation Management

(Managing scale 150 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.75	1.75															1.3	1.3	0.45	0.45							
	Harrowing	Disc harrow		2.19	2.19																	1.46	1.46	0.73	0.73					
	Land levelling	Leveller		0.91	0.91																			0.91	0.91					
	Fertilizing, seeding	Tracter (seeder)		1.41	5.65																			0.7	2.8	0.71	2.85			
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					0.85	6.3	0.65	4.2																	
	Transportation	Trailer		1.5						0.85		0.65																		
	Total		per ha	10.06	42.6	-	4.0	-	4.0	1.7	6.3	1.3	4.2							1.3	1.3	1.91	1.91	2.34	8.44	1.51	8.45	-	4.0	
			per 150 ha	1509	6390	-	600	-	600	254	945	196	630							195	195	286	286	351	1266	227	1268	-	600	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓔ Working Hours of Cultivation Management

(Managing scale 250 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.37	1.37															1.0	1.0	0.37	0.37							
	Harrowing	Disc harrow		1.87	1.87																	1.25	1.25	0.62	0.62					
	Land levelling	Leveller		0.66	0.66																			0.6	2.4	0.56	2.26			
	Fertilizing, seeding	Tracter (seeder)		1.16	4.66																			1.16	4.66					
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	0.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5				-		1.0		0.5																		
	Total		per ha	8.86	40.66	-	4.0	-	4.0	2.0	7.0	1.0	3.5							1.0	1.0	1.62	1.62	1.88	7.68	1.36	7.86	-	4.0	
			per 250 ha	2215	10165	-	1000	-	1000	500	1750	250	875							250	250	405	405	470	1920	340	1965	-	1000	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓕ Working Hours of Cultivation Management

(Managing scale 400 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.48	1.48															1.1	1.1	0.38	0.38							
	Harrowing	Disc harrow		1.94	1.94																	1.29	1.29	0.65	0.65					
	Land levelling	Leveller		0.72	0.72																			0.72	0.72					
	Fertilizing, seeding	Tracter (seeder)		1.22	4.88																			0.62	2.48	0.6	2.4			
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5						1.0		0.5																		
	Total		per ha	9.16	41.12	-	4.0	-	4.0	2.0	7.0	1.0	3.5							1.1	1.1	1.67	1.67	1.99	7.85	1.4	8.0	-	4.0	
			per 400 ha	3664	16448	-	1600	-	1600	800	2800	400	1400							440	440	668	668	796	3140	560	3200	-	1600	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-⑨ Working Hours of Cultivation Management

(Managing scale 500 ha)

(Unit Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Paddy rice	Plowing	Disc plow		1.37	1.37															1.0	1.0	0.37	0.37							
	Harrowing	Disc harrow		1.87	1.87																	1.25	1.25	0.62	0.62					
	Land levelling	Leveller		0.66	0.66																			0.66	0.66					
	Fertilizing, seeding	Tracter (seeder)		1.16	4.66																			0.6	2.4	0.56	2.26			
	Ridging	Ridger		0.8	1.6																					0.8	1.6			
	Additional fertilizing																													
	Weeding																													
	Control of disease and insect damage																													
	Water management			-	20.0	-	4.0	-	4.0															-	4.0	-	4.0	-	4.0	
	Harvesting	Combine		1.5	10.5					1.0	7.0	0.5	3.5																	
	Transportation	Trailer		1.5						1.0		0.5																		
	Total		per ha	8.86	40.66	-	4.0	-	4.0	2.0	7.0	1.0	3.5	-	-	-	-	-	-	1.0	1.0	1.62	1.62	1.88	7.68	1.36	7.86	-	4.0	
			per 500 ha	4430	20330		2000		2000	1000	3500	500	1750	-	-	-	-	-	-	500	500	810	810	940	3840	680	3930	-	2000	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓗ Working Hours of Cultivation Management

(Managing scale 25 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Soybean	Plowing	Disc plow		3.5	3.5																	1.0	1.0	2.5	2.5					
	Subsoil breaking	Subsoiler		-	-																									
	Harrowing	Disc harrow		2.0	2.0																			1.0	1.0	1.0	1.0			
	Fertilizing, seeding	Fertilizer applier, seeder		1.75	3.5																					1.75	3.5			
	Imiertillage	Cultivator		2.0	2.0																					1.0	1.0	1.0	1.0	
	Weeding	Power sprayer		1.0	1.0																							1.0	1.0	
	Control of disease and insect damage	"		4.0	4.0	2.0	2.0	1.0	1.0																			1.0	1.0	
	Harvesting	Combine		1.25	2.5					1.25	2.5																			
	Transportation	Trailer		1.25	2.5					1.25	2.5																			
	Total		per ha	16.75	21.0	2.0	2.0	1.0	1.0	2.5	5.0											1.0	1.0	3.5	3.5	3.75	5.5	3.0	3.0	
			per 18.75 ha	315	394	37	37	19	19	48	94											19	19	66	66	70	103	56	56	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓘ Working Hours of Cultivation Management

(Managing scale 50 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Soybean	Plowing	Disc plow		2.5	2.5																	1.0	1.0	1.5	1.5					
	Subsoil breaking	Subsoiler		0.75	0.75																			0.75	0.75					
	Harrowing	Disc harrow		1.5	1.5																			0.5	0.5	1.0	1.0			
	Fertilizing, seeding	Fertilizer applier, seeder		1.5	3.0																					1.5	3.0			
	Imlertillage	Cultivator		1.5	1.5																					0.75	0.75	0.75	0.75	
	Weeding	Power sprayer		0.75	0.75																							0.75	0.75	
	Control of disease and insect damage	"		3.0	3.0	1.5	1.5	0.75	0.75																			0.75	0.75	
	Harvesting	Combine		1.25	2.5					1.25	2.5																			
	Transportation	Trailer		1.25	2.5					1.25	2.5																			
	Total		per ha	14.0	18.0	1.5	1.5	0.75	0.75	2.5	5.0											1.0	1.0	2.75	2.75	3.25	4.75	2.25	2.25	
			per 37.5 ha	525	675	56	56	28	28	94	188											38	38	103	103	122	178	84	84	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓙ Working Hours of Cultivation Management

(Managing scale 100 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Soybean	Plowing	Disc plow		2.94	2.94																	1.2	1.2	1.74	1.74					
	Subsoil breaking	Subsoiler		0.75	0.75																			0.75	0.75					
	Harrowing	Disc harrow		1.72	1.72																			1.0	1.0	0.72	0.72			
	Fertilizing, seeding	Fertilizer applier, seeder		1.61	3.22																					1.61	3.22			
	Imlertillage	Cultivator		1.72	1.72																					0.86	0.86	0.86	0.86	
	Weeding	Power sprayer		0.75	0.75																							0.75	0.75	
	Control of disease and insect damage	"		3.0	3.0	1.5	1.5	0.75	0.75																			0.75	0.75	
	Harvesting	Combine		1.25	2.5					1.25	2.5																			
	Transportation	Trailer		1.25	2.5					1.25	2.5																			
	Total		per ha	14.99	19.1	1.5	1.5	0.75	0.75	2.5	5.0											1.2	1.2	3.49	3.49	3.19	4.8	2.36	2.36	
			per 75 ha	1124	1432	112	112	56	56	188	375											90	90	262	262	239	360	177	177	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓚ Working Hours of Cultivation Management

(Managing scale 150 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Soybean	Plowing	Disc plow		1.72	1.72																	0.72	0.72	1.0	1.0					
	Subsoil breaking	Subsoiler		0.4	0.4																			0.4	0.4					
	Harrowing	Disc harrow		1.03	1.03																			0.63	0.63	0.4	0.4			
	Fertilizing, seeding	Fertilizer applier, seeder		1.19	2.37																					1.19	2.37			
	Imlertillage	Cultivator		1.2	1.2																					0.6	0.6	0.6	0.6	
	Weeding	Power sprayer		0.59	0.59																							0.59	0.59	
	Control of disease and insect damage	"		2.4	2.4	1.2	1.2	0.6	0.6																			0.6	0.6	
	Harvesting	Combine		1.25	2.5					1.0	2.0	0.25	0.5																	
	Transportation	Trailer		1.25	2.5					1.0	2.0	0.25	0.5																	
	Total		per ha	11.03	14.71	1.2	1.2	0.6	0.6	2.0	4.0	0.5	1.0									0.72	0.72	2.03	2.03	2.19	3.37	1.79	1.79	
			per 112.5 ha	1241	1654	135	135	68	68	226	450	56	112									81	81	228	228	246	379	201	201	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-① Working Hours of Cultivation Management

(Managing scale 200 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Soybean	Plowing	Disc plow		1.92	1.92																	0.9	0.9	1.02	1.02					
	Subsoil breaking	Subsoiler		0.4	0.4																			0.4	0.4					
	Harrowing	Disc harrow		1.68	1.68																			1.1	1.1	0.58	0.58			
	Fertilizing, seeding	Fertilizer applier, seeder		1.27	2.54																					1.27	2.54			
	Imlertillage	Cultivator		1.27	1.27																					0.6	0.6	0.67	0.67	
	Weeding	Power sprayer		0.63	0.63																							0.63	0.63	
	Control of disease and insect damage	"		2.53	2.53	1.27	1.27	0.63	0.63																			0.63	0.63	
	Harvesting	Combine		1.25	2.50					1.0	2.0	0.25	0.5																	
	Transportation	Trailer		1.25	2.50					1.0	2.0	0.25	0.5																	
	Total		per ha	12.2	15.97	1.27	1.27	0.63	0.63	2.0	4.0	0.5	1.0									0.9	0.9	2.52	2.52	2.45	3.72	1.93	1.93	
			per 150 ha	1833	2397	191	191	95	95	300	600	75	150									135	135	387	378	368	558	290	290	

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓜ Working Hours of Cultivation Management

(Managing scale 25 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Wheat	Plowing	Disc plow		3.5	3.5							3.5	3.5																	
	Subsoil breaking	Subsoiler		-	-																									
	Harrowing	Disc harrow		2.0	2.0									2.0	2.0															
	Fertilizing, seeding	Fertilizer applier, seeder		1.75	3.5									1.75	3.5															
	Weeding	Speed sprayer		1.0	1.0											1.0	1.0													
	Control of disease and insect damage	"		3.0	3.0													2.0	2.0	1.0	1.0									
	Harvesting	Combine		1.0	2.0																	1.0	2.0							
	Transportation	Trailer		1.0	2.0																	1.0	2.0							
	Total		per ha	13.25	17.0							3.5	3.5	3.75	5.5	1.0	1.0	2.0	2.0	1.0	1.0	2.0	4.0							
			per 18.75 ha	249	319							66	66	70	103	19	19	37	37	19	19	38	75							

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓝ Working Hours of Cultivation Management

(Managing scale 50 ha)

(Unit. Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Wheat	Plowing	Disc plow		2.5	2.5							2.5	2.5																	
	Subsoil breaking	Subsoiler		-	-																									
	Harrowing	Disc harrow		1.5	1.5									1.5	1.5															
	Fertilizing, seeding	Fertilizer applier, seeder		1.5	3.0									1.5	3.0															
	Weeding	Speed sprayer		0.75	0.75											0.75	0.75													
	Control of disease and insect damage	"		2.25	2.25													1.5	1.5	0.75	0.75	0.								
	Harvesting	Combine		1.0	2.0																	1.0	2.0							
	Transportation	Trailer		1.0	2.0																	1.0	2.0							
	Total		per ha	10.5	14.0							2.5	2.5	3.0	4.5	0.75	0.75	1.5	1.5	0.75	0.75	2.0	4.0							
			per 37.5 ha	395	525							94	94	113	169	28	28	56	56	28	28	75	150							

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-◎ Working Hours of Cultivation Management

(Managing scale 100 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Wheat	Plowing	Disc plow		2.94	2.94							2.94	2.94																	
	Subsoil breaking	Subsoiler																												
	Harrowing	Disc harrow		1.72	1.72									1.72	1.72															
	Fertilizing, seeding	Fertilizer applier, seeder		1.61	3.22									1.61	3.22															
	Weeding	Speed sprayer		0.75	0.75											0.75	0.75													
	Control of disease and insect damage	"		2.25	2.25													1.5	1.5	0.75	0.75									
	Harvesting	Combine		1.0	2.0																	1.0	2.0							
	Transportation	Trailer		1.0	2.0																	1.0	2.0							
	Total		per ha	11.27	14.88							2.94	2.94	3.33	4.94	0.75		1.5	1.5	0.75	0.75	2.0	4.0							
			per 75 ha	845	1116							220	220	250	371	56	56	113	113	56	56	150	300							

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓟ Working Hours of Cultivation Management

(Managing scale 150 ha) (Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Wheat	Plowing	Disc plow		1.72	1.72							1.72	1.72																	
	Subsoil breaking	Subsoiler																												
	Harrowing	Disc harrow		1.03	1.03									1.03	1.03															
	Fertilizing, seeding	Fertilizer applier, seeder		1.19	2.37									1.19	2.37															
	Weeding	Speed sprayer		0.59	0.59											0.59	0.59													
	Control of disease and insect damage	"		1.8	1.8													1.2	1.2	0.6	0.6									
	Harvesting	Combine		1.0	2.0																	1.0	2.0							
	Transportation	Trailer		1.0	2.0																	1.0	2.0							
	Total		per ha	8.33	11.51							1.72	1.72	2.22	3.4	0.59	0.59	1.2	1.2	0.6	0.6	2.0	4.0							
			per 112.5 ha	938	1295							193	193	250	383	66	66	135	135	68	68	226	450							

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-5-ⓖ Working Hours of Cultivation Management

(Managing scale 200 ha)

(Unit: Hours)

Crops	Works	Machinery	Area	Working hours per ha		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Remarks
				M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	M.P.	H.P.	
Wheat	Plowing	Disc plow		1.92	1.92							1.92	1.92																	
	Harrowing	Disc harrow		1.15	1.15									1.15	1.15															
	Fertilizing, seeding	Fertilizer applier, seeder		1.27	2.54									1.27	2.54															
	Weeding	Speed sprayer		0.63	0.63											0.63	0.63													
	Control of disease and insect damage	"		1.9	1.9													1.3	1.3	0.6	0.6									
	Harvesting	Combine		1.0	2.0																	1.0	2.0							
	Transportation	Trailer		1.0	2.0																	1.0	2.0							
	Total		per ha	8.87	12.14							1.92	1.92	2.42	3.69	0.63	0.63	1.3	1.3	0.6	0.6	2.0	4.0							
			per 150 ha	1331	1822							288	288	363	554	95	95	195	195	90	90	300	600							

Note: M.P. = Mechanical Power
H.P. = Man Power

Table 4-1-6-ⓐ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 25 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	100	100	175	88	-	-	-	63	100	287	325	100	1,338
		Others													
	Labor for common section														
	Total		100	100	175	88	-	-	-	63	100	287	325	100	1,338
Balance			158	141	67	170	266	264	280	197	159	Δ 42	Δ 101	131	1,690

Notes: 1. Self holding labor force is shown in other tables.

2. Required labor is taken from Table 3-3-A.

Table 4-1-6-ⓑ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 50 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	200	200	350	175	-	-	-	65	95	400	440	200	2,125
		Others													
	Labor for common section														
	Total		200	200	350	175	-	-	-	65	95	400	440	200	2,125
Balance			58	41	108	83	266	264	280	195	164	Δ 155	Δ 216	31	903

Table 4-1-6-ⓒ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 100 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	400	400	700	350	-	-	-	130	186	798	872	400	4,236
		Others													
	Labor for common section														
	Total		400	400	700	350	-	-	-	130	186	798	872	400	4,236
Balance			Δ 142	Δ 159	Δ 458	Δ 92	266	264	280	130	Δ 73	Δ 553	Δ 648	Δ 169	Δ 1,208

Table 4-1-6- ⓓ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 150 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	600	600	945	630	-	-	-	195	286	1,266	1,268	600	6,390
		Others													
	Labor for common section														
	Total		600	600	945	630	-	-	-	195	286	1,266	1,268	600	6,390
Balance			Δ 342	Δ 359	Δ 703	Δ 372	266	264	280	65	Δ 27	Δ1,021	Δ1,044	Δ 369	Δ 3,362

Table 4-1-6- ⓔ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 250 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	1,000	1,000	1,750	875	-	-	-	250	405	1,920	1,965	1,000	10,165
		Others													
	Labor for common section														
	Total		1,000	1,000	1,750	875	-	-	-	250	405	1,920	1,965	1,000	10,165
Balance			Δ 742	Δ 759	Δ1,508	Δ 617	266	264	280	10	Δ 146	Δ1,675	Δ1,741	Δ 769	Δ 7,137

Table 4-1-6-ⓕ Situations of Labor Supply and Demand (Individual)

Paddy rice (Managing scale 400 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	1,600	1,600	2,800	1,400	-	-	-	440	668	3,140	3,200	1,600	16,448
		Others													
	Labor for common section														
	Total		1,600	1,600	2,800	1,400	-	-	-	440	668	3,140	3,200	1,600	16,448
Balance			Δ1,342	Δ1,359	Δ2,558	Δ1,142	266	264	280	Δ 180	Δ 409	Δ2,895	Δ2,976	Δ1,369	Δ13,420

Table 4-1-6-ⓖ Situations of Labor Supply and Demand (Individual)

Paddy rise (Managing scale 500 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Paddy rice	2,000	2,000	3,500	1,750	-	-	-	500	810	3,840	3,930	2,000	20,330
		Others													
	Labor for common section														
	Total		2,000	2,000	3,500	1,750	-	-	-	500	810	3,840	3,930	2,000	20,330
Balance			Δ1,742	Δ1,759	Δ3,258	Δ1,492	266	264	280	Δ 240	Δ 551	Δ3,595	Δ3,706	Δ1,769	Δ17,302

Table 4-1-6-ⓗ Situations of Labor Supply and Demand (Individual)

Soybean and wheat rotation (Managing scale 25 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Soybean	37	19	94	-	-	-	-	-	19	66	103	56	394
		Wheat	-	-	-	66	103	19	37	19	75	-	-	-	319
		Others													
	Labor for common section														
	Total		37	19	94	66	103	19	37	19	94	66	103	56	713
Balance			221	222	148	192	163	245	243	241	165	179	121	175	2,315

Table 4-1-6-ⓘ Situations of Labor Supply and Demand (Individual)

Soybean and wheat rotation (Managing scale 50 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Soybean	56	28	188	-	-	-	-	-	38	103	178	84	675
		Wheat	-	-	-	94	169	28	56	28	150	-	-	-	525
		Others													
	Labor for common section														
	Total		56	28	188	94	169	28	56	28	188	103	178	84	1,200
Balance			202	213	54	164	97	236	224	232	71	142	46	147	1,828

Table 4-1-6-ⓙ Situations of Labor Supply and Demand (Individual)

Soybean and wheat rotation (Managing scale 100 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	254	224	231	3,028
Required labor	Individual section	Soybean	112	56	375	-	-	-	-	-	90	262	360	177	1,432
		Wheat	-	-	-	220	371	56	113	56	300	-	-	-	1,116
		Others													
	Labor for common section														
	Total		112	56	375	220	371	56	113	56	390	262	360	177	2,548
Balance			146	185	Δ 133	38	Δ 105	208	167	204	Δ 131	Δ 17	Δ 136	54	480

Table 4-1-6-ⓚ Situations of Labor Supply and Demand (Individual)

Soybean and wheat rotation (Managing scale 150 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Soybean	135	68	450	112	-	-	-	-	81	228	379	201	1,654
		Wheat	-	-	-	193	383	66	135	68	450	-	-	-	1,295
		Others													
	Labor for common section														
	Total		135	68	450	305	383	66	135	68	531	228	379	201	2,949
Balance			123	173	Δ 208	Δ 47	Δ 117	198	145	192	Δ 272	17	Δ 155	30	79

Table 4-1-6-① Situations of Labor Supply and Demand (Individual)

Soybean and wheat rotation (Managing scale 200 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Self holding labor force			258	241	242	258	266	264	280	260	259	245	224	231	3,028
Required labor	Individual section	Soybean	191	95	600	150	-	-	- -	-	135	378	558	290	2,397
		Wheat	-	-	-	288	554	95	195	90	600	-	-	-	1,822
		Others													
	Labor for common section														
	Total		191	95	600	438	554	95	195	90	735	378	558	290	4,219
Balance			67	146	Δ 358	Δ 180	Δ 288	169	85	170	Δ 476	Δ 133	Δ 334	Δ 59	Δ1,191

Attached Table

Details of Holding Labor

Month	Working persons (Persons)	Working conversion persons (Persons)	Working days per month (Days)	Actual working hours per hours (Hours)	Monthly labor holding force	Remarks
1	2	1.8	20.50	7	258	
2	2	1.8	19.15	7	241	
3	2	1.8	19.20	7	242	
4	2	1.8	20.45	7	258	
5	2	1.8	21.10	7	266	
6	2	1.8	20.95	7	264	
7	2	1.8	22.20	7	280	
8	2	1.8	20.65	7	260	
9	2	1.8	20.55	7	259	
10	2	1.8	19.45	7	245	
11	2	1.8	17.75	7	224	
12	2	1.8	18.30	7	231	
Total					3,028	

Notes: 1. Labor force conversion in a family is 1.0 for man and 0.8 for woman.

2. Working days per month is workable days made up by meterological data of Yacyrete observatory, meterological department, Ministry of national defence (1971 ∿ 1980).

Table 4-1-7 Examination on Situations of Labor Supply and Demand during Cultivation Season

			Paddy rice	Soybean	Wheat	Remarks
Suitable season for cultivation			Aug.∿Apr.	Sep.∿Apr.	Apr.∿Oct.	
Self holding labor force						
Annual			3,028	3,028	3,028	Soybean Total of Aug. ∿ Apr. Wheat Total of Apr. ∿ Sep.
Suitable season for cultivation			1,958	1,700	1,573	
Required labors by scales	Small scale farmers	Managing scale 25 ha	1,338	394	319	
	Nucleus independent farmers	Managing scale 50 ha	2,125	675	525	
		Managing scale 100 ha	4,236	1,432	1,116	
		Managing scale 150 ha	6,390	1,654	1,295	
		Managing scale 200 ha	-	2,397	1,822	
	Industrial farmers	Managing scale 250 ha	10,165			
		Managing scale 400 ha	16,448			
		Managing scale 500 ha	20,330			

Table 4-1-8 Situations of Areal Labor Supply and Demand
(5 Towns and Villages)

(Hours)

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Developing area holding labor force			486,465	454,430	455,616	485,279	500,703	497,144	526,806	490,025	487,652	461,549	421,208	434,259	5,701,136
Required labor	Section A	Soybean and wheat rotation													
		Per managing body (a)	135	68	450	305	383	66	135	68	531	228	379	201	2,949
		Per section (a) × 171 managing bodies	23,085	11,628	76,950	52,155	65,493	11,286	23,085	11,628	90,801	38,988	64,809	34,371	504,279
	Section B	Paddy rice													
		Per managing body (b)	600	600	945	630	-	-	-	195	286	1,266	1,268	600	6,390
		Per section (b) × 266 managing bodies	159,600	159,600	251,370	167,580	-	-	-	51,870	76,076	336,756	337,288	159,600	1,699,740
	Areal total (section A + B)		182,685	171,228	328,320	219,735	65,493	11,286	23,085	63,498	166,877	375,744	402,097	193,971	2,204,019
Balance			303,780	283,202	127,296	265,544	435,210	485,858	503,721	426,527	320,775	85,805	19,111	240,288	3,497,117

Notes: 1. The required labor is calcualted by multiplying the required labors per managing body with soybean and wheat managing scale 150 ha for section A and paddy rice managing scale 150 ha for section B by number of managing bodies each.

2. Calculation of number of managing bodies is follows.

Section A: (Field area) 26,820 ha-1,200 ha (Dairy farm) = 25,620 ha, 25,620 ha ÷ 150 ha = 171 managing bodies.

Section B: (Field area) 79,880 ha (Paddy rice 39,940 ha, livestock 39,940 ha), 39,940 ha ÷ 150 ha = 266 managing bodies.

3. Holding labor force of 5 town and villages is shown in Attached Table.

Attached Table

Details of Developing Area Holding Labor Capacity

Month	Working persons (Persons)	Working conversion persons (Persons)	Working days per month (Days)	Actual working hours per hours (Hours)	Monthly labor holding force	Remarks
1	3,750					
1	3,750	3,390	20.50	7	486,465	
2	3,750	3,390	19.15	7	454,430	
3	3,750	3,390	19.20	7	455,616	
4	3,750	3,390	20.45	7	485,279	
5	3,750	3,390	21.10	7	500,703	
6	3,750	3,390	20.95	7	497,144	
7	3,750	3,390	22.20	7	526,806	
8	3,750	3,390	20.65	7	490,025	
9	3,750	3,390	20.55	7	487,652	
10	3,750	3,390	19.45	7	461,549	
11	3,750	3,390	17.75	7	421,208	
12	3,750	3,390	18.30	7	434,259	
Total					5,701,136	

Note: For estimation method

1. Working persons

Working persons are calculated by multiplying rural population 20,838 in population 5 towns and villages concerned (1982) of developing area by employed population rate (40% 1980) in Paraguay and farming and grazing population rate in occupational populations.

Calculation 20.838 persons × 0.4 × 0.45 = 3,750 persons

2. Working conversion persons

Working conversion persons are calculated by multiplying 3,750 persons by sex ratio (men 52%, women 48%) of survey area, and converted by capable conversion 1.0 for man and 0.8 for 0.8.

Calculation	Men:	3,750 persons × 0.52 × 1.0 = 1,950 persons
	Women:	3,750 persons × 0.48 × 0.8 = 1,440 persons
	Total	3,390 persons

Attached Table Population of Developing Area

Number of Families and the Population (1982)

	Families			Population							Persons per family			(Reference)
	Total	Urban area	Rural area	Total	Urban area			Rural area			Total	Urban area	Rural area	Population '72
					Total	Men	Women	Total	Men	Women				
Paraguay	586,274	263,504	322,770	3,026,165	1,281,192	621,120	660,072	1,744,973	901,783	843,190	5.2	4.9	5.4	2,357,955
Itapua	52,141	13,126	39,015	263,021	61,301	30,108	31,193	301,720	105,142	96,578	5.0	4.7	5.2	201,411
Misiones	14,832	6,130	8,702	79,278	30,078	14,763	15,315	49,200	25,193	24,007	5.3	4.9	5.7	72,277
Total	66,973	19,256	47,717	342,299	91,379	44,871	46,508	250,920	130,335	120,585	5.1	4.7	5.3	273,688
(Itapua)														
Gral-Delgodo	1,344	230	1,114	7,011	1,056	511	545	5,955	3,005	2,950	5.2	4.6	5.3	6,820
San Cosme	1,092	201	891	7,129	992	493	499	6,137	3,195	2,942	6.5	4.9	6.9	6,253
(Misiones)														
Ayolas	1,218	647	571	5,825	2,943	1,565	1,378	2,882	1,520	1,362	4.8	4.5	5.0	2,624
Santiago	1,157	542	615	5,959	2,717	1,362	1,355	3,242	1,637	1,605	5.2	5.0	5.3	5,287
Yabebyry	434	113	321	3,177	555	285	270	2,622	1,396	1,226	7.3	4.9	8.1	3,031
Total	5,245	1,733	3,512	29,101	8,263	4,216	4,047	20,838	10,753	10,085	5.5	4.8	5.9	24,025

Sourse: CENSO NACIONAL DE POBLACION Y VIVIENDAS 1982

Table 4-1-9 Situations of Areal Labor Supply and Demand (2 Departments)

(Unit: 1,000 hours)

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Holding labor force departments related to development			5,859	5,472	5,487	5,845	6,030	5,987	6,345	5,902	5,873	5,559	5,073	5,230	68,662
Required labor	Section A	Soybean and wheat rotation													
		Per managing body (a)	135	68	405	305	383	66	135	68	531	228	379	201	hours 2,949
		Per section (a) × 171 managing bodies	23,085	11,628	76,950	52,155	65,493	11,286	23,085	11,628	90,801	38,988	64,809	34,371	hours 504,279
	Section B	Paddy rice													
		Per managing body (b)	600	600	945	630	-	-	-	195	286	1,266	1,268	600	hours 6,390
		Per section (b) × 266 managing bodies	159,600	159,600	251,370	167,580	-	-	-	51,870	76,076	336,756	337,288	159,600	hours 1,699,740
	Areal total (Section A + B)		183	171	328	220	65	11	23	64	167	376	402	194	2,204
Balance			5,676	5,301	5,159	5,625	5,965	5,976	6,322	5,838	5,706	5,183	4,671	5,036	66,458

Notes: 1. Holding labor force of Itapua and Misiones departments is shown in other tables.
2. Calculation of the required labor is same to 5 towns and villages.

Attached Table

Details of Holding Labor Capacity of 2 Departments Related to Development

	Working persons (persons)	Working conversion persons (persons)	Working days per month (days)	Actual working hours per day (hours)	Monthly holding labor force (hours)	Remarks
Jan.	45,165	40,828	20.50	7	5,858,818	
Feb.	45,165	40,828	19.15	7	5,472,993	
Mar.	45,165	40,828	19.20	7	5,487,283	
Apr.	45,165	40,828	20.45	7	5,844,528	
May	45,165	40,828	21.10	7	6,030,295	
Jun.	45,165	40,828	20.95	7	5,987,426	
Jul.	45,165	40,828	22.20	7	6,344,671	
Aug.	45,165	40,828	20.65	7	5,901,687	
Sep.	45,165	40,828	20.55	7	5,873,107	
Oct.	45,165	40,828	19.45	7	5,558,732	
Nov.	45,165	40,828	17.75	7	5,072,879	
Dec.	45,165	40,828	18.30	7	5,230,066	
Total					68,662,485	

Notes: 1. Working persons 250,920 × 0.4 × 0.45 = 45,165

2. Labor conversion persons

Men 45,165 × 0.52 × 1.0 = 23,485

Women 45,165 × 0.48 × 0.8 = 17,343

Total 40,828

Table 4-1-10-@ Situations of Supply and Demand of Machine

(Paddy rice managing scale 25 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			144	134	34 134	36 143	148	147	155	145	144	136	124	128	70 1,682
Required machine operation hours	Individual section	Paddy rice	-	-	25 25	13 13	-	-	-	63	100	112	75	-	38 388
		Others													
	Labor for common section														
	Total		-	-	25 25	13 13	-	-	-	63	100	112	75	-	38 388
Balance			144	134	9 109	23 130	148	147	155	82	44	24	49	128	32 1,294

Note: 1. Machinery { Tractor 45 HP 1 unit
Combine 95 HP 0.25 unit (For 4 families use)

2. Machine operable hours are calculated by multiplying Attached Table "Details of Machinery Operable Hours" (per unit) by number of machinery.

3. Upper number of each column describes combine, and lower number tracter. For combine, each number is calculated by the limited season suitable for harvest.

Note 2, 3 applies to other tables.

Table 4-1-10-ⓑ Situations of Supply and Demand of Machine

(Paddy rice managing scale 50 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			144	134	67 134	72 143	148	147	155	145	144	136	124	128	139 1,682
Required machine operation hours	Individual section	Paddy rice	-	-	50 50	25 25	-	-	-	65	95	110	80	-	75 425
		Others													
	Labor for common section														
	Total		-	-	50 50	25 25	-	-	-	65	95	110	80	-	75 425
Balance			144	134	17 84	47 118	148	147	155	80	49	26	44	128	64 1,257

Note: 1. Machinery (Tractor 90 HP 1 unit
Combine 95 HP 0.5 unit (For 2 families use)

Table 4-1-10-© Situations of Supply and Demand of Machine

(Paddy rice managing scale 100 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			288	268	134 268	143 286	296	294	310	290	288	272	248	256	277 3,364
Required machine operation hours	Individual section	Paddy rice	-	-	100 100	50 50	-	-	-	130	186	218	158	-	150 842
		Others													
	Labor for common section														
	Total		-	-	100 100	50 50	-	-	-	130	186	218	158	-	150 842
Balance			288	268	34 168	93 236	296	294	310	160	102	54	90	256	127 2,522

Note: 1. Machinery Tractor { 80 HP 1 unit / 100 HP 1 unit

Combine 95 HP 1 unit

Table 4-1-10-ⓓ Situations of Supply and Demand of Machine

(Paddy rice managing scale 150 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			432	402	134 402	143 429	444	441	465	435	432	408	372	384	277 5,046
Required machine operation hours	Individual section	Paddy rice	-	-	127 127	98 98	-	-	-	195	286	351	227	-	225 1,284
		Others													
	Labor for common section														
	Total		-	-	127 127	98 98	-	-	-	195	286	351	227	-	225 1,284
Balance			432	402	7 275	45 331	444	441	465	240	146	57	145	384	52 3,762

Note: 1. Machinery Tractor 70 HP 1 unit
80 HP 1 unit
120 HP 1 unit

Combine 95 HP 1 unit

Table 4-1-10-ⓔ Situations of Supply and Demand of Machine

(Paddy rice managing scale 250 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			576	536	268 536	286 572	592	588	620	580	576	544	496	512	554 6,728
Required machine operation hours	Individual section	Paddy rice	-	-	250 250	125 125	-	-	-	250	405	470	340	-	375 1,840
		Others													
	Labor for common section														
	Total		-	-	250 250	125 125	-	-	-	250	405	470	340	-	375 1,840
Balance			576	536	18 286	161 447	592	588	620	330	171	74	156	512	179 4,888

Note: 1. Machinery Tractor { 80 HP 1 unit
120 HP 3 units

Combine 95 HP 2 units

Table 4-1-10-ⓕ Situations of Supply and Demand of Machine

(Paddy rice managing scale 400 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			1,008	938	402 938	429 1,001	1,036	1,029	1,085	1,015	1,008	952	868	896	831 11,774
Required machine operation hours	Individual section	Paddy rice	-	-	400 400	200 200	-	-	-	440	668	796	560	-	600 3,064
		Others													
	Labor for common section														
	Total		-	-	400 400	200 200	-	-	-	440	668	796	560	-	600 3,064
Balance			1,008	938	2 538	229 801	1,036	1,029	1,085	575	340	156	308	896	231 8,710

Note: 1. Machinery Tractor { 80 HP 3 units
120 HP 4 units

Combine 95 HP 3 units

Table 4-1-10-⑨ Situations of Supply and Demand of Machine

(Paddy rice managing scale 500 ha)

Unit:

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			1,152	1,072	536 1,072	572 1,144	1,184	1,176	1,240	1,160	1,152	1,088	992	1,024	1,108 13,456
Required machine operation hours	Individual section	Paddy rice	-	-	500 500	250 250	-	-	-	500	810	940	680	-	750 3,680
		Others													
	Labor for common section														
	Total		-	-	500 500	250 250	-	-	-	500	810	940	680	-	750 3,680
Balance			1,152	1,072	36 572	322 894	1,184	1,176	1,240	660	342	148	312	1,024	358 9,776

Note: 1. Machinery Tractor { 80 HP 2 units
120 HP 6 units

Combine 95 HP 4 units

Table 4-1-10-ⓗ Situations of Supply and Demand of Machine

Soybean and wheat rotation (managing scale 25 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			144	134	34 134	36 143	148	147	155	145	36 144	34 136	124	128	140 1,682
Required machine operation hours	Individual section	Soybean	37	19	24 24	- -	-	-	-	-	- 19	- 66	70	56	24 291
		Wheat	-	-	-	- 66	70	19	37	19	19 19	- -	-	-	19 230
		Others													
	Labor for common section														
	Total		37	19	24 24	- 66	70	19	37	19	19 38	- 66	70	56	43 521
Balance			107	115	10 110	36 77	78	128	118	126	17 106	34 70	54	72	97 1,161

Note: 1. Machinery Tractor 45 HP 1 unit

Combine 95 HP 0.25 unit (For 4 families use)

Table 4-1-10-ⓘ Situations of Supply and Demand of Machine

Soybean and wheat rotation (managing scale 50 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			144	134	67 134	72 143	148	147	155	145	72 144	68 136	124	128	279 1,682
Required machine operation hours	Individual section	Soybean	56	28	47 47	- -	-	-	-	-	- 38	- 103	122	84	47 478
		Wheat	-	-	- -	94	113	28	56	28	38 38	- -	-	-	38 357
		Others													
	Labor for common section														
	Total		56	28	47 47	- 94	113	28	56	28	38 76	- 103	122	84	85 835
Balance			88	106	20 87	72 49	35	119	99	117	34 68	68 33	2	44	194 847

Note: 1. Machinery Tractor 70 HP 1 unit

Combine 95 HP 0.5 unit (For 2 families use)

Table 4-1-10-ⓙ Situations of Supply and Demand of Machine

Soybean and wheat rotation (managing scale 100 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			288	268	134 268	143 286	296	294	310	290	144 288	136 272	248	256	557 3,364
Required machine operation hours	Individual section	Soybean	112	56	94 94	- -	-	-	-	-	- 90	- 262	239	177	94 1,030
		Wheat	-	-	- -	- 220	250	56	113	56	75 75	- -	-	-	75 770
		Others													
	Labor for common section														
	Total		112	56	94 94	- 220	250	56	113	56	75 165	- 262	239	177	169 1,800
Balance			176	212	40 174	143 66	46	238	197	234	69 123	136 10	9	79	388 1,564

Note: 1. Machinery Tractor { 45 HP 1 unit / 70 HP 1 unit

Combine 95 HP 1 unit

Table 4-1-10-㉧ Situations of Supply and Demand of Machine

Soybean and wheat rotation (managing scale 150 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			288	268	134 268	143 286	296	294	310	290	144 288	136 272	248	256	557 3,364
Required machine operation hours	Individual section	Soybean	135	68	113 113	28 28	-	-	-	-	- 81	- 228	246	201	141 1,100
		Wheat	-	-	-	- 193	250	66	135	68	113 113	- -	-	-	113 825
		Others													
	Labor for common section														
	Total		135	68	113 113	28 221	250	66	135	68	113 194	- 228	246	201	254 1,925
Balance			153	200	21 155	115 65	46	228	175	222	31 94	136 44	2	55	303 1,439

Note: 1. Machinery Tractor { 70 HP 1 unit / 110 HP 1 unit

Combine 95 HP 1 unit

Table 4-1-10-① Situations of Supply and Demand of Machine

Soybean and wheat rotation (managing scale 200 ha)

Unit: Hours

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			432	402	268 402	286 429	444	441	465	435	288 432	272 408	372	384	1,114 5,046
Required machine operation hours	Individual section	Soybean	191	95	150 150	38 38	-	-	-	-	- 135	- 378	368	290	188 1,645
		Wheat				- 288	363	95	195	90	150 150	- -	-	-	150 1,181
		Others													
	Labor for common section														
	Total		191	95	150 150	38 326	363	95	195	90	150 285	- 378	368	290	338 2,826
Balance			241	307	118 252	248 103	81	346	270	345	138 147	272 30	4	94	776 2,230

Note: 1. Machinery Tractor { 70 HP 2 units
110 HP 1 unit

Combine 95 HP 2 units

Attached Table

Details of Machine Operable Hours

(Per unit)

Month	Operation days per month (days)	Actual operation hours per day (hours)	Monthly machine operable hours (hours)	Remarks
Jan.	20.50	7	144	
Feb.	19.15	7	134	
Mar.	19.20	7	134	
Apr.	20.45	7	143	
May	21.10	7	148	
Jun.	20.95	7	147	
Jul.	22.20	7	155	
Aug.	20.65	7	145	
Sep.	20.55	7	144	
Oct.	19.45	7	136	
Nov.	17.75	7	124	
Dec.	18.30	7	128	
Total			1,682	

Table 4-1-11-@ Situations of Supply and Demand of Areal Mechanical Power

Areal Total

(Unit: Hours)

Item		Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			165,456	153,966	59,094 153,966	63,063 164,307	170,052	168,903	178,095	166,605	25,056 165,456	23,664 156,264	142,476	147,072	170,877 1,932,618
Required machine operation hours	Section A	Soybean and wheat rotation			113	28					113				254
		Per managing unit (a)	135	68	113	221	250	66	135	68	194	228	246	201	1,925
		Per section (a) × 171 managing units	23,085	11,628	19,323 19,323	4,788 37,791	42,750	11,286	23,085	11,628	19,323 33,174	38,988	42,066	34,371	43,434 329,175
	Section B	Paddy rice			127	98									225
		Per managing unit (b)	-	-	127	98	-	-	-	195	286	351	227	-	1,284
		Per section (b) × 266 managing units	-	-	33,782 33,782	26,068 26,068	-	-	-	51,870	76,076	93,366	60,382	-	59,850 341,544
	Areal total (Section A + B)		23,085	11,628	53,105 53,105	30,856 63,859	42,750	11,286	23,085	63,498	19,323 109,250	132,354	102,448	34,371	103,284 670,719
Balance			142,371	142,338	5,989 100,861	32,207 100,448	127,302	157,617	155,010	103,107	5,733 56,206	23,664 23,910	40,028	112,701	67,593 1,261,889

Note: Total of Section A and B. For calculation method, see note Section A.

Table 4-1-11-ⓑ Situations of Supply and Demand of Areal Mechanical Power

Section (A) Soybean and Wheat

(Unit : Hours)

Item \ Month			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			50,112	46,632	23,316 46,632	24,882 49,764	51,504	51,156	53,940	50,460	25,056 50,112	23,664 47,328	43,152	44,544	96,918 585,336
Required machine operation hours	Section A	Soybean and wheat rotation													
		Per managing unit (a)	135	68	113 113	28 221	250	66	135	68	113 194	- 228	246	201	254 1,925
		Per section (a) × 171 managing units	23,085	11,628	19,323 19,323	4,788 37,791	42,750	11,286	23,085	11,628	19,323 33,174	- 38,988	42,066	34,371	43,434 329,175
	Section B	Paddy rice													
		Per managing unit (b)													
		Per section (b) × 266 managing units													
	Areal total (Section A + B)														
Balance			27,027	35,004	3,993 27,309	20,094 11,973	8,754	39,870	30,855	38,832	5,733 16,938	23,664 8,340	1,086	10,173	53,484 256,161

Notes: 1. Required machine operation hours are calculated by multiplying operation hours per managing unit with managing scale 150 ha soybean and wheat by number of managing units (171).

2. Machine operable hours are calculated by multiplying monthly operable hours in managing scale 150 ha by number of managing units (171).

Table 4-1-11-© Situations of Supply and Demand of Areal Mechanical Power

Section (B) Paddy Rice

(Unit: Hours)

Item \ Months			Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Machine operable hours			115,344	107,334	35,778 107,334	38,181 114,543	118,548	117,747	124,155	116,145	115,344	108,936	99,324	102,528	73,959 1,347,282
Required machine operation hours	Section A	Soybean and wheat roatation													
		Per managing unit (a)													
		Per section (a) × 171 managing units													
	Section B	Paddy rice			127	98									225
		Per managing unit (b)	-	-	127	98	-	-	-	95	286	351	227	-	1,264
		Per section (b) × 266 managing units	-	-	33,782 33,782	26,068 26,068	-	-	-	51,870	76,076	93,366	60,382	-	59,850 341,544
	Areal total (Section A + B)														
Balance			115,344	107,334	1,996 73,552	12,113 88,475	118,548	117,747	124,155	64,275	39,268	15,570	38,942	102,528	14,109 1,005,738

Note: Calculated on the base of paddy managing scale 150 ha.
Calculation method is same as Section A.

FARMING PROGRAM (3)

AGRICULTURAL MECHANIZATION PLAN

I. INVESTIGATION OF VARIOUS CONDITIONS IN FARMING THE FARM MECHANIZATION

In an attempt at investigating the large-size mechanization for the agricultural development of Yacyreta Area, we would like to make a study here as to whether the conditions in the present locality are suitable for using highly advanced machines, with a view to introducing them and employ them in the economical as well as efficient way. The agricultural development in Yacyreta Area involves a vast area, of which survey is still under progress, and there are many things unknown to us. However, from the viewpoint of large-size machinery introduction, we would like to discuss about the basic conditions based upon the data so far obtained upto the 2nd Year Survey.

1. Topographic and climatic conditions

1.1) *Topographic conditions*

According to The First Year Survey report (5-1-4) of Master Plan study on the Irrigation and Drainage Project in the Adjacent area to the Yacyreta Dam (pub. by Japan International Cooperation Agency, March 1983) and the results of The 2nd Year Survey, the geographical features of this area of development are as follows:

The peak of its topography stands at 180 m above the sea level, and undulating hill areas occupy at 150 ∿ 100 m above the sea level. Then, flat and low, swampy zones run at 80 ∿ 60 m above the sea level. Nearly 95% are in particular at 60 ∿ 80 m above the sea level. Its detailed topographical map has already appeared in The 2nd Year Survey. From the result of this survey, this survey area is found upto the line of 90 m above the sea level. The slope of this area of development is 1/3,000 ∿ 1/5,000. All these demonstrate the most fitting topographic conditions for a large-size mechanization.

1.2) Climatic conditions

Agricultural work is mainly done in the open air, therefore the propriety of work is extremely affected by the climatic conditions, and rainfall, and rainfall becomes an important factor for affecting it in particular. The climatic conditions of the area are reported in The 1st Year Survey report (5.4 'Climate and Hydrology', by Japan International Cooperation Agency, March 1983). According to it, Yacyreta survey area

has a heavy rainfall in Paraguay, of which annual average rainfall is about 160 mm and monthly average rainfall is about 130 mm, and the average number of rainy day is 8 days per month. Distribution of rainfall by month indicates that it is comparatively more in Summer and less in Winter, that the amount of rainfall is almost the same in each month throughout the year, and that there is no definite division of a dry season and a rainy season. All these indicate that the climatic conditions is comparatively favorable. Its average amount of rainfall in a year is nearly 1,600 mm, which is comparable to that of the South Kanto District in Japan ("Agricultural Land Engineering", pub. by Asakura Shoten, August 1975). Tohoku District at the coast of the Japan Sea where it rains comparatively heavily has 1,600 ∿ 1,800 mm of average amount of rainfall in a year. In comparison with it, the rainfall of Yacyreta survey area is less. Also we judge that average 8 days of rainy days per month won't be the factor for disturbing the work by introducing large-size agricultural machines there. However, going over the monthly average rainfall of 130 mm, it rains 152 mm during October-November that are the important months for harvesting wheat and planting paddy and soybean. This point should be carefully paid attention in framing the mechanization. We computed the number of days when machines are operatable in considering the climatic conditions mentioned above.

2. On-farm conditions

2.1) On-farm plot shape (common to paddy and upland field farming)

The study of land utilization plan of the 2nd Year Survey Group suggested a plan to have a plot of 500 m × 500 m, i.e. a plot of 25 ha. From the case of Brazil, a large-size machinery work in this size of plot is anticipated to be worked out in the economical and efficient way. The supply of fertilizer and agricultural chemicals are desired to be done from both sides of a plot in the work of weeding, control of disease and insect and management practices in paddy cultivation, which is however difficult to perform from the distance of 500 m. How to manage this point? Should we use an airplane or not? This is the point to be inquired in this mechanization work system of paddy culture.

2.2) On-farm gradient

As to the on-farm gradient, the topography of Yacyreta survey area is quite flat in feature of 1/3,000 ∿ 1/5,000 on the whole. It is therefore considered to be free from slopes that hinder the operation of work to be done by the introduction of large-size machines. But the present area of development is vast, and so some slopes might be existing partially, which are however expected to be adjustable while preparing the farm land. The geographical features of this area is thus considered to be fitting for a large-size mechanization work.

2.3) Soil conditions (bearing capacity of soil)

The matters of investigation of soil conditions for the adoption of large-size machines include the bearing capacity of soil, water permeability, soil texture and underground water.

Soil survey of these matters in this area were performed in the 1st year and the 2nd year surveys. Here we would like to grasp the degree of weakness of the ground and judge the degree of bearing capacity of soil with the object of finding the propriety for conducting machinery work in this area. For the standard of its judgement, we refer to the section of 'Agricultural Machines and Bearing Capacity of Soil' in the "Soil Section" published by the Yammer Agricultural Machines, Inc. We take more than 6.5 kg/cm^2 (more than 3.9 kg/cm^2 in Yamanaka style solidity meter conversion value) as the standard of judgement under bearing capacity of soil and resistance power of cone penetration wherein tractors (foil type and plow type) of the same standard value can perform their operation most easily.

In passing, the usual testing method of bearing capacity of soil and resistance value (kg/cm^2) takes the average of resistance values (kg/cm^2) in 0, 5, 10 and 15 cm when a cone with a vertical angle 30° and bottom size 2 cm^2 penetrates into the depth of 15 cm of soil. ("Agricultural Machinery Handbook"). However in the present method, the Yamanaka style solidity meter was employed to measure the solidity of soil at each depth by digging holes in the survey points. There is thus a difference in the method and tool of survey. Also the relations between the measurement value in interpenetration resistance (kg/cm^2) and measurement value (kg/cm^2) derived from the Yamanaka style solidity meter are computed by

the conversion formula of the physical measurement method of soil (Yoken-do). From the survey results of the bearing capacity of the soil in the area (refer to Table 4-1-12, Table of Measurement of Bearing Capacity of Soil), the conversion value of cone interpenetration resistance value (kg/cm^2) is 9.8 kg/cm^2 at the average depth of 0 ∿ 24 cm. Comparing this with the standard value of 6.5 kg/cm^2, it is 3.3 kg/cm^2 above it, from which we judge that the machine work will be easily performed. However as shown in Table 4-1-12, there are spots which are supposed to be considerably weak. These places belong to sandy soil, of which ground is expected to become stable after the improvement of drainage later. We expect that the weak ground will be generally improved and the bearing capacity of soil will be fortified so that the large-size machinery work can be performed fully efficiently.

The present soil survey was performed in 38 spots in 152,300 ha. It is therefore questionable to judge the conditions of entire area of development from this survey result alone and it is necessary to continue this survey in future and pursue the investigation of the conditions further.

Table 4-1-13 offers the reference materials extracted from the 'Agricultural Machines' and 'Bearing Power of Soil' from the "Soil Section" published by the Yammer Agricultural Machinery, Inc., which are used as the standards in our judgement.

There are other matters to be discussed such as permeability of soil, soil texture and underground water, but we curtail to take them up here for they have been already examined in the field relevant to soil.

2.4) Conditions of farm roads (roads for farming work)

Farm roads are studied in the Farmland Development Program, which regulates their scale to be 6.0 m in width, without gravel and 30 ∿ 40 cm above the paddy fields. Therefore there is no obstacle in transporting farming machinery, materials and crops, and in the sizes of machines. Also regarding driving into on-farm from a road, we can solve the matter by preparing a drive-in way on the on-farm by raising the level slightly, as it is the height of 30 ∿ 40 cm.

3. Other conditions

Besides the aforementioned conditions of topography, meteorology and on-farm, there are conditions of crop-cultivation, allied facilities, utilization (common utilization, organizational utilization) and others in relation to the introduction of farming machinery. But our plans have not yet developed concretely as to the studies of these conditions, which are expected to be handled in the following year.

Table 4-1-12 List of Measured Soil Bearing Capacity

Measure number	Measure depth (cm)	Hardness testing machine of Yamanaka's method: Index hardness (mm)	Hardness testing machine of Yamanaka's method: Hardness (kg/cm²)	Conversion value to cone penetration resistance (kg/cm²)
1	0 ∿ 13	26	16.7	27.8
2	0 ∿ 13	21	7.3	12.2
3	0 ∿ 17	23	10.0	16.7
4	0 ∿ 30	25	14.0	23.3
5	0 ∿ 12	25	14.0	23.3
6	0 ∿ 20	27	20.1	33.5
7	0 ∿ 40	9	1.2	2.0
8	0 ∿ 10	7	0.8	1.3
9	0 ∿ 19	22	8.5	14.2
10	0 ∿ 20	10	1.4	2.3
Sub-total	194	195		
11	0 ∿ 14	19	5.4	9.0
12	0 ∿ 30	19	5.4	9.0
13	6 ∿ 40	20	6.3	10.5
14	0 ∿ 20	19	5.4	9.0
15	0 ∿ 30	20	6.3	10.5
16	0 ∿ 25	15	3.0	5.0
17	0 ∿ 12	18	4.7	7.8
18	6 ∿ 12	16	3.5	5.8
19	0 ∿ 45	27	20.1	33.5
20	0 ∿ 30	21	7.3	12.2
Sub-total	258	194		
21	0 ∿ 25	19	5.4	9.0
22	0 ∿ 15	18	4.7	7.8
23	0 ∿ 25	20	6.3	10.5
24	0 ∿ 30	19	5.4	9.0
25	0 ∿ 35	26	16.7	27.8
26	0 ∿ 30	22	8.5	14.2
27	0 ∿ 28	26	16.7	27.8
28	0 ∿ 32	25	14.0	23.3
29	0 ∿ 23	23	10.0	16.7
30	0 ∿ 20	20	6.3	10.5
Sub-total	263	218		
31	-	-	-	-
32	0 ∿ 35	13	2.2	3.7
33	0 ∿ 20	7	0.8	1.3
34	0 ∿ 15	24	11.8	19.7
35	0 ∿ 34	20	6.3	10.5
36	9 ∿ 26	20	6.3	10.5
37	0 ∿ 28	19	5.4	9.0
38	-	-	-	-
39	0 ∿ 19	16	3.5	5.8
40	11 ∿ 22	18	4.7	7.8
Sub-total	199	137		
Total	914	744		
Average	24.05	19.58	5.9	9.8

*1. For soil surveying instruments, hardness testing machine of Yamanaka's method was used.

*2. Measured values (index hardness mm) by Yamanaka's method hardness testing machine are data taken by soil survey group in second survey.

*3. Relation between index hardness (mm) and hardness (kg/cm²) is described by conversion formula of soil physical measuring method (published by YOKENDO).

$$\text{Conversion formula } P = \frac{100x}{0.795 \times (40-x)^2}$$

P = Hardness (kg/cm²)

x = Index hardness (mm)

*4. Relation between measured value of cone penetration resistance (kg/cm²) and measured value by Yamanaka's method hardness testing machine (kg/cm²) is described by conversion formula of soil physical measuring method (published by YOKENDO).

Conversion formula $y = 0.6\ x$

y = Measured value by Yamanaka's method hardness testing machine (kg/cm²)

x = Measured value by cone penetration resistance (kg/cm²)

Table 4-1-13 Operable Range of Farming Machine and the Bearing Capacity

(Reference date)

Machine	Cone penetration resistance value (kg/cm^2)		Conversion value of Yamanaka's method hardness testing machine (kg/cm^2)	
	Operable	Easy operation	Operable	Easy operation
Self threshing combine (rawler type)	1.5<	3.0<	0.9<	1.8<
Ordinary combine	2.5<	3.0<	1.5<	1.8<
Tractor (Wheel type, tire, self propelled type)	2.5<	5.0<	1.5<	3.0<
Tractor (Wheel type, rotary tilling)	2.5<	5.0<	1.5<	3.0<
Tractor (Wheel type, plowing)	4.0<	6.5<	2.4<	3.9<
Tractor (Crawler type, rotary tilling)	1.5<	3.0<	0.9<	1.8<

*I. For criterion for judging above, Clause soil and machine works, Volume soil, publication of Yanma farming machine is referred.

*II. Measured value of cone penetration resistance (cone index) is average value between 0 and 15 cm below ground level by cone with 30° vertical angle and 2 cm^2 base area.
However, relation between measure value of cone penetration resistance (kg/cm^2) and Measured value by Yamanaka's method hardness testing machine is described by conversion formula of soil physical measuring method (published by YOKENDO).

Conversion formula $y = 0.6x$

y = Measured value by Yamanaka's method hardness testing machine (kg/cm^2)

x = Measured value by cone penetration resistance (kg/cm^2)

II. COMPUTATION OF THE NUMBER OF DAYS ON WHICH OUTDOOR WORK IS PERFORMABLE

There are slight differences in the farming machine operatable days depending on the types of work for cultivation by crop and by season. It is however chiefly affected by the climatic conditions and soil conditions, out of which rainfall gives the largest effect in particular. In computing the number of machine operatable days, we used the observation data of rainfall during the past 10 years from 1971 to 1980 which was collected by "The 1st Year Survey" (Meteorological Data of the Yacyreta Observatory, Meteorological Department, Ministry of National Defence, with a view to having more safety in the machine utilization plan against the weather during the working period. Based on this data, we counted the number of workable days per type of work in each month and year throughout 10 years (Tables 4-1-15 ∿ 4-1-16), and computed the average number of workable days during each working period.

Table 4-1-14 offers its results. The number of this workable days does not include the number of days for machine repairing and for regular preparation, of which the former can be performed on the rainy days or at night time, and the latter can be done during the period of off-season. As to the standards involving the computation of machine operatable days, we made an assumption and computed as below by referring to the "Agricultural Development Survey Outline" (by Hokkaido Development Bureau, 1983) and to the results of interviewing survey performed on the local farmers. In standardizing it, we assumed that machines are workable upto the daily rainfall of 1.0 mm ∿ 4.9 mm, half day holiday upto 5.0 mm ∿ 9.9 mm, one day holiday upto 10 mm ∿ 19.9 mm, two days holidays upto 20 mm ∿ 29.9 mm, 3 days holidays upto 30 mm ∿ 39.9 mm, and 4 days holidays more than 40 mm.

Table 4-1-14 Outdoor Operable Days and Operable Days Rate

	Unit	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Operable days	days	20.50	19.15	19.20	20.45	21.10	20.95	22.20	20.65	20.55	19.45	17.75	18.30
Operable days rate	%	66	68	62	68	68	63	72	67	69	63	59	59

* Average operable days for 10 years by 10 years observation data, Yacyreta observatory 1971 ∿ 1980.

Table 4-1-15 Calculation Table of Outdoor Operable Days

(10 years data)

Month / 10 days \ Year		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average (day)	Operation rate (%)
Jan.	First(10 days)	5.5	8	3.5	7	4.5	2.5	1.5	8	10	10	6.05	
	Second(10 days)	8.5	7	5.5	5.5	4	7	2	6	10	10	6.55	
	Third(10 days)	9.5	8.5	7.5	7	9.5	7	7.5	9.5	7	6	7.90	
	Total	23.5	23.5	16.5	19.5	18	16.5	11	23.5	27	26	20.50	66
Feb.	First(10 days)	10	5	9	5	8	8	8	5	8.5	4	7.05	
	Second(10 days)	3.5	9	8.5	7.5	8	3	8	8.5	1	6	6.30	
	Third(10 days)	6	9	5	4	2.5	8.5	6.5	6.5	5	5	5.80	
	Total	19.5	23	22.5	16.5	18.5	19.5	22.5	20	14.5	15	19.15	68
Mar.	First(10 days)	2	7	0	5.5	4.5	2	10	7	5	6	4.90	
	Second(10 days)	1	4	6	8	2	5.5	10	8.5	10	7	6.20	
	Third(10 days)	10	7	10	6	5	8	8	9	11	7	8.10	
	Total	13	18	16	19.5	11.5	15.5	28	24.5	26	20	19.20	62
Apr.	First(10 days)	10	7.5	4	10	4	6.5	10	10	6	6.5	7.45	
	Second(10 days)	4	5	4	7	6.5	8	6	8	6	6	6.05	
	Third(10 days)	7	10	3	4	3	10	8	7.5	8	9	6.95	
	Total	21	22.5	11	21	13.5	24.5	24	25.5	20	21.5	20.45	68
May	First(10 days)	5	6	2	10	8.5	8.5	3	10	6.5	2	6.15	
	Second(10 days)	6	8.5	10	6	6	10	5	6	5	2	6.45	
	Third(10 days)	11	9	7	6	9.5	6	7	11	9	9.5	8.50	
	Total	22	23.5	19	22	24	24.5	15	27	20.5	13.5	21.10	68
Jun.	First(10 days)	7	1	2	7	7	5	10	10	6.5	6	6.15	
	Second(10 days)	10	2	10	9	10	10	7	6	10	3	7.70	
	Third(10 days)	2	7	9	5.5	5	8	7.5	8	9	10	7.10	
	Total	19	10	21	21.5	22	23	24.5	24	25.5	19	20.95	63
Jul.	First(10 days)	8	6	5	10	8.5	8.5	5.5	10	0	8	6.95	
	Second(10 days)	7	8.5	3	5.5	5	10	8	2	8	10	6.70	
	Third(10 days)	5.5	6	10	11	11	8	7	7	9	11	8.55	
	Total	20.5	20.5	18	26.5	24.5	26.5	20.5	19	17	29	22.20	72
Aug	First(10 days)	10	8.5	7.5	7	7	6	9.5	7.5	6	5	7.40	
	Second(10 days)	6	2.5	4	10	5	10	8	9	0	6	6.05	
	Third(10 days)	9.5	4.5	5	5	4	9.5	8.5	11	6	9	7.20	
	Total	25.5	15.5	16.5	22	16	25.5	26	27.5	12	20	20.65	67
Sep	First(10 days)	10	10	7	10	8.5	6	10	10	8	7	8.65	
	Second(10 days)	8	5	0	7	6.5	10	4	5	6	5	5.65	
	Third(10 days)	8	2	8	8	2	8	8	6.5	7	5	6.25	
	Total	26	17	15	25	17	24	22	21.5	21	17	20.55	69
Oct.	First(10 days)	6.5	10	2	8.5	7	5	6	6	7.5	7.5	6.60	
	Second(10 days)	9.0	4	10	10	10	4	9	7	7	8.5	7.85	
	Third(10 days)	8.5	2	6.5	5	4	9	8	3	2	2	5.00	
	Total	24	16	18.5	23.5	21	18	23	16	16.5	18	19.45	63

(Cont'd)

Month, 10 days \ Year		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average (day)	Operation rate (%)
Nov.	First(10 days)	8	8	6.5	8	7	3	4.5	4	6	4	5.90	
	Second(10 days)	10	7	8	6	5	10	6	7	5	4	6.80	
	Third(10 days)	8	3	7	4	2.5	7.5	2	4	6.5	6	5.05	
	Total	26	18	21.5	18	14.5	20.5	12.5	15	17.5	14	17.75	59
Dec.	First(10 days)	2	3	7	8	8	6	2	7	0	5	4.80	
	Second(10 days)	7.5	9	5	4.5	7	6	10	4	4	6.5	6.35	
	Third(10 days)	10	5	5.5	5	9.5	8.5	9	4	8	7	7.15	
	Total	19.5	17	17.5	17.5	24.5	20.5	21	15	12	18.5	18.30	59
Total		259.5	224.5	213.0	252.5	225.0	258.5	250.0	258.5	229.5	231.5		
Average		21.62	18.71	17.75	21.04	18.75	21.54	20.83	21.54	19.13	19.29	20.02	

Table 4-1-16-ⓐ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1971)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1	6.6	1.0			10.3	1.0			60.8	1.0											1.0	-		1.0		
	2		0.5			40.3	1.0			0.2	1.0												-	9.2	1.0		
	3					3.9	1.0				1.0									15.5	1.0	14.9	1.0	12.8	1.0		
	4	7.2	1.0				1.0				1.0	9.7	1.0					4.0	-		1.0		1.0		1.0		
	5		0.5				1.0				1.0	1.1	0.5						-								
	6						1.0					2.2	-							5.6	1.0						
	7					0.3	-					9.7	1.0								0.5			48.7	1.0		
	8	9.2	1.0				-						0.5			1.0	-								1.0		
	9		0.5	4.0	-	40.4	1.0							95.7	1.0		-					1.3	-		1.0		
	10				-		1.0							4.6	1.0			2.8	-	6.0			-		1.0		
Subtotal		23.0	4.5	4.0	-	95.2	8.0	-	-	61.0	5.0	22.7	3.0	100.3	2.0	1.0	-	6.8	-	27.1	3.5	17.2	2.0	70.7	8.0	429.0	36.0
Second 10 days	11						1.0								1.0			15.5	1.0			2.0			1.0		
	12	6.0	1.0	5.0	1.0	2.4	1.0								1.0	38.6	1.0		1.0								
	13		0.5	2.0	0.5	72.2	1.0								1.0	2.5	1.0							3.0	-		
	14			189.5	1.0	43.5	1.0	2.7	-	30.5	1.0						1.0								-		
	15				1.0	2.2	1.0	46.7	1.0		1.0						1.0										
	16				1.0		1.0		1.0		1.0																
	17				1.0		1.0		1.0		1.0										.						
	18	1.0			1.0		1.0		1.0													4.3	-				
	19					1.8	-		1.0														-				
	20					11.4	1.0	10.7	1.0			0.6	-							13.0	1.0						
Subtotal		7.0	1.5	196.5	6.5	133.5	9.0	60.1	6.0	30.5	4.0	0.6	-	-	3.0	41.1	4.0	15.5	2.0	13.0	1.0	6.3	-	8.5	2.5	512.6	39.5
Third 10 days	21	2.4	-				1.0		1.0			64.3	1.0								1.0			1.8	-		
	22		-									2.0	1.0			9.9	1.0	14.6	1.0						-		
	23			10.2	1.0					3.8	-		1.0				0.5		1.0	9.0	1.0						
	24				1.0					1.3	-		1.0								0.5						
	25			.								0.4	1.0	32.0	1.0												
	26											11.0	1.0		1.0												
	27			0.6	-			0.9	-			10.5	1.0		1.0												
	28				-				-				1.0	15.2	1.0												
	29							29.2	1.0					7.2	1.0							7.2	1.0				
	30	9.0	1.0					7.5	1.0			1.8	-		0.5							12.1	1.0	1.4	-		
	31		0.5								-													16.5	1.0		
Subtotal		11.4	1.5	10.8	2.0	-	1.0	37.6	3.0	5.1	-	90.0	8.0	54.4	5.5	9.9	1.5	14.6	2.0	9.0	2.5	19.3	2.0	19.7	1.0	281.8	30.0
Total	①	41.4		211.3		228.7		97.7		96.6		113.3		154.7		52.0		36.9		49.1		42.8		98.9		1,223.4 (mm)	
	②	7.5		8.5		18.0		9.0		9.0		11.0		10.5		5.5		4.0		7.0		4.0		11.5			105.5 (days)
	③	7		6		11		6		5		11		5		4		4		5		7		8			79 (days)
	④	24		22		20		24		26		19		26		27		26		26		23		23			286 (days)
	⑤	23.5		19.5		13.0		21.0		22.0		19.0		20.5		25.5		26.0		24.0		26.0		19.5			259.5 (days)

Note: 1 Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39 9mm 3 days off and over 40mm 4 days off.
2 ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓑ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1972)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1	2.0	-	17.0	1.0			9.5	1.0			2.7								0.8	-	3.5	-	26.4	1.0		
	2	2.0	-		1.0			8.4	1.0			17.0	1.0			4.6	-							6.3	1.0		
	3								0.5			31.1	1.0			9.2	1.0							84.3	1.0		
	4	3.6	-									95.5	1.0				0.5							15.4	1.0		
	5	17.0	1.0									59.0	1.0												1.0		
	6		1.0							30.3	1.0		1.0	32.7	1.0										1.0		
	7										1.0		1.0		1.0							17.1	1.0		1.0		
	8			7.7	1.0	47.7	1.0				1.0	120.8	1.0		1.0							0.6	1.0	1.7	-		
	9			17.9	1.0	0.2	1.0			1.6	1.0	75.9	1.0		1.0												
	10			18.7	1.0		1.0			0.6	-	5.4	1.0									0.3	-				
Subtotal		24.6	2.0	61.3	5.0	47.9	3.0	17.9	2.5	32.5	4.0	407.4	9.0	32.7	4.0	13.8	1.5	-	-	0.8	-	21.5	2.0	134.1	7.0	794.5	40.0
Second 10 days	11			-	1.0	-	1.0			0.9	-	1.9	1.0			26.8	1.0										
	12					0.3	1.0					0.3	1.0				1.0					17.5	1.0				
	13	3.4	-					24.2	1.0				1.0				1.0			62.6	1.0	17.3	1.0				
	14							38.2	1.0					6.5	1.0					0.1	1.0	1.6	1.0				
	15	0.5	-			24.5	1.0		1.0			41.1	1.0		0.5						1.0						
	16	0.2	-				1.0		1.0			21.7	1.0			19.2	1.0	21.7	1.0		1.0						
	17	1.7	-	2.5	-	15.5	1.0		1.0	8.0	1.0	23.2	1.0	3.4	-	16.6	1.0		1.0		1.0	1.1	-				
	18	10.8	1.0				1.0			3.9	0.5		1.0	2.5	-	4.0	1.0	0.4	1.0								
	19	25.0	1.0										1.0			6.0	1.0	52.9	1.0	4.9	-						
	20	6.0	1.0													1.0	0.5	1.9	1.0	91.3	1.0			38.7	1.0		
Subtotal		47.6	3.0	2.5	1.0	40.3	6.0	62.4	5.0	12.8	1.5	88.2	8.0	12.4	1.5	73.6	7.5	76.9	5.0	158.9	6.0	27.5	3.0	38.7	1.0	641.8	48.5
Third 10 days	21	-	1.0							14.6	1.0			21.2	1.0	8.4	1.0		1.0						1.0		
	22									0.3	1.0				1.0		0.5		1.0	34.7	1.0				1.0		
	23														1.0				1.0		1.0	1.1	-		1.0		
	24															44.5	1.0				1.0	53.9	1.0				
	25					33.0	1.0	3.5	-					16.6	1.0	20.9	1.0	42.8	1.0		1.0		1.0				
	26						1.0	1.1	-			0.7	-		1.0		1.0	33.7	1.0	0.3	-		1.0				
	27						1.0					6.5	1.0			6.4	1.0	1.0	1.0	10.7	1.0		1.0				
	28	7.8	1.0				1.0			3.6	-	14.9	1.0			1.6	1.0		1.0	5.6	1.0	18.8	1.0	23.0	1.0		
	29		0.5							1.3	-	0.1	1.0			0.3			1.0	0.5	-	23.6	1.0	0.4	1.0		
	30																			19.9	1.0	24.4	1.0		1.0		
	31																				1.0						
Subtotal		7.8	2.5	-	-	33.0	4.0	4.6	-	19.8	2.0	22.2	3.0	37.8	5.0	82.1	6.5	77.5	8.0	88.0	9.0	121.8	7.0	23.4	6.0	518.0	53.0
Total	①	80.0		63.8		121.2		24.9		65.1		517.8		82.9		169.5		154.4		247.7		170.8		196.2		1,954.3	(mm)
	②	7.5		6.0		130		7.5		7.5		20.0		10.5		15.5		13.0		15.0		12.0		14.0		141.5	(days)
	③	12		5		6		6		10		17		6		14		7		12		13		8		116	(days)
	④	19		24		25		24		21		13		25		17		23		19		17		23		250	(days)
	⑤	23.5		23.0		18.0		22.5		23.5		10.0		20.5		15.5		17.0		16.0		18.0		17.0		224.5	(days)

Notes. 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓒ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1973)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1	3.0	-			25.2	1.0			156.2	1.0	-	1.0	-	1.0	-	1.0			-	1.0	12.8	1.0				
	2		-				1.0			0.3	1.0	16.3	1.0		1.0								1.0				
	3	5.5	1.0	3.5	-	45.5	1.0				1.0	3.4	1.0		1.0												
	4		0.5			2.6	1.0	48.6	1.0	4.3	1.0									43.1	1.0						
	5	0.2					1.0	1.6	1.0	8.8	1.0	13.7	1.0	17.6	1.0					37.1	1.0						
	6	6.5	1.0				1.0	39.0	1.0	22.8	1.0	20.7	1.0		1.0					7.7	1.0			19.0	1.0		
	7	76.6	1.0			57.5	1.0	18.8	1.0		1.0		1.0								1.0	1.6	-	17.9	1.0		
	8	5.4	1.0				1.0		1.0		1.0	11.4	1.0			0.8	-	16.6	1.0		1.0	5.6	1.0		1.0		
	9	1.2	1.0				1.0		1.0				1.0			6.6	1.0		1.0	16.5	1.0		0.5				
	10	3.4	1.0	29.5	1.0		1.0									0.9	0.5	8.8	1.0		1.0						
Subtotal		101.8	6.5	33.0	1.0	130.8	10.0	108.0	6.0	192.4	8.0	65.5	8.0	17.6	5.0	8.3	2.5	25.4	3.0	98.4	8.0	20.0	3.5	36.9	3.0	838.1	64.5
Second 10 days	11		1.0	6.1	1.0											6.8	1.0	67.7	1.0	0.5	-						
	12				0.5							3.4	-			11.4	1.0	43.5	1.0								
	13	5.5	1.0	0.4	-									71.0	1.0		1.0		1.0					2.8	-		
	14	0.7	0.5											30.1	1.0			7.6	1.0					78.0	1.0		
	15	0.1	-					65.5	1.0					20.1	1.0				1.0						1.0		
	16								1.0					3.9	1.0			27.7	1.0			1.2	-		1.0		
	17					124.6	1.0	50.5	1.0					1.6	1.0			24.9	1.0			15.4	1.0		1.0		
	18	0.8				13.5	1.0		1.0	2.9	-				-	15.1	1.0	20.9	1.0				1.0		1.0		
	19	20.5	1.0	2.1	-		1.0		1.0					11.4	1.0	3.3	1.0		1.0								
	20	21.4	1.0				1.0		1.0					5.5	1.0	19.4	1.0		1.0								
Subtotal		49.0	4.5	8.6	1.5	138.1	4.0	116.0	6.0	2.9	-	3.4	-	143.6	7.0	56.0	6.0	192.3	10.0	0.5	-	16.6	2.0	80.8	5.0	807.8	46.0
Third 10 days	21	0.2	1.0	2.2	-	-	1.0	-	1.0					0.4	-	13.9	1.0										
	22		1.0											0.5			1.0			18.5	1.0	21.9	1.0	2.5	-		
	23													0.3							1.0		1.0				
	24	1.0		14.7	1.0											36.4	1.0						1.0				
	25			0.3	1.0			25.3	1.0			1.4	-	1.4		2.1	1.0	1.2	-					31.6	1.0		
	26	1.3							1.0					0.3			1.0								1.0		
	27	8.4	1.0						1.0					0.3			1.0	2.2	-					13.6	1.0		
	28	4.1	0.5	23.8	1.0			10.9	1.0	72.0	1.0													21.7	1.0		
	29							21.9	1.0	21.0	1.0							23.2	1.0	7.0	1.0			8.8	1.0		
	30							3.0	1.0	2.0	1.0	38.4	1.0						1.0		0.5				0.5		
	31										1.0			13.2	1.0					9.4	1.0						
Subtotal		15.0	3.5	41.0	3.0	-	1.0	61.1	7.0	95.0	4.0	39.8	1.0	16.4	1.0	54.4	6.0	26.6	2.0	34.9	4.5	21.9	3.0	78.2	5.5	484.3	41.5
Total	①	165.8		82.6		268.9		285.1		290.3		108.7		177.6		118.7		244.3		133.8		58.5		195.9		(mm) 2,130.2	
	②	14.5		5.5		15.0		19.0		12.0		9.0		13.0		14.5		15.0		12.5		8.5		13.5		(days) 152.0	
	③	19		9		6		10		9		8		15		11		11		8		6		9		(days) 121	
	④	12		19		25		20		22		22		16		20		19		23		24		22		(days) 244	
	⑤	16.5		22.5		16.0		11.0		19.0		21.0		18.0		16.5		15.0		18.5		21.5		17.5		(days) 213.0	

Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓓ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1974)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1																							12.0	1.0		
	2					24.0	1.0																		1.0		
	3			1.8	-	0.8	1.0									20.2	1.0			6.2	1.0						
	4			22.2	1.0		1.0									13.0	1.0				0.5	13.2	1.0				
	5				1.0												1.0					0.6	1.0				
	6				1.0	5.0	1.0					4.6	-														
	7			0.8			0.5					2.0	-														
	8	16.2	1.0			2.6						92.0	1.0														
	9	67.8	1.0	17.0	1.0							0.4	1.0														
	10	30.8	1.0	1.3	1.0	1.2							1.0														
Subtotal		114.8	3.0	43.5	5.0	33.6	4.5	-	-	-	-	99.0	3.0	-	-	33.2	3.0	-	-	6.2	1.5	13.8	2.0	12.0	2.0	356.1	24.0
Second 10 days	11	-	1.0							6.5	1.0											11.4	1.0	38.0	1.0		
	12		1.0							2.2	0.5												1.0	2.0	1.0		
	13		1.0	1.7	-																				1.0		
	14	8.5	1.0									0.8	-												1.0		
	15		0.5	6.6	1.0	12.4	1.0					3.4	-	6.0	1.0					3.8	-			1.2	-		
	16			1.0	0.5		1.0			5.6	1.0	1.4	-	1.0	0.5			1.0	-	0.4	-			6.4	1.0		
	17									8.8	1.0			23.2	1.0			28.0	1.0						0.5		
	18							39.0	1.0		0.5			7.0	1.0				1.0								
	19								1.0			4.6	-		1.0				1.0			12.0	1.0				
	20			72.5	1.0	12.4	2.0	17.2	1.0			39.0	1.0									30.0	1.0	2.2			
Subtotal		8.5	4.5	81.8	2.5			56.2	3.0	23.1	4.0	49.2	1.0	37.2	4.5	-	-	29.0	3.0	4.2	-	53.4	4.0	49.8	5.5	404.8	34.0
Third 10 days	21			-	1.0				1.0				1.0										1.0	65.6	1.0		
	22	14.6	1.0		1.0	1.2	-	53.2	1.0				1.0							7.6	1.0		1.0				
	23		1.0		1.0				1.0	40.2	1.0	0.8	1.0							47.6	1.0		1.0				
	24	10.0	1.0		1.0	29.0	1.0	9.2	1.0	9.0	1.0	5.4	1.0			32.6	1.0	4.4	-		1.0						
	25	1.9	1.0				1.0		1.0	27.4	1.0		0.5			2.0	1.0	11.4	1.0		1.0	28.0	1.0				
	26						1.0		1.0	3.6	1.0					10.2	1.0		1.0		1.0	1.4	1.0				
	27										1.0						1.0				1.0	1.6	1.0	77.5	1.0		
	28																			2.4	-				1.0		
	29																								1.0		
	30					16.5	1.0									14.2	1.0					2.6	-		1.0		
	31					7.0	1.0										1.0								1.0		
Subtotal		26.5	4.0	-	4.0	53.7	5.0	62.4	6.0	80.2	5.0	6.2	4.5	-	-	59.0	6.0	15.8	2.0	57.6	6.0	33.6	6.0	143.1	6.0	538.1	54.5
Total	①	149.8		125.3		99.7		118.6		103.3		154.4		37.2		92.2		44.8		68.0		100.8		204.9		1,299.0	(mm)
	②	11.5		11.5		11.5		9.0		9.0		8.5		4.5		9.0		5.0		7.5		12.0		13.5		112.5	(days)
	③	7		9		10		4		8		11		4		6		4		6		9		8		86	(days)
	④	24		19		21		26		23		19		27		25		26		25		21		23		279	(days)
	⑤	19.5		16.5		19.5		21.0		22		21.5		26.5		22.0		25.0		23.5		18.0		17.5		252.5	(days)

Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓔ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1975)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1			13.4	1.0			13.0	1.0	6.4	1.0	0.4	-							23.4	1.0						
	2				1.0				1.0		0.5										1.0						
	3					9.5	1.0														1.0						
	4						0.5							8.0	1.0												
	5	5.0	1.0			37.0	1.0					23.1	1.0		0.5							21.0	1.0	0.6	-		
	6		0.5				1.0						1.0					2.0	-				1.0	0.6	-		
	7	5.3	1.0			5.0	1.0	82.0	1.0				1.0							2.2	-		1.0	3.2	-		
	8	33.0	1.0				1.0		1.0							15.0	1.0	2.6	-			1.8	-				
	9	19.0	1.0						1.0							31.2	1.0	8.6	1.0					40.2	1.0		
	10		1.0						1.0							4.4	1.0		0.5						1.0		
Subtotal		62.3	5.5	13.4	2.0	51.5	5.5	95.0	6.0	6.4	1.5	23.4	3.0	8.0	1.5	50.6	3.0	13.2	1.5	25.6	3.0	22.8	3.0	44.6	2.0	416.8	37.5
Second 10 days	11	-	1.0			43.7	1.0		1.0			2.0	-	46.4	1.0		1.0	0.6	-						1.0		
	12						1.0			11.0	1.0			0.8	1.0	31.0	1.0	5.0	1.0						1.0		
	13						1.0	3.0	-	27.0	1.0				1.0	1.0	1.0	0.4	0.5						1.0		
	14					6.7	1.0	1.0	-	0.2	1.0				1.0	0.6	1.0										
	15						1.0				1.0				1.0		1.0	2.4	-								
	16	42.0	1.0															3.2	-	3.4	-	40.4	1.0				
	17		1.0																			1.2	1.0				
	18		1.0			26.2	1.0	8.0	1.0														1.0				
	19		1.0	38.3	1.0		1.0		0.5									40.2	1.0				1.0	4.6	-		
	20		1.0	2.4	1.0		1.0	32.8	1.0			0.6	-					10.8	1.0			10.0	1.0				
Subtotal		42.0	6.0	40.7	2.0	76.6	8.0	44.8	3.5	38.2	4.0	2.6	-	47.2	5.0	32.6	5.0	62.6	3.5	3.4	-	51.6	5.0	4.6	3.0	446.9	42.0
Third 10 days	21			-	1.0			88.0	1.0			64.4	1.0					35.0	1.0			-	1.0				
	22				1.0	12.6	1.0	1.0	1.0				1.0			14.2	1.0		1.0								
	23			28.0	1.0	0.7	1.0		1.0				1.0				1.0		1.0			48.4	1.0				
	24				1.0				1.0				1.0			21.0	1.0		1.0				1.0				
	25			5.6	1.0				1.0				1.0				1.0			39.0	1.0		1.0				
	26				0.5												1.0	14.6	1.0	135.0	1.0		1.0	7.8	1.0		
	27	5.5	1.0																1.0	23.4	1.0		1.0	4.6	0.5		
	28		0.5			47.5	1.0	3.6	-							16.2	1.0			30.8	1.0	7.4	1.0				
	29						1.0	12.6	1.0	9.6	1.0	2.6	-				1.0	13.6	1.0		1.0		0.5				
	30						1.0		1.0		0.5								1.0		1.0						
	31						1.0														1.0						
Subtotal		5.5	1.5	33.6	5.5	60.8	6.0	105.2	7.0	9.6	1.5	67.0	5.0	-	-	51.4	7.0	63.2	8.0	228.2	7.0	55.8	7.5	12.4	1.5	692.7	57.5
Total	①	109.8		87.7		186.9		245.0		54.2		93.0		55.2		134.6		139.0		257.2		130.2		61.6		1,556.4 (mm)	
	②	13.0		9.5		19.5		16.5		7.0		8.0		6.5		15.0		13.0		10.0		15.5		6.5		140.0 (days)	
	③	6		5		9		10		5		6		3		9		13		7		7		7		87 (days)	
	④	25		23		22		20		26		24		28		22		17		24		23		24		276 (days)	
	⑤	18.0		18.5		11.5		13.5		24		22.0		24.5		16.0		17		21		14.5		24.5		225.0 (days)	

Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓕ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1976)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1					24.0	1.0															-	1.0	-	1.0		
	2	5.3	1.0				1.0	5.8	1.0							6.8	1.0	38.2	1.0			17.0	1.0				
	3		0.5	1.0	-	1.8	1.0		0.5			0.8				13.6	1.0	1.6	1.0			26.4	1.0	0.9	-		
	4			16.2	1.0	41.4	1.0	15.4	1.0			88.0	1.0			10.6	1.0		1.0	46.0	1.0	33.2	1.0	5.6	1.0		
	5	74.0	1.0		1.0	3.6	1.0		1.0				1.0				1.0		1.0		1.0		1.0	2.4	0.5		
	6		1.0			10.2	1.0						1.0								1.0		1.0				
	7	5.6	1.0				1.0			5.8	1.0		1.0	6.6	1.0						1.0		1.0	6.6	1.0		
	8	10.1	1.0				1.0	2.2	-		0.5		1.0		0.5	1.8	-				1.0				0.5		
	9	9.8	1.0					2.6	-																		
	10	21.6	1.0																								
Subtotal		126.4	7.5	17.2	2.0	81.0	8.0	26.0	3.5	5.8	1.5	88.8	5.0	6.6	1.5	32.8	4.0	39.8	4.0	46.0	5.0	76.6	7.0	15.5	4.0	562.5	53.0
Second 10 days	11	12.7	1.0	1.0	-																						
	12		1.0			1.4	-							2.6	-												
	13													1.6	-												
	14			6.4	1.0															4.2	-						
	15	0.8	-	76.2	1.0															14.4	1.0			34.4	1.0		
	16				1.0	8.8	1.0													76.4	1.0				1.0		
	17				1.0		0.5													15.8	1.0	4.6	-		1.0		
	18				1.0	12.4	1.0	1.6												0.6	1.0	1.2	-		1.0		
	19	3.8	-		1.0	42.0	1.0	16.6	1.0												1.0						
	20	6.8	1.0	6.0	1.0	4.4	1.0		1.0												1.0						
Subtotal		24.1	3.0	89.6	7.0	69.0	4.5	18.2	2.0	-	-	-	-	4.2	-	-	-	-	-	111.4	6.0	5.8	-	34.4	4.0	356.7	26.5
Third 10 days	21			-	0.5	-	1.0																				
	22						1.0																	1.8	-		
	23						1.0																				
	24																			2.2	-	7.8	1.0				
	25	24.9	1.0									3.0	-										0.5				
	26		1.0							48.4	1.0	11.0	1.0														
	27		1.0							14.6	1.0		1.0	25.4	1.0	5.4	1.0							5.4	1.0		
	28										1.0						0.5								0.5		
	29										1.0							15.8	1.0								
	30	3.6									1.0							2.2	1.0	77.2	1.0	14.4	1.0				
	31	10.8	1.0																		1.0			17.5	1.0		
Subtotal		39.3	4.0	-	0.5	-	3.0	-	-	63.0	5.0	14.0	2.0	25.4	3.0	5.4	1.5	18.0	2.0	79.4	2.0	22.2	2.5	24.7	2.5	291.4	28.0
Total	①	189.8		106.8		150.0		44.2		68.8		102.8		36.2		38.2		57.8		236.8		104.6		74.6		1,210.6 (mm)	
	②	14.5		9.5		15.5		5.5		6.5		7.0		4.5		5.5		6.0		13.0		9.5		10.5		107.5 (days)	
	③	13		6		10		6		3		4		4		5		4		8		7		8		76 (days)	
	④	18		23		21		24		28		26		27		26		26		23		23		23		288 (days)	
	⑤	16.5		19.5		15.5		24.5		24.5		23.0		26.5		25.5		24		18		20.5		20.5		258.5 (days)	

Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓖ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1977)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1	23.6	1.0							12.4	1.0					1.2	0.5					4.4	1.0	23.0	1.0		
	2	23.2	1.0								1.0											9.4	1.0	6.4	1.0		
	3	94.6	1.0																	16.6	1.0	1.2	0.5		1.0		
	4		1.0			2.2	-														1.0						
	5		1.0			1.8	-			55.2	1.0													1.8	-		
	6		1.0	2.8	-					25.8	1.0			5.0	1.0									80.2	1.0		
	7		1.0					0.8	-	10.0	1.0			2.4	0.5										1.0		
	8	1.7	-	11.0	1.0					1.0	1.0			37.4	1.0					3.4	-	60.2	1.0		1.0		
	9	6.2	1.0		1.0					1.4	1.0			1.0	1.0					6.8	1.0	10.2	1.0	3.8	1.0		
	10	4.8	0.5												1.0					16.4	1.0	3.4	1.0		1.0		
Subtotal		154.1	9.5	13.8	2.0	4.0	-	0.8	-	105.8	7.0	-	-	45.8	4.5	1.2	0.5	-	-	43.2	4.0	88.8	5.5	115.2	8.0	572.9	40.0
Second 10 days	11	1.0													1.0	1.8	-				1.0		1.0		1.0		
	12															10.2	1.0			4.4	-		1.0			14.6	
	13	6.5	1.0			4.8	-							4.6	-	0.4	1.0										
	14	13.2	1.0							7.6	1.0																
	15		1.0							33.2	1.0			3.6	-	0.4	-	11.4	1.0								
	16	60.3	1.0								1.0					0.4	-	56.4	1.0								
	17	4.2	1.0					83.4	1.0		1.0								1.0		.						
	18		1.0	17.0	1.0	1.6	-		1.0		1.0	7.0	1.0						1.0								
	19		1.0		1.0	1.0	-		1.0			15.6	1.0	1.2	-				1.0			21.4	1.0				
	20		1.0					1.0				17.4	1.0	6.0	1.0				1.0				1.0	2.6	-		
Subtotal		85.5	8.0	17.0	2.0	7.4		83.4	4.0	40.8	5.0	40.0	3.0	15.4	2.0	13.2	2.0	67.8	6.0	4.4	1.0	21.4	4.0	2.6	-	398.6	37.0
Third 10 days	21	14.2	1.0						1.0				1.0		0.5							32.8	1.0				
	22		1.0													17.0	1.0	1.0	-			6.4	1.0				
	23	1.6	-									1.6	-	5.8	1.0	6.4	1.0						1.0				
	24					6.4	1.0								0.5		0.5			19.0	1.0		1.0				
	25			9.6	1.0		0.5			30.4	1.0										1.0						
	26			2.2	0.5						1.0											39.6	1.0				
	27					1.6	-				1.0	4.4	-	2.6	-							2.6	1.0				
	28			1.6	-	7.4	1.0				1.0	5.4	1.0					11.4	1.0				1.0				
	29	7.4	1.0				0.5						0.5						1.0				1.0				
	30		0.5					10.0	1.0					8.6	1.0									28.0	1.0		
	31													5.4	1.0					15.0	1.0				1.0		
Subtotal		23.2	3.5	13.4	1.5	15.4	3.0	10.0	2.0	30.4	4.0	11.4	2.5	22.4	4.0	23.4	2.5	12.5	2.0	34.0	3.0	81.4	8.0	28.0	2.0	305.4	380
Total	①	262.5		44.2		26.8		94.2		177.0		51.4		83.6		37.8		80.2		81.6		191.6		145.8		1,276.7	(mm)
	②	20.0		5.5		3.0		6.0		16.0		5.5		10.5		5.0		8.0		8.0		17.5		10.0		115.0	(days)
	③	14		6		10		3		9		6		12		7		4		7		11		7		96	(days)
	④	17		22		21		27		22		24		19		24		26		24		19		24		269	(days)
	⑤	11.0		22.5		28.0		24.0		15.0		24.5		20.5		26.0		22.0		23.0		12.5		21.0		250.0	(days)

Notes 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓗ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1978)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1			0.8	-	26.2	1.0							0.6	-							-	1.0				
	2			88.4	1.0		1.0							1.6								-	1.0				
	3			15.4	1.0		1.0															30.4	1.0				
	4				1.0													1.0	-	17.4	1.0		1.0	29.5	1.0		
	5				1.0															1.0	1.0		1.0		1.0		
	6				1.0																		1.0		1.0		
	7																	3.0	-								
	8	14.2	1.0													9.4	1.0			2.0	-						
	9		1.0	0.6													0.5			42.2	1.0						
	10															19.2	1.0				1.0						
Subtotal		14.2	2.0	105.2	5.0	26.2	3.0	-	-	-	-	-	-	2.2	-	28.6	2.5	4.0	-	62.6	4.0	30.4	6.0	29.5	3.0	302.9	25.5
Second 10 days	11					8.0	1.0					1.0	-	12.2	1.0	-	1.0			-	1.0						
	12						0.5					2.6	-		1.0					1.0	1.0			71.4	1.0		
	13	23.8	1.0											7.0	1.0			15.4	1.0	1.2	1.0			43.2	1.0		
	14		1.0							36.2	1.0			12.4	1.0			2.6	1.0						1.0		
	15		1.0	7.5	1.0					10.6	1.0	5.0	1.0		1.0										1.0		
	16				0.5						1.0	24.0	1.0	20.0	1.0							1.2	-		1.0		
	17										1.0		1.0	9.0	1.0										1.0		
	18							19.0	1.0			0.8	1.0		1.0			7.0	1.0			29.2	1.0				
	19			4.8	-	1.4	-		1.0			4.4	-					37.0	1.0			61.2	1.0				
	20	19.8	1.0																1.0			34.0	1.0				
Subtotal		43.6	4.0	12.3	1.5	9.4	1.5	19.0	2.0	46.8	4.0	37.8	4.0	60.6	8.0	-	1.0	62.0	5.0	2.2	3.0	125.6	3.0	14.6	6.0	533.9	43.0
Third 10 days	21																	-	1.0			0.4	1.0				
	22																	-	1.0				1.0				
	23													1.4	-								1.0				
	24	3.2	-																	9.8	1.0			53.2	1.0		
	25	6.8	1.0																	6.2	1.0				1.0		
	26	3.4	0.5			4.0	-							5.4	1.0	1.0	-	5.8	1.0	38.4	1.0	24.4	1.0		1.0		
	27			6.2	1.0									5.4	1.0				0.5		1.0		1.0		1.0		
	28				0.5	12.2	1.0	13.4	1.0						0.5					12.4	1.0		1.0		1.0		
	29						1.0	5.8	1.0			10.8	1.0	6.0	1.0	3.0	-			13.4	1.0						
	30								0.5				1.0	3.4	0.5					31.2	1.0			25.4	1.0		
	31																				1.0			10.0	1.0		
Subtotal		13.4	1.5	6.2	1.5	16.2	2.0	19.2	2.5	-	-	10.8	2.0	21.6	4.0	4.0	-	5.8	3.5	114.4	8.0	24.8	6.0	88.6	7.0	322.0	38.0
Total	①	71.2		123.7		51.8		38.2		4.8		48.6		84.4		32.6		71.8		174.2		180.8		232.7		1,158.8 (mm)	
	②	7.5		8.0		6.5		4.5		4.0		6.0		12.0		3.5		8.5		15.0		15.0		16.0			106.5 (days)
	③	6		7		5		3		2		7		12		4		7		12		7		6			78 (days)
	④	25		21		26		27		29		23		19		27		23		19		23		25			287 (days)
	⑤	23.5		20.0		24.5		25.5		27		24.0		19.0		27.5		21.5		16		15		15.0			258.5 (days)

Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓘ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1979)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1													78.0	1.0					3.0	1.0				1.0		
	2									19.4	1.0				1.0										1.0		
	3							32.2	1.0	0.5	1.0				1.0	28.8	1.0			8.0	1.0			56.2	1.0		
	4					15.0	1.0		1.0			13.6	1.0		1.0		1.0			1.2	0.5				1.0		
	5					14.0	1.0	0.4	1.0				1.0		1.0		1.0			0.6				19.2	1.0		
	6			5.2	1.0	22.4	1.0		1.0	0.4	-	0.4	-	17.0	1.0			2.0	-	0.8					1.0		
	7			2.4	0.5	1.0	1.0					6.8	1.0	33.2	1.0			2.0	-			45.8	1.0		1.0		
	8						1.0			7.0	1.0		0.5		1.0	3.4	-	4.2	-				1.0	21.4	1.0		
	9					0.4	-	4.8	-		0.5				1.0			35.0	1.0			0.4	1.0		1.0		
	10			1.3	-										1.0	48.4	1.0	1.2	1.0				1.0		1.0		
Subtotal		-	-	8.9	1.5	52.8	5.0	37.4	4.0	27.3	3.5	20.8	3.5	128.2	10.0	80.6	4.0	44.4	2.0	13.6	2.5	46.2	4.0	96.8	10.0	557.0	50.0
Second 10 days	11			20.7	1.0					16.0	1.0						1.0	-	1.0				1.0				
	12			36.9	1.0	1.0	-			0.4	1.0						1.0	23.6	1.0	20.0	1.0			11.6	1.0		
	13				1.0											3.0	1.0		1.0	19.0	1.0			46.8	1.0		
	14				1.0			35.2	1.0								1.0		1.0		1.0			15.8	1.0		
	15			4.7	1.0				1.0					2.2	-	30.0	1.0	30.0	1.0						1.0		
	16			23.0	1.0			7.4	1.0							14.8	1.0		1.0						1.0		
	17				1.0			0.5	1.0							14.2	1.0		1.0			72.2	1.0		1.0		
	18			8.7	1.0					29.0	1.0			13.2	1.0		1.0		1.0				1.0	3.8	-		
	19										1.0			3.2	1.0		1.0						1.0				
	20			11.2	1.0						1.0						1.0						1.0				
Subtotal		-	-	105.2	9.0	1.0	-	43.1	4.0	45.4	5.0	-	-	18.6	162.0	10.0	53.6	8.0	39.0	3.0	72.2	5.0	78.0	6.0	618.1	52.0	
Third 10 days	21				1.0					15.2	1.0					-	1.0	4.0	-			1.6	1.0				
	22										1.0									27.0	1.0	0.6	-				
	23	3.6	-			0.4	-													2.0	1.0						
	24	10.7	1.0											4.6	-					19.4	1.0	9.0	1.0				
	25		1.0											14.2	1.0	40.0	1.0			0.4	1.0		0.5				
	26														1.0		1.0										
	27	10.7	1.0	59.4	1.0												1.0		152.2	1.0							
	28		1.0	10.0	1.0											4.8	1.0	33.0	1.0	8.0	1.0						
	29							11.0	1.0									8.8	1.0	14.4	1.0			25.8	1.0		
	30								1.0			15.4	1.0						1.0		1.0	54.2	1.0	17.8	1.0		
	31																				1.0				1.0		
Subtotal		25.0	4.0	69.4	3.0	0.4	-	11.0	2.0	15.2	2.0	15.4	1.0	18.8	2.0	44.8	5.0	45.8	3.0	223.4	9.0	65.4	3.5	43.6	3.0	578.2	37.5
Total	①	25.0		183.5		54.2		91.5		87.9		36.2		165.6		287.4		143.8		276.0		183.8		218.4		(mm) 1,753.3	
	②	4.0		13.5		5.0		10.0		10.5		4.5		14.0		19.0		13.0		14.5		12.5		19.0		(days) 139.5	
	③	3		11		7		7		8		4		8		9		8		14		7		9		(days) 95	
	④	28		17		24		23		23		26		23		22		22		17		23		22		(days) 270	
	⑤	27.0		14.5		26.0		20.0		20.5		25.5		17.0		12.0		21.0		16.5		17.5		12.0		(days) 229.5	

Notes 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

Table 4-1-16-ⓙ Calculation of Outdoor Operable Days per 10 Days and Month
(Yacyrete Observatory 1980)

Month / Division / 10 days		Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov		Dec.		Total	
		Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall	Inoperable days	Rainfall (mm)	Inoperable days (days)
First 10 days	1					23.2	1.0	1.0	-	-	1.0	0.8	1.0					26.4	1.0	-	1.0						
	2					5.4	1.0			-	1.0		1.0					2.8	1.0	7.6	1.0						
	3						1.0			-	1.0		1.0						1.0	3.0	0.5						
	4			67.6	1.0					-	1.0		1.0			64.2	1.0			0.4							
	5				1.0											14.2	1.0					26.4	1.0				
	6				1.0						-						1.0					21.2	1.0				
	7	2.2	-		1.0	2.2	-	15.6	1.0	22.2	1.0			19.6	1.0		1.0			3.6	-	47.2	1.0				
	8	1.0	-		1.0				1.0	27.0	1.0			3.4	1.0		1.0					47.8	1.0				
	9							6.2	1.0	81.8	1.0											3.0	1.0				
	10			19.8	1.0	23.4	1.0	3.8	0.5	-	1.0												1.0				
Subtotal		3.2	-	87.4	6.0	54.2	4.0	26.6	3.5	134.0	8.0	0.8	4.0	23.0	2.0	78.4	5.0	29.2	3.0	14.6	2.5	145.6	6.0	61.7	5.0	658.7	49.0
Second 10 days	11			-	1.0	-	1.0	5.2	1.0	-	1.0	1.8	-							1.0	-	-	1.0				
	12					17.0	1.0	26.8	1.0	-	1.0	30.2	1.0									-	1.0				
	13						1.0		1.0	-	1.0		1.0			18.2	1.0										
	14								1.0				1.0				1.0	50.8	1.0								
	15	2.7	-										1.0						1.0								
	16			25.2	1.0					16.4	1.0								1.0								
	17				1.0					32.0	1.0	0.4	-						1.0			30.2	1.0				
	18				1.0					16.0	1.0	11.4	1.0						1.0	6.4	1.0	12.2	1.0				
	19										1.0		1.0							0.6	0.5	8.2	1.0				
	20									5.2	1.0	18.2	1.0	2.4	-							10.2	1.0				
Subtotal		2.7	-	25.2	4.0	17.0	3.0	32.0	4.0	69.6	8.0	61.8	7.0	2.4	-	29.6	4.0	50.8	5.0	8.0	1.5	60.8	6.0	45.7	3.5	405.6	46.0
Third 10 days	21									0.6	0.5					18.4	1.0			52.0	1.0	1.2	1.0				
	22																1.0			4.0	1.0						
	23	21.9	1.0																		1.0						
	24		1.0	63.2	1.0							2.4	-								1.0						
	25		1.0		1.0	32.6	1.0														1.0						
	26				1.0	15.2	1.0											5.8	1.0								
	27				1.0	8.4	1.0											50.0	1.0	20.6	1.0	23.8	1.0				
	28						1.0							1.8	-				1.0	9.0	1.0	4.4	1.0				
	29											1.8	-						1.0	10.0	1.0	2.0	1.0				
	30	18.8	1.0					48.8	1.0			1.2	-						1.0		1.0						
	31		1.0							68.6	1.0																
Subtotal		40.7	5.0	63.2	4.0	56.2	4.0	48.8	1.0	69.2	1.5	5.4	-	1.8	-	18.4	2.0	55.8	5.0	95.6	9.0	31.4	4.0	51.3	4.0	537.8	39.5
Total	①	46.6		175.8		127.4		107.4		272.8		68.0		27.2		126.4		135.8		118.2		237.8		158.7		(mm) 1,602.1	
	②	5.0		14.0		11.0		8.5		17.5		11.0		2.0		11.0		13.0		13.0		16.0		12.5			(days) 134.5
	③	5		4		8		7		10		9		4		5		5		12		13		8			(days) 90
	④	26		25		23		23		21		21		27		26		25		19		17		23			(days) 276
	⑤	26.0		15.0		20.0		21.5		13.5		19.0		29.0		20.0		17.0		18.0		14.0		18.5			(days) 231.5

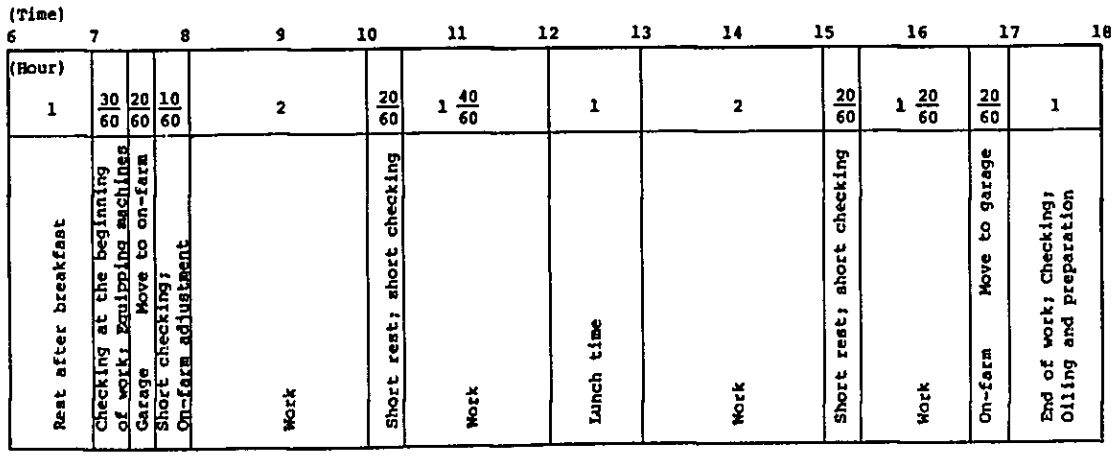
Notes: 1. Rainfall is supposed 5∿9.9mm a half day off, 10∿19.9mm a day off, 20∿29.9mm 2 days off, 30∿39.9mm 3 days off and over 40mm 4 days off.
2. ① Rainfall ② Inoperable days ③ Rain days ④ Drought days ⑤ Operable days

III. COMPUTATION OF AVERAGE DAILY WORKING HOURS IN THE OUTDOOR WORK

A days's working hours are mainly spent in the outside work, and daytime work becomes the basic rule in agriculture. Also from the peculiarity of crop cultivation, there are busy farming seasons and non-busy farming seasons. It is thus necessary to decide the average daily working hours throughout a working period by taking into consideration the factors of the types of work and effects of weather, etc. and by paying attention to the safety of work plan. It is desired to determine the daily working hours according to a season upon the basis of hours of the length of a day in the locality.

At the present stage of survey, however, we could not collect enough data involving seasons. So we assumed the average length of a day throughout the year as 12 hours from the interviewing survey made upon the farmers in the area, and computed 10 hours as the working hours of a day throughout the year, and 7 hours of a day as the actual working hours. Its itemization is as follows.

The figure offers 10 hours (600 minutes) for a day's working hours, 7 hours (420 minutes) for actual working hours, and 3 hours (180 minutes) for checking and preparation, moving and recess time. The ratio of actual work is 402 ÷ 600 minutes = 0.70, which makes 70%.



* 1. Average daily working hours throughout the year is calculated by reducing the hours for breakfast time and lunch time recess from the average hours of the length of a day

2. 20 minutes of moving time is computed by assuming 20 minutes for the time of driving done at the speed of 6 km per hour.

IV. FARMING A STANDARD MECHANIZATION IN CULTIVATING PADDY, SOYBEAN AND WHEAT

In framing a standard mechanization in cultivating paddy, soybean and wheat, we studied about various conditions involving the introduction of large-size machinery in Yacyreta survey area. We also referred to the mechanization, the tradition in cultivating these crops in Paraguay. Having studied these, we framed a standard mechanization, in accordance with the method of cultivation of each crop, i.e. paddy, soybean and wheat. (Figs. 4-1-1 ∿ 4-1-3)

The survey results of a mechanization in cultivating paddy, soybean and wheat in the main agricultural farms in Paraguary are shown in Tables 4-1-17 ∿ 4-1-19, Figs. 4-1-1 ∿ 4-1-7.

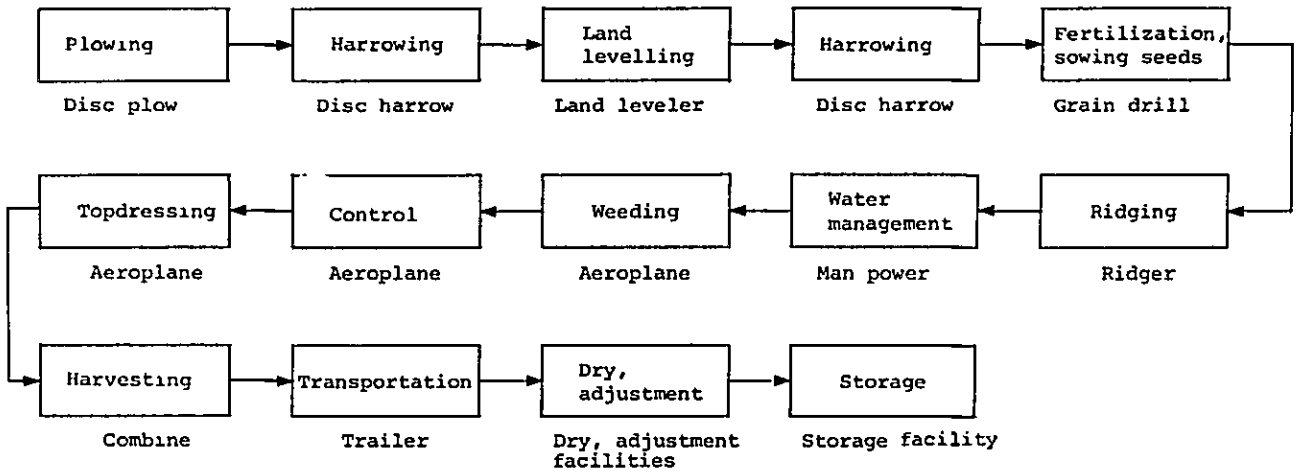


Fig. 4-1-1 Flow Chart of Mechanized Cultivation of Standard System for Paddy Rice

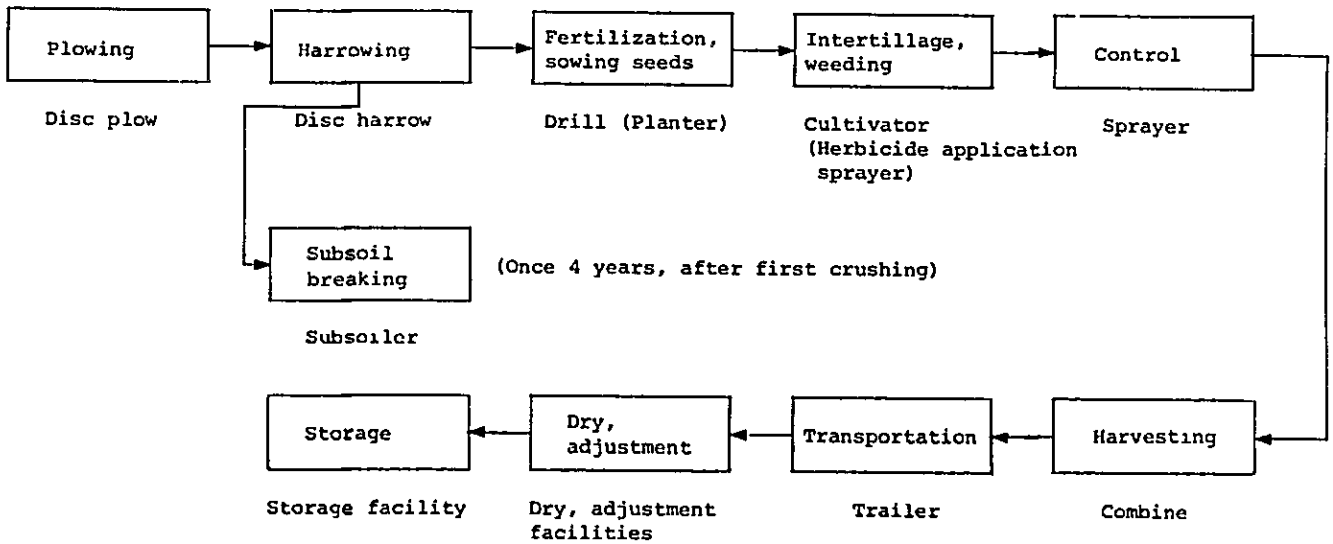


Fig. 4-1-2 Flow Chart of Mechanized Cultivation of Standard System for Soybean

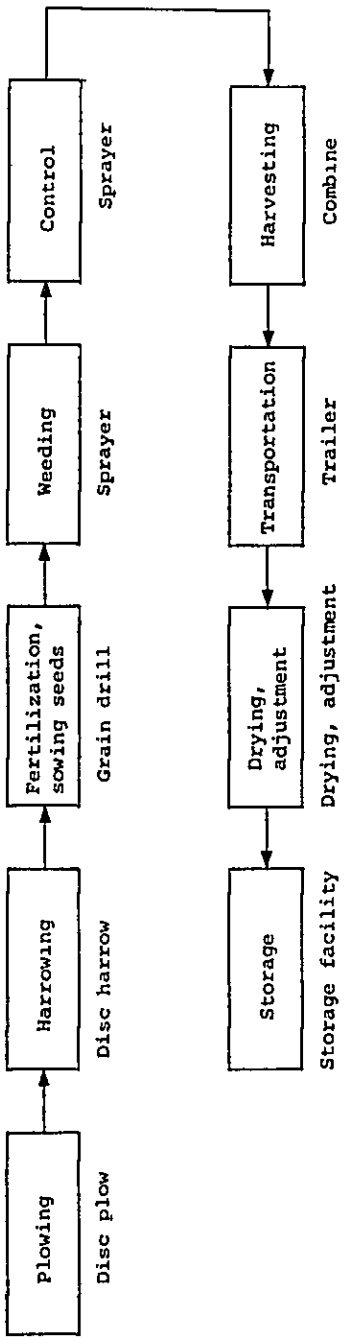


Fig. 4-1-3 Flow Chart of Mechanized Cultivation on Standard System for Wheat

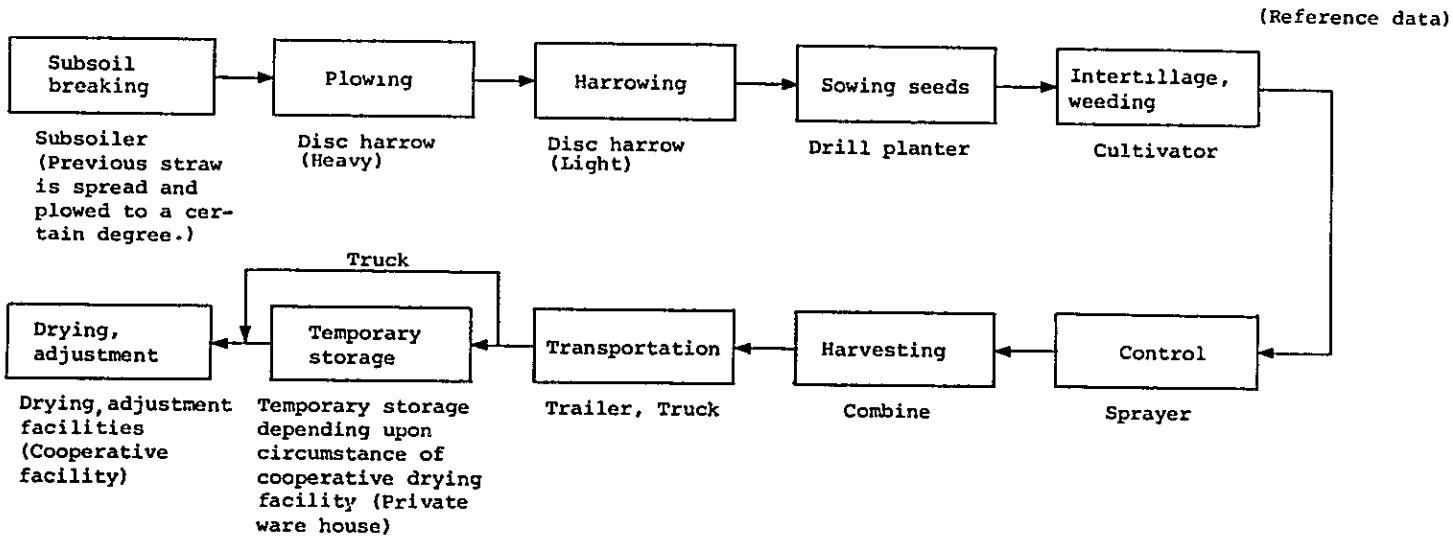


Fig. 4-1-4 Shindoi Farm Mechanized Cultivation on System for Soybean (Winter Crop.Wheat)

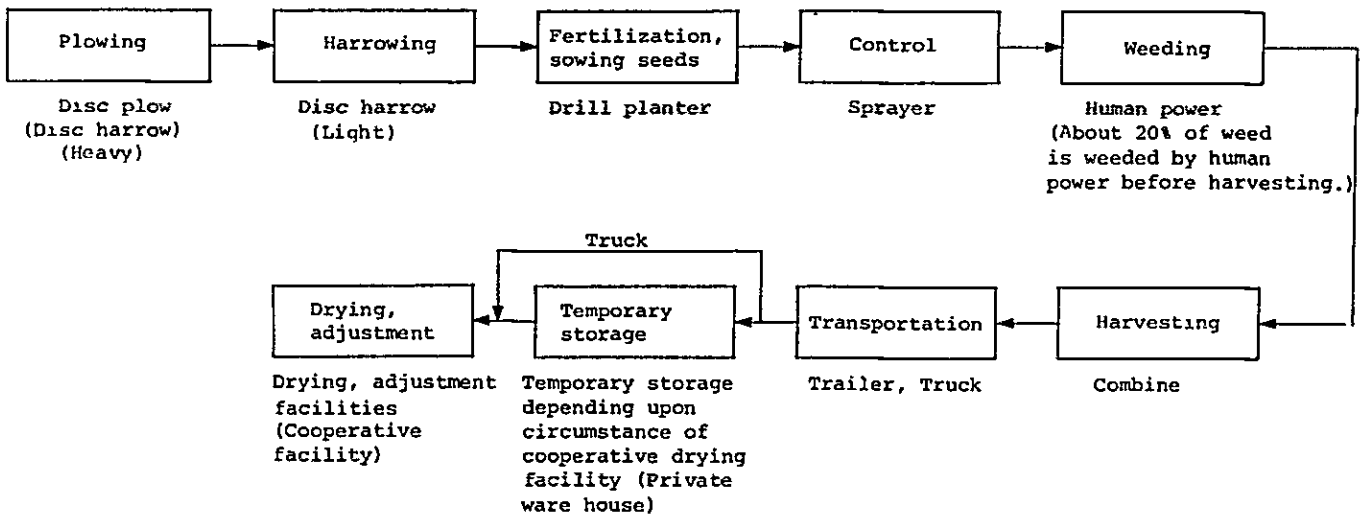


Fig. 4-1-5 Shindoi Farm Mechanized Cultivation on System for Wheat

Table 4-1-17 Shindoi Farm Outline of Hearing Investigation on Farming Machine Holding Circumstances

Name of machine	Manufacturing country	Manufacturer	Manufactured year	Size	Units	Remarks
Tractor	Sweden	Volvo		38 HP	1	
"	"	"		48 "	1	
"	"	"		80 "	1	
"	Brazil	M.F		75 "	2	
"	"	"		114 "	2	
"	"	C.B.T.		107 "	1	
Combine	USA	John Deere		(4400 type) Swath 4.8 m	1	Hopper capacity 1.75 t Second hand
"	"	"		" 3.8 m	2	Hopper capacity 1.5 t Second hand
"	Brazil	M.F.		" 3.8 m	2	"
Disc plow	"			28" × 5 rows	3	Direct attached type
"	"			28" × 4 rows	3	"
Disc harrow	"			22" × 42 sheets	2	Tracted type
"	"			22" × 32 sheets	1	"
"	"			22" × 30 sheets	1	"
Disc harrow (Heavy)	"			26" × 20 sheets	2	Tracted type, used for turn over instead of plowing
"	"			26" × 14 sheets	1	"
Cultivator	"			Disc type 16"∿18" × 6	4	Direct attached type, used for weeding
Sowing seeds (Drill, planter)	"			Width 2.6∿2.8 m	4	Direct attached type, for soybean and wheat
Disinfection sprayer	"			Tank capacity 2,000 ℓ	2	Tracted type
Bulldozer	"	M.F.		12 t equipped with ripper	1	For road repair and reclaimation
Trailer				4 t	1	
"				8 t	1	
Truck				15 t	1	For cereals transportation
"				20 t	1	"
Subsoiler	Brazil			5 rows	2	

Shindoi farm: Date of hearing investigation on farming circumstances - 2 November, 1983

Farming circumstances: Farming land area - 1,000 ha
Field area - 700 ha
Farming subjects - Soybean cultivation (700 ha) + Wheat cultivation (400∿500 ha)
Others, mountains and forests, wasteland etc.

Farm location: Pirapo migration area, Itapua department.

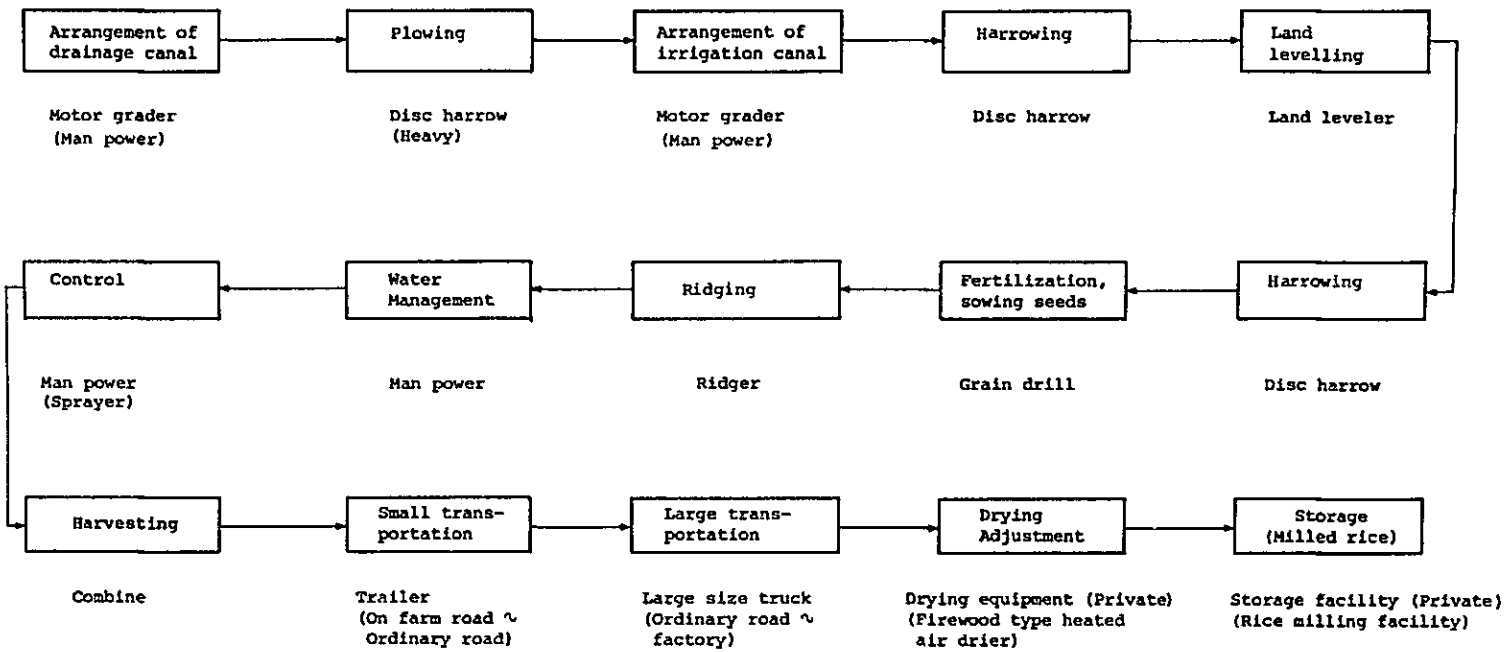


Fig. 4-1-6 Bolf Farm Flow Chart of Mechanized Cultivation on System for Paddy Rice (Reference)

Table 4-1-18 Bolf Farm Outline of Hearing Investigation on Farming Machine Holding Circumstances

Name of Machine	Manufacturing country	Manufacturer	Manufactured year	Size	Unit	Remarks
Tractor	Argentina	ZANELLO		150 HP	4	
Tractor	Brazil	MASSEY FERGUSON		85 " (275 type)	4	
Tractor	Italy	FIAT		85 "	2	
Combine	Argentina	AUMEX		135 "	3	RICE combine tank capacity 1.5 ton
"	"	SENOR		92 "	2	"
"	"				2	Not being used now because of old machine
Disc harrow	"			26 HP × 24 plates w = (1,600kg)	4	Being used for turn over with heavy harrow.
"	"			26 HP × 18 plates w = (1,000kg)	4	"
"	"			22 HP × 48 plates	2	Harrow for readjustment and levelling
"	"			20 HP × 42 plates	2	"
"	"			20 HP × 36 plates	3	"
"	"			19 HP × 32 plates	3	"
Land leveler	USA	JOHN DEERE		Blade width 3,800mm	1	1982 introduction
"	"	EVERSMAN		Blade width 3,600 mm	1	"
Levelling skraper	USA	EVERSMAN		Tracted type 7㎥ loading	1	For levelling (Hydraulic automatic)
"	"	"		Tracted type 4㎥ loading	1	"
Compacting roller	Argentina			2t	1	
Seeder (Grain grill)	Argentina	GERARDI		Tracted type Interrow space 18cm 28 stripes	2	Fertilizer hopper 300kg Seed hopper 300kg
"	USA	INTERNATIONA HARVESTER		" 28 stripes	2	Not being used now because of no fertilizer hopper.
Motor grader					2	For excavation and road repaire
Ridger (TAIPADORA)	Brazil	IMASA		28 HP disc × 2 plates w = (600kg)	1	Ridger attached directly to tractor a mounding higth (25 ∿ 30cm)
Sprayer					2	Now not being used (for herbicide application)
Trailor				Tracted type 3t	4	Tracted by tractor, for unhulled rice transportation
"				" 4t	1	"
"				" 6t	2	"
"				" 12t	1	"

(Cont'd)

Name of Machine	Manufacturing country	Manufacturer	Manufactured year	Size	Unit	Remarks
Large size truck	Japan Brazil	Toyota Benz		10 ∿ 12t	2	Incarnacion factory (Transportation from farm to factory)
Trailer	Brazil			Tracted type 15t	2	"
Truck	Brazil	Benz		4t	1	Incarnacion factory, for product transportation
Drying, adjustment equipment	Argentina			Firewood use, 60t/day dealing	1	Incarnacion factory
Rice milling facility					1	Incarnacion factory (Including storage facility)

Bolf Farm Date of hearing investigation of farming conditions 27 Oct. 1983

Farming conditions Farming land area 17,000ha

Farming subjects Livestock farming (Beef cattle 13,000)
+ Paddy rice cultivation (500∿600ha a few annual fluctuations)

Others, Solgo about 60ha, improved pasture 700ha Grassland.

Farm location Yacyreta area, Itapua department.

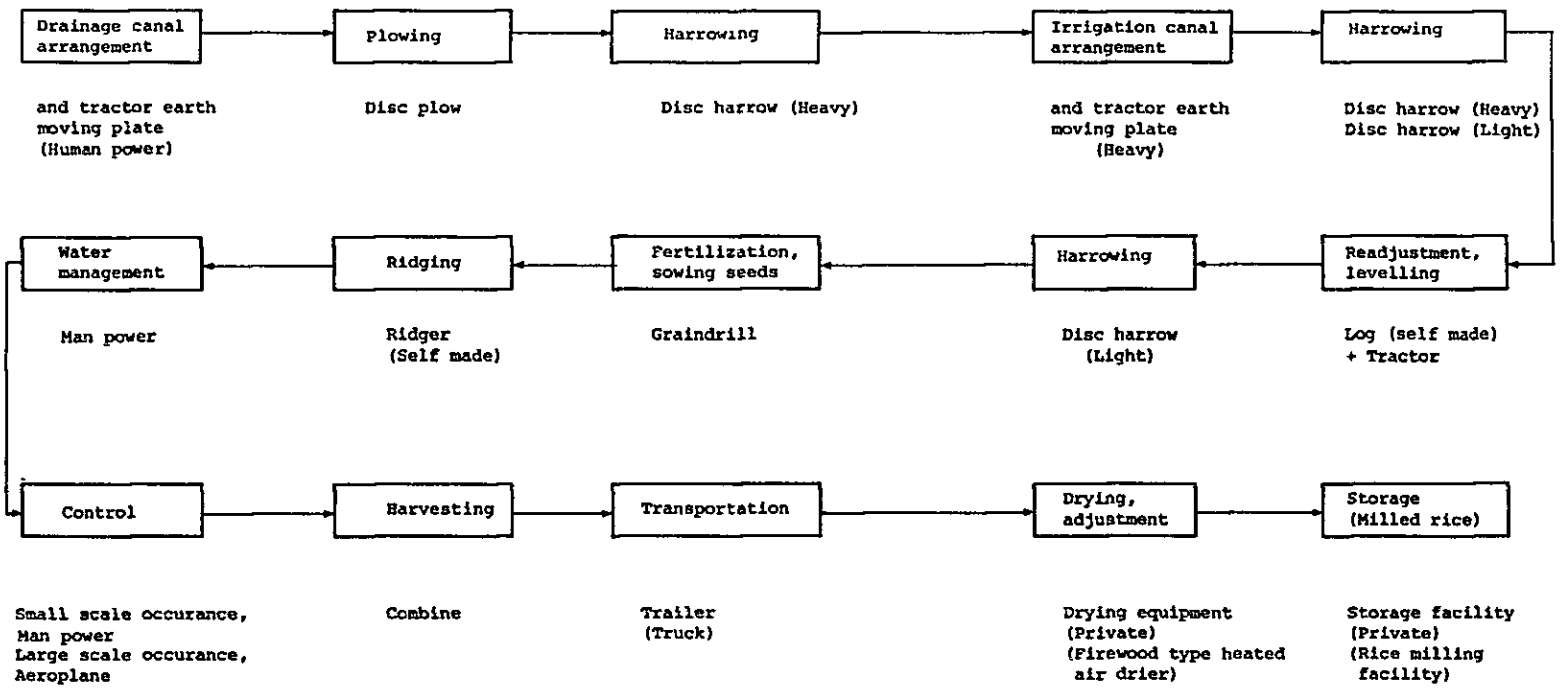


Fig. 4-1-7 Papararudo Farm Flow Chart of Mechanized Cultivation on System for Paddy Rice (Reference)

Table 4-1-19 Papararudo Farm Outline of Hearing Investigation of Farming Machine Holding Circumstances

Name of Machine	Manufacturing country	Manufacturer	Manufactured year	Size	Units	Remarks
Tractor	USA	FORD		140 HP (Rear wheel, double tires)	1	Supposed recent introduction because it is relatively new.
"	"	"		120 HP (4WD)	1	"
Tractor	Italy	FIAT		100 HP	1	(Introduced around 1960)
"	"			90 HP	3	"
"	"	"		78 HP	1	"
Combine	Argentina			110 HP (Swath 4.0m)	4	Combine for wheat (bought around 1968)
Disc plow	"			Tracted type 26 PH × 7 plates	4	(")
Disc harrow	"			20 " × 40 plates	4	(")
"	"			26 " × 24 plates	1	Heavy harrow (recently introduced)
Seeder (Grain drill)	"			Tracted type Interrow space 18cm 20 stripes	1	Drill for wheat (introduced around 1960)
Seeder (Grass land drill)	"			Seeding width 2.0m	1	Drill for pasture
Seeder	"			Rotary type	1	Supposedly broadcaster (Not being used)
Hurrower	"			Small size ditcher	1	
Trailer	"			(3 ∿ 4t)	4	
Ridger		Self made		A mounding hight 25 ∿ 30cm	1	2 times ridging about 40cm high
Truck				7 ton loading	1	
Readjustment small size scraper	USA			Tracted by tractor, oil hydraulic automatic	2	
Motor grader	Argentina				1	for road reapire
Drying facility				Firewood type heated air drier "	1 1	3 farm silos Asncion city

Papararudo farm Date of hearing investigation of farming conditions 20 Oct. 1983

Farming conditions Farming land area 19,000 ha

Farming subjects Livestock (breeding female 3,200h) + Paddy rice culture 500 ha

Others, forage crops (Solgo) 200 ha, improved pasture 600 ha, forest (eucalypt) 50 ha, Grassland

Farm location

(Suburbs of asuncion city)