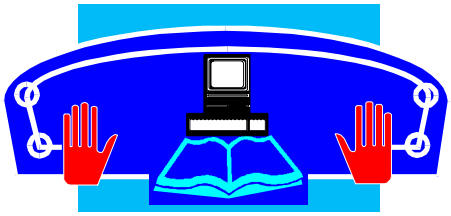

Feasibility Study Of Establishing A Fur Farm In Hay River, N.w.t.

Type of Study: Feasibility Studies Wildlife Products, Fur Ranching

Date of Report: 1985

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19 June, 1986

Sid Kirwan
Head of Renewable Resource Development
Department of Economic Development
and Tourism
Yellowknife, Northwest Territories
X1A 2L9

Dear Mr. Kirwan,

I am enclosing a copy of a "Guide to Feeding Foxes in the Keewatin Region Utilizing Country Foods" as promised.

As I mentioned in our earlier conversation, this guide is designed to assist the Inuit fox farmer by covering the most important details of utilizing country foods in the feeding of foxes, and should thus be translated into Inuktitut.

I appreciate your offer to have this guide translated. Would it be possible to send me a copy of the translated version once it comes out?

I hope you find the enclosed guide of helpful. Thank you in advance for sending the Inuit version. I will be looking forward to hearing from you.

Very truly yours,

Doris Eggers

Doris Eggers

Enclosure

Executive Summary

There are no technical impediments to establishing a fox farm in the Northwest Territories. Silver fox, a colour phase of the common red fox (Vulpes vulpes) are indigenous to many parts of the N.W.T., including all its mainland portions. They are therefore able to survive and reproduce in this climate and environment. Fe>: farms in southern Canada have pioneered animal husbandry practises that can be adapted to northern conditions to produce results equivalent to those obtained by southern operators.

The single largest difference-between the economics of southern operations and the proposed fox farm for the N.W.T. is the cost of transportation. It has been found that the best results in fox production and pelt quality is achieved from the use of prepared rations. These are normally fed in dry form, however, in the N.W.T. it must be fed wet to ensure adequate water intake during winter. The freight cost of the optimum rations (National) represents 39% of the total annual ration costs. A ration requiring supplements (Masterfeeds) is less expensive, however its transportation component is still 40% of ration costs. Feed transportation costs are therefore the basic difference in the cost of pelt production in the N.W.T. versus southern Canada. These may be offset in part by lower land assembly costs and perhaps lower property taxes. Only experience will show to what extent the northern climate will contribute to improved pelt quality.

This study shows that under current fox pelt market conditions, a fox farm starting with a breeding herd of 35 females and 15 male foxes in October 1985 can increase to 150+ females in 1988 by

keeping pelting stock for breeding purposes and so doubling the breeding population annually. At 150 breeding females, average production and market conditions in any of the previous 6 years (1979-1984), the fox farm will return to the manager the cost of operations. A larger breeding herd will return more. It is estimated that the size of the family sized operation lies between 150 and 200 breeding females. The operation cannot support debt servicing costs during the developmental stages.

It is recommended that, provided capital funding is available, the operation start in 1985 with 35 females and 15 males as a minimum size and be managed so it will double its breeding herd every year and so reach the optimum size in 1988.

While the optimum size could be reached earlier, 'this could introduce undesireable qualities to the breeding herd as well as incur greater operating losses due to the reduction in number of animals pelted for sale.

The capital required estimated to finance the minimum sized fox farm through the developmental stages (October 1985 - October 1988) is estimated to be $294,250.00 of which $92,125.00 will be provided by the applicant from cash on hand and sale of pelts and will add another $130,575.00 "in kind" in the form of labour arid management.

If pelt prices exceed the average of the last 6 years the operating loss will be lower, if pelt prices are less operating losses will increase. However, a breeding herd of 150 females and 50 males will cover operating costs plus fixed cost overhead under any market conditions experienced since 1978. The operating costs estimated assume that the owner/manager will take a less than full

salary during the developmental stage.

During the study it became known that the Government of the Northwest Territories Department of Renewable Resources is investigating the establishment of an experimental breeding facility" for fur bearers. A fox farm and experimental breeding station would add an exciting new dimension to the fur industry in the Northwest Territories. It would also serve as a demonstration to others in the N.W.T. who may be interested in pursuing such a venture but are perhaps not as experienced with fur or as enterprising as. are Warren and Nancy Magrum.

This study was funded by a contribution by the Canada/N.W.T. Economic Development Agreement to Warren and Nancy Magrum.

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1.0. INTRODUCTION

Boreal Ecology Services Ltd. was retained by Warren and Nancy Magrum of Yellowknife to determine the feasibility of establishing a fox ranch in the Hay River area (60°50"N 115°47"W) of the Northwest Territories. The Magrums, both experienced in trapping and handling fur, are pursuing fox ranching as a chosen life-style that permits a family operation in a setting that provides the amenities and services for both a family business and a public school education for their growing family. This combination is increasingly difficult to achieve on the trapline. Hay River was selected for several important reasons including:

1. The access to year 'round uninterrupted road transport.
2. Availability of well drained lands close to water and utilities
3. Availability of fish as an alternate food source.
4. A climate that produces high quality pelts.
5. A nearby community offering services and schools for their business and family.

The report that follows looks at the technical and economic feasibility of establishing a fox farm in the Hay River/Enterprise corridor.

1.1 Assumptions

Like all feasibility studies, this one makes certain assumptions. Assumptions about the operator, performance of the foxes and the suitability of the fox pelt market follow.

1 .1.1 The Operator

Warren Magrum, having been born and raised in the N.W.T. is familiar with the climatic elements in which he hopes to rear and pelt silver fox. Being a trapper he is also familiar with the vagaries of the international fur market. Furthermore, being a successful dog breeder and dog team driver, Warren knows the challenge of breeding, feeding and raising dogs - a close relative to the fox - in the north. Having trapped fur and dressed it for sale he is aware of the economic significance of pelting prime fur and the manpower implications of perhaps 50 or more fox coming into prime the same day. Mr. Magrum's experience, we believe strongly support our assumption that he and Mrs. Magrum can be competant and successful fox ranch operators. Our projections assume that the Magrums can produce fox that will yield the average auction price as provided by the Hudsons Bay Company and Statistics Canada for the past 25 years (see Table 1.3).

1.1.2 The Fe>:

The species from which ranch fox originate are native to the Northwest Territories. There is therefore nothing in our northern environment that prevents fox production and survival in their " natural environment. Selective breeding may have reduced the vigor of particular strains, however this is compensated for by animal husbandry practises by the operator that have been established in the industry. While these will ensure survival, economic viability depends on performance and costs of maintenance and production. We therefore assume that the operation will produce for pelting 2.5 pelts per breeding female and that food consumption will be within the extremes published by nutritional scientists and feed manufacturers. Economic effects of changes to these assumptions

are developed in a sensitivity analyses in the section on operating costs and revenues. Established ranchers have assured us that a competent operator should expect an average of 3 pelts per breeding female and aim for 4.

The relationship between season and breeding cycles we assume holds up in that females come into heat at the time of year when there are approximately 10 hours of sunlight per day - around 16 February. Gestation will be 52-56 days, for whelping to occur around mid-April. This will permit pups to reach mature size just when pelts come to prime at 32-35 weeks of age in late November to mid-December. We assume that growth rates in the north will duplicate those of similarly kept foxes in southern Canada.

1.1.3 The Market

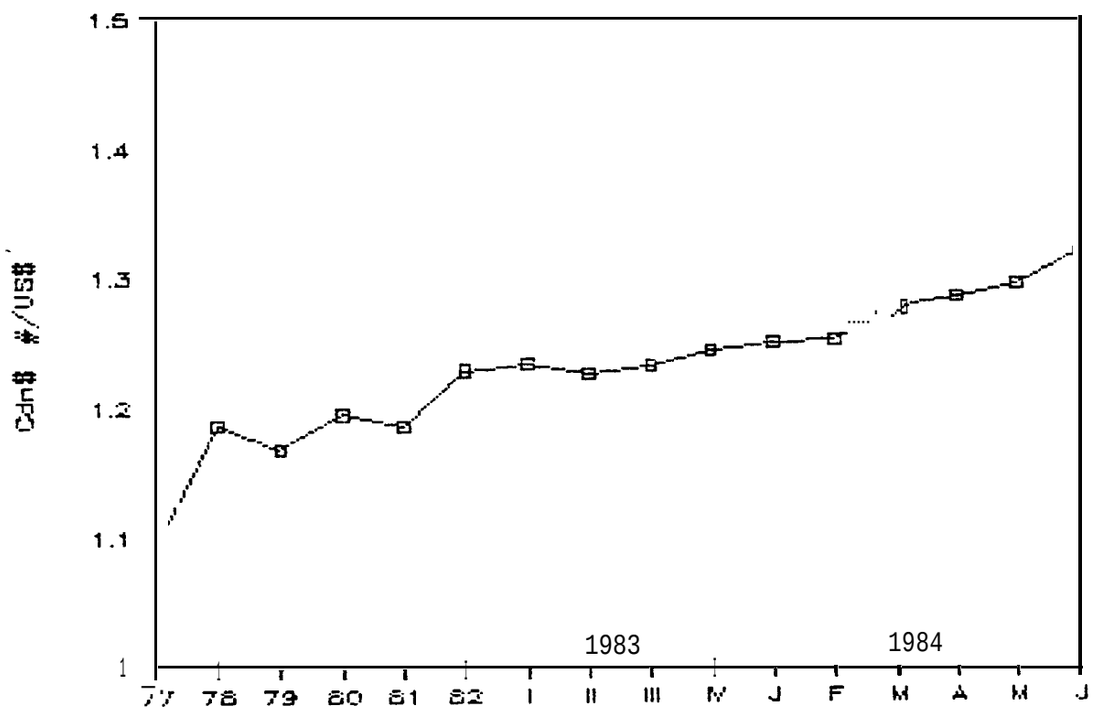
We assume that the market of the next 3-5 years will be similar to that of the past 3-5 years. This market period (1980-1984) includes neither the historic highs nor the historic lows of the industry - see Table 1. We will therefore assume that the average price per pelt produced by Warren and Nancy Magrum will bring a price equivalent to the national average.

It must be realized that the price of pelts at the auction is determined by a global market in which most northern hemisphere countries participate. While these are many factors affecting the price of pelts at the auction, a major element is the relative value of major currencies. Since the fur market is larger in Europe and also more recently in the orient than in North America, our prices in Canada are depressed by a strong American and Canadian dollar. "It appears as of this writing (December 1, 1984) that North American currencies may be weakening relative to

European currencies which is good news for fur producers. See Figure 1.1 for historical relationships of major currencies. Dean Olsen, a market development official at the Hudsons Bay Company's International Fur Sales Centre in Rexdale Ontario indicated that the 1985 fox market is expected to advance 20% over 1984.

Figure 1.1 Historical Relationships of Major Currencies

Figure 1.1a. Canadian vs. United States Dollar



Figut-e 1.1b. French Franc vs. United States Dollar

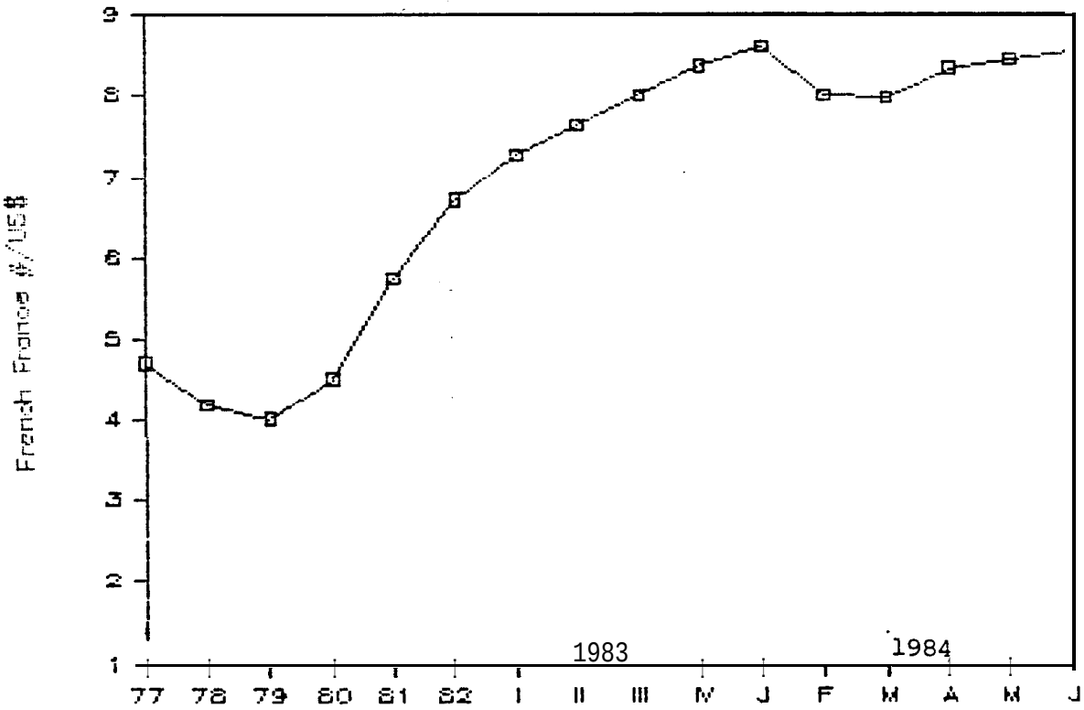


Figure 1.1c. German Deutsche Mark vs. United Stated Dollar

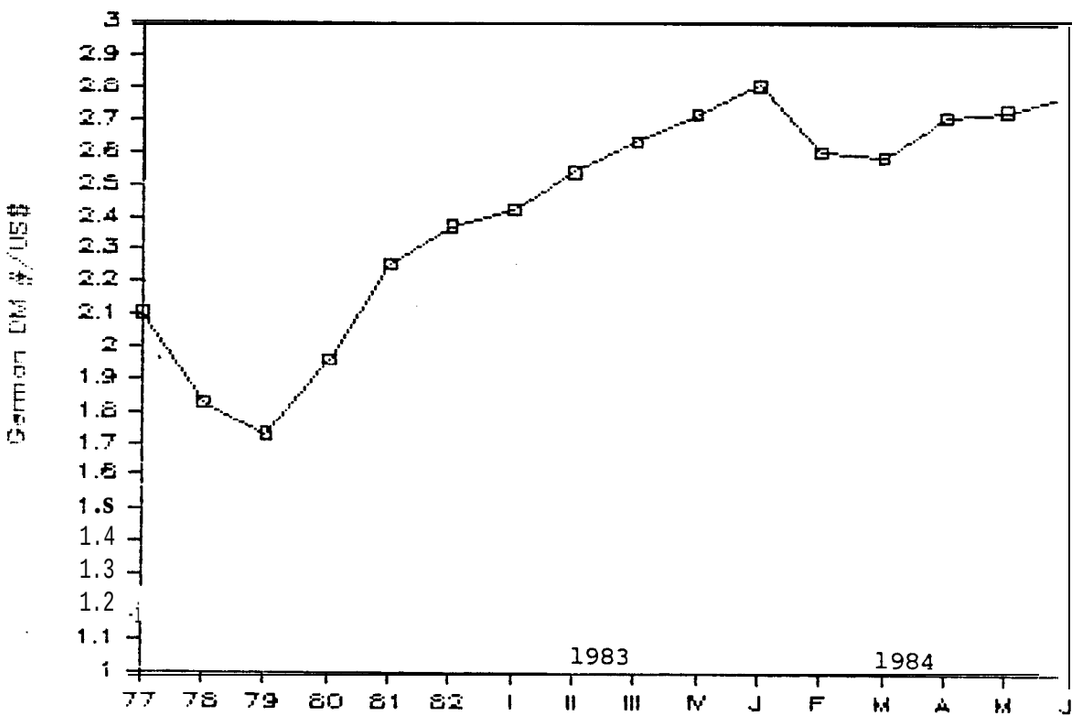


Figure 1.1d. Italian Lira vs. United Stated Dollar

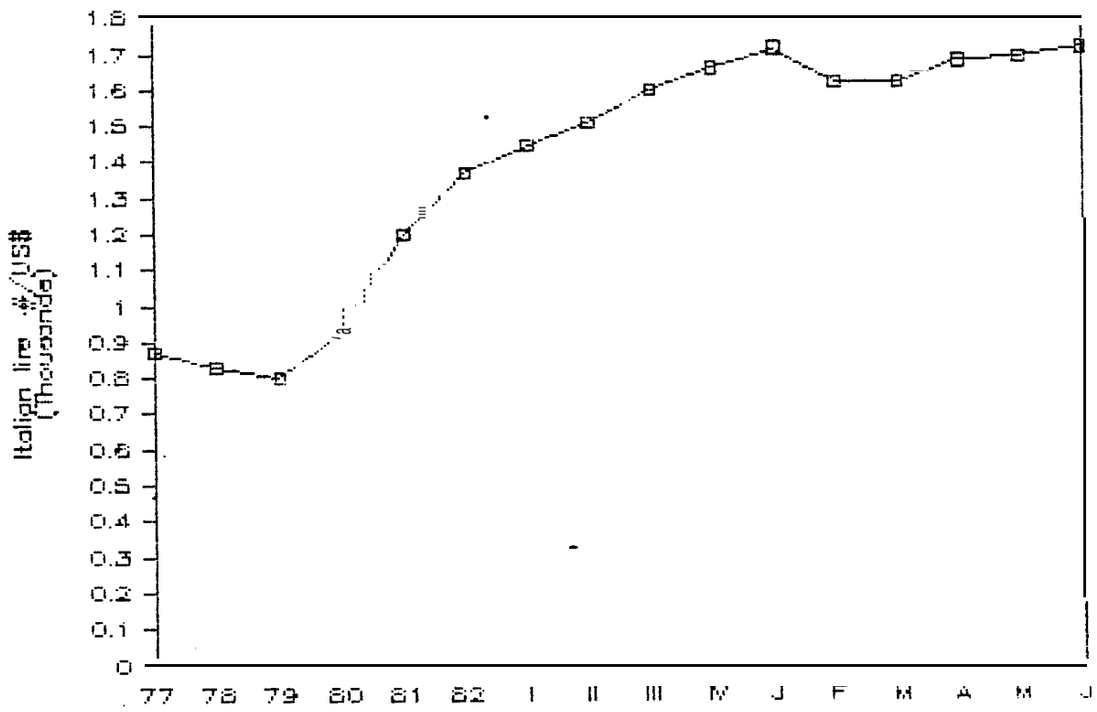
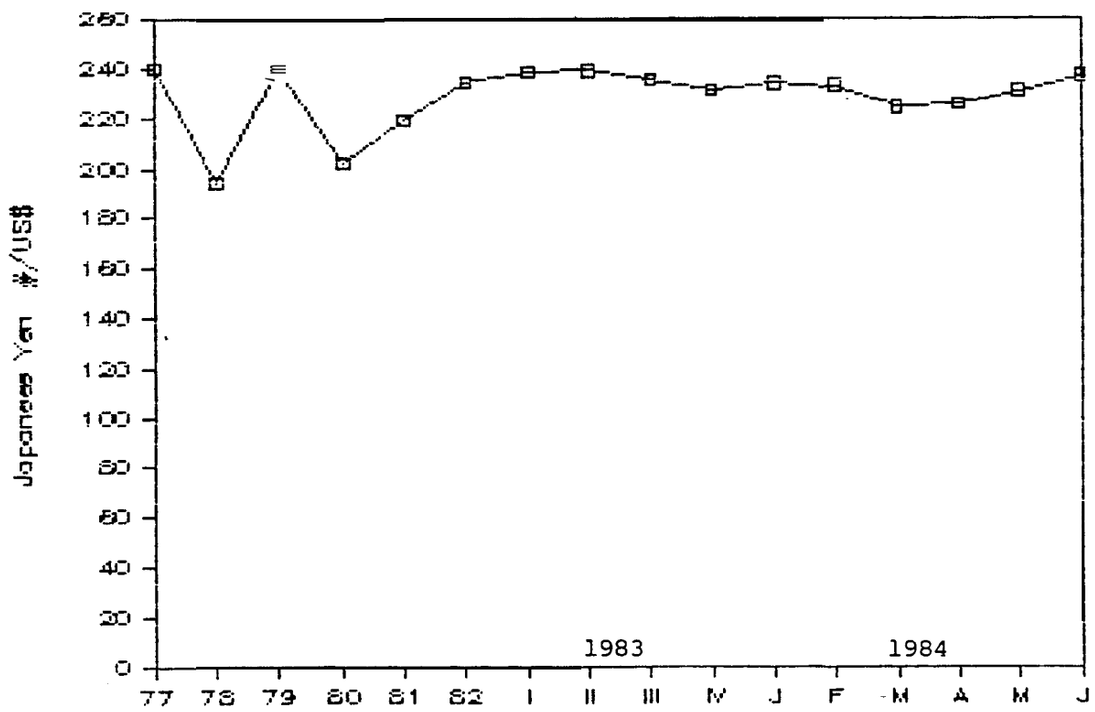


Figure 1.1e. Japanese Yen vs. United Stated Dollar



1.2 History of Fox Ranching

Fox ranching as a form of pelt production has been around for quite some time, but it is only recently that the market for pelts has skyrocketed. While it is believed that Lord Strathcona in P.E.I. in the late 1800's was one of the first fox breeders in the Americas, he was certainly among the first to raise silver fox.

The technique for raising foxes in Strathcona's time was to herd the males and females together in the same pen. As was often the case with this method, fighting occurred and some deaths, both pups and adults, resulted. A short while later it was discovered that the males unlike their human handlers preferred not to have a harem, but rather to live on their- own, thereby allowing the pups to come to maturity. The perfection of the technique started the industry on a rapid advance. The original market was not for the pelt, but for the live animal, which was used to start other ranches. To further illustrate this point, of the 12 ranches that existed in P.E.I. in 1910, all their sales were live foxes.

A good breeding pair could be purchased for an average price of $3,000.00 in 1910. Within 3 years the price had risen to $20,000.00 per pair. Wild and ranch foxes were both being used to provide for this hungry breeder market.

It was only after the first World War that serious raising of foxes, for their pelts, began. At this point, the price of a pair of breeders had stabilized at $200.00-$300.00. During the 1920's and 30's the market for pelts continued to grow, only to succome to the fickle tastes of the fashion consumer in the 40's, when short-haired furs (mainly, mink) became the vogue.

It was not until the 1960's, that pelt production once again

began to increase to an all-time high of 25,145 pelts with a total Canadian value of $3,360,506.00 in 1982. Five hundred and five Canadian fox farms were operating at that time.

In the early days of the industry, jet blat}: fur commanded the best prices, but gradually the silvers took over, as it was realized that the red pelts could be dyed black. Color mutations began to appear in the mid 30's as a result of Scandinavian efforts. The original mutation% were a platinum color, which went for as much as $11,000.00 per pelt at its best showing, in 1940. Dawn-glo, pearl platinum and other color mutants were later developed in Canada and the United States.

Today the market exists in a fairly healthy state with prices averaging $176.00/pelt at the Hudsons Bay International fur auction of February 1984. Also, the technology and knowledge of breeding and rearing of foxes has advanced to such a degree that ranchers are able to pick and chose from amongst their finest foxes to produce only the highest quality of pelts. Research efforts are currently focussing "on artificial insemination techniques and hormone implants to stimulate growth. Also, new products are being developed that appeal to a much larger fur buying clientele. Both initiatives indicate that both producers and fashion designers have faith that the demand for fox pelts will be such that the producer of quality pelts will have a market for the foreseeable future.

1.3. History of Ranched Fe): Felt Market

Following a boom in fox ranching in the 1930's the raising of silver fox declined from the 1940's through to the late sixties. In 1964 there were only 36 fox ranches in Canada who marketed 780 pelts at an average value of $43.37. A year later there were 40 breeders who marketed 523 pelts at an average value of $53.21. These years were the low point in the history of fox ranching in Canada. Previous years showed lower prices but pelt production was over 1,000 per year. These low prices reflected a shift in the market away from fox and longer haired furs to mink. Since those years the ranched silver fox has made a very strong comeback in the fur market. This strong showing is accompanied by a tremendous expansion in colours of pelts and 'an aggressive expansion in the types of garments for which ranched silver fox are being used. Table 1 shows statistics of ranched fox pelts produced on Canadian fur farms since 1958.

The market demand for ranched fox varies with the colour of the pelt. On examination of the results of the Hudson's Bay Company February 1984 sale it appears that the medium silver is the strongest pelt at the present time. Table 1.1 compares prices paid for colour phases for comparable size and grade pelts.

Table 1.1. Price Comparison for Different Colour Phases, Sizes and Conditions - February 1984

Size O Select	Ex Pale	Pale	Med	Dark
		300.		
A	290.-305.	240.-330.	305.-335.	280.
B	193"-273.	90.-280.	215.-300.	195.-235.
C	115.-240.	100.-235.	130.-235.	135.-235.
D	65.-115.	103.-185.	95.-145.	110.-145.

Table 1.1 continued

Size 1	Ex Pale	Pale	Med	Dark
Select	-	270.	295.	
A	260.	250.-275.	250.-280.	213.-245.
B	150.-250.	130.-255.	133.-265.	170.-220.
C	40.-190.	55.-220.	95.-220.	123.-195.
D	35.-165.	45.-150.	40.-160.	110.-155.
Size 2				
Select		250.	245.	
A		210.-225.	220.	
B	100.-185.	125.-240.	100.-195.	105.-185.
C	70.-140.	90.-175.	84.-175.	96.-153.
D	40.-110.	40.-130.	48.-130.	44.-130.

At the present time there are numerous colours available but none have the volume nor the history of demand shown by the silver. Perhaps one exception is the dawn-glo - an exclusive strain developed by the Bollert operations at Simcoe Ontario. Originating from a mutation in 1943, this strain has been developed through careful selective breeding ever since. The average pelt price in February 1984 for dawn-glo was $525.98.

In selecting initial breeding stock it would probably be wise to select colour stock for which there is an established market, that enjoys a high demand and a large share of the present market. It is therefore recommended that initial breeding stock be in the "light medium" silver colour phase. As the operation becomes established, the breeding stock could be expanded to include higher priced and exotic colour phases.

Table 1.2 shows volumes and average prices of ranched fox sold at the International Fur sales Centre of the Hudon's Bay Company at Rexdale Ontario in February 1984.

Table 1.2 Volumes and Average Prices for Colour Phases of Ranched Fe>: Pelts in February 1984*

Colour	Volume	% Sold	Average Price
silver fox	20, 747	99	$175.59
platinum fox	400	97	$144.52
pearl platinum fox	1,911	98	$140.22
dawn-glo fox	655	100	$525. 98
amber	222	98	$170.25

Table 1.3 Number and Value of Ranched Fox Pelts from Canadian Fur Farms*

Year	Number	Value	Average Value	Number of Farms
1958	1 , 248	$ 13,445.	$ 10.78	94
1959	1,184	14,689	12.42	84
1960	2,034	20, 340 .	10. 00	76
1961	1,811	18,110	10.00	61
1962	1,647	16,470.	10 , 00	5 3
1963	830	12,525	15.09	41
1964	780	33, 829	43.37	36
1965	523	27,828	53.21	40
1966	804	30,029	37.35	43
1967	1,284	44,015	34.28	42
1968	1,282	46,588	36. 34	42
1969	1,263	37, 440	29.64	48
1970	1,305	40,703	31.19	45
1971	1 ,403	54,950	39.11	39
1972	1,488	99,101	66. 60	40
1973	1 ,395	137,254	98. 39	42
1974	1,548	162,339	104. 87	55
1975	1,962	356,594	181 .75	55
1976	2,130	440,207	206.67	81
1977	2,942	666,000	226.50	107
1978	3,148	1,147,194	364. 42	193
1979	3 , 846	1,058,567	275.24	275
1980	10,269	3,027,704	294.84	377
1981	16,632	4,636,854	278.79	415
1982	25,145	3, 360, 506	284. 04	550
1983			154.00	
1984			175.59	

*Source: Hudson's Bay Company and Statistics Canada.

2.0 OPERATIONS

2.1. Annual Cycle

We have divided the year into 26 - 2 week periods. Week one starts April 1 which is expected to be the peak of the pupping period. These same two week cycles are kept when discussing the feeding cycle as well as cash flow. The following section shows the highlights of the fox cycle, the various ranch management aspects under the remarks column and also summarizes basic environmental conditions for Hay River. The daily maximum and minimum temperatures are based on the last 10 years of weather records whereas the extremes are based on all existing records.

2.1.1 Weather Conditions

Daily Max. and Min. Based on Two Week Average over 10 Year Period(C")
Length of Sunlight per Day (Hrs. + Min.)
Extremes from All Existing Records

Date	10 Year Average Temp & Sunlight Hours	"Events*	Extremes
Week 1-2			April 30 year average
April 4	max. 1.00 min. -10.04	- pups born - surface water system start-up	max. 1.5 min. -9.9
" 4	13h 41m sunlight		extremes
" 11	14h 15m "		max. 23.8 min. -38.9

*These events will vary from year to year. The dates given are approximate. Breeding occurs for a period of 3-6 weeks as will pupping.

Week 3-4		
April 18	max. 7.34	- pups born
	min. -3.56	- start dry feed for pups
" 17	14h 49m sunlight	
" 26	15h 40m "	
Week 5-6		
May 2	max. above zero	- start weaning pups
	min. -1.63	
" 2	16h 14m sunlight	
" 8	16h 57m "	
Week 7-8		
May 16	max. above zero	- weaning pups
	min. 2.37	- dry feed for entire herd
" 17	17h 32m sunlight	
" 23	18h 01m "	
Week 9-10		
May 30	max. above zero	
	min. above zero	
" 29	18h 26m sunlight	
June 7	18h 58m "	
Week 11-12		
June 14	max. above zero	- start separating pups to individual cages
	min. above zero	
" 13	19h 11m sunlight	
" 22	19h 28m "	
Week 13-14		
June 28	max. above zero	
	min. above zero	
" 28	19h 14m sunlight	
July 4	19h 02m "	
Week 15-16		
July 12	max. above zero	
	min. above zero	
" 13	18h 34m sunlight	
" 19	18h 09m "	

May
30 year average
max. 10.2
min. .4
extremes
max. 33.3
min. -18.9

June
30 year average
max. 17.2
min. 6.5
extremes
max. 33.3
min. -5.6

July
30 year average
max. 20.7
min. 10.8
extremes
max. 35.0
min. 1.6

Week 17-18
July 26 max. above zero
min. above zero

" 25 17h 41m sunlight
August 3 16h 54m "

Week 19-20
August 9 max. above zero
min. above zero

" 9 16h 25m sunlight
" 15 15h 52m "

Week 21-22
August 23 max. above zero
min. above zero

" 24 15h 02m sunlight
" 30 14h 28m "

Week 23-24
September 6 max. above zero
min. above zero

" 5 13h 54m sunlight
" 14 13h 04m "

Week 25-26
September 20 max. above zero
min. not. talc.

" 20 12h 30m sunlight
" 26 11h 57m "

Week 27-28
October 4 max. 6.01 - prepare to shut
min. -1.19 down water system

" 5 11h 06m sunlight - prepare for wet
" 11 10h 33m " feeding program

Week 29-30
October 18 max. 2.51
min. -4.80

" 17 10h 00m sunlight
" 26 9h 09m "

August
30 year average
max. 19.4
min. 9.3
extremes
max. 35. 6
min. -1.1

September
30 year average
max. 12.4
min. 3.7
extremes
max. 30.0
min. -11.7

October
30 year average
max. 4.8
min. -2.9
extremes
max. 24. 4
min. -30. 0

Week 31-32			
November 1	max. -2.46 min. -10.21	- select next year's breeding stock	November 30 year average max. -7.3 min. -15.3
" 1	8h 36m sunlight		extremes
" 7	8h 04m "		max. 15.0 min. -3904
Week 33-34			
November 15	max. -8.91 min. -16.88	- prepare for pelting	
" 16	7h 17m sunlight		
" 22	6h 49m "		
Week 35-36			
November 29	max. -17.48 min. -25.31	- pelting	
" 28	6h 25m sunlight "		
December 7	5h 52m "		December 30 year average max. -16.5 min. -25.3
Week 37-38			extremes
December 13	max. -16.31 min. -24.98	- pelting	max. 12.2 min. -47.2
" 13	5h 39m sunlight		
" 19	5h 32m "		
Week 39-40			
December 27	max. -18.88 min. -27.02	- start pre-breeding diet supplements	
" 28	5h 36m sunlight		
January 2	5h 43m "		January 30 year average max. -21.0 min. -30.5
Week 41-42			extremes
January 10	max. -17.26 min. -26.92		max. 7.2 min. -47.8
" 11	6h 10m sunlight		
" 17	6h 35m "		
Week 43-44			
January 24	max. -17.19 min. -27.79	- start running males with females	
" 23	7h 02m sunlight		
February 1	7h 46m "		

Week 45-46
February 7 max. -15.58 - signs of heat
min. -25.56 - early breeding expected

" 7 8h 11m sunlight
" 13 8h 53m "

Week 47-48
February 21 max. -12.76 - breeding should be at peak
min. -24.16

" 22 9h 42m sunlight
" 28 10h 17m "

Week 49-50
March 7 max. -10.92 - some breeding still "
min. -23.03 taking place

" 6 10h 52m sunlight
" 15 11h 42m "

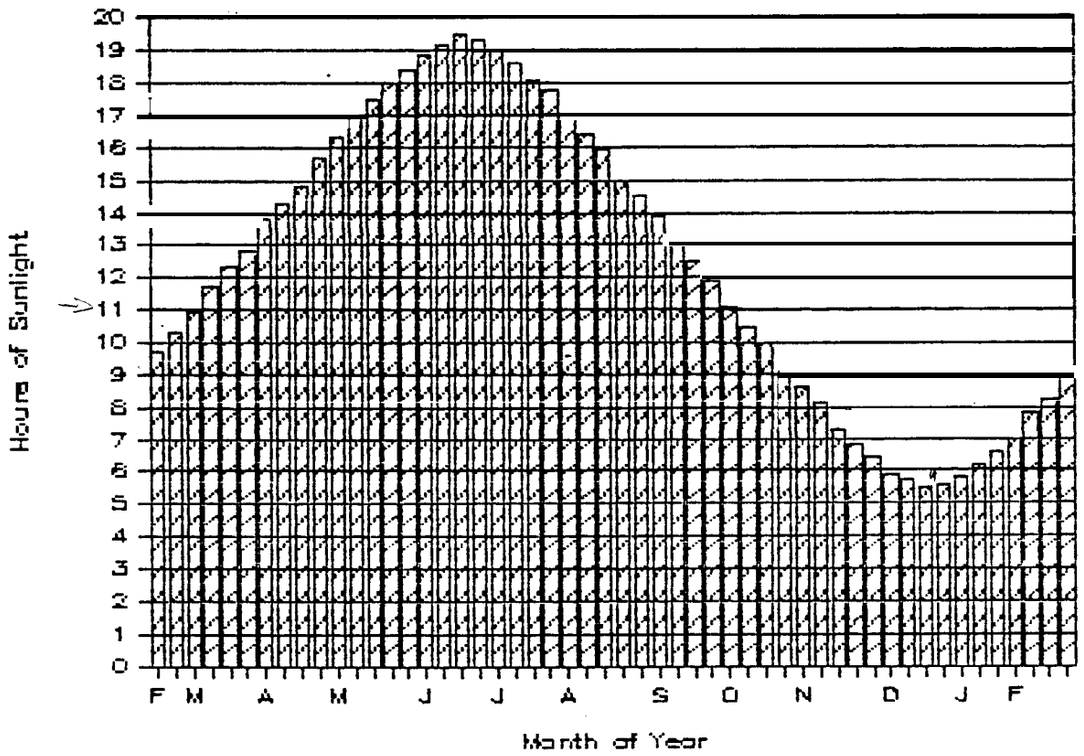
Week 51-52
March 21 max. -6.48 - expect some pups
min. -18.15 to arrive.

" 21 12h 16m sunlight
" 27 12h 49m "

February
30 year average
max. -16.2
min. -27.2
extremes
max. 13.9
min. -48.3

March
30 year average
max. -10.2
min. -22.4
extremes
max. 15.6
min. -44.4

Figure 2.1 Hours of Sunlight per Day in Hay River, N.W.T.



2.2 Feeding and Watering

2.2.1 Feeding Program

The most critical aspect of a successful fox ranch is the feeding program. Not only is feed the major item in determining the cost of production, feed also determines the growth and quality of pelters and reproductive performance of the breeding stock.

Since the beginnings of fox ranching around 1890 there has been a lot of research into fox nutrition. The basic dietary requirements for growth and reproduction have been documented and the nutrient composition of numerous food items have been described (See Appendix 7.2). Although this body of information exists, the ingredients for an optimum diet for both pelters and breeders may not be available in quantities or at prices that allow for profitable fox pelt production. In recent years commercial feed manufacturers have developed rations specifically for fox ranching. Rations for both pelters and adults have been formulated (See Appendix 7.3 & 7.4 for more information on Masterfeeds and National fox feeding products).

In researching the adequacy of commercial rations we learned that while their nutrient composition meets the specifications developed by animal nutritionists, the experience of fox rancher-s suggests that they are not always adequate for breeding stock and nursing vixen. Mr. C.W. Ash of Gilbert Plains, Manitoba relates how a rancher starting out with breeding stock from Ash suffered total reproductive failure when using a diet of commercial rations. Commercial rations are also suspected to contribute to strangulation of pups during birth due to "sticky" umbilical cords. Mr. Ash attributes these problems to insufficient water intake by the females prior to and during breeding and pregnancy.

Contrary to the experience related by Mr. Ash, Mr. Jim Rice of Fairbanks, Alaska extols the quality of the National Fox Pellet Feeding Program. Rice, an established breeder, has had good reproductive success while feeding commercial rations in dry form throughout the Alaskan winter. His only supplement during breeding and gestation is a cube of "bull liver".

Proper balance in the diet is also important. During the early days of fox ranching, it was commonly held that foxes could survive on a diet of fish exclusively. It was soon learned that such a diet resulted in a condition known as Chastek paralysis. This is due to an enzyme, thiaminase, present in numerous fish species. This enzyme destroys dietary thiamin. Cooking fish at 83°C for 5 minutes destroys the thiaminasé (National Research Council). Fish containing thiaminase include sucker, whitefish and burbot - all common in Great Slave Lake. Fish common in Great Slave Lake reported not to contain thiaminase include pike and lake trout. It may be useful to analyse Great Slave Lake fish to confirm the presence of thiaminase in the common species here.

Table 2.1 gives the "Suggested Ranges of Composition of Practical Diets for Foxes". Such a diet is tailored to the conditions and cycle of the animals. A pregnant vixen is commonly regarded as requiring more energy however there is little agreement on the additional levels required. The increased metabolizable energy during pregnancy should be approximately 1.5 times that of the intake immediately prior to pregnancy. This increase is represented by a modest increase early in pregnancy and perhaps almost a doubling of the daily intake at term.

Similarly lactation requires more energy and nutrition.

Table 2.2 shows the additional energy required per pup during lactation.

Environmental and "farming conditions" also contribute to the energy and nutrient requirements of the stock. This variability can be as great as 10% (National Research Council).

Table 2.1 Suggested Ranges of Composition of Practical Diets for Foxes*

Ingredients	Percent
Fortified cereal[a]	25-50
Liver	0-10[b]
Quality proteins[c]	5-30
cooked eggs, whole poultry, whole fish, horsemeat, rabbits, nutria, blood, etc.	
Beef by-products	10-20
tripe, lungs, lips, udders, spleen, etc.	
Poultry by-products	0-50
heads, entrails, feet	
Fish scrap	0-50
Fishmeal	5-15
Fat supplementation	0-10[d]
rendered animal fat or vegetable oils	

Proximate analysis[e]	Percent
Protein	20-30
Fat	15-30
Carbohydrates	25-60
Ash	5-15

'May consist of single-cooked grains such as oat groats or wheat in combination with vitamin and trace mineral supplementation or commercially prepared fortified cereal mixtures.

[b]Reproduction-lactation diets (March-May) often contain 5-10 percent beef liver, although necessity for this has not universally been accepted.

[c]Level of quality-protein feed stuffs is often increased during the critical fur development and reproduction-lactation phases - a practice consistent with the higher protein requirements of the foxes during these critical periods.

[d]A level of fat supplementation that provides proper protein/energy balance for each phase of the life cycle.

[e]A proximate analysis consistent with the optimum nutritional balance for each phase of the life cycle.

*Source: National Research Council. 1982. Nutrient Requirements of Mink and Foxes. Nutrient Requirements of Domestic Animals. No. 7.

Table 2.2 Recommended Energy Intake of Lactating Females for Maintenance*

10-Day Periods of Lactation	Additional Energy per Pup Daily (kcal ME)[a]
1st period	52
2nd period	123
3rd period	195
4th period	292
5th period	392
6th period	450

'Over the whole lactation period, the above recommendations represent an average of 250 kcal ME (metabolizable energy) per pup per day.

*Source: National Research Council. 1982. Nutrient Requirements of Mink and Foxes. Nutrient Requirements of Domestic Animals. No. 7.

In estimating feed requirements for the proposesd fox operations we have used both Masterfeeds ' and National Research Council data and modified intake values to reflect reproductive activity and assumptions about environmental effects on food intake. The feed requirements of each major element of the stock is discussed individually.

When discussing the merits and costs of prepared feed with operators in southern Canada, most recommended against preparing rations unless these could be analysed regularly by a lab experienced and qualified in nutrient analyses. When advised that the nearest lab was 6 hours by air freight - all felt that a commercial dry ration would be the most reliable feed type to use - especially for the breeding, gestation and lactation periods of the annual cycle. Providing that precautions for parasites are taken, it seems that a less expensive, utility ration including local products could be used for the breeders' maintenance diet.

2 .2.2 Breeding Females

Breeders and nutrition scientists are unanimous in their advice on breeding condition of female foxes. They should be trim and active. Fat females make poor breeders and poor mothers. Prior to breeding they should get a lot of exercise. The breeding diet should be started roughly 6 weeks prior to breeding. In Hay River that would be after pelting and so preparation of rations would be more easily accomplished when caring only for the breeding stock.

The basis of a prepared breeding diet can be boiled rolled oats that have had vitamins and minerals added. This feed is low cost, easily obtained and poses no storage problems other than controlling rodents in the feed shed. Table 2.1 shows that up to 50% of the diet can be made up by single or mixed cereals. This should be supplemented by beef liver, fish scrap and whole egg powder. All these items are readily "available to an operation in Hay River. The following rations should be adequate for female foxes. It's basic ingredients are available and hopefully affordable.

Pre-breeding ration (1 January - 15 February)

Fortified cereal	50%
Whole fish & scraps	50%

Breeding and pregnancy (15 February - 15 April)

Fortified cereal	50%
Whole fish & scraps	40%
Beef liver	5%
Whole egg powder	5%

Nursing (15 April - 8 June)

Fortified cereal	50%
Whole fish & scraps	40%
Beef liver	10%

Cost of the basic ingredients FOB Hay River are:

Cereal	$ .572/kg
Fish*	1.87/kg
Egg powder	1. 76/kg
Liver	. 80/kg

*Price quoted for winter caught fish from fisherman's association.

Female maintenance diet (9 June - 31 December)

Commercial Rations	1 00%

2.2.3 Breeding Males

Like females, breeding males should be kept trim and active. The literature does not report special diets for breeding males. The rations described below are selected for convenience and cost.

During the period when water is available in unlimited quantity, commercial pellets can be used. During periods of freezing temperatures when the watering system is not operational a male fox diet could consist of soaked commercial rations and served as a mash. A prebreeding and breeding diet (1 February - 15 March) should have liver and egg powder added as a supplement to the mash. The rations would therefore have the following composition:

Normal ration (16 March - 30 January)

Commercial rations	100%

Breeding season (1 February - 15 March)

Commercial rations	90%
Beef liver	5%
Egg powder	5%

2.2.4 Pelters

Whelping will probably start around 10 April and continue for 2 to 3 weeks. Pups should be left with the vixen for at least 6 weeks. They will begin taking rations at 4-5 weeks. They should be weaned by 8 weeks - earlier if the vixen is in poor condition. It is recommended that pups be placed on a diet of grower pellets and that water be available to be taken at will. In the N.W.T. the period near pelting will again require feed in the form of a mash due to the freezing temperatures preventing the use of water lines.

Nutrition of pelters is important in determining pelt quality. Breeders recommend that" pelters remain on a high quality diet from weaning right through to pelting. The National program uses a basic formula for the entire period which was developed specifically for growth and pelt development.

2.2.5 Determining the Cost of Rations (FOB Hay River)

(This is offered as an example.)

Compenent Costs:

Commercial dry fox pellets -	
Masterfeeds - all rations	$ .87/kg
National - Maintenance	*1.43/kg
Reproduction	$1.61/kg
Lactation	$1.57/kg
Super Grower	$1.59/kg
Commercial cereal	$,54/kg
Liver	$ .80/kg
Egg powder	$1.76/kg
Fish - local supply	$, 33/kg*

*Price of fish available for dogfood. The use of local fish will increase the requirement for deworming treatment.

Example: 900 grams of wet feed per day for a lactating female in week 13/14.

Component	Proportion of Ration	Daily Requirement (wet) (kg)	Price ($)/kg	cost ($)
Fortified cereal	50%	.450 x .35*	.54	.085
Liver	10%	.09	.80	.072
Eggs	10%	.09	1.76	.158
Fish	30%	.27	.33	.089
			Daily total cost	$.404

*The factor .35 converts wet rations to dry weight. This is based on wet feeds being 65% water.

A diet of commercial rations for an adult male would cost $.305 per day.

Component	Proportion of Ration	Daily Requirement (wet) (kg)	Price ($)	cost ($)
Masterfeeds Fox	100%	.150	.87	.1305

A liver and egg supplement in the male's diet during breeding would cost an additional $.057 per day.

.022 kg liver at $.80/kg = $.018
.022 kg eggs at $1.76/kg = $.039
$.057

For a full male breeding 'ration, the cost would be $.1875 per day.

In discussing feeding programs and problems with established fox breeders, we heard repeatedly the importance of nutrient reliability and consistency during breeding and gestation. Numerous experiences were related by operators who for reasons of economy changed rations during breeding/gestation with severe results. The most common consequence was spontaneous abortion. The "if it works don't change it" was repeated several times.

Several operators - Nichlasson, Brothers, Bollert, Jim 'Rice (Fairbanks, Alaska) all recommended National Fox Pellets as a starting ration for a first time fox breeder - especially for breeding, gestation and lactation. Mr. Rice of Fairbanks allowed that the cost was greater than other feeds but the reliability and consistent quality of National Fox Pellets out weighed the cost considerations - especially under the curent market for fox pelts.

A feeding schedule based entirely on National Fox Pellet Feeding Program as recommended by Milk Specializes Company of New Holstein, Wisconsin, USA is costed for the initial breeding stock below. Costs are based on the following prices of the National Fox Pellets - FOB Hay River.

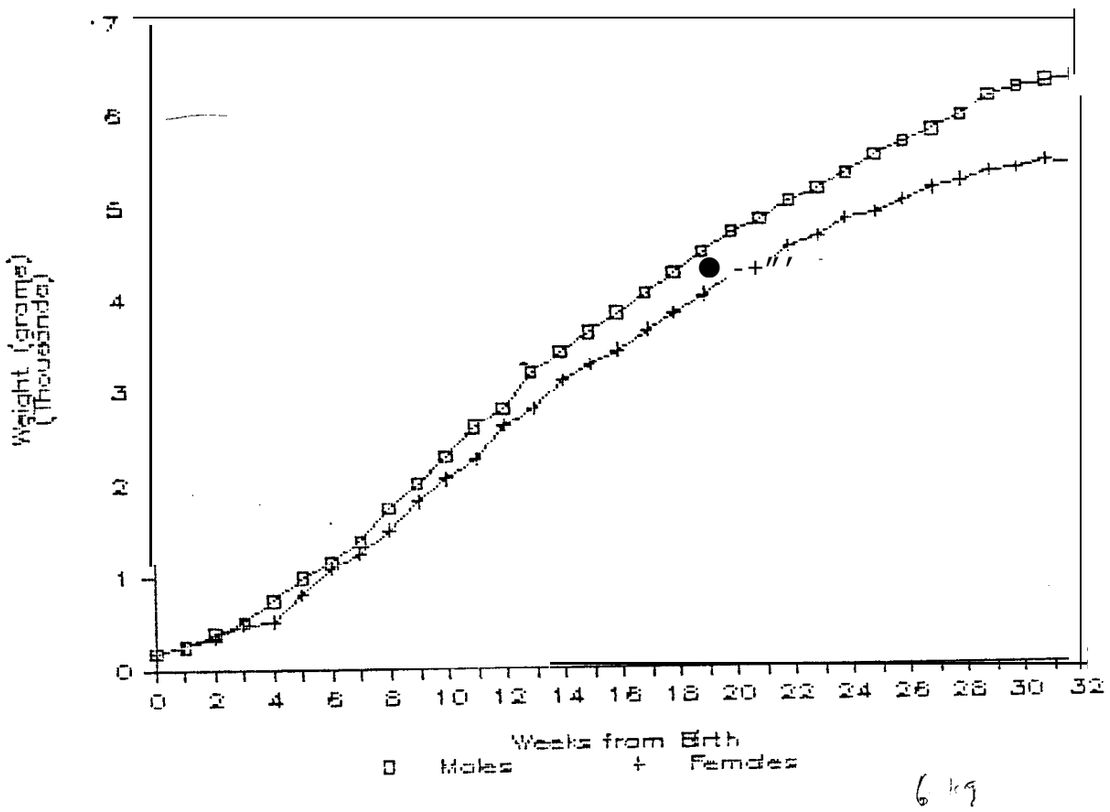
	Base Price (US$)	Exchange @ 1.32	Freight	Landed $/100	Landed $/kg
Maintenance Pellets/cwt	$17.90	$23.63	$41.23	$64.86	$1.43
Reproduction " "	24.20	31.95	"	73.18	1.61
Lactation " "	25.00	33.00	"	71.23	1.57
Super Grower " "	23.50	31.02	"	72.25	1.59

Tables 2.3a to 2.3c and 2.4a to 2.4c apply these costs to the established feeding program.

In discussing the advantage and high costs of the "National Fox Pellet Feeding Program" with Mr. Burm Yeoman - a marketing representative for National Pellets - he suggested a program that utilized their product for crucial breeding, gestation and lactation periods for breeders, and growing and furring for pelters only. He recommended a more utility type feed (fish, scraps and cereal) or cheaper pellet ration for maintenance of breeders during periods when no reproductive activities take place.

Such an approach is costed in tables and is based on the schedule established in Table 2.3a.

Figure 2.2 Fe>: Growth Rate



6 kg

Table 2.3a Feed Costs of Master feeds Rations with Supplements - First Year of Operation (2.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (/kg)	Cost* ($)
29/30	35 f	corn. dry	127	62	.87	54.00
	15 m	"	159	33	"	29.00
31/32	35 f	"	127	62	"	54.00
	15 m	"	159	33	"	29.00
33/34	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
35/36	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
37/38	35 f	corn. mash	340	167	.31	51.50
	15 m	"	430	90	.31	28.00
39/40	35 f	"	340	167	.31	51.50
	15 m	"	475	100	.53	53.00
		with supp.				
41/42	35 f	prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
		with supp.				
43/44	35 f	prep. wet	340	167	.45	75* 00
	15 m	corn. mash	475	100	.53	53.00
		with supp.				
45/46	35 f	prep. wet	340	167	.45	75, 0 0
	15 m	corn. mash	475	1 00	' 53	53. 00
		with supp.				
47/48	35 f	prep. wet	435	213	.45	96. 00
	15 m	corn. mash	430	90	.31	28. 00
49/50	35 f	prep. wet	535	262	.45	118.00
	15 m	corn. mash	430	90	.31	28. 00
51/52	35 f	prep. wet	610	299	.45	134.50
	15 m	corn. mash	430	90	.31	28. 00
1/2	35 f	prep. wet	630	309	.45	139.00
	87 pups	corn. dry	nil	0	.87	0.00
	15 m	"	150	32	"	27.50
3/4	35 f	prep. wet	670	328	.43	147.50
	87 pups	corn. dry	10	12	.87	10.50
	15 m	"	1 50	32	"	27.50
5/6	35 f	prep. wet	700	343	.45	134.50
	87 pups	corn. dry	45	55	.87	47.50
	15 m	"	150	32	"	27.50
7/8	35 f	prep. wet	825	404	.45	182.00
	15 m	corn. dry	130	32	.87	27.50
9/10	35 f	"	120	59	"	51 . 00
	15 m	"	150	32	"	27. 50

* Costs rounded to nearest .5 dollar.

Table 2.3a continued - First Year of Operation (2.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	cost ($)
11/12	35 f	com. dry	120	59	.87	51.00
	15 m	"	150	32	"	27.50
13/14	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
15/16	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
17/18	35 f	"	120	59	"	51.00
	15 m	"	130	32	"	27.50
19/20	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
21/22	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
23/24	35 f	"	120	59	"	51.00
	15 m	"	130	32	"	27.50
25/26	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.30
27/28	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
			Totals	5,576 kg		$2,899.50

Table 2.3b. Feed Costs of Masterfeeds Rations with Supplements First Year of Operation (3.0 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg.) ($)	cost ($)
29/30	35 f	corn. dry	127	62	.87	54.00
	15 m	"	159	33	"	29.00
31/32	35 f	"	127	62	"	54.00
	15 m	"	159	33	"	29.00
33/34	35 +	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
35/36	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
37/38	35 f	com. mash	340	167	.31	51.50
	15 m	"	430	90	.31	28.00
39/40	35 +	"	340	167	.31	51.50
	15 m	"	475	100	.53	53.00
41/42	35 +	with supp. prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
43/44	35 f	with supp. prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
45/46	35 f	with supp. prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
47/40	35 f	with supp. prep. wet	435	213	.45	96.00
	15 m	corn. mash	430	90	.31	28.00
49/50	35 f	prep. wet	535	262	.45	118.00
	15 m	corn. mash	430	90	.31	28.00
51/52	35 f	prep. wet	610	299	.45	134.50
	15 m	corn. mash	430	90	.31	28.00
1/2	35 f	prep. wet	630	309	.45	139.00
	105 pups	corn. dry	nil	0	.87	0.00
	15 m	"	150	32	"	27.50
3/4	35 f	prep. wet	678	332	.45	149.50
	105 pups	corn. dry	10	15	.87	13.00
	15 m	"	150	32	"	27.50
5/6	35 f	prep. wet	714	350	.45	157.50
	105 pups	corn. dry	45	66	.87	57.50
	15 m	"	150	32	"	27.50
7/8	35 +	prep. wet	864	423	.45	190.50
	15 m	corn. dry	150	32	.87	27.50
9/10	35 +	"	120	59	"	51.00
	15 m	"	150	32	"	27.50

Table 2.3b continued - First Year of Operation (3.0 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	cost ($)
11/12	35 f	corn. dry	120	59	.87	51.00
	15 m	"	130	32	"	27.50
13/14	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
15/16	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
17/18	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
19/20	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
21/22	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
23/24	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.30
25/26	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
27/28	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50 "
			Totals	5,641		$2,925.00

Table 2.3c Feed Costs of Master feeds Rations with Supplements - First 'Year of Operation (3.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg.) (*)	cost ($)
29/30	35 f	corn. dry	127	62	.87	54.00
	15 m	"	159	33	"	29.00
31/32	35 f	"	127	62	"	54.00
	15 m	"	159	33	"	29.00
33/34	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
35/36	35 f	"	120	59	"	29.00
	15 m	"	150	32	"	27.50
37/38	35 f	corn. mash	340	167	.31	51.50
	15 m	"	430	90	.31	28.00
39/40	35 f	"	340	167	.31	51.50
	15 m	"	475	100	.53	53.00
		with sup				
41/42	35 f	prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
		with supp.				
43/44	35 f	prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
		with supp.				
45/46	35 f	prep. wet	340	167	.45	75.00
	15 m	corn. mash	475	100	.53	53.00
		with supp.				
47/48	35 f	prep. wet	435	213	.45	96.00
	15 m	corn. mash	430	90	.31	28.00
49/50	35 f	prep. wet	535	262	.45	118.00
	15 m	corn. mash	430	90	.31	28.00
51/52	35 f	prep. wet	610	299	.45	134.50
	15 m	corn. mash	430	90	.31	28.00
1/2	35 f	prep. wet	630	309	.45	139.00
	122 pups	corn. dry	nil	0	.87	0.00
	15 m	"	150	32	"	27.50
3/4	35 f	prep. wet	686	336	.45	151.50
	122 pups	corn. dry	10	17	.87	15.00
	15 m	"	150	32	"	27.50
5/6	35 f	prep. wet	728	357	.45	160.50
	122 pups	corn. dry	45	77	.87	67.00
	15 m	"	150	32	"	27.50
7/8	35 f	prep. wet	903	442	.45	199.00
	15 m	corn. dry	150	32	.87	27.50
9/10	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50

Table 2.3c continued - First Year of Operation (3.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	Cost ($)
11/12	35 f	corn. dry	120	59	.87	51.00
	15 m	"	150	32	"	27.50
13/14	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
15/16	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
17/18	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
19/20	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
21/22	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
23/24	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
25/26	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.30
27/28	35 f	"	120	59	"	51.00
	15 m	"	150	32	"	27.50
			Totals	5,706		$2,950.50

Table 2.4a Feed Costs of Master feeds Rations with Supplements for Pelters Only Produced by Breeders of Table 2.3a

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost /kg ($)	cost ($)
7/8	44 f	corn. dry*	38	22	.87	19.50
	43 m	"	59	36	"	31.00
9/10	44 f	"	85	52	"	45.50
	43 m	"	123	75	"	65.50
11/12	44 f	"	13b	84	"	73. 00
	43 m	"	168	101	"	88.00
13/14	44 f	"	135	95	"	83.00
	43 m	"	185	111	"	97.00
15/16	44 f	"	163	100	"	87.50
	43 m	"	195	117	"	102.00
17/18	44 f	"	168	103	"	90,00
	43 m	"	210	126	"	110.00
19/20	44 f	"	160	103	"	90. 00
	43 m	"	213	128	"	111.50
21/22	44 f	"	165	102	"	88.50
	43 m	"	210	126	"	110.00
23/24	44 f	"	154	95	"	82.50
	43 m	"	195	117	"	102.00
25/26	44 +	"	145	89	"	77.50
	43 m	"	185	111	"	97. 00
27/20	44 f	corn. mash	388	239	.31	74.00
	43 m	"	490	295	"	91. 50
29/30	44 f	"	371	228	"	71.00
	43 m	"	379	288	"	89.30
31/32	44 f	"	362	223	"	69. 00
	43 m	"	453	273	"	84.50
33/34	44 f	"	348	214	"	66. 50
	43 m	"	442	266	"	82.50
35	44 f	"	342	105	"	32. 50
	43 m	"	428	129	"	40.00
			Totals	4,153 kg		$2,352.00

Table 2.4b Feed costs of Master feeds Rations with Supplements for Pelters Only Produced by Breeders of Table 2.3b

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost /kg ($)	cost ($)
7/8	53 f	corn. dry	36	27	.87	23.00
	52 m	"	59	43	"	38.00
9/10	53 f	"	85	63	"	55.00
	52 m	"	125	91	"	79.00
11/12	53 f	"	136	101	"	88.00
	52 m	"	160	122	"	106.50
13/14	53 f	"	155	115	"	100.00
	52 m	"	185	135	"	117.00
15/16	53 f	"	163	121	"	105.00
	52 m	"	193	142	"	123.50
17/18	53 f	"	168	125	"	108.50
	52 m	"	210	153	"	133.00
19/20	53 +	"	160	125	"	108.50
	52 m	"	213 -	155	"	135.00
21/22	53 f	"	165	122	"	106.50
	52 m	"	210	153	"	133.00
23/24	53 f	"	154	114	"	99.50
	52 m	"	195	142	"	123.50
25/26	53 f	"	145	108	"	93.50
	52 m	"	185	135	"	117.00
27/28	53 f	corn. mash	388	288	.31	89.00
	52 m	"	490	357	"	110.50
29/30	53 f	"	371	275	"	85.00
	52 m	"	379	349	"	108.C)0
31/32	53 f	"	362	269	"	83.00
	52 m	"	453	330	"	102.50
33/34	53 f	"	348	258	"	80.00
	52 m	"	442	322	"	99.50
35	53 f	"	342	127	"	39.50
	52 m	"	428	156	"	48.00
		Totals		5,023 kg		$2,838.00

Table 2.4c Feed Costs of Masterfeeds Rations with Supplements for Pelters Only Produced by Breeders of Table 2.3c

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost /kg ($)	cost ($)
7/8	61 f	corn. dry	36	31	.87	26.50
	61 m	"	59	50	"	44.00
9/10	61 f	"	85	73	"	63.00
	61 m	"	125	107	"	93.00
11/12	61 f	"	136	116	"	101.00
	61 m	"	168	143	"	125.00
13/14	61 f	"	155	132	"	115.00
	61 m	"	185	150	"	137.50
15/16	61 f	"	163	139	"	121,00
	61 m	"	195	167	"	145.00
17/18	61 f	"	16a	14.3	"	125.00
	61 m	"	210	179	"	156.00
19/20	61 f	"	168	143	"	125.00
	61 m	"	213	182	"	158.00
21/22	61 f	"	163	141	"	122.50
	61 m	"	210	179	"	156.00
23/24	61 f	"	154	132	"	114.50
	61 m	"	195	167	"	145.00
25/26	61 +	"	145	124	"	107.50
	61 m	"	185	158	"	137.50
27/28	61 +	corn. mash	388	331	.31	102.50
	61 m	"	490	419	"	130.00
29/30	61 +	"	371	316	"	98. 00
	61 m	"	479	409	"	127.00
31/32	61 f	"	362	309	"	96.00
	61 m	"	453	387	"	120. 00
33/34	61 f	"	348	297	"	92. 00
	61 m	"	442	377	"	117.00
35	61 f	"	342	146	"	45.50
	61 m.	"	428	--183	"	---56.50
			Totals	5,838 kg		$3,302.50

Table 2.5a Feed Costs of National Pellets - First Year of Operation (2.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (/kg)	cost ($)
29/30	35 f	maint. dry[1]	127	62	1.43	89.00
	15 m	"	159	33	"	47.00
31/32	35 f	"	127	62	"	89.00
	15 m	"	159	33	"	47.00
33/34	35 f	"	120	59	"	84.00
	15 m	"	130	32	"	45.00
35/36	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
37/38	35 f	maint. wet	340	167	.50	83.00
	15 m	"	430	90	.50	45.00
39/40	35 f	"	340	167	.50	83.00
	15 m	repro.+ sup.[2]	475	100	.57	57.00
41/42	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
43/44	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
45/46	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
47/48	35 f	"	435	213	.57	121.50
	15 m	maint. wet	430	90	.50	45.00
49/50	35 f	repro. + sup.	535	262	.57	149.50
	15 m	maint. wet	430	90	.50	45.00
51/52	35 f	repro. + sup.	610	299	.57	170.50
	15 m	maint. wet	430	90	.50	45.00
1/2	35 f	lact. wet[3]	630	309	.55	170.00
	87 pups	lact. dry	nil	0	1.57	0.00
	15 m	main. dry	150	32	1.43	45.00
3/4	35 f	lact. wet	670	328	.55	180.50
	87 pups	lact. dry	10	12	1.57	19.00
	15 m	maint. dry	150	32	1.43	45.00
5/6	35 f	lact. wet	700	343	.55	188.50
	87 pups	lact. dry	45	55	1.57	86.00
	15 m	maint. dry	150	32	1.43	45.00
7/8	35 f	lact. wet	825	404	.55	222.50
	15 m	maint. dry	150	32	1.43	45.00
9/10	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00

[1]Maintenance pellets.
[2]Reproduction pellets, liver supplement included.
[3]Lactation pellets.

Table 2.5a continued - First Year of Operation (2.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	cost ($)
11/12	35 f	maint. dry	120	59	1.43	84.00
	15 m	"	150	32	"	45.00
13/14	35 f	"	120	59 "	"	(34.00
	15 m	"	150	32	"	45.00
15/16	35 f	"	12C)	59	"	84.00
	15 m	"	150	32	"	45.00
1.7/18	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
19/20	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
21/22	35 f	"	120	59	"	84.00
	15 m	"	15C)	32	"	45.00
23/24	35 f	"	12CI	59	"	84.00
	15 m	"	150	32	"	45.00
25/26	35 f	"	120 -	59	"	84.00
	15 m	"	150	32	"	45.00
27/28	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
			Totals	5,576 kg		"$4,171.50

Table 2.5b Feed Costs of National Pellets - First Year of Operation (3.0 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (/kg)	cost ($)
29/30	35 f	maint. dry	127	62	1.43	89.00
	15 m	"	159	33	"	47.00
31/32	35 f	"	127	62	"	89.00
	15 m	"	159	33	"	47.00
33/34	35 f	"	120	59	"	04.00
	15 m	"	150	32	"	45.00
35/36	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
37/38	35 f	maint. wet	340	167	.50	83.00
	15 m	"	430	90	.50	45.00
39/40	35 f	"	340	167	.50	83.00
	15 m	repro. + sup.	475	100	.57	57.00
41/42	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
43/44	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
45/46	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
47/48	35 f	"	435	213	.57	121.50
	15 m	maint. wet	430	90	.50	45.00
49/50	35 f	repro. + sup.	535	262	.57	149.50
	15 m	maint. wet	430	90	.50	45.00
51/52	35 f	repro. + sup.	610	299	.57	170.50
	15 m	maint. wet	430	90	.50	45.00
1/2	35 f	lact. wet	630	309	.55	170.00
	105 pups	lact. dry	nil	0	1.57	0.00
	15 m	main. dry	150	32	1.43	45.00
3/4	35 f	lact. wet	678	332	.55	182.50
	105 pups	lact. dry	10	15	1.57	23.00
	15 m	maint. dry	150	32	1.43	45.00
5/6	35 f	lact. wet	714	350	.55	192.50
	105 pups	lact. dry	45	66	1.57	104.00
	15 m	maint. dry	150	32	1.43	45.00
7/8	35 f	lact. wet	864	423	.55	233.00
	15 m	maint. dry	150	32	1.43	45.00
9/10	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00

Table 2.5b continued - First Year of Operation (3.0 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	cost ($)
11/12	35 f	maint. dry	120	59	1.43	84.00
	15 m	"	150	32	"	45.00
13/14	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
15/16	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
17/18	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
19/20	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
21/22	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
23/24	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
25/26	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
27/28	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
			Totals	5,576 kg		$4,210.00

Table 2.5c Feed Costs of National Pellets - First Year of Operation (3.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (/kg)	cost ($)
29/30	35 f	maint. dry	127	62	1.43	89.00
	15 m	"	159	33	"	47.00
31/32	35 f	"	127	62	"	89.00
	15 m	"	159	33	"	47.00
33/34	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
35/36	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
37/38	35 f	maint. wet	340	167	.50	83.00
	15 m	"	430	90	.50	45.00
39/40	35 f	"	340	167	.50	83.00
	15 m	repro. + sup.	475	100	.57	57.00
41/42	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
43/44	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
45/46	35 f	"	340	167	.58	96.50
	15 m	"	475	100	.57	57.00
47/48	35 f	"	435	213	.57	121.50
	15 m	maint. wet	430	90	.50	45.00
49/50	35 f	repro. + sup.	535	262	.57	149.50
	15 m	maint. wet	430	90	.50	45.00
51/52	35 f	repro. + sup.	610	299	.57	170.50
	15 m	maint. wet	430	90	.50	45.00
1/2	35 f	lact. wet	630	309	.55	170.00
	122 pups	lact. dry	nil	0	1.57	0.00
	15 m	main. dry	150	32	1.43	45.00
3/4	35 f	lact. wet	678	336	.55	185.00
	122 pups	lact. dry	10	17	1.57	27.00
	15 m	maint. dry	150	32	1.43	45.00
5/6	35 f	lact. wet	714	357	.55	196.00
	122 pups	lact. dry	45	77	1.57	120.50
	15 m	maint. dry	150	32	1.43	45.00
7/8	35 f	lact. wet	864	442	.55	243.50
	15 m	maint. dry	150	32	1.43	45.00
9/10	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00

Table 2.6a Feed Costs of National Pellets for Pelters Only Produced by Breeders. of Table 2.5a

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost /kg ($)	co5t ($)
7/8	44 +	grower dry[1]	36	22	1.59	35.Ml
	43 m	"	59	36	"	56.50
9/10	44 +	"	85	52	"	83.50
	43 m	"	125	75	"	119.50
11/12	44 +	"	136	84	"	133.00
	43 m	"	168	101	"	161.00
13/14	44 +	"	155	95	"	152.00
	43 m	"	185	111	"	177.00
15/16	44 +	"	163	100	"	159.50
	43 m	"	195	117	"	186.50
17/18	44 +	"	168	103	"	164.50
	43 m	"	210	126	"	201.00
19/20	44 +	"	168	103	"	164.50
	43 m	"	213	128	"	204.00
21/22	44 f	"	165	102	"	161.50
	43 m	"	210	126	"	201.00
23/24	44 +	"	154	95	"	151.00
	43 m	"	195	117	"	186.50
25/26	44 +	"	145	89	"	142.00
	43 m	"	185	111	"	177.00
27/28	44 f	grower wet	388	239	.56	134.00
	43 m	"	490	295	"	165.00
29/30	44 f	"	371	228	"	128.00
	43 m	"	379	288	"	161.50
31/32	44 +	"	362	223	"	125.00
	43 m	"	453	273	"	152.50
33/34	44 f	"	348	214	"	120.00
	43 m	"	442	266	"	149.00
35	44 f	"	342	105	"	59.00
	43 m	"	428	129	"	72.00
		Totals		4,153 kg		$4,283.00

[1]Super Growing & Furring pellets.

Table 2.5c continued - First Year of Operation (3.5 pelters/female)

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	cost (kg) ($)	cost ($)
11/12	35 f	maint. dry	120	59	1.43	84.00
	15 m	"	150	32	"	45.00
13/14	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
15/16	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
17/18	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
19/20	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
21/22	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
23/24	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00
25/26	35 f	"	120	59	"	84.00
	15 m	"	130	32	"	45.00
27/28	35 f	"	120	59	"	84.00
	15 m	"	150	32	"	45.00 "
			Totals	5,576 kg		$4,247.00

Table 2.6b Feed Costs of National Pellets for Pelters Only Produced by Breeders of" Table 2.5b

Week	Animal	Feed Type	Daily Consumption (g.)	Total Consumption (kg.)	Cost /kg ($)	cost ($)
7/8	53 f	grower dry	36	27	1.59	42.50
	52 m	"	59	43	"	68.50
9/10	53 +	"	85	63	"	101.50
	52 m	"	125	91	"	144.50
11/12	53 f	"	136	101	"	160.50
	52 m	"	168	122	"	194.50
13/14	53 +	"	155	115	"	183.00
	52 m	"	185	135	"	214.00
15/16	53 +	"	163	121	"	192.50
	52 m	"	195	142	"	225.50
17/18	53 f	"	168	125	"	198.00
	52 m	"	210	153	"	243.00
19/20	53 f	"	168	125	"	198.00
	52 m	"	213	155	"	246.50
21/22	53 f	"	165	122	"	194.50
	52 m	"	210	153	"	243.00
23/24	53 +	"	154	114	"	181.50
	52 m	"	195	142	"	225.50
25/26	53 f	"	145	108	"	171.00
	52 m	"	185	135	"	214.00
27/28	53 +	grower wet	388	288	.56	161.00
	52 m	"	490	357	"	200.00
29/30	53 f	"	371	275	"	154.00
	52 m	"	379	349	"	195.50
31/32	53 f	"	362	269	"	150.50
	52 m	"	453	330	"	184.50
33/34	53 +	"	348	258	"	144.50
	52 m	"	442	322	"	180.00
35	53 f	"	342	127	"	71.00
	52 m	"	428	156	"	87.00
			Totals	5,023 kg		$5,170.00

Table 2.6c Feed Costs of National Pellets for Pelters Only Produced by Breeders of Table 2.5c

Week	Animal	Feed Type	Daily Consumption (13.)	Total Consumption (kg.)	cost /kg ($)	cost ($)
7/8	61 f	grower dry	36	3i	1.59	49. 00
	61 m	"	59	50	"	80.00
9/10	61 f	"	85	73	"	115.50
	61 m	"	125	107	"	169.50
11/12	61 +	"	136	116	"	184. 50
	61 m	"	168	143	"	228.00
13/14	61 f	"	155	132	"	210.50
	61 m	"	185	158	"	251.00
15/16	61 f	"	163	139	"	221 .00
	61 m	"	195	167	"	265.00
17/18	61 f	"	168	143	"	228. 00
	61 m	"	210	179	"	285. 00
19/20	61 f	"	168	143	"	228.00
	61 m	"	213	182	"	289. 00
21/22	61 f	"	165	141	"	224. 00
	61 m	"	210	179	"	285. 00
23/24	61 f	"	154	132	"	209.00
	61 m	"	195	167	"	265. 00
25/26	61 +	"	145	124	"	197.00
	61 m	"	185	158	"	251.00
27/28	61 f	grower wet	388	331	.56	185.50
	61 m	"	490	419	"	234.50
29/30	61 f	"	371	316	"	177.50
	61 m	"	479	409	"	229. 00
31/32	61 f	"	362	309	"	172. 00
	61 m	"	453	387	"	216.50
33/34	61 f	"	348	297	"	166. 50
	61 m	"	442	377	"	221 . 50
35	61 f	"	342	146	"	82. 00
	61 m	"	428	183	"	102. 50
			Totals	5,838 kg		$6,022. 50

2.3 Watering System

All references stress the importance of water intake for foxes and all state that "Foxes need a lot of water". Unfortunately no reference gives an indication of what normal daily requirements are. It appears that a wet mash diet provides sufficient water during the winter period for breeding stock. Mr. Ash of Gilbert Plains Manitoba supplements this with snow. An automatic watering system is recommended for spring, summer and fall so that easily stored and handled dry feed can be used for males and pelters. In the Hay River area the period when a surface water line can be used would begin about April 10 and last until October 10. This period could be extended by heating the circulating water. ? additional costs.

The watering system would consist of poly pipe, water fountains for each cage, a reservoir and a circulating pump located in a heated building - probably the kitchen. The source of the water will be a holding tank on the property recharged from a water tank on a trunk/trailer.

Despite the proximity of both sites to the Hay River, it appears that a local well as a water sour-cc is not feasible. Ground water tests* done for the Government of the Northwest Territories show that the gravel beds and shales underlying this area are either dry or bear waters very high in dissolved minerals.

* Thurber Consultants Ltd. 1979. Hay River-Enterprise Corridor Ground Water Assessment. Report to the Government of the Northwest Territories. Department of Local Government.

2.4. Disease Control

The best form of disease control is proper diet and animal husbandry. Fe>: diseases fall into two categories - Nutritional Diseases and those caused by pathogens - viruses, bacteria, fungi, and parasites.

2.4.1 Nutritional Diseases*

Chastek Paralysis was first reported in foxes in 1936. It is due to a deficiency of Vitamin B_1 (thiamine). It occurs because the enzyme thiaminase is present in the feed destroying the B_1.

Foxes involved become weak and go into fits. Early cases respond rapidly (several hours) to 10 mgm of injectable B_1.

Thiaminase is not related to spoiled feed. It is contained by certain types of fish such as herring, sucker, smelt and gaspereaux (alewife).

Fox brains are examined under the microscope for a diagnosis. There is hemorrhage and cell degeneration.

Prevention is by avoiding known positive fish. Cod should be cleaned before use. Fish can be cooked (200°F for 15 minutes). Liver, meat and wheat germ are all supplements high in B_1.

*Excerpt from: Ontario Fox Short Course. June 18 & 19, 1982. University of Guelph.

Calcium is essential for normal bones to develop. The fox needs at least 0.5% in the ration. It must be balanced with phosphorus and Vitamin D to avoid rickets. If feed contains 1% calcium and 1% phosphorus this will be sufficient. Avoid all-meat diets which are very unbalanced. Animals with rickets have bowed legs, large joints and soft bones.

Protein (balanced) is needed for normal growth. On a dry matter basis an analysis of 25% is necessary. Only crude protein is tested for - not available protein. Remember foods such as cooked eggs have very high quality and available protein.

Biotin is essential for normal growth. There is a factor in raw egg whites which ties it up. While some time is required for a deficiency to develop the end result is stunting and no pigment in fur. Deficient vixens give birth to similar pups.

Other vitamins such as D and A are poisonous in overdoes so do not use excess supplements.

2.4.2 Viral Diseases*

Viruses are extremely tiny - not visible under normal microscopes. You must magnify most 200,000 times using a special electron microscope to see them.

Distemper is the most important disease in this group. It is seen in dogs, racoons, mink, etc. It is not the same as cat

*Excerpt from: Ontario Fox Short Course. June 18 & 19, 1982. University of Guelph.

distemper. After about a 2 week incubation period (with no signs of illness) the animal becomes sick. Nose and feet will crust. Lack of appetite, diarrhea and fever will be seen. The virus causes pneumonia in animals. It is recognized in the laboratory by microscopic inclusion bodies (aggregates of virus particles) in cells lining the kidney, air passages and urinary bladder. There is no cure once infected but prevention is by vaccination.

Virus Hepatitis (Fe>: Encephalitis). Both forms of the disease can be seen in foxes. The virus is definitely present in the dog population. If the brain form is present the fox will have fits. If the liver is involved jaundice will be a main feature. Death usually occurs with either form. The hardy virus can live in dirt for several years. Vaccination is the only prevention. A laboratory diagnosis is required to confirm the disease by finding liver inclusion bodies or encephalitis.

Recently there has been concern about possible infection of foxes with Canine parvovirus. There have been no cases reported so far in foxes.

In dogs, vomition and diarrhea followed by death in young, old or stressed dogs ~~will be seen~~ occur. Many dogs (30%) have been exposed to the virus without being sick.

The cause is a canine parvovirus closely related to parvoviruses causing cat distemper (panleukopenia) and mink virus enteritis. This very tough virus can be killed by a solution of javex diluted 1:30.

If you are concerned about this disease control human and dog traffic on your ranch to avoid possible introduction. The source would be feces passed by infected, dogs. Isolate new animals for 2

weeks before introduction to the main ranch.

Vaccination using the mink triple shot (virus enteritis portion) will probably give some protection. For maximum antibody levels repeat the shot in 2 weeks but do <u>not</u> include the distemper portion the second time. It <u>may</u> cause passive titers in pups which could interfere with their vaccination next spring.

2.4.3 Fungal Diseases*

<u>Ringworm</u> is the main concern. It causes scabs and hair loss especially around the face and feet.

Skin scrapings are necessary for a diagnosis. Under the microscope spores can be found attached to hairs. The fungus can also be grown on special plates but this requires about 2 weeks. The best treatment is the drug griseofulvin via mouth.

<u>Feed</u>. Certain species of fungi will cause wet feed, such as cereal, to mold. Several types of very deadly poisons can thus be produced. Avoid the use of these feeds.

2.4.4 Bacterial Diseases*

Bacteria are very tiny one celled organisms. We view them under the microscope magnified 1,000 times.

*Excerpt from: Ontario Fox Short Course. June 18 & 19, 1982. University of Guelph.

We can grow and identify most bacteria in the laboratory. Culture plates are inoculated and incubated for about 24 hours. Each family and species of bacteria has different features which are used for identification. Also, using discs and plates we can aid in the selection of antibiotics for infections. An additional 24 hours is required for this test.

Fox people may ask questions about feeding meat from dead animals. Generally, I do not suggest the feeding of such animals. A number of bacterial diseases may be present and can spread to foxes. For example, avoid animals which have died from pneumonia! metritis (uterus infection) and mastitis (mammary infection). I am also concerned about animals which have died of blackleg - a Clostridial infection. Cattle muscles are dark, gas filled and have a sour smell. This bacteria can cause similar infections especially under the skin of the head of foxes. If you feed dead stock be sure they have not died of infections.

Avoid aborted fetuses from cattle. There is a slight risk of Brucellosis or Bang's Disease although the disease is probably not present in Nova Scotia. Infected cattle fetuses, afterbirth and fluids contain high numbers of Brucella abortus - the bacterial cause of this disease. The bacteria infects the cotyledons (buttons) and all fetus tissue%. It will cause a similar infection in foxes. The end result in both is abortion.

Tuberculosis has been reported in foxes. There would be many tiny white lumps in liver, etc. The most likely source here would be old laying hens from small farm flocks.

Cyctitis or urinary bladder infections are occasionally seen in foxes. If these infections extend to the kidney they become much more serious. Be sure to use an antibiotic which is excreted in

the urine for treatment.

Mastitis may be seen occasionally. It is a bacterial infection of the mammary gland. The glands would be swollen and red. They should be milked out and antibiotics given.

Enteritis or inflammation of the gut is seen occasionally. It is found most often in the young and may be due to bacteria such as Salmonella. Good sanitation and early treatment will help.

Vaccines have been developed to immunize foxes against several diseases. A recommended vaccination program* for ranched fox is as follows:

Age	Vaccine(s)	Notes
8 weeks	Canine distemper	Some types of domestic dog vaccine retain some virul ence for fox. Use strains which have been proven safe for fox.
	Fe>: encephalitis	Same virus as canine hepatitis. Best to use killed vaccine.
	Parvo virus	Safest to use killed canine parvovirus vaccine. The need for this vaccine for foxes is not proven, but probably wise.
	Botulism	
12 Weeks	Repeat the above.	
16 weeks	Rabies	Use killed vaccine given into the muscle rather than under the skin for best protection.

*Excerpt from: Ontario Fe>: Short Course. June 18 & 19, 1982. University of Guelph.

Age	Vaccine	Notes
Annual	Distemper-botulism	
	Optional Encephalitis-parvo	"
Every 2-3 years	Rabies	

2.4.5 Parasitic Diseases*

2.4.5.1 Internal Parasites

Worm parasites are the most important - there is a simple laboratory test to determine infection if worms are passing eggs or ova. A fecal sample is dissolved in a special solution which causes worm eggs to rise. After a few minutes the top layer of solution is examined via microscope. Most worm eggs passed in the stool sample can be identified.

Roundworms (Toxocara/Toxascaris) are the most common. Their eggs are passed in the fox feces. If eaten these eggs will hatch and renew the worm ~~infection~~ (station) in the ~~gut~~ (intestinal tract). The second method of infection is larval migration through the uterus of the vixen into unborn pups. This can result in a heavy infection in very young pups 2-3 week old. This is a difficult cycle to break as vixens can infect litters for five years in a row even though adult roundworms are not present in their guts.

Heavily infected pups will grow poorly and be pot-bellied.

*Excerpt from: Ontario Fe>: Short Course. June 18 & 19, 1982. University of Guelph.

Hookworms appear less frequent but are more serious. They are active blood suckers. The intestinal cycle is similar to roundworms. The other methods of infection are different. Larvae are passed via the vixen's milk to new born pups. Also, larvae can penetrate the skin of animals to migrate to the gut and establish infection.

Tapeworms. Adults are found in the fox gut, They are not too harmful but large numbers may cause gut obstruction. There are two common types. One has as a mid-host the wild rabbit. It forms the cysts often found attached to wild rabbit livers or gut. These must be frozen to prevent infection of foxes if you are feeding wild rabbits. The second type cycles through fleas. Fleas can contain tiny eggs which develop into mature tapeworm when accidently swallowed by foxes.

Lungworms are rare in ranch foxes, but ~~I~~ may have been found ~~them.~~ The adults live in the airways and lay eggs. These eggs are coughed up, swallowed and passed in the feces ~~to~~ and cause reinfection.

In the above parasites placing animals on wire is very important in breaking the cycles. This makes feces (thus worm ova) unavailable for reinfection of animals. It is probably the main reason for the reduction in the problem today.

Treating for Worms. A local practice brought Mebendazole to our attention. Investigation revealed it to have a number of important points for consideration.

*Excerpt from: Ontario Fox Short course. June 18 & 19, 1982. University of Guelph.

Developed in Belgium, it has been used widely in many species of animals. Work indicates it is very suitable for use on zoo and wild animals. It is a white powder which is odorless, tasteless and can be given in the feed.

In Canada, it is cleared for use in horses and dogs. For horses it is sold as TELMIN[R] by Pitman - Moore and is available from veterinarians. DO NOT obtain TELMIN B[R] - it will make foxes sick or even kill them.

In carnivores, including foxes, it kills 95-100% of worms including roundworms hookworms, whipworms and tapeworms.

Mode of Action. Parasites mainly live in the gut by absorbing glucose (sugar) from the contents. Mebendazole inhibits this glucose uptake. Therefore, the worms use up their own supply of glucose until they eventually die. This is a slow process so expulsion of worms may be 2-3 days after dosing. Nearly all of the Mebendazole stays in the fox gut so it does not reduce the foxes glucose.

Safety and Toxicity. It is tolerated even by young and sick animals but should be used only on healthy animals. An extreme overdose is needed to cause problems. For example, in dogs the LD 50 (lethal dose to kill one half of a group) is 640 mgm/kg of body weight. Adult Dosage: Twenty-five mgm per kg of body weight for 3 days is satisfactory. Let us say the average adult fox weight is 6 kg or 13.2 pound%. The level to use is 25 x 6 = 150 mgm per fox per day.

TELMIN[R] in the powder form for horses contains 200 mgm of Mebendazole per gram. Therefore, the daily dose per fox is 3/4 of a gram of Telmin[R].

We have used Telmin[R] at this level to successfully eliminate round and hook worms.

Young pups are more of a problem with Telmin[R] as a very small dose is needed.

It is easier to use Strongid - T[R] in the caramel flavoured form (liquid) for young pups mentioned by Mike Bollert. The preparation is pyrantel pamoate by Rogar/STB. Use 1/4cc of the liquid in a syringe by mouth for 3 week old pups. Adults may be wormed by giving 2 3/4ml in the feed for 1 day.

Foxes should be wormed before breeding, pups no later than 3 weeks of age and the entire ranch at weaning. More frequent worming of pups may be necessary in severe problems,

2.4.5.2 External Parasites

✓ Ear Mites are very common in foxes. The complete cycle takes place in the ear with females laying eggs which hatch and recycle. Any black dirt in the ear suggests infection. This dirt crawls with mites when examined under the microscope.

Several oil based treatments are available and seem to work. Use cat preparations to avoid burning. Ears treated at weaning, in the fall and' before breeding do not seem to build up infections. Ears with mites are more susceptible to secondary bacterial infections.

Mange (skin) is seen mainly in wild foxes and has been introduced to ranches by captured reds. There is intense itching, 105s of fur and scabs. Mites can be found in skin scrapings.

Malathion or Ectoral® baths may help in its control.

Fleas are seen occasionally. The adult female lays eggs after a blood meal . These hatch into tiny larvae which live on dirt, etc. , in nestboxes. The larvae change to tiny pupae - ready to hatch into a new crop of fleas with a stimulation such as vibration. These annoying parasites can usually be controlled with dusts. Avoid strong insecticides especially on young animals.

Table 2.7 Annual Costs of Disease Control

Disease Agent	Treatment-Method	Annual Cost/Fox*
distemper	injection	$ .20
foxencephalitis	injection	, 60
roundworm	with feed	. 25**
hookworm	with feed	. 25**
tapeworm	with feed	3.00**
	Total	$4 . 30

* Includes 20% freight costs.
**Estimates based on dog dosage.

2.5. Refuse Management

The layout of a fox farm and design and construction of holding facilities all relate to managing for a sanitary and odour-free operation. In our tour of fox operations we were struck by the lack of odour, and the clean appearance of operating fox farms.

The holding facilities are built up off the ground to facilitate cleaning the feces and litter that soaks up urine. Litter takes the form of straw, wood shavings, or other shredded scrap materials that ~~can~~ act as an absorbant.

The feces and litter will be raked up weekly or as required and will be disposed of in the local refuse disposal site. In southern areas the feces and litter is disposed of onto fallow agricultural lands ~~and so~~ providing a mulch fertilizer high in nitrogen and fibre. Similar disposal could be arranged with market gardeners in the Paradise Gardens district of the Hay River/Enterprise corridor.

The carcasses of pelter fox will be disposed of in the local disposal site for burning and burial.

The normal operations of a fox farm does not require any chemicals or toxins that would cause concern should they or traces of them enter the environment. They are obviously not part of the feeding system and none are required for pelt preparation. Medication) and materials required for disease control are similar and in many cases identical to those used in a modern well-run kennel and pet boarding facility.

In short, there are no aspects of a fur farming operation that pose a health or environmental threat to other residents or the environment of the surrounding area.

2.6. Breeding Program

The success of the breeding program will determine the economic viability of the operation - given a strong market. The success of a breeding program is dependent on the quality of breeding stock more than any other factor. There are few casts associated with a good breeding program that can be avoided. Once the breeding stock has been selected (October/November) for the coming year the animals should be dewormed (some ranchers do this 2 times before breeding) and the preferred pairing determined and cards and records prepared. The animals should be put into outside pens to toughen them for breeding and whelping. Putting them out into the elements of a northern winter may increase their food intake. The amount of shelter for breeders in 'January and February will come with experience. Mr. C.W. Ash at Dauphin Manitoba (mean daily minimum temperatures for January and February are -24.8°C and -21.6°C respectively) provides little additional shelter except that offered by a standard breeding cage and shelter belt of deciduous trees (see Appendix 7.5).

When discussing breeding programs with established and experienced operators - all recommended starting with the best stock available. Selective breeding of foxes is an exacting and arduous task and it could take years of breeding and low returns to improve poor original stock. "It takes just as much feed to produce a poor pelt as a good pelt." Breeding stock quality is the most important factor in ultimate pelt quality.

In our tour of operations we saw that despite the rivalry between operators, the cooperation at breeding time between operators was very important to them. If a female is not bred, the pelt/female average is reduced before the pups are born. All operators stressed that "male power" was essential to getting all

females bred. Females come into heat only once per year for a period not more than 3 days. They should be bred on two of those, so it is important to carry sufficient males to accomplish the task, especially since numerous females can come into heat the same day. The normal ratio for the breeding herd is 3 females for every male. For a beginning operation, the advice (offered repeatedly) was to reduce that, especially considering that most if not all of the original breeding stock would be young of the year and there are no neighbors to help out if you don't have enough males to go around.

On size of the original breeding herd, our advice was to start with 35 females and 15 males. Our initial cost projections are based on this sex ratio and breeding herd size.

A successful breeding program is constantly responding to the trends in the global market. The current market pays more for light silvers. The advice offered by operators was to buy initial breeding stock of standard silvers and then breed for light or dark offspring depending on market demand.

Selection of breeding stock is an annual exercise. Breeders should be pelted at age 6+ years and be replaced. Also a successful breeding program tries to bring in some new breeding stock every year.

The cost of breeding stock varies with the pelt market. A rule of thumb - not often admitted by operators who sell breeding stock seems to set the floor price for breeders at 2x the average pelt price. On the current market therefore - breeding stock costs will be from $350.00 and up. The most common price quoted was $500.00 each with $400.00 quoted on a volume (20+) purchase. An initial herd of 35 females and 15 males this fall (1984) would have cost

around $20,000.00. Delivery costs would add another $5,000.00, for a landed price of +/-$25,000.00.

The market price for breeders in 1985 will in part be determined by the price of pelts on the February 1985 sale. A strong demand for pelts will bring a commensurate demand and price for breeding. stock.

The final selection of breeding stock should be made with the assistance of an experienced rancher and fur handler. While there are numerous aspects that can be gleaned from breeding records and performance, the key ingredient of a fur bearer is the colour and quality of the pelt. Qualities to be selected for should be enumerated and a check sheet developed for each animal selected. It should include the following subjects:

- birth date - including both parents dates of birth
- litter size produced by dam
- litter size of parents litters
- survival of litter mates - both parents
- colour of litter mates including parents
- weaning date
- temperament - including both parents.

2.7 - Energy

Electricity will be used for light and power for appliances and is available from Alberta Power the local electrical utility company. Wood heat will be used for residential and other space heating needs including hot water and feed rations preparations in the feed kitchen. An oil fired heating system will provide back up and emergency heating requirements.

2.7.1 Electrical

The item consuming the greatest amount of electricity will be the freezer. A similar unit at Detah in 1983/84 consumed 22,684 kwh of electricity. At local commercial rates in Hay River, that would cost '$4,536.8<). If the power subsidy to businesses continues, the cost to the operation would be - based on Yellowknife rates - reduced to $2,101.83. The best use of a freezer for fresh feed storage can only be made under optimum conditions. These conditions will not exist until the farm has 150-200 breeding females.

The miscellaneous motors, lights and appliances in the workshop/pelting complex are estimated to consume approximately 20,000 kwh per annum - roughly 2.5 times normal home consumption - not including an electric hot water heater. Based on Yellowknife power rates this will cost approximately $2,000.00. With no subsidies in place the total cost of electricity for the operation will be (2 0, 000 kwh x $.20 =) $4,000.00. This does not include the power consumed during construction.

2.7.2 Propane

The combination of capital costs and minimum sizing appliances leads us to recommend the purchasing of a propane heating system for back-up and emergency in the workshop complex as well as in the residence. The cost of delivered BTU in propane is slightly lower than with fuel oil, the range and size of appliances much broader and the capital and maintenance costs much less. We estimate that the annual consumption of propane for back-up and emergency heating will not exceed 2,000 litres annually. At current prices that will cost $680.00 to which must be added a tank rental of $144.00/annum for a total cost estimate of $825.00.

2.7.3 Fuel Wood

As mentioned earlier, the main fuel source will be wood from local sources. The shop/pelting complex will be less costly to heat than a single storey residence because of its reduced surface area/volume ratio. Also working temperatures in this building can be lower than normal room temperature for a home. On this basis we feel that 10 cords of wood will be more than adequate to heat the building and any additional heat required for feed preparation and hot water. At current Hay River firewood costs, 10 cords will cost $550.00.

2.8 Labour

The fox ranch being discussed here is intended to be a family operation It is planned that at full production of 150-200 breeding females Mr. Magrum will work full time at the fox operation with the assistance of Mrs. Magrum. Mr. and Mrs. Magrum have both experience with the fur industry and have both visited and observed fox ranch operations. As a family operation this project must return sufficient funds to provide for the needs of the operations and their family. Based on observations made on existing fur ranches, the duties performed, responsibilities of the manager and expertise and experience required in operating a farm successfully, an annual wage of $24,000.00 for management is a reasonable remuneration considering the owner/manager role Mr. Magrum will play. Little if any extra help will need to be hired until the operation reaches a size of 100 breeding females with the exception of casual assistance at pelting time. The cost of these services are estimated, at this time, to be approximately $1,600.00 annually.

These costs can be estimated more accurately when a more precise estimate of labour requirements for pelting is developed. This is hoped to be done by Mr. Magrum visiting a farm during pelting in December 1984.

During the early stages. of the fox farm, while the breeding herd is growing, the profit/loss picture of the farm is such that full wages will not be possible. During this period wages should not exceed $7,500.00 for years 1, 2, and 3 and not more than $13,650.00 in year 4. This may require Mr. or Mrs. Magrum to take outside employment from time to time to ensure that the basics for the family are met. The summary cash flow projections assume that the Magrums' will not realize any return for either their investment or effort until 198S or year 3. (See Appendix 7.6.)

2.9 Building Maintenance

The fox habit of chewing exposed edges of wood requires that a maintenance schedule to replace and repair cages be established. While the serviceable life of a cage should be 10-15 years, the cost of maintenance and replacement should be calculated into annual cost of operations. In order to reduce cash flow we have assumed that the maintenance and replacement costs in the first four years will be nil. While this is in fact the case, the operator should be aware that these costs have been deferred to the years when he realizes a profit on operations.

2.10 Cash Flow Projections

These cash flow projections follow the annual cycle with respect to feeding costs - the major expenditure in the operation. Other costs are pro-rated on a 26 segment year.

Revenues are projected on the basis of pelt prices brought since 1979. Comparing production costs/revenues against these prices provides a sensitivity analysis of sorts which shows how vulnerable the operation is to fluctuations in the market and/or productivity rates of pelts/breeding females. This exercise shows that under recent market conditions an operation" with 150+ females, run efficiently and producing 3 pelts/female, can return the cost of operations under any market condition experienced in the last six years if the pelts are as good or better than the national average.

In the summary - for the sake of brevity - the average price/pelt over the last six years is used to show a similar conclusion.

Table 2.8a Cash Flow Projection – Cost of Operations – Year

Parameters: Breeding Stock 35 females
15 males
Production 2.5/3.0/3.5 pups per litter
Feeding Program Masterfeeds and homemade.
Projection begins with taking delivery of initial breeding stock in mid October.

Period	Feed Costs 2.5	3.0	3.5	Disease Control	Fixed Costs Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	
29/30	83.00	83.00	83.00		312.50	125.00	100.00	73.00	
31/32	83.00	83.00	83.00		"	"	"	"	
33/34	78.50	78.50	78.50		"	"	"	"	
35/36	78.50	78.50	78.50		"	"	"	"	
37/38	79.50	79.50	79.50		"	"	"	"	
39/40	104.50	104.50	104.50		"	"	"	"	
41/42	128.00	128.00	128.00		"	"	"	"	
43/44	128.00	128.00	128.00		"	"	"	"	
45/46	128.00	128.00	128.00		"	"	"	"	
47/48	124.00	124.00	124.00		"	"	"	"	
49/50	146.00	146.00	146.00		"	"	"	"	
51/52	162.50	162.50	162.50		"	"	"	"	
1/2	166.50	166.50	166.50		"	"	"	"	
3/4	185.50	190.00	194.00		"	"	"	"	
5/6	229.50	242.50	255.00		"	"	"	"	
7/8	260.00	279.00	297.00		"	"	"	"	
9/10	189.50	212.50	234.50		"	"	"	"	
11/12	239.50	273.00	304.50		"	"	"	"	
13/14	258.50	295.50	331.00		"	"	"	"	
15/16	268.00	307.00	344.50		"	"	"	"	
17/18	278.50	320.00	359.50		"	"	"	"	
19/20	280.00	322.00	361.50		"	"	"	"	
21/22	277.00	318.00	357.00		"	"	"	"	
23/24	263.00	301.50	338.00		"	"	"	"	
25/26	253.00	289.00	323.50		"	"	"	"	
27/28	244.00	279.00	311.00		"	"	"	"	
									Year 1 Total Costs
Total	4,746.00			589.10	7,500.00	1,250.00	2,600.00	1,950.00	$20,605.10 (2.5/breeder)
		5,119.00		666.50	7,500.00	1,250.00	2,600.00	1,950.00	$21,085.50 (3.0/breeder)
			5,501.00	739.60	7,500.00	1,250.00	2,600.00	1,950.00	$21,540.60 (3.5/breeder)

All annual cost estimates are divided by 26 to reduce them to two week periods identified in annual cycle.

Table 2.8b Cash Flow Projection - Cost of Operations - Year 2

Parameters: Breeding Stock — 70 females
25 males
additional breeders from year 1 progeny
carrying pelters to week 35/36
2.5/3.0/3.S pups per litter

Production Feeding Program — Masterfeeds and homemade.

Period	Feed Costs 2.5	3.0	3.5	Disease Control	Fixed Costs Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 2 Total Costs
29/30	243. S0	276. 00	308.00		312.50	12S.00	100.00	75.00	
31/32	236.50	268. 50	299.00		"	"	"	"	
33/34	227. S0	250.00	207. 50		"	"	"	"	
35/36	186.00	201. 50	216.00		"	"	"	"	
37/38	150.00	150.00	150.00		"	"	"	"	
39/40	191.50	191. 50	191. 50		"	"	"	"	
41/42	238. 50	258.50	258.50		"	"	"	"	
43/44	238. 50	238. 50	238. 50		"	"	"	"	
4S/46	238. 50	238. 50	238. 50		"	"	"	"	
47/40	239.00	239.00	239.00		"	"	"	"	
49/50	283. 00	283. 00	283.00		"	"	"	"	
51/52	316.00	31,5.00	316. 00		"	"	"	"	
1/2	324. 00	324.00	324.00		"	"	"	"	
3/4	362.00	371.00	379. 00		"	"	"	"	
5/6	450.50	476.00	501. 00		"	"	"	"	
7/0	511.50	549. 00	585. 00		"	"	"	"	
9/10	371. 00	416.00	460. 00		"	"	"	"	
11/12	471.50	537. 00	600. 00		"	"	"	"	
13/14	309.50	582. 00	653.00		"	"	"	"	
15/16	529.00	605.00	680. 00		"	"	"	"	
17/18	550. 00	631 .00	710.00		"	"	"	"	
19/20	553.00	635.00	714.00		"	"	"	"	
21/22	547.00	627.00	705.00		"	"	"	"	
23/24	519.00	594.00	667. 00		"	"	"	"	
25/26	49a. 50	569. 00	638 .00		"	"	"	"	
27/28	400.50	547. 00	613. 00		"	"	"	"	
Total	9,465.50	10,362.00	11,234.50	1,161.00 1,311.50 1,457.70	7,300.00 7,500.00 7,500.00	S,250.00 3,2S0.00 3,250.00	2,600.00 2,600.00 2,600.00	1,950.00 1,950.00 1,950.00	S25,926.S0 (2.5/breeder S26,973.50 (3.0/breeder S27,992.20 (3.5/breeder

Table I.B.1 Revenue for Year 2 from sale of pelts.

Based on average prices during the last six years these pelts would return:

	Number of pelts		
	42	60	77
at 1979 prices	$11,560.08	$16,514.40	$21,193.48
at 1980 prices	12,383.28	17.690.40	22.702.68
at 1981 prices	11,709.18	16.727.40	21,466.83
at 1982 prices	11,931.36	17,044.80	21,874.16
at 1983 prices	6,468.00	9,240.00	11,858.00
at 1984 prices	7,374.78	10.535.40	13,520.43

Use of National pellets would give same $ returns.

Table 2.8c Cash Flow Projection - Cost of Operations - Year 3

'Parameters: Breeding Stock
140 females
50 males
additional breeders from year 2 progeny
carrying pelters to week 35/36
Production 2.5/3.0/3.5 pups per litter
Feeding Program Masterfeeds and homemade.

Period	Feed Costs 2.5	3.0	3.5	Disease Control	Fixed Costs Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 3 Total Costs
29/30	479.00	542.30	606.50		312.50	125.00	100.00	75.00	
31/32	465.00	527.50	500.50		"	"	"	"	
33/34	447.s0	507.00	566.00		"	"	"	"	
35/36	371.00	397.00	529.50		"	"	"	"	
37/38	299.00	299.00	299.00		"	"	"	"	
39/40	302.50	382.50	302.50		"	"	"	"	
41/42	476.50	476.50	47.6.50		"	"	"	"	
43/44	476. SO	476.50	476.50		"	"	"	"	
45/46	476. 50	476. 50	476.30		"	"	"	"	
47/48	477.00	477.00	477.00		"	"	"	"	
49/s0	565. 00	565. 00	565.00		"	"	"	"	
51/52	631.00	631.00	631.00		"	"	"	"	
1/2	647.50	647.50	647.50		"	"	"	"	
3/4	724.00	741.50	750.00		"	"	"	"	
5/6	900. 50	951.50	1,003.00		"	"	"	"	
7/8	1,022.30	1,097.50	1,173.00		"	"	"	"	
9/10	742.00	831.50	922.50		"	"	"	"	
11/12	947.00	1,073.s0	1,204.00		"	"	"	"	
13/14	1,023.00	1,163.50	1,310.50		"	"	"	"	
15/16	1,037.s0	1,209.50	1,365.00		"	"	"	"	
17/18	1,099.50	1,261.30	1,425.00		"	"	"	"	
19/20	1,105.50	1,269.50	1,433.00		"	"	"	"	
21/22	1,093.s0	1,253.50	1,41s.00		"	"	"	"	
23/24	1,037.50	1,187.50	1,339.00		"	"	"	"	
25/26	997.00	1,137.50	1,280.50		"	"	"	"	
27/28	961.00	1,093.50	1,230.00		"	"	"	"	
Total	18.904.30	20,677.00	22,500.50	2,322.00 2,623.00 2,924.00	7,500.00 7,500.00 7,500.00	3,250.00 3,250.00 3,250.00	2,600.00 2,600.00 2,600.00	1,950.00 1,950.00 1,950.00	$36,526.50 (2.5/breeder) $30,600.00 (3.0/breeder) $40,804.50 (3.5/breeder)

Table 4.B61 Revenue for Year 3 from sale of pelts.

Based on average prices during the last five years these pelts would return:

	Number of Pelts		
	80	115	149
at 1979 prices	$22,019.20	$31,652.60	$41,010.76
at 1980 prices	23,587.20	33,906.60	43,931.16
at 1981 prices,	22,303.20	32,060.85	41,539.71
at 1982 prices	22,726.40	32,669.20	42,327.92
at 1983 prices	12,320.00	17,710.00	22,946.00
at 1984 prices	14,047.20	20,192.85	26,162.91

Use of National pellets would give same $ returns.

Table 2.8d Cash Flow Projection - Cost of Operations - Year 4

Parameters: Breeding Stock — 150 females; 50 males; additional breeders from year 3 progeny

Production — carrying pelters to week 35/36

Feeding Program — 2.5/3.0/3.5 pups per litter; Masterfeeds and homemade.

Period	Feed Costs 2.5	3.0	3.5	Disease Control	Fixed Costs Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair
29/30	958.00	1,084.50	1,217.00		300.00	125.00	100.00	7s.00
31/32	929. S0	1,054.50	1,181.00		"	"	"	"
33/34	894. so	1,013.50	1,136.00		825.00	"	"	"
3S/36	594. so	653.00	713.00		"	"	"	"
37/38	314.00	314.00	314.00		500. 00	"	"	"
39/40	397.50	397.50	397.50		"	"	"	"
41/42	49a. 00	498.00	498.00		"	"	"	"
43/44	490.00	490.00	498.00		"	"	"	"
45/46	490.00	490.00	498.00		"	"	"	"
47/48	505. 00	505. 00	505. 00		"	"	"	"
49/50	599.30	599.50	399.50		"	"	"	"
51/s2	670.00	670.00	670.00		"	"	"	"
1/2	688. 00	688.00	688.00		"	"	"	"
3/4	769. so	788.50	806.00		"	"	"	"
5/6	959. 00	1,014.00	1,068.00		"	"	"	"
7/8	1,090.00	1,170.50	1,248.50		"	"	"	"
9/10	709.00	885.00	981.00		"	"	"	"
11/12	1,004.50	1,14s.00	1,282.00		"	"	"	"
13/14	1,006.00	1,241.50	1,396.00		"	"	"	"
15/16	1,127.00	1,290.50	1,434.00		"	"	"	"
17/18	1,172.30	1,346.50	1,516.00		"	"	"	"
19/20	1,179.00	1,355.00	1,527.30		"	"	"	"
21/22	1,1.56.00	1,336.00	1,508.00		"	"	"	"
23/24	1,10s.50	1,267.00	1,426.50		"	"	"	"
25/26	1,062.50	1,213.50	1,364.00		"	"	"	"
27/28	1,023.50	1,166.00	1,310.00		"	"	"	"
Total	21,578.50	23,694.50	25,802.00	2,472.S0 2,79S.00 3,117.50	13,650.00 13,650.00 13,6S0.00	3,250.00 3,250.00 1,2s0.00	2,600.00 2,600.00 2,600.00	1,9s0.00 1,950.00 1,9s0.00

Year 4 Total Costs

$45,501.00 (2.5/breeder)

$47,939.50 (3.0/breeder)

$50,370.50 (3.5/breeder)

Table 2.8b1 Revenue for Year 4 from sale of pelts.

Based on average prices during the last five years these pelts would return:

	Number of Pelts		
	340	410	480
at 1979 prices	$93,581.60	$112,848.40	$132,115.20
at 1980 prices	100,245.60	120,884.40	141,523.20
at 1981 prices	94,788.60	114,303.90	133,819.20
at 1982 prices	96,587.20	116,472.80	136,339.20
at 1983 prices	52.360.00	63,140.00	73,920.00
at 1984 prices	59,700.60	71,991.90	84,283.20

Use of National pellets would give same $ returns.

Table 2.9a Cash Flow Projection - Cost of Operations - Year 1

Parameters: Breeding Stock — 35 females, 15 males
Production — 2.5/3.0/3.5 pups per litter
Feeding Program — National Pellets.
Projection begins with taking delivery of initial breeding stock in mid October.

Period	Feed Costs 2.5	Feed Costs 3.0	Feed Costs 3.5	Fixed Costs: Disease Control	Fixed Costs: Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 1 Total Costs
29/30	136.00	136.00	136.00		312.50	125.00	100.00	75.00	
31/32	136.00	136.00	136.00		"	"	"	"	
33/34	129.00	129.00	129.00		"	"	"	"	
35/36	129.00	129.00	129.00		"	"	"	"	
37/38	128.00	128.00	128.00		"	"	"	"	
39/40	140.00	140.00	140.00		"	"	"	"	
41/42	153.50	153.50	153.50		"	"	"	"	
43/44	153.50	153.50	153.50		"	"	"	"	
45/46	153.50	153.50	153.50		"	"	"	"	
47/48	166.50	166.50	166.50		"	"	"	"	
49/50	194.50	194.50	194.50		"	"	"	"	
51/52	215.50	215.50	215.50		"	"	"	"	
1/2	215.00	215.00	215.00		"	"	"	"	
3/4	244.50	250.50	257.00		"	"	"	"	
5/6	319.50	341.50	361.50		"	"	"	"	
7/8	359.50	389.00	417.50		"	"	"	"	
9/10	332.00	375.00	414.00		"	"	"	"	
11/12	423.00	484.00	541.50		"	"	"	"	
13/14	458.00	526.00	590.50		"	"	"	"	
15/16	475.00	547.00	615.00		"	"	"	"	
17/18	494.50	570.00	642.00		"	"	"	"	
19/20	497.50	573.50	646.00		"	"	"	"	
21/22	491.50	566.50	638.00		"	"	"	"	
23/24	466.50	536.00	603.00		"	"	"	"	
25/26	448.00	514.00	577.00		"	"	"	"	
27/28	428.00	490.00	549.00		"	"	"	"	
Total	7,487.50			589.10	7,500.00	3,250.00	2,600.00	1,950.00	$23,376.60 (2.5 $/breeder)
		8,213.00		666.50	7,500.00	3,250.00	2,600.00	1,950.00	$24,179.50 (3 $/breeder)
			8,902.00	739.60	7,500.00	3,250.00	2,600.00	1,950.00	$24,941.60 (3.5 $/breeder)

Table 2.9b Cash Flow Projection - Cost of Operations - Year 2

Parameters: Breeding Stock — 70 females
2S males
additional breeders from year 1 progeny
carrying pelters to week 35/36
Production — 2.S/3.0/3.S pups per litter
Feeding Program — National Pellets.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs: Disease Control	Labour
29/30	425.50	405.50	542.50		312.50
31/32	413.40	471.00	524. so		"
33/34	390.00	453. 50	517.00		"
35/36	323.50	350. 50	377.50		"
37/38	241.00	241.00	241.00		"
39/40	261. 00	261 .00	261. 00		"
41/42	28s. 00	288. 00	200.00		"
43/44	288. 00	288. 00	288. 00		"
45/46	288.00	288.00	288.00		"
47/40	318.00	318.00	318.00		"
49/50	374.00	374.00	374. 00		"
51/52	416.00	416.00	416.00		"
1/2	415.00	415.00	415.00		"
3/4	474.00	496.00	499.00		"
5/6	623.00	660.00	708.00		"
7/0	705.00	763.00	020.00		"
9/10	651.00	735.00	813.00		"
11/12	034.00	953.00	1,068.00		"
13/14	904.5	1,037.00	1,166.00		"
15/16	930.50	1,079.00	1,215.00		"
17/1s	977.30	1,12s.00	1,269.00		"
19/20	984.00	1,132.00	1,277.00		"
21/22	972.00	1,118.00	1,261.00		"
23/24	921.50	1,057.00	1,191.00		"
25/26	884.50	1,013.00	1,139.00		"
27/28	044.00	965.00	1,083.00		"
Total	1S,165.00	16,780.50	18,359.50	1,161.00 1,311.50 1,457.70	7,500.00 7,500.00 7,500.00

Table 2.9c Cash Flow Projection - Cost of Operations - Year 3

Parameters:	Breeding Stock	140 females 50 males additional breeders from year 2 progeny carrying pelters to week 35/36
	Production	2.5/3.0/3.5 pups per litter
	Feeding Program	National Pellets.

Period	Feed Costs 2.5	Feed Costs 3.0	Feed Costs 3.5	Fixed Costs Disease Control	Fixed Costs Labour	ergy & tilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 3 Total Costs
29/30	838.50	955.50	1,069.50		3 [illegible]	125.00	[illegible]	75.00	
31/32	814.50	926.50	1,033.50		"	"	"	"	
33/34	784.00	892.00	1,019.00		"	"	"	"	
35/36	642.00	694.50	748.50		"	"	"	"	
37/38	482.00	482.00	482.00		"	"	"	"	
39/40	522.00	522.00	522.00		"	"	"	"	
41/42	576.00	576.00	576.00		"	"	"	"	
43/44	576.00	576.00	576.00		"	"	"	"	
45/46	576.00	576.00	576.00		"	"	"	"	
47/48	636.00	636.00	636.00		"	"	"	"	
49/50	748.00	748.00	748.00		"	"	"	"	
51/52	832.00	832.00	832.00		"	"	"	"	
1/2	830.00	830.00	830.00		"	"	"	"	
3/4	948.00	972.00	998.50		"	"	"	"	
5/6	1,249.50	1,336.00	1,418.50		"	"	"	"	
7/8	1,409.50	1,526.00	1,642.50		"	"	"	"	
9/10	1,302.00	1,470.00	1,631.50		"	"	"	"	
11/12	1,667.50	1,906.00	2,144.00		"	"	"	"	
13/14	1,808.50	2,074.00	2,341.00		"	"	"	"	
15/16	1,877.00	2,158.00	2,439.50		"	"	"	"	
17/18	1,955.00	2,250.00	2,548.00		"	"	"	"	
19/20	1,967.00	2,264.00	2,564.00		"	"	"	"	
21/22	1,943.00	2,236.00	2,532.00		"	"	"	"	
23/24	1,842.50	2,114.00	2,391.50		"	"	"	"	
25/26	1,768.00	2,026.00	2,287.00		"	"	"	"	
27/28	1,688.00	1,930.00	2,174.00		"	"		"	
Total	30,282.50			2,322.00	7,500.00	3,250.00	2,600.00	1,950.00	$47,904.50 (2.5/breeder)
		33,508.50		2,623.00	7,500.00	3,250.00	2,600.00	1,950.00	$51,431.50 (3.0/breeder)
			36,760.50	2,924.00	7,500.00	3,250.00	2,600.00	1,950.00	$54,984.50 (3.5/breeder)

Cash Flow Projection - Cost of Operations - Year 4

Parameters: Breeding Stock — 150 females; 50 males; additional breeders from year 3 progeny; carrying pelters to week 35/36; 2.5/3.0/3.5 pups per litter

Production Feeding Program — National Pellets.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs: Disease Control	Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 4 Total Costs
29/30	1,676.50	1,910.50	2,146.50		500.00	125.00	00.00	75.00	
31/32	1,628.00	1,852.50	2,074.50		"	"	"	"	
33/34	1,567.00	1,784.00	2,045.50		825.00	"	"	"	
35/36	1,026.00	1,131.00	1,227.50		"	"	"	"	
37/38	506.00	506.00	506.00		500.00	"	"	"	
39/40	546.00	546.00	546.00		"	"	"	"	
41/42	604.00	604.00	604.00		"	"	"	"	
43/44	604.00	604.00	604.00		"	"	"	"	
45/46	604.00	604.00	604.00		"	"	"	"	
47/48	671.00	671.00	671.00		"	"	"	"	
49/50	791.00	791.00	791.00		"	"	"	"	
51/52	881.50	881.50	881.50		"	"	"	"	
1/2	879.00	879.00	879.00		"	"	"	"	
3/4	1,006.00	1,031.50	1,059.50		"	"	"	"	
5/6	1,329.00	1,422.00	1,509.00		"	"	"	"	
7/8	1,500.50	1,625.50	1,749.00		"	"	"	"	
9/10	1,385.00	1,565.50	1,735.50		"	"	"	"	
11/12	1,777.50	2,033.00	2,284.00		"	"	"	"	
13/14	1,928.00	2,213.50	2,494.50		"	"	"	"	
15/16	2,001.50	2,303.50	2,600.00		"	"	"	"	
17/18	2,085.50	2,402.00	2,715.00		"	"	"	"	
19/20	2,098.50	2,417.00	2,733.00		"	"	"	"	
21/22	2,072.50	2,387.00	2,699.00		"	"	"	"	
23/24	1,965.00	2,256.00	2,548.50		"	"	"	"	
25/26	1,885.00	2,162.00	2,436.50		"	"	"	"	
27/28	1,799.00	2,059.00	2,484.00		"	"	"	"	
Total	33,817.00	38,642.00	42,629.00	2,472.50	13,650.00	3,250.00	2,600.00	1,950.00	$57,739.50 (2.5/breeder)
				2,795.00	13,650.00	3,250.00	2,600.00	1,950.00	$62,887.00 (3.0/breeder)
				3,117.50	13,650.00	3,250.00	2,600.00	1,950.00	$67,196.50 (3.5/breeder)

Table 2.10a Cash Flow Projection - Cost of Operations - Year 1

Parameters: Breeding Stock — 35 females, 15 males

Production — 2.5/3.0/3.5 pups per litter

Feeding Program — National for Reproductive, Lactation and Pelter Growing Period. Masterfeeds for Maintenance Period.

Projection begins with taking delivery of initial breeding stock in mid October.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs: Disease Control	Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair
29/30	83.00	83.00	83.00		312.50	125.00	100.00	75.00
31/32	83.00	83.00	83.00		"	"	"	"
33/34	78.50	78.50	78.50		"	"	"	"
35/36	78.50	78.50	78.50		"	"	"	"
37/38	79.50	79.50	79.50		"	"	"	"
39/40	108.5	108.50	108.50		"	"	"	"
41/42	153.50	153.50	153.50		"	"	"	"
43/44	153.50	153.50	153.50		"	"	"	"
45/46	153.50	153.50	153.50		"	"	"	"
47/48	149.50	149.50	149.50		"	"	"	"
49/50	177.50	177.50	177.50		"	"	"	"
51/52	198.50	198.50	198.50		"	"	"	"
1/2	197.50	197.50	197.50		"	"	"	"
3/4	277.00	233.00	239.50		"	"	"	"
5/6	302.00	324.00	344.00		"	"	"	"
7/8	342.00	371.50	400.00		"	"	"	"
9/10	281.50	324.50	363.50		"	"	"	"
11/12	372.50	433.50	491.00		"	"	"	"
13/14	407.50	475.50	540.00		"	"	"	"
15/16	424.40	496.50	564.50		"	"	"	"
17/18	444.00	519.50	591.50		"	"	"	"
19/20	447.00	523.00	595.50		"	"	"	"
21/22	441.00	516.00	587.50		"	"	"	"
23/24	416.00	485.50	552.50		"	"	"	"
25/26	397.50	463.50	526.50		"	"	"	"
27/28	377.50	439.50	498.50		"	"	"	"
Total	6,574.50	7,300.00	7,989.00	589.10 666.50 739.60	7,500.00 7,500.00 7,500.00	3,250.00 3,250.00 3,250.00	2,600.00 2,600.00 2,600.00	1,950.00 1,950.00 1,950.00

Year 1 Total Costs

$22,414.60 (2.5/breeder)

$23,266.50 (3.0/breeder)

$24,028.60 (3.5/breeder)

Table 2.10b Cash Flow Projection - Cost of Operations - Year 2

Parameters: Breeding Stock — 70 females
25 males
additional breeders from year 1 progeny
carrying pelters to week 35/36
Production — 2.5/3.0/3.5 pups per litter
Feeding Program — National far Reproductive, Lactation and Pelt Grower Periods. Masterfeeds for Maintenance Periods.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs: Disease Control	Labour
29/30	372.50	432.50	489.50		312.50
31/32	360.30	418.00	471.50		"
33/34	347.30	403.00	466.50		"
35/36	273.00	300.00	327.00		"
37/38	150. 00	1s0.00	150.00		"
39/40	198.00	198.00	19s.00		"
41/42	288.00	288. 00	288. 00		"
43/44	288. 00	200.00	208.00		"
45/46	288.00	280.00	288.00		"
47/48	290. 00	290.00	290.00		"
49/50	346.00	346. 00	346 .00		"
51/52	388. 00	388. 00	388.00		"
1/2	386. 00	386. 00	386. 00		"
3/4	445.00	4s7. 00	470.00		"
5/6	596.00	639.00	679.00		"
7/0	676.00	734. 00	791.00		"
9/10	556.00	640. 00	718.00		"
11/12	739. 00	858. 00	973.00		"
13/14	806.0	942.00	,071.00		"
15/16	943.50	964.00	, 120.00		"
17/18	882. 50	1,030.00	,174.00		"
19/20	888. 50	1,037.00	,182.00		"
21/22	067.50	1,023.00	,166.00		"
23/24	826.50	962.00	,096.00		"
25/26	709.00	918.00	,044.00		"
27/28	749.00	870.00	,018.50		"
Total	13,649.00	15,269.50	16,879.00	1,161.00 1,311.50 1,457.70	7,500. 00 7,500.00 7,s00.00

Table 2.10c Cash Flow Projection Cost of Operations - Year 3

Parameters: Breeding Stock — 140 females
50 males
additional breeders from year 2 progeny
carrying pelters to week 35/36

Production — 2.5/3.0/3.5 pups per litter

Feeding Program — Nation for Reproductive, Lactation and Pelter Grower Periods. Masterfeeds for Maintenance Periods.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs Disease Control	Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair	Year 3 Total Costs
29/30	738.50	855.50	969.50		3,250.00	125.00	100.00	75.00	
31/32	714.00	826.50	933.50		"	"	"	"	
33/34	688.50	797.00	924.00		"	"	"	"	
35/36	547.00	599.50	653.00		"	"	"	"	
37/38	299.00	299.00	299.00		"	"	"	"	
39/40	396.00	396.00	396.00		"	"	"	"	
41/42	576.00	576.00	576.00		"	"	"	"	
43/44	576.00	576.00	576.00		"	"	"	"	
45/46	576.00	576.00	576.00		"	"	"	"	
47/48	579.00	579.00	579.00		"	"	"	"	
49/50	691.00	691.00	691.00		"	"	"	"	
51/52	775.00	775.00	775.00		"	"	"	"	
1/2	773.00	773.00	773.00		"	"	"	"	
3/4	890.00	913.50	940.00		"	"	"	"	
5/6	1,231.50	1,277.50	1,360.00		"	"	"	"	
7/8	1,351.50	1,467.50	1,584.00		"	"	"	"	
9/10	1,111.50	1,279.50	1,441.50		"	"	"	"	
11/12	1,477.50	1,715.50	1,954.00		"	"	"	"	
13/14	1,618.00	1,883.50	2,151.00		"	"	"	"	
15/16	1,686.50	1,967.50	2,249.50		"	"	"	"	
17/18	1,765.00	2,059.50	2,358.00		"	"	"	"	
19/20	1,777.00	2,073.50	2,374.00		"	"	"	"	
21/22	1,753.00	2,045.50	2,342.00		"	"	"	"	
23/24	1,652.50	1,923.50	2,201.00		"	"	"	"	
25/26	1,578.00	1,835.50	2,096.50		"	"	"	"	
27/28	1,497.50	1,739.50	1,984.00		"	"	"	"	
Total	27,318.50	30,501.00	33,756.50	322.00 623.00 2,924.00	7,500.00 7,500.00 7,500.00	3,250.00 3,250.00 3,250.00	600.00 600.00 600.00	1,950.00 1,950.00 1,950.00	$44,940.50 (2.5/breeder) $48,424.00 (3.0/breeder) $51,980.50 (3.5/breeder)

Table 2.10d Cash Flow Projection - Cost of Operations - Year 4

Parameters: Breeding Stock — 150 females; 50 males; additional breeders from year 3 progeny; carrying pelters to week 35/36; 2.5/3.0/3.5 pups per litter

Production Feeding Program — National for Reproductive, Lactation and Pelter Grower Periods. Masterfeeds for Maintenance Periods.

Period	Feed Costs 2.5	3.0	3.5	Fixed Costs Disease Control	Labour	Energy & Utilities	Property Taxes & Insurance	Equipment Operation & Repair
29/30	1,476.50	1,710.50	1,946.50		500.00	25.00	100.00	75.00
31/32	1,428.00	1,652.50	1,874.50		"	"	"	"
33/34	1,377.00	1,593.50	1,855.50		820.00	"	"	"
35/36	836.50	941.00	1,050.50		"	"	"	"
37/38	314.00	314.00	314.00		500.00	"	"	"
39/40	410.50	410.50	410.50		"	"	"	"
41/42	604.00	604.00	604.00		"	"	"	"
43/44	604.00	604.00	604.00		"	"	"	"
45/46	604.00	604.00	604.00		"	"	"	"
47/48	614.50	614.50	614.50		"	"	"	"
49/50	734.50	734.50	734.50		"	"	"	"
51/52	824.50	824.50	824.50		"	"	"	"
1/2	821.00	821.00	821.00		"	"	"	"
3/4	948.00	973.00	1,001.50		"	"	"	"
5/6	1,271.00	1,363.50	1,450.50		"	"	"	"
7/8	1,442.50	1,567.50	1,691.00		"	"	"	"
9/10	1,185.50	1,365.50	1,536.00		"	"	"	"
11/12	1,577.50	1,833.50	2,084.00		"	"	"	"
13/14	1,728.50	2,013.50	2,295.00		"	"	"	"
15/16	1,801.50	2,103.50	2,400.00		"	"	"	"
17/18	1,885.50	2,202.50	2,516.50		"	"	"	"
19/20	1,898.50	2,217.50	2,533.50		"	"	"	"
21/22	,872.50	2,187.00	2,499.00		"	"	"	"
23/24	,765.00	2,056.50	2,348.50		"	"	"	"
25/26	,685.50	1,962.00	2,237.00		"	"	"	"
27/28	,599.00	1,859.00	2,116.50		"	"	"	"
Total	31,309.50	35,133.00	38,967.50	2,472.50 2,795.00 3,117.50	13,650.00 13,650.00 13,650.00	3,250.00 3,250.00 3,250.00	2,600.00 2,600.00 2,600.00	1,950.00 1,950.00 1,950.00

Year 4 Total Costs

$55,232.00 (2.5/breeder)
$59,378.00 (3.0/breeder)
$63,535.00 (3.5/breeder)

Projected Cash Flow for Fox Farm to 31 March 1987

Item	1985 1	2	3	4	1986 1	2	3	4	1987 1	Project Total
CAPITAL COSTS										
Incorporation and Licences	1000.00									1000.00
Power Line - Clearing Labour	1000.00									1000.00
- Installation	6000.00									6000.00
Access - Clearing Labour	1000.00									1000.00
- Construction	15000.00									15000.00
Geotechnical Survey										
- Professional Fees	14000.00									14000.00
Buildings										
- Feed Storage - Materials		5000.00								5000.00
- Labour		2000.00								2000.00
Pelting Complex/Garage - Materials		22100.00								22100.00
- Labour		2000.00	2000.00	4000. m	2000.00					10000.00
- Security Fence - Material		9110. W								9110.00
- Labour		2000.00								2000.00
- Breeders Cages - Materials			8350.00				7725.00	17325.00		33400.00
- Labor			4250.00				4000.00	5250. 00	4000.00	17500.00
- Residence - Materials			37500.00							37500.00
- Labour			2500.00							2500.00
Mobile Equipment - Truck	m o o									7500.00
- Tractor, Tank, Wagon & Water Pump			10000.00							10000.00
Animal & Pelt Handling Gear			5000.00							3000.00
Breeding Stock - Animals				25000.00				%75.00		34675.00
- Transportation				5000.00						5000.00
Pelter Shed & Cages Materials						13200.00			13200.00	26400.00
- Labour						4000.00				4000.00
Total Capital /quarter	45500. m	42210.00	69600.00	34000.00	2000.00	17200.00	11725.00	32250. 00	17200.00	271685. m
Total Capital /annum				191310.00				63175. 00		
Total Capital /project										271685.00
OPERATING COSTS										
Feed			2345. 00			7035.00	4200.00		12600.00	26180.00
Diseases Control			moo		475. 00		325.00		1000.00	2000.00
Management & Labour				3000.00	3000. 00	3000. 00	3000.00	3000. m	3000.00	18000. 00
Taxes, Utilities, Insurance &				1930 00	1950.00	1950.00	1930.00	1950.00	1950.00	11700.00
Equipment Maintenance										
Operating Total /quarter	0.00	0.00	2545.00	4950.00	5425.00	11985.00	9475.00	4950. m	18550.00	57880. 00
Operating Total /annum				7495. m				31835.00		
REVENUES										
Sale of Pelts									-12900.00	-12900.00
Total Revenue /annum									-12900.00	-12900.00
EQUITY - Cash	-5000.00		-15000. al	-5000.00	-2500.00	-2530.00	-2300.00	-2500.00		-35000.00
- In Kind - Construction Labour	-2000. m	-6000.00	-8750.00	-7000.00	-3000.00	-7am.00	-7000.00	-8250. 00	-7000.00	-55000.00
- Unpaid Management &				-3000.00		-woo	-3000.00	-3000. 00	-3000.00	-18000.00
Operating Services								-%75. 00		-9675.00
- Converting Pelters to Breeder Stock										
Tots 1 /quarter	-7000.00	-6000.00	-23750.00	-15000.00	-7500.00	-12500. 00	-12500.00	-23425.00	-22900.00	-130575.00
Total /annum				-51750.00				-55925.00		

- Pelting Compl ex/[illegible] materials										
- Labour		2000.00	2000.00	4000.00	2000.00					10000.00
- Security Fence - Material		9110. W								9110.00
- Labour		2000.00								2000.00
- Breeders Cages - Materi als			8350.00				7725.00	17325.00		33400.00
- Labour			4250.00				4000.00	5250.00	4000.00	17500.00
Residence - Materials			37500.00							37500.00
- Labour			2500.00							2500.00
Mobile Equipment - Truck	7500.00									7500.00
- Tractor, Tank, Wagon e Water Pump			10000.00							10000.00
Animal & Pelt Handling Gear			5000.00							*.00
Breeding Stock - Animals				25000.00				%75.00		34675.00
- Transportation				5000.00						5000.00
Pelter Shed & Cages - Materials						13200.00			13200.00	26400. m
- Labour						4000.00				4000.00
Total Capital /quarter	45500.00	42210.00	69600.00	34000.00	2000.00	17200.00	11725.00	3,22s0.00	17200.00	271685. W
Total Capital /annum				191310.00				63175.00		
Total Capital /project										271685.00
OPERATING COSTS										
Feed			2345.09			703s.00	42a).00		12600.00	26180.00
Oi — Control			200.00		475.00		325.00		1000.00	2000.00
Management & Labour				3000.00	3000.00	3000.00	moo	3000.00	3000.00	18000.00
T-, Utilities, Insurance b Equipment Maintenance				1950.00	1950.00	1950.00	1950.00	1950.00	19s0.00	11700.00
Operating Total /quarter	0.00	0.00	2545.00	4950.00	54.25.00	11985.00	9475.00	4950.00	16530.00	57880.00
Operating Total /annum				74%.00				31 835.00		
REVENUES										
Sale of Pelts									-12900.00	-12900.00
Total Revenue /annum									-12900.00	-12900.00
EQUITY - Cash	-5000.00		-15000.00	-5000.00	-2500.00	-2500.00	-2500. m	-2300.00		-35000.00
In Kind - Construction Labour	-2000.00	-6000.00	-8750.00	-7000.00	-2000.00	-moo	-7000.00	-8250.00	-7000.00	-53000. al
- Unpaid Management & Operating Services				-3000.00	-3000.00	-3000.00	-3000.00	-3000.00	-3000.00	-18000.00
- Converting Pelters to Breeder Stock								-%75.00		-%75.00
Total /quarter	-7000.00	-6000.00	-237s0.00	-15000.00	-7500.00	-12500.00	-12500.00	-23425.00	-22900.00	-130575.00
Total /annum				-51750.00				-55925.00		
REQUIREMENT - Projected /quarter	38500.00	36210.00	48395.00	23950.00	-75.00	16685.00	8700.00	13775.00	-50.00	186090.00
/annum				147055.00				39085.00	39110.00	
/fiscal year	38500.00				108480.00					186090.00
/project										186090.00

Note:
This projection assumes the following growth in the breeding population:
October 1985 - start with 35 females and 15 males.
October 1986 - select 35 female and 10 male pelters for breeding stock.
February 1997 - sell 60 pelts at S215.00 each.
October 1987 - select 80 female and 25 male pelters for breeding stock.
February 1988 - sell 105 pelts at S215.00 each.,
February 1989 - sell 450 pelts at S215.00 each.

Table 2.11a Profit /(Loss) Projections - Based on Master feeds - rations with supplements for reproduction, and pelt prices for the appropriate years

		Pelters per Breeder		
		2.5	3.0	3.5
Year 1		(2CI,605.1O)	(21,085.50)	(21,54C~.6C))-
Year 2	1984	(18,551.72)	(16,438.10)'	(14,471.77)
	1983	(19,458.50)	(17,733.50)	(16,134.20)
	1982	(13,995.14)	(9,928.70)	(6,118.04)
	1981	(14,217.32)	(10,246.10}	(6,525.37)
	1980	(13,543.22}	(9,283.10)	(5,289.52)
	1979	(14,366.42)	(10,439.10)	(6,798.72)
Year 3	1984	(22,479.30)	(18,407.15)"	(14,641.39)
	1983	(24,206.50)	(20,890.00)	(17,858.50)
	1982	(13,800.10)	(5,930.80)	1,523.42
	1981	(14,223.30)	(6,539.13)	735.21
	1980	(12,939.30)	(4,693.40)	3,126.66
	1979	(14,507.30)	(6,947.40)	206.26
Year 4	1984	14,199.60	24,052.40	33,912.70
	1983	6,859.00	15,200.50	23,549.50
	1 982	51,086.20	68,533.30	85,968.70
	1981	49,287.60	66,364.40	83,448.70
	1980	54,744.60	72,944.9<)	91,152.70
	1979	48,080.60	64,908.90	81,744.70

Table 2.11b Profit /(Loss) Projections - Based on National 's rations, and pelt prices for the appropriate years

		Pelters per Breeder		
		2.5	3.0	3.5
Year 1		(23,376.60)	(24,179.50)	(24,941.60)
Year 2	19s4	(249251.22)	(22,856.60)	(21,596.77)
	1983	(25,158.00)	(24,152.00)	(23,259.20)
	1982	(19,694.64)	(16,347.20)	(13,243.04)
	1981	(19,916.82)	(16,664.60)	(13,650.37) "
	1980	(19,242.72)	(15,701.60)	(12,414.52)
	1 979	(20,065.92)	(16,877.60)	(13,923.72)
Year 3	1984	(33,857.30)	(31,238.65)	(28,821.59)
	1983	(35,584.50)	(33,721.50)	(32,038.50)
	1982	(25,178.10)	(18,762.30)	(12,636.58)
	1981	(25,601,30)	(19,370.65)	(13,444.79)
	1980	(24,317.30)	(17,524.90)	(11,033.34)
	1979	(23,883.30)	(19,778.90)	(13,973.74)
Year 4	1984	1,972.10	9,104.9C)	17,086.70
	1983	(5,379.50)	253. 00	6,723.50
	1982	38,847.70	53,585.80	69,142.70
	1981	37,049.10	51,416.90	66,612.70
	1980	42,506. 10	57,997.40	74,326.70
	1979′	35,842.10	49,961.40	64,918.70

Table 2.11c Pro fit/(Loss) Projections - Based on an optimum combination of rations, and pelt prices for the appropriate years

		Pelters per Breeder		
		2.5	3.0	3.5
Year 1		(22,414.60)	(23,266.50)	(24,028.60)
Year 2	1984	(22,735.22)	(21,345.60)	(20,116.27)
	1983	(23,642.00)	(22,641.00)	(21,778.70)
	1982	(18,178.64)	(14,836.20)	(11,762.34)
	1981	(1s,400.82)	(15,153.60)	(12,169.87)
	1980	(17,726.72)	(14,190.60)	(10,934.02)
	1979	(18,549.92)	(15,366.60)	(12,443.22)
Year 3	1984	(30,893.30)	(28,231.13)	(25,817.59)
	1983	(32,620.50)	(30,714.00)	(29,034.50)
	1982	(22,214.10)	(15,754.80)	(9,652.S8)
	1981	(22,637.30)	(16,363.15)	(10,440.79)
	1980	(21,353.30)	(14,517.40)	(8,049.34)
	1979	(22,921.30)	(16,771.40)	(10,969.74)
Year 4	1984	4,468.60	12,613.9<)	20,748.20
	1983	(2,872.00)	3,762.00	10,385.00
	1982	41,355.20	57,094.80	72,804.20
	1981	39,556.60	54,925.90	70,284.20
	1980	45,013.60	61,506.40	77,988.20
	1979	38,349.60	53,470.40	68,580.20

3.0 CAPITAL COSTS

3.1 Land Assembly

The initial application for land is for a lease to Commissioner's land in the Hay River/Enterprise Corridor development area. (By policy, title is not issued on lands developed for agricultural purposes.) The proposed "Hay River-Enterprise Corridor Development Regulations" would suggest that a fox farm operation would be an activity restricted to the "hinterland" zones of the corridor. Mr. Magrum's preferred sites for the development of this operation are in fact in an area designated as hinterland in the proposed regulations.

The site characteristics that are required include:

- an open exposure to the south,
- well drained land,
- semi-isolated with some natural shelter from strong winds,
- access to water, and
- reasonable access to power and road.

The site marked A on Appendix 7.1 meets all these conditions. The site marked B meets these as well, however, it would cost more to bring power to the operation on this site. Both sites are above the historic high water and flood levels of the Hay River.

	Site A	Site B
Line construction*	$2,500.00	$4,000.00
Transformer and switching*	$2,000.00	$2,000.00
Total (est.)	$4,500.00	$6,000.00

*Based on information provided by Alberta Power in Hay River.

In addition to constructing a powerline the costs of development must include the costs of an initial clearing for the fox ranching operations. The initial breeding stock will require a clearing of approximately .5 acres, the pelting shelter will require .2 acres with the workshop, residence, feed storage requiring a further clearing of about .5 acres. It is strongly recommended that this work be done by hand so that fuel wood can be salvaged and surface cover not be unnecessarily disturbed in order to maintain natural drainage.

In addition to power and clearing, land assembly costs must include security fencing for the animal holding area. The purpose of security fencing is twofold:

1. to contain any foxes that might escape from their cages during handling, and
2. to prevent intrusion from unwanted visitors, especially stray domestic or wild canids who could introduce disease, parasites or worse still cause behavioral trauma to females with newborn pups.

The initial costs of a security fence could be reduced by the strategic placement of whelping shed and workshop. Nevertheless, the cost of enclosing a 5 acre lot in which the whelping shed and workshop form a portion of the security barrier will require at least 1850 feet of security fencing of a chain link type. The material cost (FOB Hay River) is estimated to be $9,110.00.

Final land assembly costs cannot be refined further until the final configuration of a lease is provided by the Department of Local Government. For preliminary purposes we estimate that the costs of approved access for either site will be $15,000.00.

Land Assembly Costs . Summary

	Site A	Site B
Access	$15,000 . 00	$15,000 . 00
Power line and transformers	4,500.00	6 , 000. 00
Clearing by Mr. Magrum		
Security fencing	9,110.00	9,110.00
Total (est.)	$28,610.00	$30,110.0C)

In discussing land assembly and development costs with Mr. Greg Haist, an engineer who operates a market garden in the Hay River/Enterprise corridor, Mr. Haist related his experience with permafrost there. Apparently permafrost conditions exist along the river and its presence is not restricted to those areas of muskeg or high moisture content surface conditions. The distribution of permafrost is, not readily apparent from aerial photographs available. This aspect may require detailed soil examinations before building foundations are prepared.

3.2 Alternate Sites

Sites for a fox farm require a minimum of features. A southerly exposure enhances natural lighting, well drained soils provide a stable base for buildings, and all weather roads facilitate transportation requirements. Other features that add to the convenience and economic considerations of a site include electrical power and school bus services.

If for some reason land in the Hay River-Enterprise corridor is not available, where else could a fox farm be established and what are the added costs.

3.2.1 Power

A site anywhere outside the corridor would require that the farm produce its own power. While this would save the cost of building a powerline into the site, it would require that a power plant with back-up and fuel storage be added to the capital cost and its operations and maintenance costs be added to annual operating budgets. These are contrasted in Table 3.1 below.

Table 3.1 Capital Cost of Power Plant with Back-up

Gasoline		Diesel	
5 kw Yamaha (2 L./hr.)	$2,299.00		
3 kw Yamaha (2 L./hr.}	$1,299.00		
5 kw Onan (2.2 L./hr.)	$4,416.00	4 kw Onan (.95 L./hr.)	$4,600.00
3 kw Onan (2.2 L./hr.)	$3,650.00	7.5 kw Onan (1.9 L./hr.)	$5,981.00
storage - 2,000 litres	$1,000.00		$1,000.00

Total capital cost $4,598.00 to $11,5s1.00

Annual Operating and Maintenance Costs (estimates)
(based on low-medium load.)

	Full time operation	Half time operation
gasoline models		
fuel	$8,760.00	$4,380.00
oil	250.00	125.00
maintenance	150.00	75.00
diesel models		
4 kw		
fuel	$3,066.00	$1,508.00
oil	250.00	125.00
maintenance	50.00	50.00
7.5 kw		
fuel	$5,825.00	$2,915.00
oil	250.00	125.00
maintenance	50.00	50.00

operating costs would fall within the following ranges:

gasoline plant	$4,580.00 - $9,160.00
diesel plant	$3,090.00 - $6,125.00

The operating costs and reliability of diesel plants are such that they are the preferred option, despite the greater initial cost of a unit and back-up for it.

The capital costs of a power plant would be partially offset by the cost of a powerline estimated to be $4,500.00. The operating cost would be partially offset by the annual utility costs estimated to be approximately $3,000.00 which includes the costs of fuel wood. The need for fuel wood would be considerably diminished by placing the power plant in the garage workshop complex and thereby trap the jacket water heat and perhaps some of the exhaust heat as building space heat.

In summary, the installation of a power plant would increase the capital start-up costs. by up to $7,000.00, while operating costs could increase $10C).C)O to $6,100.00 annually.

3.2.2 Other Considerations

It is important that the ultimate location selected for a fur farm have school bus service for the Magum children. It is conceivable that a farm could be located along Highway #1 between Enterprise and the border or Dory Point. While this may serve the foxes it would not serve the family requirements or the fox "farmer. The costs of taking the children to where the bus could pick them up would add significantly to the cost of living and could prove the undoing of an operation before it developed to the point of assured profitability.

It is unlikely that other sites would be more or less difficult to develop. The costs of drilling a well for water may be saved if a site had a lake or river nearby or adjacent to it. But these are offset by the need for tanks and water storage facilities. Also well water is often not suitable for drinking - man or beast - purposes. It must be noted however that good quality well water is available in the Enterprise area.

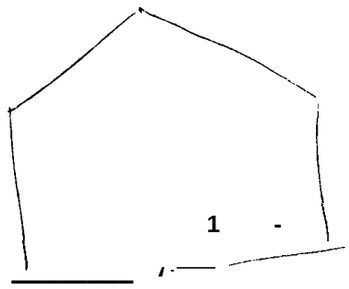
3.3. Residence

A productive operation will require a manager-in-residence. Initially the residence will consist of a mobile home for housing the Magrum family. Since the land on which the operation occurs is a lease, it is not proposed to build a permanent family home until title to the land is secured. It is estimated that an adequate mobile home with annex can be set in place for $40,000.00.

3.4. Out-Buildings - Feed Storage

Due to the critical role of feed in determining the success of a fur farm - 2 additional buildings are needed. These storage buildings are not incorporated into the main complex for fire security reasons. Both must however be built within easy reach of the main complex. A 16' x 24' uninsulated dry feed storage building is required. Material costs are estimated to be:

gravel pad and concrete slab		$ 1,100.00
strapped frame 2" x 4" 24" OC		
Tyvek wind break		
metal cladding		2,400.00
roof - trusses		
- sheathing		
- shingles		1,500.00
	Total	$5,000.00



3.5. Animal Holding Facilities - Breeders

The pens for breeding fox will be individual cages similar to those pictured on plate 1. Both male and female cages are set up outside spaced so that visual, audio and olfactory contact between foxes is possible but physical contact is not. Cages are set up so that the animals receive maximum exposure to the winter sun. Both male and female cages are identical-. To the female cage is added an insulated whelping box as shown on plates 2 and 3.

Breeder cages can be built in two basic styles, a box type or a quonset type. The basic construction methods are similar in that the frame is of lumber with wire mesh fastened to the frame with staples. Wire is held together by rings. Material costs are:

Box type		
4′ x 8′ floor	1" x 2" vinyl coated mesh	$16.88
sides/top/ends	2" x 2" mesh 14 guage	23.42
freight on mesh		20.00
p 1 ywood		23.00
1 umber		26.50
hardware, feeders, watering dish		15.00
	Total	$124.80
Quonset type		
4′ x 8′ floor	1" x 2"vinyl coated mesh	$16.88
sides/top/ends	2" x 2" mesh 10 guage	19.03
freight on mesh		20.00
1 umber		12.00
p 1 ywood		23.00
hardware, feeders, watering dish		15.00
	Total	$105.91

The box type is more common in the industry. Both styles require approximately 5 hours for construction.

Estimated cage costs are $125.00 plus labour. Breeder cages will have to be built each summer through year 4 to house the growing breeding herd.

3.5.1 Whelping Boxes

Whelping boxes are quite standard. All those observed consisted of a tunnel, a small vestibule and an insulated nesting area- (See plates 4, 5 and 6 for illustrations.) Material costs including plywood, styrofoam and hardware are approximately $60.00.

Additional whelping boxes will be added each successive year to house the growing breeding herd.

3.5.2 Pelter Sheds"

On weaning, the fox pups are removed to cages in which they will remain until they are pelted. Initially 2 or 3 pups can be put to a cage but as their pelt becomes prime they should be separated to individual cages so that they do not damage each others pelt by fighting or urine marking. Areas of the cages inspected during our field trip varied from 15 to 24 feet square with 4' x 4' being the most common size. The consideration here seems to be the ultimate width of the pelting building. In areas of high snow loads this affects the design of roof systems. In the N.W.T. where snow loads are light this consideration is not as critical as in southern Ontario.

Foundations on the other hand are a critical consideration. Where th-e uprights in Ontario are sunk to 3', in the N.W.T. it is advised that treated sills be used to prevent serious damage due to frost pushing uprights out and 50 damaging the building and perhaps allowing fox to escape. The estimated costs of a 100 cage shed follow.

The shed should be built on a gravel pad to promote good

drainage and to help control weed growth and so aid in the control of insects and parasites.

Material cost of shed proper	$ 8,700.00
Pelter cages - cost of material	4,500.00
	$13,200.00

Labour for the structure and cages are estimated to be 500 man hours.

Additional pelter holding facilities will be required in year 2 and year 3 in order to house the offspring-of a growing breeding herd.

3.6 Garage/Work shop/Pelt Handling Complex

A multi-purpose building is required for a myriad of functions like equipment, maintenance, fox food preparation, care of sick and injured animals, skinning and pelt dressing, The building must also serve as a parking garage for a farm vehicle.

The following areas are needed for the functions indicated:

Parking garage	200 ft^2
Equipment repair and cage construction	200 "
Animal care and food preparation	150 "
Skinning/Fleshing	100 "
Pelt drying and drumming	100 "
Pelt storage	100 "
Utilities	80 "
Storage	170 "
	1,100 ft^2

Incorporated into this building should also be an office and a breeding observation tower. This would add approximately 300ft^2. The breeding observation tower must be high enough to permit observation of all breeder pens. The optimum building should therefore be a two storey structure of at least 1,300 ft^2 in total.

Unfortunately the requirement for ground floor type space is greater than 2nd floor type space and a perfect balance cannot be achieved. Considering the essential requirements, it appears that a 2 storey building 20'x 40' will be required. Despite the predominant use of wood for heating the building should be a thermally efficient structure. It will require electricity and water and should have a drain leading to a natural "field" disposal system. It should be build on a gravel pad capped with a 20' x 40'

concrete slab.

Material Costs:

Shop/ Pelting complex	
- pad & slab	$ 2,500.00 "
-frame, roof, millwork & interior	12,600.00
"electrical	3,000.00
heat - wood	3,000.00
water tank	1,000.00
Total estimated	$22,100.00*

*These estimated costs assume that no additional costs will be incurred due to geotechnical considerations. Final placement and design should proceed only on full knowledge of soil conditions at the. building site. A geotechnical investigation will cost approximately $1S,000.00.

Preliminary building cost estimates provided by Clarke-Bowler Construction Ltd. were as follows:

pelter shed .	$20-22/ft^2	$48-52,800.00
feed shed	$30-32/ft^2	$11,320-12,288.00
reefer	$80/ft^2	$9,600-13,360.00
workshop	$85/ft^2	$136,000.00*

These costs breakdown to 60% material and 40% labour.

* This was based on a 40 x 40 ft. 1 storey building.

3.7 Capital Equipment

Whereever possible reliable equipment will be purchased from "used farm equipment" dealer's or auctions.

Mobile Equipment

1	light weight truck		7,500.00
1	farm tractor with front end loader		7,500.00
1	trailer for hauling fuel wood		2,500.00
1	utility farm wagon	est.	750.00
1	water tank & pump	est.	1,000.00
			$19,250.00

Animal Care & Handling - FOB Hay River

	tongs x 2	100.00
	syringes	100.00
7	sperm testing equipment	250.00
	feed containers & fish tubs	500.00
		$930.00

Pelting Equipment - FOB Hay River

	knives 9 x 3	27.00
	fleshing machine	1,200.00
	stretching boards 120 x 50	600.00
	drum	1,500.00
	blower with motor	250.00
	drying rack	150.00
	hangers, pins, grit etc.	300.00
		$4,227.00

Summary - Capital Cost (35 females & 15 males to start)

mobile equipment	19,250	
clearing - by Magrum		
powerline	4,500	- 6,000
residence	40,000	+ labour
security fence	9,110	+ labour
feed shed	5,000	- 12,288
breeding cages plus labour	13,600	
breeding stock* (FOB Hay River)	30,000	
feed equipment	500	
shop	27,600	- 135,100
pelter shed & cages	13,200	+ labour
animal care & handling	950	
pelter equipment	4,227	
Total	$167,937.00	+ labour to $284,225.00

*The price of breeding stock is very dependent on the pelt market and would go up in an improving market.

4.0 CONSIDERATIONS FOR A MINK AND FOX OPERATION IN THE NORTHWEST TERRITORIES

Many, if not most fox operations we visited raised mink before they started with fox. Fox, for them, were an interesting sideline that could be reared in response to the market with little extra expense. All fox farms visited during this study reared many more mink than fox.

Rearing fox on a mink ranch is a relatively simple task in that both animals will thrive on the same feed. Breeding of fox however is not so simple. , The rancher must be much more vigilant with fox than with mink.

In approving this study, the funding agency requested an assessment on the merits of breeding mink along with fox and so use two species as a hedge against down turns in the fur market. When pursuing this question with ranchers we visited, we were encouraged to consider a fox only operation. Several basic differences between fox and mink are at the root of this recommendation.

4.1 Feeding Strategies

1. A fox with a larger digestive system can injest sufficient food in one meal to tide it over a 24 hour period. A mink having a small stomach and short gut eats every 2-3 hours and therefore in -30°F temperatures may have to be fed wet feed 3-4 times per day in order to ensure sufficient intake for maintenance. The labour implications of such a feeding routine make winter mink feeding a very onerous undertaking.

2. Fox appear to adjust to a change from dry feed to wet feed

much -more readi 1 y than mink. When cold weather sets in the pellets will have to be fed in the form of a mash to ensure sufficient water intake. In mink, this transition will occur about a month before pelting. The adjustment period causes sufficient nutritional stress to affect pelt quality resulting in lower returns at the auction. (Dean Olsen - Hudsons Bay Company, personal communicate ens) Some experienced mink ranchers insist that the animals can only be switched from wet to dry or dry to wet feed at 3 specific times of year - December/January, April 10-15, and July. (Pellet Feeding by Austin Mullen - Mink Production Short Course. February 9, 1977).

3. Experienced ranchers estimate that 40 pounds of feed is required to put 1 mink pelt into the market. For silver fox the equivalent volume is approximately 142 pounds. Comparable feed prices are: -

mink 12.40/pelt marketed,
fox 98.51/pelt marketed,

using the National Pellet Feeding Program and the published prices for both fox and mink rations.

Relationship between feed cost (FOB Hay River) and average pelt prices for recent years are summarized below:

	Feed Costs in 1984 $		Market Prices/Pelt			
			Mink return* and margin on feed		Fox return* and margin on feed	
	Mink	Fox	/pelt	/breeder**	/pelt	ibreeder''
1980	12.40	98.51	24.14	96.56	196.33	588 .99
1981	12.40	98.51	19.56	70.24	180.28	340.84
1982	12.40	98.51	15.52	62• 08	185.53	742.12
1 983	12.40	98.51	17.39	69.56	55.49	166.47
1984	12.40	98.51	17.70″	70.80	77.08	231.24

* From Stats Canada and HBC records.
**Assuming an average of 4 kits/litter and 3 pups/litter for mink and fox respectively.

Table 4.1 The Mink Market for the Last 26 Years

Number and Value of Ranched Mink Pelts from Canadian Fur Farms

Year	Number	Value($)	Average($)	Number of farms
1958	902,783	15,968,133.	16.25	1,724
1959	1,033,857	18,698,209.	17.74	1,661
1960	1,203,853	16,888,286.	14.03	1,616
1961	1,271,449	18,436,537.	14.50	1,567
1962	1,295,672	19,602,300.	15.13	1,503
1963	1,400,021	22,142,286.	15.82	1,476
1964	1,416,085	21,126,989.	14.92	1,484
1965	1,624,154	28,279,404.	17.41	1,472
1966	1,810,691	22,471,658.	12.41	1,469
1967	1,967,323	22,789,385.	11.58	1,359
1968	196679945	22,689,589.	13.60	1,147
1969	1,778,737	18,649,822.	10.48	1,017
1970	1,499,211	14,466,752.	9.65	837
1971	1,136,522	14,648,752.	12.67	673
1972	1,046,179	16,745,578.	16.01	614
1973	1,065,808	19,184,638.	18.00	529
1974	1,113,061	16,429,319.	14.76	433
1975	955,754	19,382,425.	20.28	395
1976	911,337	23,814,878.	26.13	397
1977	949,292	24,8889256.	26.22	402
1978	1,025,684	42,115,525.	41.06	451
1979	1,063,907	46,981,141.	44.08	488
1980	1,213,684	44,351,362.	36.54	621
1981	1,390,689	44,450,500.	31.96	679
1982	1,465,961	40,930,523.	27.92	704
1983	1,491,910	43,357,145.	29.06	618
1984			30.10	

Source: Statistics Canada. Report on Fur Farms. No. 23-208

4.2 Holding Facilities

1. Cages for breeding fox are individual pens outside all year round whereas mink breeders must be housed in sheds similar to a fox pelting shed.

2. Mink require bedding constantly. In the N.W.T., dog mushers" have been paying $6.00/bale for straw bedding. The straw requirements for a mink ranch are 1 baleibr'ceding female. If the female produces an average of 4 pelted kits per year that cost is $1.25/pelt. On a pelt worth $30.00, $1.50 represents a significant portion of the margin.

A fox on the other hand requires bedding only once at whelping time. One bale of straw will satisfy 4-5 nest boxes for an average cost per pelted pup (average 3 per breeding female) of $.40-.50 for bedding, a minor cost on a pelt worth $175.00.

4.3 Breeding Herd Turnover

For fox it is reasonable to expect 6 litters per female so that once selected for breeding, and on producing the desired results in her first litter, the rancher can plan on 5 more years of production from that female, or 5 more chances to get the desired progeny in a selective breeding program. With mink, once selected for breeding, the rancher has only three chances to get desired progeny. The breeding strategy with mink ranchers is to keep many more females of a given type and so depend on probabilities for desired progeny whereas with foxes the breeding strategy is to go by breeding results rather than count on probabilities.

With the rapid turnover of mink breeding herd the rancher must be on the lookout for replacement breeders constantly - 1/3 of his herd annually - much of which should come from outside his stock. For an N.W.T. rancher this is a costly undertaking considering the distance travel led by both rancher and purchased breeding stock. Bringing in new stock also always brings with it the risk of new diseases and parasites.

The same challenge exists for a fox rancher except that once an optimum herd' size is established? it will be possible, if the . market is down, to forego bringing in outside breeding stock for a year or two. He has to replace his breeding herd only at the rate of 1/6 rather than 1/3 as with the mink rancher. Unless the mink rancher has a very large breeding "herd, it will be inbreeding much sooner than the fox rancher's herd in a low market when the ranchers can't afford to bring in breeding stock from outside. It must be constantly remembered that it's impossible to produce high quality pelts from poor quality breeding stock; and that it costs just as much to produce a high quality litter as a low quality litter. These principles apply equally to mink as to fox.

The possibility of trading breeding stock with other fox ranchers is also very good, thus cutting down on the costs of replacement stock from outside the herd. This practise is assumed for the first several years of Mr. Magrum's operation.

4.4 Disease Control

Disease control in fox is relatively simple and straight forward. The fox being a large animal is kept exposed and does not require closed shelter except during the time that pups are with the female. It is therefore easy to observe the animals and see

signs of nutritional stress or other ailments. That coupled with relatively few virulent pathogens makes fox a relatively healthy animal to keep.

Mink, being a smaller animal, requires constant shelter and therefore, if disease is suspected, the animal must be handled more (rather than observed, as with a fox) to confirm problems. Also, since mink are smaller with a higher metabolic rate there is less diagnosis and treatment time available to the operator. On a large mink ranch there are several deaths every day. Mink can suffer all the diseases the fox has, and several others and their agents like:

Aleutian disease - virus
Cellutitis - backeria
Chediak-higashi trouble - hereditary
Coccidiosis - protozoan parasite
Cotton underfur - nutritional
Enteritis - virus
Flies - numerous fly parasites
Flukes - numerous flukes - ie. liver, lung
Gray diarrhea
Hemoglobinuria - nutritional
Klebsiella infection - bacteria
Malignant edema - bacteria
Nursing sickness
Pleuritis - bacteria
Pneumonia - bacteria
Posterior paralysis
Toxoplasmosis - parasitic
Trichinosis - parasitic
Tularemia - bacteria
Tuberculosis - bacteria
Yellow diarrhea - bacteria

On a mink ranch, it is said that the most important time of day is the inspection for disease or other abnormal conditions in the herd. Despite the numerous diseases that afflict mink, the costs of a disease prevention program is similar to that for fox - $5-7.00/animal/year. The vigilance and labour required however is many times greater with mink than with fox.

4.5 Capital Investment

The capital investment for the minimum scaled mink farm will be greater than that for fox because mink - both breeders and pelters - must be housed year 'round. Except for the initial cost of breeding stock, starting up for receiving mink will call for more money than starting up for fox. Unlike fox however, a mink requires less space than a fox. The area required for a mink is approximately 1/2 of that required for a fox. This advantage is reduced however by the requirement to house breeders year round. With foxes, "breeders are not housed at all and pelters require a shed for only 6-7 months. The sheds therefore are unoccupied for a long period during which maintenance or renovations are possible with out causing any disturbance to the breeding stock.

The capital investment for pelting and pelt dressing are similar for both species.

4.6. Labour

Mink seem to be a much more labour intensive animal than fox. Where, while on a wet diet, fox need be fed only once per day - mink require. 2 feedings per day - especially in hot weather to prevent spoilage, and feed becoming "fly blown". The mink has a small stomach and short gut and therefore must eat small amounts - but frequently - every 2 to 4 hours. This feature causes problems with the very hot weather and the very cold weather. That is why pelletized feed is so popular when water is available in liquid form.

The vigilance required for disease detection in mink is also an

important labour consideration. Fox ante weaned and established on a pellet diet with automatic watering systems are almost carefree during the months of July, August and September. This permits the operator of a large operation to look after maintenance and other aspects of his operation. With a small (<50 females) fox operation many of the manager% take part-time employment or run their fox operations on a part-time basis. Under marginal market conditions this could be an option for Mr. Magrum with a fox only farm. This is not an option for a mixed operation - especially in winter.

4.7 Conclusions.

1. The direct costs of feed, immunization and bedding for mink production are about 2/3 of current market price for pelts.

2. The care and rearing requirements for mink are more exacting than for fox.

3. The capital investment in buildings and equipment is greater for mink than for fox.

4. The relative cost of production is higher for mink than fox when compared to the current market price for pelts.

5. The difficulties of watering, feeding and handling mink in the severe N.W.T. winter are predicted to be much greater than fox.

6. The challenges of maintaining strong breeding lines in mink require more purchases of new breeding stock with attendant risks than with fox.

7. Under the current mink pelt market conditions, rearing mink will not serve as a hedge against a down turn in the fox market. If one compares mink and fox pelt prices for the last 26 years, mink pelts (using current costs of production) would have been a hedge for a mixed mink/fox ranch 4 years and fox would have been a hedge in 9 years. It is noteworthy that the strong fox market is in the recent period (1976 to present), while the strong mink market occurred briefly in the period from 1978 to 1981. The conclusion is to stay out of mink under current market conditions.

Despite the conclusion that under present and foreseeable market conditions mink may not be an effective hedge against the vagaries of the international fur market, the operator should nevertheless explore options that provide the cash flow necessary to maintain high quality breeding stock and produce high quality pelts as efficiently as possible under "marginal and adverse market conditions.

The role of fur in the overall economy of the Northwest Territories may perhaps never regain the stature it once enjoyed. It can nevertheless be improved. Fur ranching is one aspect of the road to improvement. Mr. Magrum's operation can serve as a demonstration that fur ranching is a viable endeavour. The long term fate of the. fur industry may be in ranched fur rather than wild fur. It may therefore be useful to develop more types of ranched fur for the market.

Messrs. Brothers and Bollert are both experimenting with blue fox and lynx. Both would like to expand their experiments to include marten (sable on the market). Both operators encouraged Mr. Magrum to consider experimenting with new species rather than

expanding operations to include mink. Both gentlemen advised to stay away from blue fox because it has a very volatile market (which is down right now) and Canadians have not been able to improve on the Scandinavian production performance. It appears that the European producers can meet global market requirements. That is not the case with lynx which has not been ranched but has been bred in captivity successfully. Both men strongly recommended that Mr. Magrum apply his skills in trapping and handling animals to developing new types of fur for the ranch fur market. Both men also acknowledged that the wild fur available to an N.W.T. trapper was of superior breeding stock than say an Ontario lynx. .

How does this serve as a hedge?

1. An active trade in breeding stock brings in more revenue than the sale of pelts.
2. The sale of breeding stock does not necessarily track market cycles - especially for species that are in very short supply like lynx.
3. Development of new ranch species should be subsidized by the Department of Renewable Resources, Government of the Northwest Territories which is actively looking for ways to conduct research into breeding northern species for the purpose of establishing new commercial fur species, It would perhaps be less expensive to conduct this research at an operating factility set up to produce fur for the market than to establish a research facility with trained staff and equipment to look after what may turn out to be a relatively small herd of breeding animals.

The following figures show the volumes and average prices that N.W.T. white fox, lynx and marten brought between 1957 and 1979.

Figure 4.1

fluctuations in the annual harvest and average price for White Fox pelts from 1957/58 to 1978/79.

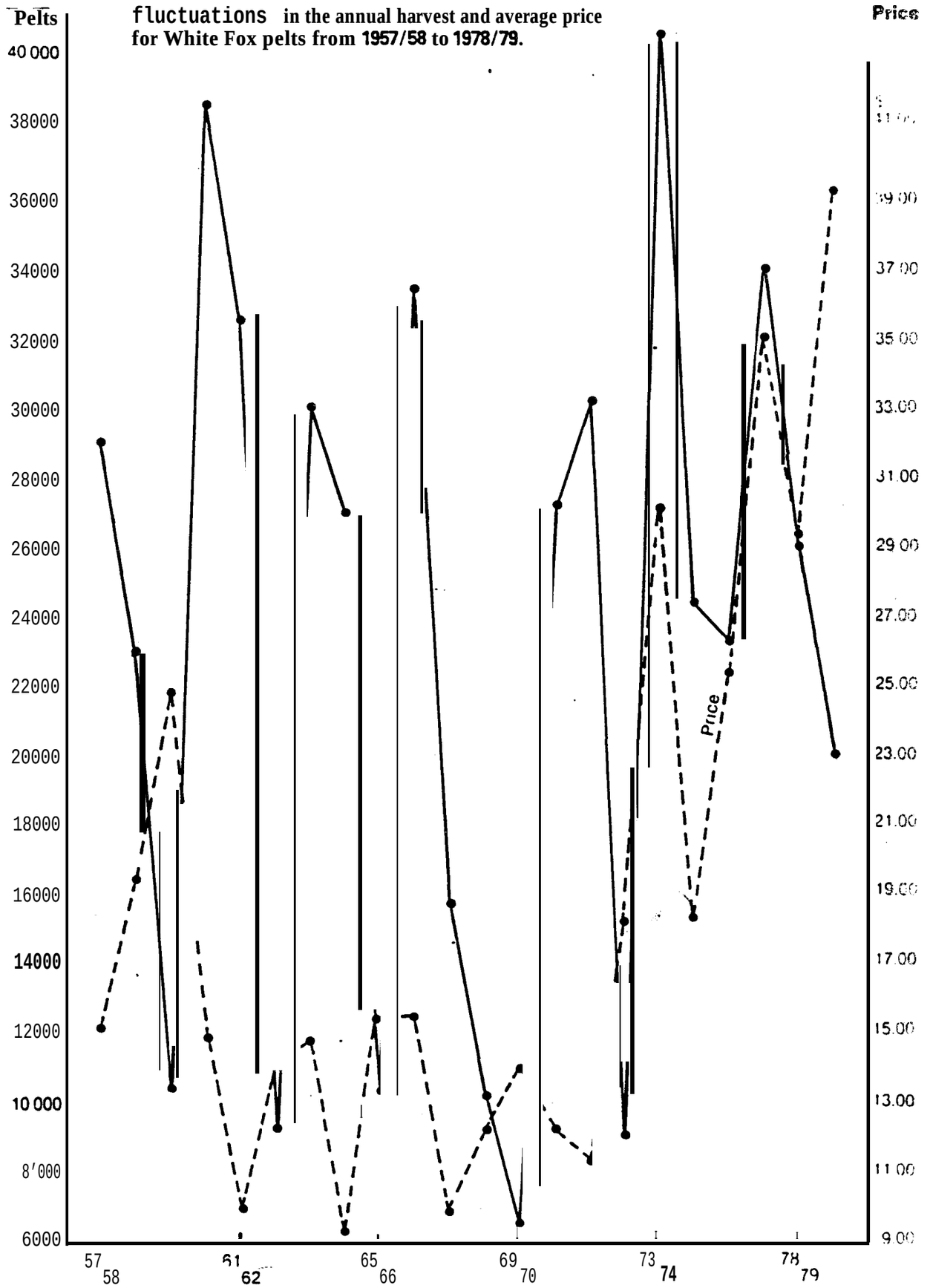
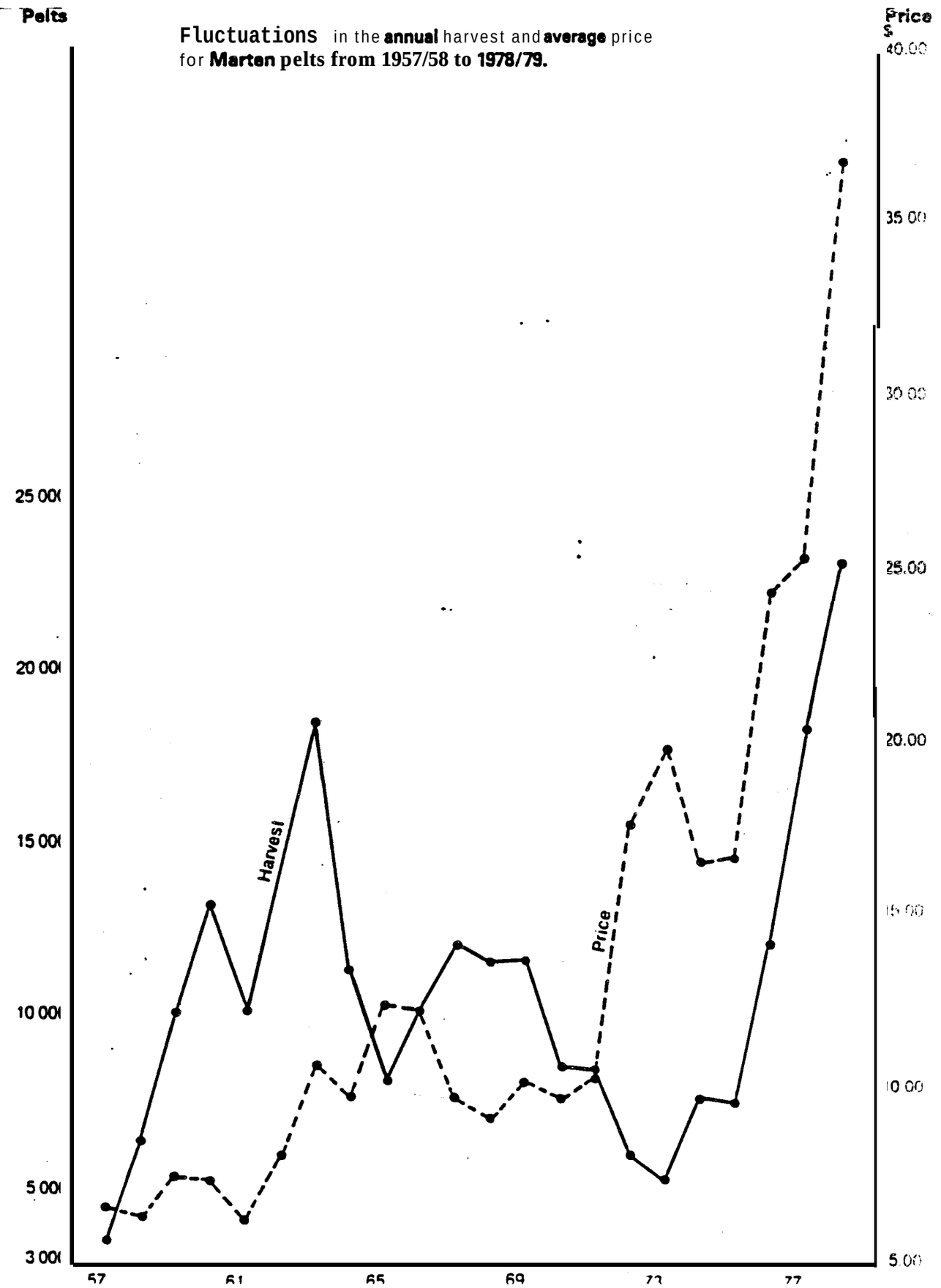


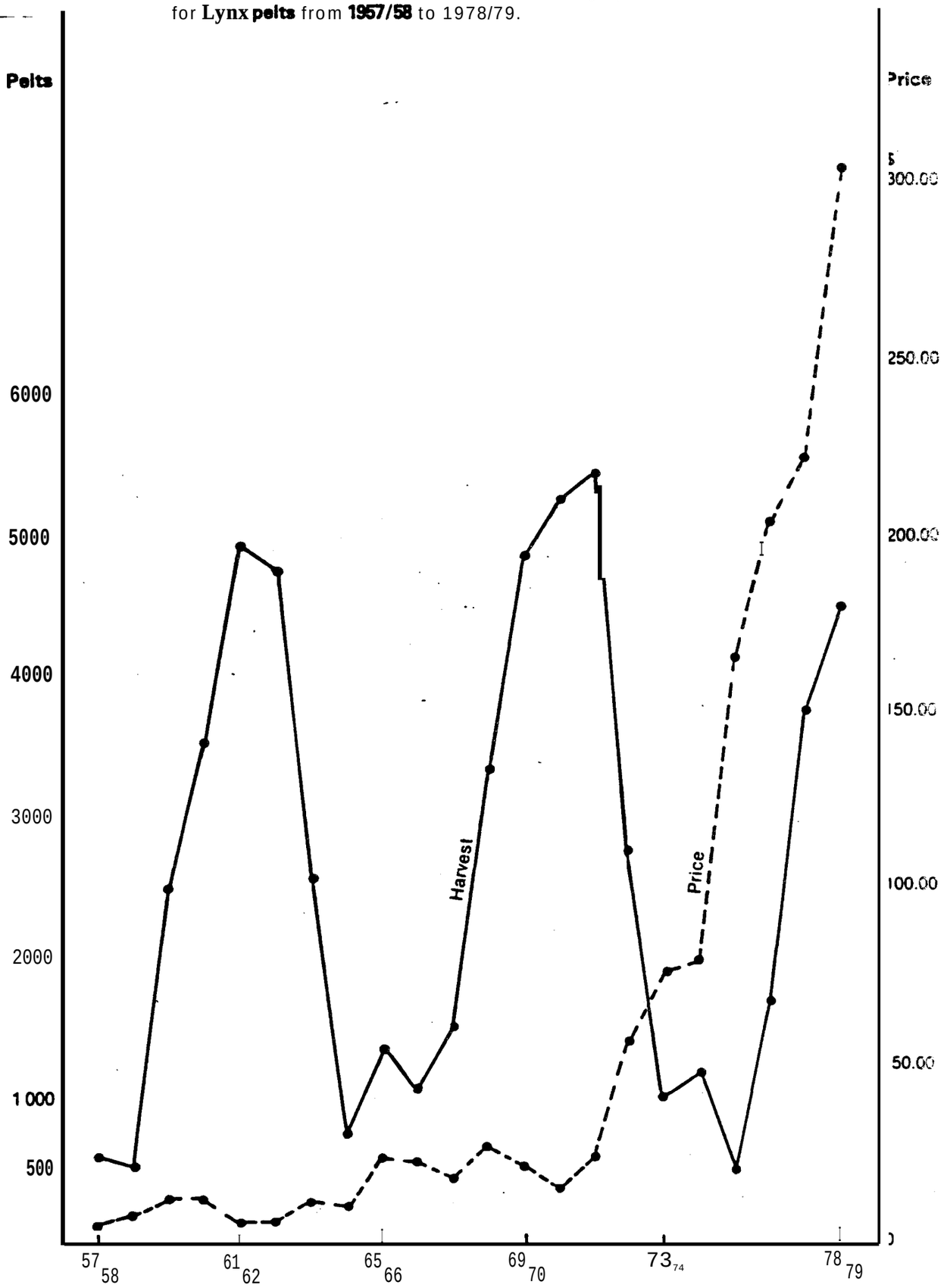
Figure 4.2



Fluctuations in the **annual** harvest and **average** price for **Marten pelts from 1957/58 to 1978/79.**

Figure 4.3

fluctuations in the annual harvest and average price for **Lynx pelts** from **1957/58** to 1978/79.



The figures above show the 19S8-1979 market for white fox, lynx and marten. Lynx is a highly cyclical species and therefore its supply is not reliable. A successful ranching program may provide a more steady supply and hence a steadier price. This could serve to benefit the market for wild caught lynx as well. The figures are taken from a publication" entitled Fish, Fur and Game in the Northwest Territories, published by the Science Advisory Board in 1980.

5.0 REGULATORY ASPECTS

5.1 Land Assembly

Holding commissioner's land for the purposes of a fox farm will require a lease arrangement with the Government of the Northwest Territories. Terms and conditions will be attached to the lease. At the time of writing these terms and conditions remained to be developed. It is known however that they will cover the following areas including:

- permissible activities,
- nature of access to main traffic corridor,
- garbage and refuse disposal, and
- water use.

5.2 Fox Farm

The establishment of a fur farm will require the Magrums' to get a Fur Farm Licence from the Government of the Northwest Territories. This licence is required by the Wildlife Ordinance and will cost $5.00. It must be renewed annually.

5.3 Export of Pelts

It is expected that all pelts to be exported will require a 9ame export permit as required by the federal Game Export Act.

5.4 Capture-and-Export

Should the fur farm wish to experiment with local species, a Licence-to-Capture-Live-Wildlife will be required. This item is available from the Department of Renewable Resources at a cost of $5.00 "or such higher fee as is specified "by the Superintendent".

Should the fur farm start exporting breeding stock to other fur farms, a Licence to Export-Live-Wildlife will be required. This licence costs $25.00 "plus the Superintendent's assessment of its average market value established by Canadian fur auction sales".

6.0 RECOMMENDATIONS

1. Further Investigation

a) Land Assembly - before final lot selection is made a further assessment of geotechnical conditions should be done. Prior to construction it is recommended that the presence or absence of permafrost conditions should be confirmed.

b) Pelting Technique and Selection of Breeding Stock

Before the breeding stock is selected it is recommended that Mr. Magrum again visit a fox farm operation to gain experience in recognizing the numerous aspects of pelt preparation. It would also familiarize Mr. Magrum with fox farm operations during fall/winter conditions when wet feed is being used.

2. Scale

A fox ranch under current fur market conditions can be an economically viable undertaking only on reaching a certain size. At current development costs and interest rates, it is doubtful that a ranch of the size that can be run as a family operation can provide an acceptable return on capital. Based on observations at operating ranches and discussions with ranchers, a herd of 150-200 breeding females would be an appropriate size of operation for a family. It would provide three man years employment.

The instantaneous capital investment for such an operation (200 breeding females) would be approximately $400,000.00.

When considering the learning aspects of the business, the natural increase of a breeding herd, the cash flow and capital requirements, we recommend the following approach to buildup of the breeding stock:

year 1 - beginning Oct. 1985		35 females
		15 males
year 2		70 females
		25 males
year 3		140 females
		50 males
year 4	up to	200 f emal es
		70 males

On the sale of pelts in year four, the operation should be in a break even position on the cost of operations, and could at that point finance further development from earnings.

3. Monitoring

The establishment of a fur farm in the N.W.T. will demonstrate another economic endeavor available to persons who wish to puruse an economically viable business in a rural setting. It will require a certain felxibility in zoning and land management planning in and around northern communities. It will also require a certain vigilance on the part of government agencies, that oversee rural lands, domestic animal care, and those quasi-agricultural pursuits conducted in the N.W.T. This project, if launched, could generate considerable interest and so in order to be most helpful, especially to prospective fur farmers, government should monitor the Magrum operations in order to answer questions and provide sound and helpful advice.

The governments of Ontario, Nova Scotia and Prince Edward Island all have sections in their Departments of Agriculture that deal exclusively with fur farming concerns.

4. Research

Most fur farms raise more than one species. A fully operational fur farm in the N. W.T. should be used to develop other fur species as a ranched pelt producer. Lynx and/or marten are northern species that have enjoyed favorable returns in the fur market. These species could be developed as a hedge for northern fur farmers..

A growing industry in the N.W.T. would also justify research into ways and means of using fish racks and offall as a furbearer food supply. At the present time it is marginal to use these products in a small operation because the animals produce best when on a steady and consistent diet. This is difficult to achieve when mixing ones own feed. Also more research should be conducted into the presence and levels of thiaminase in Great Slave Lake fish species.

A thriving fur ranching industry could lead to a local feed supply business using fish scraps, plus imported cereals and beef/chicken scraps.

7.0 APPENDICES

7.1 **Map of Hay River-Enterprise Corridor.**

7.2 Nutrient Requirements of Mink and Foxes. 69 pp. under " separate cover.

7.3 National Product Information.

7.4 **Masterfeeds** Product Information.

7..3 Photos .

7.6 Cash Flow Projections - 1 January 1985 to 31 March 1987
- 1" April 1987 to 31 March 1989.

PRODUCT INFORMATION

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Animal protein products: grain products: plant protein products: animal fat. preserved with BHA, Citric Acid. and propyl galate; vegetable fat: lecithin; molasses; thiamine hydrochloride; pyridoxine hydrochloride; folic acid; Vitamin B^{12}; Vitamin A palmitate; D-activated animal sterol (source of Vitamin D^3); riboflavin supplement: Vitamin E supplement; niacin; calcium pantothenate; choline chloride; calcium iodate; manganous oxide; zinc oxide; copper oxide; iron carbonate; ferrous sulfate; iron oxide; cobalt carbonate; and salt.

FEEDING GUIDE

Feed to adult animals during any maintenance period. NOT recommended for feeding to females during the gestation and lactation period, nor for growing pups. CAUTION: Fox fed pellets dry require more water than Fox fed wet feed. Ample clean. fresh water must be provided. Snow or ice will not provide adequate water.

MANUFACTURED BY

Milk Specialities Co.

NEW HOLSTEIN, WISCONSIN

NET WEIGHT 50 POUNDS

SUPER — GROWING & FURRING

National™

COMPLETE

FOX FOOD PELLETS

GUARANTEED ANALYSIS

Protein, not leas than	34%
Fat, not less than	15%
Fiber, not more than	4.5%

INGREDIENTS

Animal protein products; grain products: plant protein products: animal fat. preserved with BHA. propyl galate and citric acid; vegetable fat: sodium bentonite; Salt lecithin; cane molasses; thiamine mononitrate; pyridoxine hydrochloride: folic acid; vitamin B^{12} supplement; vitamin A supplement; vitamin D' supplement; riboflavin supplement; vitamin E supplement; niacin: biotin; sodium selenite; calcium pantothenate; choline chloride; calcium stearate; manganous oxide: zinc oxide; copper oxide; ferrous sulfate; iron oxide; cobalt carbonate: copper sulfate and calcium periodate.

FEEDING GUIDE

Feed from weaning through pelting. Clean, fresh water should be available at all times.

CAUTION: In accordance with good feeding practices, any change in feed should be made on a gradual basis. Established taste preferences may affect the acceptance of any new feed. Bloat, vomiting or diarrhea may result from a sudden change from wet feed. also from "extruded" type of feed. due to overfeeding.

MANUFACTURED BY

Milk Specialities Co.

NEW HOLSTEIN, WISCONSIN

NET WEIGHT ON BAG

LACTATION

National™

COMPLETE

FOXFOOD PELLETS

GUARANTEED ANALYSIS

Protein. not less than	32%
Fat, not less than	14%
Fiber, not more than,	4.50/0

INGREDIENTS

Animal protein products; grain products; plant protein products; animal fat, preserved with BHA, Citric Acid. and propyl galate; vegetable fat: lecithin; molasses: thiamine hydrochloride: pyridoxine hydrochloride: folic acid; Vitamin B^{12}; Vitamin A palmitate; D-activated animal sterol (source of Vitamin D'); riboflavin supplement: Vitamin E supplement; niacin; calcium pantothenate; choline chloride; calcium iodate; manganous oxide; zinc oxide: copper oxide: iron carbonate; ferrous sulfate; iron oxide; cobalt carbonate: and salt.

FEEDING DIRECTIONS

Feed from whelping thru weaning. Since established taste preferences may affect the acceptance of any new feed, any change in feed should be made on a gradual basis. Ample clean, fresh water MUST be provided at all times.

MILK SPECIALTIES CO.

NEW HOLSTEIN, WISCONSIN

NEW WEIGHT 50 POUNDS

REPRODUCTION

National™

COMPLETE

FOXFOOD PELLETS

GUARANTEED ANALYSIS

Protein, not less than	31%
Fat, not less than	9%
Fiber, not more than	4.5%

INGREDIENTS

Animal protein products, grain products: plant protein products, animal fat preserved with BHA, propyl galate and citric acid: vegetable fat: sodium bentonite: salt lecithin: cane molasses: thiamine mononitrate, pyridoxine hydrochloride, folic acid, vitamin B^{12} supplement, vitamin A supplement: vitamin D^3 supplement: riboflavin supplement; vitamin E supplement; niacin: biotin: calcium pantothenate: choline chloride, calcium stearate: manganous oxide: zinc oxide, copper oxide: ferrous sulfate: iron oxide cobalt carbonate; copper sulfate: and calcium periodate

FEEDING GUIDE

Feed from just prior to breeding to whelping. The females should be kept in proper trim condition prior to whelping.

CAUTION: Fox fed pellets dry require more water than fox fed wet feed. Ample clean, fresh water MUST be provided. Snow or ice will not provide adequate water.

In accordance with good feeding practices, any change in feed should be made on a gradual basis. Established taste preferences may affect the acceptance of any new feed. Bloat, vomiting or diarrhea may result from a too sudden change from wet feed, also from a dry "expanded" type of feed, due to overfeeding.

MANUFACTURED BY

Milk Specialities Co.

NEW HOLSTEIN, WISCONSIN

NET WEIGHT ONBAG

the week before whelping and afterwards increased gradually until the vixen is on full feed when pups are a week old. Pups will start to eat at 4-5 weeks of age and should be weaned at 8 weeks, earlier if vixen is in poor condition.

The vixen will consume 280 to 360 grams of wet feed per day for each pup in the litter feed consumption will increase by 150-250 grams per day.

Wet mixes are thus recommended during Breeder-Starter Phase from December through to June 15th. Some example Fox Breeder-Starter diets would be as follows:

Ingredients	Typical Rations		
Masterfeeds 20% Fox Breeder-Starter	40	40	40
Red Meat	20		20
Chicken Waste	-	25	10
Beef Liver	10	5	10
Fish	10	10	
Beef Tripe	20	15	15
Cooked Eggs		5	5
	100	100	100

A number of ranchers also have mink and during the breeding-whelping season will feed the foxes the same feed as mink. A typical ration in this case would be as follows:

	suggested	Range
Chicken Waste	30%	10 - 30%
Cooked Eggs	10%	0 - 15%
Fish	12%	0 - 30%
Tripe and Lungs	12%	10 - 25%
Liver	8%	5 - 15%
Meat	8%	0 - 20%
MASTERFEEDS 17% Mink Breeder-Starter	20%	20%
	100%	

MASTERFEEDS also offers what we call MASTERFEEDS 28.5% High Cereal Mink Breeder Starter, which is mixed at 30% of the ration and contains Fishmeal so that no Fish is required to be added at the Farm or Ranch.

Note: Sufficient water should be added to the above rations to make a proper mix.

A well balanced diet is a must, using these types of rations changes can be made in the make-up of the raw mix, however, the "Cereal" portion must be added at the suggested level. The suggested level of "Cereal" will supply the needed vitamin, trace mineral and carbohydrate quantities for best performance. Lower usage level may result in poor performance during the breeding and whelping season. .

Some ranchers prefer not to use fish in the ration and this can certainly be accomplished with both the Masterfeeds Fox Breeder-Starter and the Mink Breeder-Starter by using the animal by-products in greater quantity.

2. Growing Phase (June 15 - September 15)

As indicated above, pups will start to eat feed ("wet ration") at 4-5 weeks and will be weaned at 8 weeks unless the vixen is in poor shape. The fast growing puppy (during the summer) requires a highly nutritive,palatable diet which allows it to eat well and grow fast. Nutrient requirements for growth are outlined in Table 1 (taken from the National Research Council Nutrient Requirements for Mink and Foxes) . Once the pups are weaned, feed them all the feed they will eat to allow for maximum growth. Recommended feed from June 15th to September 15th is the Masterfeeds 25% Fox Puppy Grower Pellets. This is a dry pelleted feed. It contains 25% crude protein to provide for the demands for faster growth. Puppies will consume approximately 17 kg of Masterfeeds 25% Fox Puppy Grower during this period.

TABLE 1

Daily Nutrient Requirements for Growing Foxes .

		Age (weeks)							
		7	11	15	19	23'	27	31	35
FOR ONE MALE									
Body weight	kg	1.4	2.3	3.3	4.1	4.7	5.2	5.4	5.7
Daily dry feed	g	59.0	16S.0	195.0	213.0	195.0	172.0	159.0	150.0
Protein	g	15.0	42.0	49.0	53.0	37.0	33.0	30.0	2s.0
Minerals									
Calcium	g	.35	1.01	1.17	1.28	1.17	1.03	.95	.90
Phosphorus	g	.35	1.01	1.17	1.28	1.17	1.03	.95	.90
FOR ONE FEMALE									
Body weight	kg	1.3	2.2	3.0	3.7	4.2	4.4	4.6	4.7
Total daily dry feed	g	36.0	136.0	163.0	168.0	154.0	136.0	127.0	11s.0
Protein	g	9.0	34.0	41.0	42.0	29.0	26.0	24.0	22.0
Minerals									
Calcium	g	.22	.82	.98	1.01	.92	.82	.76	.71
Phosphorus	g	.22	.X2	.98	1.10	.92	.82	.76	. 7 1

1 kg = 1000 g
1 Lb = 454g

3. Furring-Pelting Phase (Sept. 15 - December]

In the fall the same puppy requires a feed which will allow it to continue to grow and produce a quality fur. Nutrient requirements are outlined in Table 1. Recommended feed is Masterfeeds 20% Fox Pellets (Dry feed).

Foxes will consume about 23 kg of Masterfeeds 20% Fox Pellets during this period.

Note: Mature foxes other than the milking vixen may be fed Masterfeeds 20% Fox Pellets at all times except during the winter when water intake may become a problem. .

By providing three seasonal feeds as outlined above, you have been relieved of the nutritional problems other than those related to meat, fish, eggs and chicken waste in the winter. The " MASTERFEEDS "cereal" solves the need for vitamins, minerals, extra protein and carbohydrate other than the by-products. The pellets provide all the nutrients required for growth and performance in the summer and fall.

By-products from poultry processing plants and meat packers and in some areas fish supplies are becoming increasingly difficult to obtain and with this demand also more expensive. Refrigeration, freezing and labor cost are increasing and the rancher has turned to "complete" dry feed pellets. Pellets while they have many advantages - (1) It is complete, (2) Needs no refrigeration (3) No mixing equipment needed (4) Reduced labor and (5) Better pelt, - have one major problem, water! Foxes need a lot of water. In the spring, summer and early fall water this is no problem but once freezing temperatures hit, problems maybe encountered on pellets.

Outlined below are the MASTERFEEDS Feeds which are available.

Type of Feed	Usage	Comment
1. MASTERFEEDS 20% FOX Breeder - Starter	40%	"Cereal" -Mix with 60% meat and fish and add water.
2. MASTERFEEDS 20% Mink Breeder - Starter	20%	"Regular Cereal''-Mix with 80% meat and fish and add water.
3. MASTERFEEDS 26% High Cereal Mink Breeder - Starter	30%	Contains fishmeal-mix with 70% meat, poultry and cooked egg by-product and add water
4. MASTERFEEDS 25% Fox Puppy Grower Pellets	100%	Pellet - Complete Dry Feed - Feed June 15 - Sept. 15
5. MASTERFEEDS 20% Fox Pellets	100%	Pellet - Complete Dry Feed Feed Sept. 15 - December Mature Animals.

Masterfeeds

A Division of Maple Leaf Mills Limited

FEEDING AND NUTRITION OF FOXES

This provides information about:

1. **Feeding programs for the breeder-starter, growing and furring phases.**
2. **Feed types available and information on mixing.**
3. **Daily Nutrient Requirements of growing foxes.**
4. **Typical ingredient analysis of by-products for foxes.**

FEEDING PROGRAM

The Masterfeeds Fox feeding program **is** divided **into** three sections to adjust to the nutritional requirements for **reporduction** and maintenance, starting the young pups, growing and the furring-pelting phase.

1. Breeder-Starter Phase (December - June 15th)

Wintering foxes on dry feed on a ranch scale continues to be a problem because of water consumption. Foxes require a considerable amount of water and unlike mink, foxes **will** not eat enough snow or lick **ice** to get sufficient water. Feed recommended for foxes during the winter **is** thus a "wet ration" using either **Masterfeeds** Fox Breeder-Starter or one of the Masterfeeds **Mink Breeder-Starter** "Cereals" as the base, along with fresh or frozen meats, **fish,** cooked eggs and/or poultry waste. The "Cereal" is a source of carbohydrate (energy) , some extra protein, vitamins and trace minerals.

Energy (fat) **levels** of the **winter** rations are also very **important** as **it is difficult** to **keep the vixen (female) in good shape** and **in** some cases to keep them **alive in** the bitter cold periods. If vixens are too thin, reproduction also may become a problem.

Foxes only cycle once a year which appears to be related to lights, and breeding takes place from **mid January to** mid **March.** It is thus important that the vixen be **in** "trim" shape for breeding. Foxes generally are **in** almost too good a condition **in** December since **we** are trying to produce **a quality pelt and must** thus **be watched closely and feed quantity reduced. Fat vixens will** have breeding problems and **if too heavy** will also **have** problems during **whelping (giving birth) and be more susceptible to milk fever. Feed must be** reduced

Northwest Territories, YELLOWKN I FE

GOVERNMENT OF THE NORTHWEST TERRITORIES

EXECUTIVE OFFICES

DATE: Dec 31/85

TO: GERALD TANNER
REGIONAL DIRECTOR
KEEWATIN REGION
819-645-2856.

FROM: STUART WOOD
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MINISTER LAUDS BEAUFORT FIND

YELLOWKNIFE ( )--Tagak Curley, minister of energy, mines and resources, says Gulf's announcement of a major oil find indicates the Beaufort Sea has the potential to become one of Canada's major oil-producing regions.

Gulf Canada Resources disclosed Monday that its Amauligak drilling site on the Beaufort seabed 48 miles northeast of Tuktoyaktuk could contain an oil field in excess of 400 million barrels.

"This is by far the largest oil find ever in the Beaufort," said Curley. "And it doubtlessly will spur Gulf and the other main Beaufort players to intensify their exploratory efforts on the seabed to locate other pools."

Meanwhile, Finance Minister Tom Butters said he is "delighted" at Gulf's success and enthusiastic about the future of the Beaufort and the positive effect it will have on Western Arctic business. Butters also is MLA for Inuvik.

The Gulf field (below 100 feet of water) is twice the size of all of Norman Wells' reserves. It is expected to yield about 35,000 barrels a day, the rate at which Norman Wells now pumps.

"The find could not have come at a better time," said Curley. "Both Gulf and the other players consider the 1985-86 drilling season as a make-or-break year and, as a result, have been drilling more in the Beaufort than ever before. It appears now that their determination and tenacity have been rewarded."

The minister suggested that the Gulf find, along with smaller concentrations of oil in the Beaufort, could make production practical.

"With this major field the economics of extraction are dramatically changed," said Curley. "It means that concentrations that up to now have not been commercial could become so."

In addition, said Curley, if a pipeline is built to bring out the oil it will probably follow the Mackenzie River south, meaning an increase in exploration all along its route down the Delta and the Valley.

"The same economics will be true in the Delta and the Valley," Curley said. "With a pipeline already in place oil that might not be commercially supportable on its own could be."

At the same time, Curley said, Gulf's production would not begin until probably the 1990s, "giving all of us sufficient lead time to address all social and environmental issues.

"As a government, while we are delighted with the find, we also are aware of the need to ensure that it is extracted without damage to our environment and our people," Curley said.

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