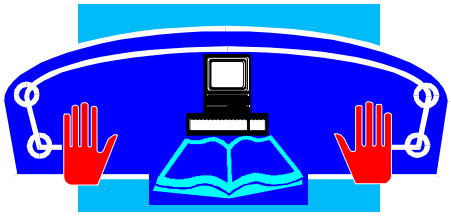

Small Scale Agriculture In The Northwest Territories

Type of Study: Industry Development Agriculture, Nwt Agriculture

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December 12, 1985

Mr. Sydney Kirwan
Head Renewable Resources Development
Department of Economic Development and Tourism
Government of the Northwest Territories
Yellowknife, Northwest Territories

Dear Mr. Kirwan:

RMC Resources Management Consultants (NWT) Ltd. is pleased to submit to you our report entitled "Small Scale Agriculture in the Northwest Territories".

Agriculture is a sector of the renewable resource industry that has a real role to play in the economic development and diversification of the Northwest Territories. This report outlines some of the opportunities and constraints of agricultural development, and we hope that the study will be an usefull addition to the ongoing discussions.

The economic and political situation in the NWT makes agricultural development a multi-faceted and challenging task, and we would like to thank you for the opportunity to undertake this study.

Yours truly,

RMC RESOURCES MANAGEMENT CONSULTANTS
(NWT) LTD.

Maarten Ingen-Housz
Associate

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EXECUTIVE SUMMARY

The study presented in this report, entitled "Small Scale Agriculture in the Northwest Territories", was commissioned by the Department of Economic Development and Tourism of the Government of the NWT and done by RMC Resources Management Consultants (NWT) Ltd. in the fall and early winter of 1985. The focus of the study is on economic and technical feasibility of small scale commercial agricultural production in the South Slave Lake and South Mackenzie area.

Agriculture covers a wide variety of activities and has, for the purposes of this study, been limited to traditional agriculture aimed at providing food for the local market. This starting point excludes such agricultural activities as fur farming and greenhouse production because these activities are outside the mainstream of agriculture in Western Canada. The emphasis on the small scale of possible development excludes those activities that require large capital outlays such as milk production.

The technical feasibility of agriculture in the southern NWT is not really in question. Agriculture has a rich history in the area, dating back to the 17th century. More recently there are the Agriculture Canada experimental farm in Fort Simpson and the continued existence of market gardens in the Hay River - Enterprise corridor. Closing the experimental station was not a reflection on the feasibility of agriculture in the NWT, but rather a reaction to the low level and slow pace of agricultural development. This study addresses the technical feasibility by reporting on a number of assessments of the agricultural capability of selected areas, done in the late 70's, and by comparing data on several climatic variables, with relevance for plant growth, from the study area and more established agricultural regions in the Peace country of Alberta. In addition, there is a discussion of several production methods, ranging from careful site selection for a market garden to possible adaptation of livestock through cross-breeding, that can be used to increase the success of agricultural production in the north.

Lack of a sufficiently large number of established farms lies behind the choice of a budget rather than a consensus research approach to the question of the economics of small scale agriculture in the NWT. Cost and return budgets are set up for a number of farm operations using cost data gathered in the study area. A three acre market garden, a 4000 hen egg laying operation, and a small hog farm show positive returns to capital, management, and labour using this approach, while a 250 acre crop enterprise, a 250 acre hog farm, and a 40 head cow-calf operation show negative returns. These results are tested by changing some of the underlying assumptions and by including the $50/tonne feed freight assistance that is available to NWT farmers, but the picture does not change.

It should not come as a surprise that setting up a farm from scratch is not always feasible in the study area. The same kind of results would be obtained all over Canada. One of the ways to circumvent the negative returns is by supplementing the family income by off-farm work and building up the farm over a number of years. All enterprises, except one 40 head cow-calf operation, give positive returns to capital, management, and labour if it is assumed that the farm is paid for, stocked, and equipped by off-farm income.

Subsistence farming is another way to counter the negative returns of some enterprises. In this type of farming, which falls outside the commercial sector, capital outlays are kept to a minimum by keeping the scale very small, basically just enough to provide for the farm family. A short discussion of subsistence farming has been included in this report because it may be a first step towards a commercial operation and it has been suggested that its a good vehicle for Native people to get into agriculture.

More agriculture development will provide a number of jobs and may reduce transfer payments. However, the size of the NWT market will limit the size of the agricultural sector and thus the number of jobs that would be created. If NWT farmers would capture 25% of the market in the study area, the total industry would not exceed 23 small part-time beef producers, 2 pork producers, 1 egg laying operation providing one half-time job, 17 market gardeners, and 6-10 cereal/hay farmers, who would be busy in the summer but not in the winter.

A more developed agricultural sector with the full complement of farms that the local market can support would need further development or establishment of an infrastructure, especially of the vegetable storage and transportation system, the meat processing system, and inspection. Supplying the Yellowknife market with locally grown produce throughout most of the year requires expansion of the storage facilities that are available. A well positioned central storage for potatoes, carrots, cabbage and other storeable vegetables offers an opportunity to NWT farmers to take advantage of higher prices

outside the harvest period and could increase the market power of the producers. Volumes of slaughter are too small to support a killing plant and facilities will remain a very real obstacle to the livestock industry in the NWT. A possible solution may lie in a small, possibly mobile, slaughtering facility that would process the animals on the farm. Territorial inspection and regulations would be needed if meat processed this way were to be sold in the retail trade.

Although the economic and technical feasibility of agriculture in the NWT are the focus of this report, there is a need to investigate the political environment. Agriculture will compete for a landbase with hunting and trapping, urban expansion, and recreation. The small scale of the developments will limit the conflicts although steps to regulate the use of potential agricultural land for residential purposes are needed.

A greater barrier for the development of agriculture is the perception that further developments should not take place so that they can not prejudice the land claims negotiations. There are indications, however, that the Dene/Metis Negotiating Secretariat would view small scale agricultural development proposals in a positive way if they were community initiated and oriented, would involve aboriginal people in all phases, and be sensitive to other renewable resource and environmental concerns. The Fitz/Smith and the Hay River Dene Band both have indicated an interest in agriculture as an alternative economic base for their communities and the Hay River Band is actively investigating the possibilities for a large egg laying facility. All these are indications that there may be room for agricultural development before a formal settlement of the land claims, especially if the development is initiated by Native people.

Involvement of the non-native farmers will likely be limited to the parcels of land now deeded or leased. But even within these very narrow confines there is room for further expansion since not all market garden lots are actively worked.

If agriculture is to develop further in the NWT, and there are economic and political indications that it can, it is most likely that it will spread from the small pockets of agricultural activity that now exist. These active pockets indicate a possible structure of the industry with vegetable growing and egg production in the Hay River - Enterprise corridor, and with Hay River and Yellowknife as markets; livestock production, especially hogs, and vegetable growing in the Ft. Smith area, where there is also a possibility for subsistence farms under the umbrella of the Fitz/Smith band, and market gardening in the Ft. Simpson area, possibly with an eye on the Yellowknife market.

Relatively simple measures on the part of the Territorial government can help this possible development along. A separate organization to open up the channels of communication between farmers, Native organizations, and government would help to keep proposed developments within the boundaries set by each of the participants. Formalization of the existing links between NWT farmers and Alberta extention services and Agriculture Canada research stations would facilitate the spread of knowledge to people in agriculture. Finally, arrangements with the Farm Credit Corporation would make credit more readily available. All these steps would be very beneficial to the development of agriculture in the NWT and, at the same time, not clash with any stated preconditions put upon the development.

TABLE OF CONTENTS

1. INTRODUCTION

The fall of 1985 was marked by a barrage of announcements of support payments to the agriculture sector by both the federal and provincial governments. Prairie agriculture is in a difficult position after several consecutive years with draught, grass hopper infestation, and early snow. These climatic set backs come on top of a far more structural problem of high, often crippling debt loads, and an ongoing spiral of increasing input costs and decreasing product prices. There is continued talk about the crisis situation in agriculture.

Considering this less than rosy picture of the agriculture sector, why would there be interest in investigating whether or not there are possibilities to develop a more vigorous agricultural industry in the Northwest Territorities, the very fringe of the area where traditional agriculture is agronomically possible? The answer to that question lies in the scale and orientation of the proposed agricultural development.

This report addresses some of the questions that surround the possibilities for small scale agricultural production in the NWT, a production geared towards the supply of food to the local market. It is this persecutive that sets the (possible) developments that are discussed in this study apart from the mainstream of prairie agriculture. Instead of large scale production for the export market, the focus is on small scale production for the local market. The different perspective does not mean that all the forces, both climatic and economic, that influence southern agriculture have no hold over agricultural production in the North. Economies of scale, the need for mechanization, and erratic weather patterns do influence northern agriculture. But by keeping the scale of production small, there are possibilities for more intensive management; and by focussing on the local market, there are reasons to shift away from the major cereals towards more labour intensive, higher priced crops such as vegetables. Further on in the report it becomes clear that, indeed, those enterprises that emulate southern cereal agriculture but on a smaller scale have less chance of survival than those that explore the less common path of, for example, vegetable growing.

The study presented in this report is economic in outlook. there are some parts of the report that contain agronomic information, but the study is not intended to produce a handbook for northern agriculture. The study area is the South Slave Lake and South Mackenzie area, and the economic analyses of different enterprises are kept relatively general to arrive at conclusions with relevance for the total study area.

Focus was on economic feasibility on an industry level and this study should not be used to asseses any particular farm. A site specific investigation will be able to adjust the general information given here to the particular circumstances of each operation and come up with specific operational plans.

The low level of development of the agricultural industry in the NWT necessitates an often exploratory approach to questions of economic viability. There are simply not enough farms around to be able to come up with sufficient insights by studying existing operations. The first four sections of this report contain the exploratory part and section 5 discusses the possibilities and barriers that the political and economic reality of the NWT brings with it. More in detail, the structure of the report is as follows.

Section 2 analyses the market for agricultural commodities in the southern part of the NWT. To supply the market or segments thereof with locally grown commodities is the reason for any of the agricultural enterprises discussed in this report. It is therefore proper to start with an investigation of the size and characteristics of this market.

Section 3 discusses, in general terms, the requirements for production in terms of soil, climate, and special cultural practices that are needed in the north. This section presents an inventory of agronomic information on the study area.

Section 4 contains the bulk of the economic analyses and gives estimates for costs and returns for a number of agricultural enterprises. The economics of small scale agriculture presented in this section forms the basis of the discussion of the desirability and political viability of agriculture in the NWT.

Section 5 is a logical extension of section 4, and explores the socio-economic ramifications of the agricultural enterprises discussed. There are both socio economic costs and benefits connected with agricultural development, and this section discusses these costs and benefits.

Section 6 sets itself apart in that it does not explore what could be but rather what the political realities are and how the possibilities, explored from an agronomic and economic stand point in Section 2 though 5, could be expedited.

In general terms, the report is set up to present the major flow of the argument in the text, illustrated with tables or figures where appropriate. Materials that support or explain the numbers used in the report have been collected as much as possible in the appendices.

2. MARKETS

2.1 Market Size

The market that this study focusses upon is the southern Northwest Territories, more precisely Yellowknife, Ft. Smith, Hay River, Ft. Simpson, and smaller communities around these centres. It is assumed that the primary focus of agricultural production in the NWT will be to supply local demand, and this section presents an estimate of this local demand.

Two of the most used sources of consumption data are the apparent per capita consumption and the family food expenditure data, both published by Statistics Canada. The apparent consumption data estimates the amount of a commodity that is available for consumption by estimating all uses other than consumption of a commodity and subtracting this amount from the total production and imports of that commodity. Thus the apparent consumption figure gives an estimate of what is available for use to the ultimate consumer through retail stores and the hotel, restaurant, and institutional trade. Family Food Expenditure data, on the other hand, are the result of a survey of the actual purchases of consumers in retail stores, and thus reflects consumption more directly, albeit only of food purchased in stores and not restaurants.

The Family Food Expenditure data allow for a further breakdown of the Canada-wide apparent consumption figures to a more regional and product specific level. The result of this regionalized consumption is presented in Table 1.1. Included in this table are the amounts that local processors or producers could hope to market under different market share assumptions (i.e. 50-25-10%) and an estimate of the percentage of the year in which they can expect to be able to market their product. This last item ranges from the ability the market year round (i.e. 100%) in the case of non seasonal commodities such as eggs and meat, to a short marketing season (i.e. 15% of the year or less than two months) for perishable commodities such as lettuce and broccoli.

Please note that the estimates presented in Table 1.1 are based on Canada-wide estimates that are regionalised by using Family Food Expenditure data to reflect the reality of the NWT. For those communities with an active hunting and trapping economy this approach may lead to an overestimation of e.g. meat demanded at the store level due to the availability of wild meats. A source of underestimation is the fact that stores in the market area do also service bush orders (to camps and boats). This market is highly seasonable and dependent on the general level of economic activity and has not been incorporated in the estimate.

Table 1.1

Estimate of the size of the market for selected agricultural commodities available to local producers under different market share assumptions (in tonnes).

Commodity	Kg.	Total Tonnes	Time	Total Needed	Market Share 50%	Market Share 25%	Market Share 10%
Pork Fries	10.42	247.00	100.00	247.80	123.90	61.95	24.78
Loin Cuts	6.45	153.39	100.00	153.39	76.69	38.35	15.34
Belly Cuts	2.18	51.84	100.00	51.84	25.92	12.96	5.18
Shoulder Cut	1.24	29.49	100.00	29.49	14.74	7.31	2.95
Beef Fries	30.72	730.55	100.00	730.55	365.28	182.64	73.06
Hipcuts	5.70	135.55	100.00	135.55	67.78	33.89	13.56
Loin Cuts	3.58	85.14	100.00	85.14	42.57	21.28	8.51
Rib Cuts	10.53	250.41	100.00	250.41	125.21	62.60	25.04
Chuck Cuts	5.56	132.22	100.00	132.22	66.11	33.06	13.22
Stewing Beef	0.82	19.50	100.00	19.50	9.75	4.88	1.95
Ground Beef	9.44	224.49	100.00	224.49	112.25	56.12	22.45
Eggs	12.75	303.21	100.00	303.21	151.60	75.80	30.32
Potatoes	69.72	1658.01	80.00	1326.41	663.20	331.60	132.64
Carrots	8.72	207.37	80.00	165.90	82.95	41.47	16.59
Turnips	2.54	60.40	80.00	48.32	24.16	12.08	4.83
Cabbage	6.13	145.78	70.00	102.04	51.02	25.51	10.20
..Lettuce	8.86	210.70	15.00	31.60	15.80	7.90	3.16
Onions	6.88	163.61	70.00	114.53	57.26	28.63	11.45
Cauliflower	2.24	53.27	15.00	7.99	4.00	2.00	0.80
-Broccoli	1.26	29.96	15.00	4.49	2.25	1.12	0.45
Honey	6.85	20.21	100.00	20.21	10.10	5.05	2.02

Source: Statistics Canada 32-229 and 62-554, and RMC Analysis

The estimates of table 1.1 are based on a population estimate of the total Ft. Smith region, including Yellowknife, Ft. Smith, Ft. Simpson, and Hay River. The market size by population centre is given in Appendix A.

Consumption patterns change over time; beef consumption, for example, has been steadily declining over the past years. However, the changes in per capita consumption will have a relatively small influence in the total market available to NWT farmers due to the small size of the agricultural sector. Any change over time in the total consumption of a commodity will influence the market for NWT farmers a lot less than a change in the share of the market that they hold. Thus the development of the market size over time is being investigated on the basis of market share assumptions which have been included in Table 1.1 and Appendix A.

2.2 Marketing channels

Retail stores

Of the 7 major stores in the market area - IGA and Super A in Yellowknife, Super A in Hay River, Hudson Bay, Food store and Keasar's in Forth Smith and the Bay and T.J.'s in Fort Simpson, - four stores have experience in the purchase and resale of locally grown produce: Godwin's Super A in Hay River, the Bay and T.J. Grocery Ltd. in Fort Simpson and Keasar's in Ft. Smith. These stores responded positively to the possibilities of retailing local produce and the Hay River store has a substantial history of marketing some of the products of the market gardens in the area. The major limitation here is not the willingness of the retailer, but the limited supplies of local growers after their on-farm sales have taken place. Two of the Hay River area gardeners have in the past washed and bagged their produce when supplying the store, (the bags were supplied by the store) and received the Edmonton wholesale price plus freight from the garden to the store for their produce.

Those stores that did not have any experience in handling local produce were, in general, hostile to the idea and used the argument that it would upset the relationship with their wholesaler. Stores in the area are supplied by Home and Pilfield(IGA, YK), Alberta Grocers (Super A in Yellowknife and Hay River and T.J.'s in Ft. Simpson) and Scot National (Hudson's Bay Food store - Fort Smith). The Hudson Bay's food store in Fort Smith used to use Alberta Grocers but switched to Scot National and receives better produce after the switch.

Edgson's produce occupies a special position in the Yellowknife market. This new entrant is establishing a produce-only store and brings up one truckload of fresh produce from larger market gardens in the Peace River country and from an Edmonton based wholesaler. The set up of this store could allow introduction of locally produced vegetables and the owner showed willingness to use local supplies.

Institutions

The institutional trade can be considered as another outlet for local products. Contacts with the penitentiary in Yellowknife showed a willingness to consider local products. Currently the correctional centre tenders a contract for the supply of their food products over the period of one year in February. Traditionally the centre has negotiated a standing offer to supply food with one wholesaler, but the tender process does not exclude more than one supplier so that, in principle, there is room for e.g., a NWT market gardener to supply produce. Ability to supply over a specified time is the key to penetrating the institutional field, which covers, the correctional centers in Yellowknife and Hay River and local hospitals.

Other

A successful way of marketing, especially for market gardeners, is farm gate sales. This method, together with its variant, the pick-your-own market garden, ensures the highest return to the operation because all middlemen are cut out of the action. Market gardens in the Hay River - Enterprise corridor have used this method successfully for a number of years and these operations only sell through the Super A in Hay River on odd occasions when one crop (e.g. potatoes) is especially abundant.

Farm gate sales have also been used by at least one livestock producer in the NWT. The difficulties that surround inspection of meat and the fact that local trappers know how to butcher animals led to the sale of live finished hogs to the end consumers, who then processed the animal themselves.

2.3 Transportation

Food commodities are currently shipped up by truck from Edmonton, with the exception of the supply of the Yellowknife market in the period of freeze up and spring thaw when the road bans are on. In the latter case produce and groceries are trucked to Hay River and flown into Yellowknife. The larger stores in the area are supplied two or three times a week.

Transportation for general merchandise from Edmonton to the major markets in the study area are given in Table 1.2. These rates are those that trucking companies must post with the Western Tariff Bureau and can only be used as a guideline for the actual transportation costs paid by area retailers. Information gathered in Yellowknife suggests that the larger stores may pay 10-15% less than the posted WTB tariffs due to the use of private carriers.

Table 1.2

Freight Rates for General Merchandise, 1985
$/cwt

Edmonton to:

	15,000 lbs.	40,000 lbs.
Hay River	13.28	5.94
Fort Smith	16.01	7.18
Fort Simpson	16.83	7.63
Yellowknife	18.39	8.36

Notes: Refrigeration increases the price by $5/truckload; less than truckload surcharges $74/load.

Source: Alberta Agriculture transportation branch based on W.T.B. rates.

The setting of the rates is influenced by a number of factors such as road conditions, and backhaul availability. Since most of the traffic, especially of refrigerated truckloads goes one way, i.e., into the NWT it can be assumed that the rate structure reflects the unavailability of backhaul. There are indications (Highway Transport Board 1979) that never more than 50% of the volume of general merchandise trucks are used on the way back and the real percentage is possibly substantially lower.

Two major population centres in the study area, Yellowknife and Fort Smith are at the very end of the transport routes, leaving only Hay River as a location to which producers outside the direct area can ship using backhaul opportunities. This factor should be kept in mind when considering the location of any agricultural enterprise that is not necessarily tied to a larger land base such as hog finishing, and egg production.

Locally produced products are sheltered to some extent by the cost of transportation from Edmonton. The transportation advantage is largest if the production takes place right where the final market for the commodity is. Experiences of the market gardens in the Hay River-Enterprise corridor show that people are willing to travel quite some distance to purchase fresh produce. The Alberta experience is that market gardens can draw their customers from up to 60 km distance.

The transportation advantage becomes less and less if one locally produced food has to be brought to its final consumer. Yellowknife is a market that cannot be supplied to any substantial degree by gardens in the area; the soil and climatic constraints are too severe. The transportation costs there will be incurred to get produce from, eg. Hay River to Yellowknife, will be proportionally higher than the Edmonton - Yellowknife freight rates due to smaller, less frequent and more irregular runs.

3. PRODUCTION

3.1 Soils

Approximately 4.4 million hectares of the southern N.W.T. have been surveyed and evaluated. Reports have been published on the soils of the Slave River lowlands (Day 1972), the Upper Mackenzie area (Day 1968) the Liard and Mackenzie area (Rostad 1976), and the Hay River Valley (Kozak and Rostad, 1977). A special publication (Rostad and Kozak 1977) addresses the separate issue of the agricultural potential of these areas in the Northwest Territories.

Agriculture potential is a wider concept than agricultural capability. The latter depends on soil and climate only, and covers the agronomic possibilities of growing crops. The former comprises capability, size of suitable soil areas, ease of access, present forest stand, and a host of economic factors. The economics of establishing an agricultural industry will be discussed in Section 3 of this report. Here, we can limit ourselves to soil capability and size of suitable areas.

Figures 1-3 map out the soil capability for agriculture and show the location and size of areas with agricultural capability to 9row vegetables, cereals, and forests. The maps were taken from Rostad and Kozak (1977a, 1977b).

Ft. Smith area

Most of the soils in the Slave River Lowlands area level to near level, poorly drained, and medium to fine textured. Cool summer temperatures are a limitation. The better drained medium and fine textured soils have the highest agricultural capability, but any farmer would need to take special care in choosing area to clear so that cold air does not become trapped and aggravates the difficulties caused by the low average temperature. There is a total of 178,000 hectares of Class 3 land in this area. Soils are neutral to alkaline and there are extensive areas of saline soils.

Ft. Simpson and Hay River area

The survey of soils of the upper McKenzie area shows the soils south of the river to be coarsely textured, stoney, and wet. North of the river soils tend to be finer textured. Stoness can be a major hindrance for any agricultural use, but well to medium drained, stone free soils have agricultural capability. Some soils in the floodplain of the Hay River are a fine clay and have a good agricultural capability. There are 448,000 hectares of class 3 land in this survey area but only some 3000 hectares of it are near the population area of Hay River. Soils are neutral.

Figure 1: Soil Capability for Agriculture, Upper Mackenzie River Area.

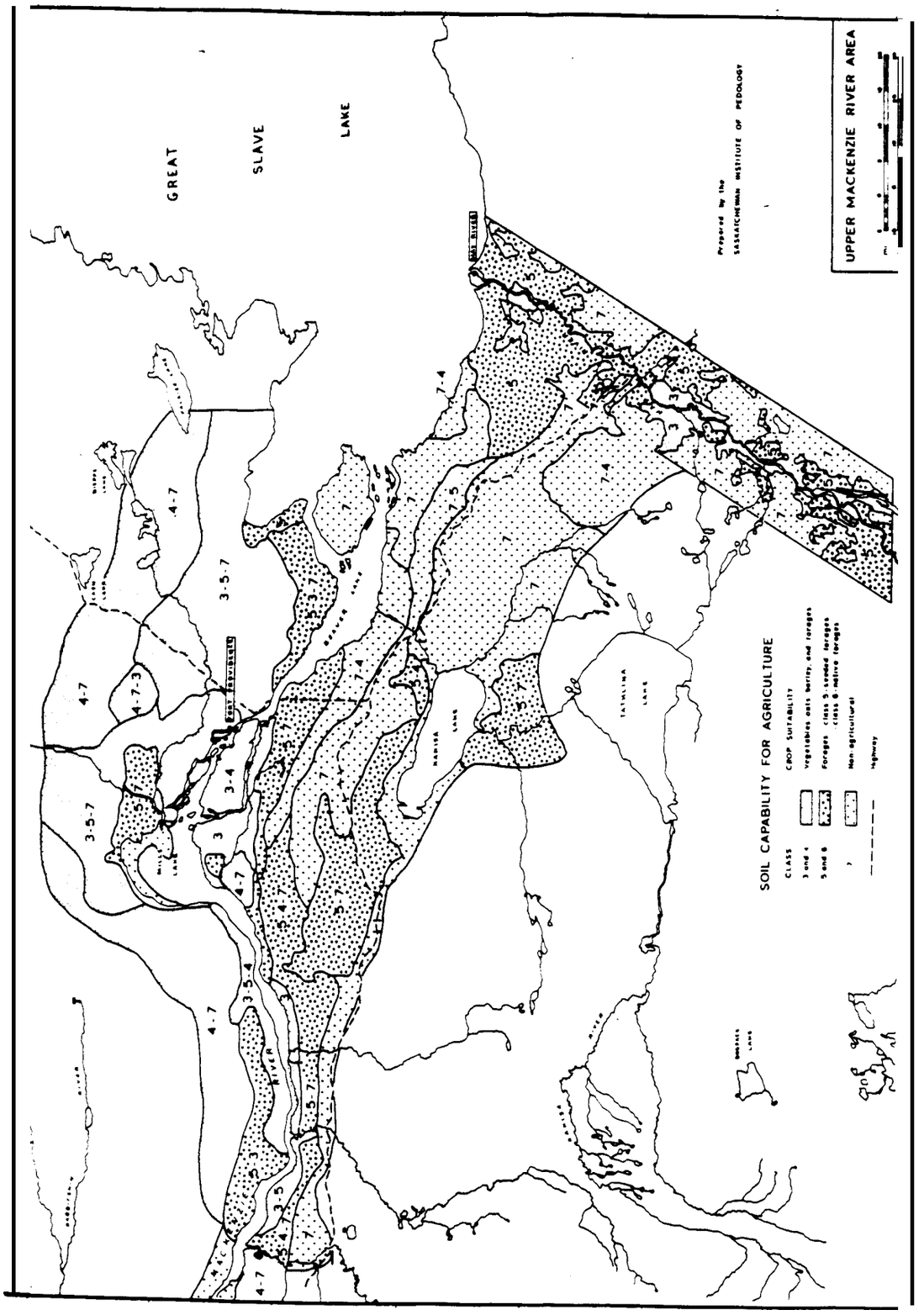


Figure 2. Soil Capability for Agriculture, Hay River Valley

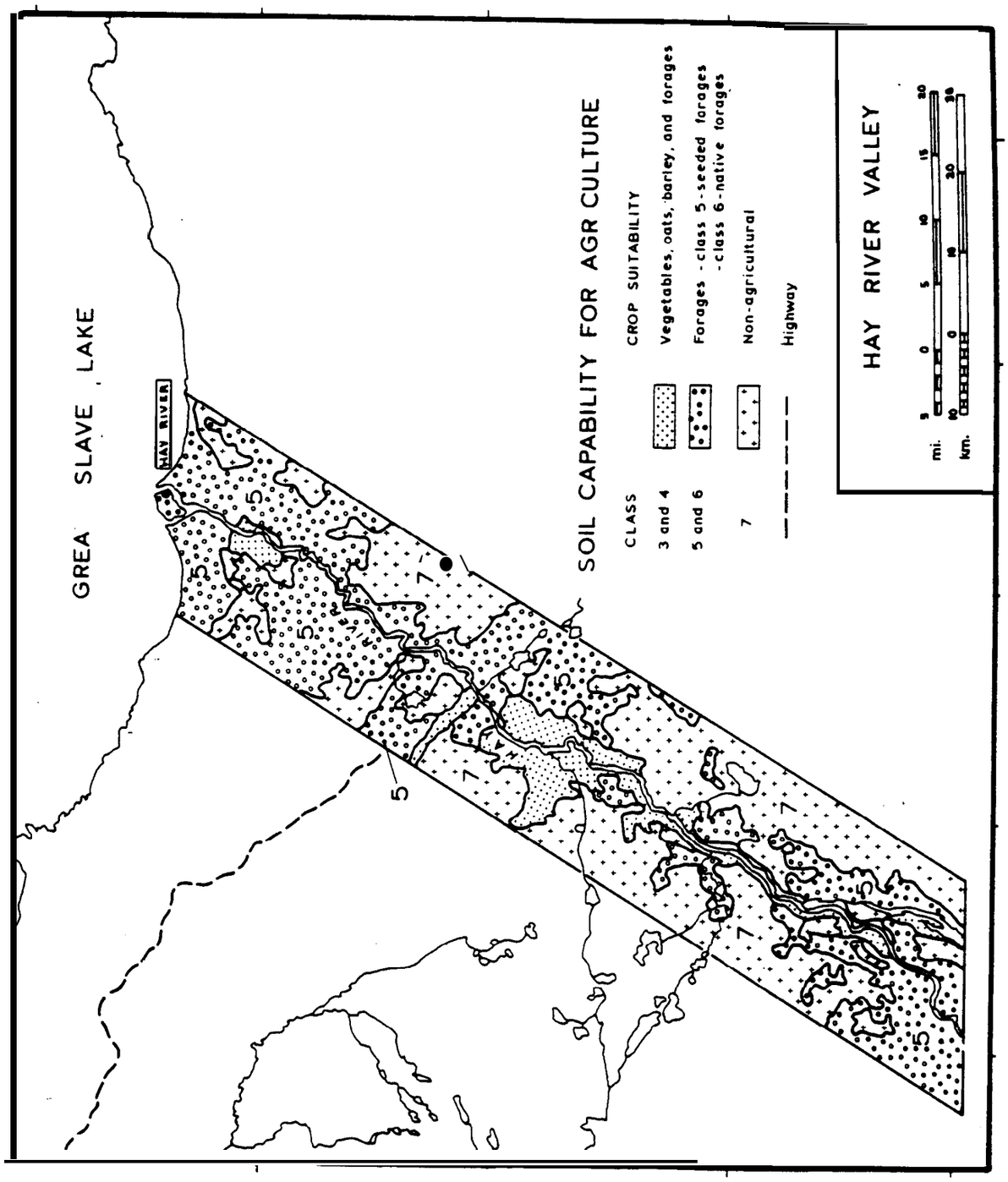
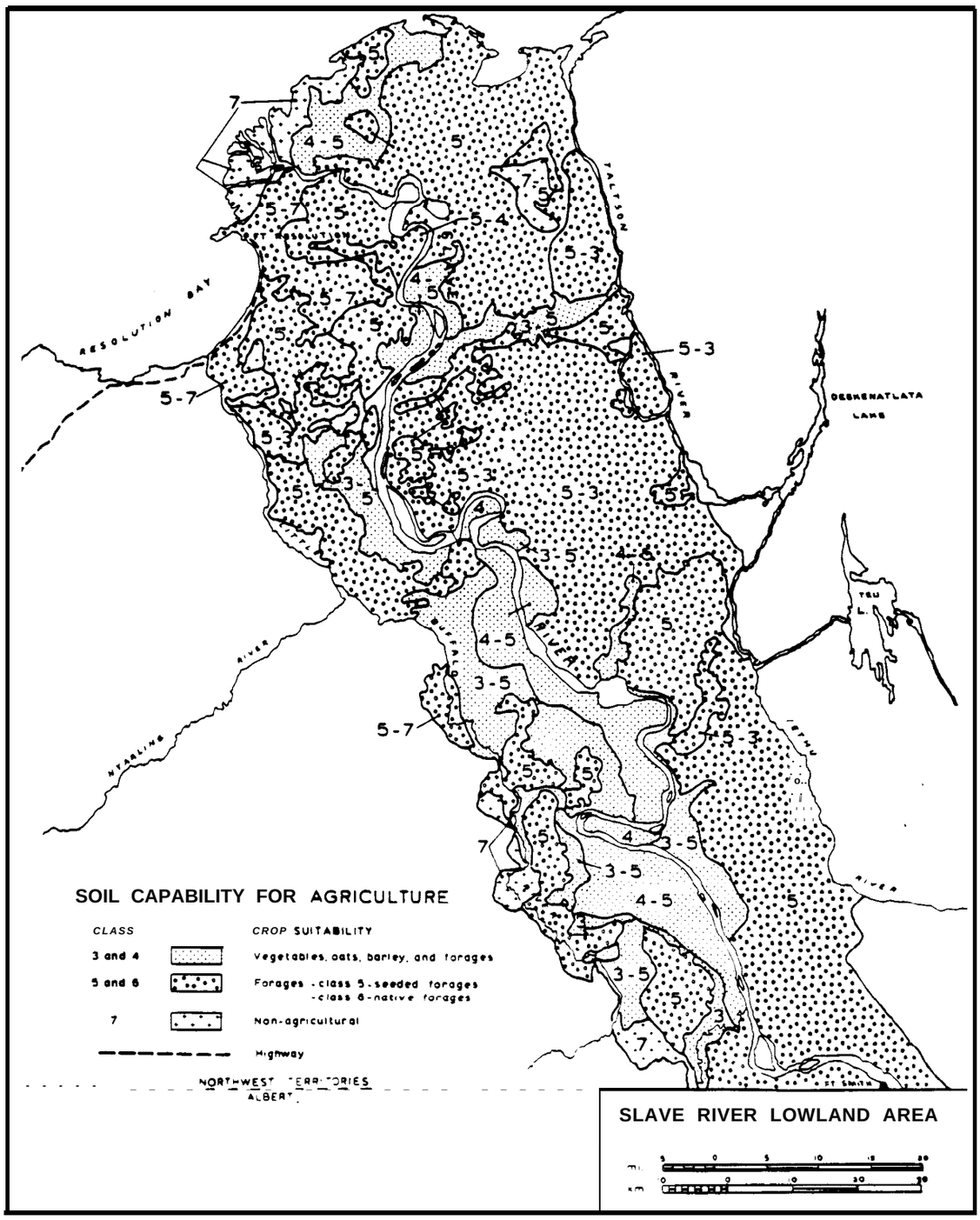


Figure 3. Soil Capability for Agriculture Salve River Lowland Area



Further downstream of the Mackenzie river and along the Liard River, there are alluvial soils with good capability for agriculture. These soils are generally level to gently undulating, but often fairly heavily treed. There are 293.000 hectares of Class 3 land in this survey. Many of the soils are strongly acidic but there are no salt problems.

3.2 Climate

It cannot be denied that any agricultural operation in the N.W.T. will have to contend with less than ideal climatic circumstances. Similar to the established farming area of the Peace River, the southern N.W.T.'s climate is characterised by irregular extremes of weather. However, the northern location also results in very long days in the summer and high numbers of sunshine hours, which can compensate for the generally lower soil temperature and shorter growing season.

From an agricultural point of view, one climatic variable is of utmost importance: the number of growing degree days which is a degree measurement day of heat units available to a crop for cool season crops such as cabbage, carrots, and barley is determined by taking the mean temperature of the day and calculating the number of degrees by which this mean temperature exceeds 5.0° C. Thus a day with a mean temperature of 10° C. contributes 5 degree days of heat to the crop. For warm season crops the mean temperature of the day has to exceed 10.0° C. to contribute to a degreeday.

Other important climate variables include the frost free period, which is the period between the last frost in the spring and the first frost in the fall; precipitation, including the time when the moisture is available; and hours of sunlight. All these variables have a direct relationship with plant growth and none of them should be taken as an absolute measure for the areas ability to grow crops.

Table 2.1

Degree days of 5.0° C,
Bright sunshine and average frost free period
at various locations in the NWT and Alberta

	50 Degree Days	Bright Sunshine	Average Frost Free Period*
Hay River	1050.3		96
Paradise Gardens	1112.1		93
Fort Smith	1130.6	2029.3	64
Fort Simpson	1194.3	1915.8	88
Fort Resolution	1030.8		97
Fort Providence	1122.9		71
Yellowknife	1027.1	2276.6	71
Beaverlodge	1220.9	2125.5	107

* The possibility of a frost free period of this length equals 50% (or 1 in 2).

Source: Canadian Climate Normals, Vol. 4, 6, and 7.

Table 2.1 gives some climate variables that can logically be captured in a table and for which the yearly averages make sense. Most variables such as temperature, precipitation and bright sunshine are more usefully looked at over time so that it can be analyzed how the variables are distributed over the growing season. Figure 4-6 give the occurrence over the year of bright sunshine, temperature of air and soil, and precipitation.

The graphs show that locations in the study area score very well compared to locations in established agricultural areas. For example, soil temperature, which is critical for germination, is higher in Ft. Smith than in Beaverlodge starting in mid April, before seeding time, and bright sunshine hours in the study area exceed Beaverlodge during the growing period.

3.3 Other Variables Influencing Agricultural Production

Vegetation:

Tree cover is very variable in the study area. The Fort Smith and Fort Providence region have naturally occurring open areas which can be turned into agricultural land with little extra effort in terms of clearing. Indeed the prairies around Fort Smith are continued to be used for wild hay gathering.

Figure 4.

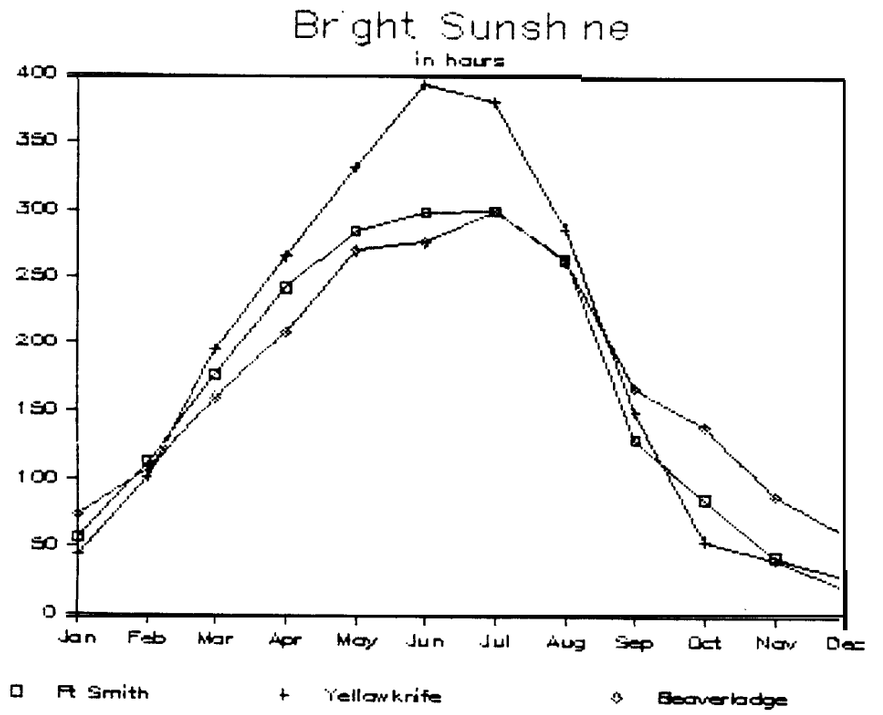


Figure 5.

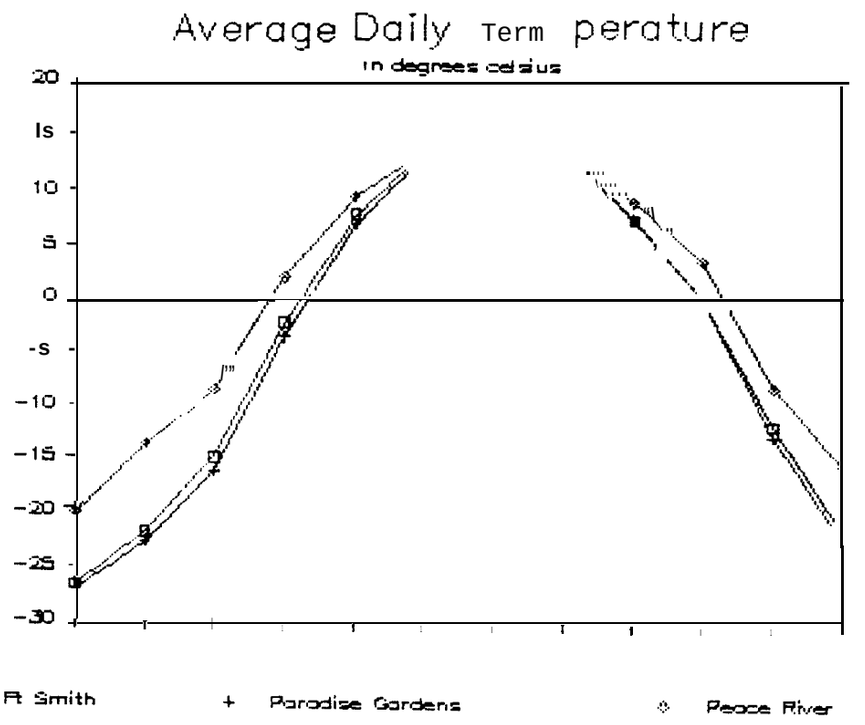


Figure 6.

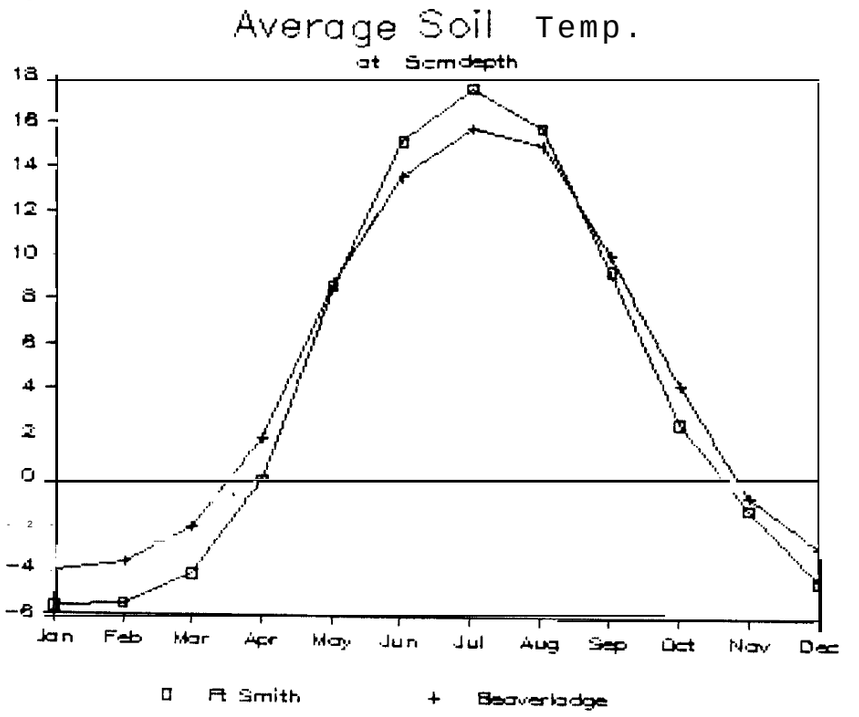
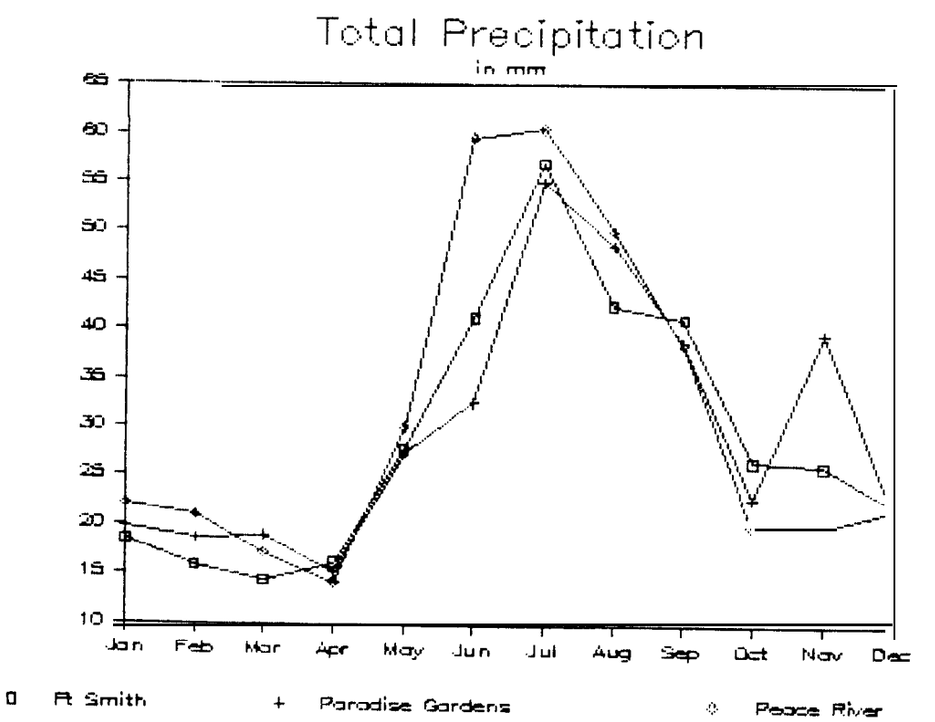


Figure 7.



The Hay River area in generally heavily wooded and land will have to be cleared before it can be used for agricultural purposes. There are areas that have been cleared over the years, especially in Paradise Gardens and at mile 12, but all further expansion will need extensive clearing.

Predators and Black Flies

Predators have been a problem in the Horn River area, where they have been known to attack and kill calves and the weakened cattle. In the Fort Smith and Hay River area predators are not a real concern. Bugs, especially blackflies are a major nuisance for animals in the whole study area but nowhere as bad as in the Horn River region. In this region cattle were reported to refuse to come out of the barn because of the blackflies. In Fort Smith and Hay River area animals seem to be less severly bothered by the files and insecticides have been used successfully to minimize the ill effects of the files.

Bison

There are bison herds in both the Fort Smith and Fort Providence areas; both herds have disease problems - Anthrax and Brucellois which will pose a threat for domesticated animals. Any livestock operation will have to be set up in such a way that contact between the bison herds and domesticated animals is minimized or avoided.

3.4 Northern Agriculture Production

Section 2.1 through 2.3 outlined some of the factors limiting agriculture in the NWT. There are, however, many ways in which these factors can be minimized. Most of these practices have been well tested in many areas of Canada but all have a special relevance for northern agriculture.

3.4.1 Market Garden Site Selection

When selecting a site the following should be kept in mind:

Micro climate. The slope of the land, closeness to a river or other body of water, and shelterbelts all contribute to the particulars of the climate in any one spot.

Fertility of soil. Since only a few acres are needed for a market garden, it may well be possible to find a plot that is substantially more fertile than the surrounding area due to, for example, old creekbeds or different vegetation. In orther words, a general soil classification of 4 or 5 does not have to mean that market gardening is not possible.

Gentle slope. Especially in areas where frost is a hazard, it is recommended that a garden is slightly sloped with no obstruction, such as a hedge or fence on the lower end. Cold air gathers at the lowest spot and the described set-up ensures that frost pockets do not establish themselves in the garden.

Shelterbelts. The garden should be protected against prevailing winds. Each foot in height of shelterbelt gives approximately 30 feet of shelter on the lee side. Crops are especially susceptible to wind damage in the sping when the plants are being established. Fall seeded crops such as winter wheat or fall rye can be considered as shelterbeds.

Surrounding crops. Vegetables are very susceptible to herbicides used on cereals and oilseeds, and sprayed pesticides may drift into the garden if it is close to other fields and cause damage to the crops. If the plot to be gardened has been cultivated before it will be beneficial to know its cropping history due to possible pesticide residues.

3.4.2 Crop and Variety Selection

Different crops take different number of days to reach maturity and within each crop there are varieties that differ in this respect. Table 1 gives an indication of the number of growing days that different crops need to mature.

TABLE 2.2
Average Number of Days to Reach Maturity
for Selected Vegetable Crops

Crop	Number of Days
Radish	30 days
Lettuce	70 days
Peas	60-80 days
Summer Squash	75 days
Broccoli	80-85 days
Root Crops	100 days
Sweet Corn	100 days
Cabbage	100-140 days
Cauliflower	100-140 days

The figures in Table 2.2 indicate averages for crops that are seeded directly in the garden. 8y fall seeding, using vegetable transplants and special cultural practices, the number of days needed before a crop reaches maturity can be reduced substantially. Broccoli grown from transplants, for example, matures in 40-45 days, and cauliflower in 65-75 days.

A general typology of vegetable crops divides the crops in cool and warm season crops depending on frost tolerances and subdivides both categories into short and long season crops. Table 2.3 gives a listing of cool season crops. Considering the frost danger it is likely that the selection of crops for a northern market garden will be made from this list. Warm season crops require more heat units and they also need extra care and attention in a northern garden.

TABLE 2.3
Cool Season Crops

Short Season	Long Season
Asparagus	Cabbage
Beets	Carrots
Broccoli	Cauliflower
Lettuce	Celery
Peas	Potatoes
Radishes	Rutabagas

Within each crop there are many varieties available. Careful selection of the varieties will aid in both the ease of growing and marketing. Ease of growing Is increased if the requirements of the particular variety can be met by the local circumstances and ease of marketing is increased if the product is close to the requirements of the markets. Variety selection should be based on one recommendation of the Brooks Horticultural Centre's Vegetable Production Guide and local experiences, and not on recommendations of seed catalogues, because they often reflect the situation in more southern locations.

For cereals the variety selection is also of great importance. Not all varieties are created equal. A northern farmer may have to choose between those varieties with the highest yield potential but which need long growing seasons and those which need fewer days to mature but yield less on average.

Table 2.3 shows some of the more likely varieties to be grown in the north. The figures are based on experimental work in Northern Alberta.

Table 2.3
Average Number of Days to Reach Maturity
for Selected Cereal Crops

Crop	Variety	Number of Days
Barley	Bonanza	92
	Klondike	91
	Johnston	96
	Ota 1	83
Wheat	Park	98
	Benito	100
	Neepawa	101

Source: Agriculture Canada (1985) Tests on Cereal and Oilseed Crops in the Peace River Region - 1984

Johnston barley and Neepawa wheat are currently the most popular varieties in the Peace country. The other varieties shown in the table all yield less than the two main varieties but their shorter maturation period diminishes the risk of frost damage. Varietal selection should not be done on the number of days needed to mature alone. Other factors such as disease resistance, lodging characteristics, resistance to sprouting, and scatter characteristics play a role.

3.4.3 Cultural Practices

Certain cultural practices such as fall seeding, mulching, tunneling and the use of transplants can be mentioned as especially useful for northern gardening. None of these practices is limited to northern locations but most will increase the survival chance of the plants, and reduce the number of days needed to reach maturity; both results that would make market gardening in the north more feasible.

Growing Transplants

All crops can be started in the protected environment such as a greenhouse, or a sunny window. The advantage is the control that the market gardener can exercise in the early and critical stages of the crops development and the higher survival rate that results from this increased control. Not all crops need to be started as transplants; many can be seeded directly in the garden.

The cost of growing transplants, connected with the special soil mixture needed, the greenhouse or shelter, the energy for heating the area and chemical control of diseases, will limit the number of crops that are started as transplants to those who will not grow or reach maturity if seeded directly into the garden. Most warm season crops, such as cucumber, eggplant, pumpkin and tomato will fall in this category, but some cold season crops, such as cabbage and cauliflower will benefit from the artificial extension of the growing season that is made possible though transplanting.

Fall Seeding

Another way to make optimal use of the length of the growing season is to seed the crop in the fall. Lettuce, carrots, onions, parsnips and spinach will all yield more and mature earlier, all other things being equal, if they are seeded before freeze up in October when the soil temperature is around 5oC.

Mulching

Black or clear mulch (1.5 mm thick plastic) to cover the seedbed has proven to be beneficial to enhance earliness and yield of some crops by increasing soil temperatures, reducing soil moisture loss, and reducing soil nutrient leaching.

The idea is to cover a well prepared seedbed with the plastic mulch, which is available in width between 3'-6' and from 500' to 2000' feet in length, so that a tight fit is accomplished between the plastic and the soil. This tight fit is especially important if black mulch is used because the contact between soil and plastic is necessary for heat conduction.

Seeding or transplanting is done by punching the mulch, which has been covered on all sides by some dirt, and seeding/transplanting though the hole. The transplanted seedlings or the plant growing from the deposited seed will grow through the hole in the mulch and the root system will be in the part of the seedbed covered by the mulch. The result is that the soil is warmer and with better moisture and that the plant will do better.

Black mulch will not let any sun through and acts, therefore as an inhibitor of weed growth. Clear mulch does not inhibit weeds and a herbicide should be applied before the mulch is laid.

Best results have been obtained with vine crops, such as cucumbers, melons, peppers and squash. Substantial increases in yield, up to 2 or 3 fold increases, and up to two weeks earlier harvest have been documented. Mulch is not recommended for cole crops and potatoes where they increase top growth.

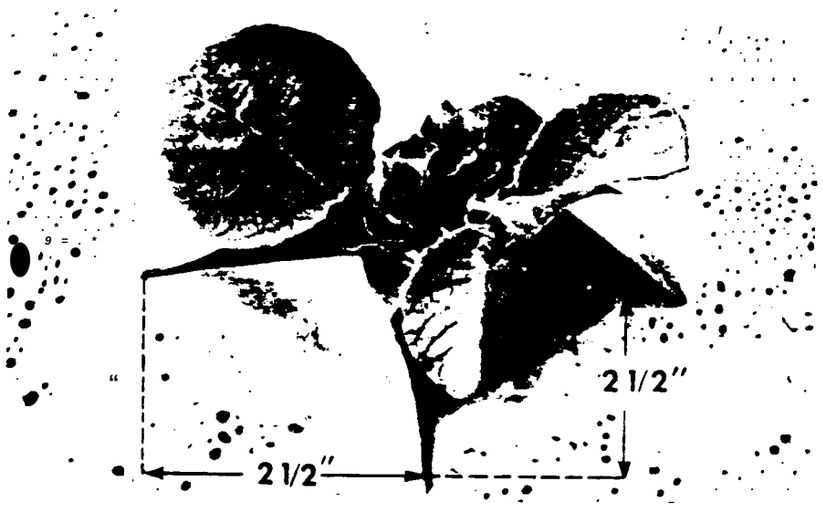
The application of mulch does not protect the plant from frost and seeding/transplanting should not been done earlier than is recommended.

Figure 8 shows a seedling growing through a slit made in the mulch.

Tunneling

A further development of the mulching technique is the addition of plastic tunnels to the mulch-covered seedbed after the crop is in. The tunnels will act as a miniature greenhouse and creates a warm and humid environment which increases the speed with which the crop grows and matures.

FIGURE 8

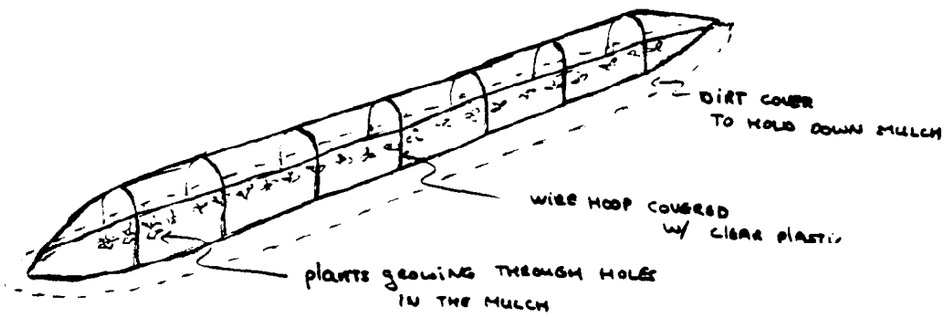


Clear plastic, with perforated small holes, for ventilation is stretched over wire hoops that straddle the mulch. Hoops are placed each 4-6 feet down the row and the plastic is kept in place by covering the edges with soil.

When the plant completely fills the tunnel, and the first signs of scorching of the leaves occur, the tunnel is split on the top and the plant is allowed to grow outside the tunnel . The use of tunnels has shown to give better yields than mulch alone.

Mulching and tunneling, or plasticulture, is gaining in popularity in Alberta. In 1982 there were some 4 acres with mulch and none with tunnels, and this has increased to 40 acres of mulch and 25 acres with tunnels. Figure 9 shows a diagramme of a tunnel-covered row.

FIGURE 9



3.4.4 Fertilization and Pest Control

High production per acre also means high nutrient needs per acre. Market gardening will require the replenishment of soil nutrients in order to sustain yields over time. The vegetable production guide gives the fertilizer requirements and recommended application times for different crops. As a general caveat, it should be mentioned that actual fertilizer needs will depend on the actual amount of nutrients available in the soils and soil tests are, therefore, strongly recommended.

Pest control, the control of weeds and insects, is a major task in market gardening. Weed control can be accomplished by manual and cultural methods such as hoeing and black mulch, but also by chemical means through the use of registered herbicides.

Insect control pretty well needs chemical intervention and timely intervention at that. For detailed description of pests that can be expected and how to combat them, the Alberta Vegetable Production Guide is recommended.

Insecticides have been used successfully to deminish the losses in livestock production due to black flies and mosquitos. The major difficulty here is the expense and amount of labour involved in an effective treatment program. One method, that has proved to be successful, is the construction of a self-treatment station for cattle (Khan 1984). Cattle were forced to walk through gates equipped with pesticide dispensing oilers, and were thus treated every day with an insecticide - oil solution. At a very low cost, $0.03 Per animal per day, the treatement reduced total blackflies by 48.0% and mosquitos by 64.3%.

3.4.5 Adaptation of Livestock

Experience shows that white faced cattle are more bothered by blackflies than blackfaced animals, and that longer haired animals are harassed less than short haired stock. One possible reaction is to introduce longer hairs and dark faces into the animals that are used in a northern livestock operation. This can be done by cross breeding standard stock (e.g., Herfords or Charolais) with long haired stock (e.g. Highland cattle) or blackfaced cattle (e. g., Angus). One important factor that should be kept in mind is the marketability of the crosses, especially when they are sold in southern markets and in competition with the southern commerical herds. Certain types of animals (e.g., Friesians) always are discounted by large buyers because their characteristics are less favorable to good dress-out than the standard breeds. In adapting an animal to the north, through cross breeding, one should weigh the disadvantages of lower dress-out weights etc. against the better gain over time due to less harassment by flies.

4. THE ECONOMICS OF SMALL SCALE AGRICULTURAL PRODUCTION

4.1 Cost of Land and Equipment

Research into the costs and returns for selected agricultural enterprises in the NWT is faced with the difficulty of the low level of agricultural development. Traditionally, cost and return studies have used the Consensus Research Method, in which a group of established farmers is polled regarding their costs and returns in a detailed manner, and the results of the survey analyzed often by size of operation and location. This route is not available for a study of costs and returns in the NWT because the farming base is lacking. Using data from Alberta and adjusting the value for the differences in location can only be done with extreme caution since the situation in the NWT is often too different from even northern Alberta to make any comparisons plausible.

The approach taken in this report can be described as a budget approach in which a number of hypothetical enterprises were built up on paper and the component parts costed out using cost data gathered in the study area. Southern data were used to the extent that numbers such as the amount of time and fuel needed to cultivate x number of acres, were taken from available literature, especially from Alberta.

Cost of Land

While thinking about further agricultural development from a situation which only a few active farms in the study region, several unique difficulties are encountered, specifically with regard to the cost of land and machinery. With the introduction of the freeze on agricultural lands in 1975, any semblence of a market for agricultural lands has been wiped out. Deeded land that can be used for agriculture for example, has always been treated for tax purposes as residential land, and land with agricultural potential, especially in the Hay River Enterprise corridor, has always had to compete with pressure to build residential dwellings. The development of the Delaney estates around the market garden of the Delaney's is a case in point.

A further complication arises from the great variability in land that could be considered for agriculture. Around Ft. Smith there are substantial tracts of open prairie which could be used for agriculture with relative ease and low costs. Land in the Hay River - Enterprise corridor is heavily wooded and any further expansion of the agricultural landbase will have to contend with the costs of clearing the land. Clearing and breaking, which normally entails cutting, piling and other cat work, as well as raking, plowing, and cultivating can run as high as $350/acre in the study area for smaller tracts of land done by an outside contractor. A lot of the land clearing in the area, however, has been done by the farmers themselves using their own machinery or has been part of a barter economy that often characterizes outlying rural areas.

Thus both the need for land clearing and the methods of doing it are subject to a large variability making the assessments of land values from a strictly engineering point of view almost impossible.

A third complication in the determination of land value is the differences in the perspectives of Native and non-native farmers and prospective farmers. The case is argued that the Native people already own the land as part of their aboriginal rights and should therefore have free access to the land. Section 4 will discuss the land claims issue in more detail. It will be very unlikely that a non-native farmer will ever have free access to the land. The history of land on reserves and Metis settlements and the ongoing development of the country around Vermilion and La Crete bear out this observation.

Land values have a substantial influence on the cost figures for any agricultural enterprise and the discussion presented here indicates that this cost will be substantially different for a Native as opposed to non-native farmers and for an operation in the Hay River as opposed to the Ft. Smith area. In this section land value will be included on a locational and clearing basis.

Cost of Machinery

There is not a lot of agricultural machinery in the NWT. The closest farm machinery dealer in Ft. Vermilion and the machinery that is available there is designed for large scale extensive cereal agriculture, not the small scale agriculture that can be expected to develop in the NWT. This poses a difficulty for the assessment of machinery costs in this study. To assume that all machinery will be brought in as new equipment is to stack the deck against possible economic feasibility of the operation. However, to assume that any new enterprise will be able to come up with a suitable line of good used equipment is to impute qualities to the hypothetical prospective farmer that may not

hold true. Finding good used machinery, that is appropriate for the size of the operation in the north, will take a substantial amount of time and extensive searching which a new farmer, especially if he is a part-time farmer, may not be able to extend.

Machinery costs will be presented in both new and second hand values. For the second hand prices we have chosen 50% of new which is in line with the experience of southern farm operations.

4.2 Prices for Agricultural Products

Spatial price surveys conducted the Bureau of Statistics of the G.N.W.T. show that food costs are on average 27% higher in Yellowknife than in Edmonton. These prices are measured at the retail level and have only an indirect relevance for the prices that a N.W.T. farmer can expect for his products. More relevant is the price for which the retailer can get the agricultural products from the wholesaler. This price, Edmonton wholesale plus transportation, is the one that a farmer will have to meet to be considred an alternative to existing sources of supply. Exceptions are those products that can be sold at the farm gate such as produce, eggs, and honey. If the volume of these farm gate sales remains limited, the local supply will not depress the retail store price too much and the farmer may be able to absorb not only the wholesale price and freight, but also part of the retail margin.

Table 3.1 gives an indication of price levels for food products in the study area in the first half of 1985. These prices were taken from local newpapers and may underestimate the average costs of the food because of the inclusion of advertised specials.

Table 4.1
Average Retail Food Prices for Selected Commodities ($/kg) ,
Ft. Smith Jan - Sept. 1985
Hay River Jan - May 1985

Item	Fort Smith	Hay River
Broccoli	1.60	1.72
Cabbage	0.83	1.04
Potato	0.43	1.19
Onion	0.78	0.53
Turnip	0.69	
Lettuce	*0.99	1.30
Cauliflower	*1.75	2.14
Pepper	1.88	3.63
Carrots		0.89
Rutabega		0.68
Tomato		1.33

*each

The table Is set up In such a way to illustrate two realities of food prices in the NWT. Firstly, the absolute level and secondly, their seasonal variation. Prices reported for Hay River only cover January through May and they are generally higher than the prices reported for Ft. Smith which cover January through September, and thus incorporate the lower prices for produce during harvest. Cabbage prices in Ft. Smith, for example, varied from 1.05/kg in January to $0.44/kg in August and onions from $0.89 in February to $0.66. However, prices are relatively stable throughout the year showing how well the produce market in North America is integrated.

Local prices of meat are not very relevant since no processing facilities are available. Therefore, especially in the short run any production will have to be sent south and take the prices that are current at the time of marketing. Infra-structure will be discussed in more detail in Section 4.

4.3 Cost and Return Estimates

This section will present RMC's estimates of the cost and returns that are associated with several agricultural enterprises. Included are:

Three acre market garden
4,000 hen egg laying operation
hog finishing operation
250 acre crop enterprise
250 acre hay enterprise
40 head cow-calf operation
50 hive beekeeping operation

All the assumptions behind the numbers presented in this section are gathered in the appendix, so that the flow of the text is not unnecessarily disrupted by large amounts of data.

The choice of the enterprises to be included in this section depended on the current state of the industry in the NWT, the aspirations of some of the people involved, and some economic considerations. Poultry production, for example, has not been included since virtually all production in Canada is on a very large scale. Since this study focusses on small scale agriculture, the inclusion of poultry did not seem warranted. Greenhouse vegetable or bedding plant production was not included because this type of production is qualitatively different from the traditional forms of agriculture discussed in this report. Greenhouses are touched upon in the market garden section since a small greenhouse is included in this operation for growing transplants.

4.3.1 Three Acre Market Garden Operation

The cost of production estimate presented in Table 4.3 is set up for a newly established market garden in the Hay River area. Hence the cost of the land has been set at the estimate cost of clearing of $300 an acre. To adjust this estimate to e.g., the Ft. Smith area one could reduce the cost of the land to reflect the availability of open land, but, conversely, one should increase the transportation component of each category. High Level is assumed to be the supply centre for such items as fertilizer and pumps. Less common items such as a drip or sprinkler irrigation system will have to be hauled from Edmonton. All the detailed assumption that underlie the figures in Table 4.2 can be found in Appendix A.

This hypothetical garden will grow seven (7) cool season crops, three of which store well. The crop selection is basically arbitrary but has been made in such a way that it includes only crops which have proven to be well adapted to the North and which can form a major component of the food intake of local consumers.

The following crops were included in this costing exercise:

Potatoes	1.0 acre
Broccoli	.3 acre
Cabbage	.5 acre
Carrots	.3 acre
Cauliflower	.3 acre
Peas	.3 acre
Onions	.3 acre
Total	3 acres

Only seven crops were included and the total acreage was restricted to 3 acres to obtain some similarity to a market garden in an early stage of development. Three acres can be tended by mainly manual methods and seven crops will ensure that sufficient attention can be given to each crop.

There are several other crops that could be included in the production plan but they would not shed any further light on the economics of market gardening. Inclusion of berries merits further mention because of positive spin-off effects that berry production can have on a cottage preserve industry.

In this analysis of the economics of market gardening, we will assume that all production of the garden will be sold at the gate. This assumption can be explained by the fact that gate sales are the most popular way of marketing for market gardens and that the relatively small size of our example market garden does not presuppose 'large numbers of customers to dispose of the production.

To be able to calculate the returns on the production of vegetables it will have to be established how much of each crop can be expected to be produced and what kind of price can be expected. Yields have been taken from Hausher (1985) and represent not the high or low end of yield possibilities, but a yield that can be considered fair. Caution should be taken here: the yield of each crop or the whole garden and consequently the revenue of the whole operation can be as low as zero (0). This could be the case if frost wiped out the garden before harvest.

The price that has been used is a composite of the prices reported in Table 4.1 and percentage prices obtained by Alberta Market Gardeners. Thus if yields may be overestimated for northern locations, price is probably slightly underestimated.

Table 4.2
Production and Gross Revenue
of a Three Acre Market Garden

Crop	Fair Yield Per Acre (in kg)	Acreage	Tota 1 Yield (in kg)	Gate Price in ¢	Gross Revenue in $
Potato	9,000	1	9,000	76.0	6,840'
Carrot	6,000	.3	1,800	94.1	1,694
Cabbage	10,000	.5	5,000	84.3	4,218
Onions	10,000	.3	3,000	76.7	2,301
Cauliflower	6,000	.3	1,800	195.1	3,512
Broccoli	2,000	.3	600	164.7	988
Peas	2,500	.3	750	187.2	1,404
Tots 1					20,957

One conclusion that should not be drawn from the above figures is that the low yielding Broccoli, for example, should be replaced by onions to increase the total return. This switch may increase the total return on the operation, but only if additional markets are available. If these onions are hard to market and have to be stored then it may well be that the immediate cash returns of the broccoli are to be preferred over the uncertain and delayed returns of the onions. The market, that is, what can be sold in the actual situation, should be the ultimate judge of the crop selection and consequently the potential returns on the the operation.

Table 4.3 presents the cost and return estimates for a three acre market garden.

By presenting the information without incorporating the price of labour, management, and capital, we hope to allow differentiation of the numbers for different situations and still break down the cost category sufficiently to come up with a plausibe estimate.

In our analysis we have not tried to put a price on labour, management and capital. All three of those items are valid costs and should be taken into consideration when considering the costs and returns of a market garden. The absence of the return to management can be defended on the ground that returns to management are often very low or even negative in agriculture. Livestyle factors and not economic considerations are often the most important in the decision to farm. This holds especially true for part-time farmers. The cost of labour and capital are not included because of the potential large variability between operations. Existing market gardens have virtually operated on family labour alone, so that there are no real life data on an agricultural labour market available. More to the point is that the outlook of the farmer/operator will determine the need and the price of labour. The perspective of a Native Band and a corporate farmer may be radically different on this subject. The cost of capital depends on the need of the farmer to borrow and at what rate. If grants are available or if the operator has income/ capital from other sources the interest costs will be greatly reduced.

Table 4.3
Cost and Returns of a Three Acre Market Garden
RMC Estimates 1985

Investment	Tota 1	Per Acre
Land	$ 900.00	$ 300.00
Small Greenhouse	800.00	266.67
Root Cellar	1,270.00	423.33
Equipment	10,550.00	3.516.67
Tota 1	$13,520.00	$4,506.67
Fixed Costs		
Building Depreciation 5%	$ 103.50	$ 34.50
Equipment Depreciation 15%	1,582.50	527.50
Land Mortgage	244.00	81.33
Tota 1	$1,930.00	$ 643.33
Variable Costs		
Fertilizer	$ 193.00	$ 64.33
Chemicals	51.00	17.00
Seed	655.00	218.33
Marketing Costs	500.00	166.67
Operating Costs	1.125.00	375.00
Tota 1	$2,524.00	$ 841.33
Total Costs	$4,454.00	$1,484.67
Gross Sales	$20,957.00	
Total Costs	4,454.00	
Return to Capital, Management and Labour	16,503.00	

Source: Appendix 8

4.3.2 4,000 Hen Egg Laying Enterprise

The decision to take a 4,000 bird operation as the unit of analysis is based on the calculation of possible market sizes presented in section 1.1. A 25% share of the market in the study are on a year-round basis which will require a flock of this size. Conversely if we take Hay River and Ft. Smith as one market and Yellowknife as a separate market, a 4,000 hen operation will be able to supply close to the full market requirement.

The assumption on which the numbers presented in Table 4.4 are based are presented in Appendix B. One non-quantitative assumption has been made: i.e., that there will be quota available for this operation. This first assumption regarding the quota is easily defended by referring to public statements of officials of the Canadian Egg Marketing Agency (CEMA) and provincial boards that indicate that CEMA is willing to give the NWT an as yet undertermined quota.

The Hay River Dene Band has been very active over the past year in an effort to establish a very large egg laying facility of up to 200,000 birds. This project would change the situation in which a small flock would operate from one where the small scale farmer would be protected by a transportation advantage to a fiercely competitive situation within the NWT market. A large Hay River operation would also influence the possible location of small flock and limit it to a location close to Yellownife, serving that market alone.

Inspection of the figures presented in Table 6 shows the importance of the feed costs which take up over 50% of the variable costs of the operation. The feed costs have been calculated at the price of a complete feed (17% laying mash) hauled up from Grande Prairie to Hay River. A complete feed has definite nutritional advantages over buying a feed concentrate and mixing it with locally grown feedgrains. Feed mixing is a highly specialized task requiring constant monitoring and research, apart from some specialized machinery. Contacts with industry and university indicate that any cost advantage of mixing your own feed is more than offset by the increased risk. Feed companies also assume a certain responsibility for their feeds and it has happened that a producer was compensated for losses to the flock due to shortcomings of the purchased feed.

4.3.3 Hog Finishing Operation

The size of this hypothetical hog finishing operation is set at 425 hogs . This number of hog marketing over one year will supply some 25% of loin cuts for a town the size of Hay River if one considers that an average hog yields some 74 kgs. of dressed meat (16.8% or almost 13 kgs. of which are loin cuts and 12.8% or 9.4 kgs., belly cuts) .

Table 4.4
Cost and Returns of a 4,000 Hen Egg Laying Operation
RMC Estimates 1985

Investment	Tota 1	Per Dozen	Per Bird
Building	$59,077.00	$0.74	$14.77
Equipment	33,356.00	0.42	8.34
Land	900.00	0.01	0.23
Total	93,333.00	1.17	23.33
Fixed Costs			
Building Depreciation 5%	$2,953.85	$0.04	$0.74
Equipment Depreciation 15%	5,003.40	0.06	1.25
Land Mortgage	244.00	0.00	0.06
General Overhead 2c/Doz	1,600.00	0.02	0.40
Total	9,801.25	0.12	2.39
Variable Cost			
Pullet Depreciation	$14,600.00	$0.18	$3.65
Feed	46,311.20	0.58	11.58
Energy	3,118.00	0.04	0.78
Total	64,029.20	0.80	16.01
Total Costs	$73,830.45	$0.92	$18.40
Gross Sales			
Grade A Eggs	$100,000.00		
Birds Sold	$600.00		
Tota 1	$100,600.00		
Total Cost	$73,830.45		
Return to Capital, Management and Labour	$26,769.55		

Source: Appendix B

Hog finishing rather than a farrow to finish operation is set up in this hypothetical example to reflect the fact that at this time no hog farmer is operating in the NWT and that a fledgling operation would do well to keep the project as simple as possible in the early years of its existence. The inclusion of a farrowing operation would increase the risk unnecessarily. Plans exist to. start up a hog farm in the Ft. Smith area and this farm would be set up as a finishing operation.

Feed costs have been calculated separately and the results are shown in Table 4.5. Prices are 1985 prices and grains are deemded to be grown locally so that the transportation costs are minimized. If local grain crops are not available it will be assumed that the subsidy programme will offset the cost of transpiration. (See Section 4.3.4)

Table 4.6 shows the results of our analysis of costs and returns of the 225 hog operation. Assumptions are shown in Appendix B. Again, as with the presentation of the cost and returns of the market garden and the egg laying facility, the residual item of returns to capital, management and labour has not been subdivided further to allow for easy comparisons between production options and to reflect the varying management aspirations, capital sources, and labour availability between different people and groups with an interest in agriculture.

Table 4.5
Feed Cost Calculation

Commodity	Amount Tonnes	Prices Tonnes	Total
Barley	74.4	$93.00	$6,919.20
Other Grain	21.4	115.00	2,461.00
Starter	16.9	225.00	3,802.50
Grower	33.5	200.00	6,700.00
Finisher	14	200.00	2,800.00
Protein Supp.	3.5	425.00	1,487.50
Tota 1	163.7		2,417.20

Source: Economics of Hog Production in Alberta, Alberta Agriculture 1980 and RMC Analysis

Table 4.6
Cost and Returns of a Hog Enterprise Marketing 425 Hogs a Year
RMC Estimates 1985

	Tota 1	Per Hog
Investment		
Building	$79,061.40	186.03
Equipment for Pens, etc.	3,000.00	7.06
Feed Storage	4,600.00	10.82
Equipment/Machinery	3,000.00	7.06
Land Clearing	900.00	2.12
Tota 1	90,561.40	213.09
Fixed Costs	**Total**	**Per Hog**
Building Depreciation 5%	$3,953.00	9.30
Pen Equipment Depreciation 10%	300.00	.71
Feed Storage Depreciation 5%	230.00	.54
Machinery Depreciation 15%	450.00	1.06
Land Mortgage	244.00	0.57
Tota 1	5,177.00	$12.18
Variable Cost	**Tota 1**	**Per Hog**
Weaner Cost	$8,760.00	$20.00
Feed	27,904.00	65.66
Total	36,664.00	85.66
Total Costs	41,841.00	97.84
Gross Sales	$54,273.35	$127.70
Total Cost	41,841.00	97.84
Return to Capital, Management and Labour	12,431.35	29.86

Source: Appendix B

Feed costs are again the major item on the cost side. This dependence on feed prices is not unique to the NWT but it is in line with the results of investigations of costs and returns in e.g., Alberta. Death losses are set at 3% which is in line with the experience of finishing operations of this size. Underlying is the assumption that the operator is experienced in hog raising; if this assumption does not hold true one could expect a higher death loss percentage in the early years of the operation.

4.3.4 250 Acre Crop Enterprise

The size of the crop enterprise has been chosen in such a way that: a) it can be considered small scale agriculture; and, b) that the crops can be marketed in the NWT provided that some other agricultural enterprises discussed in this section come into being.

There are some cereal and oil seed crops grown in the NWT and over time there has been efforts to investigate the possibilities of growing crops in both Ft. Simpson and Grand Detour near Ft. Smith. The economics of growing crops discussed in this section are rather dismal showing a negative return to capital, management and labour. The major reason for this showing, presented in Table 4.7 is the high cost of machinery. As pointed out in Section 4.1, there is a conceptual difficulty with pricing the machinery in the absence of an established agricultural sector. The almost $300,000 equipment investment would buy a full complement of new cultivation, harvesting, and haying equipment; bought in the Ft. Vermilion at 1985 prices. In section 3.5 we willlet go of this very restrictive assumption but the figures are presented here reflecting new values in order to be consistent throughout the presentation of the cost and return estimates.

Assumptions used in Table 3.8 are written out in Appendix 8. The poor picture for a newly established crop enterprise is aggravated by the Feed Freight Assistance program that will pay $50 for each tonne of feed brought into the NWT. This program effectively lowers the price that a farmer could expect for his grain to around $90/tonne of barley. The figures deteriorate dramatically if this subsidy is included. The figures are presented here without reference to the transporation subsidy to show the real costs and returns without interference allowing an investigation of the opportunities if the subsidy would be withdrawn.

Table 4.7

Cost and Returns of a 250 Acre Crop Enterprise
RMC Estimated 1985

Investment	Tota 1	Per Acre
Land	90,000	300.00
Equipment	191,000	636.67
Repair Shed	30.250	100.83
Tota 1	311,250	1,037.50
Fixed Costs		
Building Depreciation 5%	1,512.50	5.04
Land Mortgage	11,674.56	38.92
Equipment Depreciation 10-15%	23.175.00	77.25
Tota 1	36,362.06	121.21
Variable Costs		
Fuel	6,908.72	23.03
Repair	5,730.00	19.10
Seed	900.00	3.00
Fertilizer	1,152.00	3.84
Spray	750.00	2.50
Grass Seed	1.200.00	4.00
Tota 1	16,640.72	55.47
Total Costs	53,002.78	176.68
Sales of Grain	14,500	
Sales of Hay	14,400	
Total Sales	28,900	
Return on Capital, Management and Labour	(24,102.78)	

Source: Appendix 8

4.3.5 250 Acre Hay Enterprise

Hay does not face the same competition as grain or because the feed freight assistance program does not cover hay. It is, therefore usefull to investigate the costs and return for a hay enterprise. Haying is also an activity that requires less equipment and thus cuts down on the major cost factor. But as seen from the numbers presented in Table 4.8 the economics are still not there if the farm is set up from scratch. Assumptions for Table 4.8 are virtually the same as listed for the crop enterprise in Appendix B except that the fuel costs have been adjusted for the haying operator.

Land has been valued at a lower cost of clearing to reflect the likelihood that a haying operation would be set up on land that is rather open or not heavily treed. However land costs are not the determining factor in our cost estimates, and the return remains negative.

4.3.6 40 Head Cow-Calf Operation

The size of the hypothetical cow calf operation is chosen to stay in line with the grain, hay and pasture output of the enterprise described above. The beginning cattle inventory is set at 1 bull and 17 cows, and it is assumed that each year calf crop will consist of 16 calves. The growth of the herd will be:

	Calves	Yearlings	2 Year Olds
Year 1	16		
2	16	16	
3	16	16	15 (1 death loss) .

By year three the operation can be expected to have animals for sale and revenues will be generated. Not all 15 two year olds will be sold; three of the two year heifers will be retained in the herd to replace the weakest cows. Sales and revenues would take the followig form using September 1985 cattle prices.

7 Steers @ 1,100 lbs. x .78 /lb		$6006.00
56 Heifers @ 850 lbs. x .64 /lb		2720.00
3 Cows @ 900 lbs. X .50 /lb		1350.00
	Total	$10,076.00

Table 4.8

Cost and Returns of a 250 Acre Hay Enterprise
RMC Estimated 1985

Investment	Tota 1	Per Acre
Land	75,000.00	300.00
Equipment	78,000.00	312.00
Repair Shed	30,250.00	121.00
Tota 1	183,250.00	733.00
Fixed Costs		
Building Depreciation 5%	1,512.50	6.05
Land Mortgage	9,728.80	30.92
Equipment Depreciation 10-15%	11,300.00	45.20
Tota 1	22,541.13	90.17
Variable Costs		
Fuel	4,545.60	18.18
Repair	2,340.00	9.36
Grass Seed	3,000.00	12.00
Fertilizer	1,920.00	7.68
Spray		
Tota 1	11,805.60	47.22
Total Costs	34,346.73	137.39
Sales of Hay	36,000,00	144.00
Return on Capital, Management and Labour	1,653.27	6.61

Source: Appendix 8

Costs and returns for the enterprise are estimated in Table 4.9. All animals numbers are converted to animal units, using standard conversion factors, so that industry wide feed conversion numbers can be used. The figures in Table represents the costs and returns in Year 3.

Inspection of the figures presented in Table 3.10 shows that the variable costs, the feed costs, outweigh the fixed costs 10 to 1; an illustration of the low level of mechanization needed for a cow calf operation. The feed freight subsidy has not been incorporated in these figures in order to get consistency throughout the presentation of the hypothetical operations. the $50/tonne subsidy would lower the variable cost by $908 to $12,789, but would not bring a positive return to capital, labour, and management.

Dismal though they be, this outcome is not unexpected and in line with findings of other studies. Trant (1984) in an investigation of cost relationships in the cow calf sector found that 46% of the total cow herd of specialized cow-calf enterprises was on small farms (gross sales less than $31,000) and that as a group these enterprises have costs exceeding sales. The continued existence of these non-economical enterprises has to be found in the willingness of their often part-time operator to produce and sell below real costs.

4.3.7 50 Hive Beekeeping Operation

A beekeeping operation is not set up as an independent enterprise but rather as a sideline to another operation such as market gardening. The operation is set up to use a new bee population each year. It may well be possible to over winter bees in the north and there are indications that over wintering will increase the yield and lower costs, but the risks are substantial especially for a new operation. Table 4.10 shows the numbers for a small beekeeping operation.

Table 4.9

Cost and Return of a 40 Head Cow Calf Operation
RMC Estimates 1985

Investments	Tota 1	Per **A.U.**
Site Preparation	$5,080.00	127.00
Fences	150,00	3.75
Windbreak Fence	286.00	7.15
Open Front Pole Shed	3,580.00	89.50
Fenceline Feeder	1,080.00	27.00
20 Feet Gates	400.00	10.00
Watering System	800.00	20.00
Grain Storage	2,300.00	57.50
Land	1,500.00	37.50
Total	$15,176.00	$379.40

Fixed Costs	Tota 1	Per **A.U.**
Depreciation		
Buildings and Fences 5%	$ 454.80	$11.37
Equipment 1s%	228.00	5.70
Grain Storage 10%	230.00	5.75
Land Mortgage	407.60	10.19
Tota 1	$ 1,320.40	$33.01
Variable Costs:		
Hay	9,600.00	240.00
Grain	1,688.80	42.20
Pasture	1,600.00	40.00
Tota 1	$12,888.80	$322.20
Total Costs	$14,208.80	$355.20
Total Sales	10,076.00	
Return on Capital, Labour and Management	(4,132.40)	

Source: Appendix 8.

4.3.8 Mixed Farming

Efficiencies can be had by combining two or more enterprises because of complementary in machinery and buildings. The possible combination of enterprise is large but not all of them will record in cost savings. Market gardening and beekeeping are two enterprises that may well be combined, but since the equipment for each of the activity is quite different from the other, the total costs of the two activities combined would be very close to the sum of the costs for the individual enterprises. However, since both activities show a positive return to capital, labour, and management, the combination may be beneficial to the operating making more efficient use of his time and increase total returns and cash flow.

A mixed crop, hay, and cow-calf operation is a common combination with the cow-calf operator growing his own feed. Trying to exploit the complementaries in machinery between on cereal and hay growing does not lead to a positive return as is shown by the figures of the 250 acre crop enterprise which include both cereal and hay. The expense for a full line of harvesting equipment combined with the availability of relatively cheap feed grains in High Level and a transportation subsidy stack the deck against cereal agriculture in the N.W.T.

If we set up a 40 head cow-calf operation and assume that all the required hay will be grown on the farm while grain will be bought, this farm will need a productive capacity of 120 tonnes of hay or 70 acres of hay land. Total cost of production for the 70 acres in hay would drop to around $18,000 from $34,000 reflecting the lower land costs and operating expenses. The major item, equipment depreciation, is not really affected since the same set of equipment is needed for a 70 or a 250 acre hay enterprise. The cost of production per tonne of hay in this example is $150 as opposed to $75 in the situation were 250 acres are devoted to hay. The increase in price is a clear example of diseconomies of scale. Canadian agriculture in general has seen a clear trend towards large farms in order to take advantage of the lower per unit costs associated with large scale farming.

Table 4.10

Cost and Returns of a 50 Hive Beekeeping Operation
RMC Estimates 1985

Investment	Tota 1	Per Hive
Buildings	$4,779.00	$95.58
Honey Equipment	11,031.00	220.62
Transportation	2.575.50	51.51
Tota 1	$18,385.50	$367.71
Fixed Costs:		
Building Depreciation 5%	$ 238.95	$ 4.7B
Equipment Depreciation 15%	1,654.65	33.09
Vehicle Depreciation 15%	386.33	7.73
Total	$ 2,279.93	45.60
Variable Cost		
8ees and Freight	$ 1,187.00	$ 23.74
Vehicle Expenses	747.00	14.94
Feeding Costs	296.00	5.92
Containers	383.00	7.66
Overhead	367.50	7.35
Total	$ 2,980.50	$ 59.61
Total Cost	$ 5,260.43	$105.21
Gross Sales	6,276.38	
Total Cost	4,260.43	
Return to Capital Management and Labour	$ 1,015.95	

Source: Appendix 8

One conclusion that could be drawn from this exericise is to produce the hay at a level that is economical and adjust the livestock population. The 250 acre hay enterprise produces 450 tonnes of hay and the corresponding cattle operation would be 150 animal units. In this case the variable costs of finishing the cattle till be slightly less than 3.75 times the numbers presented in Table 3.10 to reflect the $5 saving for each tonne of hay. The fixed costs will not rise by a factor of 3.75 but slower to reflect the economies of scale. The end result will still be a negative return to capital labour, and management even if it is assumed that all the production could be sold. The reasons is the heavy weight that feed costs in relation to total costs and the inclusion of the haying operation only decreases this cost marginally.

4.4 Part-Time Farming & Subsistence Agriculture

Figures presented above do not indicate a positive return to capital, labour and management for all enterprises and some operations were too small to keep the farm going. It should come as no surprise that it is not economic to start up, for example, a hog finishing operation from scratch. No where in Canada would this be possible. But people are still starting farms and ranches and the developments of the northern Peace country are illustrative of this. Many studies have pointed out the poor economics of starting up a farm (see for example Woods Gordon, 1984), but the demand for any new lands that have become available has always exceeded supply. If one look at the type of people that are interested to start up farms and the way they go about building a farm one thing stands out: willingness to work off the farm to supplement farming income.

Part-time farming is a fixed attribute of all agricultural areas in earlier stages of development, and is a way to gradually increase the level of capitalization to a point where the farm can be viable by itself. Most of the farms in operation in the NWT are operated or were started by a part-time farmer and the result is that the operations grow without incurring a heavy debt burden. The motivation of part-time farmers are often not of an economic but rather of a lifestyle nature; the quality of life on the farm and a genuine love for the soil and animals take precedent over the short term economic considerations. However, from a longer term perspective, there often is sound economic reasoning that plays in many part-time farmers, in that an established farm has a real value as retirement investment or inheritance. Off-farm income is critical for most farmers in Northwestern Alberta: Woods Gordon (1984) shows that 47.4% of the respondents to a survey in the High Level/La Crete area received 60% or less of total income from their farming operation. The service industry was the most important source for off farm income followed by such occupations as trucking and construction.

If more than one subsistence farm exists in a certain area it would become possible to share equipment between farms and reduce the outlay per farm. Another option could be that equipment be available from a central institution such as a band.

The hypothetical subsistence farm that is used in this report as the unit of analysis will have the following livestock and crops

10 laying hens
3 beef cows
1 milk cow
1 acre garden
hay fields to provide for animal feed.

The total outlay to stock this subsistence farm with the livestock listed will be around $3,000. Inclusion of a full set of haying equipment, even at 25% of new value, would increase the tab to around $20,000, a rather sizeable investment for such a small operation. The economics of subsistence farming become a lot better if there are a number of farms that can share the cost of the equipment. If, for example 5 subsistence farms share a common hay field and equipment, the investment cost per farm drops to around $4,000. Cooperation between subsistence farms, among themselves or via a central organization such as the Band, can have other advantages such as shared use of bull or bulls for breeding purposes, combined buying of inputs to make use of volume discounts and lower freight rates, and mutual assistance in the farm work.

The open areas in the Ft. Smith area are particularly suited for this kind of operation since land clearing will not be necessary and breaking can be done with relatively simple implements. The operation described above can be worked with a minimum of equipment. A tractor and some haying equipment is all that is really needed apart from garden and building tools. Thus, after an initial investment is made to start-up the subsistence farm and the farmstead is established and stocked with livestock machinery the farm could be pretty well self sufficient.

Our hypothetic subsistence farm will provide the farm family with eggs, meat, milk, and vegetables; the manure of the livestock can be used to improve the garden; culls from the garden can also be transformed into compost (or feed to pigs if they were to be part of the farm); the beef cows and their calves would be left to graze, unless the snow cover was to thick, in a field fenced off using rail fences; the winter quarters of the animals, which would be used year around by the milk cow, would be constructed from local lumber or logs; and a flock of chickens would be kept large enough to have eggs for the family and perhaps relatives and friends year round.

4.5 Sensitivity Analysis

Figures presented above can only be used as a general indication of the economics of the analyzed enterprises. In no way should they be interpreted in an absolute sense and used without adjustments for any one particular operation. More detailed and site-specific analysis will be needed to assess the economic viability of any one enterprise. This site specific analysis can take into account the particular financial situation of the operator and come up with a tailor-made plan for operations.

In relative terms, the numbers are more reliable. The same budget method was used to derive all cost and returns estimates so that the figures can be compared with each other with some degree of confidence.

The cost of production figures presented above change dramatically if the production is approached from a part-time farming point of view. As mentioned in section 4.3.6 there is a large group of cattlemen operating cow-calf operations on a part-time basis and willing to produce and sell below the real costs . This becomes more understandable if one is willing to look at owning a farm, i.e., land buildings and machinery, in non-economic terms. This means that the farmer is willing to absorb the fixed costs and some of the variable costs such as pasture, which is valued at $10/head/month in our example but which a part-time farmer need not incur if he has the land base. Running a 40 head cow calf operation on a farm that is paid for by off-farm income starts to make economic sense because the variable costs of $11,288.80 are almost covered by the total sales of $10,018.50. A slight increase is cattle prices or herd size will set the variable costs at par with sales.

Table 4.11 presents an overview of the yearly cash flow requirements of the farms that were analysed in this section. Mortgage costs have not been included as a cash outlay for those enterprises with a small land base, and this way of presentation preserves the method of calculating return to capital, management, and labour used in section 4.3. For those operations with a larger landbase, such as the crop and hay operation, the mortgage costs were included because they do constitute a real and recurring cost. The cumulative net figures of Table 4.11 represent the money that is made (lost) in the operation on a yearly basis and which can be used to pay for borrowed capital, management, and labour.

From the point of view of the part-time farmer the figures of table 4.11 have an extra importance because they indicate which enterprises would give a positive return if only variable cost are taken into account. Under the assumption that off-farm income and the gradual building up of the farm over time have resulted in a paid-for, fully equipped, and stocked farm, the cumulative net income (loss) figures equate the net return (loss) of the operation. In this special case all enterprises except the 40 head cow-calf operation make economic sense.

Subsistence farming is another option for those enterprises which do not show economic viability. In this form of agriculture, economic variables only play a very minor role; indeed, the money economy is only of limited relevance. The emphasis is on the way of life and the ability to provide food and shelter without taking parts in the wage economy. Subsistence farming was mentioned as an objective in disucssions with the Fitz/Smith Band and by extention could be a form of agriculture that could be considered by other bands in the area. Subsistence farming, like part-time farming, is a way of gradually building up an enterprise and can thus be seen as a possible first step towards a more commercial farm.

The difference between subsistence farming and part-time farming lies primarily in the role that money plays in the operation. In a part-time farming operation off-farm work is sought in order to build up the farm, while in subsistence farming the farm is used as a means to build a well rounded life outside the wage economy.

Table 4.11
Cash Flow Projections for Selected Farms

Cashflow for the Three Acre Market Garden

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Fertilizer	0	0	0	0	193	0	0	0	0	0	0	0	193
Chemicals	0	0	0	0	51	0	0	0	0	0	0	0	51
Seed	0	0	0	0	655	0	0	0	0	0	0	0	655
Marketing Costs	0	0	0	0	0	0	100	200	200	0	0	0	500
Operating Costs	0	0	0	0	225	255	225	225	255	0	0	0	1125
Monthly Expenses	0	0	0	0	1124	225	325	425	425	0	0	0	2524
Sales	0	0	0	0	0	0	3492	3492	3492	3492	3492	3492	20952
Monthly Net	0	0	0	0	-1124	-225	3167	3067	3067	3492	3492	3492	18428
Cumulative Net	0	0	0	0	-1124	-1349	1818	4885	7952	11444	14936	18428	

Cashflow for the Hog Finishing Operation

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Weaners	2190	0	0	2190	0	0	2190	0	0	2190	0	0	8760
Feed	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325	27900
Monthly Expenses	4515	2325	2325	4515	2325	2325	4515	2325	2325	4515	2325	2325	36660
Sales	0	0	0	13568	0	0	13568	0	0	13568	0	0	40704
Monthly Net	-4515	-2325	-2325	-9053	-2325	-2325	-9053	-2325	-2325	9053	-2325	-2325	4044
Cumulative Net	-4515	-6840	-9165	-112	-2437	-4762	4291	1966	-359	8694	6369	4044	

Cashflow for the 4,000 Hen Egg Lay Operation

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Pullets	15200	0	0	0	0	0	0	0	0	0	0	0	15200
Feed	6615	6615	0	6615	0	6615	0	6615	0	6615	0	6615	46305
Energy	260	260	260	260	260	260	260	260	260	260	260	260	3120
General Overhead	133	133	133	133	133	133	133	133	133	133	133	133	1596
Monthly Expenses	22208	7008	393	7008	393	7008	393	7008	393	7008	393	7008	66221
Sales	8333	8333	8333	8333	8333	8333	8333	8333	8333	8333	8333	8333	100596
monthly Net	-13875	1325	7940	1325	7940	1325	7940	1325	7940	1325	7940	1925	34375
Cumulative Net	-13875	-12550	-4610	-3825	4655	5980	13920	15245	23185	24510	32450	34375	

Table 4.11
(continued)

Cashflow for the 250 Acre Crop Enterprise

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Fertilizer	0	0	0	0	1152	0	0	0	0	0	0	0	1152
Chemicals	0	0	0	0	750	0	0	0	0	0	0	0	150
Seed	0	0	0	0	2100	0	0	0	0	0	0	0	2100
Mortgage	913	973	973	973	973	973	973	973	973	973	973	973	11676
operating costs	0	0	0	0	2106	2106	2106	2106	2106	2106	0	0	12636
Monthly Expenses	973	973	973	973	7081	3079	3079	3079	3079	3079	973	973	28314
Sales	0	0	0	0	0	0	0	5980	5980	S980	5980	5980	29900
Monthly Net	-973	-973	-973	-973	-7081	-3079	3019	2901	2901	2901	5007	5007	1586
Cumulative Net	-973	1946	-2919	-3892	-10973	-14052	-17131	-14230	—1329	-8428	-3421	1586	

Cashflow for the 250 Acre Hay Enterprise

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Fertilizer	0	0	0	0	1920	0	0	0	0	0	0	0	1920
Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0
Seed	0	0	0	0	3000		0	0	0	0	0	0	3000
Mortgage	811	811	811	811	811	811	811	811	811	811	811	811	9732
Operating Costs	0	0	0	0	1377	1377	1377	1377	1377	0	0	0	6885
Monthly Expenses	811	811	811	811	7108	2188	2188	2188	2188	811	811	811	21537
Sales	0	0	0	0	0	0	0	0	7200	7200	7220	7200	36040
Monthly Net	-811	-811	-811	-811	-7108	-2188	2188	5012	5012	6409	6409	6389	14503
Cumulative Net	-811	1622	-2433	-3244	-10352	-12540	-14728	-9716	-4704	-1705	-8114	14503	

Cashflow for the 40 Head Cow-Calf Operation

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Hay	0	0	0	0	0	0	0	0	9600	0	0	0	9600
Grain	0	0	0	0	0	0	0	0	1688	0	0	0	1688
Pasture	0	0	0	0	1600	0	0	0	0	0	0	0	1600
Mortgage	34	34	34	34	34	34	34	34	34	34	34	34	408
Monthly Expenses	34	34	34	34	1634	34	34	34	11322	34	34	34	13296
Sales	0	0	0	0	0	0	0	0	10018	0	0	0	10018
Monthly Net	-34	-34	-34	-34	-1634	-34	-34	-34	1304	-34	-34	34	-3278
Cumulative Net	-34	-68	-102	-136	-1770	-1804	-1838	-1872	-3176	-3210	-3244	3278	

A subsistence farm is characterized by a mix of very small scale agriculture operations set up not to produce a marketable surplus, but a year-round food supply for the family. Thus one would expect to see a fair sized garden with crops such as potatoes, carrots, and cabbage that store well, a small flock of laying hens, and perhaps a milk cow and three or four beef animals. It is unlikely that a subsistence farm can be started without any money from previous work, income support payments or other revenues. However the amounts will be relatively small and in estimating the economics of a subsistence farm it is within reason to assume that labour is valued at zero, and that local supplies are used for buildings, etc.

To test the results of the presented cost and return estimates we have varied some of the assumptions made to arrive at the estimates and calculated the results for each enterprise. Table 4.12 gives the summary of costs and returns as presented in previous sections and shows the influence of setting the machinery cost at 50% of new value, and calculates the repercussions of the $50/tonne feed freight assistance programme. Setting the machinery cost at 50% of replacement, which is in line with the situation is more established rural areas, improves the performance of the heavily machine dependent enterprises such as cropping and haying. However, the cropping enterprise does not show a positive return under this assumption. The second variation, the inclusion of the feed freight subsidy, clearly hurts the cropping enterprise since it effectively lowers the price of feed grain. The livestock enterprises benefits from this subsidy and their performance improves. The improvement in the returns of the cow-calf operation is not enough to bring the return into the positive.

Table 4.12

Summary of Costs and Returns for Various Agricultural Enterprises

	3 Acre Market Garden	4,000 Hen Egg Operation	425 Hog Operation	250 Acre Crop Enterprise	250 Acre Hay Enterprise	40 Head Cow Calf Operation	50 Hive Bee-keeping
Total Costs	4454	73830	41842	53003	34347	14209	5260
Total Sale	20957	100600	54273	28900	36000	10076	6276
Return to C&M&L	16103	26770	12431	(24103)	1653	(4133)	1016

Summary of Cost and Return for Various Agriculture Enterprises
Assuming Machinery Costs at 50% of New Costs

	3 Acre Market Garden	4,000 Hen* Egg Operation	425 Hog* Operation	250 Acre Crop Enterprise	250 Acre Hay Enterprise	40 Head* Cow Calf Operation	50 Hive Bee-keeping
Total Costs	3663	73830	41842	41415	28697	14209	4239
Total Sale	20957	100600	54273	28900	36000	10076	6276
Return to C&M&L	17294	26769	12431	(12515)	7303	(4133)	2036

Summary of Costs and Returns for Various Agricultural Enterprise
Assuming Machinery Costs at 50% of New and Including
$50 Feed Freight Assistance

	3 Acre Market Garden	6,000 Hen* Egg Operation	425 Hog* Operation	250 Acre Crop Enterprise	250 Acre Hay Enterprise	40 Head* Cow Calf Operation	50 Hive Bee-keeping
Total Costs	3663	65755	38447	41415	28697	13B46	4239
Total Sale	20957	100600	54274	26100	36000	10076	6276
Return to C&M&L	17294	34845	15827	(15315)	7303	(3770)	2036

* Machinery costs do not figure in the costs of production figures of an egg laying operation, and cost of other equipment such as cages cannot be reduced due to a lack of easily accessible second hand market. The same holds true for the cow-calf operation and the hog farm.

5. SOCIO-ECONOMIC IMPACT AND IMPLEMENTATION

5.1 Job Creation

Farming has traditionally been a family oriented economic activity, although there are examples around of successful cooperative and communal farms. Scale of farming is correlated with organizational structure in that communal and corporate farms tend to be large operations able to absorb larger amounts of available labour and money. Small scale agricultural development has been based on the family farm.

The number of jobs created by small scale agricultural development in the NWT is limited by the total size of the market. It does not take an enormous amount of agriculture to service the total Ft. Smith region. Working back from the total market size, estimated in section 2.1, we can derive the total number of acres and total number of livestock needed to supply the market. Number of man years of work needed, can then be calculated using indications from other farming areas regarding how much time any one agricultural activity takes.

Table 5.1 shows the estimate of the total market in the Ft. Smith Region for various commodities that could be produced in the NWT together with an indication of the number of acres or animals it would take to produce the amounts consumed. Conversion is based on dress-out weights for beef and pork (55 and 78% respectively) and average yields for vegetables and honey. The assumptions concerning the number of months that the locally produced agricultural products can be marketed in the NWT that were made in Table 2.1, have been retained. Thus pork is assumed to be marketed year round, potatoes three-quarters of the year, etc. Table 5.1 sketches the very real limits of the agricultural industry in the NWT It may be possible for some commodities to capture a larger market share: cabbage and potatoes spring to mind and perhaps pork if the infra-structure is more developed, but even if we assume that all potatoes and all carrots consumed in the study area were produced locally, not more than 105 acres of potatoes and 35 acres of carrots are needed.

Table 5.1

Estimate of size for NWT Agricultural sector.
Total Marketing area: Ft. Smith Region.

Commodity	Market Share 25%		Market Share 10%	
	in tonnes	# animals or acres	in tonnes	# animals or acres
Pork Fresh	61.95	836	24.78	334
Beef Fresh	182.64	732	73.06	292
Eggs	75.80	5345	30.32	2138
Potatoes	331.60	37	132.60	15
Carrots	41.47	7	16.59	2.8
Cabbage	25.51	2.5	10.20	1
Onions	28.63	2.8	11.45	1.1
Cauliflower	2.00	0.3	0.80	0.1
Broccoli	1.12	0.6	0.45	0.2
Honey	5.05	72*	2.02	29*

*Hives

Source: Table 2.1 and RMC analysis

In view of the figures presented in section 4, one should approach the number of jobs available in a further developed agricultural sector with caution. Beef production will depend on part-time farming and taking the figure of 31 beef cows (the Canadian average) as herd size we arrive at 23 small herds assuming a 25% market penetration.

Pork production needs only two operations of the size of our example farm to fill its 25% share of the total pork market. Each operation would keep its operator well occupied especially if the marketing of the hogs needs extra attention due to the underdeveloped infra-structure.

The labour equipment of a laying operation in the 4500-5000 hen range will depend quite a bit on the technology employed. A state-of-the-art laying operation could be run with very little labour; the highly capital intensive operation reduces actual labour, as opposed to management, to a few hours per week. The operation that was analysed in section 4.3.2 does not show a very high level of capitalization and the labour requirement for an operation of the size that would be needed to supply 25% of the NWT market is estimated at 20 hours/week or one half-time job.

Market gardening is one of the most. labour intensive forms of agriculture. Total area needed to supply the 25% of the market, under the marketing time assumptions made, is about sO acres of vegetables or 17 market gardens of the size analysed in section 4.2.1. A three acre market garden will keep its operator more than busy during the growing season and will require additional help at planting and harvest times. Market gardening is not a year round undertaking: in winter work comes to a standstill with the exception of some machinery upkeep and marketing.

Crop and hay production is not a labour intensive undertaking. The 732 cows and their offspring and the 876 hogs that can be marketed if NWT producers obtain 25% market share will need approximately 600 tonnes of barley and 2000 tonnes of hay or 600 acres of barley and 1600 acres of hay. This production would need 6 operations of the size analysed in section 4.3.5 or 6 crop enterprises as analyzed in section 4.3.4 and 4 specialized haying operations. Each of these operations would require in the neighbourhood of 40 hours a week during the growing season.

Honey production on the scale discussed in section 4.3.7 is definitely a sideline for a farmer engaged in some other activity. Even the 70 hives which would supply the NWT's demand under the 25% market share consumption can be' handled after hours and on weekends.

Potato production on the scale that all demand for potatoes in the Ft. Smith region are supplied by local growers during the whole marketing year requires 185 acres. This production falls outside small scale agriculture.

5.2 Infra-Structure

The infra-structure in the NWT is not set up to accommodate an agricultural industry. There are no processing facilities for cattle and hogs. There aren't even any killing plants. There are no inspection facilities, no livestock vetenarian services, no extention services, and no commercial storage, no machinery dealership and farm supply centre. This observation has a major impact on the type of agricultural development that will take place and the time schedule of this development.

Those agricultural activities that require little or no infra structure are most likely to develop first. In this category we find: market gardening, small scale egg production and honey production. Most of the marketing of the products of these enterprises can be sold at the farm gate or through the local stores without or with minimal processing. If produce is to be marketed over a larger period of the year, storage facilities will become a necessity. Any development in the meat sector, both beef and pork, will be depending on the availability of processing facilities. And, finally, all agricultural activities will benefit if machinery and agricultural inputs become more available.

5.2.1 Vegetable Storage and Transportation

Prices are always lower at harvest time than at any other time of the marketing year as a result of the large supplies coming on the market. In order to take advantage of the higher prices available to the market gardener outside the immediate harvest period, storage will be necessary. The market garden analysed in section 4.2.1 includes a root cellar that will suffice for local sales.

The market area under consideration is characterized by the fact that the largest population concentration, i.e. Yellowknife, is a considerable distance from existing market gardens (i.e. Hay River Enterprise corridor). Other possible sites for market gardens, such as Ft. Simpson and Ft. Smith, are also far removed from the major market in the area. Thus the need for storage is complicated by the need for transportation if the Yellowknife market is to be supplied.

Lack of storage facilities close to the Yellowknife markets and the distance between local supply and this major market can be seen as an opportunity for local procedures if they are willing to develop an infra-structure. This will permit them to exploit the peculiarities of the market. A larger commercial storage facility under control of NWT growers close to Yellowknife would allow northern market gardeners.

- to supply the Yellowknife market with selected storable commodities throughout most of the year

- to take advantage of higher prices, especially during freeze-up and spring thaw when normal supply lines from the south are disrupted.

A storage facility of 185 tonnes would suffice to provide 25% of the demand for potatoes, carrots, and cabbages in the Yellowknife market for 80% of the marketing year. A potato facility to supply all of Yellowknife's needs year-round would need to be at least 740 tonnes. Costs of a potato/bulk vegetable storage facilities range between $100 and $200 per tonne depending on the sophistication of ventilation and handling facilities. Taking the high end value to reflect the high building costs in the North, we can make a rough estimate of storage costs: the 187 tonne facility would cost in the neighborhood of $37,000 and the 740 tonne potato facility $148,000.

5.2.2 Slaughtering/Meat Processing Facilities

Currently there are no inspected killing facilities in the NWT, There is talk about a small killing plant in Ft. Smith in conjunction with a planned bison ranch in the area but recent development have made this facility uncertain. Domestic animals, both hogs and cattle, in the study area have at the moment two possible market outlets: 1. shipment to southern markets, and 2. sale of live animals to individuals, who will themselves kill and dress the carcasses. Both marketing methods have drawbacks: The southern market is an expensive market to get access to for northern producers. Producers in the market area proper do not have to contend with some of the limiting factors of northern livestock raising and their animals are not subjected to the same level of transportation stress as the animals from a NWT farmer.

Selling live animals to individuals for slaughter and processing limits the market to those areas where people have the skills and willingness to slaughter the animal themselves. In areas with an active hunting and trapping tradition there may be possibilities but it seems unlikely that one could market very many animals this way in the urban market of Yellowknife.

The obvious answer lies in the introduction of a meat processing facility in the NWT It is questionable however if the price of even a small facility (around the 1 million dollar mark) could even be justified in a small market such as the NWT The throughput that such a facility would need, and would be capable of, would be in excess of total NWT demand. There is a possibility that a small federally inspected facility will be built in Ft. Vermilion.

An intermediate solution may lie in the introduction of a small killing plant, possibly mobile, and small cottage meat industry in the form of a family butcher operation. Any further development of an infra-structure for meat will always be hindered by the marginal nature of beef raising in the NWT A mobile abattoir set up with a 11.5 KVA powerplant, pressurized water system, hoists, power split saw, and 18 beef capacity hanging rails can be bought for $12,000 - $15,000. Rigs like these are used in the Prairie provinces to do custom killing for farmers at the farm site. Provincial regulations differ in that Alberta prohibits the sale of meat processed in this way while in eg., Saskatchewan and B.C. do allow the sale of meat that is processed in a mobile abattoir.

5.2.3 Inspection

If agricultural commodities cross national or provincial borders they are subject to federal inspection. For commodities that remain inside provincial or territorial boundaries, provincial or territorial law takes precedence over federal law.

Inspection issues arise out of concern for public health and all provinces have initiated some form of provincial inspection of meat that is consumed within the province. Quebec, Ontario and Alberta have autonomous provincial meat inspection systems and the other provinces have contracts with the federal government for the provision of the so-called domestic meat inspection. The domestic meat inspection is a service provided by Agriculture Canada and paid for by the contracting province, much in the same way that RCMP services are contracted by provinces with small provincial police forces. Domestic meat inspection is not as rigorous as the federal inspection, especially when it comes to building standards of the processing facility.

Inspection of produce can be requested from Agriculture Canada by for example, a NWT retailer if he suspects the quality of the produce received. A condition inspection will be performed and the suspect produce described in terms of percentage rot, etc. In the normal flow of business as it is established now, the produce that is shipped up to the NWT from southern wholesalers will be inspected in Edmonton or Peace River as part of good business practice. For locally grown produce there is no inspection requirement on the federal level. Provincial or Territorial law may institute such inspection if desired.

Another issue in this context is the issue of grades. Most vegetable produce that is grown in Canada has a grading system that needs to be adhered to if the produce is sold in the store. Apart from size and quality requirements there are also rules regarding packaging in effect. The Department of Corporate & Consumer Affairs has the authority to enforce these grading standards and can impound produce that is offered for sale in stores without the proper grade.

Grade requirements do not apply to farm gate sales of produce. Since the farmer is not bound by grades if he sells at the gate, or if he operates a pick-your-own operation, there is a possibility to sell a lot of the produce that would be culled due to size to comply with grade requirements. Stronger yet, it is the experience of Alberta market gardeners, who operate pick-your-own gardens, that the customers who harvest their own produce do not discriminate on size and uniformity the way the grading system does.

5.3 Subsistence Farming

There is no real limit to the number of subsistence farms that could be accommodated along the Slave and Hay Rivers. The area along the lower MacKenzie that can be used for subsistence farming in less extensive, but, in view of the small population base of the area, there is no real concern that land is an obstacle.

A functioning subsistence farm will provide for most of the needs of the family that works the farm, thus reducing the need for money for food and shelter. In principle it is therefore possible that existing income support payments to a family will not be necessary after the farm is established. It is unlikely that all transfer payments to family members can be stopped if a subsistence farm is started. It is likely, however, that the transfer payments will take another form and change from direct support payments to subsidies or grants towards the farm operation proper. This change from supporting the family directly towards help in the operation of a farm that can support a family can bring increased stability to Native communities, that have a need for an alternative economic base now that trapping is diminishing in economic importance. Help in providing a living for a family through farming is qualitatively different from supporting a family through direct payments.

Farming, on whatever scale, also provides excellent opportunities for training and personal development. By their very nature, farmers will be away from the towns forcing the farmer to be more self reliant and develop the skills needed to make the operation a success. Farming is both management and labour intensive, puts a premium on timeliness of applications and actions, and requires continuous care and attention. Farming can thus be seen as an excellent opportunity to learn and develop job related skills and will increase the chances for young people to become a part of society.

The argument that subsistence farming will decrease transfer payments will be more tenable if and when subsistence farms develop into more commercially directed enterprises. Subsistence farming is then a phase in the development of the agricultural sector and a learning ground for new entrants into the industry. If the skills learned in the subsistence phase of a farm are solid enough and if the farmer has ambitions in that direction, there is no reason why the operations could not grow and become part of the commercial sector. It is only if this happens and the family actually derives income in the form of money from the farming activity, that transfer payments other than those that are part of the agricultural industry, such as stabilization or crop insurance payments, can stop.

5.4 Implementation

Section 4 outlines the economics of small scale agriculture in the Northwest Territories. This outline can only be used as an indication of the costs and returns that can be expected because each actual farm will have a multitude of special circumstances that will modify the figures presented.

To take the next step and outline an implementation plan is an even more tentative undertaking. Cost and return figures can be presented in a way that they have relevance for several people and circumstances by not estimating the cost of capital, management, and labour. Implementation is, however, so different in each situation that two implementation strategies really only meet on the level of abstract steps that have to be part of each strategy, such as securing of capital and preparation of the site.

What follows are two implementation scenarios, one for a market garden and one for a hog operation. The purpose of these two scenarios is to illustrate what costs and which revenues can be expected over the start-up of the operation. Both farms set up as commercial enterprises, using borrowed money, and for both the growth path outlined will minimize risk and uncertainty. These two implementation scenarios should be used as examples only; each real life situation will differ in many aspects (and will be more complex) than the situations presented here.

5.4.1 Three Acre Market Garden

The starting assumptions is that the aspiring market gardener has been granted a lease for a five acre lot in the Hay River - Enterprise corridor; the lot is not cleared. To reduce his risk, the market gardener decides to start out on a small scale with one acre of potatoes, a crop that has proved to do well in the area and for which there is a ready market in Hay River. Long term money is borrowed over a 5 year time period at 13.5% compounded semi-annually. The sequence of actions over time is:

Year 1

Clearing of 3 acres by hiring a cat to clear and break the land. Three acres are cleared at once to reduce the cost.

Year 2

One acre is prepared for potatoes, a rototiller, irrigation system, and other gardening equipment is purchased and one acre is planted with potatoes.

Year 3

One more acre is prepared for gardening and planted with potatoes; the first cleared acre is put into cabbages and carrots; a root cellar is built.

Year 4

Third acre is brought under production, and the full complement of crops discussed in Section 4.3.1 are planted; a small greenhouse is built.

Year 5

Start with crop rotation, clear remaining two acres.

Prices of inputs and produce are held constant to not complicate the picture and to not give a semblance of accuracy to this illustration of an implementation strategy.

The financial result of the implementation strategy sketched above are shown in Table 5.2. Inspection of the table shows the staggered nature of the introduction of costs and revenue over the first 5 years. The garden starts to show a profit in year 3 and profits are increasing with the introduction of more land. Year 6 and 7 will see a reduction of the cost of long term capital because in year 6 the initial loan for the land clearing will be paid off and in year 7 the initial equipment loan.

Table 5.2

Pro-Forma Income Statement for a Three Acre Market Garden

Fixed Costs	Year 1	Year 2	Year 3	Year 4	Year 5
Building Depreciation			80	80	103
Equipment Depreciation		1582	1582	1582	1582
Cost of Operating Capital		150	300	500	500
Cost of Long Term Capital	240	3240	3640	3640	3800
Lease Cost	100	100	100	100	100
Variable Costs					
Fertilizer		65	130	195	195
Chemicals		17	34	51	51
Seed		218	436	655	655
Marketing Cost		160	320	500	500
Operating Cost		375	750	1125	1125
Total Cost	340	5907	7372	8428	8611
Total Revenue	0	5000	10000	20000	20000
Profit/Loss	-340	-907	2628	11572	11389

Table 5.2 sketches a good weather scenario. All crops are harvested and fair yields are obtained. What happens if the weather does not cooperate and, for example, the first and third harvest are halved by an early frost? cost figures will not be influenced by this calamity but revenue will decline and the profitability of the undertaking starts to look less attractive, as shown in Table 5.3.

Table 5.3
Pro-Forma Income Statements
For a Three Acre Garden With Frost in Year 2 and 3

Fixed Costs	Year 1	Year 2	Year 3	Year 4	Year 5
Total Cost	340	5907	7372	8482	8611
Total Revenue	0	2500	10000	10000	20000
Profit/Loss	-340	-3407	2628	1572	11389

The Inclusion of the uncertainty caused by the climate underlines the need for commitment on the part of the gardener. By the end of Year 4, he had 4 summers of hard work in the operation and he has less than $500 to show for it, under these assumptions.

5.4.2 Hog Enterprises Marketing 425 Hogs a Year

The starting assumption here is that the aspiring hog farmer has the landbase and the possibility to build on his land. Although most of the cost for the building and equipment are up front, the farmer decides to build up his production over three years. This way he needs less operating capital in the early stages and he can develop his market. For simplicity sake it is assumed that he can market the hog locally, either on the hoof or to a local killing plant. The farmer invests $40,000 of his own money in the operation and borrows the rest of the capital from a commercial source at 11% over 25 years. The sequence of actions over time is:

Year 1

Building and site preparation, completion of all the necessary paper work, and construction of the hog barn.

Year 2

First weaners are bought; 150 hogs are finished.

Year 3

300 hogs are finished.

Year 4 and 5

Operation is at desired level of 425 marketing.

Table 5.4 shows the financial repercussions of the scenario outlined above. Inclusion of the cost of capital makes this operation a lot less desirable for a farmer: the interest cost takes most of the return to capital, management and labour that was calculated in section 4.3.3., but the operation is in the black by year 4.

Table 5.4

Pro-Forma Income Statement for a Hog Finishing Operation

Fixed Costs	Year 1	Year 2	Year 3	Year 4	Year 5
Building Depreciation		3950	3950	3950	3950
Equipment Deprecation		980	980	980	980
Cost of Operating Capital		1500	3000	4300	- 4300
Cost of Long Term Capital	6000	6000	6000	6000	6000
Variable Costs					
Weiner Cost		3000	6000	8500	8500
Feed		10000	20000	28000	28000
Total Cost	6000	25430	39930	51730	51730
Total Revenue	0	18750	37500	53000	53000
Profit/Loss	-6000	-6680	-2430	1270	1720

6. THE POLITICS OF SMALL SCALE AGRICULTURAL PRODUCTION

6.1 Land Use Issues

One major barrier to the development of an agricultural industry is the freeze on lands that was instituted in 1975. Ownership of most land in the N.W.T. lies with the crown and lands are administered by the Department of Indian and Northern Affairs. The land freeze was instituted by DIAND in consultation with the G.N.W.T. to allow for time to develop long-term policies and complete an inventory of suitable lands. Continued uncertainty over what areas will be included in any land claims settlements continues to be a major force to keep the freeze in place, and agricultural development has been virtually at a standstill since 1975.

Basically, there are three categories of land in the NWT: Federal or Crown lands, Commissioners lands, and private lands. Crown land is all the land in the NWT unless it is otherwise disposed of and up to the mid 1960's virtually all lands fell into this category. Administration for these land lies with the Minister of Indian and Northern Affairs.

Commissioner's land came into being when surface rights to blocks of land were transferred from DIAND to the government of the NWT. This process started in 1966 and the major transfers occurred in the early 70's. The reasons for block transfers of land lie mainly in administrative efficiency and an effort to give communities a possibility to effectively plan their development. Technically, the title to Commissioner's lands remains with the crown but the GNWT can dispose of them at will and keep the proceeds of any disposal by e.g., sale or lease agreements. There are Commissioner's lands in Ft. smith, Hay River - Enterprise corridor, Pine Point, Fort Providence, Ft. Simpson and Yellowknife.

Private lands are those lands to which an individual holds title. Title to the land allows the individual to use or dispose of the land at will within the legal and administrative framework that exists. Some of the market gardens in the Hay River - Enterprise corridor are privately held.

The Hay River Dene band is the one band in the N.W.T. that has established a reserve. The move to establish a reserve in 1974 whas made mainly as an effort to gain control over land north of the Hay River opposite the current town site in the expectancy of major developments in relation with the Mackenzie Pipe Line. Contacts with the band confirm that the existence of the reserve does not necessarily preclude any further claims under land claims negotiations.

Agriculture will have to compete with other land uses such as hunting and trapping, urban development, and recreation. Within the agricultural sector there will be competition for land between smale scale crop enterprises, larger scale livestock, and large scale non-traditional agricultural operations such as bison ranching.

The small scale agricultural development discussed in this report will not have a large impact on the hunting and trapping economy in terms of land use. Not only is the scale by definition small, but it will also take place close to urban areas where the products of the agricultural operation will have to find their market. The proximity to town and roads will make the land that can be used for agriculture less desirable for hunting or trapping. Conflicts may arise, though, which may give a need for the regulation of access to agricultural land by hunters.

Urban development and agriculture are very likely to be in conflict with each other. Early settlements almost always took place on the best land in the area and further development of a settlement virtually always encroaches on the good farm land. Diminishing farmlands is an issue is all agricultural areas and regulations to direct urban developments toward agriculturally less desirable land will conserve the agricultural potential regardless of the direction that the industry may take.

Conflicts between recreational and agricultural use of lands will be limited by the small scale agricultural development discussed, and it can be arguedthatinsomeformsof agriculture, such as pick-your-own market gardens, agriculture and recreation can go hand in hand. Another example of complementing are riding stables that are made possible by locally available feed.

Conflicts over land use within the agricultural sector, for example between a large scale bison ranch and subsistence agriculture in the Slave River lowlands, will have to be resolved on the basis of the aspirations of the people involved. Carefull planning may forestall possible conficts and enhance both activities by stressing complementaries in the use of machinery and infrastructure and through a division of labour, for example if local area farmers would supply hay to the bison ranch for winter feed.

6.2 Land Claims

The claims negotiations have not yet dealt explicitly with agriculture and agricultural land leases. Up to now the emphasis in the negotiations has been on the right of Native population to make the decisions and not on the decisions themselves. Principles regarding the provision of lands in the settlement areas and the participation of the Dene and Metis people in the planning, management, and conservation of lands and water have been dealt with in the "Interim Agreement on key Elements of Land and Resources" of July, 1985.

Even though it is not known which lands will be included in the land claims negotiations, it is likely that most land with agricultural potential will be included in the process. Thus there is a very close link between the outcome of the negotiations and the development of the agricultural industry.

A special note should be included in the land in the Hay River Enterprise corridor, Ft. Smith, and Ft. Simpson. Most of this land is under the control of the government of the NWT (Commissioner's land) and some of it is held privately. In an effort to stimulate market gardening in this area, the government has made land available both at mile 12, in Paradise gardens, and within the boundaries of Ft. Smith and Ft. Simpson. Leases for up to 25 years are available and after three years of successful production, the farmer is allowed to build a residence on the land. These measures have failed to increase the acreage in vegetables but have increased the number of cleared acres, especially in the Hay River – Enterprise corridor. The importance of these lands in the context of land claims negotiations is that there are possibilities for Native and non-Native farmers cling to get control over limited amounts of lands before formal land claims settlement. Reasons for the lack of development of market gardens on these Commissioners land lie in the restrictions of building a residence on the property, the relative short term of available leases, and the difficulty to borrow money if one does not have title to the land.

The future of agricultural development can be best discussed by keeping two perspectives seperate: that of the Native people and that of existing or aspiring non-Native farmers. From the point of view of the Native people, the land claim issues do not constitute a real hindrance. In perhaps somewhat simplistic terms it can be stated that any band or Native organisation can draw a cheque on the upcoming land claims negotiations. If a Native band would want to pursue an agricultural activity it can use its influence to get control over the land in question and include the parcels in any upcoming land claims. From the perspective of a non-native farmer land claims uncertainty is an almost insurmountable object.

It is not possible, at this time, to predict the outcome of claims negotiations on land selection, lease costs, and development timetables. However, there are indications of what kind of agricultural development is most likely to be postively received by the Oene Nation and the Dene Metis Negotiating Secretariat. Such development would:

* be community initiated and oriented;
* have aboriginal people involved in all phases of the development, including the management;
* benefit Native people economically;
* be sensitive to other renewable resource and environmental concerns;
* protect the rights of the community to the land and not tie the land to a single use indefinitely.

All of the points described above can be easily accommodated by the type of small scale agricultural development discussed in this report. The one exception could be the time period over which a particular piece of land could be committed to one form of land use: i.e., agriculture. If the timeframe is short, i.e., less than 10 years, it will be difficult to interest anybody in investing the time and effort necessary to start up a farm.

6.3 Seeds of Development

Agricultural activity has persisted in the NWT regardless of the land freeze, uncertainty of land claims, and the winding down of agricultural research in the North. Those people who are currently farming in the North or who have done so in the recent past are a very valuable resource for futher development. In market gardening, for example, there is a wealth of experience and knowledge gained through experimentation, embodied in the people who have been gardening in the Hay River - Enterprise corridor.

Throughout the southern N.W.T. there are pockets of activity and aspirations that can be the starting point of further development. The following is by no means exhaustive list of these agricultural hotspots.

Hay River - Enterprise corridor market gardens. The market gardens in this area are an ongoing concern and have proved their viability and persistence. More land is available for market gardening but restriction regarding size of lots and permission to build residences have retarded growth. The current generation of market gardeners has not been sufficiently augmented by younger farmers to ensure continuity of the industry in this corridor. A more clear policy regarding rural residential housing vs. farms is needed.

Hay River Dene Band. Actively involved in the initial phases of setting up a egg laying facility, the band has shown interest in other agricultural activities as well. Potatoes used to be grown on what is now the reserve and several smaller fields along the river could be put in the production with relatively little need for clearing and breaking. A major egg laying facility would be beneficial for other agricultural activities since it would establish solid transportation links for feed or feed products with Alberta, and also produce larger amounts of poultry manure that can be used to upgrade the available land.

Fort Smith Band. Currently the Band is not involved in any agricultural activities, but members of the Band have shown considerable enthusiasm for agriculture as an alternative economic base for the Band. Large tracts of land are suitable for agriculture in the Ft. Smith area and development costs will be low due to the open prairies that exist in the area. Both the Hay River and Fort Smith Band are not as constricted by uncertainty regarding land claims as non-Native farmers.

Ft. Smith area farmers. Plans exist to start up a hog farm near Ft. Smith and a small herd of beef cattle still exists just over the Alberta-NWT border. The ongoing efforts by non-Native farmers are seriously hampered by the lack of available land. The same goes for the market gardening in the area. There are many backyard gardens in Ft. Smith and more available land may see some backyard gardens grow a marketable surplus.

There are ongoing, though not always continuing, efforts to grow vegetables in Ft. Simpson, Pine Point, and Ft. Resolution. Plans exists to grow potatoes commercially in Ft. Simpson.

Starting with these existing or impending agricultural activities it seems that there is an implicit division of kinds of operation between areas. Vegetables for the Hay River and possibly the Yellowknife market in the Hay River - Enterprise corridor; subsistence agriculture and hog production for local market and possibly territory wide market in the Ft. Smith area; and vegetable production for local market for the Ft. Simpson area. Hay River seems the most likely place for egg production, judging by its position at the hub of transportation routes and aspirations of the Hay River Dene Band.

The rough sketch of emphasis on different kinds of agricultural enterprises in different areas has repercussions for the infrastructure. There is a close fit between the needs for infrastructure for the different types of farms and what is already there. Transportation facilities are best developed in Hay River and it should be investigated further if produce could be economically brought to the Yellowknife market by plane or barge from Hay River. There is also cleared high quality land in the Hay River - Enterprise corridor for further expansion of the vegetable production.

Slaughtering facilities are most likely to be established in the Ft. Smith area due to the proposed game ranching activities in the area. Also there is complementary between hog raising and subsistence farming in that both activities would benefit by available processing facilities. The three activities togher (i.e., subsistence farming, hog raising, and game ranching) may be sufficient to support a local butchering facility. With respect to marketing in the rest of the NWT there is a definite complementary between the needs of hog production and game ranching.

The very small market of Ft. Simpson is unlikely to be able to support any substantial infrastructure development, hence agricultural development in this area is most likely to be restricted to those activities with a low infrastructure needs: i.e., market gardening.

6.4 Available Assistance

Established agricultural areas have a multitude of farm assistance programmed, both federal and provincial. Some of these programs are short term and limited in scope, such as financial assistance to livestock producers hit by drought; others have a more long term and structural character, such as extention services and market development assistance.

There is a basic division of labour between the federal and provincial/territorial governments in that research is mainly the federal, and extension the provincial/territorial mandate. This division is not very sharp since provincial governments do engage in agricultural research, through for example Alberta's Farming for the Future Programme. Conversely there are definite extension sides to the work done by federal research stations.

Appendix C gives a list of programmed provided by the federal government, that apply or could apply to farmers in the NWT. Two areas, credit and extension, warrant further discussion since both will be critical in an agriculture development in the NWT. In compiling this ist emphasis has been placed on programmed available outside the established business programmed of the GNWT and general federal programmed such as the Federal Business Development Branch services.

6.4.1 Credit

Under normal circumstances a lender will always insist on a mortgage, preferably a first mortgage, to secure a loan extended to a farmer. This way the lending agency, a commercial bank or an institution like the Farm Credit Corporation (FCC), has recourse to foreclosure action if the lendor defaults on the loan. This situation has several difficulties in the early phases of agricultural development. Credit requirements are likely to be high due to the need to cover up-front costs of clearning, building, and setting up, while equity levels are likely to be low. Thus, there is a liklihood that the collateral will not be sufficient to cover the size of the loan that is needed.

Ability to borrow money is directly linked with ownership of the land. It is very difficult to borrow money against a lease, no matter how long term the lease is. But even ownership may no be enough. Ownership needs to individual and ownership must be alienable. A lot of the land in the NWT will be owned by the aboriginal people, although the land claims negotiations have not yet narrowed down exactly which parcels, and nobody will contend that the Hay River Dene Band does own their reserve. However, experience from Southern reserves, has shown that ownership, as opposed to use of reserve land, cannot be transferred from the band to an individual and cannot be alienated from the band. Thus, although there is clear ownership, a lending agency cannot foreclose and get possession of the land in case of default on payments, and will be unwilling to lend money.

There is an agreement between DIAND and the FCC that addresses this catch 22, which provides for a recourse of the FCC on the minister of DIAND if a loan to a Band member to farm on indian controlled land fails and foreclosure is called for. This construct allows for FCC loans on farms on Native controlled land. The only catch is that the receiver of the loan must be a legal entity, i.e., a person, corporation, or other legal organizational structure. A Band is not necessarily a legal entity in the narrow sense of the DIAND-FCC agreement.

6.4.2 Extension

Farmers in the NWT have been able to use the Alberta Extension Services if needed. This use has been limited due to low number of active farmers in the NWT, and has taken place on an ad hoc informal basis. Further development of the agricultural sector may cause a strain on this relationship.

The government of the NWT does not maintain a agricultural extension service but there have been recent efforts to hire a renewable resource officer with a special mandate for agriculture in the Ft. Smith area. In view of the small size of the agricultural sector it will probably be enough to have one person involved in extension provided there are solid links with established extension and research organizations of e.g., Alberta Agriculture and Agriculture Canada, to provide back up and help. Considering the low level of development of the industry it seems that there is more than enough work to keep this person fully occupied. Stronger yet, it is unlikely that one person can fulfill all the extension and development needs unless there are provision to bring in specialized help from time to time. An example could be the market garden sector of the industry. There is currently a definite need to bring younger people into this sector of the industry to ensure its long term viability. A GNWT officer may be able to encourage people to consider the option but he would be hard pressed to provide a full range of services to existing and potential market gardeners. Short term help from the very well established horticultural centre in Brooks in the form of their Market Garden courses, may add to the services offered by the GNWT officer and result in a well rounded assistance to the farmers.

6.5 Short Legislative History

Interest in agriculture by the NWT legislative assembly has waxed and waxed over the post decade or so. Since the land freeze imposed in 1975, the following moments of legislative history sketch this process.

1977 Announcement of market garden policy and public statements regarding the need to develop a positive agricultural policy.

1979 Extension of market garden policy permitting larger leases (up to 20 acres).

1980 Discussion in the assembly of 'Principles for the Development of an Agricultural Policy'. These principles are:

GNWT supports development of commercial agriculture,
land will be made available for commercial agriculture,
GNWT will be responsible for selection of land using as criteria
* full public consultation
* not prejudice native land claims
* minimize demand for public funds
all initial disposition of land will be-on the basis of leases,
public funds required to make lands available will be recovered and operator will be responsible for municipal type services,
operators will be eligible for GNWT business assistance programs.

The discussion did only cover the first three points and a resolution was passed to the effect that no agricultural policy should be put in place till landclaims are settled.

1984 Agricultural policy comes up in the debate in the legislative assembly. The Hansard of the NWT of February 1984 shows a quote from Hon. Tegak Curley, Minister of Economic Development and Tourism. "While I appreciate that land claims are an issue in the development of agriculture lands, it is my sincere hope that ways and means can be found to develop an agricultural sector that will benefit us all".

"(...) In response to the wishes of the Farmers Association, I am prepared to reopen the question of an agricultural policy for the NWT and plan to beqin again to consult with the various groups to seek their views without making any further commitment to the area".

Hon. Tegak Curely, Hansard May 9, 1984. The day before, the respresentative of the Ft. Smith region urged the government to make land available for agriculture.

"(...)" I am redoubling my departments commitment to work to develop the many renewable resources assets that we possess in the NWT. My staff, in lose cooperation with those in Renewable Resources, will be working on plans to develop industries in each of the renewable sectors of the NWT economy."

Hon. Tagak Curely, Hansard November 6, 1984.

1985 "(...) I cannot positively indicate (. ..) that we are engaged in the agricultural part"

Hon. Tegak Curly, Hansard May 14, 1985 **Curleywas** responding to urges of **MacQuarrie** for an agricultural policy and indicated that fisheries and fur sectors had the priority.

7. CONCLUSION AND RECOMMENDATIONS

Small scale agricultural development in the NWT is a valid policy objective and will broaden the economic base of the Territories, increase the quality of life by providing fresher produce, and provide an alternative for some communities whose economic base is being eroded by the decline of hunting and trapping.

Not all agricultural operations are likely to succeed in the NWT. Cereal agriculture and beef production do not show a positive return to management, labour, and capital. Market gardening, a small scale egg laying operation, and to a lesser extent, hog production are viable enterprises.

There are several very real barriers to the development of an agricultural industry in the NWT, with uncertainty about the land claims settlements being the major one. Development is, however, possible, even in the absence of a settlement, if the needs of all parties involved in or touched by the development are recognized and if there is a form in which possible conflicts can be straightened out.

Absence of a agricultural infrastructure is another barrier to development, and those operations are most likely to succeed that need the least in terms of infrastructure investment. Market gardens, that can sell their produce at the gate, are thus more likely to lead the development than e.g., hog production which requires slaughtering facilities. But even the latter case there may be possibilities that a small, possible mobile, facility is feasible, especially by exploiting complementation between hog farming, bison ranching, and subsistence farming.

Availability of capital is always a burden on development but especially for agriculture in an early stage. Part time farming in which off-farm income is used to build up the operation is one way to, slowly, provide enough investment. FCC activities may be another, although there will be a need for special agreements to give a lending agency some security in a situation where most land is leased.

The conclusion from the short legislative history of section 6.5 seems to be that although interest in the development of an agricultural policy is warming up, there are no indications that the situation has changed substantially from the position taken in 1980. This report has investigated some of the economic and political questions that relate to the establishment of a small

scale agricultural industry in the NWT. To round off the report, this section will outline some actions that would assist the agricultural industry that is now in existence and not conflict with land claims settlements and the principles for an agricultural policy as outlined in the 1980 submission to the legislative assembly and partly discussed there.

* Open up channels of communication between the various players, such as the Native organizations, farmer's association, and government. It may be considered to establish a separate organization, made up to of representatives of all these groups, to receive, investigate, and decide upon requests for agricultural land. Discussions among the participants should decide whether this entity would be part of the government structure, the Department of Economic Development and Tourism, or the Department of Renewable Resources, or be directly responsible to the legislative assembly.

* Start discussions with the Federal government to decide which existing programmed are available to NWT farmers or could be extended to them. Recent experience of the Yukon hs shown that special assistance can be forthcoming from Agriculture Canada.

* Formalize the up to now ad hoc links between the extension service of Alberta Agriculture and farmers in the NWT. Formal links, possibly on a fee for service basis, would change the extension services available to NWT farmers from a favour by individual extension officers to a more reliable system. If a fee for service is incorporated in the system, this fee should be borne in total or for the largest part by the GNWT in order that there will be no money barrier that will limit the dissemination of knowledge.

* Take steps to extend the services of the Farm Credit Corporations to NWT farmers. The agreement between FCC and DIAND regarding farm loans on Native controlled land is valid in the NWT situation, and it may be necessary, since most agricultural land is only available under lease agreements, to set up a similar agreement between the FCC and the GNWT to cover non-native farmers.

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APPENDIX A

ESTIMATES OF MARKET SIZE BY COMMUNITY

ESTIMATE OF MARKETS FOR NWT AGRICULTURE
TOTAL MARKETING AREA: FT SMITH REGION POPULATION 23781

COMMODITY	KG	TOTAL TONNES	MARKETING TIME	TOTAL NEEDED	MARKET SHARE 50%	MARKET SHARE 25%	MARKET SHARE 10%
PORK FR	10. 42	247.80	100.00	247.80	123.90	61.95	24.78
LOIN CUTS	6.45	153.39	100.00	153.39	76.69	38.35	15.34
BELLY CUTS	2.18	51.84	100.00	51.84	25.92	12.96	5.18
SHOULDER CUT	1.24	29.49	100.00	29.49	14.74	7.37	2.95
BEEF FR	3's. 72	730.55	100.00	730.55	365.28	182.64	73.06
HIPCUTS	5.7	135.55	100.00	135.55	67.78	33.89	13.56
LOIN CUTS	3.58	85.14	100.00	85.14	42.57	21.28	8.51
RIB CUTS	10.53	250.41	100.00	250.41	125.21	62.60	25.04
CHUCK CUTS	5.56	132.22	100.00	132.22	66.11	33.06	13.22
STEWING BEEF	0.82	19.50	100.00	19.50	9.75	4.88	1.95
GROUND BEEF	9.44	224.49	100.00	224.49	112.25	56.12	22.45
EGGS	1.2.75	303.21	100.00	303.21	151.60	75.80	30.32
POTATOES	69.72	1658.01	80.00	1326.41	663.20	331.60	132.64
CARROTS	8. 72	207.37	80.00	165.90	82.95	41.47	16.59
TURNIPS	2.54	60.40	80.00	48.32	24.16	12.08	4.83
CABBAGE	6.13	145.78	70.00	102.04	51.02	25.51	10.20
LETTUCE	8. 86	210.70	15.00	31.60	15.80	7.90	3.16
ONIONS	6.88	163.61	70.00	114.53	57.26	28.63	11.45
CAULIFLOWER	2.24	53.27	15.00	7.99	4.00	2.00	0.80
BROCCOLI	1.26	29.96	15.00	4.49	2.25	1.12	0.45

ESTIMATE OF MARKETS FOR NWT AGRICULTURE
MARKETING AREA: HAY RIVER POPULATION 3322

COMMODITY	KG	TOTAL TONNES	MARKETING TIME	TOTAL NEEDED	MARKET SHARE 50%	MARKET SHARE 25%	MARKET SHARE 10%
PORK FR	10.42	.34.62	100.00	34.62	17.31	8.65	3.46
LOIN CUTS	6.45	21.43	100.00	21.43	10.71	5.36	2.14
BELLY CUTS	2.18	7.24	100.00	7.24	3.62	1.81	0.72
SHOULDER CUT	1.24	4.12	100.00	4.12	2.06	1.03	0.41
BEEF FR	30.72	102.05	100.00	102.05	51.03	25.51	10.21
HIPCUTS	5.7	18.94	100.00	18.94	9.47	4.73	1.89
LOIN CUTS	3.58	11.89	100.00	11.89	5.95	2.97	1.19
RIB CUTS	10.53	34.38	100.00	34.98	17.49	8.75	3.50
CHUCK CUTS	s.56	18.47	100.00	18.47	9.24	4.62	1.85
STEWING BEEF	0. 82	2.72	100.00	2.72	1.36	0.68	0.27
GROUND BEEF	9.44	31.36	100.00	31.36	15.68	7.84	3.14
EGGS	12.75	42.36	100.00	42.36	21.18	10.59	4.24
POTATOES	69.72	231.61	80.00	185.29	92.64	46.32	18.53
CARROTS	8.72	28.97	80.00	23.17	11.59	5.79	2.32
TURNIPS	2.54	8. 44	80.00	6.75	3.38	1.69	0.68
CABBAGE	6.13	20. 36	70.00	14.25	7.13	3.56	1.43
LETTUCE	8.86	29.43	15.00	4.41	2.21	1.10	0.44
ONIONS	6.6A	22.66	70.00	16.00	8.00	4.00	1.60
CAULIFLOWER	2.24	7.44	15.00	1.12	0.56	0.28	0.11
BROCCOLI	1.26	4.19	15.00	0.63	0.31	0.16	0.06

ESTIMATE OF MARKETS FOR NWT AGRICULTURE
MARKETING AREA: FT SMITH POPULATION 2389

COMMODITY	KG	TOTAL TONNES	MARKETING TIME	TOTAL NEEDED	MARKET SHARE 50%	MARKET SHARE 25%	MARKET SHARE 10%
PORK FR	10.42	24.89	100.00	24.89	12.45	6.22	2.49
LOIN CUTS	6.45	15.4i	100.00	15.41	7.70	3.85	1.54
BELLY CUTS	2.18	5.21	100.00	5.21	2.60	1.30	0.52
SHOULDER CUT	1.24	2.96	100.00	2.36	1.48	0.74	0.30
BEEF FR	38.7'2	73,39	100.00	73.39	36.70	18.35	7.24
HIPCUTS	5.7	13.62	100.00	13.62	6.81	3.40	1.36
LOIN CUTS	3.58	8.55	100.00	a. 55	4.28	2.14	a. 86
RIB CUTS	10.53	25.16	100.00	25,16	12.58	6.29	2. 52
CHUCK CUTS	5.56	13.28	100.00	13.28	6.64	3.32	1.33
STEWING BEEF	a. 62	1.96	100.00	1.96	0.98	0.49	a. 20
GROUND BEEF	9.44	22.55	100.00	22.55	11.28	5.64	2. 26
EGGS	1'2.75	30.46	100.00	30.46	15.23	7.61	3.05
POTATOES	69.72	166.56	80.00	133.25	66.62	33.31	13.32
CARROTS	8.72	20. 83	80.00	16.67	8.33	4.17	1.67
TURNIPS	2.54	6.07	80.00	4.85	2.43	1.21	0.49
CABBAGE	6.13	14.64	70.00	10.25	5.13	2.56	1.03
LETTUCE	8.86	21,17	15.00	3.17	1.59	0.79	0.32
ONIONS	6.88	16.44	70.00	11.51	5.75	2.88	i. 15
CAULIFLOWER	2.24	5.35	15.00	a.80	0.40	0.20	a. 08
BROCCOLI	1.26	3.01	15.00	0. 45	0.23	0.11	0. 05

ESTIMATE OF MARKETS FOR NWT AGRICULTURE
MARKETING AREA: YELLOWKNIFE POPULATION 10634

COMMODITY	KG	TOTAL TONNES	MARKETING TIME	TOTAL NEEDED	MARKET SHARE 50%	MARKET SHARE 25%	MARKET SHARE 10%
PORK FR	10.42	110.81	100.00	110.81	55.40	27.70	11.08
LOIN CUTS	6.45	68.59	100.00	68.59	34.29	17.15	6.86
BELLY CUTS	2.18	23.18	100.00	23.18	11.59	5.80	2.32
SHOULDER CUT	1.24	13.19	100.00	13.19	6.59	3.32	1.32
BEEF FR	30.72	326.68	100.00	326.68	163.34	81.67	32.67
HIPCUTS	5.7	60.61	100.00	60.61	30.31	15.15	5.06
LOIN CUTS	3.58	38.07	100.00	38.07	19.03	9.52	3.81
RIB CUTS	10.53	111.98	100.00	111.98	55.99	27.99	11.20
CHUCK CUTS	5.56	59.13	100.00	59.13	29.56	14.78	5.91
STEWING BEEF	0.82	8.72	100.00	8.72	4.36	2.18	0.87
GROUND BEEF	9.44	100.38	100.00	100.38	50.19	25.10	10.04
EGGS	12.75	135.58	100.00	135.58	67.79	33.90	13.56
POTATOES	69.72	741.40	80.00	593.12	296.56	148.28	59.31
CARROTS	8.72	92.73	80.00	74.18	37.09	18.55	7.42
TURNIPS	2.54	27.01	80.00	21.61	10.80	5.40	2.16
CABBAGE	6.13	65.19	70.00	45.63	22.82	11.41	4.56
LETTUCE	8.86	94.22	15.00	14.13	7.07	3.53	1.41
ONIONS	6.88	73.16	70.00	51.21	25.61	12.80	5.12
CAULIFLOWER	2.24	23.82	15.00	3.57	1.79	0.89	0.36
BROCCOLI	1.26	13.40	15.00	2.01	1.00	0.50	0.20

APPENDIX B-1

Budget Cost Estimates for a Three Acre Market Garden.

Assumptions

- size three acres
  availability of water for irrigation
- land is valued at a clearing cost of $300/acre and amortized over 5 years
- 1 acre under black mulch

Fertilization

Estimates are based on the recommendations for each crop in the Alberta Vegetable Production Guide. Actual rates are dependent on the needs of each particular plot as determined by soil testing.

Crop	Type of Application	Type of Fertilizer	Recommended Rate kg/acre	Average of crop	Total Weight (In kg)
Cabbage	b	11-55-0	70	.5	35
	b	34-o-o	45		22.5
	a	34-o-o	45		22.5
Cauliflower		same as cabbage		.3	21
					13.5
					13.5
Broccoli		same as cabbage		.3	21
					13.5′
					13.5
Peas	b	11-55-0	35	.3	10.5
	b	34-o-o	50		15
	a	11-55-0	30		10.5
Carrots	b	11-55-0	100	.3	33
	b	34-o-o	90		30
	a	34-o-o	15		4.5
Onion	b	11-55-0	20	.3	.6
	a	34-o-o	35		11.5
Potatoes	b	11-55-0	120	1	120
	b	34-o-o	140		140

a: application during growing season
b: broadcast application prior to seeding

total fertilizer requirement:
11-55-0: 257 kg or 11 bag 25 kg
34-0-0: 300 kg or 12 bag of 25 kg

Price per March 1, 1985 (Source: Alberta Wheat Pool)
11-55-0: $422/metric tonne or 10.55/bag
34-0-0: $256/metric tonne or 6.40/bag

Fertilizer cost: $192.85

Chemicals

Weed control
Reliance on hoeing for weed control

Insect control
Dependent on insect infestation

Method of calculation: inflate the findings of the cost of production study of 1979 by the C.P.I. It is recognized that this is a very inaccurate method but it should be taken into account that chemicals do not constitute a major cost for a market garden (less than 1% of total cost) operation so that inaccuracy in this category does not unduly influence the total costing procedure.

Seed

Cabbage	1-20 grams will produce enough transplants to plant 1 acre of cabbage. Thus, total cabbage seed requirement is 60 grams.	
	1 x 20 gram package of Early Marvel (early variety)	$ 3.40
	1 x 20 gram package of Storage Green (late storage variety)	$ 6.30
Cauliflower	1-20 " grams will produce enough transplants to plant 1 acre of cauliflower. Thus, total cauliflower seed requirement is 40 grams.	
	2 x 20 gram package of White Rock at 20.70	$ 41.40
Broccoli	1-20 grams of seed will produce enough transplants to plant 1 acre of broccoli. Thus, total broccoli seed requirement is 40 grams	
	2 x 20 gram package of Premium Crop at 14.50	$ 30.80

Carrots	1.5 kg of seed required to seed 1 acre of carrots, thus, total carrot seed requirements is 450 grams of carrot seeds 1 x 454 grams of Touchon Deluxe at 22.80	$ 22.80
Onion	Full seeded with a density of 4.25 kg/acre giving a total seed requirement of 375 grams 3 packages of 113 gram = 339 gram of Norstar at 38.20 2 packages of 28 grams = 56 gram of Norstar at 10.40	$48.60
Peas	30 kg/acre of seed is needed if row cropped, resulting in a total seed requirement of 10 kg 10 kg of Green Arrow at $3.63/kg	$ 36.30
Potatoes	one acre of potatoes planted with 90 cm between the row and 30 cm between seed pieces (using 55 gram seed pieces) requires 800 kg of seed potatoes (netted gems) at $.33/kg	$264.00

Total seed requirements: $453.60

Source: for seeds: 1985 Catalogue of Stokes Seed Ltd.
for potatoes: Edmonton Potato Growers (1971) Ltd.

Transpiration: seed prices include postage,
seed potatoes will be sent up by bus to Hay River for a cost of $200.

Machinery and other equipment

- Backpack sprayers (2) @ $125	$ 250
- Small garden tools	$ 300
- Precision seeder	$ 1,000
- Rototiller, heavy duty	$ 800
- Fertilizer spreader, push type	$ 200
- Irrigation*	$ 3,000
Tota 1	$10,550

*Irrigation

type of system: drip irrigation, ie. high grade plastic tubing delivering the water to the plant on ground level

advantage: low pressure system needs less pumping power delivers water to the plant -- no waste of water (100 feet of tubing at 10 psi only need 1 gallon/hour)

disadvantage: tubing lies on top of the soil along the row of crops, thus only hand cultivation between plants.

Equipment needed:

- one fully rigged pump of no more than one (1) hp.	$700
- tubing to deliver water to plants (6500 running feet)	$7300

Water requirements:
Monotubing will need 600 gallons/hour

Sources: Hausher (1985)
Green Thumb Irrigation Ltd.

Greenhouse

It is assumed that several of the crops are started early and transplanted into the garden. For this purpose, and for this purpose alone, a small greenhouse is included in this budget estimate. The greenhouse will be in use from late winter/early spring till planting time.

Pre-packaged greenhouses can be had for as little as $400. The estimated total cost for a small greenhouse plus a woodstove for heating is estimated at $800.

Storage

Although refrigeration will improve the storage life and the quality of the product, the storage requirement is met in this exercise by a well constructed root cellar, ie. well insulated walls and ceiling, concrete floors, subdivided for bins, and a ventilation system.

The following figures are an average of cost figures presented by the Horticultural Centre in Brooks.
Average building cost in Alberta: $150/tonne
Tonnage of vegetables to be stored: 7 metric tonnes
Building cost adjustment factor 1.21
Total building costs $1,270.50

Marketing Cost

In the example operation it is assumed that the sales will be at the gate. Marketing costs are limited to the erection of a stand and some signs, all of which can be erected for less then $300. In addition it is likely that some advertising will be done.

Total marketing cost: $500

Transportation

The assumption of farm gate sales reduces the transportation requirement to the need to bring the inputs to the garden. It is assumed that some vehicle (preferably a half ton truck) is available so that only some operating cost are included. See operating cost.

Operating Costs

Gas and maintenance for rototiller, irrigation pump, truck and miscellaneous items is estimated at:	$ 1000.
Black mulch to cover one acre: 6000 feet @ 4"1 .04/2000 feet:	$ 125
Total costs estimated at:	$ 1125

* Depreciation of machinery is limited to the irrigation system. rototiller, and precision seeder, all to to be depreciated over 10 years.

Total value:	$9800
Depreciation period:	10 years
Annual depreciation:	$ 980

* Total short term capital required to cover the operating expenses, including debt servicing is $7750.29. Not all expenses come early in the season; money for labour, for example, is mainly needed in the harvest season. What is needed is a line of credit large enough to cover all expenses as they come up. The cost of this line of credit is estimated at $500.

APPENDIX B-2

BUDGET COST ESTIMATES FOR A 4000 HEN EGG LAYING OPERATION

Table B-1

Comparison Between Building Supply Prices in Edmonton and Hay River, October 1985

	Edmonton	Hay River	Hay River/Edmonton
Lumber:			
2x4x10	$2.20	$2.60	1.18
2x6x10	3.20	3.90	1.22
1x6x10	2.10	2.37	1.13
1X4X10	1.35	1.39	1.03
Plywood:			
4x8x1 /2	14.49	17.05	1.18
4x8x3/8	9.99	12.60	1.26
Other:			
Shingles (235)	17.99	24.00	1.33
Roofing Nails	1.00	1.23	1.23
Common Nails 3"	0.70	0.85	1.21
Common Nails 4"	0.70	0.88	1.26
Insulation R12	15.99	23.75	1.49
Portland Cement (40 kg)	7.49	10.65	1.42
Weighted Average			1.21
Source: RMC Survey of Prices			1.21

Assumptions:

Building costs have been adjusted to 19B5 levels using the CIP and increased by 1.21 to account for Hay River area building costs (see Building Costs, Table B-l).

Equipment costs have been adjusted to 19B5 levels using CPI and increased by the 1.21 building cost factor to account for the northern location.

Land is valued at the cost of clearing of $300/acre, amortized over 5 years at 12%, compounded semi-annually.

Pullets are priced at $3.60/ bird being the quota price and tota 1 pullet cost is adjusted upward by $BOO for transporation. Salvage value is estimated at $0.15/bird.

Feed cost is estimated at $292 /tonne being $237 for complete 16% laying mash, example, Grande Praire, hauled up in 7 trips for a total of 158.6 tonnes (conversion rate 1.98 kg. feed/doz. eggs). Each trip costs $55/tonne or $1,210/load.

Source: A Cost Analysis of Egg Production in Alberta 1983; and RMC Analysis.

APPENDIX B-3

Budget Cost Estimate for a Hog Enterprise Marketing 425 Hogs a Year.

1. Land cost is set at the cost of cleaning: 300/acre amortized over 5 years @ 12% interest rate, compounded semi-annually.

2. Hog barn @ 0.60 m^2/hog on 255m^2 pen area and total barn 300m2 Building cost of $20/square foot ($217.8/m^2) adjusted by the building cost factor of 1.21 to allow for northern location.

3. Buys 438 each @ $20/head (18 kg or 40 lbs).
Sells 425 95 kg. (210 lb.) finished hogs @ $1.34/kg. ($0.61 /lb.)
Oeath loss: 3%

4. Feed cost calculation

Commodity	Amount tonne	Price tonne	Total
Barley	74.4	97.00	6919.20
Other grain	21.4	115.00	2461.00
Starter	16.9	225.00	3802.50
Grower	33.5	200.00	6700.00
Finished	14.0	200.00	2800.00
Protein Supplement	3.5	425.00	1487.00
Tota 1	163.7		24170.20

Barley and other grains are sourced locally and the other feeds are brought up from Grand Prairie for $55./tonne. Total brought up from Grande Prairie equals 67.9 tonnes @ $55./tonne = $3734.50

APPENDIX B-4

Budget Cost Estimates for a 250 Acre Crop Enterprise.

1. A 300 acre farm in the Ft. Smith area with the following cropping pattern:

Wheat on stubble or summerfallow	50 acres
Barley on stubble or summerfallow	100 acres
Hay (Clover Brome mixture)	100 acres
Summerfallow	50 acres

2. Yields and prices

Wheat	800 kg/acre (30 bu.)	@ $130/tonne*
Barley	1000 kg/acre (40 bu.)	@ $ 93/tonne*
Hay	1800 kg/acre	@ $ 80/tonne
Hayseed Clover 8rome mixture		@ $245/100 kg

* prices for board 3 CWRS wheat and non-board 1 FD Barley in High River, November 1985. For the purposes of the sensitivity analysis of section 4.5 the wheat and barley prices have been reduced to $110 and $70 per tonne.

3. Seeding rates

Wheat	27.24 kg/acre (60 lbs)	= $ 8/acre**
Barley	36.32 kg/acre (80 lbs)	= $ S/acre**
Hay***		= $12/acre

** prices include seed cleaning
*** Red Clover at 3.6 kg/acre (8 lbs.) and 8rome at 5.4 kg/acre (12 lbs.)

4. Fertilizer rates

Wheat and Barley acreage 30 kg (66lbs) of 34-O-O per acre @ $256/tonne

5. Wheat control

Wild oat control and one application of broadleaf herbicide for an average of $5/acre.

6. Machine shed is 1000 square feet @ $25/square foot and is adjusted to reflect building in N.W.T. by a factor of 1.2.

7. Bulk fuel prices (Ft. Smith, Oct., 1985). Gas 57.0¢/litre, diesel 54.2¢/litre. The operation will need 5550 litres of gas and 6910 litres of diesel.

8. Machinery Stable.

Item	New Cost	Hours use	Fuel Consumption litres/hour	Depreciation %
Tractor 80 hp.	30,000	250	17	15
Cultivator 14′	8,000	50*		10
Feeder 12′ end wheel	9,000	25*		10
Harrow	2,000			10
Sprayer	6,000	25*		10
Swather 15′	5,500	20*		10
Rake 9′	4,000	20**		10
Self Propelled				
Combine 45″ pickup	72,000	20	22	10
Round baler	16,000	20		15
Truck 3 tonne	24,000	150	37	15
Dryer	10,500	60	37	15
Augers	3,000			15
	191,000			

* Assumes 80% field efficiency and 5 m.p.h. field speed.
** Rake is used at higher field speed.

9. Repair costs are assumed at 3% of replacement value.

APPENDIX B-5

Budget Cost Estimates for a 250 Acre Hay Enterprise.

1. A 250 acre farm in the Ft. Smith area all in hay using a clover, brome mixture.

2. Yield & Prices.

   Hay 1800 kg/acre @ $80/tonne
   Grass seed @$245/100 kg

3. Seeding rate

   Red Clover 3.6 kg and Brown 5.4 kg per acre @ 12/acre.

4. Machine shed of 1000 square feet @ $25/square foot adjusted for northern location by building cost factor of 1.21.

5. Machinery Stable

	new costs	hours use	fuel use	Depreciation(%)
Tractor, 80 hp	30,000	150	17	15
Mower 7'	4,000	30		10
Rake 9'	4,000	30		10
Round Baler	16,000	40		15
Truck 3 tonne	24,000	150	37	15
	78,000			

6. Fuel : diesel 54.24/litre
   gas 57.04/litre
   Bulk Prices Ft. Smith Oct. 1985

7. Fertilizer application of 30 kg (66 lbs) of 34-0-0 @ $256/tonne .

APPENDIX B-6

Budget Cost Estimates for a 40 head Cow-Calf Operation.

1. 40 head cow-calf operation using pens to contain the animals. All feed and pasture is bought. Land is valued at the cost of clearing: $300/acre.

2. Site preparation: 50 square feet/head @ $2.54/sq. ft.

Fences @ $3/foot
Windbreak @ $7.15/head
Open front pole shed 4.75 square foot/head
Feeder @ $27/foot

7. Feed requirements

Hay 3 tonnes per animal unit	@ $80/tonne
Barley 454 kg per animal unit	@ $93/tonne
Pasture for 4 months	@ $10/animal unit/month

For the purposes of the sensitivity analysis is section 5.4 the price of barley has been reduced to $73/tonne.

APPENDIX B-7

Budget Cost Estimates for a 50 Hive Beekeeping Operation.

1. Major source is Alberta Agriculture: Economics of Beekeeping.

2. Prices have been adjusted using CPI.

3. Averages for a 10-99 hive operation have been adjusted upward by 10% to reflect the northern location.

4. Yield and Prices
Each hive yealds 71.73 kg (158 lbs.) of honey which sells at an average of $ 1.75/kg.

APPENDIX C

Programmes Available to N.W.T. Farmers

The list of programmed in this Appendix is culled from Alberta Agriculture, Assistance Available for Alberta Farmers Agdex 8/71 (1985) and from personal communication of the author with Agriculture Canada. Not all programmes listed may be in existence in 1986. Users are advised to contact the program agency to see if an application can be made or whether other, obscure, programmed apply.

Feed Freight Assistance Programme

Assistance in the form of $50 rebate for each tonne of livestock feed brought into the Territories. The farmer is responsible for the application for this rebate. Applications should be directed to:

Livestock Feed Board of Canada
17655 - 57th Avenue
Suite 3
Surrey (Cloverdale) B.C.
V3S 1H1

Advance Payments for Crops Act (APCA)

Purpose: To assist farmers producing storable crops to improve their marketing pattern and timing of sales.

Terms:
- Provides elegible producer groups with guaranteed interest free loans to make advance payments to their members;
- covers all storable crops grown in Canada excepting wheat, otas and barley covered by the Canadian Wheat Board;
- an individual producer may receive an advance of up to $15,000 for all crops produced each year.

Apply to:
Operating Programs
Marketing & Economics Branch
Agriculture Canada
Sir John Carling Building
Ottawa, Ontario KIA 0C5
Phone: 995-5880

Agricultural Products Cooperative Marketing Act (APCMA)

Purpose: The federal government guarantees bank loans for initial payments and operational costs to groups wishing to market a commodity in a cooperative fashion.

Terms:
- Most agricultural products are eligible, -except crops covered by the Canadian Wheat Board;
- the product must operate under a plan which gives equal returns to producers for like grade and quality;
- if actual selling prices are higher than the initial payment plus marketing costs then surplus funds are distributed to producers as a final payment;
- if the initial payment exceeds the final selling price then the federal government pays the difference to the marketing group.

Available to: Any producer group organized as a cooperative that has a plan and a pooling system, may apply.

Apply to:
Operating Programs
Marketing & Economics Branch
Agriculture Canada
Sir John Carling Bldg.
Ottawa, Ontario KIA 0C5
Phone: 995-5880

Canadian Agricultural Market Development Fund (CAMOF)

Purpose: To help develop domestic markets, or stimulate or promote Canada's agricultural and food products in domestic markets.

Terms: The program will contribute up to 50 percent of total costs of projects in three areas.

- feasibility projects to identify the potential for development of market, technical and commercial ventures;
- development projects that help expand markets for new or improved food products through activities such as Promotion, distribution, transportation, or product processing innovations;
- Canadian capability projects that help wherever there is a lack of technical, production or marketing capability or skills.

Available to: Most types of organizations can apply, but must demonstrate adequate financial and managerial resources to carry out the obligations under the agreement. Priority is given to projects that will benefit the greatest number of producers.

Apply to: Operating Programs
Marketing & Economics Branch
Agriculture Canada
Sir John Carling Bldg.
Ottawa, Ontario KIA OC5
Phone: 995-5880

New Crop Development Fund (NCDF)

Purpose: To encourage the growth and efficiency of a diversified crops sector in Canadian agriculture; to evaluate new crops, varieties and production techniques; to assist in the development of new crops, and to accelerate the adoption of new crops and technologies.

Terms: - grants to 75 percent of project cost to a maximum of $500,000.
- for crops with a reasonable chance of commercial success.
projects to establish a specific commercial enterprise are not eligible.

Available to: Commercial organizations, industrial or producer organizations, universities and other non-profit organizations and provincial and territorial agencies.

Apply to: New Crop Development Fund
Secretariat
Crop Production Division
Regional Development Branch
Agriculture Canada
Sir John Carling Bldg.
Ottawa, Ontario K1A 0C5
Phone: 995-5880

Fruit and Vegetable Cold Storage Program

Purpose: To assist in the construction or renovation of cold storage facilities to extend the marketing season.

Terms: Assistance - 1/3 of construction costs to a maximum of $500,000.00.

Available to: Groups of three or more primary producers of fruits and vegetables, including associations, cooperatives and limited companies.

Apply to: Operating Programs
Marketing & Economics Branch
Agriculture Canada
Sir John Carling Bldg.
Ottawa, Ontario KIA OC5
Phone: 995-5880

Federal Excise Tax Refund On Gasoline

Purpose: Provide lower fuel costs for farmers.

Terms: Excise Tax of 1.5¢/litre after Jan. 1/79 is refundable to farmers for gasoline used in their farming operations. Claims may be submitted at six month intervals for periods ending December 31 and June 30 or when the tax claimable amounts to $200, subject to a maximum of one claim per month.

Farmers will be eligible for a rebate of 4.8 cents per litre on the fuel they buy for off-highway use in commercial activities between December 1, 1984 and January 1, 1987. The new rebate is in addition to the 1-1/2 cents per litre excise tax refund.

Applications for refunds must be made within four years of the date of purchase of the gasoline. It is not necessary to submit receipts or vouchers with a claim, but each claimant must retain documentation for audit purposes.

Available to: Individual producers using gasoline for farming operations.

Anthrax Indemnification Program

Purpose: Compensation to reduce the losses of a farmer whose animals die from this disease.

Terms: The payment for cattle, horses, sheep, swine and goats which die of this disease is the market value of the animals, subject to limits. As well, free vaccination is provided to treat the herd. Confirmation of disease must be done by a federal veterinarian. Compensation is available-for confirmed cases up to $500 for cattle, $350 for horses and $200 for sheep, swine and goats.

Available to: Farmers with confirmed cases of Anthrax in their herds.

Apply to: One of the district offices of Health of Animals Branch, Agriculture Canada.

Turberculosis/Brucellosis Compensation Program

Purpose: Compensation and advisory assistance for farmers with animals that have to be destroyed because of these diseases.

Terms: Compensation is paid on the following basis:
- Grade Beef Cattle up to $1,000
- Grade Dairy Cattle up to $1,200
- Purebred Beef Cattle up to $1,500
- Purebred Dairy Cattle up to $1,800

This compensation is made up of a combination of the salvage value of the carcass plus a government grant. If the salvage value of the carcass is more than the specific allocation, no additional government grant is made.

Disease must be confirmed by a meat inspector or federal veterinarian.

Available to: Farmers with livestock contacting tuberculosis or brucellosis.

Apply to: Health of Animals Branch, Agriculture Canada at one of the district offices in Alberta.

Swamp Fever of Horses (Equine Infectious Anemia)

Purpose: Compensation for horses that have to be destroyed because of swamp fever.

Terms: Maximum payment of $200 per head, plus salvage value of the animal.

Diagnosis of swamp fever is done by the use of Coggin's test and the result is confirmed by a federal veterinarian.

Available to: Persons with horses contracting Swamp Fever.

Apply to: Health of Animals Branch, Agriculture Canada at one of the district offices in Alberta.

Newcastle Disease in Poultry

Purpose: Compensation for losses of poultry that die from Newcastle Disease.

Terms: Compensation for losses of birds and eggs is based on the market value as determined by an inspector.

Available to: Farmers whose poultry is infected with Newcastle Disease.

Apply to: Health of Animals Branch, Agriculture Canada. Disease must be confirmed by a federal veterinarian at one of the district offices in Alberta.

Federal Sales Tax Exemption

Purpose: Provide farmers with production inputs without payment of sales tax.

Terms: Farmers who are producers of unconditionally exempt products are entitled to purchase machinery apparatus and parts thereof, for use directly in the manufacture or production of goods, without payment of sales tax.

Exemption is done by quoting the following certificate of exemption on their purchase order:

We certify that the goods ordered/imported hereby are to be used as outlined in Section 1, 3, and 4 of Part IV of Schedule 111 of the Excise Tax Act.

_____
Signature of Purchaser

An "End Use" description should be given with this certificate. "End Use" is a term used to indicate the location and purpose for which the materials or equipment are purchase.

Pipe, pipe fittings and valves, hose, electric wire, cable and conduit and multi-purpose materials, such as lumber and steel, must be purchased on a tax-paid basis. The tax paid is subject to refund when these goods are incorporated into production equipment.

For specific details please contact Revenue Canada - Excise. Examples of exempt equipment are: farrowing crates, drainage tile and granaries, but not other buildings.

Available to: Farmers who are producers of unconditionally exempt products.

Apply to: Revenue Canada Excise
P.O. Box 2525, Station M
Calgary, Alberta
T2P 367
Phone: 231-5672