PN-ABT-573

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Consultants & Managers In Agriculture

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FEASIBILITY STUDY TO ESTABLISH A 5,000 HEAD WATER BUFFALO FEED YARD AND A 500-COW DAIRY WITH MILK PROCESSING AT EL HAGER, EGYPT

LOTUS FARMS
20 ADLY STREET
CAIRO, EGYPT

A.I.D. Grant # OTR-0000-G-SS-2333-00
PROJECT # 940-0002

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March, 1983

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SUMMARY

After thoroughly studing the technical, financial and marketing aspects of a buffalo feedlot and 500 cow dairy with milk processing, we have come to the following conclusions:

1. The market for dairy products and red meat is very large under the current set of conditions.

2. A 500 cow dairy can be very profitable if it processes its milk into high margin products such as ice cream, white cheese, etc. Selling raw milk at the farm level is not profitable enough to attract investors.

3. Water buffalo feedlots are vitally needed to increase red meat supplies but are not profitable given the current circumstances: meat prices, feed costs, buffalo performance.

4. A dairy would need to grow its own feed to ensure availability, quality and low cost.

5. Disease is not a limiting factor, but requires good management and clean facilities.

6. Current practices relative to early slaughter of male water buffaloes is wasteful but totally understandable. More and better incentives will have to be given to investors before these young buffaloes will be raised to maturity. The low cost loans and supply of milk replacers is not enough to ensure an even marginal profit. The price of red meat will need to rise, imports curtailed, feed costs reduced, performance greatly improved or more government incentives given in order to attract capital.

7. Financially the 500 cow dairy has a 30.3% Internal Rate of Return. The 5,000 head feedlot generates only an estimated $54,000 per year on an investment over six million Egyptian pounds.

8. Egyptian research on use of by-products is very well advanced and there is not much need for help in this area. There are new concepts, yet unproven that may be helpful in reducing feed costs.

I. 5,000 Head Feedlot for Water Buffalo in Egypt

A. Marketing Data: The Production, Processing, and Distribution of Red Meat and Dairy Products

A. 1 Introduction and Background

The Egyptian consumption of red meat and dairy products has been growing rapidly in recent years. As Figure I. 1 indicates, between 1972-1980, meat consumption increased almost 85 percent. In each case, because local production has failed to keep pace with growing demand, imports have filled the gap between local supply and consumption.

The livestock industry in Egypt is highly fragmented. Few farmers specialize in meat and dairy production, and most livestock is held by millions of small farmers primarily for work purposes or to supplement local food requirements. Table I. 1 provides a breakdown of recent meat and dairy product consumption.

Historically, the government's major agricultural emphasis has been on increasing yields and improving production systems for field crops. Because animal production has been of secondary importance, yields of meat and milk have not expanded to the same degree as has the production of field crops. This situation is changing, however. In the 1980's and 1990's, greater government emphasis will be placed upon improving the livestock industry. The government hopes to increase the quantity of meat and milk available in Egypt through a series of programs to upgrade the productivity of the livestock raised by small farmers. In addition, the government is encouraging joint ventures with foreign livestock producers, and is supporting the establishment of specialized commercial meat and dairy operations.

A. 2 Livestock Population and Products

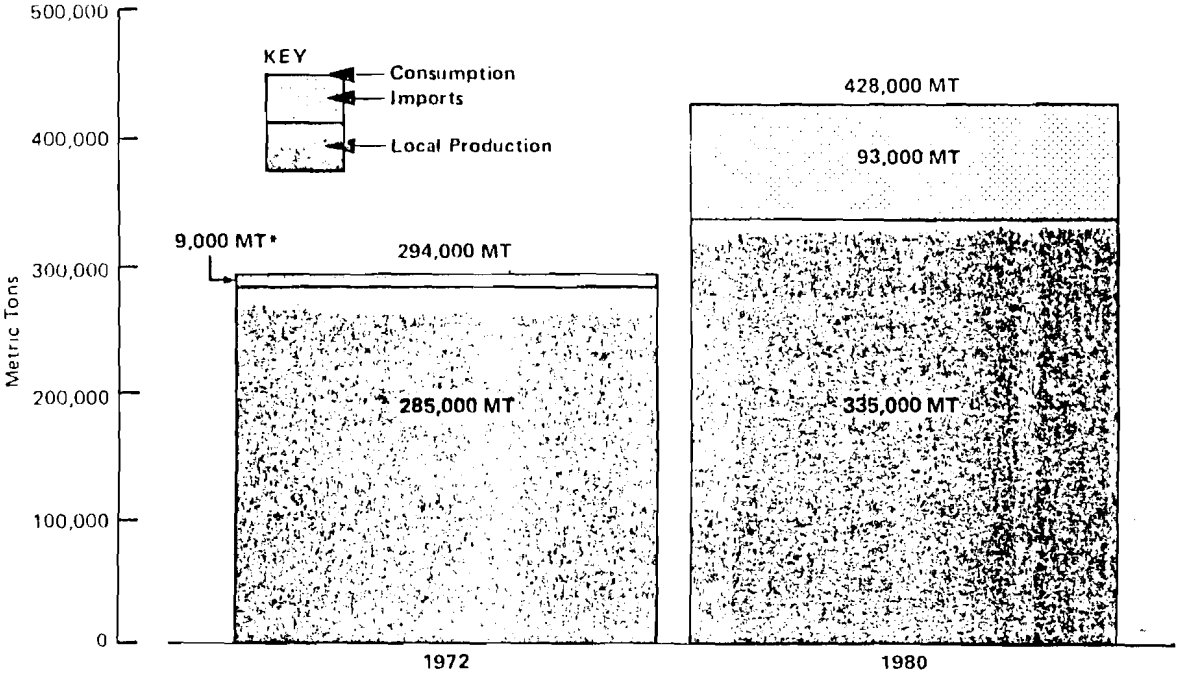
Despite its lack of organization and extreme fragmentation, the livestock industry plays an important role in Egypt. As shown in Table I. 2, the farm value of meat and milk products was an estimated LE 932 million in 1980. This represents 25 percent of the total value of agricultural output in Egypt in that year.

A. 3 Cattle and Water Buffalo

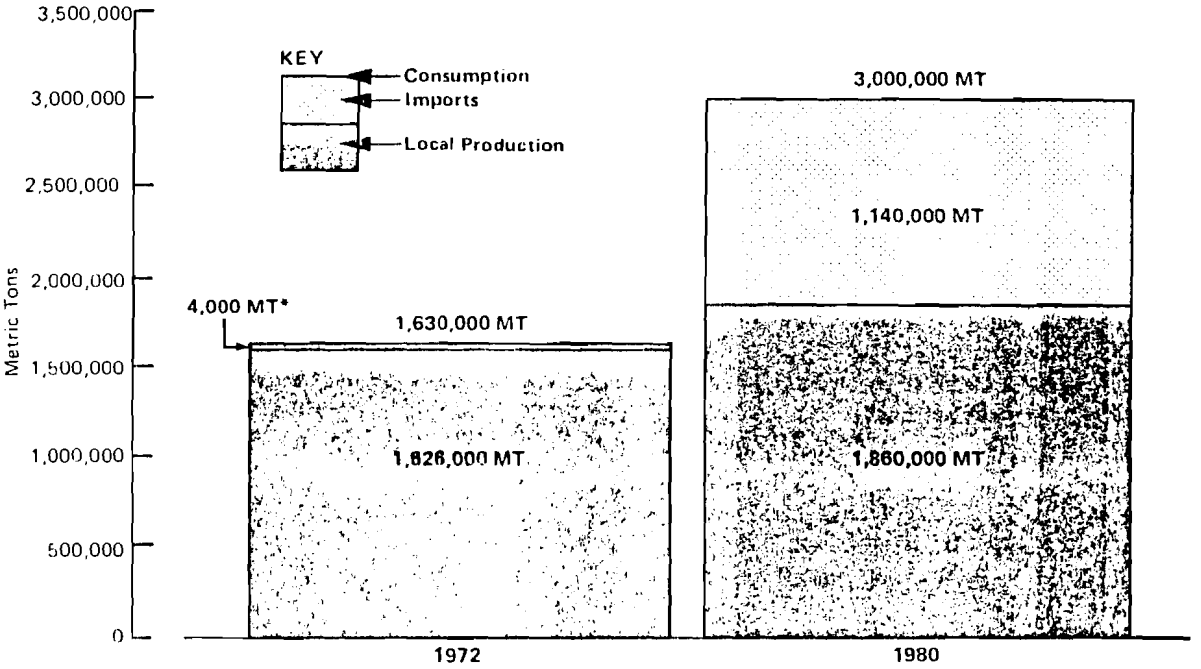
As shown in Table I. 2, cattle and water buffalo are the principal sources of local meat and milk in Egypt, accounting for 85 percent of the red meat production and 96 percent of the milk production. Unfortunately, both the

Figure I.1
EGYPTIAN CONSUMPTION, PRODUCTION, AND IMPORTS OF RED MEAT AND DAIRY PRODUCTS, 1972 and 1980

RED MEAT



DAIRY PRODUCTS**



*CTIC estimate.
**Whole milk equivalent.

Source: Ministry of Agriculture and U.S. Embassy, Cairo.

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Table I.1

BREAKDOWN OF CONSUMPTION OF
MEAT AND DAIRY PRODUCTS IN EGYPT, 1980

Item	Production (000 MT)	Imports (000 MT)	Estimated Consumption (000 MT)	Estimated Per Capita Consumption (kgs per year)
Red meat				
Beef and buffalo	272	80	352	8.4
Sheep, mutton, camel, and pork	63	13	76	1.8
Poultry meat	128	76	204	4.9
Fish	168	130	298	7.1
Subtotal	631	299	930	22.2
Eggs*	79	2	81	1.9
Milk	1,860	1,140	3,000	71.8
TOTAL	2,570	1,441	4,011	95.9

* Expressed in millions of eggs, Egyptian production, imports, estimated Egyptian consumption, and estimated per capita consumption in 1980 came to 2,110, 57, 2,167, and 52, respectively.

Source: Ministry of Agriculture and U.S. Embassy, Cairo.

Table I.2

VALUE OF FARM PRODUCTION OF
LIVESTOCK FOOD PRODUCTS IN EGYPT, 1980

Item	Quantity (000 MT)	Value (Million L.E.)
Red meat		
Beef	168	336
Buffalo	104	187
Sheep and goat	56	84*
Camel and pork	7	10*
Subtotal	335	617
Milk		
Cattle	656	98
Buffalo	1,150	207
Goat	70	10*
Subtotal	1,876	315
TOTAL	-	932

* CTIC estimates.

Source: Ministry of Agriculture, Cairo.

number of livestock and meat and milk output have grown slowly in recent years, at a rate of increase that actually has been below the rate of population increase. Table I. 3 indicates the extent to which, since 1972, per capita production of meat and milk and the number of livetock per Egyptian have decreased.

There are many reasons for the continued low meat and milk production levels. The most important are as follows:

a) Because cattle and water buffalo are used principally for draft purposes, they are selected for their strength and adaptability to work rather than as productive producers of milk and meat.

b) Because much of the energy of the livestock is used for work, their milk, meat, and reproductive capabilities are reduced.

c) Calves, especially males, are slaughtered at an early age, before they have been fattened.

d) Especially during the summer months, sufficient quantities of proper feeds are unavailable. This reduces growth rates and milk output and encourages early slaughtering.

e) Sterility rates are high, and birth rates low. Internal and external parasites are widespread, further lowering productivity.

f) There are no organized distribution systems for meat and dairy products.

A. 4 Meat and Milk Production

Although cattle and water buffalo are used principally as draft animals, meat and milk production does represent a significant source of supplemental income and household food supply to the farmer and therefore influences, to some extent at least, the raising pattern of animals.

Most male water buffalo are sold for slaughter shortly after birth. The male buffalo is considered dangerous and not suitable for work purposes. Also, because of its higher fat content, buffalo milk is preferred to cattle milk and thus sells at a premium price. By disposing of the calf shortly after birth, the mother's milk is available for household use or sale. The Ministry of Agriculture estimates that of the 500,000 male water

Table I.3

NUMBER OF CATTLE AND WATER BUFFALO/
MILK AND MEAT PRODUCTION, COMPARED TO EGYPTIAN POPULATION,
1972 and 1980

Item	1972	1980	% Change Per Annum
Egyptian population (millions)	34.6	42.2	2.5
Meat production (1000 MT)	242.0*	272.0	1.2
Per capita meat production (kgs)	7.0	6.4	(1.1 decrease)
Milk production (1000 MT)	1,626.0	1,801.0	1.1
Per capita milk production (kgs)	47.0	42.7	(1.2 decrease)
Number of head (1000s)	4,114.0	4,400.0	0.9
Number of head per capita	.12	.10	(2.5 decrease)

* Chase Trade Information Corporation estimate.

Source: Ministry of Agriculture; Central Agency for Public Mobilization and Statistics.

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buffalo calves born annually in Egypt, 80 percent are slaughtered at an average live weight of 70 kilograms.

Figure 1. 2 based on a 1970 survey conducted by USDA in cooperation with U.S. AID and the Egyptian Ministry of Agriculture, indicates that the percentage of calves and male water buffalo that survive to become yearlings is low. Few become adults. Male buffalo represent only three percent of adult buffalo herds.

Female cattle also are used for draft purposes. Male cattle are generally sold or slaughtered after weaning or at the end of the clover season. However, 35 percent of male cattle survive to become yearlings. Only about nine percent of the adult cattle herds are males. Since October 1980, the slaughtering of female cattle has been banned by the government.

Table I. 4 provides a breakdown by size of cattle and water buffalo slaughtered at official Egyptian slaughterhouses during the first eight months of 1980. About 90 percent of the cattle slaughtered at official slaughterhouses were calves. Close to 70 percent of the water buffalo slaughtered during the period were calves, largely baby calves with an average carcass weight of only 40 kilograms.

A. 5 The Ministry of Agriculture Strategic Plan

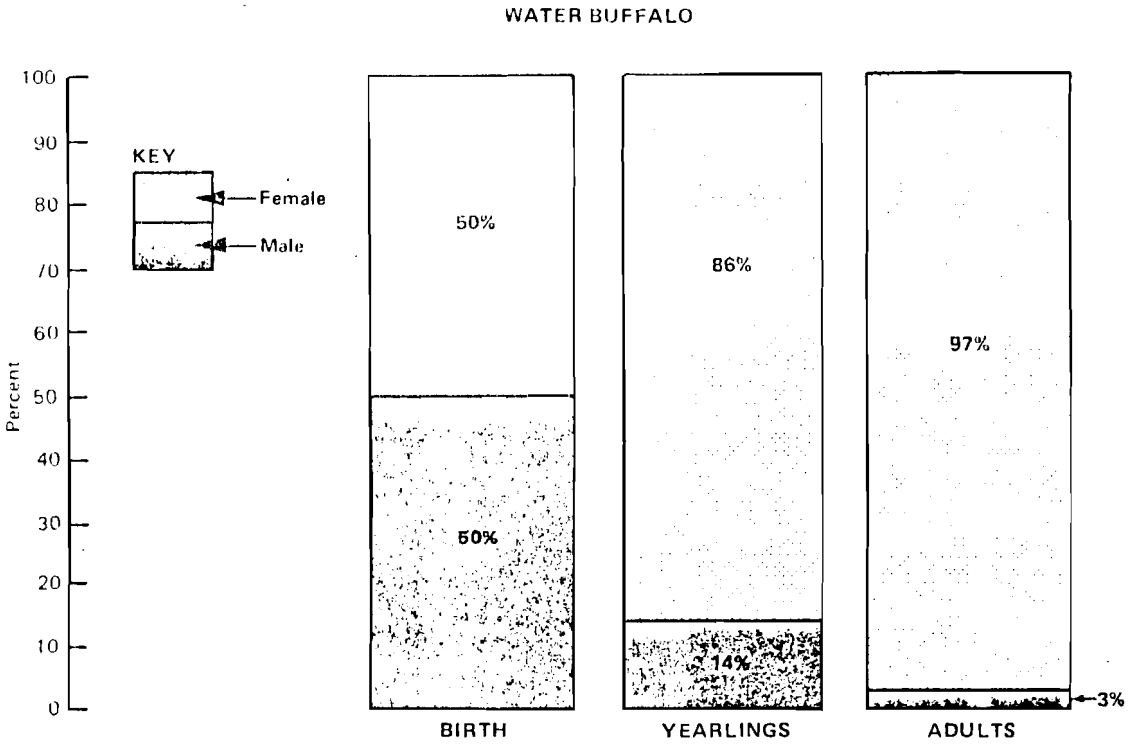
To increase production of cattle and water buffalo meat as well as milk production, the Ministry of Agriculture has developed a strategic plan for the period 1981-2000. This plan has been ratified by the People's Assembly and the Egyptian Cabinet, and supportive implementation and financing plans are being prepared for approval. Overall goals of the plan for increased production are as follows:

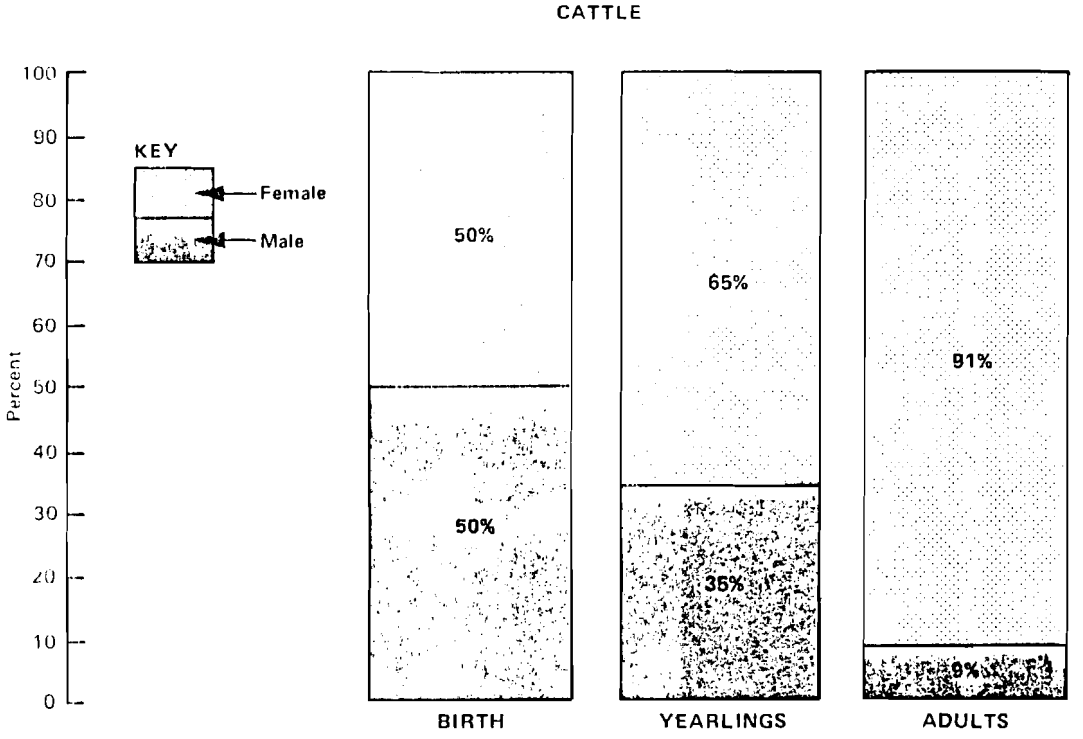
	1980	2000	Total Increase	Percent Increase
Meat (000 MT)	272	518	246	90
Milk (000 MT)	1,806	4,679	2,873	159

Although these production goals represent substantial increases over 1980, if achieved, even at 1980 per capita consumption rates, they still will not satisfy projected annual consumption rates for the year 2000, assuming an increased population of 70 million. Table I. 5 indicates a production gap of 70,000 MT of meat and 360,000 MT of dairy products (in terms of fluid milk equivalent). The gap in

Figure I.2

PERCENTAGE OF MALE AND FEMALE WATER BUFFALO AND CATTLE IN EGYPT FOR VARIOUS AGE CATEGORIES, 1970





Source: CTIC, based on data from *Egypt: Major Constraints to Increasing Agricultural Productivity*, Foreign Agricultural Economic Report No. 120, USDA, Washington, D.C., June 1976, page 118.

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Table I.4

NUMBER AND AVERAGE WEIGHT OF CATTLE AND WATER BUFFALO KILLED, BY CATEGORY, AT OFFICIAL EGYPTIAN SLAUGHTERHOUSES, JANUARY 1-AUGUST 31, 1980

Category	Average Weight (CWE)* (kilograms)	Number Slaughtered	Percent of Total Number Slaughtered	Total Slaughtered Weight (MT)	Percent of Total Weight
Cattle					
Calves	165	298,407	90.1	49,237	83.4
Cows	300	31,802	9.6	9,541	16.2
Steers	250	994	0.3	249	0.4
TOTAL	-	331,203	100.0	59,027	100.0
Water Buffalo					
Baby calves	40	103,813	47.2	4,153	12.6
Fattened calves	180	48,406	22.0	8,713	26.2
Adults	300	67,908	30.8	20,372	61.3
TOTAL	-	220,127	100.0	33,238	100.0**

* CWE: carcass weight equivalent.
** Details do not add to total because of rounding.

Source: "Egypt: Livestock and By-Product Report," U.S. Embassy, Cairo, October 1980

Table I.5

EGYPTIAN PER CAPITA PRODUCTION AND CONSUMPTION
OF CATTLE AND WATER BUFFALO MEAT AND MILK, 1980 AND 2000

Product	1980 Per Capita Production (kgs/yr.)	2000 Projected Per Capita Production (kgs/yr.)	1980 and Assumed 2000 Per Capita Consumption (kgs/yr.)	Production Gaps (MT 1000s)	
				1980 Imports	2000 Projected
Meat	6.5	7.4	8.4	80	70
Milk	43.0	67.0	72.0	1,140	360

Source: CTIC estimates, based on Ministry of Agriculture statistics.

2000 will be less than the 1980 gap, especially for milk, unless, of course, per capita consumption increases. The per capita consumption of dairy products increased at an annual rate of 3.5 percent between 1972 and 1980. If this rate were to continue, which is unlikely, per capita consumption would double by the year 2000, thus resulting in a milk production gap of 5.4 million MT.

I. B Financial Requirements

B. 1 Total Costs:

		LE
1.	Land	22,500
2.	Slaughter Plant	534,000
3.	Equipment	240,000
4.	Corrals, Feed Bunkers	2,571,000
5.	Site Work	250,000
6.	Miscellaneous & Contingency	50,000
7.	Operating Capital 1st Year	2,324,114
	TOTAL LE	5,991,614

B. 2 Proposed Financial Structure

In the cash flow, a 20% equity share is used. The financial statements cleary show that either cost must be reduced or prices of red meat raised to make this type of venture attractive to investors. The only other possibility is for increased government incentives to try a project. If 350,000 male buffalo calves were raised to 450 Kg, it would provide approximately 32,000 MT of red meat and save on importation of meat.

B. 3 Buffalo Feedlot - Facility Needs

Corrals

- Fencing
- Feed Bunks
- Waterers
- Cement Aprons
- Roads
- Gates
- Drive Alleys and Dorting Alleys

Processing Area

- Cattle Squeeze
- Sorting Gates
- Calf Receiving Barn & Pens
- Branding Equipment
- Multiple Dose Syringes
- Sick Pens
- Cattle Probes

Cattle Receiving

- Unloading and Loading Chute
- Cattle Scale

Calf Feeding

- Calf Feeding Crates
- Calf Milk Replacer Mixer
- Feeding Bottles
- Bottle Washers

I. C Introduction, Technical Plan, Operating Costs

Egypt is now experiencing a great shortage in animal protein. At present the population consumes only 8-10 grams per day which is only 1/3 of the minimum daily requirement (29 grams) set by the export committee of the United Nations.

Everyone knows that beef production is not the most efficient way of producing animal protein. However, if the conversion in animal protein of poor roughage such as grazing land is taken into consideration, then beef production becomes as efficient as chickens because no other animal can do this. Furthermore, if 70% of the plant protein is substituted by urea then beef production becomes only second to milk production followed by eggs and broiler meat.

Since land in Egypt is limited, it must be devoted to intensive irrigated agriculture and not grazing pastures as in Australia or South Africa.

Beef must be produced using the most intensive feeding programs such as those found in the western part of the United States of America. Under these programs very little plant protein is fed to beef. Most of the nitrogen is derived from non protein sources such as urea, Di-ammonium phosphate, and Mono-ammonium phosphate.

Egyptians like red meat and cannot rely or like plants for entire protein requirement.

The main purpose of the buffalo is as a draft animal. This robs its potential as a milk and meat producer. Furthermore, the local breeds have poor genetic qualities. In addition to all this there exists in Egypt a shortage of all types of animal feeds. Beside's these problems enumerated there are many endemic diseases and particularly parasites which sap the animals of vitality.

In order to save on fresh milk the University of Alexandria has done some experiments to early wean the buffalo calves. In the United States calves from the milking cows are weaned at a day of age and raised on milk replacer and concentrate. It is our intention to do this in Egypt because of the great success we have had in the United States. For this purpose calves are taken at early weaning and placed in a calf crate pen and given milk replacer by means of a pail with a nipple on the side. From the first day the calf is introduced to solid feed high in energy and digestibility.

I. C. 1 Operation Costs

Performance Data and Assumptions

Purchase Weight	Kg	50
Purchase Cost	LE	75
Mortality Rate	%	10
Revised Purchase Cost	LE	84
Gain Per Days	Kg	1.20
Selling Weight (Live)	Kg	450
Total Cost of Gain	LE	259.30
Cost per Kg of Gain	Kg	.66573
Total Days of Feed		325
Total Yardage Cost		46.76
Interest on Calf & Feed		56.00
Total Cost Per Head Finished	LE	362.06
Total Cost Slaughtered & Dressing	LE	15.00
Total Cost Dressed		377.06

C. 2 Feedlot Labor

	Annual Salaries US $	LE
Expatriate		
Manager	50,000	99,000
Cattle Foreman	40,000	
Egyptian		
Veterinarian	1	12,000
Accountant	1	7,200
Secretary Bilingual	1	4,800
Feedlot Workers	7	33,600
Total		57,600
Total Cost of Labor		156,600

C. 3 Sales Data

Selling Weight Live	450	Kg
Carcus Weight	247.5	Kg
Meat for Sale	198	Kg
Average Value of Meat (1/3 fore quarter 2/3 hind quarter)	3.00	LE Per Kg
Value of Meat Per Animal	594.00	LE

Profit Estimates:

Total Sales & Value per Head	594.00	
Total Cost Dressed	377.06	
Gross Profit LE	216.94	Per Head

Sell 5,000 Per Year = LE 1,084,700 Gross Profit

I. D. 1. Common By-Products Available for Use In Animal Feeds:

	Cost: LE/MT		Cost: LE/MT
Bone Meal	147.0	Cotton Seed Meal	97.0
Wheat Bran	65.0	Rice, Bran	87.0
Wheat Germ Meal	89.0	Rice, Polishings	*
Middlings	60.0	Rice, Rough	*
Wheat Shorts	60.0	Rice, Germ Meal	50.60
Local Fish Meal	**	Linseed Meal	*
Rootlets (Brewery)	*	Brewer Grains, Wet	*
Malt Husks	*	Screened Grains (husk)	*
Grape Pomace	25	Palm Nut Meal	*
Molasses	22.5	Poultry By-Product Meal	*
Urea	90.0	Poultry Waste	10.0

* Not enough quantity to use.
** Quality not consistent cannot use.

In order to properly evaluate each possible commodity for use in animal diets, we testd for protein, fat, crude fiber, established metabolizable energy, calcium, phosphorus, sodium, potassium, chloride, maganese, zinc, all amino acids and all vitamins. The results of our tests are listed in Appendix I

D. 2 The Most Commonly Used Feedstuffs and Their Prices in Egypt Today.

Corn:	
Imported (subsidized)	65 LE/MT
Local	100 LE/MT
Soybean Meal (48%) Imported	285 USD/MT
Wheat Bran (16% Protein)	65 LE/MT
Fish Meal (68%) Imported	507 USD/MT
Bone Meal	147 LE/MT
Cottonseed Meal (Local)	97 LE/MT
Molasses	22 LE/MT
Whole Soybeans (local)	220 LE/MT
Limestone	16 LE/MT

D. 3 Marginal By-Products

Some of the by-products that are either marginal in nutritive value or need special treatment are:

Corn Stover - free at harvest if you can find it.
Rice Straw - LE 23 per ton
Cotton Stocks - free at harvest
Bean Straw
Date Skins
Orange Peels
Cotton Hulls
Corn Cobs
Bean Straw

It is possible to treat the straw and other feedstuffs heavy in lignins with sodium hydroxide at the 5% level or ensile with urea at the 5% level.

D. 4 Research Review on By-Products

Grains and roughage are the volume products needed in a feedlot and dairy. The meals are used more in poultry feeds where the protein levels need to be higher. Most of the by-products in Egypt are not available in large enough quantities to be used in a large feedlot. These by-products are known to us and have been used extensively in animal feeds in the United States for many years. The ones that we are most interested in have been used in the diets listed for the feedlot. Wheat, rice, and cotton milling by-products are the most plentiful and will be used the most. We don't have really anything new to offer the Egyptians in the area of by-product use at this time. We had hoped to use more poultry waste and molasses but this concept is still too new to design a feeding program around it.

I. E Nutrition and Feed Program

I. E. 1 Rations

In order to do any efficient job of feeding the buffalo and dairy bulls, it is recommended that a five stage ration program be followed. The five ration will be a step-up program in energy for optimum energy utilization.

	#1	#2	#3	#4	#5
Roughage	60	40	30	20	12
Corn	30	50	60	70	78
Millrun	6	6	6	6	6
Premix	4	4	4	4	4
Totals	100	100	100	100	100

I. E. 2 Calculated Analysis

Protein	13.45	12.25	11.59	10.96	10.46
Calcium	1.28	1.02	.88	.77	.64
Phosphorus	.32	.33	.34	.33	.33

Roughage and corn will be grown in farm land in order to bring the price of feed to a reasonable level.

Price of Feed

#1	68.50	LE/tonne
#2	80.10	LE/tonne
#3	82.90	LE/tonne
#4	87.70	LE/tonne
#5	91.00	LE/tonne

Premix

	Amount in 4% of total ration	lbs. per batch
Rice Germ Meal	2.4315	610
Bone Meal	.2860	70
Urea	.2500	65
Limestone	1.0000	250
Vitamin A USP Units	.0110	2.5 Million
Vitamin D INT.Units	.0010	1.3 Million

Vitamin E INT.Units	.0180	250,000
Rumensin 132 g/Kg	.0025	.6
Totals	4.0000	1000

Prot.	28.70
Ca.	10.80
P	11.13

I. E. 3 Weight Gains

Iraqi buffalo show better gains at 14-16 months the animal showed a body weight of 250 Kg with a daily gain of 1.13 Kg.

Table (2) Slaughter Data of Iraqi Buffalo Calves

Description	Group (1)	Group (2)	Group (3)
Weight before Slaughter	231.2	265.7	253.7
Weight of Carcass Warm	116.5	135.6	186.3
Weight of Carcass Chilled	114.2	133.0	186.6
Dressing Percentage	50.3	50.6	52.3
Ration of Meat & Bone in 3rd Rib Samples			
Meat %	58.6	64.8	63.7
Bone %	23.2	19.9	19.7

Buffalo can be made to gain better than has been shown in the studies in Egypt. This can be done by using a more intensive feeding program or by improving the genetics. It is more probable that a combination of both of these factors will be needed. In Italy, Franciscis (1978), showed the buffalo calf up 150 Kg in three age groups this could show a daily gain of 1.103, 0.987, 0.973, with dressing percentages of 59.40, 59.06, 59.28 respectively.

Buffalo Normal Growth Weight - Ragab 1966

Time	50 Days	6 Months	12 Months	18 Months	24 Months
Weight Kg.	74	157.67	230.33	359.33	449.60
Castrated Calves			236.00	360.33	450.00
ADG.	.67	.64	.40	.72	.50

Buffalo gain 1 Kg of gain for 8.22 Kg conc.

From	6-12 months	
	12-18 months	7.55 Kg conc.
	18-24 months	12.8 Kg conc.

Table (1) Percentage of Fore & Hind Quarter

Quarter	50 Days	6 Months	12 Months	18 Months	24 Months
Fore Quarter	51.54	50.99	50.45	52.96	52.92
Hind Quarter	47.37	48.64	47.71	46.61	47.08

Buffalo Dressing Percent According to Age

Age	50 Days	6 Months	12 Months	18 Months	24 Months
Percentage	59.92	57.16	53.67	57.57	52.74

I. E. 4 Packing and Slaughter House Data

Cattle		50-51
Buffalo		40-45
Buffalo	--	55% Yeild
Bone		20%
Cattle	--	58% Yeild
Bone		18%

Cost of Slaughter 10 LE for killing and separating offall and quartering.

Cost of Slaughter 15 LE for killling and separating offall and separating the bone.

The slaughter house constructed by Farm Key, a British Firm, at a cost of 300,000 pound sterling.

I. F Red Meat (Water Buffalo) Market Summary and Estimates

Wholesle Prices - Per Kilo

LE	1.40	Live
LE	3.50	Veal, Whole Animal
LE	3.25	Hindquarter on Beef
LE	3.50	Liver
LE	3.00	An average per kilo price for whole carcass.
LE	2.50	Forequarter

Retail Prices - Meat Markets - Per Kilo

LE	3.25	Minced Meat (hamburger)
LE	3.70	Steaks and Roasts
LE	3.40	Poorer Quality Roasts
LE	4.00	Liver
LE	3.50	Heart, Tongue, Brain, Spleen, Pancreas

Orientation: Hotels and meat shops.

Volume: 428,000 MT
21.7% imported (1980 figures).

Sales Objectives: Sell entire output to hotels and meat shops in the major cities.

Customers: Major hotels, some distributors and small meat shops.

Distribution Channels: Direct to the customers listed above.

Present Sources of Supply: 21.7% imported rest from local production.

Future Competition: Other feedlots and better breeds of cattle that will be more efficient converters of feeds.

Tariff Protection or Import Restriction: Some restrictions from time to time because of balance of payments problems.

Market Share: .1% will sell 5,000 male water buffalos per year.

Critical Factors That Determine Market Potential: Tourism, per capita income, population growth, economic stability, efficiency of beef production,

government pricing policies.

Any proposed or existing regional economic intergration agreements: None to my knowledge.

Anticipated Effect on Market Price by Increased Red Meat Production: None anticipated, demand is too great.

Government Regulations: Past policies have discouraged fattening of the water buffalo, i.e. restriction of slaughter days per week, restriction of meat sales by reducing the days it can be sold, discouraging meat consumption, priorities on crop production, limitation of imports, lack of incentives to the farmer to keep and fatten the water buffalo.

Organoleptic study has indicated that there is no difference between cattle and buffalo meat.

I. G Buffalo Feedlot Financials

G. 1 Profit and Loss Estimates

A 5,000 head feedlot which cost LE 6.1 million only generates LE 54,000 per year profit. This obviously is not a good investment.

Tables I. G. 1 and I. G. 2 show the projected Cash Flow of the feedlot.

EGYPT BUFFALO FEEDLOT

G. 2 ESTIMATED YEARLY PROFIT AND LOSS STATEMENT

		LE
Sales:		2,970,000
Costs:		
Buffalo Calves	420,000	
Labor	156,600	
Feed	1,326,400	
Administration, Management Fees	100,000	
Hauling	15,000	
Selling	18,000	
Interest	555,216	
Depreciation	244,500	
Other	80,000	
Total LE	2,915,716	2,915,716
Profit Per Year		54,284

G. 3 SUMMARY OF KEY ASSUMPTIONS

1. Cost of Feed: Average LE 82.90/MT.
2. Feed Conversion: Eight Kg of feed to One Kg of live weight.
3. Daily Weight Gain: 1.20 Kg.
4. Mortality: 10%
5. Average Selling Price (Wholesale): LE 3.00 per Kg.
6. Interest: 12%
7. Depreciation: 15 Years.
8. 80% - 20% - debt/equity ratio.
9. Sales - 5,000 head each year.
10. Kg per animal - 198 Kg net meat sales.
11. Feed Bunk Cost: 30 LE each (50 cm feed space).
12. Corral Cost: Steel cables 10 MM is 1.5 LE per meter. Black steel pipe two inches is 2.5 LE per meter.
13. Cost of Male Buffao Calf: LE 75 each.

G. 4 Lotus Buffalo Feedlot Estimated Cash Flow - 1 to 5 Years - Egyptian Pounds - LE

	1	2	3	4	5
CASH OUTFLOW					
Capital Costs					
Slaughter Plant	534000				
Land	22500				
Equipment	240000				
Corrals, Feed Bunkers	2571000				
Site Work	250000				
Misc. & Contingency	50000				
TOTAL CAPITAL COST	3667500				
Operational Expense					
Calves	420000	420000	420000	420000	420000
Labor	147600	156600	156600	156600	156600
Feed,Inc. Milk Replacer	974298	1326400	1326400	1326400	1326400
Admin. & Mgmt. Contract	100000	100000	100000	100000	100000
Hauling	12500	15000	15000	15000	15000
Selling	-0-	18000	18000	18000	18000
Interest	431340	555216	555216	555216	555216
Depreciation	165050	244500	244500	244500	244500
Other	73326	80000	80000	80000	80000
TOTAL OPERATIONAL EXPENSE	2324114	2915716	2915716	2915716	2915716
TOTAL OUTFLOWS	5991614	2915716	2915716	2915716	2915716
CASH INFLOWS					
Equity Capital	1220000				
Loans	4880000				
TOTAL	6100000				
Sales					
Meat Products		2970000	2970000	2970000	2970000
TOTAL INFLOWS	6100000	2970000	2970000	2970000	2970000
Depreciation	165050	244500	244500	244500	244500
Cumulative Cash	273436	572217	871001	1169785	1468569
PROFIT & LOSS	-2324114	54284	54284	54284	54284

G. 5 Lotus Buffalo Feedlot Estimated Cash Flow Statement - 1st Year - Egyptian Pounds - LE

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
CASH OUTFLOW													
Capital Costs													
Slaughter Plant								534000					534000
Land (5 feddans)	22500												22500
Equipment	100000	140000											240000
Corrals, Feed Bunkers	2571000												2571000
Site Work	250000												250000
Misc. & Contingency	50000												50000
TOTAL CAPITAL COSTS	2993500	140000						534000					3667500
Operational Expeses													
Calves			75000	75000	75000	75000	75000	45000					420000
Labor	6500	10600	13050	13050	13050	13050	13050	13050	13050	13050	13050	13050	147600
Feed Inc. milk replacer			60500	69800	85200	95600	110533	110533	110533	110533	110533	110533	974298
Admin. & Mgmt. Contract	8333	8333	8333	8333	8333	8333	8337	8333	8333	8333	8333	8333	100000
Hauling			1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	12500
Selling													-0-
Interest			40000	40000	40000	40000	40000	46268	46268	46268	46268	46268	431340
Depreciation			16505	16505	16505	16505	16505	16505	16505	16505	16505	16505	165050
Other		6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	73326
TOTAL	14833	25599	221304	230604	246004	256408	271337	247605	202605	202606	202605	202605	2324114
TOTAL OUTFLOW	3008333	165599	221304	230604	246004	256408	271337	781605	202605	202606	202605	202605	5991614
INFLOWS													
Equity 20%	700000			120000			200000		200000				1220000
Loans	2800000			480000			800000		800000				4880000
TOTAL INFLOWS	3500000			600000			1000000		1000000				6100000
Depreciation			16505	16505	16505	16505	16505	16505	16505	16505	16505	16505	165050
Cumulative Cash Balance	491667	326068	121269	507170	277671	37768	782936	17836	831736	645636	459536	273436	273436

I .H. LEGAL REQUIREMENTS

I. H. 1 Egyptian Government Plan and Incentives

Five projects relating to cattle and water buffalo are specified in the Ministry of Agriculture's strategic plan. Some of these projects will be implemented solely by the government, and others may offer opportunities for participation by foreign investors.

H. 1 (a) Treatment of Sterility

The first project is designed to upgrade the fertility of existing cows through the application of hormones. It is hoped that fertility can be increased by five per cent over a five year period beginning in 1981. If this goal is achieved, birth rates of cattle cows are projected to increase from 72 per cent to 77 per cent, and projected birth rates of water buffalo will increase from 60 to 65 per cent. If the goal is achieved, annual meat production will be increased by 20,000 MT, and annual milk production will be increased by 142,000 MT. The annual cost of the project is projected at LE 3.9 million, and the value of the additional meat and milk produced will be LE 64 million (LE 40 million for meat and LE 24 million for milk at current prices). The project will be implemented by the Ministry's field staff.

H. 1 (b) Treatment of Parasites

The second project, also scheduled for five years starting in 1981, provides for the treatment of internal parasites such as stomach worms, helminths, distoma hepatica, and blood parasites as well as external parasites, all of which reduce both the milk and meat productivity of livestock. The annual cost of the program, which includes treatment of sheep, goats, camels, horses, and poultry, is projected at LE 26 million, but, if successful, annual milk and meat production will be increased by an estimated 28,000 MT and 243,000 MT, respectively, and valued at a total of LE 97 million. This project also will be administered by Ministry personnel.

H. 1 (c) Raising Male Buffalo Calves

The third program aims to increase the pre-slaughtering weight of male water buffalo calves from the current average of 70 kilograms to weights averaging between 400-500 kilograms. This program offers opportunities for commerical feedlot operations in which foreign investors might participate.

Currently, only about 115,000 of the 500,000 water buffalo calves born each year are fattened. The goal

is to increase this number to 500,000 by 1988 by encouraging the expansion of feedlot operations. The Ministry proposes to provide low-cost, soft term loans of LE 1,000 per head to feedlot operators and to make available milk replacers for suckling calves so as to release the mother buffalo's milk for human consumption. The Ministry also will make available primary feeds for the first three months after the calves' weaning and concentrated feeds until slaughtering.

This program is expected to increase the production of water buffalo meat from fattened calves by about 75,000 MT per year. The use of milk replacers will release for human use 100,000 MT of milk annually. These annual increases represent a value at current prices of LE 135 million (LE 117 million for meat and LE 18 million for milk).

In addition to providing opportunities for investment in feedlots, the program provides opportunities for the production and sale of milk replacers and prepared feeds. Once the program is fully implemented, annual program requirements for feeds, in addition to green rations, are estimated by Ministry as follows:

Item	Annual Requirements Per Head (Kgs)	Annual Program Requirements (MT)
Milk Replacers	40	20,000
Primary Feed	135	68,000
Concentrated Feed	1,250	625,000
Corn	500	250,000
Bran	250	125,000

H. 1 (d) Genetic Upgrading of Cattle

The fourth program, to be implemented over a ten year period, involves the genetic upgrading of local cattle herds through artificial insemination, using imported semen. This program also would offer opportunities for feedlot operations as well as for the provision of milk replacers. In addition, systems for handling and distributing semen are required. Effective means of keeping imported semen properly frozen and of identifying cows in heat throughout the widely disbursed villages of the country also are required.

The project aims to increase average milk production to 1,300 kilograms annually, a doubling of current yeilds.* Milk replacers also would be used for cattle calves, thereby saving 250,000 MT of milk annually for human consumption. Male calves would be fattened in feedlots to reach a live weight of 400 kilograms, thus producing about 220 kilograms of meat per head.

The successful implementation of the project would increase annual meat production by 114,000 MT by 1992 and annual milk production by 1.2 million MT. The total annual value of the increased output at current prices is projected at LE 403 million.

The project's program of artificial insemination, which will establish frozen semen units in nine Egyptian governorates, in addition to the three units already established, is expected to require an investment of LE 6.5 million. In addition to 48 million MT of green forage and hay, the project is expected to require 1.5 million MT of feed concentrates, compared to the 340,000 MT used for cattle in 1980.

A project to genetically upgrade water buffalo, using local studs for semen, is expected to cost about the same as the project for cattle. During the first three years of the project, the Institute of Animal Production Research will work on breeding and selecting water buffalo studs. Once the studs have been selected, the program of artificial insemination will be implemented over a ten year period.

H. 1 (e) Importation of Pregnant Heifers

The fifth project, which will be implemented entirely by the government, contemplates the annual importation of 10,000 head of high-breed heifers, such as Friesians and Brown Swiss, for a period of ten years. These heifers will directly increase milk supply, and their male offspring will be used as studs to further upgrade existing cattle herds. The imported heifers will be allocated to specialized private corporations, agricultural cooperatives, and governorates. The project is expected to increase yields as follows:

a) 549,000 MT of milk, worth LE 82 million
b) 13,200 MT of meat, worth LE 26 million

Implementation of this project will require an additional 240,000 MT of feed concentrates by 1991.

Table I. H. 1 indicates the total production quantities and values resulting from the five livestock

projects through the year 2000.

* The Winrock International survey found that the average cow on the farms surveyed yielded about 670 kilograms of milk per year, including amounts used for suckling calves.

Table I. H. 1 Projected Annual Production of Cattle and Water Buffalo Meat and Milk through 2000, Based on the Egyptian Ministry of Agriculture's Strategic Plan

	Meat		Milk	
Year	Quantity (000 MT)	Value (LE Millions)	Quantity (000 MT)	Value (LE Millions)
1981	269	518	1,839	305
1986	395	744	2,612	403
1990	468	867	3,690	526
1994-2000	518	965	4,679	689

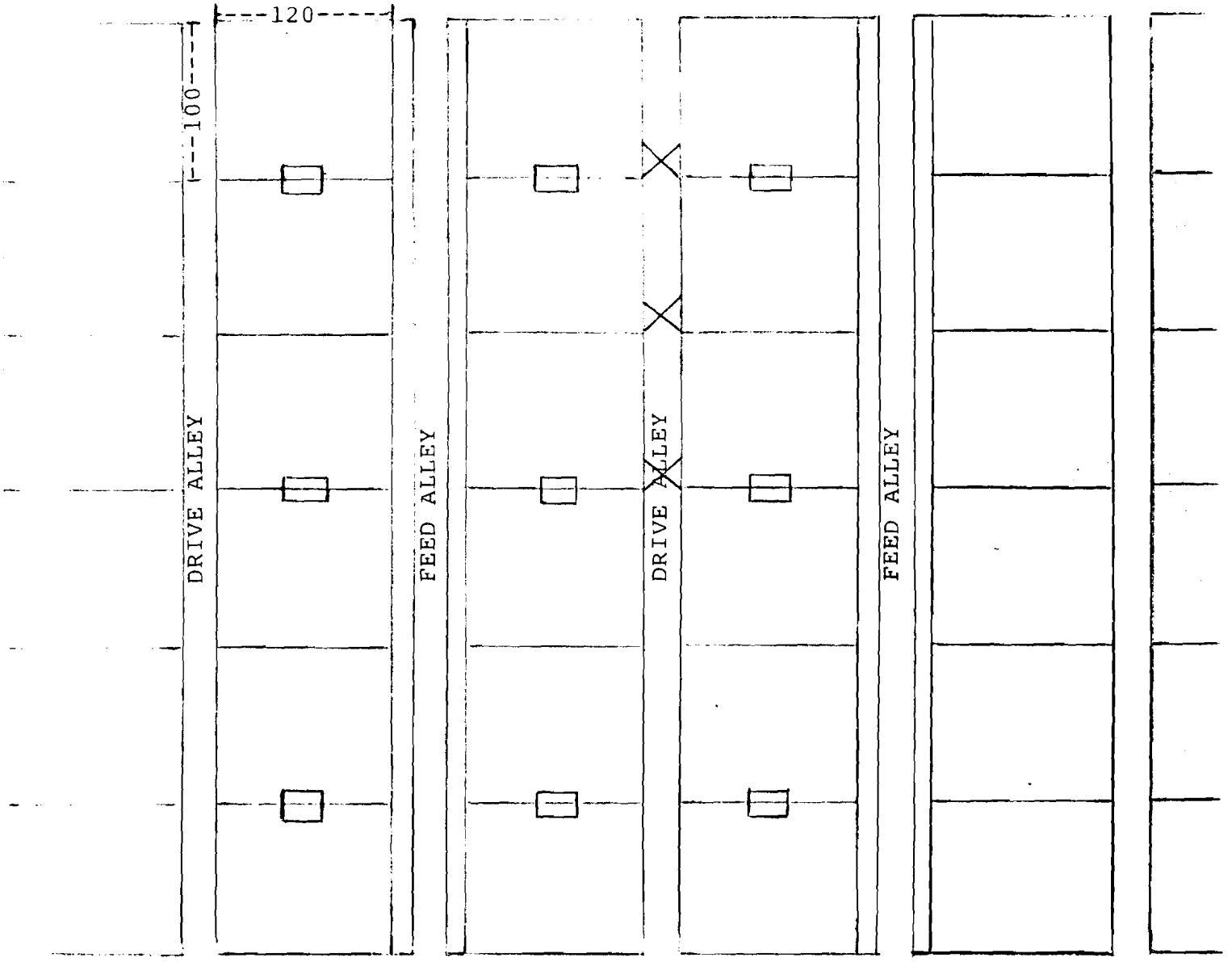
Source: Ministry of Agriculture, Cairo

H. 2 Approval to Diversify Lotus Farms

We have received tentative approval to expand Lotus Farms into Dairy and Feedlot Projects. The Investment Authority and the Ministry of Agriculture has encourged us to develop these projects.

H. 3 The Egyptian Government has low cost loans available for water buffalo feedlots. Loans are available through local banks at 13% interest in Egyptian pounds and to secure the loan. Money is available to support viable projects with good financial backing.

Figure I. 3 Feedlot Layout



II. 500 COW DAIRY AND MILK PROCESSING PLANT

We have studied a dairy operation at El Hager, Egypt which is in the Nile Delta near Alexandria where we are operating an egg production facility.

The climate is ideal for milk cows. Tables II.I through II.4 show that the temperature is not too hot and not too cold. The open style California dairy facility is ideal for this part of Egypt.

We visited the new dairy facility of the University of Alexandria located on the agricultural road just south of Alexandria. This facility was very efficient and the milk cows which were an English variety were doing quite well.

Since we know there is a demand for milk and milk products and that dairies have existed for many years in Egypt, we concentrated most of our efforts on the financial soundness of this potential project for Lotus Farms.

A. FINANCIAL REQUIREMENTS

A list of the estimated capital costs is given in Table II.5:

TABLE II.5 SUMMARY OF ESTIMATED CAPITAL COSTS

			$	LE
1.	Land (leased) 7 acres			
2.	Dairy Processing Plant	5,229,708	4,820,508	450,000
3.	Dairy Facilities & Equipment (Table II.9)	1,435,569	1,035,569	400,000
4.	Beef Feedlot (Table II.6)	306,000	-0-	306,000
5.	Farm to Produce Feed	1,017,000	508,500	508,500
6.	Electrical Facilities	270,000	-0-	270,000
7.	Housing	400,000	-0-	400,000
8.	Prepaid Expenses	90,600	-0-	90,600
9.	Working Capital	340,290	-0-	340,290
10.	Cows & Freight	510,300	513,300	-0-
	TOTAL	9,599,467	6,874,877	2,765,390
	$ Portion	$6,874,877	71%	
	LE Portion	2,765,390 LE	29%	

LOTUS FARMS SITE, EL HAGER, EGYPT

TABLE II.I TEMPERATURE

MONTH	C MEAN MIN	C MEAN MAX	C MEAN	F MEAN MIN	F MEAN MAX	F MEAN
JANUARY	9.3	18.3	13.6	48.7	64.9	56.5
FEBRUARY	9.7	19.2	14.3	49.5	66.6	57.7
MARCH	11.2	21.0	15.8	52.2	69.8	60.4
APRIL	13.5	23.6	18.3	56.3	74.5	64.9
MAY	16.7	26.5	21.4	62.1	79.7	70.5
JUNE	10.2	28.2	24.2	79.4	82.8	75.6
JULY	22.7	29.6	26.0	72.9	85.3	78.8
AUGUST	22.9	30.4	26.6	73.2	86.7	79.9
SEPTEMBER	22.3	29.4	25.4	72.1	84.9	77.7
OCTOBER	17.3	27.7	22.8	63.1	81.7	73.0
NOVEMBER	14.8	24.4	19.4	58.6	75.9	66.9
DECEMBER	11.2	20.4	15.0	52.2	68.7	59.7

LOTUS FARMS SITE, EL HAGER, EGYPT

TABLE II.2 ABSOLUTE MAXIMUM TEMPERATURE

MONTH	C	F
JANUARY	26.3	79.3
FEBRUARY	36.4	65.5
MARCH	40.4	104.7
APRIL	41.6	106.9
MAY	41.8	107.2
JUNE	42.1	107.8
JULY	38.1	100.6
AUGUST	39.7	103.5
SEPTEMBER	39.9	103.8
OCTOBER	39.0	102.2
NOVEMBER	36.5	97.7
DECEMBER	28.4	83.1

LOTUS FARMS SITE, EL HAGER, EGYPT

TABLE II.3 WIND

MONTH	MEAN VELOCITY KNOTS	M.P.H.
JANUARY	9.0	10.4
FEBRUARY	8.4	10.8
MARCH	9.4	10.8
APRIL	8.4	9.7
MAY	8.0	9.3
JUNE	8.4	10.0
JULY	8.4	9.4
AUGUST	7.8	9.0
SEPTEMBER	7.5	7.5
OCTOBER	5.8	6.7
NOVEMBER	7.3	8.9
DECEMBER	7.2	8.3

LOTUS FARMS SITE, EL HAGER, EGYPT

TABLE II.4 MEAN DAILY RELATIVE HUMIDITY

MONTH	%
JANUARY	69
FEBRUARY	67
MARCH	65
APRIL	66
MAY	68
JUNE	70
JULY	73
AUGUST	72
SEPTEMBER	68
OCTOBER	67
NOVEMBER	70
DECEMBER	71

The absolute minimum temperature for the site since 1942 was two degrees C or 35 degrees F; consequently, there have been no freezes at the site during the last 33 years.

Table II. 5 Capital Costs

Beef Feedlot	U.S. $
Corrals (420 head)	216,000
Working Chute	30,000
Loading Chute	50,000
Hospital Pens	10,000
Total Cost	306,000

Feedlot Facility in Connection with the Dairy

It is assumed for the purpose of this calculation on the feedlot facility that no water buffalo feedlot is available on the El Hager property.

The capital costs associated with the construction on a 420 head fedlot are listed in Table II.6.

B. TECHNICAL PLAN

1.1 Dairy facility cost. Figure II.1 shows a typical facility layout for a 500-milking-cow dairy facility. The most essential item is the milking parlor with associated milk cooling and storage and cow preparation areas. Milking-cow feeding and exercise corrals are located adjacent to the milking parlor for convenience in moving them to the parlor. Additional corrals are provided for dry cows and heifers. Pens are also provided for bulls and calves.

The stabilized herd composition is listed in Table II. 6 Under stabilized conditions, one-fourth of the milking-cow herd will be replaced annually, i.e., 150 heifers calving for the first time will be used to replace 150 cows culled from the herd. Table II.7 indicates that the stabilized herd will produce 200 heifers calving for the first time each year. Thus, there will be a surplus of 50 heifers over the number required to maintain a stable herd size. Table II. 9 lists the Capital Costs for a 500-cow facility.

TABLE II.6 STABILIZED HERD COMPOSITION
(Average for a year)

500	Milking cows
100	Dry cows
30	Heifer calves, 1 to 45 days old
29	Heifer calves, 45 to 90 days old
168	Heifer calves, 3 to 12 months
110	Yearling heifers, 12 to 18 months old
134	Bred heifers, 18 to 26 months old
10	Breeding bulls of different ages
1081	Total Animals

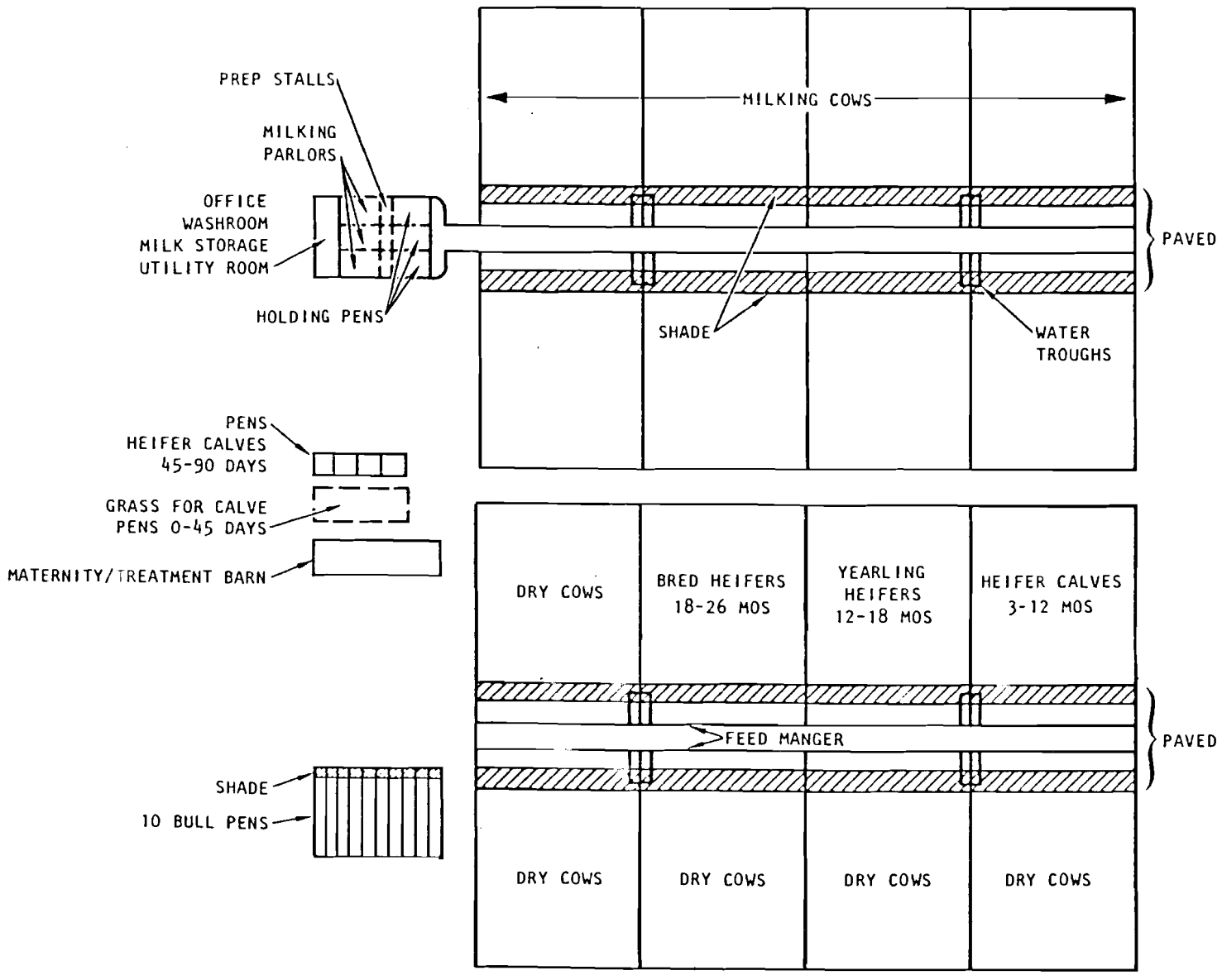


FIGURE II.1 SCHEMATIC PLAN FOR 500-MILKING-COW DAIRY FACILITY

TABLE II.7 ANNUAL CALF PRODUCTION (FOR STABILIZED 500-MILKING-COW HERD)

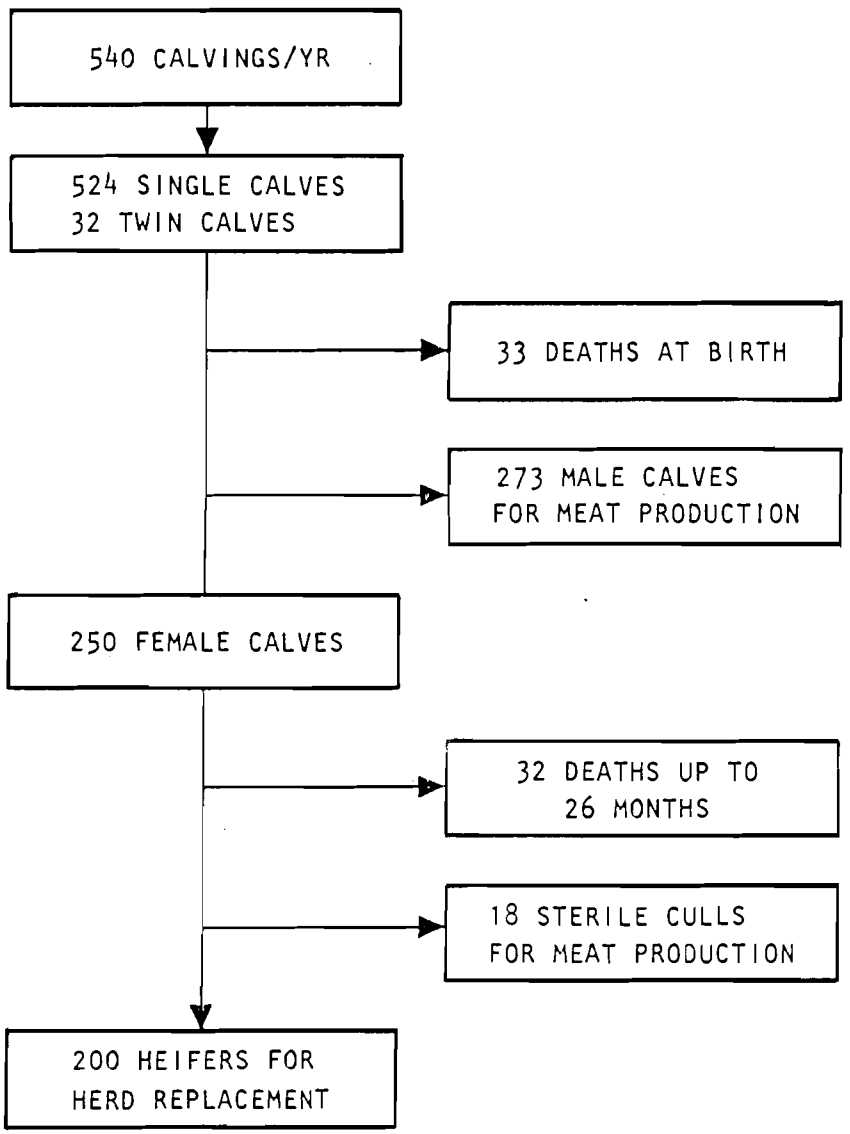


TABLE II.8 DAIRY FACILITIES & EQUIPMENT

CAPITAL COSTS - 500 COW DAIRY

		U.S. $
1.	Milk House	99,430
2.	Breeze Way	17,500
3.	Dairy Barn	117,190
4.	Cow Udder Wash Pen	84,400
5.	Calving Barn	33,250
6.	Hospital Pen & Dirt Pen	9,373
7.	Calf stalls & Corrals	72,000
8.	Cow Corrals	235,500
9.	Waste Water Storage	57,600
10.	2 Double 12 Herringbone Milking Parlor with Boumatic Milking Equipment	64,514
11.	2 12,680 Liter Milk Storage Tanks	41,450
12.	Recommended Minimum Spare Parts	2,875
13.	6 Months Supply Cleansing Agent	6,400
14.	Lighting & Electrical System for Milking Parlor, Milkroom and Holding Pen	25,130
15.	Installation Fee	102,000
16.	Site Preparation	200,000
17.	Storage Propane & Butane Tank	5,000
18.	Contingency Fee	261,960
	TOTAL	1,435,569

B. 1.2 LIVESTOCK BUILDING

The livestock will be housed in open fenced pens equipped with shades sufficient for all cows. Each pen will contain a water trough, equipped with a float value to maintain the water level and a feed manger along one side of the pens will permit feeding the cows by means of a feed wagon with a side discharge.

The floor of the pens will have a 1 1/2 m wide concrete pad immediately in front of all mangers, to allow the cattle to stand comfortably in front of the manger to eat even after stormy weather. The rest of the pen will be layered with sand over natural crushed limestone.

A concrete roadway will be provided in the center drive alley and roadway. The drive alley is used to drive the cattle to and from the milking parlor and the roadway is used to operate the feed wagon to feed the cattle.

Extra pen space will be provided to accommodate new cows and to move cows for the purpose of cleaning the pens.

B. 1.3 Manure Disposal

With the moderate humidity of the area, the manure will dry slowly in the pens and it will be cleaned every two to three months. Each pen will be scrapped with a front-end loader and stockpiled in an area away from the building. The manure will be used on the farmland or sold to the local farmers.

B. 1.4 Milking Parlor

The cows will be housed in groups of 144 per pen and each pen will be milked separately. Each pen of 144 cows will be brought to the wash pen, where the 144 cows are washed automatically by means of a warm water spray system located flush with the concrete floor. From this point each group of 24 cows are collected prior to going to the milking parlor.

A double 12 herringbone milking parlor will milk 144 cows in 45 minutes so that the milking time for 500 cows will be three hours. Each herringbone string of 12 is operated by two milkers.

The herringbone parlor has been selected because it is the simplist type of parlor with the highest throughput of cows and with a proven record of trouble-free maintenance. Figure II.2 and II.3 shows the double-six herringbone which is set up the same way as the double-twelve herringbone.

B. 1.5 Calf Housing

The calf barn is designed to accommodate all the calves that will be born from the 500 cows that will be shipped. We are assuming that every cow imported will have a calf within the first 18 months. The calf facilities provide for 500 individual calf stalls. Calves will spend 6 weeks in calf stalls. They then will be transferred to outside calf pens that hold 10 to a pen where they will grow for 8 weeks. At that point the heifers will be selected as heifer replacements. All the bulls, however, will be transferred to the feedlot.

B. 1.6 Calving Barn

Up to 500 cows will calve during a twelve month period. Cows about to calve should spend one day prior to calving in calving barn in order to relax and settle down and three days after calving (which ensures that the calf receives colostrum for the first three days of its life.

B. 1.7 Hospital Pens

Any sick cattle must be isolated at the hospital as soon as an infection is noted.

B. 2 FEED STORE AND HANDLING

B. 2.1 Feed Storage

The recommended diet involves the combination of concentrate and forage ingredients to provide a complete diet for the cows.

Almost all the ingredients making up the diet are low in moisture. The only exception is the green forage. This cannot be stored without a breakdown of quality. A regular collection service is thus essential.

The storage facilites are designed to provide for at least two months supply of essential feedstuffs. This includes dairy concentrate, soybean meal, vitamins and minerals.

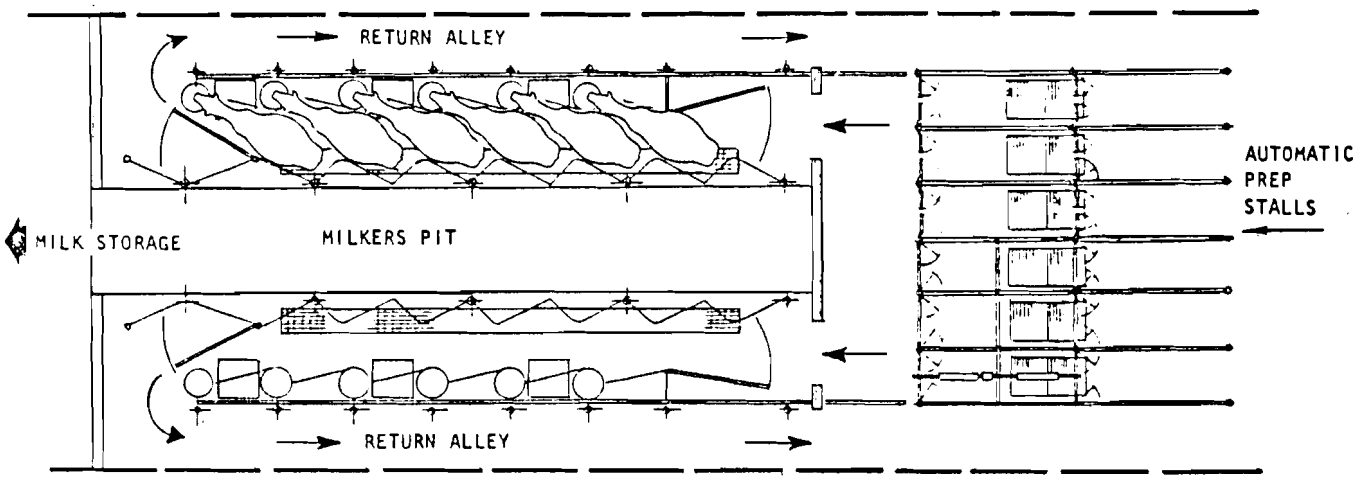


FIGURE II.2 PLAN FOR DOUBLE-SIX HERRINGBONE MILK PARLOR

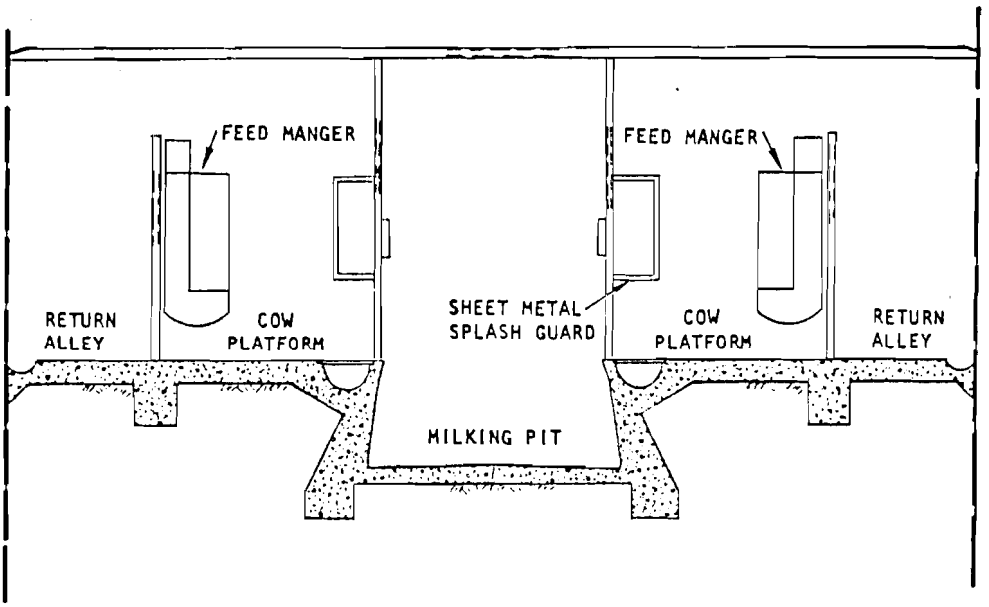


FIGURE II.3 CROSS-SECTION FOR DOUBLE-SIX HERRINGBONE PARLOR

B. 2.2 Feed Processing

Most feedstuffs do not require any further processing after arrival to the dairy farm except for the forage (green or dry).

Figure II.4 illustrates the flow diagram with maximum daily tonnages of basic ingredients involved in filling of mixer feed wagon.

Green forage requires precision chop in order that it be mixed prior to feeding.

Dry sorghum forage will require to be chopped and milled in order to reduce particle size of roughage to mix in mixer wagon.

B.3 REQUIRED EQUIPMENT FOR DAIRY FARM

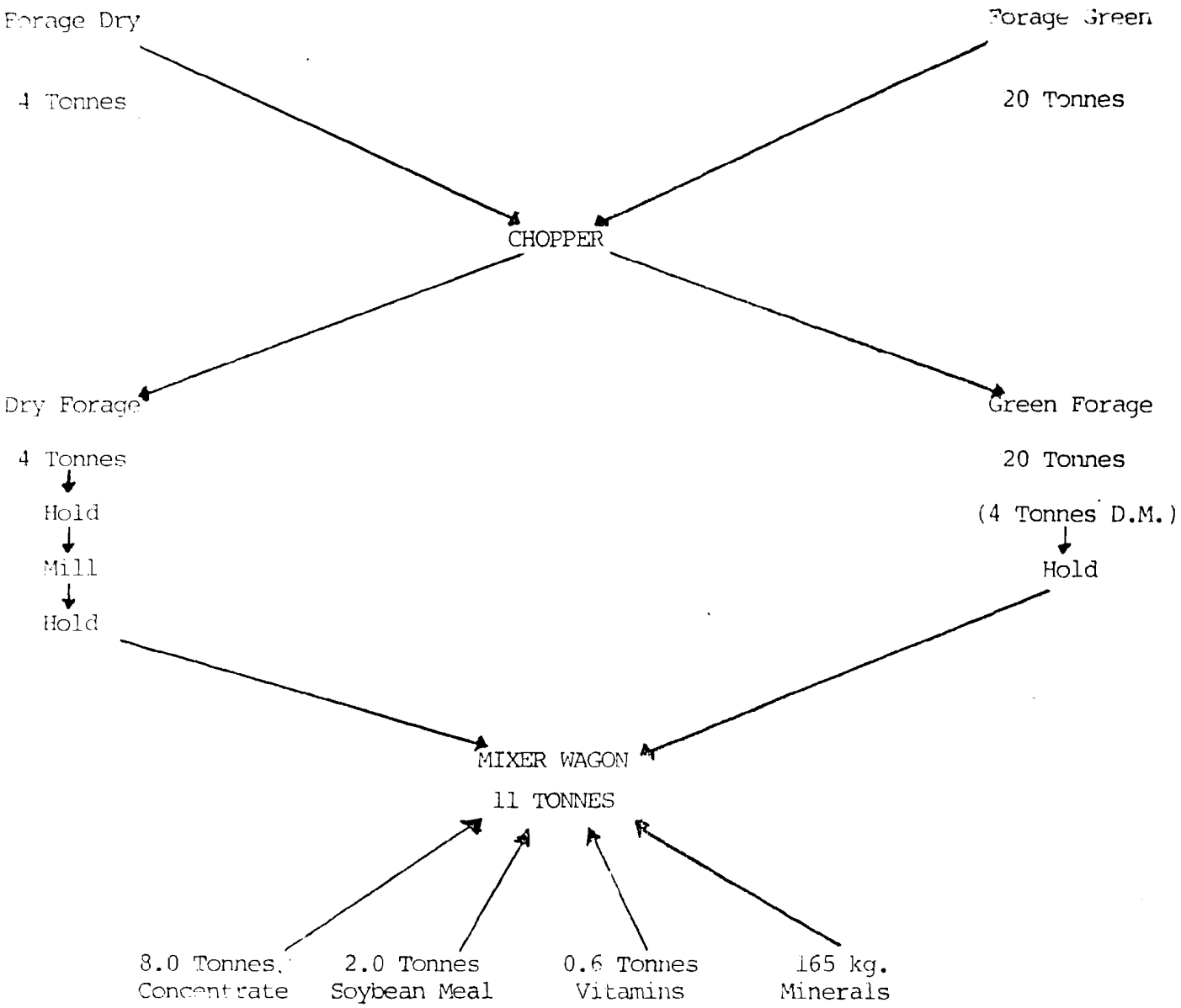
NO.	Equipment
2	Feeder Mixer Wagons (approx. eight cubic meters capacity).
2	Flat bed two wheel trailers, 2 tonnes capacity.
2	44 H.P. Massey Ferguson Tractors
1	2000 Liter mobile water tank, with pump and spray bar.
1	Front-end loader.
1	Rotary brush attachment for tractor.
1	Diesel fired incinerator.
2	Forage chopping machines with electric motor and drive. Total capacity five tonnes per hour.
1	Hammer mill for dry forage and stalks. capacity two tonnes per hour.
4	Hand sack trucks, two wheel type.

An assortment of shovels, brooms, brushes, wheel barrows and hand tools.

B. 3.1 Transporting Equipment

NO.	Vehicle
2	25 tonnes Forage Hauler Trucks
2	2 tonnes Refrigerated Delivery Trucks
2	2 Sales Caravans
1	Toyota Land Cruiser
2	500 kg Capacity Pick-up Trucks

Figure II.4



Flow diagram of feeds and daily tonnages required to produce recommended diet.

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B. 3.2 Electrical Facilities

Power will be brought in from the municipal power lines already available in the area. In addition, we will have standby generators.

	LE
General Standby 300 Kw	
Dairy Processing	90,000
Standby Generator Housing 50 Kw	20,000
Engineer Electrical (general)	100,000
Distribution Power Lines	60,000
Totals	270,000

B.4 WATER STORAGE AND TREATMENT PLANT

Water will be pumped from wells on the site or from nearby canals to the treatment (softening) plant and then to storage. Four storage tanks making up a total of 50,000 liters. The tanks will be raised above the highest point on the property to provide gravity water pressure to all outlets.

II. C STAFF AND MANAGEMENT HOUSING COST

C. 1. Dairy Staff and Manangement

The operation and maintenance of the dairy requires experienced and skilled personnel, both for milk production and for processing operations. Skilled expatriate help is, therefore, recommended in the organization structure.

Table II.10shows the list of personnel that are recommended to run the milk production operation. The list does not show a general manager because he is shown as part of the administrative team. The cost of this team is allotted on a percentage basis to the operational expense of all project entities such as milk production, milk processing, farming and feedlot.

C. 2. Housing For Staff

Housing in the dairy area for expatriate labor can be of prefabricated construction as long as it contains modern conveniences in the form of appliances. It is important that housing accommodations, be constructed as soon as possible. Cost for all accommodations are listed in Table II.10.These costs are based on traditional Egyptian housing built at our poultry facility.

Table II. 9 Housing Requirements

		LE
General Manager	111 sq.m. 2 bedroom	60,000
Herdsman	92 sq.m. 2 bedroom	50,000
Assistant Herdsman	92 sq.m. 2 bedroom	50,000
Processing Manager	92 sq.m. 2 bedroom	50,000
Technician Processing	92 sq.m. 2 bedroom	50,000
Technician Electrical	92 sq.m. 2 bedroom	50,000
Feedlot Manager	92 sq.m. 2 bedroom	50,000
Contingency		40,000
TOTAL		400,000

II. D LIVESTOCK: Breed and Costs

D. 1 Breed

According to the data we have gathered, there are no climatic factors that can be interpreted as limiting to any dairy cattle breeds. In fact the weather is ideal for the production of milk using dairy breeds such as Holstein and Friesian. These two breeds are the highest producers of both milk and butterfat. The breed of choice is the Holstein breed which has been highly developed as a dairy cow in America. Cattle of this type are available throughout the United States. However, the best buys are now found in the dairy state of Wisconsin. Furthermore, all cattle bought from that state are guaranteed by the state government as to breed and production capabilities.

We would suggest that dairy cattle purchases be confined to heifers, six to eight months old from cows having a milk production record of not less than 7,000 liters and butterfat of not less that 3.5% during the previous lactation period.

All cattle should be certified free of tuberculosis and brucellosis and the country of origin be free of blue tongue.

The best price and cattle are now available from the U.S.A. These dairy cattle have a guaranteed production as well as a much higher milk production than any other country.

D. 2 Air Freight or Ocean Freight

The state of Wisconsin offers cattle in lots of 200-300.

It is possible to charter a DC8 Freight airplane completely equipped to handle cattle shipments, at a rate of $183,000. This plane will carry 79, 545 Kg heifers, 95, 450 Kg heifers or 171, 250 Kg heifers.

It is also possible to charter a 747 Freight airplane fully equipped for a fee of $322,000. This plane can carry 201, 450 Kg heifers or 173, 545 Kg heifers or 314, 250 Kg heifers.

Cows have been shipped via boat from England. We have estimated that we will have to pay $1020 per heifer for animal and ocean freight to Alexandria.

D. 3 Breeding Policy

The breeding policy of the majority of commercial dairy herds throughout the world is directed to the establishment of regular 12 month calving intervals in order to maximize liquid milk production.

In view of the economics involved in heifer replacements, it is recommended the heifers be raised and bred in the dairy. Of late, the price of pregnant heifers has increased from $950.00 F.O.B. country of origin (in 1978) to $1,550.00 (in 1982). Since replacement heifers are replacing the culled cows, the cost of replacement must be compared. Culled cows are valued at LE 1200 and the cost of an imported pregnant heifer is LE 2500. The difference is not sufficient to continue shipping pregnant heifers. Heifers must be produced in Egypt.

Heifers will be selected at weaning time and placed on a calf growing ration (Table II. 12). The heifers will be grown until the age of 12-13 months and then bred by artificial insemination.

Calves will be fed in two groups:

1. As heifer replacements.
2. As feeders for beef.

All calves will be fed for six weeks on milk replacer and a complete ration made up of roughage and conventrate feed. This feeding program will be continued for a total of six weeks. At that point out of all the heifers will be selected the heifer replacements. The rejected heifers and bulls will be placed in the feedlot.

The heifer replacements will be fed for growth without much fat and for the maintenance of good health. Rations are shown on Table II. 12 and Table II.13.

High fertility remains the most important feature of reproduction for the milking herd in order that cows may

Table II.10 Quotations of Dairy Cattle in U.S. $

Country	Type	Cost F.O. . $ Dollar U.S.A. Per Head
Holland	Pedigree B & W Friesian Heifers 19-26 months of age. Four to seven months pregnant. Dams with minimum third lactation of 5,000 L at 3.8% B.F.	$1,520.00
Denmark	B & W Friesian Heifers with ability of 4,500 - 5,000 L per lactation. Five to seven months pregnant.	$1,730.00
United Kingdom		
	a. Pedigree British Friesian 24-36 months of age. Four to seven months pregnant. Dams with minimum 5,000 L at 3.5% B.F.	$1,325.00
	b. Purebred non-registered British Friesian 24-36 months of age. Four to seven months pregnant. From herds with average lactation of 5,000 L at 3.5% B.F.	$1,435.00
	c. Pedigree B & W British Friesians. 19-24 months of age. Three to seven months pregnant from dams and grand-dams with 5,500 L at 3.8% B.F.	$1,420.00
United States		
	a. Purebred registered Holstein six to seven months pregnant. Out of dams with recorded 7,000 L lactation and 3.8% B.F.	$1,550.00
	b. Holstein purebred registered: Six to eight months old. Out of dams with recorded 7,000 L lactation with 3.8% B.F.	$800.
Australia	Non registered Friesian:five months pregnant 432 Kg. live weight. From herds with 4,500 L lactation average. Exported in lots of 200-300.	$920.

Table II. 11 Calf Rations

	1	2	3
Sorghum or Corn Silage	40.0	28.0	15.0
Corn	27.9	39.9	38.9
Barley	20.0	25.0	39.0
Soybean Meal	10.0	5.0	5.0
Di-Calcium Phos.	.5	0.5	0.5
Limestone	1.0	1.0	1.0
Salt	.3	0.3	0.3
Trace Minerals	.2	0.2	0.2
Vitamins	.1	0.1	0.1
TOTALS	100.0	100.0	100.0

500 Calves per year to be fed for 180 days.
Total Feed ..... 1825 tonnes.

Table II. 12 Dairy Feedlot Rations

	1	2	3
Alfalfa, Soghum or Berseen	40.0	28.0	15.0
Corn	27.0	39.9	52.9
Barley	20.0	25.0	25.0
Soybean Meal 44%	10.0	5.0	5.0
Di-calcium Phosphate	.5	.5	.5
Limestone	1.0	1.0	1.0
Salt	0.3	0.3	0.3
Trace Minerals	0.2	0.2	0.2
Vitamins	0.1	0.1	0.1
TOTALS	100.0	100.0	100.0
Calculated Analysis:			
Crude Protein	15.10	12.70	12.00
Calcium	1.08	.88	.73
Phosphorus	.39	.43	.38
Net Energy, N.E.m	161.10	168.70	177.80
Net Energy, N.E.g	103.00	110.20	118.50
Sodium	.17	.17	.17

calve regularly and nutrition remains the major factor in the maintenance of high fertility.

Two breeding alternatives may be considered:

1. Artificial insemination.
2. Natural service.

Artificial insemination requires the use of sophisticated techniques and equipment together with well qualified technologists. Both the equipment and necessary techinical requirements are intricate and may be costly in Egypt. However, it is the best means of maintaining and improving herd quality and productivity.

The use of natural service is a simple and economical effective method, particularly where there is little emphasis on genetic improvement. If the sole air is to get cows in calf, without concern for genetic value of the calf as a heifer replacement, then the use of natural service using common bulls would be desirable. However, if there is necessity to use the heifers in the milking string, natural service using common beef or dairy bulls will not produce the results required. Good beef bulls are very expensive and difficult to manage in a commercial dairy.

It is recommended the cows be milked through four lactations during their productive life with rigid culling after the second year. Culls are anticipated to be about 20-25% per year.

D. 4 Records

In order to maintain a high producing herd, the maintenance of good records is imperative. To better accomplish this, the milking machines are equipped with a computer that will record milk production daily on each individual cow, average production, group totals and averages, deviation from average, cow problems, udder problems and cows in heat.

Once weekly records of milk yield of cows in lactation give an indication of individual performance. This is used in determining culling practice and to monitor production efficiency based on daily feed intake.

II. E. PROCESSING PLANT: CAPITAL COSTS AND EQUIPMENT LIST

The dairy facility will contain a fresh milk processing plant with the capabilities of producing pasteurized milk, ice cream, cheese and labneh.

A drawing of the proposed plant has been included showing the layout of the machinery and space requirements for the different operations. The building would measure 34 m x 60 m for a total area of 2040 square meters and would be a one story structure with an inside clear height dimension of 4 m to allow for air circulation. The processing room is in the center of the building, facing the milking shed, with the supporting areas adjacent to and extending to the outside parameters to allow for future growth. The flow pattern provides for an efficient movement in the individual work areas and the layout is arranged to allow each operation to be done in sequence to simplify the product movement and minimize costs.

II. E. MILK PROCESSING FACILITY COST:

		US $
1.	Building - 2100 Square Meters	1,500,000
2.	Shop - 360 Square Meters	248,235
3.	Processing and Supporting Equipment	1,917,900
4.	Freight	150,000
5.	Office Equipment	30,000
6.	Transportation Equipment	342,060
7.	Equipment Installation	220,000
8.	Start-Up Expenses	75,000
9.	Architecture & Engineering	132,515
10.	Miscellaneous & Spare Parts	294,488
11.	Contingency & Unforeseen Expenses	319,510
	Total Estimated Investment Costs	5,229,708

Explanation of the investment costs.

E. 1 Building

The building will be designed architectually by the equipment supplier. The actual construction will be done by an Egyptian construction company.

The processing building will be 2040 square meters in size.

The area for the processing plant building according to the proposed plant layout would be 2040 square meters. This building includes acid resistant floors in all

of the processing areas designed with adequate slopes to facilitate rapid draining of water and liquid wastes; tile walls or similar impervious materials to allow the walls to be easily cleaned; proper floor drains to remove water and liquid wastes from the plant area so that they will not be retained in the system to cause bacteriological contamination; good ventilation to avoid airborne micro-organism problems from both within and outside the processing area, especially in the culture and fermentation rooms; and sufficient insulation throughout the plant to allow the different areas to maintain the temperatures that are required for processing and holding milk products. The ceilings in the work and storage area should be six meters high.

E. 2 Shop

A building 360 square meters in size is provided to work on ten cars at one time. The building will be equipped with toilets, wash room, three car and truck hydrolytic lifts, cabinets and work benches with drawers.

E. 3 Processing and Supporting Equipment

Prices on the different types of machinery that will be needed at the plant have been obtained from Crepaco. A reputable equipment supplier in the United States. The prices given are F.O.B. Lake Mills, Wisconsin. These are summarized in Table II. 13.

TABLE II. 13

Raw Milk Cooling, Etc.	168,000
Pasteurizing	84,800
Pasteurizing Milk Packaging	191,800
Yoghurt Production	56,500
Labneh Production	32,500
Ice Cream Processing	139,000
Cheese Production	74,000
Refrigeration Plant	445,000
Control Panels	78,500
Cip Plant	56,000
Steam Boiler	55,000
Sanitary Piping, Etc.	99,500
Service Piping	64,800
Air Compressor System	20,000
Misc. Equipment	81,500
Inflation	100,000
Contingency	171,000
TOTAL	1,917,900

Installation Supervision:

1 Process Man 13 Weeks
1 Refrigeration Man 7 Weeks
1 Electrical Man 6 Weeks

Price for each man per calender day is 380 dollars. Travel, lodging, food and misc. expenses not included in above are extra and will be charged at net cost.

E. 4 Freight

The rates that have been used for ocean freight are those currently in effect between the east coast of the United States and Alexandria for each commodity. Some of the machinery will be shipped in cargo containers while others will be boxed for export and shipped individually. Estimated freight requirements that have been used are the following:

6 meter cargo containers (20 foot) with a capacity of about 21.5 meters cubed machinery.

12 meter cargo containers (40 foot) with a capacity of about 42.5 meters cubed machinery.

E. 5 Office Equipment

An amount of US $30,000 has been allocated to purchase the office equipment that will be needed by the plant.

E. 6 Transportation Equipment

1 Trailer Refrigerated 12.25m x 2.4m x 2.5m High with Refrigeration Equipment by Thermo King - 40 Degrees F
4 2 Ton Truck Vans with Refrigeration Equipment by Thermo King, Similar or Better
2 Fork Lifts 1 Ton Capacity
2 Mini Buses
2 Sedans
4 Pick-ups

E. 7 Equipment Installation

The time required for the installation of all of the plant equipment has been estimated at three months. Foreign personnel from the equipment suppliers should supervise the installation of their equipment, in addition to specialists such as electricians and pipe fitters and refrigeration men. The cost of these people includes their plane transportation to Egypt and their per diem wages, but not their local living costs.

The plant supervisor and maintenance man should work with the foreign personnel installing the equipment so that they will become familiar with the machinery and its future operation. The installation budget also includes five laborers and heavy equipment to move machinery and place the equipment according to the final layout.

E. 8 Start-Up Expenses

After the equipment has been installed, a start-up or testing period will be needed to insure that the machinery is functioning in accordance with their specifications. A minimum of two weeks has been allotted for this purpose and the cost includes the foreign personnel that will be needed and all of the plant personnel, raw materials and packaging.

E. 9 Architecture and Engineering

The architecture and engineering will be done by the equipment supplier. It has been estimated that five per cent of the total cost of the equipment will be charged for engineering and architectural building design.

E. 10 Miscellaneous and Spare Parts

Since equipment parts are not readily obtainable in Egypt. It is important that an inventory of spare parts be carried on the plant site. The supplier recommends a two year supply.

E. 11 Detailed List of Processing Equipment:

Raw milk cooling, storage and separation.

1. 1 575 liter capacity milk receiving tank 304 stainless steel, polished inside and outside; removable cover and inspection ports; pneumatic level sensing device with inlet valve to control product level; the tank is designed to receive raw milk from the milking parlors and act as a surge prior to the raw milk cooler.

2. 1 centrifugal transfer pump; capacity 4000 liters per hour.

3. 1 raw milk cooler plate heat exchanger; stainless steel frame with 316 stainless steel; designed to cool 4000 liters per hour raw milk from 35 degree C to four degree C.

4. 3 horizontal milk storage tanks, capacity 15,100 liters each; tank lining 304 stainless steel with #4 finish; outer jacket heavy steel shell with welded seams with stainless steel front head and collars; stainless steel oval (508 mm x 406 mm) manway, insulated, with sample cock in door - vented for cip; agitator; 54 mm insulation; CIP sprayball; stainless steel ladder with hand grip; 150 mm sight glass with light; for raw milk and standardized milk storage.

5. 1 centrifugal transfer pump; capacity 6000 liters per hour; all liquid contacting parts are 316 stainless steel.

6. 1 cold milk separator complete with standardizing device; capacity 6000 liters per hour; milk contact parts are stainless steel.

Pasteurizing System (H.T.S.T. System)

1. 1 304 liter capacity product balance tank; 304 stainless steel complete; polished inside and outside; pneumatic level transmitter; includes product inlet, outlet, divert, recycle and water inlet sanitary connections.

2. 1 centrifugal transfer pump; capacity 6000 liters per hour; all liquid contacting parts are 316 stainless steel.

3. 1 plate heat exhanger; high-temperature short-line pasteurization system, capacity 6000 liters per hour; stainless steel and

sanitary design dual screw take-up frame; plates are 316 stainless steel; heater, cooler and regenerator sections; product indicating thermometer; designed for cleaning-in-place; 16 second stainless steel product holder tube.

4. 1 hot water system; hot water circulation pump, complete with fittings; flange type motor totally enclosed fan cooled design, with self adjusting shaft seal; lot of interconnecting piping, fittings and valves between supply pump and steam/water mixing chamber; one steam/water mixing chamber for heating water to supply the plate unit; one diaphragm steam flow control valve, operated automatically by pasteurizing temperature recorder/controller, mounted in control panel; automatically controls pasteurizing temperature; one steam pressure reducing valve, with steel pressure adjusting spring; one steam strainer.

5. 1 one air operated sanitary product flow diversion valve, complete with 38 mm sanitary fittings; valve is controlled by H.T.S.T. temperature recorder/controller mounted in central control panel, and automatically diverts unpasteurized product to the product balance tank.

6. 1 homogenizer, capacity 3000/6000 liters per hour, complete with two-speed motor for processing whole milk and ice cream mix; all product contact parts are 316 stainless steel; two pressure gauges with dual reading faces are included; complete with electrical motor; designed for cleaning-in-place.

7. 1 control panel; for complete and automatic control of processing; to control H.T.S.T. pasteurization system; totally enclosed, stainless steel cabinet, water proof design; includes H.T.S.T. temperature recorder/controller and plate bypass controller for laban processing; all operations monitored by pilot lights.

Pasteurized Milk Packaging

1. 1 pasteurized milk horizontal type storage tank, capacity 10,000 liters; tank lining 304 stainless steel with #4 finish; outer jacket heavy steel shell with welded seams with stainless steel front head and collars; agitator; 54 mm insulation; CIP sprayballs; stainless steel ladder with hand grip;150 mm sight glass with light.

2. 1 centrifugal transfer pump; capacity 5000 liters per hour; all liquid contacting parts are 316 stainless steel.

3. 1 filler sealer for packaging milk and laban in pure-pak type plastic coated paperboard cartons; capacity 6000 of 0.25 and 0.5 liter containers per hour, and 4800 of 1.0 liter containers per hour; includes two separate filler bowls with level float controls to enable filling both laban and fluid milk in unison as required; includes branding type date coder; includes spare parts kit and set of U.S. tools; includes carton discharge conveyor to carton case packing area.

Ice Cream Processing

1. 2 model rib ice cream mix storage tanks, 3000 liter capacity each; tank lining type 304 stainless steel polished to a #4 finish; sides and breast type 304 stainless steel polished to a #4 finish;atmospheric dome top, type 304 stainless steel with 457 mm manway with hinged cover, air vent and screen; insulation, 76 mm bottom and side-walls; cold water heat exchange dimple sheet surface; inverted dish bottom; CIP sprayballs fixture with removable sprayballs; 54 mm no-foam inlet with 54 mm outlet fixture; stainless steel adjustable ball feet; 304 stainless steel wide-sweep agitator, vertical fixed baffle.

2. 1 centrifugal transfer pump; capacity 1500 liters per hour; all liquid contacting parts are 316 stainless steel.

3. 1 multi compartment mix flavor tank, two compartment tanks, 600 liter capacity each compartment; CIP sprayballs; 1/6 HP agitators each compartment; chilled water surface dimple sheet, with outer jacket per compartment; 304 stainless steel

polished to a #4 finish; stainless steel adjustable ball feet calibar level gauge; no-foam product inlet;457 mm circular manway with hinged cover.

4. 2 centrifugal transfer pump, to supply ice cream mix to freezer.

5. 1 continuous ice cream freezer for direct expansion ammonia service; maximum capacity, per cylinder, 680 liters per hour of 100% overrun ice cream. Total freezer capacity is 1360 liters per hour; freezer design is one stainless steel cabinet with controls mounted and two individual freezing cylinders capable of totally independent control; dasher drives are 15 HP TEFC per cylinder; pump drives are 1 HP per cylinder

6. 1 rotary cup and cone filler; capacity variable from 2000 to 4000 cups or cones of one size per hour.

7. 2 stainless steel manual filling tables.

8. 1 one manual filling device.

Cheese Production

1. 1 rectangular, double walled cheese vat; capacity 6000 liters; 304 stainless steel, polished inside and outside; includes stainless steel curd transfer pails and accessories for production; includes whey screen and draining assembly.

2. 1 culture starter heater and incubator for cheese culture; includes temperature controls for heating and cooling starter culture; stainless steel construction.

3. 1 pneumatic cheese mold press; effectively drains whey and solidfies cheese curd into molded blocks; bottom collector pan accumulates whey and drains to one end; air cylinders with air controls provided for each row to ensure constant and even pressure to each stack of molds.

4. 40 cheese molds; stainless steel, three piece sanitary molds, to form cheese curd into blocks of 20 KG each.

5. 1 cheese mold filling table; stainless steel table for assembly of molds and filling of

molds with curd.

6. 1 cheese block cutting table.

7. 1 cheese bag filler and heat sealing unit for vacuum sealing cheese portions; approximately 0.5 and 1 KG.

Yoghurt Production

1. 1 processing tank for yoghurt capacity 3800 liters; designed for the innoculation and incubation of yoghurt at a constant temperature of approximately 43 degrees C; tank is equipped with complete steam/water mixing controls and circulation pumping system to maintain incubation temperature and cooling water controls for cooling product following incubation; tank is 304 stainless steel polished inside and outside; agitator vertically mounted, totally enclosed with gear reduction; tank with dome top with 457 sanitary manway with sanitary gasket and hinged covers; thermometer mounted in tank stainless steel ladder; observation port with light assembly; CIP sprayballs.

2. 1 centrifugal transfer pump; capacity 10,000 liters per hour; all liquid contacting parts are 316 stainless steel.

3. 1 yoghurt milk cooler plate heat exchanger; stainless steel frame with 316 stainless steel heat exchange plates; designed to cool laban drink from 42 C to 5 C in approximately one hour.

4. 1 horizontal yoghurt surge tank, 3800 liter capacity; tank lining 304 stainless steel 2 with #4 finish; outer jacket heavy steel sheel with welded seams with stainless steel front head and collars; stainless steel oval (508 mm x 406 mm) manway insulated with sample cock in door; 54 mm insulation on shell and head; dimpled chilled water surface; CIP sprayballs; adjustable 76 mm pipe legs with ball ends; 76 mm dial thermometer mounted in stainsteel projectile well; air vent located on front head.

5. 1 centrifugal transfer pump; capacity 5500 liter per hour; all liquid contacting parts are 316 stainless steel.

Labneh Production

1. 1 processing tank for labneh, capacity 1200 liters; designed for the innoculation and and incubation of yoghurt at a constant temperature of approximately 43 degrees C; tank is equipped with complete steam/water mixing controls and circulation pumping system to maintain incubation temperature and cooling water controls for cooling product following incubation; tank is 304 stainless steel polished inside and outside; agitator vertically mounted, totally enclosed with gear reduction; tank with dome top with 457 sanitary manway with sanitary gasket and hinged covers; thermometer mounted in tank; stainless steel ladder; observation port with light assembly; CIP sprayballs.

2. 1 sanitary positive rotary pump, type 136 stainless steel; 1 HP drive, TEFC; mounted on a painted, milk steel base with adjustabl legs; motor coupling guard;

3. 1 labneh curb mixer; floor mounted, vertical mixer; mixing bowl capacity 136L mounted on moveable bowl truck with casters.

Refrigeration Plant

Air conditioning air unit.

Ice builder to provide chilled water for processing.

Water Circulation Pumps.

Accessories.

Three milk and fermented products cold air blower units.

Hardening room cold air blower unit.

Two suction accumulators.

One intercooler.

One receiver.

Two booster compressor complete.

Four compressor, complete.

One evaporative condenser.

One liquid recircualtion system.

One air purger.

One control panel.

Lot of piping and fitting with insulation.

Lot of hand valves.

Lot of ammonia controls.

Control Panels

1. 1 HTST key panel (main control panel) with all necessary components for one HTST processing system complete with switchgear for routing product to and from HTST systems, and appropriate tank liquid level gauges; controllers for all processing start-up and shut-down functions including complete CIP program; includes instrumentation for temperature control and routing and metering functions.

2. 1 CIP room panel, includes level and temperature controls and other instrumentation for control of CIP solution make-up.

3. 1 processing motor control center panel to include main and auxiliary circuit breakers and starters for all motors located in the product processing areas, as well as, the boiler system.

CIP Plant

1. 2 complete cleaning systems, include three compartment tanks for solution, acid and rinse; 304 stainless steel, polished; stainless steel circulation pumps; three automatic valves, air operated; (1) solenoid valve for water inlet; (1) solenoid valve for steam inlet; (1) steam injector; (1) suction manifold for pump with connection to chemical dosing pumps and chlorinator; (2) thermostats for temperature control; (1) pressure reducing station for compressed air; (1) stainless steel cabinet for mounting of solenoid valves for air operated valves, pressure reducing station and electrical terminals.

2. 3 air operated chemical dosing pumps for the CIP unit, in stainless steel design delivered complete with suction and discharge plastic hose.

Steam Boiler

1. 1 high efficiency york shipley steam boiler package cylindrical and horizontal in design includes high pressure oil burner; control panel; set of steam mounting: (1) - set of feed water stop/check valves, (1) set of boiler blow down valves, (1) set steam line stop valve and check valves; two feed pumps mounted on boiler; includes complete feed water system with tank; includes chemical feed system.

Fully automatic softening plant

AlSl 304 stainless steel sanitary piping, fittings and valves.

1. 1 complete set of stainless steel piping, fittings and pneumatic valves for equipment as specified, for product and CIP routing; includes all necessary tube bends, tees, unions, as well as, sanitary check valves, air blow valves, etc.; includes necessary clamps and pipe hangers; includes required AlSl 304 stainless steel routing valves for process and CIP.

Service Piping

One set of steam and condensate pipes complete with fittings; includes all required steam control valves.

One lot of insulation materials for steam and condensate pipes.

One set of chilled water pipes, fittings and valves includes all required chilled water control valves.

One lot of insulation materials for chilled water pipes.

One set of compressed air pipes, fittings and valves.

Air Compressor System

1. 2 reciprocating air compressors, single cyclinder vertical; open drip-proof motor, 10 HP; control panel; V-belt guard; inlet filter; receiver.

Miscellaneous Equipment

1. 6 steam and water mixers of standard bronze; equipped with 25 foot hose and safety features.

2. 4 flying insect killers, 53" x 9" x 9" with two insect attractant lamps/unit; eyebolts provided for each flush mounting to ceiling; frame and interior structures made of aluminized steel.

3. 2000 milk cases for products; dimension each 330 mm x 330 mm x 279, will accommodate each approximately 40 of 500 CC containers; For storage, cooling and distribution of products; may be stacked five to six high for maximum efficiency of product movement, cooling, storage and distribution.

4. 75 milk case trolleys, to accommodate manual movement of 15 stacked milk cases full of product. Accommodates cases stacked 3 x 5 high; heavy steel angle frame mounted on ball-bearing casters.

5. 2 stainless steel accumulating/working tables, heavy guage stainless steel tops with tubular legs with adjustable sanitary ball feet.

6. 60 heavy duty storage pallets, constructed of high density polyethylene plastic, high strength-to weight ratio, high impact resistance, exceptional durability; double faced four-way entry, tapered; surfaces will not retain dirt, form splinters, lose nails.

7. 4 manual hydraulic lift trucks.

8. Lot workshop equipment, necessary equipment and supplies for the workshop to accomplish ordinary maintenance and minor repairs in the dairy plant: (1) pipe and tube welder; set of hand and electricial tools and equipment; set threading tools.

9. Equipment for sufficient laboratory analysis

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of all products being processed, including; fat determination; acidity tests; reductase test; specific gravity determination; phosphatase test; microscopic apparatus; culture preparation apparatus; laboratory glassware.

10. 1 sanitary washing tank with recirculation pump and controls; capacity 600 liters.

II F Milk Processing Plant Design, Operational Costs, and Assumptions

F. 1 Processing Plant Design

The dairy facility will coftain a fresh milk processing plant with the capabilities of producing pasteurized milk, ice cream and white cheese.

A drawing of the proposed plant has been included showing the layout of the machinery and space requirements for the different operations. See Figure II.5.

Three raw milk storage tanks will be located in the processing building each with a capacity of 15,140 liters. This is larger than the anticipated daily volume of milk that is produced, however it allows storage for the seventh days' production when the plant will not be operating and also will serve as a surge tank should there be any disruption in the production line.

The largest supporting area is used for the refrigeration system which includes the air conditioning units, water circulation pumps, ice builders, air units, compressors and condenser. Part of this area may be used for a small shop and to store spare parts needed to maintain the equipment. The refrigeration room is adjacent to the milk cold storage area to minimize any temperature losses.

The cold storge room will hold about two days supply of finished product stacked five crates high. By increasing the crate stacking height in the warehouse additional space can be made available if necessary. The crates will be conveyed from the fillers to the cold storage room where they will be stacked on the floor until moved by hand lift trucks to different locations so that each product is separated by carton size. This process would be reversed when loading the delivery trucks. In order to avoid heat during the loading process a retractable conveyor could be used and could be removed when not in use with the conveyor opening closed. Provision has been made to allow sufficient area for palletization should this be required at a future date.

The dry storage area will be used to store cartons and cleaning materials. The daily demand for cartons is not great, consequently it is suggested that carton cases be stacked manually using conveyors to reach the desired height in the warehouse. This process can be reversed when cartons are required at the filling stations and they can be moved into the plant on hand trucks since the greatest demand for one liter milk cartons is only five cases per hour. The storage area has been designed for

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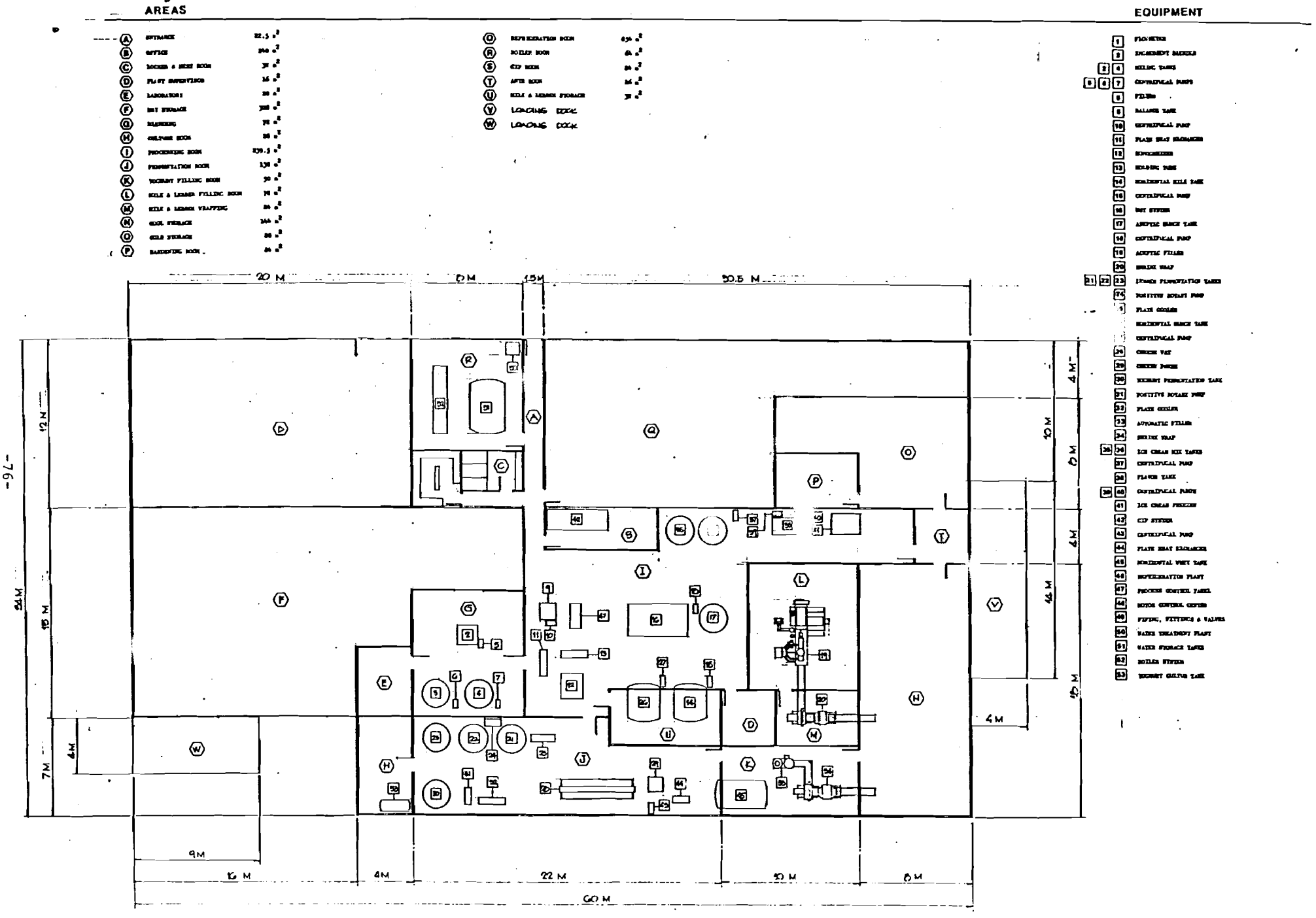
Figure II. 5



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palletization should this be desirable in the future, however since a four meter height has been used throughout the plant which will only accommodate stacking two pallets high, provision could be made in the final design for a six meter height in the warehouse that would allow stacking three pallets high and thus permit more storage space.

Empty crates will be stored in an area that can hold approximately 3,600 crates stacked six high and will be close to the filling equipment. The crates will be moved on hand trucks in the warehouse, though a conveyor will be used to move empty crates inside the area, feed the washer and transport crates to the filler.

A small laboratory has been provided for quality control of all products.

The boiler and water treatment section has been placed close to the areas that require heat and hot water to avoid heat losses.

The office area is limited but should be sufficient for the administrative personnel. Some of the men will be involved with both the dairy operation and the processing plant, so it will be necessary to determine where these people should be located, in order to provide additional space if required. As the office has been placed in one corner of the building, it would be very easy to increase the size with a minimum amount of added cost.

Sufficient locker and rest room space has been allocated to handle the number of workers needed for the plant. Entry to the building will be adjacent to the main office and locker room so that the workers can change their clothes in the morning and evening and at the same time it will allow office personnel to control unauthorized people going into the plant.

II. F. 2 Milk Processing Plant

F. 2 (a) Fresh Pasteurized Milk

The production plan is based on milking the dairy herd twice a day using automatic equipment. When milk is taken from the cow it will have a temperature of about 32.2 degrees C or 90 degrees F and in order to avoid spoilage, the temperature should be lowered to 4.4 degrees C (40 degrees F) as rapidly as possible. In order to meet this requirement, milk that has been collected in the milk surge tank will be pumped through a plate cooler then to a refrigerated storage tank located in the milking shed area that will hold the product at 4.4 degrees C.

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The daily plant operation will start by pumping the milk from the storage tank through a flow meter to determine the volume of product that is being sent to the plant and from there to a clarifying-standardizing centrifuge. This unit will remove any impurities that might be in the milk such as leuccocytes (white blood corpuscles), larger bacteria, body cells from the cows udder as well as any contaminates which may get into the milk during or after milking. The centrifuge will also standardize the milk by removing some of the excess milk fat or cream so that it will contain the proper amount of fat to meet local standards.

The excess fat will be stored in a separate vat and can be sold as cream while the milk will go to one of the fresh milk storage tanks.

As there will be two milking periods during the day, the plant has been designed to collect each days production in one tank where it will be held over night. The next morning this milk will be pumped through the HTST system and processed, while the second tank will be used for collecting milk from the current days production. As the plant will only work six days a week while the milking cycle calls for seven days production, the extra days milk can be held in the third storage tank and fed gradually into the system either by increasing the number of operating hours of the filling equipment or by packaging milk in the larger size containers that will allow a greater volume to be run on this machinery.

In order to utilize the equipment in the most efficient manner, the first daily operation would be to start pumping milk from one of the storage tanks into the HTST (High Temperature Short Time) system. The balance tank acts as a surge to insure that there will be sufficient milk available at all times for a continuous operation of the HTST equipment. A centrifugal pump removes the milk from the balance tank to the first section of the plate heat exchanger where its temperature is increased from 4.4 degrees C (40 degrees F) to about 60 degrees C (140 degrees F), then through the second section where the heat is increased to pasteurization temperature of 74.4 degrees C (166 degrees F) and after homogenizing it is pumped to the holding tube where it is held for 16 seconds to allow for complete pasteurization.

Milk is an oil in water type emulsion in which butterfat is dispersed as fat globules in the skim milk portion. The specific gravity of butterfat is much less than that of skim milk, consequently these globules tend to rise and form a cream layer above the skim milk. By homogenizing milk these large globules are broken down into smaller particles that are less likely to separate from the milk since there is not as much bouyant or separating force

on small globules as in larger ones. A homogenizer is in essence a high pressure pump that forces milk through a valve on the discharge side which reduces the size of the fat globules and disperses the smaller particles into the milk.

Milk is pumped from the storage tank to a surge on the filler, that fills cartons at a fixed rate of 4,500 units per hour. The filler therefore has a capacity of 4,500 liters an hour on one liter cartons, 2,250 liters an hour on 1/2 liter cartons and only 1,125 liters an hour when running 1/4 liter cartons. The cartons have been designed using the same square base that allows the capacity to vary by changing the height, which can be done by a simple adjustment on the machine. After filling, the cartons are manually placed into crates that are transported to the cold storage warehouse until needed for distribution. Storage temperature will be maintained at 4.4 degrees C (40 degrees F).

F. 2 (b) Production Capacity

The plant has been designed to handle the raw milk production of a 500 cow dairy herd with an estimated daily production of 13,250 liters per day. Raw milk storage consists of one tank in the milking shed that will hold 7,570 liters and three tanks in the processing plant holding 15,140 liters each for a total of 45,420 liters. The extra capacity can be used to hold production from the seventh day when the plant will not be working and to provide additional storage should there be a breakdown in the processing line.

F. 2 (c) Assumptions

F. 2 (d) Marketing and Production Plan

The marketing plan calls for 50% of the raw milk to be sold as ice cream, and 20% as pasteurized milk and 30% as cheese. This represents 6,625 liters of milk to be used in ice cream for a total ice cream production of 20,500 liter per day; 2,650 liters will be sold as fresh pasteurized milk, and 3,975 liters will be sold as cheese.

The finished products will be packaged in the following manner:

ICE CREAM

1/2 Liter Cartons	50%	6,625 Liters	13,250 Cartons
1 Liter Cartons	50%	6,625 Liters	6,625 Cartons
Total			19,875 Cartons

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PASTEURIZED MILK

1 Liter Cartons	60%	1,590 Liters	1,590 Cartons
1/2 Liter Cartons	40%	1,060 Liters	2,120 Cartons
Totals		2,650 Liters	3,710 Cartons

F. 2 (e) Packaging Requirements

In planning the carton storage area it was decided to provide for a 90 day maximum storage capacity which will require careful control of the inventory and ordering procedures to insure that a constant supply of containers is available.

Carton requirements can be broken down in the following manner:

Product	Daily Requirements 1 Liter	1/2 Liter
Ice Cream	6,625	13,250
Pasteurized Milk	1,590	2,120
Totals	8,215	15,370
	Annual Requirements	
Ice Cream	2,027,250	4,054,500
Pasteurized Milk	486,540	967,248
Totals	2,513,790	5,021,748

The 90 day ordering quantitites would be 739,350 one liter cartons, 1,383,300.

One liter cartons are packaged 500 to a case weighing about 18.8 kilos each. These cases would be palletized on a wooden pallet measuring 107 cm in width and 122 cm in length, eight cases to the layer, five layers high for a total of 40 cases per pallet. The height including the pallet would be 168 cm.

Half liter cartons are packaged 1,000 per case weighing approximately 19.8 kilos each. Using the same pallet size, six cases would go on a layer, five layers high for a total of 30 cases per pallet with a height of 155 cm.

F. 2 (f) Milk Carton Crate Requirements

It is recommended that the two sizes of cartons be stored in plastic crates that have a standard dimension of 34 cm x 34 cm, allowing 16 one liter cartons to fit into the crate and 32 half liter. Using this method the daily crate need would be 1,158 crates, however at least five times this number would be required to handle cold storage inventory, crates in the distribution system and empty crates in storage. Storage capacity has been allowed to handle 3,600 crates stacked six inches high. Here too, additional storage space can be achieved by stacking the crates higher.

Delivery trucks will unload the empty crates onto a conveyor leading into the storage area where they will be stacked manually. As needed by production, the crates will be placed back onto the conveyor to go through the washer and rinser, then to the fillers.

F. 2 (g) Milk Storage Tanks

Horizontal milk storage tanks are being used in the plant because of size and lower cost of these units. To avoid cleaning problems, the tanks are normally placed in a room adjacent to the processing area so that only the end of the tank protrudes into the production floor. Two such areas have been planned, one for raw milk and the other for milk that is stored prior to filling. The CIP system has been installed in the second storage area that also has sufficient space to hold some of the cleaning materials that will be needed by this unit.

F. 2 (h) Boiler and Water Treatment Room

A 50 HP boiler should be sufficient for the processing plant needs and is complete with the necessary feed tanks and fuel pumps. A small water treatment plant has been included to provide portable water for the normal clean-up opertions. This unit will have a capacity of 37,850 liters that should be sufficient for these requirements. It has been assumed that the water for the dairy herd operation will also be treated, in which case it can act as a secondary source for water in the plant, especially for the refrigeration system.

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F. 2 (i) Refrigeration Room

Space has been allocated to hold all of the refrigeration equipment needed for the plant in an area next to the cold room. Piping will be required to connect all of the equipment that requires cold water on the production floor and milk storage tanks, but these can be insulated to avoid raising the temperature of the coolant being pumped to these areas.

F. 2 (j) Estimated Production Costs

2. (j) 1 Raw Milk

Production from the dairy herd has been estimated at 13,250 liters of milk per day and operating 365 days the annual volume would be 4,836,250 liters of milk. The estimated cost of raw milk from the dairy is:

4,836,250 Liters of Raw Milk divided by LE 1,070,813
1 Liter = LE .22

2. (j) 2 Direct Labor

Plant operations will be under the direct supervision of the Processing Manager who should take an active role in the work that is required. He will be responsible for the daily start-up of the plant, seeing that all of the plant operations are conducted efficiently.

A laboratory chemist is essential for a successful dairy operation. The chemist would be responsible for quality control plant sanitation, and all of the tests that are required for raw milk and finished products. As this is a small plant where there may not be enough lab work to keep a chemist busy eight hours a day, he can also be used as an assistant to the Processing Mananger and assume some of the operating responsibilities.

A qualified maintenance man is very important to insure that the processing and supporting equipment for the plant is kept in excellent working condition. Refrigeration is the most complicated part of the plant followed by the filling machines, consequently the person selected for this job should have had experience in maintaining both types of equipment.

Most of the operations have been automated to minimize the amount of labor that would be required. The areas where labor will be needed is in materials handling and filling. An operating schedule of eight hours per day would need a minimum of four men to perform the work, though a fifth man has been included to provide relief for

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the other laborers. Starting at 0600, the workers would have two and a half hours to load the delivery trucks, clean empty crates, assist in making cheese and prepare for the filling operation. From 0830 to 0930 the men would be used to fill and store milk crates in the cold storage room. When milk filling has been concluded, the four men could be used to clean up the equipment and prepare for wrapping cheese that could start between 1045 adn 1100. It may be worthwhile to consider a lunch break before starting to package cheese as this would avoid shutting down the line during this period, that would require the equipment to be cleaned before resuming production to insure that there would be no bacterial contamination of the product.

When the daily filling operations have been concluded, the men can clean up the equipment and prepare for the next days operation.

2. (j) 3 Utilities

Our cost estimate is based on production of electricity from generators. We do have electrical lines in the area, but no negotiated price from the government. We have assumed this price to be less than power obtained from generators. Fuel costs are: 3 pt per liter at the gas pump and approximately 13.6 pt per liter delivered to the El Hager site.

2. (j) 4 Packaging Materials

Two types of packaging materials will be used at the plant, standard gable top paper cartons for milk and ice cream and plastic crates to protect the cartons during distribution to the various sales outlets.

The price for cartons has been based on one color printing in quantities to cover a 90 day production period. There are price differentials for volume purchases and additional colors if desired up to a maximum of four. The cost for each added color would be approximately 30 pt per thousand cartons. The cost of ocean freight has been calculated using standard 35 to 40 foot containers that will hold 600,000 one liter cartons or 1,200 cases and 1,000,000 1/2 liter cartons or 1,000 cases. The limiting factor is weight since the maximum allowable capacity for the containers is 20,400 kilos. Carton prices on the East and West Coast ports, are comptitive, however freight rates from the East Coast ports are lower then from Gulf or West Coast ports, US 4,425 vs US 4,800. Freight rates are established by the different Steamship Conferences and in many instances if the volume justifies lowering rates, an appeal can be made to the Conference to obtain this advantage. Since New Ag is located in Los Angeles a West

Coast supplier has been used with the containers shipped via the mini-land bridge to Houston and from there to Alexandria. Maintaining the required supply of cartons may become a problem with two products and two carton sizes, as there is not sufficient volume to warrant a container for each size, consequently mixed shipments will have to be made.

Prices of the estimated carton cost by product and the annual cost for these items are shown below:

ANNUAL COST - MILK

	1 Liter	1/2 Liter
Annual Quanitiy	483,624	967,248
Annual Cost	24,181	31,919

ANNUAL COST - ICE CREAM

	1 Liter	1/2 Liter
Annual Quantity	2,418,125	4,836,250
Annual Cost	120,906	159,596

ANNUAL COST - CHEESE

Shrink Wrap Film	26,500
Total All Products	363,102

Heavy duty plastic crates have been selected for the plant that have a steel frame on top for added protection and longer life. The crates will hold 16 one liter cartons and 32 half liter. The estimated daily requirement would be 1,730 crates and a five day supply should be purchased as the minimum quantity required which will allow for a normal turn around. The crates will also be shipped in containers from the West Coast to Alexandria, with each container holding approximately US $4.20 each and the ocean freight is estimated at US $2.64 per crate for a total cost of US $7.50 per unit. A five day supply of crates represents 8,650 unites with a price of US $64,875 that has been rounded out to US $65,000.

2. (j) 5 Administrative Costs

The cost of administration personnel will be divided between the dairy, processing plant, feedlot and the farming operation on an equal basis, with the processing area absorbing any extra miscelleanous expenses.

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2. (j) 6 Sales Expenses

The sales staff would consist of two salesmen who would also drive the panel trucks for local deliveries, an inside assistant to handle the orders and two truck drivers for long distance hauling.

Two diesel powered trucks with trailers would be used for the long distance hauling and it is estimated that they would travel 600 kilometers a day each, 300 days per year, for a total of 360,000 miles per year. Diesel consumption would be 12 miles per gallon at a cost of LE .51 per gallon of fuel. This would represent an annual cost of LE 183,600.

Local deliveries would be made in two gasoline powered panel trucks and it is estimated that each truck would travel 25,000 miles per year for a total of 50,000 miles. Gasoline consumption is estimated at 10 miles per gallon at a cost of LE .51 per gallon, which would represent an annual cost of LE 2,550.

It is difficult to estimate the amount of maintenance that would be required for the transportation equipment, however in discussing this matter with the owner of a diesel truck maintenance facility, based on the annual mileage, he suggested using a figure of LE 15,000 per unit on the large trucks and LE 20,000 for the panel trucks, which would total LE 35,000 per year.

An amount of one mil of total sales has been allocated for miscellneous sales expenese such as advertising, point of sales material, entertainment and travel that would amount to approximately LE 10,000 per year.

2. (j) 7 Depreciation (To be used in Profit & Loss Statement Only)

The amount of allowable depreciation on fixed assets can either be established by law or by the useful life expectancy of the asset. The latter method has been used in preparing this report based on the following deprecition schedule.

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Table II.14 DEPRECIATION SCHEDULE FOR THE FIXED ASSETS OF THE PROCESSING PLANT

	Item	Life Expect.	Dep.	Value LE	Amt. of Annual Dep.
1.	Building	25 Years	4%	2,048,235	81,929
2.	Processing Equipment	10 Years	10%	2,850,195	285,020
3.	Transportation Equipment	5 Years	20%	342,060	68,412
4.	Office and Lab Equipment	10 Years	10%	30,000	3,000
TOTAL DEPRECIATION					438,361

2. (j) 8 Maintenance

It is difficult to estimate the amount of annual maintenance that will actually be required for this plant, however the norm used in many dairy processing plants is to allow 3% of the initial cost of the equipment per year. During the first few years of operation this figure may be high but as the machinery gets older more maintenance will average out. The following chart shows the maintenance that has been allocated to operating expenses.

ESTIMATED MAINTENANCE COSTS

	Item	Est. Maint.	Initial Value	Amount of Annual Maint.
1.	Building	1%	2,048,235	20,482
2.	Processing and Supporting Equipment	3%	2,850,195	85,506
3.	Office and Lab Equipment	5%	30,000	1,500
	Total Maintenance Costs			107,488

2. (j) 9 Working Capital

The firm anticipates operating on a cash basis, therefore collections from sales will be made either daily or weekly depending on the customer status providing a constant cash flow. The only inventory that will be required is for milk and ice cream cartons where a three months supply has been projected. The company should maintain a positive bank balance however, so it is recommended that sufficient cash should be available to cover one months operating expenses and three months supply of cartons.

2. (j) 10

ESTIMATED DAILY UTILITY REQUIREMENTS

Equipment	Motor HP	KW	KWH Day	Water l	Fuel Oil l	Steam Kgs	Ice l	Natural Gas
1. Plate Cooler	2.00	1.88	5					
2. Raw Milk Storage	5.00	4.63	13					
3. C-6V Pump	-	-	-					
4. Flow Meter	5.00	5.00	14					
5. Clarifier - Standardizer	2.25	2.13	51					
6-8. Milk Storage Tanks	15.00	14.00	32					
9-9a. C6V Pumps	-	-	-					
10. Balance Tank	-	-	-					
11. Heat Exchanger	50.00	46.63	105					
12. Homogenizer	-	-	-					
13. Holding Tube	0.75	0.75	2					
14. Milk & Lebben Surge Tanks	5.00	4.63	12					
15. C-4V Pump	4.50	4.13	3					
16-18. Lebben Fermentation Tanks	5.00	4.63	3					
19. C-6V Pump	-	-	-					
20. Plate Cooler	0.75	.75	3					
21. Lebben Surge Tank	5.00	4.63	19					
22. C-4V Pump	26.00	24.25	158	7,560				36 m^3
23-24. Carton Fillers #1	30.00	27.88	112	1,500		1,878		
25. Crate Washer	20.00	18.63	121					
26. Crate Conveyors	400.00	372.88	3729	20,500			2,300	
27. Refrigeration System #2	100.00	93.20	1305					

2. (j) 10 (cont.)

ESTIMATED DAILY UTILITY REQUIREMENTS

	Equipment	Motor HP	KW	KWH Day	Water l	Fuel Oil l	Steam Kgs	Ice l	Natural Gas
28.	Water Treatment	5.00	4.63	46					
29.	Water Storage	-	-	-					
30.	Boiler System	7.50	7.00	70		568			
31.	Process Control Panel	-	-	-					
32.	Motor Control Center Panel	-	-	-					
33.	CIP System	7.50	7.00	46					
34.	Lift Truck (optional)	-	-	-					
35.	Milk Crates	-	-	-					
36.	Piping - Valves - Clamps	-	-	-					
TOTALS		599.25	556.06	.5849	33,560	568	1,878	2,300	36 m^3

#1 If Butane or Propane gas will be used this amount would be lowered to 12 m^3.

#2 The electricity consumption is based on operating all of the equipment for 10 hours per day and only maintaining sufficient refrigeration to keep the cold storage room at 4° C (40° F) for 14 hours when the processing section is not working.

#3 This is for milk processing and does not include cold storage or freezer requirements.

Table II.15 ESTIMATED TIME SCHEDULE FOR STARTING OPERATIONS FOR DAIRY AT EL HAGER, EGYPT

	Months From the Time the Letter of Credit is Received in USA											
	1	2	3	4	5	6	7	8	9	10	11	12
A. Orders Placed with Suppliers	X											
B. Estimated Time for Manufacturing the Equipment		X	X	X	X	X						
C. Ocean Shipping Time to Egypt							X					
D. Customs Clearance and Transportation to Plant Site								X				
E. Equipment Installation									X	X	X	
F. Start-up Testing of Equipment												X
G. Construction of the Building		X	X	X	X	X	X					

II. G Operational Costs

G. 1 Milk Production Operational Expense

		LE
	Administrative	23,125
	Labor	97,840
* *	Feed Concentrate & Roughage (Hay)	591,848
	Management & Technical Services Fee	50,000
	Medications	18,000
	Miscellaneous & Supplies	45,000
	Utilities	26,000
	Interest (12%)	144,000
	Depreciation (16 Years) Average	75,000
	TOTAL LE	1,070,813

* Combined: 1081 cows @ 30 lbs/head/day; 5 pt/lb for feed cost

G. 2 Milk Processing Plant Operational Expense

	LE
Administrative Cost	70,500
All Direct Labor including Maintenance, Transportation, Laboratory	148,740
Packing Materials	363,102
Sales Expense	41,500
Maintenance	107,488
Miscellaneous	104,350
Utilities & Fuel	430,000
Interest (12%)	632,461
Depreciation (15 Years)	438,361
Management & Technical Service Fee	70,000
TOTAL LE	2,406,502

G. 3 Dairy Feedlot Operational Expense

		LE
	Administrative and Sales	23,125
*	Feed	42,279
	Milk Replacer	12,781
	Labor	45,720
	Depreciation (15 Years)	20,400
	Utilities & Fuel	12,000
	Medication	2,647
	Interest (12%)	36,720
	Management & Techinical Service Fee	15,000
	TOTAL LE	210,672

* 291 male calves @ 1308 Kb in 6 months
5 pt/lb feed cost

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II. H BY-PRODUCTS ANALYSIS

DAIRY IS THE SAME AS FEEDLOT

II.I Disease Analysis

Cattle diseases which would affect the feedlot and dairy in the El Hager, Egypt are:

1. Foot and Mouth;
2. Cattle Plague;
3. Brucellosis;
4. Tuberculosis;
5. Septicaemia;
6. Rift Valley;
7. Liver Flukes.

The biggest disease problem would be cattle plague with blood parasites being second. In the feedlot, liver flukes would probably be the most serious problem along with tuberculosis.

There are vaccines for the various viruses, such as foot and mouth, rift valley and cattle plague. With a proper disease identification program and good quality vaccines, these diseases could be kept under control.

The parasitic disease such as liver flukes and blood parasites will require constant treatment and close attention. The treatment of these diseases is standardized and should keep the cattle performing as they would in developed countries such as the U.S.

Some diseases are bacterial such as septicaemia and can be treated with antibiotics.

We don't feel that the disease problems will be limiting factor in the success of a feedlot or dairy in Egypt. There are successful dairies in Egypt today. Disease control will require better management than in the U.S. but it can be controlled.

There are diseases that develop when conditions are not kept clean and sanitary such as tuberculosis. Any facility for dairy and feedlot cattle needs to be designed and managed with cleanliness in mind.

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II. J Farming Operation to Produce Feed for Dairy

The farming operation will provide most of the feed requirements for the dairy animals. In the United States and Europe many of the major dairies are using the "complete diet" concept which feeds the entire diet as the same complete mix throughout the day rather than feeding separtate constituents of the diet at various times of the day. The first advantage of the concept is that the type of fatty acid fermentation in the rumen remains constant and thereby the rumen pH is also constant and this results in higher butterfat and milk solid production. On the other hand when different feeds are given separately both fatty acids and pH fluctuate. The disadvantage of the system is that additional equipment is required to accomplish the mixing of the feed.

Since we will attempt to grow all of our feed, we will need approximately 2,000 feddans in the farming operation. The assumptions for this feed production operation are given in Table II. .

During the growing process the roughage substitution will be sorghum or corn, either dry or green, whichever is available at the different times of the year. The diets that will be used are found in Tables II. and II. These diets will supply all the nutrient requirements of the dairy cow.

The dairy cow's production cycle is divided into four (4) phases. Normally the roughage would be increased at each phase.

C. 1 Roughages Currently Grown and Their Quality

The most common roughages grown in the El Hager area are Berseem (clover) which is 90% water on first cut, 88% on second and 85% on third cutting; Alfalfa which is 85% moisture; Sorghum is cut in 70 days and is very high in energy; Rotus grass is 85% to 82% moisture and grows very well in Egypt.

C. 2 Mineral Nutrition

The levels of minerals provided by the recommended diets are apparently adequate when compared with the United States National Academy of Science National Research Council specifications for complete diet.

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TABLE II. 16 Assumptions - Dairy Farming Operation

Farming -

1. Yields:

Corn (feed)	1 1/2	MT/feddan
Corn (Silage)	14	MT/feddan
Alfalfa	6	MT/feddan
Sorghum (Silage)	14	MT/feddan
Soybeans	800	Kg/feddan
Barley	1.2	MT/feddan

2. Two crops per year.

3. Feed intake 38.50 pounds per day for lactatry cows.

4. Feed intake 25 pounds per day for herd average, 1081 animals equals 4,500 tons per year allowing for wastage of ten per cent equals 5,000 tons per year.

5. Fifty percent of diet in roughage and fifty percent concentrates.

6. LE 60 per feddan for operting costs on crops.

7. The consumption of hay is given in Table II. C. 5.

8. Total feed cost per pound equals LE .04.

Table II. 17 FEED REQUIREMENTS (HOLSTEIN DAIRY COWS)
D.M. FEED INTAKE

638 Kg. Cow producing 5650 l. milk and 220 Kg. B Fat per year

Phase	Days of Lactation	l. Avg. Daily Milk	Kg. Daily TDN Needed	Kg. Daily CP Needed	Daily D. M. Intake Kg.	%
1	0-70	28.3	13.5	2.9	17.8	2.8
2	71-140	24.7	12.4	2.6	19.7	3.1
3	141-308	10.9	8.2	1.6	16.4	2.4
4	309-365	0	6.7	1.1	12.7	1.7

638 Kg. Cow producing 7065 l. milk and 273 Kg. B Fat per year

1	0-70	36.7	16.2	3.53	19.1	3.0
2	71-140	32.0	14.7	3.18	21.6	3.4
3	141-308	13.7	9.0	1.84	18.4	2.7
4	309-365	0	6.7	1.09	13.5	1.8

638 Kg. Cow producing 8478 l. milk and 327 Kg. B Fat per year

1	0-70	42.6	18.1	3.99	23.6	3.7
2	71-140	37.2	16.4	3.58	25.0	3.9
3	141-308	17.4	10.3	2.13	23.6	3.7
4	308-365	0	6.7	1.09	15.9	2.5

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Table II. 18 First Year Complete Diet

	% of Dry Matter	LE Cost Per LB.
Chopped Sorghum or Corn	50.0	.019
Dairy Concentrate	47.50	.057
Vitamins	2.0	.118
Minerals	0.5	.040
TOTAL	100.0	.234
C. Protein	15.37	
Calcium	.55	
Phosphorus	.60	
N.E. (lc)	141.78	
Cost - average based on formula above	LE .04 per lb.	

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Table II. 19 HAY CONSUMPTION (FOR STABILIZED 500-MILKING-COW HERD)

Age Group	Body Weight, Kg	Consumption of Hay in Kilograms			Number Animals in Group	Total per Group per Month, tons
		Per 100 Kg Body Weight per Day	Total per Animal per Day	Total per Animal per Month		
Cows (milking and dry)	610	2.5	15.3	459	600	276
Calves (0 to 3 mo)	60	1.0	0.6	18	59	1
Heifers (3 to 12 mo)	200	1.5	3.0	90	168	15
Heifers (12 to 18 mo)	385	2.0	7.7	231	110	26
Bred Heifers (18 to 26 mo)	520	2.5	13.0	390	134	52
Bulls	910	2.0	18.2	546	10	6
	Total Tons of Hay Per Month					376

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II. K Capital Costs for Farming Operation

		Farm 2,000 feddans	US $
1.		Irrigation System	142,000
2.	6	60-80 Horesepower Tractors	150,000
3.	2	Grain Drill	40,000
4.	2	Discer and Ripper	40,000
5.	3	Swathers	150,000
6.		Self Propelled Baler	130,000
7.		Pick-up Truck (500 Kg.)	45,000
8.	3	Truck Tractors	150,000
9.	4	Flat Bed Trailer for Hauling Baled Hay	120,000
10.		Contingency & Miscellaneous	50,000
		TOTAL	$1,017,000

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II. L Estimated Farming Operating Costs

	LE
Labor	108,100
Maintenance	18,353
Transporttion	10,471
Pesticide	41,765
Miscellaneous Including Seed	86,982
Administrative	23,125
Fertilizers	59,559
Utilities & Fuel	83,500
Land Rental LE 50/feddan/year	100,000
nterest (12%)	122,040
Depreciation	101,700
Mangement & Technical Service Fee	15,000
TOTAL	770,595

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III. DAIRY MARKET SUMMARY AND ESTIMATES

Wholesale Prices:

	LE
Milk	.625 liter to .75 liter
Ice Cream	6.0 per gallon
White Cheese	1.015 per kilo
Yoghurt	.10 per 150-200 grams

Orientation: Hotels and grocery stores.

Volume: 1980 - 3,000,000 MT for all dairy products.

Sales Objectives: Sell entire output to hotels and grocery stores.

Market Share: .2% of the 1980 Market with 500 cow dairy.

Customers: Major hotels, distributors and grocery stores.

Distribution Channels: Direct to the customers listed above.

Present Sources of Supply: Importation.

Future Competition: Other dairies.

Tariff Protection or Import Restriction: Some restriction from time to time because of balance of payments problems.

Critical Factors That Determine Market Potential: Population growth, per capita consumption, personal income, efficiency of local milk production, priority on land use and crops grown.

Any Proposed or Existing Regional Econmic Integration Agreements: None to my knowledge.

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Anticipated Effect on Market Price by Increased Milk:

None anticipated.

Government Regualtions:

None in effect at present time except if you purchase subsidized feed, you may have to sell to government stores at lower prices.

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IV. DAIRY FINANCIALS

IV. A Profit and Loss Estimates

The 500 cow dairy with milk processing plant is a profitable operation. A yearly profit of LE 4.4 million is an adequate return on all overall investment of LE 10.8 million and should attract investors.

IV. B Cash Flow Statements

These statements indicate that the loans would be paid off in the fourth year. At the end of ten years there would be a cumulative cash balance of LE 37,708,000 assuming no taxes are paid. We would expect at least a five year tax holiday. A reduction of interest expense would also offset some of the potential taxes.

It should be noted that the feedlot associated with the dairy is not a profitable operation and ways need to be found to produce beef cheaper in Egypt.

IV. C Internal Rate of Return

The Internal Rate of Return for the ten year period is 30.3 %.

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LOTUS DAIRY PROJECT

IV. D ESTIMATED YEARLY PROFIT AND LOSS

		LE
Sales:		8,831,000
Costs:		
	LE	
Farming	770,000	
Feedlot	210,000	
Milk Processing	2,407,000	
Total	4,458,000	4,458,000
Profit LE Per Year		4,373,000
Internal Rate of Return		30.3%

IV. E Dairy -- Yearly Volume -- Assumptions

Raw Milk Production: 4,836,250 Liters Per Year

Product Sales:	% of Raw Milk	Yearly Volume	Sales (LE)
1. Pasturized Milk	20%	967,248 Liters	604,530
2. Ice Cream	50%	1,277,602 Gallons	7,665,612
3. Cheese	30%	398,761	404,742

Assumptions:

1. Milk output per cow, per day. 26.5 Liters
2. Butterfat level in raw milk. 3.8 %
3. Total milk production and product sales.

   a) Milk production (raw) 26.5 Liters per cow, per day=

   13,250 Liters per day
   403,020 Liter per month
   4,836,250 Liters per year

   b) Sales:

	% Raw Milk Production	Price	Monthly Volume Units	LE
Pasturized Milk	20%	.625 LE/ Liter	80,604 Liters	50,378
Ice Cream	50%	6.00 LE/ Gallons	106,467	638,801
White Cheese	30%	1.015 LE/ Kg	33,230 Kg	33,729

4. Feed Consumption - Average - 30 lbs per cow per day.
5. 100 Kg Raw Milk = 13 Kg white cheese.

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6. Holstein Cross Calf Performance

Birth Weight	32 Kg
Six Month Slaughter Weight	250 Kg
Net Gain	218 Kg
Feed Conversion	6 Kg of Feed/ Kg of Gain
Total Feed Consumed	1308 Kg
Cost of Feed Per Kg	11 Pt
Total Cost of Feed, LE	144
Cost of Milk Replacer, LE	47
Carcass Value, 150 Kg at 3.5 Kg	525 LE
Margin Over Feed Costs	381

V. Dairy Legal Requirements

See legal requirements for buffalo feedlot. They are the same. Section covers the feedlot as well as the dairy.

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Table IV. 1 Lotus Dairy Company - LE - Monthly - Year 1

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
CASH OUTFLOW													
Capital Costs													
Dairy & Equipment	717785	—	—	—	—	—	—	—	—	—	—	—	717785
Processing Plant	—	—	—	—	—	—	—	—	—	—	—	—	—
Farm	1017000	—	—	—	—	—	—	—	—	—	—	—	1017000
Feedlot Beef	—	—	—	—	—	—	—	—	—	—	—	—	—
Power Generation	135000	—	—	—	—	—	—	—	—	—	—	—	135000
Housing	100000	—	—	—	—	100000	—	—	—	—	—	—	200000
Prepaid Expense	20000	—	—	—	—	—	—	—	—	—	—	—	20000
Working Capital	140000	—	—	—	—	—	—	—	—	—	—	—	140000
Cows & Freight	510300	—	—	—	—	—	—	—	—	—	—	—	510300
TOTAL CAPITAL COSTS	2640085	—	—	—	—	100000	—	—	—	—	—	—	2740085
Operational Expense													
Dairy				44600	44600	44600	44600	44600	44600	44600	44600	44600	401400
Farming			42000	42000	42000	64216	64216	64216	64216	64216	64216	64216	575512
TOTAL OPERATIONAL EXPENSE			42000	86600	86600	108816	108816	108816	108816	108816	108816	108816	976912
CASH INFLOW													
Capital Equity & Loans	3000000						500000				500000		4000000
TOTAL CASH INFLOW	3000000						500000				500000		4000000
Cumulative Cash	359915	359915	317915	231315	144715	35899	427083	318267	209451	100635	491819	383003	383003

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Table IV. 2 Lotus Dairy Company - LE - Monthly - Year 2 - (000)

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
CASH OUTFLOW													
Capital Costs													
Dairy & Equipment	718												718
Processing Plant	2615		1308			1308							5230
Feedlot	1000					2060							306
Power Generator	135												135
Housing	200												200
Prepaid Expenses	71												71
Working Capital	200												200
TOTAL CAPITAL COSTS	4039		1308			1514							6860
Operational Expense													
Milk Production (Dairy)	89	89	89	89	89	89	89	89	89	89	90	90	[illegible]
Milk Processing						201	201	201	201	201	201	201	1407
Feedlot Beef						18	18	18	18	18	18	18	126
Farming	64	64	64	64	64	64	64	64	65	65	64	64	770
TOTAL OPERATIONAL COST	153	153	153	153	153	372	372	372	373	373	373	373	3373
TOTAL OUTFLOW	4192	153	1460	153	153	1886	372	372	373	373	373	373	10233
Loan Repayment												1000	1000
CASH INFLOW													
Capital													
Equity & Loans	4000		1807			1000							6807
Sales													
Dairy Products						723	723	723	723	723	723	723	5061
Meat Products						13	13	13	13	13	13	13	91
Total Sales						736	736	736	736	736	736	736	5152
TOTAL INFLOW	4000		1807			2472	1472	1472	1472	1472	1472	1472	17111
Depreciation	19	19	19	19	19	53	53	53	53	53	53	53	466
Cumulative Cash	100	24	390	256	122	25	442	859	1275	1678	2094	1497	1497

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Table IV. 3 Lotus Dairy Company - LE - Yearly - (000)

	3	4	5	6	7	8	9	10
CASH OUTFLOW								
Operational Expense								
Milk Production	1071	1071	1071	1071	1071	1071	1071	1071
Milk Processing	2407	2407	2407	2407	2407	2407	2407	2407
Feedlot Beef	210	210	210	210	210	210	210	210
Farming	770	770	770	770	770	770	770	770
TOTAL	4458	4458	4458	4458	4458	4458	4458	4458
Loan Re-payment	3000	2484						
CASH INFLOW								
Sales								
Dairy Products	8675	[illegible]	8675	[illegible] 75	8675	8675	8675	8675
Meat Products	156	[illegible]	156	156	156	156	156	156
TOTAL	8831	8831	8831	8831	8831	8831	8831	8831
Depreciation	635	635	635	635	635	635	635	635
Cumulative Cash	3505	6029	11037	16045	21053	26061	31069	36077
Loan Balance	2484							
Equity	4323	4323						

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TABLE IV. 4 500 COW DAIRY WITH PROCESSING PLANT AND FARMING OPERATION IN EL HAGER, EGYPT

LABOR REQUIREMENTS

ANNUAL SALARIES

		Unit Salary	Total
1	Dairy Manager General (American)	60,000	60,000 $
1	Herdsman (American)	40,000	40,000 LE
1	Assistant Herdsman	8,000	8,000 LE
6	Milkers	2,184	13,100 LE
4	Dairy Laborers	1,560	6,240 LE
1	Processing Manager (American)	45,000	45,000 LE
4	Processing Laborers	1,560	6,240 LE
1	Office Accountant (Manager)	12,000	12,000 LE
1	Laboratory Chemist	10,000	10,000 LE
1	Secretary	5,000	5,000 LE
3	Clerks	5,000	15,000 LE
2	Salesman	12,000	24,000 LE
2	Drivers (Dairy Products)	2,500	5,000 LE
1	Sales Assistant	8,000	8,000 LE
1	Farm Manager (American)	40,000	40,000 LE
10	Farm Laborers	1,560	15,600 LE
1	Miscellaneous Farm Labor	40,000	40,000 LE
4	Beef Feedlot Laborers	1,560	6,240 LE
2	Feed Mixing Laborers	1,560	3,120 LE
1	Feed Truck Driver	2,500	2,500 LE
2	Feed Laborers	1,560	3,120 LE
2	Drivers Feed	2,500	5,000 LE
2	Driver Helpers	1,560	3,120 LE
2	Feed Handlers	1,560	3,120 LE
1	Mechanic (Dairy Processing) American	40,000	40,000 $
1	Mechanic (Electrical)	12,000	12,000 LE
1	Mechanic (Auto)	12,000	12,000 LE
	TOTAL	371,164	434,400 LE

Workers - all Egyptian unless distinction made.

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TABLE IV. 5 General Office Administrative Expense
Management and Techinical Services

	Yearly
General Manager	60,000
Adminstrative Accountant	12,000 LE
Three Clerks	15,000 LE
Secretary	5,000
Supplies	500
Miscellaneous	15,000
TOTAL LE	107,500
Management & Technical Services Agreement	$150,000

Water Buffalo and Dairy Study Bibliography

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12. The Response of Dairy Cattle to Hay Versus Silage as a Source of Roughage, Alex. Jour. Agric. Res., Hassan, Adel, et. al., 25 (1) 21-28, 1977.

APPENDIX I

Carnier Research
888 North Sepulveda Boulevard, Suite #614, El Segundo, California 90245
Cable Address: CARNRES Telephone (213) 640-0386

Lab No. 9308 Reported: 1/24/83

For: New Ag Received: 1/20/83

Report on: Lotus Farms for Egg & Poultry Production

	Brewers Grains Wet		Screening & Husks	Malt Husks	Rootlets
	As rec'd	ADM			
Moisture	71.90	10.00	8.60	6.00	5.20
Crude Protein	6.20	19.86	11.05	4.90	25.60
Crude Fat	1.67	5.34	1.40	.49	5.10
Crude Fiber	4.30	13.77	15.60	31.60	8.80
Ash	1.45	4.64	17.40	7.40	15.00
Starch	9.40	30.11	31.15		

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Lab No. 9309

For: New Ag Reported: 1/27/83

Report on: Water Received: 1/22/83

Mark: Sample No. 2 Canal Water

PH --- 6.9
E.C. (Micromhos at 25° C) --- 2000

	C.P.M.	P.P.M.
Calcium	4.00	80
Magnesium	2.80	34
Sodium	13.04	300
Potassium	0.13	5
Total cations	19.97	
Bicarbonates	3.52	215
Sulfates	4.90	235
Chlorides	11.52	408
Nitrates		
Boron		
Total Dissolved Solids		1350

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Lab No. 9311 Reported: 1/12/83

For: New Ag Received: 1/8/83

Report on: Feed

RICE GERM MEAL

Moisture	14.0	%
Protein	13.35	%
Fat	9.45	%
Fiber	6.1	%
Ash (mineral matter)	8.15	%
Calcium (Ca)	0.23	%
Phosphorus (P)	1.04	%

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Lab No. 9312 Reported: 1/12/83
For: New Ag Received: 1/8/83
Report on: Feed Supplement

UNTREATED RICE HUSK

Moisture	11.4	%
Protein	12.15	%
Fat	10.85	%
Fiber	3.6	%
Ash (Mineral matter)	7.85	%
Calcium (Ca)	0.29	%
Prosphorus (P)	0.86	%

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Lab No. 9313 Reported: 1/12/83

For: New Ag Received: 1/8/83

Report on: Feed Supplement

YELLOW MAIZE

Moisture	13.0	%
Protein	9.20	%
Fat	3.80	%
Fiber	2.2	%
Ash (mineral matter)	0.95	%
Calcium (Ca)	0.01	%
Phosphorus (P)	0.25	%

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Lab No. 9314 Reported: 1/12/83

For: New Ag Received: 1/8/83

Report on: Feed Supplement

BONE POWDER

Moisture	3.3	%
Protein	3.50	%
Calcium (Ca)	32.0	%
Phosphorus (P)	13.88	%

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Lab No. 9315 Reported: 1/12/83
For: New Ag Received: 1/8/83
Report on: Feed Supplement

LIMESTONE

Calcium (Ca)	38.5	%

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Lab No. 9317 Reported: 1/18/83

For: New Ag Received: 1/11/83

Report on: Amino Acid Profiles

	Grape Pomace	Rice Bran	Rice Polishings	Soybeans Whole
Dry Matter	91.0	91.0	90.0	91.0
Crude Protein	11.7	12.7	12.1	39.4
Arginine	.68	.85	.63	7.01
Cystine	.17	.18	.14	.37
Glycine	.91	.80	.71	3.31
Histidine	.26	.32	.19	1.93
Isoleucine	.55	.51	.36	1.81
Leucine	1.64	.90	.65	3.67
Lycine	.51	.57	.53	1.47
Methionine	.1[illegible]	.24	.21	.22
Phenylalanine	.55	.58	.39	2.90
Serine	---	---	---	2.80
Threonine	.38	.47	.35	1.48
Tryptophane	.07	.10	.10	---
Tyrosine	.16	.68	.42	2.17
Valine	1.10	.76	.73	2.29

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Lab No. 9317 - Continued Reported: 1/18/83

For: New Ag Received: 1/11/83

Report on: Amino Acid Profiles

	Wheat Millrun	Cottonseed Meal	Sesam Seeds	Soybean Meal
Dry Matter	90.0	91.0	93.0	91.0
Crude Protein	15.6	41.3	44.3	43.4
Arginine	.90	4.26	4.59	3.14
Cystine	.20	.82	.60	.77
Glycine	.40	2.12	3.88	1.97
Histidine	.40	1.11	1.16	1.12
Isoleucine	.70	1.56	1.97	1.99
Leucine	1.20	2.46	3.10	3.48
Lycine	.50	1.69	1.25	2.83
Methionine	.40	.60	1.37	.53
Phenylalanine	---	2.15	2.13	2.23
Serine	---	1.71	2.95	2.35
Threonine	.50	1.3[illegible]	1.60	1.80
Tryptophane	.20	.55	.72	.71
Tyrosine	.50	.83	1.85	1.60
Valine	.80	2.56	2.36	1.96

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Lab No. 9320 Reported: 1/19/83

For: New Ag Received: 1/15/83

Report on: Fish Powder

Moisture	8.2	%
Protein	31.05	%
Fat	2.35	%
Fiber	2.50	%
Ash (mineral matter)	41.92	%
Calcium (Ca)	11.80	%
Phosphorus (P)	1.17	%

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Lab No. 9321 Reported: 1/22/83
For: New Ag Received: 1/18/83
Report on: Egyptian Sample

COTTONSEED MEAL

Moisture	11.30 %
Protein	45.05 %
Fat	2.97 %
Fiber	8.10 %
Ash	7.25 %
Calcium	0.38 %
Phosphorus	1.10 %
Aflotoxin	N.T.
Gossypol, total	.99
Gossypol, free	.23

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Lab No. 9322 Reported: 1/25/83
For: New Ag Received: 1/18/83
Report on: Amino Acid Profile

FISH MEAL

Moisture	92.00
Alanine	4.09
Arginine	3.82
Aspartic Acid	6.28
Cystine	.60
Glutamic	8.54
Glycine	3.66
Histidine	1.60
Isoleucine	3.12
Leucine	5.01
Lycine	5.09
Methionine	2.00
Phenylalanine	2.82
Proline	2.65
Serine	2.41
Threonine	2.80
Tryptophan	.76
Tyrosine	2.26
Valine	3.51

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Carrier Research
888 North Sepulveda Boulevard, Suite #614, El Segundo, California 90245
Cable Address: CARNRES Telephone (213) 640-0386

Lab No. 9323 Reported: 1/25/83

For: New Ag Received: 1/18/83

Report on: Amino Acid Profile

COTTONSEED MEAL 41% PROTEIN SOLVENT EXT.

Moisture	8.9
Crude Protein	41.9
Crude Fat	2.1
Alanine	1.47
Arginine	4.36
Aspartic Acid	3.35
Cystine	.67
Glutamic Acid	7.48
Glycine	1.61
Histidine	1.02
Isoleucine	1.20
Leucine	2.17
Lysine	1.59
Methionine	.49
Phenylalanine	2.00
Proline	1.39
Serine	1.57
Threonine	1.21
Trytophan	.48
Tyrosine	1.06
Valine	1.64

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Carnier Research
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Lab No. 9324 Reported: 1/25/83

For: New Ag Received: 1/21/83

Report on: Feed Samples

	Cairo Soap & Oil		United			
	1	2	Layer 1	Chick 2	Layer 3	Layer 4
Moisture	11.10	10.80	11.20	11.00	11.30	10.70
Crude Protein	14.15	14.35	17.15	21.00	18.00	25.45
Crude Fat	4.50	5.05	4.00	3.90	3.90	4.40
Ash	5.55	10.65	10.50	5.75	11.00	18.50
Calcium	3.24	3.02	3.03	.80	3.15	3.84
Phosphorus	.69	.57	.72	.75	.80	1.30

	Far East Feeds			Cairo Poultry Feeds	
	Chick Starter	Grower	Layer	Chick Starter	Layer
Moisture	9.30	9.20	9.00	12.00	11.80
Crude Protein	20.65	17.75	18.60	18.15	15.65
Crude Fat	3.55	3.75	2.90	3.30	3.50
Crude Fiber	3.10	3.10	3.00	3.50	3.00
Ash	5.05	4.95	10.25	9.35	8.70
Calcium	.84	1.25	3.06	1.42	4.20
Phosphorus	.81	.64	.56	.58	.58

	Golden Farms Feed		
	Layer	Starter	Soybean Meal
Moisture	11.90	12.10	11.30
Crude Protein	15.75	23.40	45.05
Crude Fat	4.15	3.10	19.60
Crude Fiber	3.20	3.60	5.10
Ash	9.11	9.50	9.55
Calcium	2.37	.90	.27
Phosphorus	.55	.63	.63

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Lab No. 9327 Reported: 1/25/83

For: New Ag Received: 1/21/83

Report on: Dried Poultry Waste

	Sample #2
Protein Nitrogen	1.76
Non Protein Nitrogen	2.03
Crude Protein	23.70
Nitrogen Free Extract	30.70
Moisture	7.51
Ether Extract	2.33
Crude Fiber	9.95
Ash	36.76
Calcium	11.18
Phosphorus	2.79

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Lab No. 9328 **Reported:** 1/25/83

For: New Ag **Received:** 1/21/83

Report on: Dried Poultry Waste

	Sample #3
Protein Nitrogen	1.64
Non Protein Nitrogen	1.41
Crude Protein	19.10
Nitrogen Free Extract	41.26
Moisture	8.58
Ether Extract	2.10
Crude Fiber	16.59
Ash	27.22
Calcium	5.63
Phosphorus	2.53

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Lab No. 9329 Reported: 1/25/83

For: New Ag Received: 1/21/83

Report on: Dried Poultry Waste

	Sample #4
Protein Nitrogen	1.79
Non Protein Nitrogen	1.54
Crude Protein	20.84
Nitrogen Free Extract	45.13
Moisture	---
Ether Extract	2.30
Crude Fiber	18.15
Ash	23.21
Calcium	6.16
Phosphorus	2.77

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Lab No. 9331 Reported: 1/25/83

For New Ag Received: 1/21/83

Report on: Dried Poultry Waste

	Sample #6
Chlorine	1.080
Copper	.005
Iron	.266
Magnesium	.546
Manganese	.030
Potassium	2.090
Sodium	.960
Zinc	.045

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Lab No. 9335 Reported: 1/25/83

For: New Ag Received: 1/18/83

Report on: Dried Poultry Manure
(Air Dry Basis)

	1
Moisture %	11.4
Nitrogen N x 6.25%	28.7
Urea %	0.0
Uric Acid %	6.3
True Protein %	10.5
Total Amino Acids %	8.6
Alanine %	0.61
Arginine %	0.38
Aspartic Acid %	0.71
Glutamic Acid %	1.12
Glycine %	1.33
Histidine %	0.23
Isoleucine %	0.36
Leucine %	0.55
Lycine %	0.39
Methionine %	0.12
Cystine %	0.15
Phenylalanine %	0.35
Tyrosine %	0.27
Serine %	0.38
Threonine	0.35
Valine	0.46
Ether Extract	1.76
Nitrogen-free Extract %	35.61
Available Carbohydrates %	6.70
Ash %	26.5
Calcium (Ca) %	7.8
Phosphorus (P) %	2.2
Sodium (Na) %	0.42
Potassium (K) %	1.37
Copper (Cu) ppm	61.0
Iron (Fe) %	0.2
Zinc (Zn) ppm	325
Magnesium (Mg) %	0.63
Manganese (Mn) ppm	291
Bromine (Br) ppm	16
Chlorine (Cl) %	0.93
Fiber %	13.34
Lignin %	---

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