

FAYOUM AGRICULTURAL DEVELOPMENT PROJECT
SOUTH AREA OF LAKE QARUN (1)

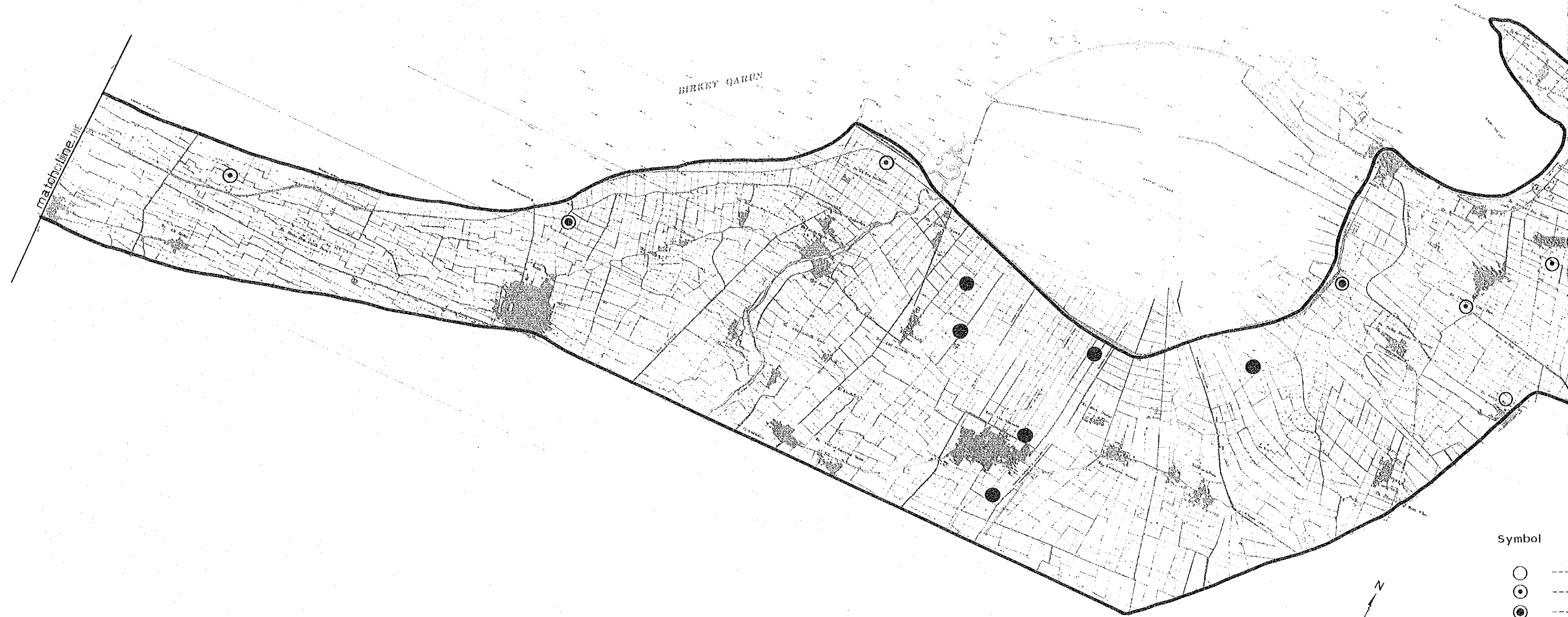
SALINITY MAP



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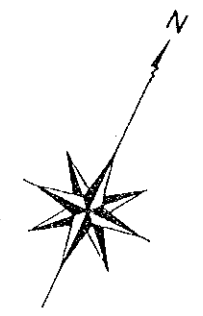
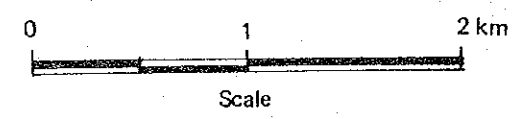
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SALINITY MAP



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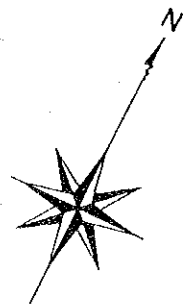
BIRKET QARUN



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FAYOUM AGRICULTURAL DEVELOPMENT PROJECT
SOUTH AREA OF LAKE QARUN (2)

SALINITY MAP

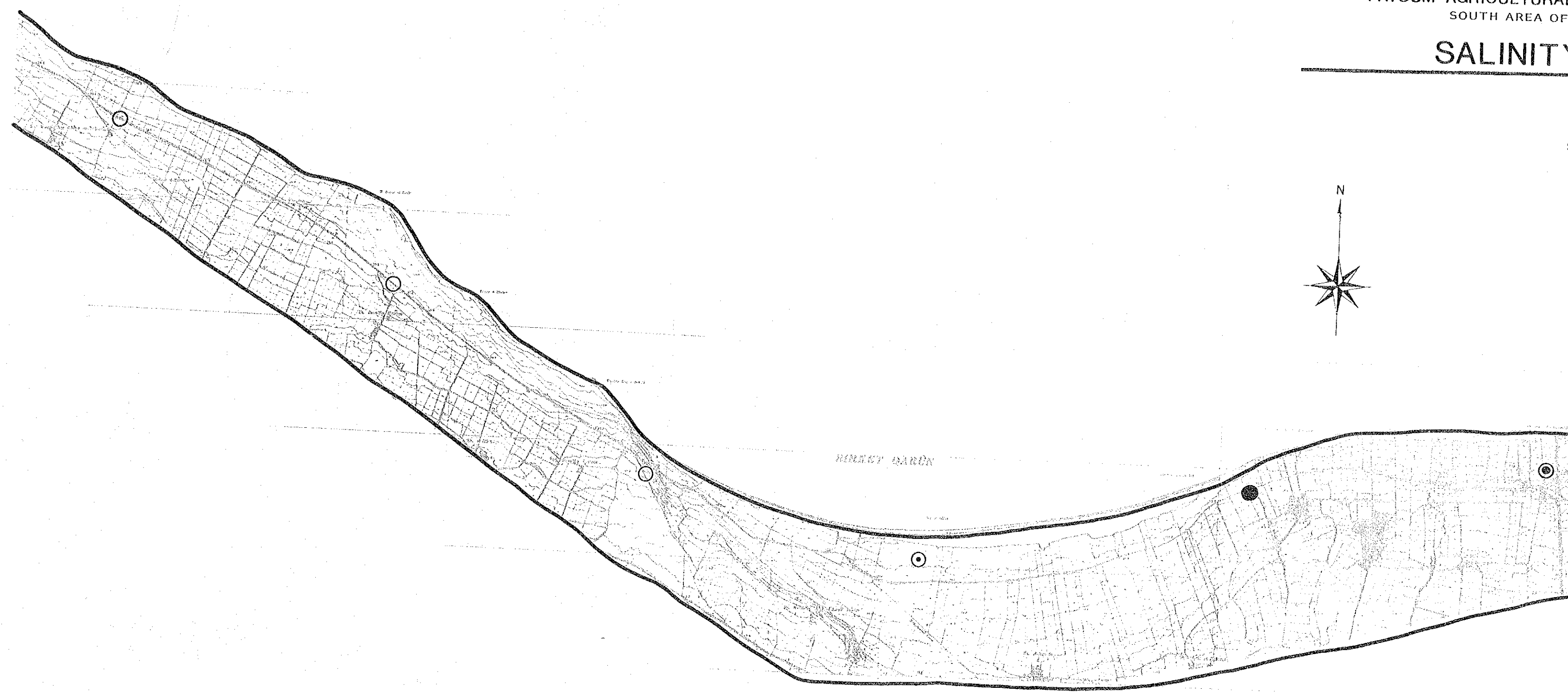


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FAYOUM AGRICULTURAL
SOUTH AREA OF

SALINITY

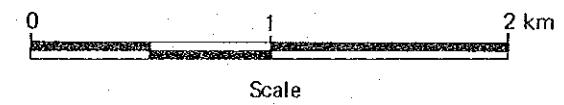
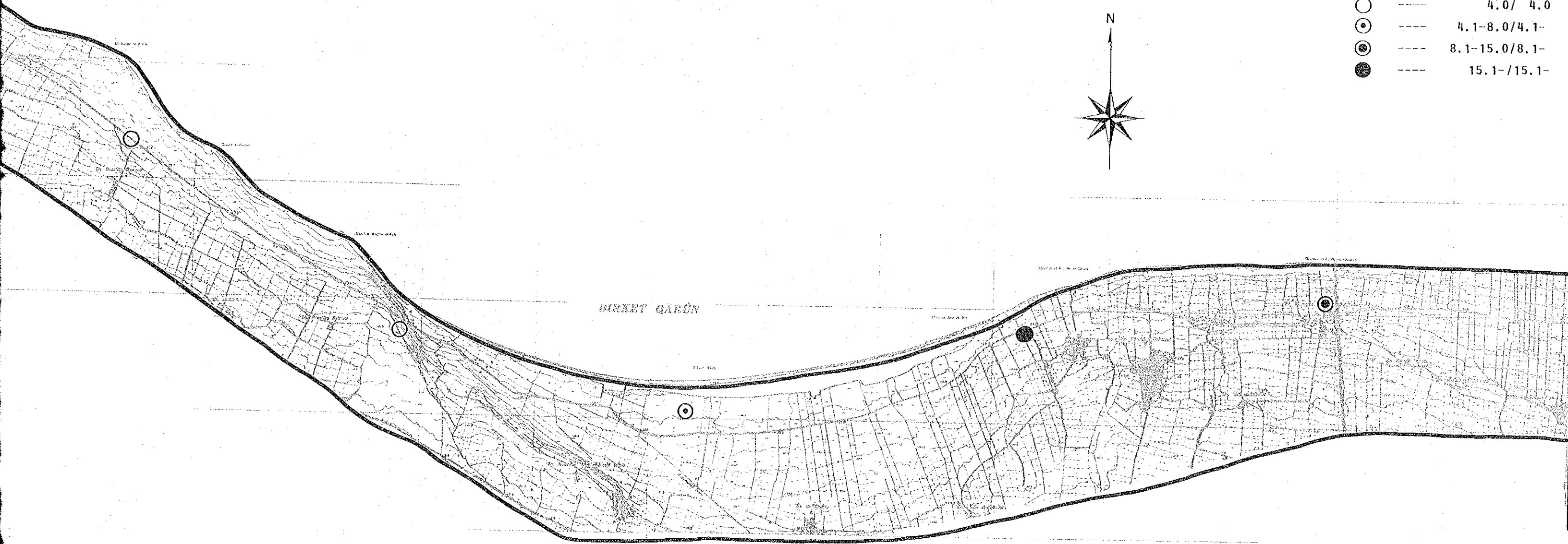


FAYOUM AGRICULTURAL DEVELOPMENT PROJECT
SOUTH AREA OF LAKE QARUN (3)

SALINITY MAP

LEGEND

Symbol	EC (mmhos/cm) Surface/Sub surface
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⊙	4.1-8.0/4.1-
⊗	8.1-15.0/8.1-
●	15.1-/15.1-



APPENDIX D.
AGRICULTURE

Appendix D. AGRICULTURE

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APPENDIX D. AGRICULTURE

D-1. General

The average cultivated land per farmhousehold is 1.6 feddan in Egypt and 2.8 feddan in Fayoum Governorate. 87 percent of the total farmhouseholds in Fayoum Governorate have cultivated land of less than five feddan. (refer to Table D1-1)

Because of the poor water conditions, there is a fair-sized amount of land use for Nili crops which is about 18 percent of the cultivated land in Fayoum Governorate though the amount in Egypt is about seven percent. (refer to Tables D1-2 and D1-3)

Cotton is cultivated in large areas in Fayoum Governorate. However, such areas are decreasing in size here as well as throughout Egypt. (refer to Table D1-4)

Table D1-1 Distribution of Land Ownership

Farm size	Whole Egypt(1979)000fed		Fayoum(1981) fed		Tamiah(1981) fed	
	Owners (%)	Area (%)	Owners (%)	Area (%)	Owners (%)	Area (%)
0-5 fed	3,223(95)	2,854(51)	87,226(87)	128,991(47)	9,769(83)	16,207(40)
5-10	93(2.7)	609(11)	8,382(8.3)	54,757(19.8)	1,102(9.4)	7,316(17.9)
10-20	44(1.3)	569(10)	3,045(3.0)	39,020(14.1)	502(4.3)	5,983(14.6)
20-50	23(0.7)	663(12)	1,844(1.8)	53,656(4.9)	374(3.2)	11,235(27.5)
50-	8(0.3)	855(16)	7(0.0)	300(0.1)	2(0.0)	100(0.2)
	3,391(100)	5,530(100)	100,504(100)	276,724(100)	11,749(100)	40,841(100)

Source: Statistics of the Arab Republic of Egypt and Statistics of Fayoum Governorate

Table D1-2 Cultivated Areas by Cropping Season

	Whole Egypt			Fayoum		
	Area (000 fed)	Percent (%)		Area (fed)	Percent (%)	
	1979	1980	1981	1979	1980	1981
Winter crops	5,065	4,926	5,105	45	44	45
Summer crops	5,051	5,038	4,994	45	45	44
Nili crops	781	803	792	7	7	7
Orchards etc.	342	361	568	3	3	3
	11,237	11,128	11,259	100	100	100
				536,244	529,486	520,934
				100	100	100

Source: Statistics of the Arab Republic of Egypt and Statistics of Fayoum Governorate

Table D1-3 Cropped Area, Yield and Production
(Whole Egypt)

	1979			1980			1981		
	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production
Summer Crops									
Cotton	1,196		1,245				1,178		
Rice	1,037	2.41	2,511	970	2.45	2,384	954	2.55	2,236
Sorghum	394	1.56	635	398	1.57	642	400	1.58	653
Maize	1,413	1.56	2,938	1,432	1.69	3,231	1,434	1.72	3,308
Soybeans	100	1.10	106	83	1.10	92	109	1.20	130
Sugarcane	249	35.40	8,791	253	34.20	8,618	251	34.30	8,616
Groundnuts	31	0.87	27	28	0.90	26	28	0.90	26
Sesame	37	0.34	16	39	0.41	16	40	0.41	17
Winter Crops									
Wheat	1,391	1.34	1,864	1,326	1.35	1,790	1,400	1.38	1,932
Beans	288	0.95	274	276	0.87	240	282	0.87	245
Barley	107	1.14	122	96	1.12	108	91	1.13	105
Fenngreek	31	0.75	23	28	0.74	21	25	0.75	19

Source: Statistics of the Arab Republic of Egypt.

Note : Unit of Area '000 feddan
Unit of Yield ton/feddan
Unit of Production '000 ton

Table D1-4 Cropped Area, Yield and Production
(Fayoum Governorate)

	1979			1980			1981		
	Area (fed.)	Yield (ton/fed.)	Produc- tion (ton)	Area (fed.)	Yield (ton/fed.)	Produc- tion (ton)	Area (fed.)	Yield (ton/fed.)	Produc- tion (ton)
<u>Summer Crops</u>									
Cotton	53,808	0.756	40,679	49,169	0.825	40,564	44,901	0.909	40,815
Rice	16,198	2.240	36,284	14,176	2.260	32,038	13,779	2.330	32,105
Sorghum	41,404	1.550	64,176	43,700	1.550	67,735	43,556	1.550	67,512
Maize	26,824	1.589	42,623	27,652	1.562	43,192	32,206	1.529	49,243
Groundnuts	722	0.468	338	575	0.583	338	356	0.518	184
Sesame	1,038	0.506	523	1,904	0.509	969	3,267	0.509	1,663
Vegetables	22,986	6.200	142,513	25,192	6.100	153,671	22,940	6.200	142,228
Sunflower	5,028	0.750	3,771	2,841	0.673	1,912	4,795	0.660	3,165
<u>Nilii Crops</u>									
Rice	2,537	0.947	2,403	1,930	0.986	1,903	1,973	0.970	1,914
Maize	79,242	1.170	92,713	76,698	1.172	89,890	68,078	1.009	68,700
Vegetables	23,574	5.600	132,014	24,879	6.100	151,762	24,017	6.700	160,914
<u>Winter Crops</u>									
Wheat	72,052	1.404	101,161	71,320	1.386	98,850	76,104	1.464	111,416
Beans	19,707	0.857	16,889	20,626	0.609	12,561	15,864	0.930	14,754
Barley	7,760	1.139	8,839	6,057	1.082	6,554	7,101	1.102	7,825
Flax	2,417	1.932	4,670	2,320	1.950	4,524	889	2.040	1,814
Onion	3,975	7.460	29,654	5,819	7.850	45,679	4,532	8.010	36,301
Berseem	104,970	4.880	448,271	106,277	4.880	452,751	92,941	4.980	462,846
Vegetables	21,457	6.260	134,321	25,520	5.800	148,016	27,349	6.600	180,053
<u>Others</u>									
Rush	4,086	2.470	10,092	4,816	2.500	12,040	3,652	2.970	10,846
Sugarcane	372	37.900	14,099	396	31.300	12,395	512		
Orchards	20,274			20,274			19,961		

Source: Statistics of Fayoum Governorate

D-2. North Wahby and Com Osheem Areas

D-2.1. Proposed Cropping Pattern

(1) Selection of Crops

In selecting proposed crops for the Project, several crops are considered to be introduced, which are main crops in Fayoum governorate, vegetables and fruits which have great demand and profitability, and forage crops to be supplied organic matter to the soil.

Among many upland crops to be cultivated in the Project Area, 24 crops have been selected for the study. (refer to table D2-1) Their main features are as follows:

1) Field Crops

Barley has a high salt tolerance, but its profitability is low. Wheat also has a high salt tolerance and it is one of the main food crops in Egypt. Cotton is widely cultivated in the Delta region, and it has a high salt tolerance. However, the area under cultivation is on a decreasing trend and there is some fear of damage to its qualities if it is cultivated on desert lands.

Sesame and groundnuts are suited to the desert land. They are the main oil crops in Egypt and expected to increase their production. Soybeans are cultivated in the Delta region, but not yet have been introduced in Fayoum Governorate.

2) Forage Crops

Berseem is a winter crop, cultivated widely in the Delta region and it is recommended to introduce for the Project for

the purpose of supply organic matter to the soil. For summer crops, sorghum and maize are proposed to introduce for the Project.

Elephant grass and alfalfa are perennial crops. They have a high salt tolerance, but they require a lot of irrigation water.

3) Vegetables

Tomatoes have a high salt tolerance among a kind of vegetables and enjoy a high demand especially in winter. Strawberry is widely cultivated in the delta region, but its salt tolerance is very low.

The same can be said for onion, watermelon are suited to the desert land and has a large demand in summer. Potato has great demand for export, but its salt tolerance is also low.

4) Fruit and Woody Trees

Fruit trees have a high salt tolerance and require less irrigation water, olive is a representative fruit. Grape seems to satisfy demand at the present. Dates are normally planted along the boundary of each field of farmers and grow with little attention. Mango, Guava, and Citrus have much demand and profitability. Casuarina is the most familiar tree in Egypt and is suited to a windbreak tree. As the conditions of introducing them for the Project, the following matters should be taken into consideration;

- having a high salt tolerance;
- suited to the desert land; and
- require less amount of irrigation water.

Consequently, the following crops have been selected as suitable crops to be introduced to the Project.

Field crops	:	Wheat, beans, sesame, groundnuts
Forage crops	:	Berseem, sorghum, maize
Vegetables	:	Tomatoes, watermelons
Fruit and woody trees:		Olives, mangoes, guavas, citrus, casuarina

(2) Cropping Pattern

The study on five alternative cases of cropping pattern has been carried out using the crops which can be introduced for the Project as mentioned paragraph (1) (refer to Fig. D2-1). Berseem and sorghum are forage crops having a high salt tolerance and a high yield. Tomatoes and watermelons are representative vegetables in Fayoum governorate, and they are transported to Cairo. Sesame and Groundnuts are an important oil crops and wheat is an important grain crop.

For the selection of the proposed cropping pattern, net income per feddan, water requirement and labor distribution of each cropping pattern have been determined.

- Net income per feddan

The case 3 is estimated having the highest net income per feddan of 533 LE/feddan, and the case 5 is the second of it at 488 LE/feddan.

- Water requirement

The case 5 needs the lowest water requirement and gains a high advantage over the other 4 cases. The case 4 needs the 8,280 cu.m/feddan/year of the high water requirement.

- Labor Distribution

Although the case 1 has the lowest labor requirement, the labor power is concentrated in May and August. The case 3 needs the highest labor power in 718 man-day/4.8 feddan. The case 5 needs comparatively high labor power, but its distribution is as same as the case 1.

Consequently, the cropping pattern No.5 is adopted for the proposed cropping pattern. And fruit trees will be introduced in 25 percent of the total cultivated area because the land is suited to fruit trees and the consuming city is located near the Project Area. (refer to Tables D2-2, D2-3 and D2-4)

Crops	Alternative cases divided by cultivated area ratio of crops				
	No.1	No.2	No.3	No.4	No.5
Winter					
Berseem	1/2	1/2	1/2	1/2	1/3+1/3 (s)*
Wheat	1/2	1/4	-	1/4	1/6
Tomato	-	1/4	1/2	-	1/6
Beans	-	-	-	1/4	-
Summer					
Sorghum	1/2	1/2	1/2	1/2	1/3
Maize	-	-	-	1/2	-
Sesame	1/2	1/2	1/4	-	-
Groundnuts	-	-	1/4	-	1/3
Watermelon	-	-	-	-	1/3

Note: (s)* : short

D-2.2. Yield and Production

After the land reclamation and leaching, berseem and sorghum will be introduced when the value of ECe decreases to 10 mmhos/cm. Berseem and wheat as winter crops and sorghum as a summer crop will be introduced, when the value of ECe decreases to 7 mmhos/cm by continuous leaching. When the value of ECe decreases to below 5 mmhos/cm, the economic cultivation will start.

The yield of each crop is shown in Tables D2-4 and D2-5. Yield of crops may be low at the early stage. However, it will show a rapid increase by means of decrease in salt density and the improvement of agricultural techniques. Proposed yield has been estimated from some data shown in Table D2-7.

Crop yield by year in each area and construction stage are shown in Tables D2-8 and D2-9.

D-2.3. Agricultural Mechanization Plan

Sixty Five PS tractors are introduced mainly for farming. Disease protection is carried out by sprayers. Wheat is harvested by a thresher. Rotavators, such as the ones operated by FAO in Ismailia Governorate because of their high working efficiency, shall be used for plowing and grading. Plows should be used for breaking the plowsole once in three years. Agricultural machinery for the Project is shown in Table D2-10 and D2-11 and Figures D2-2 and D2-3.

To bring good service to farmers, workshops and storehouses are requested as follows;

Office room	20 sq.m	
Machinery shed	650 "	
Storage of new parts	100 "	
Repairing workshops	200 "	(including parts store 50 sq.m)

D-2.4. Crop Budget

(1) Farm Input

Required seed varieties, fertilizers and agricultural chemicals based on the extension data from the organization in Fayoum Governorate are shown in Table D2-12. Some practice in handling agricultural chemicals is necessary to decrease any harmful effects.

(2) Labor Requirements

Labor requirement and labor balance of each farm size is shown in Table D2-13. Labor availability of a small-size farm house (5 fed.) at the peak farming period is not sufficient so that seasonally employed laborers are necessary. As for the middle-sized farm house (15 fed.) and the large-sized farm house (20 fed.) four to five employed laborers for the former and seven and eight employed laborers for the latter are necessary to be employed full time. Labor potential available of a small-sized farm house is estimated at two man-days. Since there are 25 working days a month this means that a total of 50 man-days are potentially available.

Table D2-1 Evaluation of Crops under Study

	<u>Salt Tolerance</u>	<u>Water Requirement</u>	<u>Local Adaptability</u>	<u>Domestic Demand</u>	<u>Demand for Export</u>
<u>Winter Crops</u>					
Berseem	b	a	a	a	
Wheat	b	a	a	a	
Barley	a	a	a	b	
Beans	b	a	a	a	
<u>Summer Crops</u>					
Cotton	a	c	b	b	a
Sorghum	b	b	a	a	
Maize	b	b	a	a	
Sesame	b	b	a	a	
Soybeans	b	b	b	a	
Groundnuts	b	b	b	a	
<u>Vegetables</u>					
Tomato	b	c	a	a	a
Potato	b	b	b	b	a
Watermelon	b	b	a	a	c
Onion	c	a	b	a	a
Strawberry	c		c	c	b
<u>Perennial Fodder</u>					
Elefant grass	a	c			
Alfalfa	b	c			
<u>Fruit and Woody Trees</u>					
Dates	a		a	a	b
Mango	b		a	a	c
Olive	b		a	b	b
Grape	b		a	b	b
Guava	b		a	c	b
Lemon	c		b	b	a
Casuarina	a		a	a	
a	High	Low	High	High	High
b	Medium	Medium	Medium	Medium	Medium
c	Low	High	Low	Low	Low

Table D2-2 Net Income by Alternative Cropping Pattern

	(Unit: LE/feddan)				
	<u>No.1</u>	<u>No.2</u>	<u>No.3</u>	<u>No.4</u>	<u>No.5</u>
Net Income	358.0	462.2	533.0	330.8	488.2

Table D2-3 Monthly Water Requirement by Cropping Pattern

	(Unit: m ³ /fed./day, m ³ /fed. in Total)				
	<u>No.1</u>	<u>No.2</u>	<u>No.3</u>	<u>No.4</u>	<u>No.5</u>
Jan.	16	16	15	16	16
Feb.	20	19	18	20	19
Mar.	21	20	20	23	19
Apr.	17	16	15	21	20
May	13	13	12	23	20
Jun.	26	26	25	34	25
Jul.	42	42	41	51	29
Aug.	33	33	33	37	23
Sep.	11	12	13	11	9
Oct.	5	8	11	7	7
Nov.	15	15	16	15	15
Dec.	19	19	18	19	19
<u>Total</u>	<u>7,249</u>	<u>7,283</u>	<u>7,224</u>	<u>8,446</u>	<u>6,721</u>

Table D2-4 Monthly Labor Distribution by Cropping Pattern

	(Unit: man-day/4.8 feddan)				
	<u>No.1</u>	<u>No.2</u>	<u>No.3</u>	<u>No.4</u>	<u>No.5</u>
Jan.	2	46	91	8	32
Feb.	40	84	127	39	83
Mar.	38	67	96	38	60
Apr.	38	37	36	55	42
May	79	55	34	33	48
Jun.	33	19	14	28	44
Jul.	12	13	14	28	8
Aug.	69	78	98	38	68
Sep.	28	28	20	57	19
Oct.	38	32	45	48	34
Nov.	28	25	33	16	16
Dec.	16	39	110	42	74
<u>Total</u>	<u>421</u>	<u>523</u>	<u>718</u>	<u>430</u>	<u>528</u>

Table D2-5 Growth of Yield by Crop

Crop	(Unit: ton/feddan)					
	1st	2nd	3rd	4th	5th	6th
Berseem (per one cut)	1.3	2.1	2.5	4.0	5.0	5.0
Tomato	-	-	11.0	12.0	15.0	15.0
Wheat	-	1.1	1.7	1.8	1.8	1.8
Groundnuts	-	-	0.4	0.6	0.8	0.8
Watermelon	-	-	7.0	9.0	10.0	10.0
Sorghum	4.5	10.0	16.2	17.0	18.0	18.0

Table D2-6 Growth of Yield of Fruit

Crop	(Unit: ton/feddan)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Olive	Settle plant	0	0.7	1.0	3.0	5.0	7.0	7.0	7.0	7.0
Mango	0	0	0.6	1.0	1.5	3.0	5.0	6.0	6.0	6.0
Orange	0	0.8	2.0	4.0	6.0	8.0	8.0	8.0	8.0	8.0
Guava	0	0.7	2.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0
Grape	0	0.6	1.5	3.0	5.0	6.0	6.0	6.0	6.0	6.0

Table D2-7 Yield of Selected Crops

Crop	Whole Egypt 1980	1981	FAO Statistics	Research Centre		Field Survey		Consultant		Prospected Yield	Remarks
				Present	Potential	Extension	Farmer	No.1 (Potential)	No.2		
Berseem	N.A.	N.A.	N.A.	4/1 cut	6/1 cut	4/1 cut	N.A.	26.5	N.A.	5/1 cut	N.A.: Data not available
Wheat	1.35	1.38	1.35	1.20	2.25	0.60	0.89	1.72 (2.31)	N.A.	1.8	
Tomato	7.43	7.57	7.35	12.00	20.00	4-5	6.88	(26.88)	10.00	15.0	
Sorghum	N.A.	N.A.	N.A.	N.A.	N.A.	1.8-1.7 (Seeds)	0.91 (Seeds)	20.68 (Leaves)	20-30 (Leaves)	18.0	
Groundnuts	0.90	0.99	0.72	N.A.	N.A.	0.45	0.25-0.45	-	N.A.	0.8	
Watermelon	10.18	10.44	9.77	N.A.	N.A.	2,000 units 4 kg/unit	1.00	N.A.	6.00	10.0	
Olive	0.8	1.0	N.A.	1.5	3.0	7.0	N.A.	N.A.	N.A.	7.0	Temperature, Soil, Wind condition is adaptable.
Orange	5.69	5.52	N.A.	N.A.	N.A.	8.0	N.A.	N.A.	N.A.	8.0	
Guava	6.69	6.59	N.A.	N.A.	N.A.	7.0	N.A.	N.A.	N.A.	7.0	
Mango	3.5	4.24	N.A.	N.A.	N.A.	6.0	N.A.	N.A.	N.A.	6.0	

Table D2-8 Crop Yield by Year

(Unit: ton)

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
<u>North Wahby</u>													
Berseem (Long)	4,916	10,520	13,360	13,208	16,172	19,740	21,000	21,000	21,000	21,000	21,000	21,000	21,000
" (Short)				788	2,310	4,043	4,935	5,250	5,250	5,250	5,250	5,250	5,250
" (Long in orchard)				316	924	1,620	1,344	632					
" (Short in orchard)				317	926	1,621	1,346	633					
Berseem Total	4,916	10,520	14,781	17,368	23,456	27,365	27,515	26,250	26,250	26,250	26,250	26,250	26,250
Sorghum	4,253	15,120	21,956	21,609	17,913	18,585	18,900	18,900	18,900	18,900	18,900	18,900	18,900
Wheat		520	961	1,161	930	946	946	946	946	946	946	946	946
Tomato			1,734	4,202	6,610	7,407	7,880	7,880	7,880	7,880	7,880	7,880	7,880
Groundnuts			126	357	630	777	840	840	840	840	840	840	840
Watermelon			2,205	5,775	9,135	10,185	10,500	10,500	10,500	10,500	10,500	10,500	10,500
" (in orchard)			886	2,315	3,663	2,819	1,265						
Watermelon Total			3,091	80,90	12,798	13,004	11,765	10,500	10,500	10,500	10,500	10,500	10,500
Olive			88	244	634	1,260	2,100	2,688	2,940	2,940	2,940	2,940	2,940
Orange			76	291	708	1,264	1,396	2,338	2,528	2,528	2,528	2,528	2,528
Mango				38	113	217	378	662	987	1,197	1,260	1,260	1,260
Guava			22	93	266	498	678	742	742	742	742	742	742
<u>Com Osheem</u>													
Berseem (Long)	1,560	3,992	6,756	6,188	7,052	9,100	10,000	10,000	10,000	10,000	10,000	10,000	10,000
" (Short)			250	838	1,763	2,275	2,500	2,500	2,500	2,500	2,500	2,500	2,500
" (Long in orchard)			100	340	720	728	460						
" (Short in orchard)			100	338	892	719	455						
Berseem Total	1,560	3,992	7,206	7,704	10,427	12,822	13,415	12,500	12,500	12,500	12,500	12,500	12,500
Sorghum	1,350	5,363	9,908	11,285	8,420	8,775	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Wheat		165	374	583	425	436	436	436	436	435	435	435	435
Tomato			550	1,563	2,946	3,313	3,625	3,625	3,625	3,625	3,625	3,625	3,625
Groundnuts			40	130	268	345	387	387	387	387	387	387	387
Watermelon			700	2,125	4,033	4,625	4,833	4,833	4,833	4,833	4,833	4,833	4,833
" (in orchard)			280	857	1,676	1,529	910						
Watermelon Total			980	2,982	5,709	6,154	5,743	4,833	4,833	4,833	4,833	4,833	4,833
Olive			28	89	253	500	900	1,220	1,400	1,400	1,400	1,400	1,400
Orange			24	102	280	528	830	1,072	1,208	1,208	1,208	1,208	1,208
Mango				12	41	92	158	273	430	555	600	600	600
Guava			7	33	102	206	311	357	357	357	357	357	357
<u>Cattle Fattening Centre</u>													
Berseem	2,600	6,800	9,200	13,000	18,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Sorghum	2,250	7,250	13,100	16,600	17,500	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000

Table D2-9 (1) Crop Yield by Year

(Unit: ton)

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
<u>North Wahby</u>													
<u>1st block</u>													
Berseem (Long)	1,229	992	788	1,260	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575
" (Short)				788	1,260	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575
" (Long in orchard)				158	252	315	0						
" (Short in orchard)				635	1,012	1,265	0						
Berseem Total	1,229	992	2,367	3,784	4,730	5,150	5,150	5,150	5,150	5,150	5,150	5,150	5,150
Sorghum	4,253	9,450	5,103	5,355	5,670	5,670	5,670	5,670	5,670	5,670	5,670	5,670	5,670

Table D2-9 (2)

(Unit: ton)

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
<u>North Wahby</u>													
(1st block)													
Wheat		520	268	284	284	284	284	284	284	284	284	284	284
Tomato			1,734	1,892	2,365	2,365	2,365	2,365	2,365	2,365	2,365	2,365	2,365
Groundnuts			124	189	252	252	252	252	252	252	252	252	252
Watermelon			2,205	2,335	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
" (in orchard)			1,771	2,277	2,530								
Watermelon Total			3,976	5,112	5,680	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
Olive			88	126	378	630	882	882	882	882	882	882	882
Orange			76	190	380	570	760	760	760	760	760	760	760
Mango			38	63	95	189	315	378	378	378	378	378	378
Guava			22	64	160	224	224	224	224	224	224	224	224
2nd													
Berseem (Long)		1,638	1,323	1,050	1,680	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
" (Short)				1,050	1,680	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
" (Long in orchard)				210	336	420							
" (Short in orchard)				840	1,344	1,680							
Berseem Total		1,638	1,323	3,150	5,040	6,300	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Sorghum		5,670	12,600	6,804	7,140	7,560	7,560	7,560	7,560	7,560	7,560	7,560	7,560
Wheat			693	357	378	378	378	378	378	378	378	378	378
Tomato				2,310	2,520	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
Groundnuts				168	252	336	336	336	336	336	336	336	336
Watermelon				2,940	3,780	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
" (in orchard)				2,352	3,024	3,360							
Watermelon Total				5,292	6,804	7,560	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Olive				118	168	504	840	1,176	1,176	1,176	1,176	1,176	1,176
Orange				101	252	504	756	1,008	1,008	1,008	1,008	1,008	1,008
Mango					50	84	126	252	420	504	504	504	504
Guava				29	84	210	294	294	290	290	290	290	290
3rd													
Berseem (Long)			1,229	992	788	1,260	1,575	1,575	1,575	1,575	1,575	1,575	1,575
" (Short)					788	1,260	1,575	1,575	1,575	1,575	1,575	1,575	1,575
" (Long in orchard)					158	252	315						
" (Short in orchard)					633	1,012	1,265						
Berseem Total			1,229	992	2,567	3,784	4,370	3,150	3,150	3,150	3,150	3,150	3,150
Sorghum			4,253	9,450	5,103	5,353	5,670	5,670	5,670	5,670	5,670	5,670	5,670
Wheat				520	268	284	284	284	284	284	284	284	284
Tomato					1,734	1,892	2,365	2,365	2,365	2,365	2,365	2,365	2,365
Groundnuts					126	189	252	252	252	252	252	252	252
Watermelon					2,205	2,335	3,150	3,150	3,150	3,150	3,150	3,150	3,150
" (in orchard)					1,771	2,277	2,530						
Watermelon Total					3,976	5,112	5,680	3,150	3,150	3,150	3,150	3,150	3,150
Olive					88	126	378	630	882	882	882	882	882
Orange					76	190	380	570	760	760	760	760	760
Mango						38	63	95	189	315	378	378	378
Guava						22	64	164	224	224	224	224	224

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
<u>Com Osheem</u>													
1st block													
Berseem (Long)	390	315	250	400	500	500	500	500	500	500	500	500	500
" (Short)			250	400	500	500	500	500	500	500	500	500	500
" (Long in orchard)			25	40	50								
" (Short in orchard)			100	160	200								
Berseem Total			825	1,400	1,750	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Sorghum	1,350	3,000	1,620	1,700	1,800	1,800	1,800	1,300	1,800	1,800	1,800	1,800	1,800

Table D2-9 (3)

	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th																																																																																																																
<u>Com Osheem</u>																																																																																																																													
<u>(1st block)</u>																																																																																																																													
Wheat		165	85	90	90	90	90	90	90	90	90	90	92																																																																																																																
Tomato			550	600	750	750	750	750	750	750	750	750	750																																																																																																																
Groundnuts			40	60	80	80	80	80	80	80	80	80	80																																																																																																																
Watermelon			700	900	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000																																																																																																																
" (in orchard)			280	360	400																																																																																																																								
Watermelon Total			980	1,260	1,400	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000																																																																																																																
Olive			28	40	120	200	280	280	280	280	280	280	280																																																																																																																
Orange			24	60	120	180	240	240	240	240	240	240	240																																																																																																																
Mango				12	20	30	60	100	120	120	120	120	120																																																																																																																
Guava			7	35	102	206	311	357	357	350	350	350	350																																																																																																																
2nd																																																																																																																													
Berseem (Long)		683	551	438	700	875	875	875	875	875	875	875	875																																																																																																																
" (Short)				438	700	875	875	875	875	875	875	875	875																																																																																																																
" (Long in orchard)				45	72	90																																																																																																																							
" (Short in orchard)				178	284	355																																																																																																																							
Berseem Total		683	551	1,535	2,456	3,071	2,626	2,626	2,626	2,626	2,626	2,626	2,626																																																																																																																
Sorghum	2,363	5,250	2,835	2,975	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150																																																																																																																
Wheat		289	149	158	158	158	158	158	158	158	158	158	158																																																																																																																
Tomato				963	1,050	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313																																																																																																																
Groundnuts				70	105	140	140	140	140	140	140	140	140																																																																																																																
Watermelon				1,225	1,575	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750																																																																																																																
" (in orchard)				497	639	710																																																																																																																							
Watermelon Total				1,722	2,214	2,460	1,750	1,750	1,750	1,750	1,750	1,750	1,750																																																																																																																
Olive				49	70	210	350	490	490	490	490	490	490																																																																																																																
Orange				42	106	212	318	424	424	424	424	424	424																																																																																																																
Mango					21	35	53	105	175	210	210	210	210																																																																																																																
Guava				7	20	50	70	70	70	70	70	70	70																																																																																																																
3rd																																																																																																																													
Berseem (Long)			378	709	563	900	1,125	1,125	1,125	1,125	1,125	1,125	1,125																																																																																																																
" (Short)					563	900	1,125	1,125	1,125	1,125	1,125	1,125	1,125																																																																																																																
" (Long in orchard)					58	92	115																																																																																																																						
" (Short in orchard)					228	364	455																																																																																																																						
Berseem Total			3,038	6,750	3,645	3,825	4,050	4,050	4,050	4,050	4,050	4,050	4,050																																																																																																																
Wheat				544	177	188	188	188	188	188	188	188	188																																																																																																																
Tomato					1,146	1,250	1,562	1,562	1,562	1,562	1,562	1,562	1,562																																																																																																																
Groundnuts					83	125	167	167	167	167	167	167	167																																																																																																																
Watermelon					1,458	1,875	2,083	2,083	2,083	2,083	2,083	2,083	2,083																																																																																																																
" (in orchard)					657	819	910																																																																																																																						
Watermelon Total																																																																																																																													
Olive					63	90	270	450	630	630	630	630	630																																																																																																																
Orange					54	136	272	408	544	544	544	544	544																																																																																																																
Mango					27	45	68	135	225	270	270	270	270																																																																																																																
Guava					16	46	115	161	161	161	161	161	161																																																																																																																
<table border="1"> <thead> <tr> <th></th> <th>8th</th> <th>9th</th> <th>10th</th> <th>11th</th> <th>12th</th> <th>13th</th> <th>14th</th> <th>15th</th> <th>16th</th> <th>17th</th> <th>18th</th> <th>19th</th> <th>20th</th> </tr> </thead> <tbody> <tr> <td colspan="14"><u>Cattle Fattening Centre</u></td> </tr> <tr> <td colspan="14"><u>1st block</u></td> </tr> <tr> <td>Berseem</td> <td></td> <td>650</td> <td>1,050</td> <td>1,250</td> <td>2,000</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> </tr> <tr> <td>Sorghum</td> <td>2,250</td> <td>5,000</td> <td>8,100</td> <td>8,500</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> </tr> <tr> <td colspan="14"><u>2nd block</u></td> </tr> <tr> <td>Berseem</td> <td></td> <td>650</td> <td>1,050</td> <td>1,250</td> <td>2,000</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> <td>2,500</td> </tr> <tr> <td>Sorghum</td> <td>2,250</td> <td>5,000</td> <td>8,100</td> <td>8,500</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> <td>9,000</td> </tr> </tbody> </table>															8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	<u>Cattle Fattening Centre</u>														<u>1st block</u>														Berseem		650	1,050	1,250	2,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	Sorghum	2,250	5,000	8,100	8,500	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	<u>2nd block</u>														Berseem		650	1,050	1,250	2,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	Sorghum	2,250	5,000	8,100	8,500	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th																																																																																																																
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Berseem		650	1,050	1,250	2,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500																																																																																																																
Sorghum	2,250	5,000	8,100	8,500	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000																																																																																																																
<u>2nd block</u>																																																																																																																													
Berseem		650	1,050	1,250	2,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500																																																																																																																
Sorghum	2,250	5,000	8,100	8,500	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000																																																																																																																

Table D2-10 Agricultural Machinery for North Wahby and Com Osheem Areas

<u>Machinery</u> (Private farm)	<u>Form</u>	<u>North Wahby Area</u>	<u>Com Osheem Area</u>	<u>Total</u>	<u>Cattle fattaring centre</u>
Tractor	65 Ps	12	6	18	7
Mold board plow	14" x 2	8	4	12	3
Rotavator	230 cm	6	3	9	6
Disc harrow	15" x 24	8	4	12	3
Tooth harrow	310 cm	8	4	12	3
Ridger	3 rows	7	4	11	-
Cultivator	3 rows	1	1	2	-
Sprayer	600 l	7	3	10	-
Thresher	3 hr/fed.	7	3	10	-
Forage harvester		-	-	-	8
Farm Waggon		-	-	-	8
Manure spreader		-	-	-	4
Broad caster		-	-	-	4

Table D2-11 Working Efficiency

<u>Machinery</u>	<u>Form</u>	<u>Efficiency</u> (hours/feddan)
Rotavator	230 cm	1.1
Mold board plow	14" x 2	1.0
Disc harrow	15" x 24	0.6
Tooth harrow	310 cm	0.3
Ridger	3 rows	0.8
Cultivator	3 rows	0.55
Sprayer	600 l	0.35
Thresher	3 hr/fed.	3

Table D2-12 Input Materials Applied per Feddan by Crop

Crop	Watermelon	Groundnuts	Berseem	Tomato	Wheat	Sorghum
Seed	Giza No.1 ; 1kg	Local; 15kg	Local ; 15kg	Britchard etc.; 250gr	Ciza 1S7; 75kg Sokha 8	Sordan; 25kg Pioneer
Fertilizers						
Superphosphate	150kg	200kg	100kg and 100kg at each cut	300kg	100kg	100kg
Potassium	100kg	-	-	100kg	-	-
Azot or NH_4NO_3	46% ; 100kg	46% ; 100kg	33% ; 50kg	46% ; 160kg	46% ; 150kg	50% ; 100kg
Chemicals						
	Karathene ; 10l		Lannote; 300cc	Nursery stage		
	Dianthwate 4%; 500cc			Tamaron 40% ; 1,200cc Diathene M45; 2,000gr		
				Field stage		
				Tamaron 40% ; 1,200cc Diathene M45; 750gr Diathene sulfate		

Table D2-12 Input Materials Applied per Feddan by Crop (over 7 years age)

Crops	Olive	Orange	Guava	Mango (over 10 years)
Seedlings	150 trees	150 trees	150 trees	80 trees
Fertilizers				
Superphosphate	300 kg	300 kg	200 kg	200 kg
Potassium	-	-	-	100 kg
Azotor NH_4NO_3	46% ; 300 kg	46% ; 300 kg	46% ; 200 kg	15.5% ; 1,000 kg
Chemicals				
	Sedial 500 ; 30 kg	(same as olive)	(same as olive)	Rubligan; 6 l
	Dianthwate 40% ; 6 l			Volk oil; 80 l
				Malathion; 6 l
				Mankeper; 60 kg

Source: Department of Agriculture, Fayoum

Table D2-13 Monthly Labor Balance

Size	Item	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
5 fed.	Plan	74.4	80.5	62.4	40.8	48.0	45.6	16.4	67.8	45.8	65.6	13.9	64.8	626.0
	Home Labor	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	600.0
	Balance	24.4	30.5	12.4	9.2	2.0	4.4	33.6	17.8	4.2	15.6	36.1	14.8	26.0
15 fed.	Plan	223.2	241.5	187.2	122.4	144.0	136.8	49.2	203.4	157.4	196.8	41.7	194.4	1,878.0
	Home Labor	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	300.0
	Balance	198.2	216.5	162.2	97.4	119.0	111.8	24.2	178.4	112.4	171.8	16.7	169.4	1,578.0
20 fed.	Plan	297.6	322.0	249.6	163.2	192.0	182.4	65.6	271.2	183.2	262.4	55.6	259.2	2,504.0
	Home Labor	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	300.0
	Balance	272.6	297.0	224.6	138.2	167.0	157.4	40.6	246.2	158.2	237.4	50.6	234.2	2,204.0

Fig. D.2-1 Alternatives of Cropping Pattern

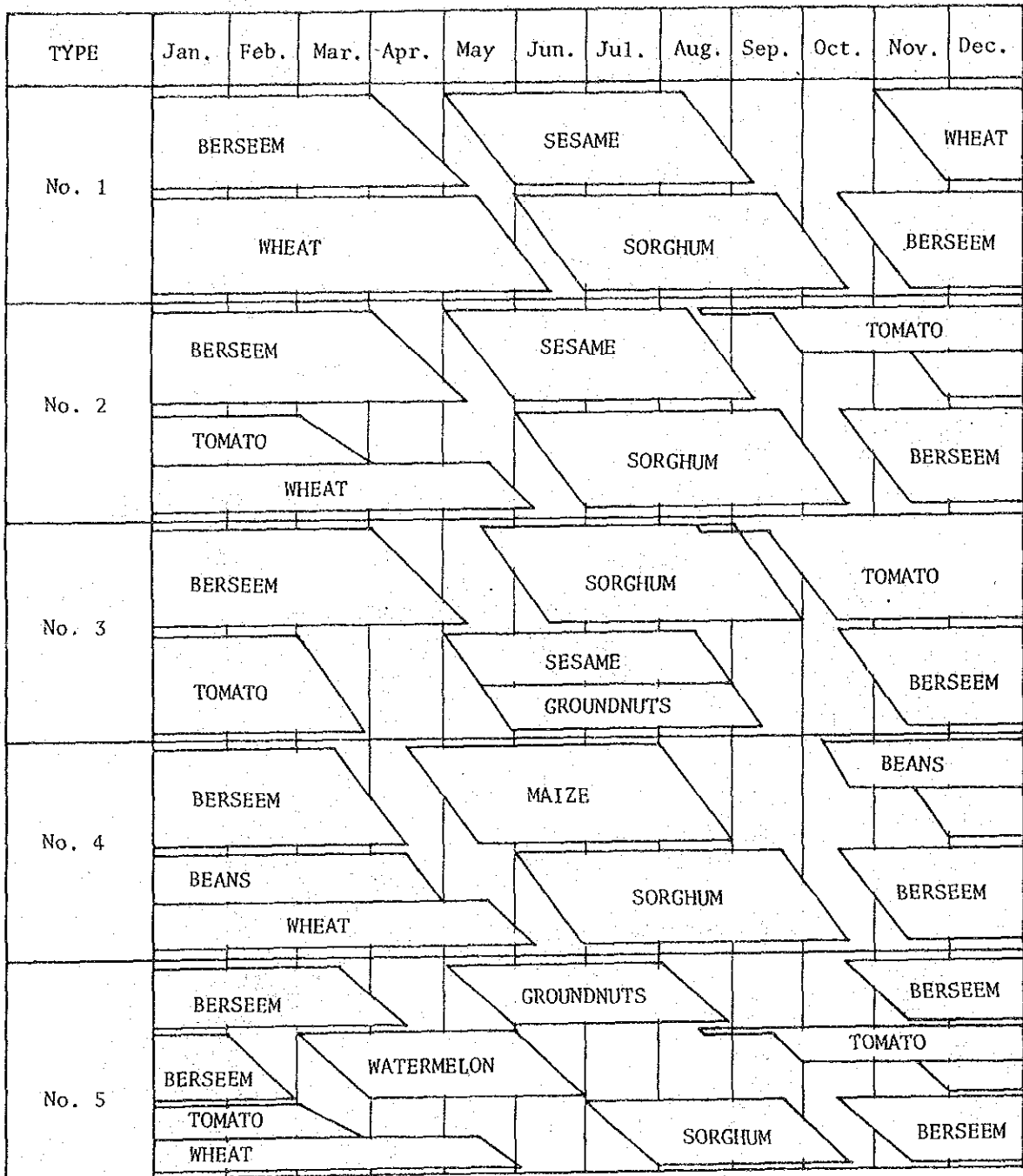


Fig. D2-2 Machinery Operation Schedule

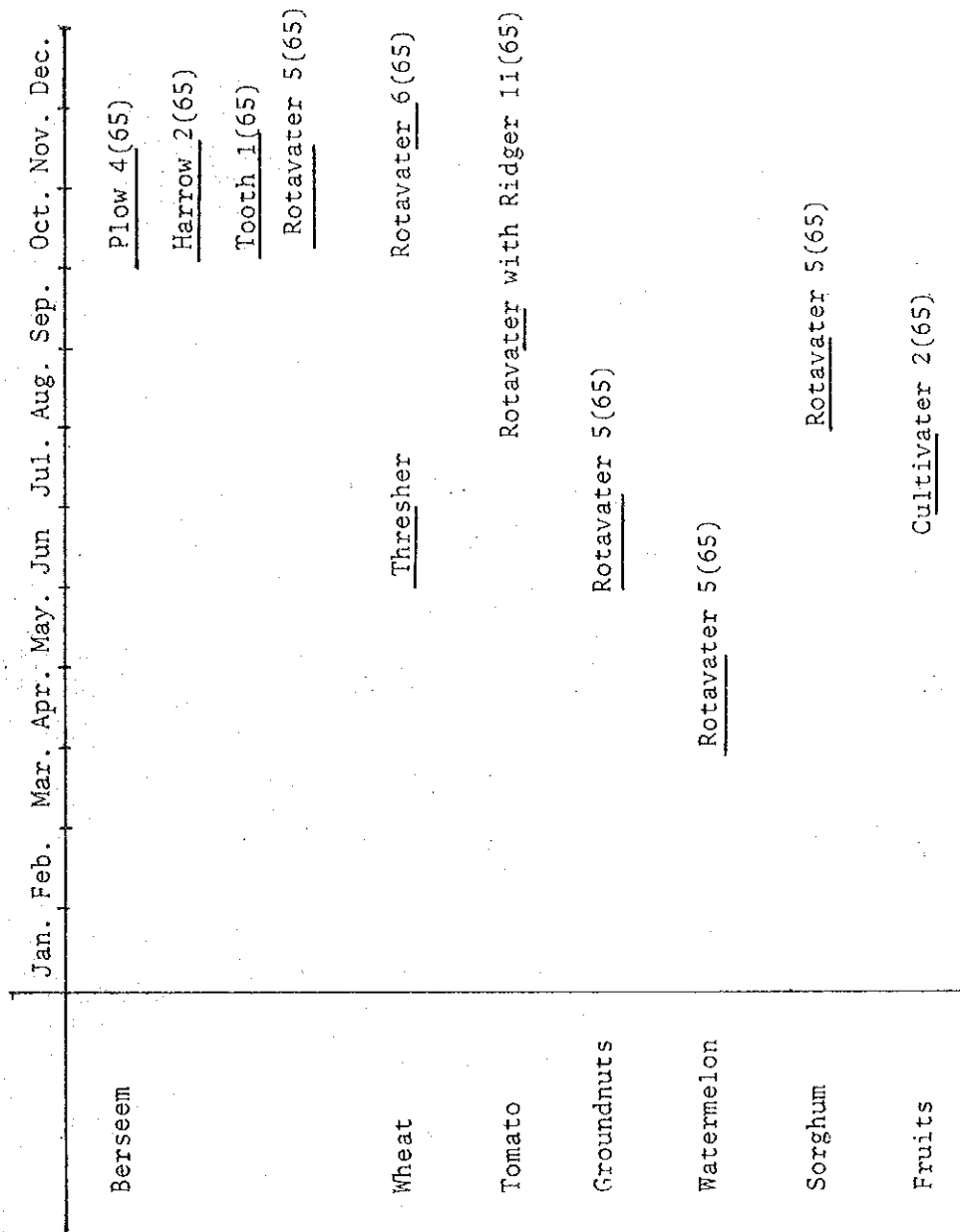
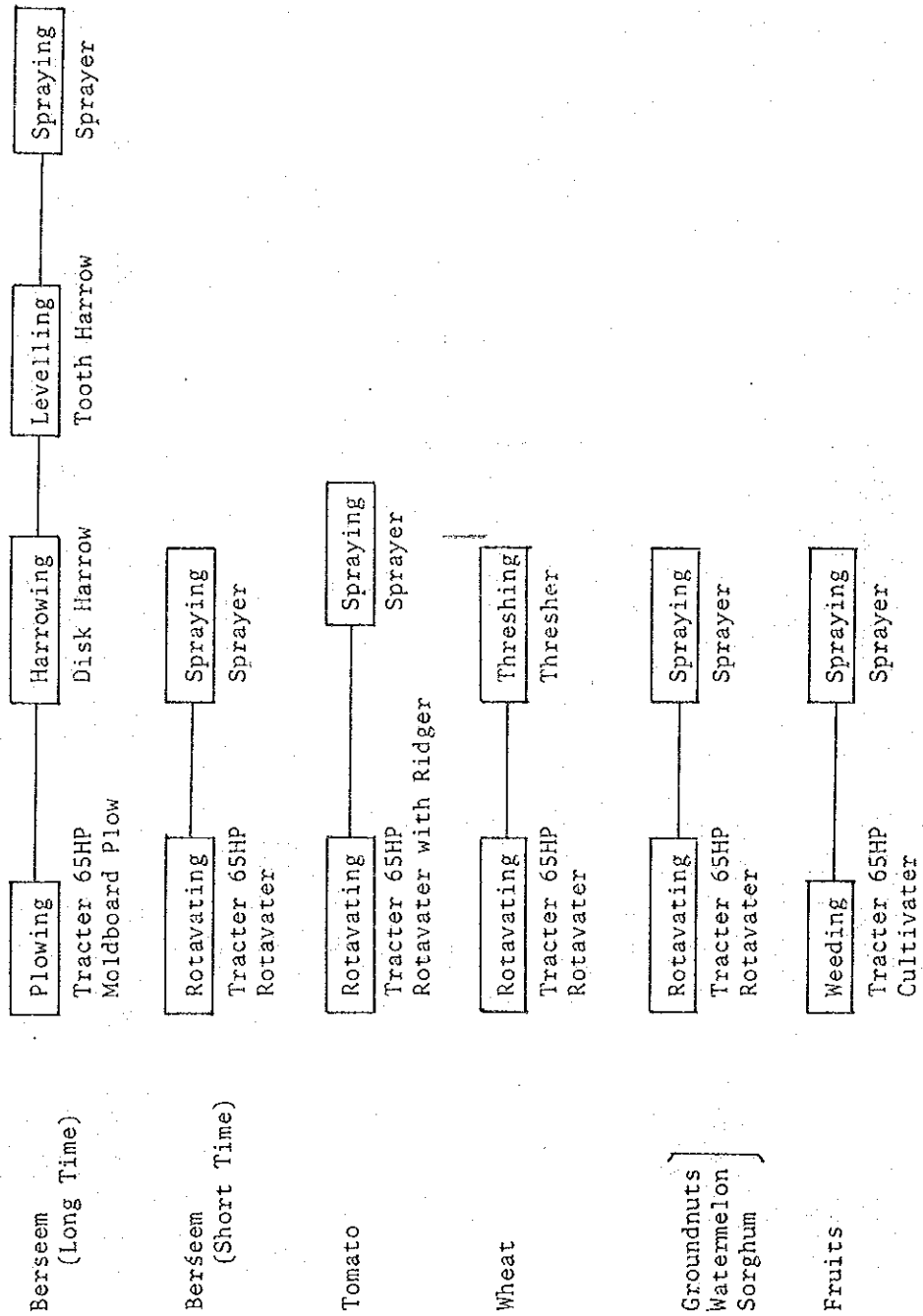


FIG. D2-3 Operation System by Machine



D-3. Wahby Downstream Area

D-3.1. Present Agriculture Conditions

The average cultivated land per farmhousehold in this area is about seven feddan. However, the cropping intensity is low, for example, 79 percent in winter, 55 percent in summer, or 134 percent per year. Nili crops are widely cultivated, as much as 20 percent of the total cultivated land is applied to their production, this is much more than the seven percent average in Egypt.

Main crops are berseem, wheat, tomatoes, barley and beans as winter crops, millet, cotton, sesame and sunflower as summer crops, and maize as a Nili crop. Because of the shortage of irrigation water, a rotational cultivation has not been introduced. Berseem, maize and wheat straw are fed to cattle.

D-3.2. Proposed Cropping Pattern

Variety of crops and the proposed cultivation area will be changed for the purpose of the improvement of the irrigation system, and the crop production may increase. However, it is assumed that the proposed cropping pattern would not be changed.

D.3.3. Yield and Production

Yield and production of each crops to be introduced in the area are shown in Table D3-1.

D-3.4. Agricultural Mechanization Plan

Tractors, chisel plows and sprayers are fairly widely used in the area at present. Agricultural mechanization in this area is expected to be extended in the future.

D-3.5. Crop Budget

(1) Farm Input

Required amount of seeds, fertilizers and agricultural chemicals per feddan for cotton cultivation are as follows:

Seeds	Giza No.75	25 kg
Fertilizers	Superphosphate	100 kg
	Urea	100 kg
Agricultural Chemicals	Lannet	300 cu.m
	DC	600 cu.m
	CCN	"
	DIZA	"

Those for other crops are the same as shown in Table D2-12.

(2) Labor Requirement

The present cropped area is 10,965 feddan for winter crops and 8,041 feddan for the summer crops. These area will be extended to 13,113 feddan for the winter crops and 11,656 feddan for the summer crops by executing the Project. This means that the crop intensity will be 95 % in winter, 80 % in summer and 175 % through a year.

A cultivated land per farmhousehold is comparatively wide (7 feddan) and the present cropping intensity is low (134 %). Since some agricultural labor forces escape to other area at present, it is supposed that there will be enough labor force for the Project.

At present, harvesting of cotton is carried out by labor mobilization of children, and this system is proposed to continue in the future.

Table D3-1 Cropped Area, Yield and Production with Project
(Wahby Downstream Area)

	Without Project			With Project		
	Area	Yield	Production	Area	Yield	Production
Berseem	5,179	4.7	24,341	6,161	4.8	29,573
Wheat	3,285	1.4	4,599	3,910	1.6	6,256
Barley	976	1.1	1,074	1,163	1.4	1,628
Beans	428	0.9	385	509	1.1	560
Tomato	1,087	9.5	10,326	1,300	12.0	15,600
Others (Winter crop)	10			70		
Cotton	360	0.8	288	513	1.0	513
Maize	2,837	0.9	2,553	4,091	1.5	6,137
Millet	4,357	1.3	5,664	5,711	1.7	9,709
Sesame	147	0.4	60	221	0.5	111
Sunflower	234	0.8	187	338	0.8	270
Others (summer & nili)	104			782		
<u>Total land (feddan)</u>		<u>14,620</u>		<u>14,570</u>		
Cropped in winter		10,965 (75%)		13,113 (90%)		
Cropped in summer		8,041 (55%)		11,656 (80%)		

Note: Unit of Area : feddan
Unit of Yield : ton/feddan
Unit of Production: ton

D-4. South Area of Lake Qarun

D-4.1. Present Agricultural Conditions

The average farm size of cultivated land per farmhousehold in this area is about four feddan. Cropping intensity is very low such as 60 percent in winter, 68 percent in summer, or 128 percent through a year. Nili crops are widely cultivated as much as 23 percent of the total cultivated area.

Main crops are berseem, wheat and tomatoes as winter crops, and millet, maize and cotton as summer and Nili crops. Rotational cultivation system has not been introduced.

D-4.2. Proposed Cropping Pattern

Variety of crops and the proposed cultivation area will be changed for the purpose of the improvement of the irrigation and drainage system, and the crop production may increase. However, it is assumed that the proposed cropping pattern would not be changed.

D-4.3. Yield and Production

Yield and production of each crops to be introduced in the area are shown in Tables D4-1, D4-2, D4-3 and D4-4.

D-4.4. Agricultural Mechanization Plan

A tractor, a chisel plow and a sprayer are used at the present. Agricultural mechanization in the area is expected to be extended in the future.

D-4.5 Crop Budget

(1) Farm Input

Required amount of seeds, fertilizers and agricultural chemicals per feddan are shown in Chapter D-3.5 and Table D2-12.

(2) Labor Requirement

The present cropped area is 3,583 feddan for the winter crops and 3,274 feddan for the summer crops. These areas will be extended to 4,634 feddan for the winter crops and 4,125 feddan for the summer crops by executing the Project. This means that the cropping intensity will be 76 % in winter, 86 % in summer and 162 % through a year.

A cultivated land per farmhousehold is 4 feddan and the present cropping intensity is low (128 %). Since some agricultural labor forces escape to other area at the present, it is supposed that there is enough labor force for the Project.

Table D4-1 Cropped Area, Yield and Production with Project
(South Area of Lake Qarun)

	Without Project			With Project		
	Area	Yield	Production	Area	Yield	Production
Berseem (per one cut)	2,162	4.7	1,016.2	2,804	4.9	13,868
Wheat	975	1.3	1,293	1,254	1.6	2,022
Barley	94	1.3	123	126	1.6	199
Beans	226	0.6	141	295	1.0	292
Tomato	99	7.0	693	117	9.0	1,053
Onion	15	9.0	135	17	9.4	160
Others(winter crop)	12			21		
Cotton	844	0.9	760	1,076	1.1	1,206
Maize	1,049	1.4	1,468	1,224	1.7	2,099
Millet	1,289	1.7	2,191	1,730	1.8	3,103
Sunflower	88	0.6	53	89	0.7	62
Others(summer crop)	4			6		
Total land(feddan)		5,345			5,610	
Cropped in winter		3,583 (67%)			4,634 (83%)	
Cropped in summer		3,274 (61%)			4,125 (74%)	

Note: Unit of Area : feddan
Unit of Yield : ton/feddan
Unit of Production: ton

Table D4-2. Crop Production in Abu-Harawa Sub-Area

	Existing										Future												
	Direct affected area					Indirect affected area					Class A				Class B								
	Total area (fed)	Area Yield Prod. (ton)	Area Yield Prod. (fed)	Area Yield Prod. (ton)	Area Yield Prod. (fed)	Total area (fed)	Area Yield Prod. (ton)	Area Yield Prod. (fed)	Area Yield Prod. (ton)	Area Yield Prod. (fed)	Direct affected new land (fed)	Direct affected old land (fed)	Direct affected (ton)	Indirect affected (fed)	Indirect affected (ton)								
Berseem	373	4.7	1,753	276	4.6	1,269	97	5.0	485	825	5.0	4,089	89	4.6	409	654	5.0	3,270	82	5.0	410		
Wheat	167	1.3	217	123	1.2	147	44	1.6	70	370	1.6	576	40	1.2	48	293	1.6	469	37	1.6	59		
Barley	22	1.3	29	16	1.2	19	6	1.6	10	49	1.6	76	5	1.2	6	59	1.6	62	5	1.6	8		
Beans	41	0.6	25	30	0.5	14	11	1.0	11	91	0.9	86	10	0.5	5	72	1.0	72	9	1.0	9		
Others (winter crop)	5		5			0				11			1		9				1				
Cotton	250	0.9	225	222	0.9	197	28	1.0	28	376	1.0	371	47	0.9	42	292	1.0	292	37	1.0	37		
Maize	183	1.4	256	163	1.3	220	20	1.8	56	276	1.7	480	55	1.3	46	214	1.8	585	27	1.8	49		
Millet	478	1.7	813	425	1.7	718	53	1.8	95	720	1.8	1,287	91	1.7	155	559	1.8	1,006	70	1.8	126		
Others (summer crop)	1		0			1				2			0		2				0				
Total land	1,520		1,350			170				1,750			230		1,550				170				
Cropped in winter	608	(40%)	450	(40%)		158	(40%)			1,346	(77%)		145	(63%)		1,067	(79%)		134	(79%)			
Cropped in summer	912	(60%)	810	(60%)		102	(60%)			1,374	(79%)		175	(75%)		1,067	(79%)		134	(79%)			

Table D4-3. Crop Production in Bats Said Sub-Area

	Existing						Future															
	Direct affected area			Indirect affected area			Class A			Class B												
	Total area Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Total area Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Direct affected new land Area Yield Prod. (fed) (ton)	Indirect affected old land Area Yield Prod. (fed) (ton)	Direct affected new land Area Yield Prod. (fed) (ton)	Indirect affected old land Area Yield Prod. (fed) (ton)	Direct affected new land Area Yield Prod. (fed) (ton)	Indirect affected old land Area Yield Prod. (fed) (ton)										
Berseem	1,245	4.7	5,852	709	4.5	3,172	536	5.0	2,680	1,536	5.0	6,671	19	4.5	86	750	5.0	3,750	567	5.0	2,855	
Wheat	559	1.3	727	518	1.1	341	241	1.6	386	600	1.6	956	8	1.1	9	337	1.6	539	255	1.6	408	
Berley	72	1.3	94	41	1.1	44	51	1.6	50	77	1.6	123	1	1.1	1	43	1.6	69	33	1.6	53	
Beans	138	0.6	83	79	0.3	24	59	1.0	59	148	1.0	147	2	0.5	1	85	1.0	85	65	1.0	65	
Others (winter crop)	1		1			0			2			0			2						0	
Cotton	245	0.9	311	196	0.8	162	149	1.0	149	448	1.3	583	5	0.8	4	252	1.0	252	191	1.0	191	
Maize	251	1.4	351	143	1.1	157	108	1.8	194	326	1.8	583	4	1.1	4	183	1.8	329	139	1.8	250	
Millet	659	1.7	1,120	576	1.6	609	294	1.8	511	856	1.8	1,539	10	1.6	16	482	1.8	868	364	1.8	655	
Others (summer crop)	1		1			0			1			0			1						0	
Total areable land	2,370		1,350			1,020			2,405			2,405			35			1,350			1,020	
Cropped in winter	2,015	(85%)	1,148	(85%)		867	(85%)		2,163	(90%)		30	(85%)		1,215	(90%)		918	(90%)			
Cropped in summer	1,256	(53%)	716	(5%)		541	(53%)		1,631	(68%)		19	(53%)		918	(68%)		684	(68%)			

Table D4-4. Crop Production in Abu Torfaya Sub-Area

	Existing						Future											
	Direct affected area			Indirect affected area			Total area			Class A			Class B					
	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)	Area Yield Prod. (fed) (ton)			
Berseem	544	4.7	2,557	363	4.5	1,561	181	5.5	996	643	4.8	3,108	429	4.5	1,931	214	5.5	1,177
Wheat	249	1.4	349	166	1.3	208	83	1.7	141	284	1.7	490	196	1.5	294	98	2.0	196
Beans	47	0.7	53	31	0.5	17	16	1.0	16	56	1.1	59	37	0.8	30	19	1.5	29
Tomato	99	7.0	693	66	5.5	363	33	10.0	330	117	9.0	1,055	78	7.0	546	39	15.0	507
Onion	15	9.0	135	10	8.0	80	5	11.0	55	17	9.4	160	11	8.0	88	6	12.0	72
Others (winter crop)	6			4			2			8			6			2		
Cotton	249	0.9	224	166	0.8	133	83	1.1	91	252	1.0	252	168	0.9	151	84	1.2	101
Maize	615	1.4	861	410	1.2	492	205	1.8	369	622	1.7	1,036	415	1.4	581	207	2.2	455
Millet	152	1.7	258	101	1.6	166	51	1.8	92	154	1.8	277	103	1.6	165	51	2.2	119
Sunflower	88	0.6	53	59	0.5	30	29	0.8	23	89	0.7	62	59	0.6	35	50	0.9	27
Others (summer crop)	2			1			1			3			2			1		
Total area	1,455		970	485		485	1,455		970	1,455		970	485		970	485		485
Cropped in winter	960	(66%)	640	(66%)	320	(66%)	1,125	(77%)	757	(78%)		757	(78%)		378	(78%)		
Cropped in summer	1,106	(76%)	737	(76%)	369	(76%)	1,120	(77%)	747	(77%)		747	(77%)		575	(77%)		

D-5. Marketing Structures

D-5.1. Present Situation of Marketing in Fayoum

(1) Quota Crop

There are four wheat mills, one government rice mill and four cotton ginned factories. (refer to Tables D5-1, D5-2 and D5-3) The El Waddy cotton gin factory and the mill were surveyed by the study team as shown in the following description.

El Waddy Cotton Gin Factory

- Production Quantity in 1983

Raw seed cotton 46,029 kantar

Ginned cotton 53,739 "

Seed 37,739 ardab

Scarts 1,306 kantar.

- Raw cotton for El Waddy Factory is supplied by the Eastern Company for Cotton. Lint produced is sold to the Eastern Company. These products are generally consumed for a domestic purpose.

- Ginning unit cost is estimated at LE 2.5 per Kantar.

- Transportation costs are payed by the Eastern Company.

- Seed cotton grade of about 90 % is almost occupied by a good class.

- The ex-mill price would be estimated at raw material LE 75/Kantar + transportation cost + ginning cost LE 2.5/Kantar.

Government Rice Mill

- The milling capacity is 100 tons per day. An operation period of of the mill is about nine months. Quantities of paddy milled are 22,000 tons in 1982/1983 and 13,000 tons in 1983/1984. The reduction of quantities in 1983/1984 was caused from change to new rice breed.
- Milling rate is 65 percent.
- Destination of rice and by-products
 - * Rice Local market, about 1,000 tons was exported.
 - * Bran Animal feed factory
 - * Husk Brick factory
- Milling cost is LE 4.0 per ton of paddy.
- Transportation cost are paid by the Government Trading Company.
 - * Village collection center to mill ... LE 3.0 per ton of paddy
 - * Mill to local market LE 1.2 per ton of rice
- Paddy 1,000 kg ... Rice 65 percent, Bran 13 percent, Husk 16 percent, Broken 6 percent.
- Bran 5.0 LE/ton, Husk 55 LE/ton, Broken 120 LE/ton.

(2) Vegetable and Fruits

Fayoum Governorate has two wholesale market facilities for vegetable and fruits. The one of wholesale markets surveyed by the survey team was established in 1972. Vegetable and fruits produced

in Fayoum are collected by this market. Sometimes during summer season, part of the production is collected and is transferred from the other governorate, especially the north region.

It is reported that about 50 to 60 percent of total products of tomatoes, watermelon and cucumber are collected by this wholesale market. About 80 percent of tomatoes collected by this market are transported to Cairo. Prices of Watermelon and tomatoes are fluctuating according to demand and the governorate's tariff. In some case, price of mango also is fluctuated. The middlemen of 58 persons belongs to this market.

Wholesale prices are sometimes decided by the auction system and another time by the governorate tariff group.

Fayoum governorate has five districts. Four district excluding Fayoum have a special marketing day which every things are sold. The manager of the wholesale market suggested on the marketability of the projected crops as follows.

- The centralized marketing on vegetable and fruits shall be strengthen by the new central wholesale marketing law.
- The freezing system is a better method to protect the products from slump of price, especially for guava.
- It is better to improve the package box for vegetable and fruits.
- It is better to promote an agricultural industry for making jam and juice.
- The middlemen intend to reduce the marketing loss as much as possible. But in general, since the harvesting of tomatoes is made by boy's hand, the losses are not reduced. These losses also are caused from use of the traditional box.

The freezing plant surveyed by the Team belongs to the GERCO. The capacity of plant is 140 tons which are equipped by two room of 25 tons and three room of 30 tons. Fish and meat are frozen under the degree of (-)10 to (-)15 degree centigrade and (-)15 to (-)18 degree centigrade, respectively. Vegetable are cooled around three to five degree centigrade. Cooling system is not economy because of no user.

An improvement on the grading system of tomatoes is promoted by the Marketing Cooperative for Vegetable and Fruits, Fayoum. The activities of the cooperative are presented as follows.

Marketing Cooperative for Vegetable and Fruits

- Established Year 1964
- No. of Membership 63 local cooperatives
- Function of Cooperative
 - * to give loan for cultivation of tomato and sweet melon
 - * to supply all kinds of vegetable seeds excluding fruits
 - * to supply sprayer with or without motor and chemicals
 - * to supply paper for leaf
- Quantities of Commodity Handled
 - * ten ton of seeds
 - * loan LE 0.5 million for tomato and sweet melon
 - * two ton of chemicals per year
 - * 1.5 ton of sulphate
- Market Project

A cooperative has one project to establish the grading station for an export of tomato. Feasibility study was conducted by USA Agency and MOA of Egypt. After the

feasibility study, the grading station with capacity of 5,000 kg per hour will be prepared. The fund of 50 percent is prepared by the Netherland and the remained 50 percent by the cooperative society. This station is planned to locate at about 2 km from the Fayoum city and to start from next tomato season.

- Transportation Cost

Fayoum to Cairo LE 40 per 5 tons by truck
Fayoum to Alexandria ... LE 80 per 5 tons by truck

- Price of Tomato

A price of tomato has been fluctuated because of rich harvest in this year. The price is fluctuated from LE 30 to 100 per ton.

(3) Fruits Processing

There is no any large factory for processing fruits and vegetables processing factory in Fayoum. But the small and traditional factory has been played an important role. A fruits drying factory surveyed by the study team is located in the local unit of Biyakho village.

Fruits Drying Factory

- Established year	1965
- Staffs	Officers of Governorate
- Period of operation:	
Dates processing	10th of October to March
Apricots processing	25 days starting 20th of May

- Production and Prices

<u>Item</u>	<u>Dates</u>	<u>Apricots</u>
Raw fruits per year	100 tons (products 68 tons)	20 tons
Source of raw fruits	Farmers	Farmers
Average price of raw fruits	0.35 LE/kg	0.152 LE/kg
Processing production per year	68 tons/year (maximum 1 ton/day)	5 tons/year
Selling prices	0.7 LE/kg (including transportation cost)	3 LE/kg

- Market
1. School in village and Government
 2. Biscuit factory in Cairo and super market

- Processing of Dates

Fumigation ... washing ... drying ... extracting bones ...
pressing ... packing

- The purchasing cost of raw dates was from LE 0.4 to 0.73 per kg in the last year

Dry dates of 600 kg are extracted from one kilogram of raw dates. The profit is only 0.05 LE per kg. Raw dates are purchased from merchants. Profitability is very low because of high cost of raw dates and high labor wage. Marketing in Fayoum is unsuitable because the marketing for fresh dates is popular. Marketing to Cairo is more profitable. Export will be hopeful. Collecting raw dates and selling them to factory by the agricultural cooperative are difficult because the cooperative can treat only quota crops. Harvested raw dates are dried at a field or a dates garden for two or three days until middlemen collect dried dates by using advance payment. It is difficult for the factory to collect directly the

dates by truck from farmers. The factory has no function on the advance payment system and the advance purchasing system in directly.

D-5.2. Marketability of Project Crops

According to the New Five Years Plan, self-support ratio on the projected crops in 1986/87 are forecasted at 32.7 percent of wheat, 99.4 percent of vegetables, 100 percent of fruits and 66.1 percent of livestock meat. The full development stage in this Project is planned in 2002. The target year of the project is far from that of the national plan. It is supposed that the production of vegetables and fruits will reach at full self-support and in additionally some surplus of the crops will be expected. Hence the balance of demand and supply of the projected crops at present and with project were estimated under several hypothesis as follows.

(refer to Tables D5-4 and D5-5)

Wheat Supply in the Fayoum can not meet full demand at present. This condition will be continued in future. The production with project will contribute to reduce the shortage.

Groundnuts .. The annual production with shell in Fayoum is only 149 ton. This can not meet the full demand of 520 ton or 0.3 kg per capita. In future this shortage would be resolved by the Project.

Tomato At present, about 86 percent of total tomatoes produced in the Fayoum are distributed outside the Fayoum. Even if the annual growth rate of about four percent on the present tomato production will be forecasted, about 86 percent of the total production with project will be transported outside the Fayoum in future.

In future, the demand in a domestic market will be met the enough supply. The fresh tomatoes with good quality to be marketed from the Fayoum will be competitive in the domestic market. An export of fresh tomato produced in winter season will become an important marketing strategy in the Project. In order to realize the strategy, the tomato grading station would be established in the Project Area, as shown in Table D5-6.

- Olive Almost products are distributed outside the Fayoum. This situation will be continued in future. The possibility on the processing of pickled olive would be studied.
- Orange In the same way with groundnuts.
- Guava The products will contribute to reduce the shortage of supply in Fayoum.
- Watermelon .. It is estimated that at present watermelon production are under overproduction. About 27 percent is transferred outside the Fayoum. But the yield has been stagnant. Since it is supposed this stagnant will be still continued in future, the production of watermelon in Fayoum will not satisfy the future demand owing to increase of population.
- Mango At present, about 30 percent of the production of mango is marketed outside the Fayoum. According to the statistics of Egypt, annual growth rate of yield is high. In future, the production without Project would be transported outside the Fayoum. This projection is estimated by using annual consumption of 2.8 kg per capita which is less than 12.3 kg of

India and 5.8 kg of Philippines. It is considered that mango is high class fruits and consumer price is higher than other fruit. Then the consumption per capita has been under stagnant.

The North Wahby and Com Osheem areas to be reclaimed are considered as one of the most suitable place for mango production. An annual production by this Project will increase the marketable volume and then contribute to stabilization of market price.

Table D5-1 Cotton Ginned Factory

Name of Factory	Established Year	Capacity of Actual Production (Kanter)	(Kanter)	Number of Worker			Salaries per Year (LE)				
				Labor Clerk	Technician	Serv-ices	Total	Clerk	Techni-	Serv-ices	Total
ARABIA	1930	80,000	48,000	11	32	5	48	17,248	38,558	4,583	60,389
EL WADDY	1930	100,000	80,000	15	28	41	84	21,731	35,149	26,661	83,541
MISR	1934	90,000	90,095	13	34	26	73	19,953	30,885	8,355	59,173
MISR	1936	80,000	15,000	13	23	20	56	15,000	28,000	49,310	92,310
Total		350,000	283,095	52	117	92	261	73,912	132,592	88,909	295,413

Source: Annual Statistics of Fayoum Governorate, 1981

Table D5-2 Rice Mill

Capacity (ton/hr)	Actual (ton/year)	No. of Worker		
		Clerk	Technician	Labor
7	24,200	21	42	88
				151

Source: Annual Statistics of Fayoum Governorate, 1981

Table D5-3 Wheat Mill

<u>No. of Mill</u>	<u>Cylinder Type</u>		<u>No. of Worker</u>	<u>No. of Mill</u>	<u>Other Type (Electric Cell)</u>		<u>No. of Worker</u>
	<u>Capacity (ton/hr)</u>	<u>Actual (Sacks/yr)</u>			<u>Capacity (ton/hr)</u>	<u>Actual (Sacks/yr)</u>	
1	3.2	29,200	85	3	3.2	600,000	172
					3.3	240,000	60
					4.0	180,000	62
					(Total)	(1,020,000)	(294)

Source: Annual Statistics of Fayoum Governorate, 1981

Table D5-4 Supply and Demand Prospect
(New Five Year Development Plan)

<u>Products</u>	<u>Year</u>	<u>Domestic Production</u>	<u>Import</u>	<u>Total Demand (include export)</u>	<u>Degree of Self-Sufficiency</u>
Wheat	81/82	1,983.0	4,022.0	6,005.0	33.0
	86/87	2,387.0	4,904.0	7,291.0	32.7
Vege- table	81/82	9,106.0	67.0	9,173.0	99.3
	86/87	10,270.0	60.0	10,330.0	99.4
Fruits	81/82	2,900.0	36.0	2,936.0	98.8
	86/87	3,235.0	-	3,235.0	100.0
Meat	81/82	362.0	141.0	503.0	72.0
	86/87	397.0	204.0	601.0	66.1
Chicken	81/82	150.0	50.0	200.0	75.0
	86/87	251.0	17.0	268.0	93.7

Source: New Five Yen Development Plan.

Table D5-5 Supply and Demand in Fayoum with North Wahby and Com Osheem Areas

Crops	1981			1995			(Unit: ton)	
	Supply	Demand	Balance	By the		Total		
				Supply	Project			Supply
Wheat	101,268	142,400	-41,132	130,600	1,395	131,995	211,500	-79,505
Groundnuts	149	520	-371	150	1,240	1,390	890	500
Tomato	474,343	66,742	407,601	792,000	11,628	803,628	113,000	690,628
Watermelon	53,376	39,229	14,147	54,400	21,700	76,100	66,300	9,800
Olive	8,835	263	8,572	10,700	4,340	15,040	445	14,595
Orange	14,363	19,483	-5,120	24,000	3,720	27,720	32,900	-5,180
Mangoes	5,406	3,683	1,723	13,000	1,860	25,360	6,240	19,120
Guava	1,779	3,423	-1,644	3,000	1,085	4,085	5,795	-1,710

- Note:
1. Supply in 1981 is based on the Statistical Yearbook, Fayoum, 1982.
 2. Supply in 1995 is forecasted using the annual growth rate estimated based on those rate calculated on each crop production in the nationwide from 1977 to 1981.
The rate on olive is estimated using the rate in Fayoum as the productivity in the nationwide has been in constant during 1977 and 1981.
 3. Consumption per capita is based on the figures of FAO.
 4. Consumption rate per capita in 1995 is assumed for the rate in 1981 to increase one percent by year.

Table D5-6 Tomato Grading Station

1. Operation Plan for one set of grading machine

Efficiency : 27,600 pieces per hour (460 pieces per minute)
(average weight per piece --- 180 gram)
(5.0 ton per hour)

Handling volume per day :

$$27,600 \text{ pieces} \times 8 \text{ hour} = 220,800 \text{ pieces}$$

Tomato Production Yield per feddan :

$$15,000 \text{ kg} \div 0.18 = 83,333 \text{ pieces}$$

Havesting period : 90 days in winter season

Handling volume during havesting season :

$$220,800 \text{ pieces} \times 90 = 19,872,000 \text{ pieces}$$
$$19,872,000 \times 0.18 \text{ kg} = 3,577 \text{ ton}$$

Acreage to be able to handle by one grading machine

$$19,872,000 \div 83,333 = 238 \text{ feddan}$$
$$238 \text{ fed.} \div 775 \text{ fed.} = 30 \%$$

2. Number of grading machine to be projected --- three set

3. Quality of tamato handled

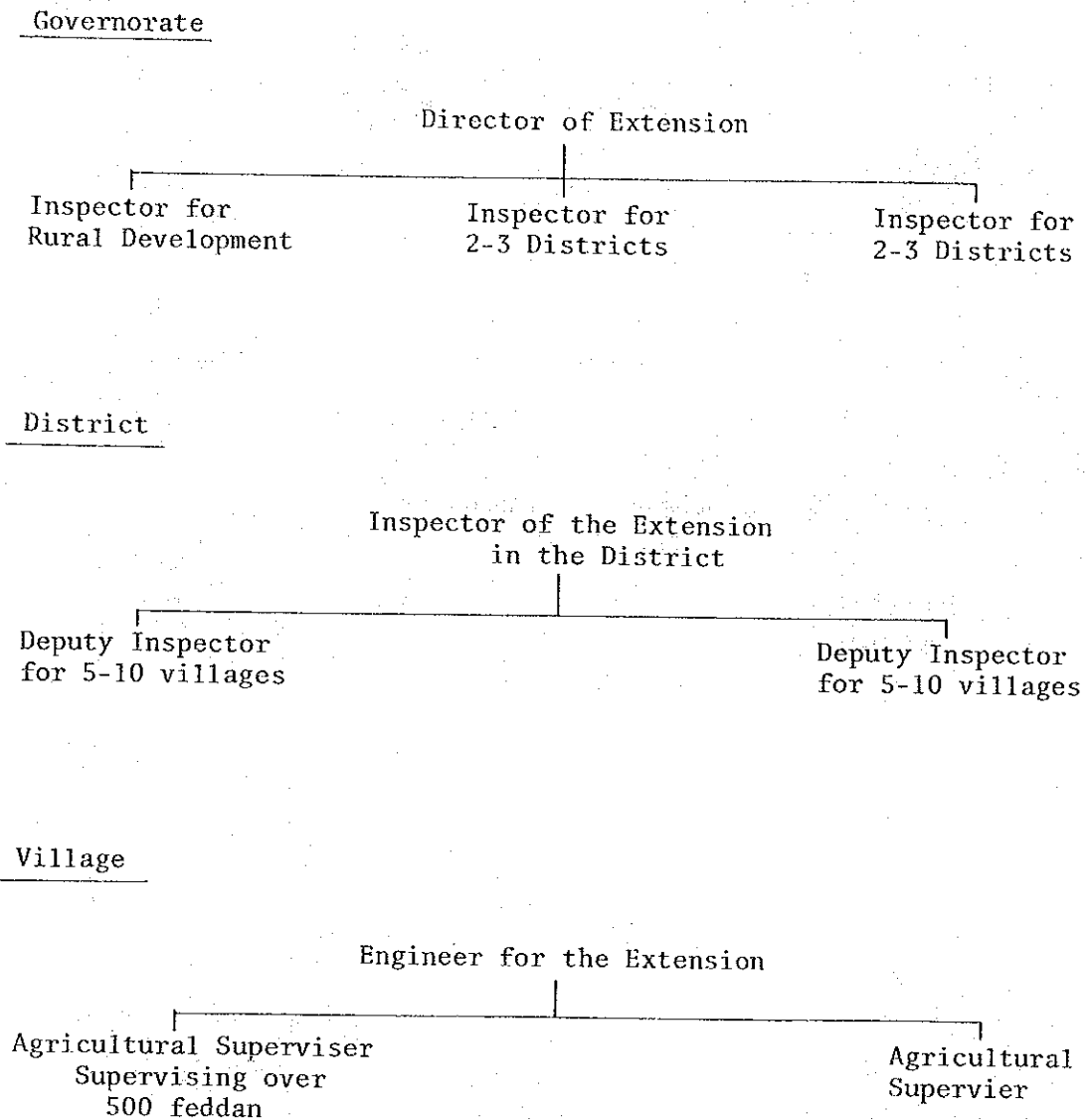
Superior quality	---	60 %	
Good	"	---	25 %
Minimum Requirements	---	15 %	

D-6. Agricultural Research and Extension Services

The organization chart of agricultural extension in Egypt is shown in Fig. D6-1. Agricultural supervisors are appointed under the extension engineer, and they are responsible for the practical extension at the village level. One agricultural supervisor covers an area of 500 feddan. Having more effective extension services, the following matters should be considered.

- The transfer of agricultural technique directed by the agricultural supervisors does not provide sufficient extension.
- The shortage of vehicles prevents the agricultural supervisor from carrying out sufficient services.
- The information about marketing is poor.
- Strengthening the training for the supervisors is necessary.

Fig. D6-1 Extension System



Source: Department of Agriculture, Fayoum

D-7. Agricultural Cooperatives and Credit

D-7.1. Agricultural Cooperative

The organization chart of the agricultural cooperative is shown in Fig. D7-1.

According to the law (No.122/1980), a multipurpose cooperative should be established in the cultivated area of every 750 feddan to promote agricultural production.

In the newly reclaimed areas, one multipurpose cooperative and some branches will be established. They are in charge of the following matters;

- Study and decision of cropping pattern
- Selection of seedlings, fertilizers and agricultural chemicals
- Introduction and lending of farm machineries
- Transmission of marketing informations
- Supplying of farm inputs

A specialized cooperative for animal husbandry will be established with the multipurpose cooperative, and be in charge of the following matters;

- Introduction of cattle
- Transmission of informations about health, hygiene, breeding, production of forage crops and so forth
- Supplying of inputs for animal husbandry
- Management of the slaughterhouse and the milk factory in cooperation with the Government and the Governorate

D-7.2. Credit

There are 158 agricultural cooperatives in the Fayoum Governorate (refer to Table D7-1), which have no function on credit. This credit function is conducted by the Agricultural Development Bank. Total quantities purchased by the Bank are shown in Table D7-2. The purchasing works on credit are conducted by the village bank as terminal facilities of the Agricultural Development Bank. Loan condition for the Bank are shown in Table D7-3.

The loan is classified by three types of short, medium and long term. Interest rate are divided into two kinds such as subsidized and unsubsidized rates.

A credit condition for a settle farmers is shown in Table D7-4. This condition is adapted to the settle farmers in the North Wahby and Com Osheem areas. The present credits required by a borrower in Tamiah district are shown in Table D7-5. The purpose for credit mostly concerns to an animal husbandry.

Table D7-1 Activity of Local Cooperative
(1982)

<u>No. of</u> <u>Cooperation</u>	<u>Area</u> <u>Cultivated</u> (feddan)	<u>Capital</u>	<u>Income</u>	(Unit; L.E. 1,000)		
				<u>Expend- iture</u>	<u>Net Profit</u>	<u>Net Loss</u>
158	315,026	398	565	392	173	

Table D7-2 Total Quantities Purchased

<u>Commodity</u>	<u>Unit</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Fertilizer:					
Potassium	tons	367	367	698	4,733
Posphate	"	12,390	52,974	12,149	13,278
Azoto(nitrogen)	"	157,064	177,469	162,740	165,505
Chemical:					
Pesticides	tons	601	984	1,235	320
Seeds:					
Cotton	ardab	37,469	37,172	24,364	25,784
Onions	"	709	172	-	-
Beans	"	3,423	12,472	3,908	4,472
Rice	"	4,701	5,823	6,206	5,378
Wheat	"	15,688	19,702	18,224	14,456
Sesame	tons	-	13	2	25
Groundnuts	ardab	6	6	20	-
Maize	"	123	34	49	90
Crops:					
Cotton	kantar	236,971	236,679	197,056	
Garlic		-	-	-	-
Onions	tons	38,391	27,003	26,545	
Beans	ardab	61,473	25,928	96,674	61,389
Rice	tons	91,751	17,338	19,414	
Wheat	ardab	19,367	96,708	40,054	
Sesame	"		14,488	13,116	1,088
Groundnuts	"	394	208	105	122

Source: Agricultural, Development Bank

Table D7-3 Loan Condition in Agricultural Development Bank

Type of Loan	Interest Rate	Duration of Repayment	Collateral
I. Short Term Loans			
a. Loans for cultivating	(1) 35 milliemes for a pound for winter crops	Less than a year	The crop
	(2) 40 milliemes for a pound for summer and nili crops till 30th of June	Less than a year	The crop
	(3) 25 milliemes for a pound after the 30th of June	Less than a year	The crop
b. Investment Loans	(1) 13% not subsidized	Less than a year	Agriculture land he owns
	(2) 7% subsidized	Less than a year	more than 5 years
II. Medium Term Loans			
	(1) 13% not subsidized	More than a year, and not more than 5 years	Agriculture land
	(2) 7% subsidized	ibid.	ibid.
III. Long Term Loans			
	(1) 13% subsidized	More than 5 years	Agriculture land
	(2) 7% subsidized	ibid.	ibid.

- Note :
1. Management fees of 1% per year are added to amount of loan except loans for cultivating.
 2. How to get a loan from the bank (procedure).
 - a) For short term loans:
The client should introduce the paper of ownership. Then the bank examines his amount and examines the property. After that, they can get the loan from any branch bank.
 - b) For medium term loans:
The same as short loans.
 - c) For long term loans:
The same as short loans.

Source : Agricultural Development Bank, Fayoum.

Table D7-4 Credit Condition for Settle Farmer

Credit Items	Bank	Period Repayment	Grace Period	Interest
Land	Commercial Bank (unspecified)	25 years	5 years	Small farmer: non interest Large farmer: 1%
Building	Commercial Bank	25 years	5 years	Small farmer: non interest Large farmer: 1%
Terminal Irrigation Facilities	Agricul. Development Bank	Medium Terms (one year to five years)	-	Non-subsidize: 14% Subsidize : 8% (including 1% of commission)
Agri. Machines	Agri. Deve. Bank	Medium Terms (one year to five years)	-	Non-subsidize: 14% Subsidize : 8%
Agri. Building	Agri. Deve. Bank	Medium or Long Medium: one to five years Long : over five years	-	- ditto -
Levestock Male (for fattening)	Agri. Deve. Bank	Short Terms (less than one year)	-	- ditto -
Female (for breeding)	Agri. Deve. Bank	Medium Terms (one to five years)	-	- ditto -
Founds for cultivation	Agri. Deve. Bank	Short Terms (less than one year)	-	35 millimus/L.E. 40 millimus/L.E. 25 millimus/L.E.
Winter crops				
Summer and Nili crops until June, 50				
Summer and Nili crops after June, 50				

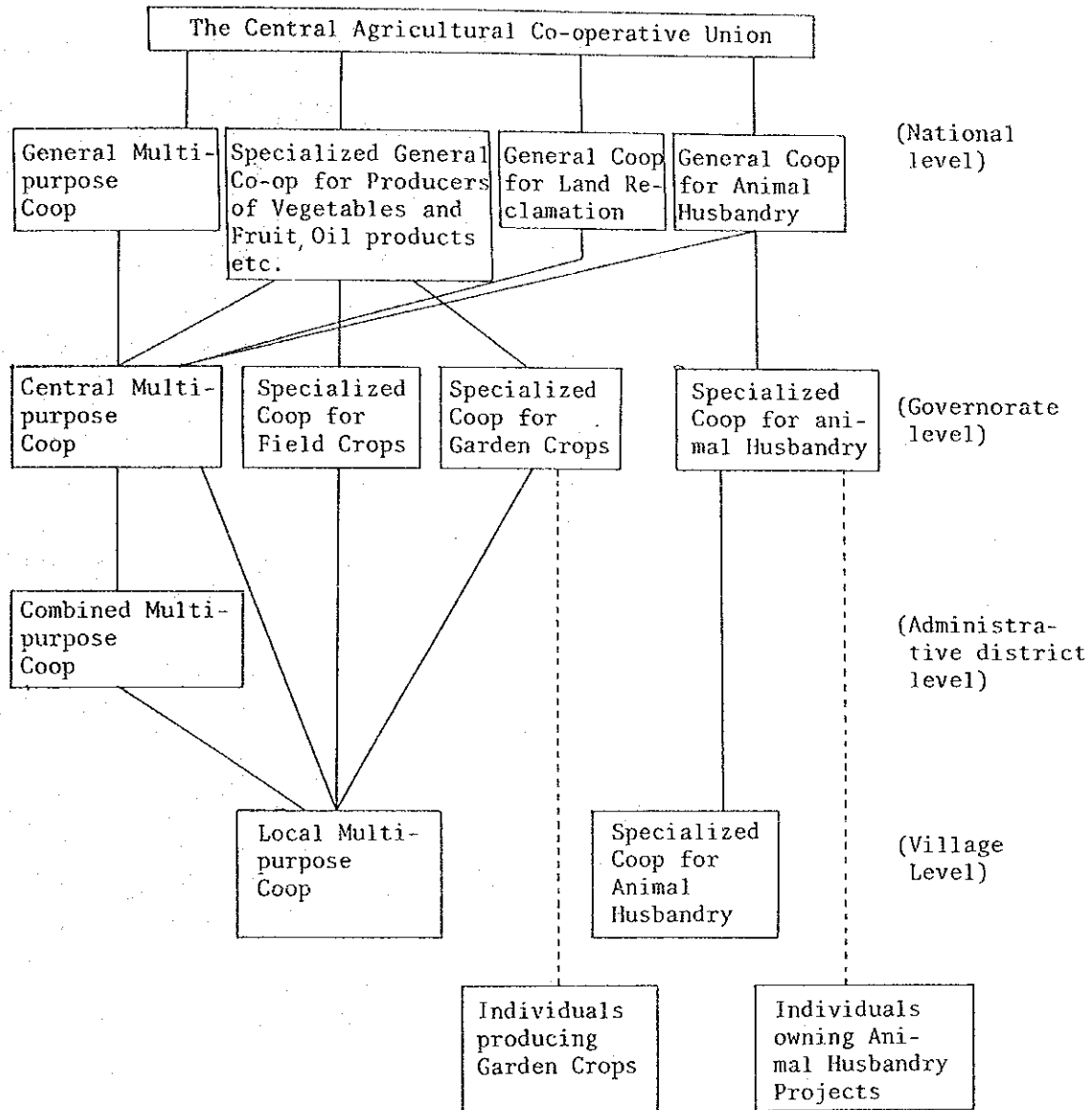
Source: Agricultural Development Bank, Fayoum

Table D7-5 Agricultural Credits Distributed to Tamiah District
(Jan. 1, 1982 to Dec. 31, 1982)

<u>Amount of loan in 1982 LEI,000</u>	<u>Number of loan</u>	<u>Value of loan accumulated LEI,000</u>	<u>Number of individuals</u>	<u>Remarks</u>
2,316	219	7,957	1,758	<u>Short term loans</u> Fattening cattle
-	-	21	2,187	Purifying drains
125	11	704	120	<u>Medium term loans</u> Breeding female cattle (personal)
-	-	767	10	Breeding female cattle (cooperative)
-	-	194	13	Establishing pens (personal)
-	-	316	8	Establishing pens (cooperative)
9	2	87	31	Breeding poultry (personal)
-	-	11	1	Breeding poultry (cooperative)
25	1	55	7	Poultry houses (personal)
-	-	40	1	Poultry houses (cooperative)
-	-	512	1	<u>Long terms loans</u> Poultry houses

Sources: Agricultural Development Bank, Fayoum

Fig. D.7.-1 Agricultural Cooperative in Egypt



Source: Department of Agriculture, Fayoum

D-8. Land Disposal Plan

(1) Land Holding System

The land disposal in the land reclamation projects in Egypt is carried out by two systems of distribution and auction. The distribution system is adapted to establish small holder and the auction system is adapted for large holder. The small holders, that is, settlers of small land or landless farmers and retired soldiers, are traditionally distributed at one to eight feddan. While the large holders, that is, settlers of agricultural secondary school diploma and university graduates, are disposed at ten to 30 feddan. The allocation rate of the reclaimed land for the distribution system and the auction system is reported at 40 percent for distribution and 60 percent for auction system according to the informations of GARPAD. The maximum acreage on auction is limited by 400 feddan of reclaimed land per settler.

(2) Implementing Direction

The land holding system as mentioned above aims at the development of a large number of successful family farms. In parallel with this process, the Government has established large size farms such as state farms, land reclamation co-operative farms and corporate farms. These concepts also involve implementing direction of the land reclamation projects. An implementing direction is classified by government, co-operative & persons and companies. According to the Five Year Development Plan for 1982/87, the percentage of the implementing land disposed by the government, co-operative & persons and companies are 48, 49 and three percent, respectively. It is considered that the Government is attempting to mobilize private capital through a realization of implementing direction by co-operative & persons and companies.

(3) State Farm

According to the General Department of Plants Production, GARPAD has 13 state farms which are managed by the agricultural companies under the Government. Reportedly, the size of these state farms ranges from 15,000 to 50,000 feddan, and one state farm is composed of several production units. The production unit covers about 5,000 feddan.

(4) Land Reclamation Co-operative

The land reclamation co-operatives have been organized to upgrade the membership's social and economic situation. The main functions are as follows;

- to purchase Government's lands;
- to reclaim, develop and plant crops on the lands purchased;
- to sell the field reclaimed to their membership; and
- to train the farmers employed by the co-operative to be independent in future.

(5) Land Disposal System

The land disposal system as studied above could be adjusted as follows:

<u>Implementing Direction</u>	<u>Land Disposal System</u>	<u>Traditional Size of Farm (feddan)</u>
a. Government	Distribution Auction	1. Small holder: 1 to 8 2. Large holder: 10 to 30 max. 400
b. Land Reclamation Co-operative	Distribution Auction	Land sold to membership less than 5 fd..5,000 fd.. 5 to 20 fed. ...larger than 5,000 fd.
c. Company	Auction	

(6) Decision of Implementing Direction

Since the implementing direction to company farm is not so important in the Five Year Development Plan, company farms will not be taken into consideration in this land disposal. The implementing direction by Government including Fayoum Governorate and Land Reclamation Co-operative will be recommended for the Project.

As the first procedure, 1,060 feddan of total arable land out of 7,580 feddan of the reclamation area would be allocated for the Cattle Breeding and Fattening Farm. The Fayoum Agricultural Office, Department of Agriculture, MOA has carried out "Cattle Breeding and Fattening Project" since 1983 in Com Osheem area. This Project consists of eight units with 1,000 head of adult cattle per one unit and the area of 250 feddan per one unit. One unit had been established adjacent to Com Osheem area. The Fayoum Agricultural Office has a plan to establish four units with the same scale as mentioned above in the Project Area.

The implementation of the remaining 6,520 feddan should be made by either direction of Government or Land Reclamation Co-operative. The large size state farm would not be recommended. Because the acreage of the reclamation area is insufficient to dispose state farm with large area, and the state farm needs to employ sufficient laborers from the small farmers whose family farm labor can willingly work overtime.

As the second procedure, the land disposal system should be studied on the following implementing direction.

- Government Distribution and auction
- Land reclamation co-operative ... Distribution and auction

According to the regulation, the land reclamation co-operative has the function to give land to landless or small farmer in burden of land cost by the Government. As principle, the share to be allocated by this distribution system is reported at more than 25 percent of land owned by the co-operative.

An important criteria to decide the recommendable system from two direction mentioned above would be the proper way to raise money on local currency cost of social infrastructure construction.

The auction system used in the implementing direction of the Government would result in establishment of large farm at maximum 400 feddan. There is some anxiety that this system would encourage land speculation in the future. Hence, the way to prepare the construction cost of the social infrastructure through the auction system in the Government's implementing direction would be undesirable from the social point of view.

It may be suggested that the implementing direction of the land reclamation co-operative would be carried out under the auction system. An area to be sold to the co-operative's membership is limited in smaller area than those in the Government's auction system.

(7) Allocation of Land

Concerning the allocation of land for distribution and auction system of 6,520 feddan, as mentioned in previous paragraph as principle, the land reclamation co-operative can distribute lands to small holder. Though the actual procedure is not clear, allocation of land for large holder would be considered to be carried out through auction system.

According to the field survey, the value of cultivated land is varied by village shown as follows;

- Value of cultivated land (LE/feddan) -

Fanaus	Average 5,000, Maximum 8,000
Rashuwan	Average 7,000, Maximum 20,000
Tamiah	3,000 to 5,000 (House Lot)
Menshat Tantawi ...	2,000
Saedia	1,000

The local currency cost of social infrastructure is estimated at LE 11.6 million.

Table D8-1 shows the private capital to be mobilized for the social infrastructure cost by the sold land value.

(8) Allocation between Small Holder and Large Holder

Allocation of the large area for small holders, that is, a small land farmer, landless farmer and retired soldiers, would be enable to settle much in number. But, since the local currency cost for construction of social infrastructure should be born by land value to be sold to large holder, it is desirable to allocate the large area to the large holders.

Average land value in the Wahby Downstream Area is roughly assumed at 3,000 to 4,000 LE per feddan of cultivated land. According to the study on private capital to be mobilized for construction of social infrastructure from land value sold as shown in Table D8-1, among several cases of allocation rate between small holder and large holder, the case of the rate at 50:50 can be recovered for the purpose.

(9) Alternative Study on Land Holding Size

The farm size disposed in North Wahby and Com Osheem areas after reclamation is decided taking into account the following conditions;

- A sufficient income to manage a suitable living standard inclusive of education, capital funds, techniques, etc., should be ensured for the settlers;
- A sufficient income should be given to the settlers to be able to afford rising living standard in future and the repayment of the amortization of lands and buildings etc.
- The farm size distributed to the settlers is generally four to six feddan for most settlers, and from 10 to 20 feddan for a few graduate settlers. Since the graduate settlers will become a leader among settlers, the number of them should be limited.

Alternative studies on net farm income (balance) by different farm size are carried out by using two cases of average base and low base on the financial prices of crops as shown in Tables D8-2 and D8-3. When the financial value of crops will fall in price, the farmer with 4.0 feddan can not support the living standard, while the farmer with 5.0 feddan can support his living standard.

Alternative study on land disposal between 5.0 feddan and 6.0 feddan shows that the 6.0 feddan farmer can certainly gain more income than that of the 5.0 feddan farmer. However, different number of settlers between the two is 110 households as follows:

Small Holder with 5 feddan	$3,250/5 = 650$ households
Small Holder with 6 feddan	$3,250/6 = 540$ households

The area of 3,270 feddan would be allocated to large holder. Supply and demand of labors would be one of the most important problem for the large farmer. It is reasonable that the shortage of labors in the large holder group would be supplemented by the small holders as much as possible. When labor balance is still short, both farmers have to employ labors from the near village. (refer to Table D8-4)

Population in the near village is accounted to about 65,000 in 1982. Population in 2000 is forecasted at about 108,700 persons. Workable labor over 15 years is estimated occupying 60 percent or 65,240 persons, of which 55 percent is assumed as unemployment. This unemployment workable labor is estimated at 31,840, particularly men and women with from 15 to 49 years are 8,100, respectively. These unemployment workable labor can be considered as labor source for the Project Area. Specially, Rashedwan, Fanaus, Mazatly and Tamiah are expected to supply farm labors. The unemployment workable man labor of an age from 15 to 49 years in these four village are estimated at 6,550 persons.

According to the labor balance study between small holder group and large holder group, shortage of labor in disposal with 6.0 feddan is harder than that with 5.0 feddan as shown in Table D8-5.

(10) Reclamation on Farm Size

The following farm size to be distributed to the settlers is recommended in consideration of the above-mentioned matters;

Small holder	5 feddan
Graduates	
Graduates from agricultural secondary schools...	15 feddan
Graduates from universities.....	20 feddan

Table D8-1 Private Capital to be Mobilized for Construction of Social Infrastructure from Land Value Sold

<u>Percent of Allocation</u>		<u>Area of Allocation</u>		<u>L.C. of Infra.Cost</u>	<u>Land Value to be Mobilized</u>
<u>S</u>	<u>L</u>	<u>S</u>	<u>L</u>	10 ⁶ LE	LE/feddan
		fed.	fed.		
30	70	1,956	4,564	11.6	2,540
40	60	2,608	3,912	11.6	2,960
<u>50</u>	<u>50</u>	3,260	3,260	11.6	<u>3,560</u>
60	40	3,912	2,608	11.6	4,450
70	30	4,564	1,956	11.6	5,930
80	20	5,216	1,304	11.6	8,900
90	10	5,868	652	11.6	17,800

Note (1) S: Small holder

L: Large holder

L.C. of infra. cost: Local currency cost of construction of for social infrastructure

(2) Land value to be mobilized for social infrastructure is estimated as follows:

$$11.6 \times 10^6 / 4564 = 2,540 \text{ LE/feddan}$$

Table D8-2 Alternative of Land Disposal
(Financial prices with average base in 1995)

(Unit: LE)

Item	3.0	4.0	5.0	6.0	10.0	15.0	20.0
Gross Farm Income	5,782	7,710	9,637	11,564	19,274	28,911	38,548
Production Cost	1,910	2,546	3,183	3,820	9,495	14,697	20,348
Farm Income	3,872	5,164	6,454	7,744	9,779	14,214	18,200
Amortization	737	942	1,050	1,296	2,036	3,260	4,290
Irrigation Water Charge	144	192	240	288	480	720	960
Disposal Income	2,991	4,030	5,164	6,160	17,263	10,234	12,950
Cost Living	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Balance	-9	1,030	2,164	3,160	4,263	7,234	9,950

Note: Cost living is estimated based on 60 percent of Engel's Coefficient

Table D8-3 Financial Prices with Low Base in 1995

(Unit: LE)

Item	3.0	4.0	5.0	6.0	10.0	15.0	20.0
Gross Farm Income	4,562	6,083	7,604	9,125	15,208	22,812	30,416
Production Cost	1,910	2,546	3,183	3,820	9,495	14,697	20,348
Farm Income	2,652	3,537	4,421	5,305	5,713	8,115	10,068
Amortization	737	942	1,050	1,296	2,036	3,260	4,290
Irrigation Water Charge	144	192	240	288	480	720	960
Disposal Income	1,771	2,403	3,131	3,721	3,197	4,135	4,818
Cost of Living							
Case 1 (Tab.D8-2)	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Case 2	2,640	2,640	2,640	2,640	2,640	2,640	2,640
Balance							
Case 1	-1,229	-597	131	721	197	1,135	1,818
Case 2	-869	-237	491	1,081	557	1,495	2,178

Note: Cost of living is estimated based on the followings;
Case 1 ... Engel's Coefficient 60%
Case 2 ... Engel's Coefficient 70%

Table D8-4 Workable Labor under Un-employment, 2000

Village	Popu- lation	Popu- lation	Workable Labor over	Un- employ- ment	15 to 49 Yrs.	
	1982	2000	15 Years		Male	Female
Mazatly	8,551	14,280	8,570	4,700	1,100	1,100
Fanaus	1,197	2,000	1,200	600	150	150
Tamiah	24,243	40,490	14,290	13,360	3,100	3,100
Rashuwan	18,964	31,670	19,000	10,450	2,200	2,200
Menshat	7,409	12,370	7,400	4,070	950	950
Saedia	4,774	7,970	4,780	2,600	600	600
<u>Total</u>	<u>65,138</u>	<u>108,780</u>	<u>65,240</u>	<u>31,840</u>	<u>8,100</u>	<u>8,100</u>

Table D8-5 Labor Balance in the Project

Description	5.0 feddan			6.0 feddan		
	Small Holder	Large Holder	Total	Small Holder	Large Holder	Total
Number of labor to be supplied from near village (annual)	- Man Month/Year -					
	2,246	7,450	9,696	3,401	8,934	12,335
Number of labor to be supplied in February	- Man month/February -					
	863	1,794	2,657	1,083	1,794	2,877
Ratio of supply from four village, 6,550 persons	40%			44%		

Table D8-6 Labor Balance between Small Holder Group (5.0 feddan) and Large Holder Group (15.0 and 20.0 feddan)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Labor Requirement on Farm with 5.0 feddan (days)													
52.8	85.2	60.8	42.4	48.0	44.8	8.8	68.0	19.2	34.4	16.8	74.4	553.6	
Labor Requirement in Small Holder Group 5.250 feddan, 650 farm (days)													
21,320	54,080	39,520	27,560	31,200	29,120	5,720	44,200	12,480	22,360	10,920	48,560	546,840	
Available Family Labor (2 labor x 25 day/month x 650 settlers = 32,500 days)													
32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	390,000
Balance of Labor (days)													
+11,180	-21,580	-7,020	+4,940	+1,500	+3,580	+26,780	-11,700	-20,020	-10,140	-21,580	-15,860	-43,160	
Number of hired labor to be supplied from near village (man/month)													
-	863	281	-	-	-	-	468	-	-	-	654	2,246	
Labor Requirement on Large Holder Group 5.270 feddan, 191 farm (days)													
21,448	54,404	39,757	27,725	31,587	29,295	5,734	44,465	12,555	22,494	10,986	48,650	548,920	
Available Family Labor (2 labor x 25 day/month x 191 settlers = 9,550 days)													
9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	114,600
Balance of Labor (days)													
-11,898	-44,854	-30,207	-18,175	-21,037	-19,745	-5,786	-34,915	-3,005	-12,944	-1,436	-3,910	-234,520	
Labor to be supplied from small holder group (days)													
11,180	-	4,940	1,500	3,580	-	-	20,020	10,140	21,580	15,860	86,400		
Labor days to be hired from the near villages (days)													
-98	-44,854	-30,207	-18,255	-20,537	-16,365	-	-34,915	-	-2,804	-	-23,240	-186,253	
Number of hired labor to be supplied from the near village (man/month)													
4	1,794	1,208	529	821	653	-	1,597	-	112	-	950	7,450	

Table D8-7 Labor Balance between Small Holder Group (6.0 feddan)
and Large Holder Group (15.0 and 20.0 feddan)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Labor Requirement on Small Holder Group with each 6.0 feddans, 3,250 feddans (day)	21,320	54,080	59,520	27,560	31,200	39,120	5,720	44,200	12,480	22,360	10,920	48,360	346,840
Available Family Labor (2 labor x 25 day/month x 540 settlers = 27,000 days)	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	324,000
Balance of Labor (days)	+5,680	-27,080	-12,520	-560	-4,200	-2,120	+21,280	-17,200	+14,520	+4,640	+16,080	-21,360	-22,840
Number of hired labor to be supplied from near village (man/month)	-	1,083	501	22	168	85	-	688	-	-	-	854	3,403
Labor Requirement on Large Holder Group 3,270 feddan, 191 farm (days)	21,448	54,404	59,757	27,725	31,387	39,295	5,754	44,465	12,555	22,494	10,986	48,650	348,920
Available Family Labor (2 labor x 25 days/month x 191 settlers = 9,550 days)	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	9,550	114,600
Balance of Labor (days)	-11,898	-44,854	-50,207	-18,175	-21,837	-19,745	+3,796	-34,915	-3,005	-12,944	-1,436	-59,100	-234,320
Labor to be supplied from small holder group (days)	5,680	-	-	-	-	-	21,280	-	14,520	4,640	16,080	-	62,200
Labor to be hired from the near villages (days)	-6,218	-44,854	-50,207	-18,175	-21,837	-19,745	-	-34,915	-	-8,304	-	-59,100	-223,355
Number of hired labor to be supplied from the near village (man/month)	249	1,794	1,208	727	873	790	-	1,597	-	532	-	1,564	8,934

APPENDIX E.

ANIMAL HUSBANDRY

APPENDIX E. ANIMAL HUSBANDRY

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APPENDIX E. ANIMAL HUSBANDRY

E-1. Present Situation of Animal Breeding

E-1.1. Number of Animals

The number of animals in the past five years in the Fayoum Governorate is given in Table E1-1. Annual increase rate of each animals is 9.8 percent for baladi cows and 8.9 percent for sheep and goats but the population of buffalo is on the decrease at the rate of 2.2 percent annually. At present, there are some 192,000 head of cows and 63,000 head of buffalo, 122,000 head of sheep and goats.

Meanwhile, Table E1-2 shows the number of animals in the Wahby Downstream Area and South Area of Lake Qarun in 1982. This table is made based on the statistics given from the Statistics Department of the Fayoum Governorate. There are about 6,500 head of buffalo and 26,700 head of cows, 13,700 head of sheep and goats, 1,257,000 chickens. Some exotic cows such as friesian is included in cows group.

E-1.2. Structure of Animals

Age structure of buffalo and cows is shown in Table E1-3. The number of productive cattle more than two years occupies 59 percent for buffalo, 42 percent for baladi cow, and 54 percent for the cross.

It is considered that there is no remarkable differences in the structure by age and sex between the Fayoum Governorate and the Wahby Downstream area and South Area of Lake Qarun.

E-1.3. Performances of Cattle

Information on performances of cattle was collected from field survey, Agricultural Department, Veterinary Department and so on as shown in Table E1-5. The buffalo is the main milk animal and baladi cow is for farm operation and for meat production. But meat and milk production per head of baladi cow or buffalo is low not only because of the limited feed resources but also as a result of long selection for high work capacity. To improve the indigenous cattle the Egyptian Government has been introduced exotic cows such as Friesian and Brown Swiss. In the Fayoum Governorate, Friesian cows have been raised in large-scale farm and the Cattle Breeding and Fattening Farm in Com Osheem. Friesian cows have a high performances for milk and meat production.

E-1.4. Feed Situation

Egypt is a rainless country which has no natural pastures. In the Fayoum Governorate too, at present, all the fodder crops for livestock comes from irrigated land in the form of green fodder such as berseem and maize, crop residue (mainly wheat straw) and agricultural by-products (cotton seed cake, cereal bran, etc). Table E1-6 shows the cropped area by crops in Wahby Downstream Area and South Area of Lake Qarun.

Farm animals feed on Egyptian Clover (Berseem) for about six months, while for the rest of the year, they are fed green maize, sorghum, crop residues and by-products.

E-1.5. Estimation of Animal Production

There are no data available on meat and milk production in the Fayoum Governorate and the Wahby Downstream Area and South Area of Lake Qarun. Production of animal products is compelled to estimate based on the number of animals by age and sex, number of slaughtered animals and performances which are given as for Governorate-level.

(1) Milk Production

According to Table E1-4 66 percent of female buffalo and 18 percent of baladi cow, 63 percent of cross is belonging to more than two years old group. The estimation of milk production would be made taking into consideration the effective calving rate as follows:

Female buffalo (more than two years)	
1,560 head x 0.55 x 1,200 kg	= 1,030 tons
Female baladi (more than two years)	
6,060 head x 0.55 x 650 kg	= 2,166 tons
Female cross (more than two years)	
830 head x 0.85 x 3,800 kg	= 2,681 tons
<u>Total</u>	<u>5,877 tons</u>

(2) Meat Production

As mentioned above, no data are available as regards slaughtered animals in the Wahby Downstream Area and South Area of Lake Qarun but Governorate's data indicates that annually 6.6 percent of number of livestock is slaughtered in the Fayoum Governorate.

Applying this figure to the Estimation, it is estimated that some 1,680 head of livestock was slaughtered in the aforesaid both areas in 1982.

According to the statistics of the Veterinary Department, about 80 percent is occupied by cattle and the remainders by sheep and goats. As the result of calculation, meat production, in the both areas is estimated as follows:

Beef	1,345 head x 350 kg x 0.52	= 245 tons
Lamb	335 x 50 x 0.50	= 8 "

E-1.6. Farm-gate Prices of Animals and Animal Products

Tables E1-7 and E1-8 shows the farm-gate price of animals and animal products in the Fayoum Governorate in 1983.

Fattened cattle is sold at the price of 2.20 LE per kg of live body weight. As for milk, farm-gate price is changed according to milk fat ratio. Generally 0.30 LE per kg is applied for cow milk and 0.4 LE for buffalo milk.

For references market price of animal products in the Fayoum Governorate is shown in Table E1-9.

E1.7. Supporting Services for Livestock

There are 87 animal health centers and 32 artificial insemination centers in the Fayoum Governorate. One to four veterinarians are distributed in each animal health center in order to make spraying and vaccination to prevent animal diseases.

Table E1-10 and E1-11 shows the distributed supporting service centers in the Fayoum Governorate and the number of vaccinated and artificial inseminated animals in the past five years.

Table E1-1 Number of Livestock in Fayoum

<u>Variety</u>	(Unit: head)				
	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Cows	132,319	134,754	164,072	184,801	192,042
Buffalo	68,794	72,376	79,087	59,019	62,921
Sheep & Goats	86,747	98,837	102,092	118,123	122,029

Source : Veterinary Department, Fayoum

Table E1-2 Number of Livestock in the Project Area
(1982)

<u>District</u>	<u>Village</u>	(Unit: head)			
		<u>Buffalo</u>	<u>Cow</u>	<u>Sheep & Goats</u>	<u>Chicken</u>
Tamiah	Aslan	139	473	220	57,000
	Mazatly	299	7,507	783	147,516
	Fenaous	302	1,286	786	29,385
	Tamiah	228	638	365	47,014
	Rashwan	522	3,948	364	107,828
Senorus	Osman	50	141	85	6,671
	Menshats	772	1,122	3,199	115,025
	Saedia	99	256	214	4,009
Ibshwai	Shakshok	19	172	130	63,204
	Khalidiya	16	78	18	1,440
	Kahak	39	98	126	6,862
	Abu Lutei Basil	27	35	151	6,053
	Misharrak	183	396	184	6,623
<u>Total</u>		<u>2,695</u>	<u>16,156</u>	<u>6,625</u>	<u>598,630</u>

Note : Estimated based on the data from the Statistics Department, Fayoum Governorate.

Table E1-3 Structure of Cattle by Age
(1981)

(Unit: head)

	Cows							
	Buffalo		Baladi		Cross		Total	
	Below 2 years	Over 2 years	Below 2 years	Over 2 years	Below 2 years	Over 2 years	Below 2 years	Over 2 years
Fayoum	6,945	12,257	24,589	11,447	2,499	2,227	34,003	25,931
Senorus	4,000	10,035	13,738	9,620	-	350	17,738	20,005
Ibshwai	4,889	10,583	13,995	15,883	66	50	18,950	26,516
Itsa	8,160	10,558	14,780	16,783	300	207	23,240	27,548
Tamiah	8,160	3,500	23,618	12,692	300	928	32,078	17,120
<u>Total</u>	<u>32,154</u>	<u>46,933</u>	<u>90,720</u>	<u>66,425</u>	<u>3,165</u>	<u>3,762</u>	<u>126,039</u>	<u>117,120</u>

Source : Statistic Department, Fayoum Governorate

Table E1-4 Structure of Cattle by Age and Sex in Fayoum
(1981)

(Unit: head)

	Buffalo		Baladi Cow		Cross	
	Male	Female	Male	Female	Male	Female
	Less than 2 years	8,629	23,525	59,279	31,441	1,315
More than 2 years	496	46,437	745	65,690	317	3,445
<u>Total</u>	<u>9,125</u>	<u>69,962</u>	<u>60,024</u>	<u>97,131</u>	<u>1,632</u>	<u>5,295</u>

Source : Statistic Department, Fayoum Governorate

Table E1-5 Performances of Cattle

Items	Buffalo	Baladi	Friesian
Body Weight (adult)	500- 650 kg	300-400 kg	500- 550 kg
Milk Yield	900-1500 kg	600-650 kg	4000-5000 kg
Milk Fat	7.0-9.0 %	2.5-3.5 %	3.0-3.5 %
First Calving	30 months	30 months	26 months
Lactation period	150 days	150 days	300 days
Delivery Rate	50-65 %	50-65 %	85 %
Dressing Percentage	50 %	60 %	55- 58 %
Draft Power	-	4 fed/2 head	-

Table El-6 Cropped Area for Animal Feeds by Villages in the Project Area

District	Village	Winter Crops						Summer Crops				(Unit: feddan) Nilli Crops		
		Berseem		Berseem		Wheat	Barley	Broad bean	Rice	Maize	Sorghum		Maize	Rice
		(full-term)	(catch crop)	(full-term)	(catch crop)									
Tamiah	Aslan	1,921	390	1,550	295	133	442	470	-	885	-	-		
	Mazatly	1,636	40	919	640	177	189	216	238	820	-	-		
	Fanaous	2,265	100	1,251	410	145	7	120	25	1,090	5	5		
	Tamiah	1,328	350	1,051	153	224	16	103	-	670	5	5		
	Raswan	3,980	120	1,580	591	143	16	45	25	1,272	-	-		
Senorus	Osman	1,025	102	743	116	175	30	297	-	548	256	256		
	Menshats	1,741	233	503	1,330	172	14	80	-	1,680	157	157		
	Saedia	924	257	397	11	94	-	63	-	781	8	8		
	Shakshok	225	238	407	109	31	-	112	-	500	-	-		
Ibshwal	Khalidiya	120	160	270	94	132	-	-	-	200	-	-		
	Kahk	512	312	680	135	168	-	34	-	1,250	-	-		
	Abu Lutei Basil	450	203	305	95	156	-	38	-	750	15	15		
	Misharrak	440	240	227	12	36	-	141	-	525	-	-		
Total	16,567	2,745	9,883	3,991	1,786	714	1,719	288	10,971	446	446			

Source : Statistics Department Fayoum Governorate

Table E1-7 Farm Gate Price of Animals
(1983)

Items	Baladi	Friesian	(Unit: LE) Buffalo
Cow (adult)	500 - 600	1,200 - 1,500	700 - 800
Calf (6 month old - male)	350 - 450	400 - 450	300 - 400
Calf (6 month old - female)	250 - 400	400 - 450	350 - 450
Cow + Pregnancy (3 year old)	650 - 700	1,500	1,000
Cull	600 - 800	900 - 1,000	500 - 600
Unit price per Body weight	2.20	2.20	2.00

Table E1-8 Farm Gate Price of Animal Products
(1983)

Items	Prices	Items	(Unit: LE) Prices
Fattened Cattle	2.20 /kg	Egg	0.08 /egg
Cow Milk	0.25 /kg	Fattened Sheep	3.00 /kg
Buffalo Milk	0.40 /kg	Chicken	1.30 /kg
Rice Straw	30.00 /ton	Bran	70.00 /ton
Fresh Berseem	15.00 /ton	Concentrate	40.00 /ton (Government price)
Wheat Straw	100.00 /ton	Concentrate	150.00 /ton (Free Market)

Table E1-9 Market Price of Animal Products (1983)

Beef (boneless)	4.500 LE/kg
Chicken	1.300 LE/kg
Egg	0.085 LE/kg
Mutton	4.500 LE/kg
White Cheese	2.000 LE/kg
Butter	4.000 LE/kg
UHT Milk	0.700 LE/kg
Yoghurt	0.100/150g

Table E1-10 Supporting Service Centers for Animals
(1980)

<u>District</u>	<u>No. of Animal Health Center</u>	<u>No. of Artificial Insemination center</u>
Fayoum	27	8
Senorus	12	6
Ibshwai	16	6
Itsa	18	8
Tamiah	14	4
<u>Total</u>	<u>87</u>	<u>32</u>

Source : Veterinary Department, Fayoum

Table E1-11 Number of Vaccinated Animals and Artificial Inseminated Animals

	(Unit: head)				
	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Veccinated Animals	57,583	154,273	94,244	248,605	217,874
Artificial Inseminated Animals	3,373	2,987	2,940	1,367	1,385

Source : Veterinary Department, Fayoum

Table E1-12 Feeding Plan through the Year (1)

1. North Wahby					
Feed	Growing Stage	Ration (kg/day)	Period (days)	No. of Head (head)	Total Ration (tons)
<u>Winter (182 days)</u>					
<u>Buffalo</u>					
Berseem	Adult Cow	10	182	540	3,931
	Heifer	12	182	160	349
	Bull Calf	12	30	160	58
	Sub-total				4,338
<u>Baladi Cow</u>					
Berseem	Adult Cow	28	182	2,130	10,854
	Heifer	11	182	640	1,281
	Bull Calf	11	90	640	634
	Sub-total				12,769
<u>Fattening Cattle</u>					
Berseem	Buffalo	25	90	160	360
	Baladi Cow	20	90	640	1,152
	Sub-total				1,512
	Total				18,619
<u>Summer (183 days)</u>					
<u>Buffalo</u>					
Sorghum	Adult Cow	35	183	540	3,459
	Heifer	10	183	160	293
	Bull Calf	10	30	160	48
	Sub-total				3,800
Wheat Straw	Adult Cow	1.5	183	540	148
	Heifer	1.0	183	160	29
	Bull Calf	-	-	160	-
	Sub-total				177
<u>Baladi Cow</u>					
Sorghum	Adult Cow	24	183	2,130	9,355
	Heifer	9	183	640	1,054
	Bull Calf	9	90	640	518
	Sub-total				10,927
Wheat Straw	Adult Cow	1.0	183	2,130	390
	Heifer	0.8	183	640	93
	Bull Calf	-	90	640	-
	Sub-total				483
<u>Fattening Cattle</u>					
Sorghum	Buffalo	23	90	160	331
	Baladi	17	90	640	979
	Sub-total				1,310
Wheat Straw	Buffalo	2.0	90	160	29
	Baladi	2.0	90	640	115
	Sub-total				144
Total (Sorghum)					16,037
Total (Wheat Straw)					804
<u>Feed Balance</u>					
Season	Fodder Crops	Feed Available (tons)	Requirement (tons)	Balance (tons)	
Summer	Sorghum	16,065	16,037	28	
	Wheat	804	804	0	
Winter	Berseem	22,313	18,619	3,694	

Table E1-12 Feeding Plan through the Year (2)

2. Com Osheem (Settlers)

<u>Feed</u>	<u>Growing Stage</u>	<u>Ration (kg/day)</u>	<u>Period (days)</u>	<u>No. of Head (head)</u>	<u>Total Ration (tons)</u>
<u>Winter (182 days)</u>					
<u>Buffalo</u>					
Berseem	Adult Cow	40	182	270	1,966
	Heifer	12	182	80	175
	Bull Calf	12	30	80	29
	<u>Sub-total</u>				<u>2,170</u>
<u>Baladi Cow</u>					
Berseem	Adult Cow	28	182	1,060	5,402
	Heifer	11	182	320	641
	Bull Calf	11	90	320	317
	<u>Sub-total</u>				<u>6,360</u>
<u>Fattening Cattle</u>					
Berseem	Buffalo	25	90	80	180
	Baladi Cow	20	90	320	576
	<u>Sub-total</u>				<u>756</u>
	<u>Total</u>				<u>9,286</u>
<u>Summer (183 days)</u>					
<u>Buffalo</u>					
Sorghum	Adult Cow	35	183	270	1,729
	Heifer	10	183	80	146
	Bull Calf	10	30	80	24
	<u>Sub-total</u>				<u>1,899</u>
Wheat Straw	Adult Cow	1.5	183	270	74
	Heifer	1.0	183	80	15
	Bull Calf	-	-	80	-
	<u>Sub-total</u>				<u>89</u>
<u>Baladi Cow</u>					
Sorghum	Adult Cow	24	183	1,060	4,656
	Heifer	9	183	320	527
	Bull Calf	9	90	320	259
	<u>Sub-total</u>				<u>5,442</u>
Wheat Straw	Adult Cow	1.0	183	1,060	194
	Heifer	0.8	183	320	47
	Bull Calf	-	90	320	-
	<u>Sub-total</u>				<u>241</u>
<u>Fattening Cattle</u>					
Sorghum	Buffalo	23	90	80	166
	Baladi	17	90	320	490
	<u>Sub-total</u>				<u>656</u>
Wheat Straw	Buffalo	2.0	90	80	14
	Baladi	2.0	90	320	58
	<u>Sub-total</u>				<u>72</u>
	<u>Total (Sorghum)</u>				<u>7,997</u>
	<u>(Wheat Straw)</u>				<u>402</u>

Feed Balance

<u>Season</u>	<u>Fodder Crops</u>	<u>Feed Available (tons)</u>	<u>Requirement (tons)</u>	<u>Balance (tons)</u>
Summer	Sorghum	8,000	7,997	3
	Wheat	536	402	134
Winter	Berseem	10,625	9,286	1,339

E-2. Development Plan of Animal Breeding

E-2.1. Selection of Livestock

The per capita consumption of meat reached 13.0 kg in 1978. As for dairy products 48 kg per capita per year are consumed. It is considered that annual per capita consumption of these animal products will be rised and in accordance with that imports of animal products will also increased with increase of population.

On the other hand, vegetables and wheat and cotton have been occupied many arable lands. These agricultural products have been played an important role in economic aspects in the Fayoum Governorate. From a cropping point of view, it is very important to supply barnyard manure to maintain productivity of soil for crop production. Application of organic matter will be very effective for improvement of physical and chemical features of soil.

Taking into consideration these circumstances mentioned above, animal breeding have an important role from a viewpoint of keeping crop's productivity and supplying animal protein for the people in the future too.

In the Fayoum Governorate, baladi cows account for 80 percent among the cattle and then follows buffalo. Agricultural Department in the Fayoum have been trying to improve milk and meat production of baladi cows by using friesian bulls in Com Osheem since 1983. One unit (1,000 head of adult cows) have been already introduced. For that purpose baladi cows will be important as a basis of cattle to be improved.

Although buffalo requires much more green foddors than baladi cows, buffalo is still important animal for milk production for the small-scale farmers.

Sheep are bred on stubble grazing and agricultural by-products. Sheep meat is necessary for Egyptian people, and it is considered that combined use of arable land with sheep and cattle is reasonable from the viewpoint of fodder utilization.

Considering all the above, the breed selected for introduction to the Project Area are Friesian, Baladi cow and sheep.

In addition, some case study was carried out to know the fluctuation in production by changing percentage of Baladi cows and buffalo each other as follows:

<u>Case</u>	<u>Baladi Cow</u>	<u>Buffalo</u>
Original	80%	20%
Case-1	70	30
Case-2	60	40
Case-3	50	50
Case-4	40	60
Case-5	30	70

In each case number of sheep to be bred is fixed owing to feed on stubble grazing and by-products.

E-2.2. Feeding Plan for Livestock

(1) Feeding Standard in Egypt

It is very important to know a suitable nutrient requirement in accordance with performances of each cattle. In Egypt feeding standard which has been used is that recommended by Kellner. Starch equivalent (SE) and digestible protein (DP) is used for measuring nutrient requirement. These requirements are varying with the live body weight and amount of milk production of the cattle.

For the cow each 100 kg of live body weight requires 0.58 kg of starch equivalent and 50 g of digestible protein for maintenance. For the buffalo 0.51 kg of SE and 50 g of DP are required as well.

As for the milk production, Mollgard and Ghoneim set an equation to calculate the calorific value of the cow's milk as follows:

$$\begin{aligned} \text{The calorific value of 1 kg of cow's milk} \\ = 115.0 \times \text{Fat \%} + 280.6 \dots (A) \end{aligned}$$

$$\begin{aligned} \text{The calorific value of 1 kg of buffalo's milk} \\ = 110.33 \times \text{Fat \%} + 278.63 \dots (B) \end{aligned}$$

The metabolisable energy needed for producing one kilogram of cow's milk and buffalo's milk can be calculated as follows:

$$\text{Cow} \quad A \times 100 / (75 \times 3,761) = \text{Starch (kg)}$$

$$\text{Buffalo} \quad B \times 100 / (75 \times 3,761) = \text{Starch (kg)}$$

Meanwhile, the amount of protein which must be present in the productive ration for milk production can be calculated according to the following equation set by Anderson, Langmack and Ghoneim, respectively as follows:

$$\text{Protein percentage in cow's milk} = 1.597 + 0.446 \times \text{Fat \%}$$

$$\text{Protein percentage in buffalo's milk} = 3.43 + 0.1216 \times \text{Fat \%}$$

The capacity of the animal in transforming plant protein to milk protein is usually considered as 50 percent. Therefore, after getting the amount of protein in the animal milk, the amount of protein in the ration is calculated by multiplying this latter amount.

These two portion of starch equivalent and digestible protein for the production ration, are added to the requirement for maintenance in order to form the total daily requirements.

Nutrients requirement to breed baladi cow and buffalo was calculated according to this feeding standard mentioned above and the results are given in Tables E2-4 to E2-6.

On the other hand, nutrients (SE and DP) production in each year is calculated according to the proposed cropping pattern and an analysis table (refer to Tables E2-7 to E2-9). As the result of calculating nutrients requirement and nutrients production in each year, feedable number of cattle and buffalo in the Project Area were estimated.

In the farmer's level, these kind of feeding standard has not been popular but as mentioned before, it is very important to know suitable amount of forage crops to be offered to the cattle every day due to save and utilize efficiently forage resources in summer and winter.

Therefore, it is recommended to extend a feeding standard for the farmers through the Veterinary Department and Agricultural Department and the model farm which will be established by the Project in Com Osheem. These extension services will contribute to improve productivity of animals and to increase production of animal products in the Fayoum Governorate.

(2) Forage Production

Of the crops in the proposed cropping pattern, those that can be fed to the animals are berseem, sorghum, wheat straw and the respective production by year is shown in Table E2-8. In the absence of berseem during summer, sorghum and wheat straw become the main roughage and some concentrate the protein source in animal feeds.

Farm by-products produced in the largest amount is wheat straw. Marketing prices of wheat straw have been higher in accordance with increase of demand.

But protein content of wheat straw is low. Therefore, some materials with high protein should be added. For example bran and cotton seed cake, molasses and so on would be available in order to increase nutrient value and paratability for animals. As for mineral resources, blood and bone meal produced as by-products in the proposed slaughterhouse would be available.

It is considered that these raw materials should be processed into pellets taking into consideration preservation and transportation.

E-2.3. Number of Animals by Year

Number of animals by year was calculated based on the annual nutrients requirement (refer to Table E2-4), nutrients production (refer to Table E2-9). The result of calculation is given in Table E2-10 and E2-11.

At the full development stage, 4,030 head (about one head per feddan) of baladi cow and buffalo in North Wahby and 2,010 head (about one head per feddan) in Com Osheem area for settlers would be introduced. In addition, three units of friesian and one unit of baladi cow will be introduced to the Cattle Breeding and Fattening Farm in Com Osheem according to the Plan of Agricultural Department.

Some case study was carried out by changing percentage of herd structure as mentioned in section E-2.1 and number of animals in each cases is given in Table E2-16 and amount of production is shown in Table E2-17.

E-2.4. Production of Animal Products

Production of animal products was estimated taking into consideration the potentiality, live body weight, calving rate, fodder crops production by year and so forth. Tables E2-13 to E2-16 show the estimated production of animal products in the newly reclaimed areas in each year.

As for the existing area in Wahby Downstream Area and South Area of Lake Qarun the following production was estimated.

	<u>Without Project</u>	<u>With Project</u>	<u>Incremental</u>
Milk	5,877 tons	7,708 tons	1,831 tons
Beef	245 "	295 "	50 "
Sheep Meat	8 "	10 "	2 "

Table E2-1 Nutrients Requirement for Maintenance

For each 100kg of live body weight	<u>SE (kg/day)</u>	<u>DP (g/day)</u>
Cow	0.58	50
Baffalo	0.51	50

Table E2-2 Nutrients Requirement for Growing

<u>Age in Weeks</u>	<u>SE(kg/day)</u>	<u>DP(g/day)</u>	<u>Age in Weeks</u>	<u>SE(kg/day)</u>	<u>DP(g/day)</u>
3 - 4	0.1	18	53 - 56	2.0	400
5 - 8	0.2	35	57 - 60	2.1	400
9 - 12	0.4	70	61 - 64	2.1	425
13 - 16	0.6	105	65 - 68	2.2	450
17 - 20	0.8	140	69 - 72	2.3	450
21 - 24	1.0	175	73 - 76	2.4	450
25 - 28	1.10	200	77 - 80	2.4	475
29 - 32	1.25	225	81 - 84	2.5	475
33 - 36	1.40	250	85 - 88	2.6	500
37 - 40	1.55	275	89 - 92	2.7	500
41 - 44	1.70	300	93 - 96	2.7	500
45 - 48	1.85	325	97 - 100	2.8	525
49 - 52	2.00	350	101 - 104	2.8	550

Note : SE: Starch Equivalent
DP: Digestible Protein

Table E2-3 Requirement for Producing 1 kg Milk

<u>Animal</u>	<u>Fat % in Milk</u>	<u>SE (kg)</u>	<u>DP (g)</u>
Cow	3.0	0.223	58.8
	3.5	0.243	63.2
	4.0	0.263	67.6
	4.5	0.283	72.0
	5.0	0.303	76.4
Buffalo	6.0	0.333	83.2
	6.5	0.353	84.4
	7.0	0.373	85.6
	7.5	0.393	86.8
	8.0	0.413	88.0

Table E2-4 Nutrients Requirement for Breeding Unit

	per day		Period	Requirement		
	SE (kg)	DP (g)		SE (kg)	DP (g)	
<u>1. Buffalo</u>						
Adult	Maintenance	0.510	50.0	365 days	838	82
	Milk Production	0.373	85.6	910 kg	339	78
Cow	Pregnancy	0.850	200.0	90 days	27	18
	<u>Sub-total</u>				<u>1,254</u>	<u>178</u>
	Raising Heifer (0.30 head)	2.4	475	365 days	263	52
	Bull Calf (0.30 head)	0.2	35	60 "	4	1
	<u>Sub-total</u>				<u>267</u>	<u>53</u>
	<u>Total</u>				<u>1,521</u>	<u>231</u>
<u>2. Baladi Cow</u>						
Adult	Maintenance	0.580	50.0	365 days	741	64
	Milk Production	0.223	58.8	520 kg	116	31
Cow	Pregnancy	0.650	170.0	90 days	59	15
	<u>Sub-total</u>				<u>916</u>	<u>110</u>
	Raising Heifer (0.30 head)	2.30	450	365 days	252	49
	Bull Calf (0.30 head)	1.21	210	183 "	66	12
	<u>Sub-total</u>				<u>318</u>	<u>61</u>
	<u>Total</u>				<u>1,234</u>	<u>171</u>
<u>3. Friesian</u>						
Adult	Maintenance	0.580	50.0	365 days	1,122	97
	Milk Production	0.243	63.2	3,780 kg	919	239
Cow	Pregnancy	0.850	200.0	95 days	81	19
	<u>Sub-total</u>				<u>2,122</u>	<u>355</u>
	Raising Heifer (0.43 head)	2.50	475	365 days	392	75
	Bull Calf (0.43 head)	1.70	300	183 "	134	24
	<u>Sub-total</u>				<u>526</u>	<u>99</u>
	<u>Total</u>				<u>2,648</u>	<u>454</u>

Table E2-5 Nutrients Requirement for Fattening

	per day		Period (day)	Requirement (kg)	
	SE (kg)	DP (g)		SE (kg)	DP (g)
Buffalo	3.84	526	182	699	96
Baladi	3.57	411	182	650	75
Friesion	4.38	598	182	797	109

Note : Nutrients requirement is for average body weight for fattening period.

Table E2-6 Nutrients Requirement for Sheep

	per day		Period (day)	Requirement (kg)	
	SE (kg)	DP (g)		SE (kg)	DP (g)
Ewe (1.0)	0.47	33	365	172	12
Follower (0.16)	0.32	22	365	19	1
Lamb (F - 0.36)	0.36	25	365	66	5
Lamb (M - 0.36)	0.36	25	180	32	2
<u>Total</u>				<u>289</u>	<u>20</u>

Note : F : Female
M : Male

Table E2-7 Nutrients Content

<u>Crops</u>	<u>SE (%)</u>	<u>DP (%)</u>
Corn	82	7
Barley	76	6
Beans	76	26
Rice Bran	65	12.5
Wheat Bran	50	6
Cotton Seed Cake	55	17
Berseem	10	2
Clover Hay	32	9
Wheat Straw	26	1
Rice Straw	-	21.7
Fish Meal	59	55
Sorghum	11	0.1
Maize	82	6

Table E2-8 Forage Production by Year

	8	9	10	11	12	13	14	15	16	17	18	19	20
	(1991)	(1992)	(1993)	(1994)	(1995)	(1996)	(1997)	(1998)	(1999)	(2000)	(2001)	(2002)	(2003)
<u>North Wahby</u>													
Berseem	4,916	10,520	14,781	17,368	23,456	27,365	27,515	26,250	26,250	26,250	26,250	26,250	26,250
Sorghum	4,253	15,120	21,956	21,609	17,913	18,585	18,900	18,900	18,900	18,900	18,900	18,900	18,900
Wheat Straw	-	851	1,418	1,514	945	945	945	945	945	945	945	945	945
<u>Com Osheem</u>													
Berseem	1,560	3,992	7,206	7,704	10,427	12,822	13,415	12,500	12,500	12,500	12,500	12,500	12,500
Sorghum	1,350	5,363	9,908	11,285	8,420	8,775	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Wheat Straw	-	540	990	990	630	630	630	630	630	630	630	630	630
<u>Cattle Breeding Center</u>													
Berseem	2,600	6,800	9,200	13,000	18,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Sorghum	2,250	7,250	13,100	16,600	17,500	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Wheat Straw	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E2-9 Starch Equivalent and Digestible Protein Production

	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998-2003</u>
(Unit: tons)								
<u>North Wahby</u>								
SE	816	2,496	3,622	3,831	3,878	4,273	4,315	4,207
DP	87	199	282	327	422	489	492	470
<u>Com Osheem (Settlers)</u>								
SE	259	959	1,758	1,929	1,812	2,049	2,121	2,044
DP	28	77	139	149	190	231	241	226
<u>Cattle Breeding Center</u>								
SE	431	1,256	2,007	2,657	3,166	3,383	3,383	3,383
DP	46	122	168	235	321	355	355	355

Note : SE : Starch Equivalent
 DP : Digestible Protein

Table E2-10 Number of Livestock by Year

North Wahby

(Unit: head)

<u>Year</u>	<u>Baladi Cow</u>			<u>Buffalo</u>		
	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>
1991	430	130	130	110	30	30
1992	1,730	520	520	430	130	130
1993	2,560	770	770	640	190	190
1994	2,540	760	760	640	190	190
1995	2,040	610	610	510	150	150
1996	2,100	630	630	530	160	160
1997	2,130	640	640	540	160	160
2003	2,130	640	640	540	160	160

Com Osheem (Settlers)

<u>Year</u>	<u>Baladi Cow</u>			<u>Buffalo</u>		
	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>
1991	140	40	40	30	10	10
1992	670	200	200	170	50	50
1993	1,240	370	370	310	90	90
1994	1,380	410	410	340	100	100
1995	1,000	300	300	250	80	80
1996	1,040	310	310	260	80	80
1997	1,060	320	320	270	80	80
2003	1,060	320	320	270	80	80

Cattle Breeding Center

<u>Year</u>	<u>Baladi Cow</u>			<u>Buffalo</u>		
	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>	<u>Adult Cow</u>	<u>Heifer</u>	<u>Bull Calf</u>
1991	340	110	110	110	40	40
1992	1,080	360	360	360	120	120
1993	1,970	660	660	660	220	220
1994	2,480	830	830	830	280	280
1995	2,620	870	870	870	290	290
1996	2,700	900	900	900	300	300
1997	2,700	900	900	900	300	300
2003	2,700	900	900	900	300	300

Table E2-11 Number of Sheep by Year

(Unit: head)

Year	North Wahby				Com Osheen			
	Ewe	Follower	Lamb (F)	Lamb (M)	Ewe	Follower	Lamb (F)	Lamb (M)
1991	160	30	80	80	50	10	30	30
1992	450	70	230	230	160	30	80	80
1993	650	100	330	330	300	50	150	150
1994	690	110	350	350	340	50	170	170
1995	720	120	360	360	330	50	170	170
1996	800	130	400	400	370	60	190	190
1997	810	130	410	410	390	60	200	200
1998	780	120	390	390	370	60	190	190
2003	780	120	390	390	370	60	190	190

Table E2-12 Milk Production

(Unit: tons)

	North Wahby		Com Osheem				Total
	Baladi	Buffalo	Settlers		Breeding Center		
			Baladi	Buffalo	Baladi	Friesian	
1891	224	100	73	27	59	1,278	1,761
92	900	391	348	155	187	4,082	6,063
93	1,331	582	645	282	342	7,447	10,629
94	1,321	582	718	309	431	9,389	12,750
95	1,061	464	520	228	454	9,900	12,627
96	1,092	482	541	237	468	10,206	13,026
97	1,108	491	551	246	"	"	13,070
98	"	"	"	"	"	"	"
99	"	"	"	"	"	"	"
2000	"	"	"	"	"	"	"
2001	"	"	"	"	"	"	"
2002	"	"	"	"	"	"	"
2003	"	"	"	"	"	"	"

Table E2-13 Beef Production

(Unit: tons)

	North Wahby		Com Osheem				Total
	Baladi	Buffalo	Settlers		Breeding Center		
			Baladi	Buffalo	Baladi	Friesian	
1991	35	10	11	3	11	43	113
92	138	41	54	16	32	138	419
93	204	61	99	29	58	253	704
94	203	61	110	32	74	318	798
95	162	48	79	25	78	334	726
96	168	51	83	26	79	345	752
97	171	"	85	"	"	"	757
98	"	"	"	"	"	"	"
99	"	"	"	"	"	"	"
2000	"	"	"	"	"	"	"
2001	"	"	"	"	"	"	"
2002	"	"	"	"	"	"	"
2003	"	"	"	"	"	"	"

Table E2-14 Sheep Meat Production

	(Unit: tons)		
	<u>North Wahby</u>	<u>Com Osheem</u>	<u>Total</u>
1991	2	1	3
92	6	3	9
93	9	5	14
94	10	"	15
95	"	"	"
96	11	6	17
97	12	5	"
98	11	"	16
99	"	"	"
2000	"	"	"
2001	"	"	"
2002	"	"	"
2003	"	"	"

Table E2-15 Wool Production

	(Unit: kg)		
	<u>North Wahby</u>	<u>Com Osheem</u>	<u>Total</u>
1991	285	90	375
92	780	285	1,065
93	1,125	525	1,650
94	1,200	585	1,785
95	1,260	570	1,830
96	1,395	645	2,040
97	1,410	675	2,085
98	1,350	645	1,995
99	"	"	"
2000	"	"	"
2001	"	"	"
2002	"	"	"
2003	"	"	"

Table E2-16 Number of Cattle in the Case Study

	For Settlers										Cattle Breeding and Fattening Center						
	Buffalo		Adult		Baladi Cow		Friesian		Adult		Baladi Cow		Friesian		Adult		
	Adult Cow	Heifer	Bull Calf	Cow	Heifer	Bull Calf	Adult Cow	Heifer	Adult Cow	Heifer	Bull Calf	Adult Cow	Heifer	Bull Calf	Adult Cow	Heifer	
North Wahby																	
Case-1	780	230	230	1,820	550	550											
Case-2	1,030	310	310	1,540	460	460											
Case-3	1,250	370	370	1,250	380	380											
Case-4	1,460	440	440	980	290	290											
Case-5	1,690	510	510	720	220	220											
Com Osheem (Settlers)																	
Case-1	390	120	120	900	270	270											
Case-2	510	150	150	760	230	230											
Case-3	620	190	190	620	190	190											
Case-4	730	220	220	480	140	140											
Case-5	840	250	250	360	110	110											
Cattle Breeding and Fattening Center																	
Case-1	-	-	-	-	-	-	2,700	900	900	900	300	300	300				
Case-2	-	-	-	-	-	-	"	"	"	"	"	"	"				
Case-3	-	-	-	-	-	-	"	"	"	"	"	"	"				
Case-4	-	-	-	-	-	-	"	"	"	"	"	"	"				
Case-5	-	-	-	-	-	-	"	"	"	"	"	"	"				

Table E2-17 Production of Animal Products in the Case Study

(Unit: tons)

	North Wahby		Com Osheem			Total
	Buffalo	Baladi	Buffalo	Baladi	Breeding Center	
<u>Milk</u>						
Case-1	770	946	355	468	10,674	13,153
Case-2	937	801	464	395	"	13,271
Case-3	1,138	650	564	322	"	13,348
Case-4	1,329	510	664	250	"	13,427
Case-5	1,538	374	764	187	"	13,537
<u>Beef</u>						
Case-1	74	146	38	71	424	753
Case-2	98	122	48	61	"	"
Case-3	118	101	60	50	"	"
Case-4	134	78	70	38	"	749
Case-5	161	58	80	29	"	752

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