

REVISED

Compilation of Sectoral



Information on Agriculture

Yukon
Renewable Resources

REVISED
COMPILATION OF SECTORAL INFORMATION
ON YUKON AGRICULTURE

Prepared by:

A. Hodgson

Prepared For:

Department of Renewable Resources,
Agriculture Branch,
Whitehorse

February, 1990

PREFACE

To the Revised Compilation Of Sectoral
Information on Agriculture

The original report was prepared in 1989. Since that time the Agriculture Branch, Department of Renewable Resources became aware of additional reports relating to the agriculture industry. This material has been reviewed and incorporated with the original (1989) document. The revised report is primarily a reflection of the opinions and conclusions of other workers in the field of agriculture. It represents a summary of all Yukon agricultural information which was available to the author.

All documents reviewed are included in the reference section of the report. Readers who are aware of reports or other published, or unpublished information pertaining to Yukon agriculture, are invited to contact the Agriculture Branch regarding this material.

TABLE OF CONTENTS

Preface	i
Table of Contents	ii
List of Tables	iii
I. Introduction	1
a) Background	1
b) Objectives	1
II. Government Policies	2
III. General Economic Considerations	6
IV. Sectoral Analysis	12
a) Cereals and Greenfeed	12
b) Forages	14
c) Horticulture	17
1. Vegetables	17
2. Berries	22
3. Honey	24
4. Specialty Crops	24
d) Livestock	26
1. Dairy	26
2. Beef	31
3. Sheep	33
4. Poultry	34
5. Hogs	38
6. Game Animals	40
e) Summary of Land Data.....	42
V. Marketing	48
a) Farmers Market	48
b) Local Distributing Companies	48
c) Export Potential	49
d) Processing Possibilities	50
VI. Pertinent Recommendations From Documents Reviewed ..	53
VII. Conclusions	58
VIII. References	60

List of Tables

Table I. Number, Area and Use of Farmland, Yukon Territory for Selected Years	4
Table II. Value of Farm Capital and Sales of Farm Products	5
Table III. Annual Cost of Hay Production	16
Table IV. Wholesale Grocers and Market Shares	19
Table V. Wholesale Prices of Vegetables and Potatoes ...	20
Table VI. Market Gardening Costs of Production	21
Table VII. Capital Costs, Production Estimates and Estimated Revenues for Commercial Berry Production in B.C.	23
Table VIII. Yukon Dairy Consumption	28
Table IX. Prices of Dairy Products	29
Table X. Projected Milk Market	30
Table XI. Costs and Returns for a 32 Cow/Calf Enterprise	32
Table XII. Projected Cash Flows From a 6700 Layer Farm ..	36
Table XIII. Costs and Returns for a Broiler Enterprise Marketing 4800 Birds per Year	37
Table XIV. Costs and Returns for a Farrow-To-Finish Enterprise Marketing 4800 Hogs per Year	39
Table XV. Acreages of Various Types of Agriculture as Indicated on Agricultural Land Applications up to February, 1989	44
Table XVI. Acreage of Land Required for the Production of Meat in Yukon	45
Table XVII. Acreage of Land Required Excluding Red Meat Production	46
Table XVIII. Summary of Agricultural Land Disposition Data.....	47

I. INTRODUCTION

a) Background

Agriculture is not new to the Yukon. At the time of the gold rush Dawson was producing sufficient quantities of agricultural goods to feed its population. Since then production has decreased, however, the seventies saw a major resurgence in interest in agriculture. Copious papers, studies and reports have since been written which have analyzed most sectors of Yukon's agriculture. These have been written from both the government and private viewpoints, and range from casual comments through detailed feasibility studies.

b) Objectives

The purpose of this report is to provide the Agriculture Branch of the Department of Renewable Resources with a consolidated sectoral review of the existing published and unpublished data relevant to the agricultural industry in Yukon.

To this end, material has been reviewed from the files and library of the Agriculture Branch, the Yukon Archives, the Department of Renewable Resources library and reports relating to agriculture from the Economic Development Agreement. A list of all documents reviewed is provided in Section VIII.

The main thrust of the report is to provide background material and data which would assist an agricultural economist in developing a detailed marketing strategy.

In order to avoid repeating information which is readily available, no attempt has been made to include detailed data on soils, climate or the historical review of Yukon agriculture. Instead the interested reader is referred to the following reports: Smythe (1989), Maurer (1989) or Peake and Walker (1975) for a detailed history of agriculture in Yukon; to Rostad, Kozak and Acton (1977) for soils information; and to Carder (1965) or Ely and Findlay (1977) for agroclimatic information.

II. GOVERNMENT POLICIES

In the past, government policy was basically to discourage, or at best, have a "go slow" approach to the development of agriculture in Yukon. More recently there has been a strong commitment on the part of the Yukon Government for the support of agriculture. The Green Paper (1985 - Discussion Paper "The Future of the Yukon's Renewable Resources") states that:

"The primary goal of the agriculture unit of Renewable Resources is to support the development of a self-sustaining agricultural industry in Yukon."

"The Yukon Government is committed to preparing a agricultural policy. This policy will determine, to a large extent, how land is released for farming. The policy will emphasize that agricultural activities in Yukon must be based on market demands. In other words we should grow and produce what we can competitively sell to local consumers, and not invest in operations or activities that are non-competitive and that will need government subsidies."

Loeks (1986, Phase III, p.1) states that "..... the Government of Yukon has three goals in implementing an agricultural land disposition program:

- "a) to encourage the development of a self-sustaining agricultural industry;
- b) to select the most suitable land for agriculture from an ecological and economic perspective and;
- c) to encourage environmentally sound farming practices."

Additional goals and objectives were given in the Department of Renewable Resources, Renewable Resources Commitment to Agriculture (Anonymous, Undated,a)). These included:

- "- to encourage the sustainable development of the Yukon's agricultural industry;
- to ensure the primary role of the private sector in agricultural development;
- to encourage the development of a non-subsidized multi-faceted agricultural industry by
 - . promoting food production that replaces imported foods to the greatest extent possible,

- . promoting non-food agricultural products of high value, and
- . allowing a reasonable diversity of opportunity and life-style for Yukoners interested in agriculture."

The formation of the Agriculture Branch within the Department of Renewable Resources in 1986 is "a clear indication of the serious commitment this government is prepared to give to the farm sector." (Renewable Resources Commitment to Agriculture, p.6). It is important to note that this report also emphasizes the "importance of agriculture as a way of life and as a rural lifestyle that many people wish to pursue the public can expect a continued commitment to this objective."

This continued support is emphasized in the Yukon 2000 - Yukon Economic Strategy goals for agriculture (p. 34) which are:

"Promote the development of economically viable agriculture.

Increase the availability of those lands suitable for agricultural purposes.

Help the industry to develop markets and provide the necessary infrastructure to assist the growth of the industry.

Support research and other inovative development."

The recent development of various agriculture policies and Acts further emphasizes the government commitment to the agricultural sector (eg. Agricultural Policy, Agricultural Products Act, Grazing Policy, Game Ranching/Farming Policy) and Meat Inspection and Abattoir Regulations. In addition, Farmers Market Health Regulations are being developed.

Various agricultural statistics indicate that the government support of agriculture is having a positive effect on Yukon agriculture (see Tables I and II). For example, between 1966 and 1987 the value of farm capital has increased dramatically from \$47,300 to \$24,478,000 (note that the dollar values have not been adjusted to 1987 levels); the number of farms have increased from 9 to 198; and the total area of farms has increased from 3,680 to 30,511 acres (1490 to 12352 ha).

TABLE I

NUMBER, AREA AND USE OF FARM LAND, YUKON TERRITORY FOR SELECTED YEARS¹

Item	unit	1931	1941	1956	1961	1966	1987 ²
Number of farms	Number	41	26	16	15	9	198
Number of commercial farms	"	n.a.	n.a.	4	2	2	n.a.
- full time farmers	"	-	-	-	-	-	29
- part time farmers	"	-	-	-	-	-	75
- hobby farmers	"	-	-	-	-	-	94
Total area of farms	acres	5,197	2,781	3,997	8,072	3,680	30,511
Improved land	"	778	511	634	954	463	4,323
Unimproved land	"	4,419	2,270	3,363	7,118	3,217	n.a.
Crops - wheat	"	8	-	23	42	-	-
- oats	"	63	27	52	77	20	1,248
- barley	"	n.a.	n.a.	15	4	-	41
- hay	"	558	392	88	104	108	2,456 ₃
- potatoes	"	69	47	17	12	4	30.8 ₂
- vegetables	"	5	1	9	5	2	393.2
Livestock - horses	Number	62	90	172	230	17	992
- cattle	"	72	52	104	206	98	206
- milk cows	"	n.a.	n.a.	7	16	9	35
- hens & chickens	"	224	138	296	358	635	9,611
- hogs	"	n.a.	n.a.	n.a.	n.a.	n.a.	144
- sheep	"	n.a.	n.a.	n.a.	n.a.	n.a.	70 ₃
- goats	"	n.a.	n.a.	n.a.	n.a.	n.a.	70 ₂

¹from Carr, D.W., 1968, p.150 except for 1987 data

²from Yukon Economic Review and Outlook, 1987 - 1988, p.31

³from Filteau, Agriculture Survey, 1987.

TABLE II

Value of Farm Capital and
Sales of Farm Products

	1961 ¹	1966 ¹	1987 ²
Land & Buildings	198,600	47,300	24,478,000
Machinery	113,900	56,100	3,967,000
Livestock	59,900	17,900	n.a.
Total Capital	372,400	121,300	28,445,000
Total sales of Farm products	15,610	22,480	364,000 ³

¹ Carr, D.W., 1968, p. 151

² Yukon Economic Review and Outlook, 1987 -1988, p. 31

³ This figure does not include sales of bedding plants, sod or agricultural products consumed on the farm.

III. GENERAL ECONOMIC CONSIDERATIONS

A review of the reports published in the early 1900's indicate that little has changed since that time. Rowath (1916, p.206) states "farming operations can only be successssful so long as those who are engaged in agriculture produce no more than is required for consumption in the Territory. Careful and systematic farming operations, with due regard to the peculiarities of climate, would abolish the importation into the Yukon of many of the agricultural products required by the people....."

There is little question that the Territory is capable of producing a wide variety of agricultural products as this has been demonstrated many times in the past. Reports (Steinberg, 1908; Rowath, 1916; Harris, 1969; Carr, 1968; YLAA, 1986; etc.) indicate that vegetables, forages and grains have been successfully grown in diverse locations ranging from Dawson, Mayo, Haines Junction and Whitehorse. Recent experience with demonstration crops confirm these observations (Ames, 1989; Smith et at, 1985, and Bisset, 1989).

Although the technical ability to produce agricultural products has been demonstrated, the literature suggests that there may be problems both with producing these products economically and with marketing.

In general, many reports were quite negative to the prospects of commercial agriculture succeeding in Yukon. The following quotes illustrate this point:

- "Farming may be possible in the Yukon but it is unlikely to be profitable." (Carr, 1968, p.168);
- "There is virtually no potential in Yukon for the new large scale, highly mechanized farming now dominating agriculture in the rest of Canada because the physical environment is not suitable for it." (Carr, 1968, p.169);
- "Heavy capital investment, the high cost of inputs, labor and transportation, the low yields and limited markets make farming financially unsound." (Peake & Walker, 1975, p.44);
- "There are opportunities for producing vegetables, small fruits, beef and pork in some areas. Although the production of pigs, cows and poultry in modern barns is equal to that produced elsewhere, the cost of housing is higher and the availability of low-priced processed products limits the size of the market. There is a small market for grains and hay for pack horses, but the development of these crops will have to go hand in hand with livestock production." (Harris, 1972, p.25)

- "Also, the cost of overcoming these extreme transportation, soil and climatic constraints may outweigh any potential benefits." (Beattie et al, 1981, p.31)

In addition, the 1981 Special Committee on Food Prices was told repeatedly that "there are few commodities that could be produced here economically". However, it was also evident to the Committee that Yukon farmers believe that they can compete with locally grown produce.

General development costs for a farm were provided by the Subcommittee on Zoning and Taxation (1986, p.1). "Land development costs vary from \$200.00 to \$750.00 an acre to clear, pile, break, seed and fertilize, depending on the location of the property and the cover on it. On 100 acres this will cost, based on an average of \$500.00 per acre, \$50,000 before he enjoys any return on his investment. He may also have to spend \$50,000 to install and operate irrigation equipment. This does not take into account the cost of providing a place to live or buildings needed for agricultural purposes or equipment to operate the farm. Because of these high costs there may be a need to provide a financial incentive to keep agricultural lands in production."

The Subcommittee (1989, p. 1) also stated that "because of the short-term economic value of land used for agriculture is lower than other uses of the land, there is concern that the Yukon's scarce agricultural lands may be lost to other land uses."

Although "many studies have pointed out the poor economics of starting up a farm..... the demand for any new (agricultural) lands that have become available has always exceeded the supply." (RMC, 1985,p.46).

This is likely due to the fact that "land holding has a special fascination, encouraging exaggerated expectations which often cloud realistic assessment of the chances of success" (Burton, 1971, p. 15).

A more detailed study of farm economics was undertaken in the Northwest Territories. This study revealed that smaller scaled farm operations were viable while larger operations showed negative returns. "Instead of large scale production for the export market, the focus is on small scale production for the local market..... by keeping the scale of production small, there are possibilities for more intensive management; and by focusing on the local market there are reasons to shift away from the major cereals towards more labour intensive, higher priced crops..." (RMC, 1985,p.1).

The RMC report went on to state that:

"One of the ways to circumvent negative returns is by supplementing the family income by off-farm work and building up the farm over a number of years. All enterprises..... gave a positive return to capital, management and labour if it is assumed that the farm is paid for, stocked and equipped by off-farm income.

Part-time farming is a fixed attribute of all agricultural areas in the earliest 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.

The motivation of part-time farmers is often not of an economic but rather of a life-style 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 is often sound economic reasoning..... in that an established farm has a real value as a retirement investment or inheritance." (RMC, 1985, p.46)

These ideas are supported by Maurer (1989, p.26) who also cites characteristics which will contribute to the continuation of agriculture in northern or marginal areas. These include location of the farms on the best soils in the area, location near a reliable transportation network, farm diversification, and part-time farming or reliance on off-farm work for part of the income.

Beattie et al (1981, pp.21-22) provide a general profile of farmers in marginal areas. Usually they are farming on a part-time basis, are young and inexperienced, and they tend to be under-educated or with limited farm management skills.

The following quote from the director of the Institute of Agricultural Sciences, Alaska (Miller, 1975, p.228) probably applies as much to the Yukon situation today as it did to Alaska in 1975.

"The great American dream! To be independent. To be completely self reliant and, if possible, self sufficient. Not necessarily to be rich, but to be one's own boss and beholden to no one. This is what brought our forefathers to this continent in the first place This is the magnet that still draws people to Alaska."

The Yukon Government is committed to supporting the development of a self-sustaining agricultural industry

with a goal of reducing the importation of agricultural products into the Territory. The Government has also indicated support for agriculture as a 'way-of-life' and rural lifestyle. The following observations by Burton are of interest in this regard:-

"The 'homestead' type of agriculture development may meet certain personal goals for many individuals for a period of time, but it is an inefficient means of attaining goals associated with an accelerated rate of agricultural industry growth and development and is costly in terms of social capital" (Burton, 1971, p. 36).

"Future rural settlement-development programs must recognize the critical distinction between 'homestead' - part-time or small commercial ventures oriented to personal goals with a 'quality of life' emphasis - and potentially large commercial agricultural production units. Programs directed to the former must emphasize aspects that will enhance the 'social welfare' of that particular group. Programs directed to the latter must emphasize institutions and technology that will lead to rapid growth and transition to a large-scale commercial agricultural industry" (Burton, 1971, p. 34).

Other Economic Considerations

1. Government supported research:

a) Canada Department of Agriculture - the Division of Horticulture in Ottawa provided vegetable seed for planting trials to various growers in Carcross, Mayo, Dawson, and Fort Selkirk during the late 1930's and early 1940's (Ferguson, 1945).

b) Agricultural Experimental Station - The Federal Government operated an experimental farm at mile 1019 on the Alaska Highway between 1945 and 1968. This farm was successful in raising cattle, hogs, cereals, green feed, forages, vegetables, ornamental shrubs and flowers. The farm also assisted local growers by establishing trial plots of various crops on their farms (Abbot, 1954). Detailed results from the operation of the farm can be found in the Yukon Archives in Whitehorse.

c) New Crop Program - This program is administered by the Yukon Livestock and Agriculture Association. The program has established test plots with producers to look at the commercial potential of

both traditional and new field crops. This program "has two advantages for Yukon agriculture. First, new crops that appear suitable in terms of growth characteristics and potential profitability will be actively sought. Second, the capability of running field trials allows a better evaluation of crop response under real growth conditions." (Smith, Filteau, 1984, p. 23)

d) Yukon Government - the Agriculture Branch, Department of Renewable Resources has run experimental plots of vegetables, small fruits, cereals, and forages. These plots were established in the spring of 1988 and are located in the Federal Forestry farm property and are part of the ongoing research program of the Branch.

2. Economic Development Agreement:

The Canada/Yukon Economic Development Agreement 1985-88 provided a significant amount of funding for renewable resource related projects. Under this agreement the agricultural sector received funding totalling \$1,722,141. About 70% of these funds focussed on demonstration projects such as greenhouses, grass seed production and commercial egg production (FERENCE, 1989, p.3).

"Negotiations are currently underway between federal and territorial governments to establish a new Economic Development Agreement(EDA) for the Yukon" (FERENCE, 1989, p.4). This proposed new agreement also contains provisions to provide assistance to the agricultural sector.

3. Other Government Assistance:

a) Agriculture Canada supports agriculture development in the Yukon by maintaining a Regional Development staff position responsible for northern agriculture. This office is located in Edmonton.

b) The Prairie Farm Rehabilitation Administration (PFRA) provides the Yukon with an advisory service on developing existing water sources for agricultural use and irrigation.

c) Agriculture Canada, Soil Survey Unit maintains one soil scientist in Whitehorse "to work on a variety of soil-related projects, many of which are related to agriculture." (Smith, Filteau, 1985, p.19)

d) Farm Credit Corporation (FCC) operates as a

lending institution as well as an extension service for farm financial planning. These services have been available to the Yukon since 1961. The FCC services were formally established in the Yukon in 1985.

IV. SECTORAL ANALYSIS

This section provides an overview of available on four major components of Yukon agriculture - cereals, forages, horticulture and livestock.

The potential land base which is available for these activities is as follows:-

(from Prescott-Allen, et al, 1987, p.27).

- . There is no class 1 or class 2 land in Yukon.
- . There is a total of 63,201 ha (156,106 acres) of class 3 and class 4 land. This land is located mainly in Pelly Crossing-Carmacks (27,730 ha or 68,493 acres), Dawson-Stewart Crossing-Mayo (24,380 ha or 60,218 acres), Watson Lake (10,447 ha or 25,040 acres) and Faro (644 ha or 1590 acres).

These class 3 and 4 lands are suitable for growing vegetables, oats and barley.

- . There is a total of 641,494 ha (1,584,490 acres) of class 5 land. The largest single tract of this land is located around Whitehorse

This land is suitable for growing frost tolerant vegetables, hay and forage crops.

- . The areas with the best climate for crop production are Mayo and Dawson, however most of the farming is located around Whitehorse.

a) Cereals and Greenfeed

- . Land currently in production:

Filteau (1987) reported that there were 141 acres (57 ha) of barley, 1087 acres (440 ha) of oats, 139 acres (56.3 ha) of fall rye, 2 acres (0.8 ha) of hard spring wheat and 161 acres (65.2 ha) of greenfeed (oats) in production in 1987.

- . Land applied for:

No applications were recorded which indicated the growing of cereals as an agricultural activity. Greenfeed was presumably included in annual forage production. However, annual forage was usually combined with perennial forage production on the applications. This made it impossible to obtain an acreage specific to greenfeed or annual

forage. A total of 19,582 acres (7,928 ha) was identified for perennial/annual forage/livestock combinations on the application forms.

. Current production:

No farm production information was found in the literature for the growing of cereals or greenfeed.

. Current market and price:

YLAA estimated that 10,410 acres (4,214 ha) of barley would be required to meet Yukon's needs. There has been no information found on oats.

. Cost of production:

Specific production costs would vary from farm to farm depending on a number of variables. The following examples only provide an indication of production costs.

Deloitt, Haskins & Sells (1987, p.37) give a \$83.01/acre cost for a dryland hay/greenfeed operation and \$144.29/acre cost for an irrigated hay/greenfeed operation in Yukon.

Resource Management Consultants (1985, p.39) reported that the estimated cost for production of grain for a 250 acre farm in the NWT was \$176.68/acre. They estimate the cost of production for a 250 acre hay operation as \$137.39/acre. Note these costs do not include the investment costs for land, equipment and machine shed which totaled \$1,037.50/acre for the grain farm and \$733.00/acre for a hay farm.

. Imported product:

An estimated \$4.5 million was spent on cereals and grains in 1985 in Yukon according to the report on Assessment of Import Substitution Opportunities (p.14).

The 1984 estimated cost of feed barley in Whitehorse was \$195/tonne (DPA Group, 1984, p.4)

b) Forages

i) pasture

. Land currently in production:

Filteau (1987) reports that there were 1,108 acres (449 ha) of improved pasture and 9,446 acres (3,824 ha) of unimproved pasture. Grazing leases totaled 14,750 hectares (36,432 acres). (Prescott-Allen, 1987, p. 29).

. Land applied for:

There were 76,434 acres (30,945 ha) of grazing land identified in the computerized record of land applications as of Feb/1989.

. Current production:

Only preliminary information on native pastures was found in the literature reviewed. (Johansen, 1989)

. Current market and price:

No information is available on the current price of grazing land. Market (demand) appears to be high as indicated by the amount of grazing land which has been applied for under the agricultural land program.

ii) hay

. Land currently in production:

The Yukon agricultural census (Filteau, 1987) reports a total of 2,456 acres (994 ha) of land in hay. Most of this land is sown to brome grass.

. Land applied for:

A total of 8,815 acres (3,569 ha) has been applied for as forages and an additional 10,767 acres (4,359 ha) of land as a combination of forage and livestock. Both of these categories include option lands and could also include land which will be used for greenfeed production.

. Current production:

Estimated yields for brome production range from 2-3 tons/acre on unfertilized fields and up to 5 tons/acre for fertilized land.

Whiting (1980, p.25) states that in 1979 "The average level of production was 2,651 bales (50 lb. bales) on an average 89.9 acres, or 34 bales per acre."

Filteau stated that "an increase in production can be expected in 1988 and further increases should be evident in each succeeding year. A saturation point will likely come in 1988 or 1989."

. Current market and price:

Most of the hay produced in the Yukon is consumed by local livestock (horses and cattle). Hay sells for up to \$7.00 per 60 lb bale (Yukon Agriculture - A Unique Resource).

. Cost of production:

The cost of producing hay was identified as a constraint in the Assessment of Import Substitution Opportunities report, (Session 2, p.13).

The average annual operating cost for a farm producing hay in 1979 was \$8,387 (Whiting, 1980, p.27). See Table III for the annual cost of hay production in 1979.

. Imported product:

The Assessment of Import Substitution Opportunities report also gives the figure of 2,000 tonnes of hay being imported into Yukon (Session 1, p.8).

The estimated cost of imported hay was \$185/tonne in 1984 (DPA, 1984, p.4-6).

Approximately \$1 million of the total value of agricultural production is accounted for by forage production, which is primarily destined for horses maintained by outfitters. (Yukon Economic Review, 1986-1988, p.50)

Table III. Annual Cost of Hay Production, 1979*

	Cost per Farm (\$)	Average Annual Cost per acre (\$)
Seed	382	15.80
Fertilizer	2,725	27.10
Machinery Operation	3,296	87.94
Hired Labour	865	9.62
Cash Overhead**	1,119	17.45
Total Cash Costs	8,387	157.91
Depreciation	1,366	36.70
Interest on Investment	2,410	23.84
Operator Labour Value	839	6.00
Total non-cash costs	4,615	66.54
TOTAL COSTS	13,002	224.45
Average acres under cultivation	89.9 acres	
Average bales per acre	34	
Average cost per bale	\$6.60	

* From Whiting, 1980, p.25

** Cash overhead includes: taxes, utilities, insurance, rent, mortgages, bedding, stove oil/wood, licences, repairs to buildings and freight.

b) Horticulture

i) vegetables

. Land currently in production:

There is some confusion on exactly how much land is under vegetable production. HLA (1988, p.6) reports 32 acres of potatoes and 14.5 acres of vegetables as the total Yukon area in production. This information was apparently derived from the agricultural census (Filteau, 1987), however an examination of this data gives a total of 30.8 acres of potatoes and 358 acres of mixed vegetables in 1987. Filteau also states that there are several greenhouse operations. Since the census survey there have been at least two commercial hydroponic greenhouse operations start - one growing lettuce and the other tomatoes and cucumbers.

In addition, the Yukon Economic Review for 1987-88 states that there were 424 acres of land under vegetable production for the same period.

. Land applied for:

The computerized listing of agricultural land applications indicates that a total of 885 acres of land was under application as of February, 1989.

. Current production:

"The Yukon fresh vegetable industry is characterized by uncoordinated market garden production. Yukon commercial production of vegetables has been held back by:-

- prior establishment of produce supplies from Alberta, B.C. and U.S.A. suppliers;
 - absence of grading and storing facilities;
 - the small size of commercial growers;
 - the practice of selling in the harvest season when there is an abundance of fresh product; and
 - lack of developed land for vegetable growing."
- (HLA, 1988, p.6)

. Current market and price:

"Growers utilize the following methods in selling their products:

1. Gate sales - produce sold on the farm.
 2. Farmers market - produce sold at a central urban market along with other producers.
 3. Pick-Your-Own or U-Pick - the consumer comes to the farm and picks his/her own produce.
 4. Direct sales - to stores and restaurants."
- (HLA, 1988, p.6)

The main wholesale distributors operating in Yukon and the percentage of the market of each distributor is presented in Table IV.

Prices for locally grown produce are characteristically higher than those of suppliers from southern markets. HLA (1988, p. 10) points out " if wholesalers can purchase the same products from distant markets at lower prices than they can from local markets, they will do so. Wholesalers do not guarantee loyalty to one or two suppliers. Wholesalers are characterized by purchasing products from suppliers who can provide competitive prices and quality products."

See Table V. for wholesale prices of representative produce between 1983 - 1987.

. Cost of production:

Peake & Walker (1975, p.40) stated that the cost of developing a 25 acre vegetable farm in Alaska was between \$1200 and \$1500 per acre.

RMC (1985, p.33) give the total fixed and variable costs for a three acre market garden in the NWT as \$1,484.67/acre. In addition to this there is also a cost of \$4,506.67/acre for the investment in land, root cellar, green house and equipment.

See Table VI for Market Garden Costs of Production in 1979. According to Whiting (1980, p.16) a market garden had average annual operating costs of \$3,576 in 1979.

. Imported product:

Prices paid for imported vegetables are the same as those indicated in Table V for the wholesale price of vegetables.

Table IV. Wholesale Grocers and Market Shares*
(from HLA, 1988, p. 5)

Wholesaler	Location	Estimated Market Share %	Suppliers
Kelly Douglas & Co. Ltd.**	Whitehorse	60	California Mexico, B.C.
Horne & Pitfield Limited	Grande Prairie	30	California Mexico, B.C. Alberta
MacDonalds Consolidated	Dawson Creek	5	California, Mexico, B.C. Alberta
Whitehorse Distributors	Whitehorse	2	Alberta
Simon & Reimann Food Dist. Ltd.	Edmonton	1	California, Mexico, B.C. Alberta
Local Growers	Whitehorse Area	1	
Other (ie. Grocery People)	B.C.	1	California, Mexico, B.C. Alberta

* Market share information was obtained by surveying the wholesalers and retailers who are dominant in the Yukon.

** Includes Sunspan Food Services, which is a division of Kelly Douglas & Co. Ltd.

Table V. Wholesale Prices of Vegetables and Potatoes
(1983 - 1987)*

Date	Potatoes (50 Lb.)	Carrots (24x2 lb.)	Rutabaga (50 lb.)	Green Cabbage (50 lb.)
Jan/83	\$6.50-8.10	\$12.50-15.60	\$ 9.25-12.95	\$10.00-22.00
April/83	7.50-10.00	15.90	9.95-19.50	N/A
July/83	N/A	12.50-16.70	10.95-14.75	8.95-11.50
Oct/83	6.00-7.75	10.95-15.60	10.75-12.50	8.25-12.95
Jan/84	6.05-12.85	10.50-15.75	10.25-11.25	9.50-12.20
April/84	8.50-12.80	13.50-14.90	7.95-10.90	N/A
July/84	N/A	11.25-15.50	10.25-11.25	9.25-10.00
Oct/84	6.25-7.00	9.25-15.50	10.15-11.95	6.75-11.00
Jan/85	7.00-8.50	11.25-20.95	8.00-12.50	8.25-12.25
April/85	6.00-7.50	N/A	9.00-21.80	N/A
July/85	N/A	9.95-15.00	9.95-14.50	6.90-11.00
Oct/85	5.25-7.00	9.50-14.75	8.00-14.50	6.90-12.50
Jan/86	6.75-8.50	13.25-15.99	8.75-12.95	7.50-12.61
April/86	6.50-11.00	N/A	8.75-15.69	N/A
July/86	N/A	13.50-16.50	11.70-16.95	8.00-11.00
Oct/86	7.25-8.00	13.50-15.00	9.75-12.85	7.95-11.00
Jan/87	12.40	14.20	10.50	14.20
April/87	11.85	16.40	9.10	16.40
July/87	9.50	15.00	8.75	15.00
Oct/87	9.40	13.40	11.10	13.40

* From HLA, 1988. P.8

Table VI. Market Garden Costs of Production in 1979.*

	Average Annual Cost per Farm (\$)	Cost per Acre (\$)
Seed	231	87
Fertilizer	120	60
Hired Labour	146	60
Stove Oil/Wood	422	189
Machinery Operating Costs	1,366	571
Cash Overhead**	1,309	536
Total Cash Costs	3,576	1,513
Depreciation	966	386
TOTAL COSTS	4,542	1,899

Average size of farm 2 - 4 acres.

* from Whiting, 1980, p.16

** Cash overhead includes: taxes, utilities, insurance, rent, mortgages, licences and commissions, and repairs to buildings

ii) berries

. Land currently in production:

The Yukon Gardens has some berries in its operation.

. Land applied for:

Only one application listed berries as a crop. This was in combination with an operation which included livestock. The total land which was applied for is 161 acres (65 ha) plus 642 acres (260 ha) of option land (in 1989).

. Current production:

Ference (1989) indicates that there is no information available on the production of raspberries or strawberries in the Yukon and no farmers are known to produce significant quantities at present.

"Northern Wild Berries Company of Whitehorse purchases wild cranberries and arctic cloudberries from local pickers. The berries are either crushed or left whole and sold directly to consumers. In 1987, the company sold approximately 24,000 kg of fresh and crushed berries." (Ference, 1989, p. 66)

See Table VII for capital cost and estimates of production and revenue from berry operations in B.C.

. Current market:

The report 'Feasibility Study to assess the production of Small Fruits and Berries in the Mayo - Stewart Valley Area' (1988) indicates that it is possible to grow saskatoon berries, raspberries and strawberries commercially in the Yukon.

. Cost of production

No information was found in the literature reviewed on the cost of berry production in Yukon.

. Imported product:

No information was found in the literature reviewed on the importing of berries to Yukon.

Table VII. Capital Costs, Production Estimates and Estimated Revenues for Commercial Berry Production in B.C. (from Ference, 1989)

Capital Costs	Raspberry(1) Farm	Strawberry(2) Farm	Cranberry(3) Farm
Capital Assets	\$130,000	\$100,000	N/A
Land Preparation	15,000	15,000	N/A
Planting Costs	31,000	5,000	N/A
Working Capital	78,000	25,000	N/A
Totals	\$254,000	\$145,000	\$450,000

Estimated Year 5 Production and Returns

	Production	Gross Returns	Net Returns
1) 30 acre raspberry farm	8,000 lbs/ac	\$210,000	N/A
2) 25 acre strawberry farm	4,000 lbs/ac	N/A	\$18,000
3) 30 acre cranberry farm	10,000 lbs/ac	\$180,000	\$33,000

iii) Honey

There is an active beekeeping society in Yukon. There were no statistics found on land utilization, production, costs of production, or on the imported product. The 1987 YLAA census survey indicated that there were 38 beekeepers with 110 colonies.

The Beekeepers Society constructed an overwintering facility which during its first winter (1988-89) is storing 70 hives (EDA Beekeepers progress report, 1988).

The beekeepers are receiving assistance from Fairview College, Alberta on an irregular basis.

iv) Specialty crops

Mushrooms, bean sprouts, a sod operation, a possible tree seedling nursery and native seed production are included under this section.

There has been a feasibility study completed on the growing of mushrooms in Faro (Northern Resources and Associates, 1987). The information on mushrooms in this section is taken from that report.

The Yukon consumption of commercially grown mushrooms is nearly 5 lbs per person per year, which gives a total market of between 120,000 and 125,000 lbs of mushrooms per year. On average, wholesalers purchase fresh bulk mushrooms for \$1.86/lb, although prices range from \$1.45 to \$2.00/lb.

Mushrooms sell to Yukon retailers and restaurants at an average price of \$2.06/lb, and range from \$1.55 to \$2.20/lb.

In addition, there exists the possibility of exporting mushrooms to Alaska, the Northwest Territories and northern British Columbia. No firm estimate on the volume required to supply these markets was available.

Depending on the degree of mechanization, costs could range from \$14.00 - \$45.00 per square foot for the construction of a mushroom operation.

A study on the feasibility of establishing a Yukon tree seedling nursery was conducted by Reid, Collins and Associates Limited. This study concluded (p.21) that "a private sector nursery located in Watson Lake could be viable at a 5 million/year seedling production level, assuming competitive seedling prices."

"However, in the consultants opinion, this study although useful from the viewpoint of developing relative capital and operating costs for various production levels, may be a "cart-before-the-horse" situation, in that tree seedling nurseries should be designed for production of a specific number and type of seedlings. These questions must be resolved first; then a nursey can be developed."

Progress has been made in establishing a native grass and legume seed industry in the Yukon (Vaartnou, 1988). Several nurseries were established in 1986 to cultivate various plant varieties suitable for revegetation /reclamation projects in the Yukon. A breeders seed plot program was initiated in 1987 to evaluate seed production from specific plant varieties. If this program is successful, the following benefits can be realized from the native seed industry (Vaartnou, p.2):-

- increased income for Yukon residents,
- reversal of cash flow currently required for revegetation projects,
- lower long term revegetation costs through minimization of the need for follow-up revegetation, and
- a possible increase in tourism through scenic enhancement of the Yukon.

There is very little information available on the other specialty crops. The one sod farm operation in Yukon is listed as being 22 acres (9 ha) in size by Filteau (YLAA census, 1987). There is also one bean sprout operation. No other published or unpublished data was found on these operations.

d) Livestock

1) Dairy

"To support a dairy herd, a land base is required to produce the required forage and, ideally, the grain as well. Linked directly to forage and grain operations are the required input suppliers for repairs, chemicals, fertilizers and other production necessities. These are often expensive and difficult to source in the Yukon. Similarly, other inputs to the dairy are required, including minerals and supplements, repairs and parts, veterinary services and milk testing. The plant processing the milk also requires support services including maintenance and service, quality testing and promotional expertise. The final link in the system is the slaughter plant. The livestock culled from the herd require disposal..

Many of these basic requirements still require development in the Yukon." (Deloitte, Haskins & Sells, 1987,p.128)

. Land applied for:

No land was identified as being for dairy operations, however this may have been included in the livestock section.

. Current production:

Filteau reports that there are 35 dairy animals in Yukon, and that the milk is sold from the farm gate with demand far exceeding supply. No other production information was found in the literature.

. Current market and price:

The potential market for fluid milk in Yukon is approximately 2,500,000 liters. However Deloitte, Haskins & Sells (1987) point out that "NADP (Northern Alberta Dairy Pool) and Palm Dairies have indicated that both will retaliate possibly in the form of price undercutting, should a third supplier of milk and/or dairy products enter the market place. In this event it is unlikely that a local dairy could survive..."

See Tables VIII, IX and X for detailed consumption, prices and market projection figures of dairy products.

Note that Whitehorse fluid milk sales are estimated to represent 85% of all milk sales in the Yukon.

. Cost of production:

Peake (1975) stated that development costs in Alaska for a 100 head dairy herd would be between \$900 and \$1500 per head.

Deloitte, Haskins & Sells (p.98) have calculated that costs for a dairy operation to produce and process milk range from \$0.82 to \$0.99/litre over a five year period. Costs were not allocated for interest on debt, principal payments and returns for growth and expansion. They considered the costs to produce milk high in light of the retail and wholesale prices.

They state (p.1) "the high degree of management required, as well as high start up costs, production costs and transportation, have been the constraints that curtailed growth of dairy farming in Yukon to date."

. Imported product:

Deloitte, Haskins & Sells (p.43) state that fluid milk products are currently imported into Yukon from the following Alberta and B.C. dairies:

- Palm Dairies Ltd.
- Northern Alberta Dairy Pool (NADP).
- Foremost Dairies (B.C.).

Milk and dairy products are distributed by four major wholesaler/ distributors in Whitehorse:

- Burns Food Ltd.
- Kelly Douglas.
- Whitehorse Distributors.
- Nu-Maid Distributors.

Burns Food is the largest distributor of fluid milk products in the Yukon (p.43).

Distribution within Whitehorse is 3-5 times per week while the smaller communities may only receive dairy shipments once or twice per week (p.44).

Deloitte estimates that freight charges add \$0.50 per 2 litre carton of milk.

Table VIII. Yukon Dairy Consumption*

Product	Daily	Yearly
Standard (Homogenized Milk)	2,281 l	832,859 l
Partly Skimmed 2% Milk	4,364 l	1,593,068 l
Skim Milk	309 l	112,633 l
10% Cereal Cream	200 l	73,172 l
18% Table Cream	26 l	9,408 l
33% Whipping Cream	61 l	22,213 l
Sour Cream	51 l	18,815 l
Yogurt	172 l	62,815 l
Ice Cream	875 l	319,345 l
Butter	279 kg	101,675 kg
Cheddar Cheese	175 kg	64,026 kg
Processed Cheese	195 kg	71,082 kg
Variety Cheese	266 kg	96,953 kg
Cottage Cheese	96 kg	35,018 kg
Skim Milk Cheese	9 kg	3,136 kg
Whey	6 kg	2,091 kg

Note: Based on Yukon population of 26,133 and national per capita dairy consumption figures.

*From Deloitt, Haskin and Sells, 1987. p.50

Table IX. Prices of Dairy Products*

Product	Suggested Wholesale Price Averages	Retail Price Averages
Homogenized	0.86 - 0.98/1	1.16/1
2% Partly Skimmed Milk	0.87 - 0.97/1	1.12/1
Skim Milk	0.93/1	1.10/1
Yogurt (flavored)	0.67/200g	1.02/200g
Yogurt (plain)	1.20/500g	1.83/500g
Ice Cream	2.44/21	3.69/21
Ice Cream	5.65/41	6.45/41
2% Cottage Cheese	1.23/500g	1.97/500g
Butter	2.67/454g	2.87/454g
Cheddar Cheese	7.56/kg	10.97/kg

Note: Suggested wholesale price averages were obtained through discussions with major retailers and distributors. Retail prices were obtained from store surveys.

*From Deloitte, Haskin and Sells, 1987, p. 52

Table X. Projected Milk Market*

Year	Estimated Population	Fluid Milk Requirements Per Week (litres)	Fluid Milk Requirements Per Year (litres)
1986	26,133	36,687	1,907,709
1987	26,394	37,053	1,926,762
1988	26,658	37,424	1,946,034
1989	26,925	37,799	1,965,525
1990	27,195	38,178	1,985,235
1991	27,467	38,559	2,005,091
1992	27,742	38,956	2,025,166

Note: Based on a 1% rate of population growth per year and 73 litres per capita consumption.

* From Deloitte, Haskin & Sells, 1987, p.51.

2) Beef

- . Land currently in production:

As reported in pasture section.

- . Land applied for:

According to the land application records a total of 96,694 acres (39,147 ha) of land have been applied for forage, livestock and grazing.

- . Current production:

Filteau (1987) reports that there are 85 beef cows, 26 beef heifers and 19 steers out of a total of 206 cattle in the Yukon in 1987.

- . Current market and price:

No information was found in the literature reviewed regarding the current market or prices of Yukon beef.

- . Cost of production:

The Abattoir Study (Hunt, 1989) provided a cost and return model for a beef operation marketing 30 animals a year. Table XI presents a summary of this information.

The study notes that even at the highest levels of revenue a positive return to capital, management and labour is not attained. Hunt (1989, p. 6-11) concludes that "it is not felt that beef operations will ever contribute significantly to a Yukon agricultural base, nor would beef carcasses prove significant in the operation of an abattoir."

- . Imported product:

No information was found in the literature reviewed on imported beef.

TABLE XI. COSTS AND RETURNS FOR A 32 COW/CALF ENTERPRISE*

Capital Costs

Investments 400 acres land @ \$400/Ac	\$160,000
Buildings	44,960
Equipment	35,900
Total Capital Costs	\$240,860

<u>Annual Fixed Costs</u> (Equip. and bldg. depreciation)	5,288
--	-------

<u>Variable costs</u> (fuel, repairs, seed, fertilizer, etc)	\$38,950
Total Fixed and Variable Costs	\$44,238

Income

Sales	Price/lb	Value
15 steers @ 1100 lbs. @	0.90	\$14,850
	1.00	18,150
	1.30	21,450
10 heifers @ 850 lbs. @	.70	5,950
	.90	7,650
	1.10	9,350
5 cull cows @ 900 lbs @	.50	2,250
	.55	2,475
	.60	2,700
Total value of sales	\$23,050	
	28,275	
	34,500	

Returns to capital, management and labour	\$(21,288) (loss)
	(16,063)
	(9,838)

Annual cost per pound of production	\$1.49
Annual revenue per pound of production	
Worst price \$0.71; Medium price \$0.83; Best price \$1.02	

*from Hunt, 1989, p. 6-7.

3) Sheep

- . Land currently in production:

No information was found in the literature reviewed on the amount of land currently in production.

- . Current production:

According to Ference (1989, p. 35) there is one sheep farm in the Yukon which houses a total of 52 ewes and 100 sheep on the farm.

- . Current market and price:

"At the present time, the lambs produced in the Yukon are sold at the farm gate . Based on an average price of \$4 per pound, the revenue derived per animal is approximately \$160 for a 40 pound carcass.

According to a study undertaken by Don Ference & Associates Ltd., the per capita consumption of lamb in Canada is approximately 1.5 pounds per person. Utilizing this factor, the consumption in the Yukon is estimated to be approximately 40,000 pounds, approximately 1,000 sheep would be required to replace the lamb imported to the Yukon." (Ference, 1989, p. 36).

"One of the major constraints to sheep farm production in Yukon is the lack of an inspected meat processing plant. Consequently, lambs must be sold at the farm gate and the sale of lamb to the local grocery store is not permitted unless the meat is inspected." (Ference, 1989, p. 36).

- . Cost of production:

"... there does not exist information on the viability of sheep production in the Yukon. According to the recipient of EDA assistance for the demonstration project, the production of lambs in Yukon is viable." (Ference, 1989, p. 36).

- . Imported product:

No information was found in the literature reviewed on imported lamb.

4) Poultry

- . Land currently in production: Not applicable
- . Land applied for:

Three applications indicated the production of eggs and poultry as the main activities. These totaled 82 acres (33.2 ha). In addition, several applicants indicated poultry as one of a mix of activities.

- . Current production:

Filteau (1987) reports a total of 9,611 hens and chickens, 561 turkeys, 3,750 ducks, geese, quail and pheasants, and a total production of 48,534 dozen eggs.

- . Current market and price:

According to Deloitte et al (1987) consumers will pay approximately 25% more for farm fresh eggs. Imported eggs retail for \$1.69/doz by Kelly Douglas and Burns, while farm fresh eggs sold for between \$2.00 - \$2.50/doz.

The current market for meat birds is very competitive because of the mass produced birds in the rest of Canada. Unless grain can be produced locally, production would not be competitive with current suppliers. (Deloitte et al, p. 65)

Ference (1989, p.32) provides the following statistics "Based on an annual per capita consumption of 18.33 kilograms of chicken and other fowl, the estimated yearly demand for poultry in the Whitehorse area is approximately 341,000 kilograms and 493,525 kilograms for the entire Yukon. Satisfying the projected demand would require the production of 214,580 chickens while 53,645 chickens would be required to replace 25% of the imported poultry consumed in Yukon."

According to Hunt (1989, p. 1-26) there exists a market for high quality chicken and pheasants which could demand a higher price.

"Another major constraint to large scale poultry production in the Yukon is the lack of a poultry meat processing plant. The establishment of a local abattoir could, however, utilize chicken as a production input." (Ference, 1989, p. 34)

. Cost of production:

Table XII provides revenue and costs associated with egg production from a 6,700 layer operation. Ference (1989, p.44) gives the following information on capital costs. "A 1985 study entitled 'Small Scale Agriculture in the NWT' estimates the building cost of a northern 4,000 hen operation to be \$23.34 per bird. This includes \$14.77 for buildings, \$8.34 for equipment, and \$0.23 for land. For a 6,700 hen operation, the estimated capital costs, therefore, would be as follows: building at \$98,959, equipment at \$55,878, and land at \$1,541, or a total capital cost of \$156,311."

Table XIII provides an indication of the revenue and costs associated with the production from a 4,800 bird broiler enterprise.

. Imported product:

No information was found in the literature reviewed on imported poultry products.

Table XII. Projected Cash Flow From A 6,700 Layer Farm*

	Total	Per Dozen Eggs	Per Chicken
<u>Gross Revenues</u>			
Grade A Eggs	\$167,500	\$1.250	\$25.000
Birds Sold	1,005	0.008	0.150
Total	168,505	1.258	25.150
<u>Fixed Costs</u>			
Bldg Depreciation @ 5%	4,948	0.037	0.738
Equip Depreciation @ 15%	8,382	0.063	1.251
Land Mortgage	418	0.003	0.062
General Overhead @ \$0.02/Doz	2,680	0.020	0.400
Total	16,428	0.123	2.451
<u>Variable Costs</u>			
Pullets	24,455	0.183	3.650
Feed	77,586	0.579	11.580
Energy	5,226	0.039	0.780
Total	107,267	0.801	16.010
Total Costs	123,695	0.924	18.461
Return to Capital, Management and Labour	\$44,810	0.334	6.680

*from Small Scale Agriculture in the Northwest Territories,
N.W.T Department of Renewable Resources, 1987. (Ference, 1989
p. 44).

Table XIII. Costs and Returns for a Broiler Enterprise Marketing 4800 Birds per Year*

<u>Capital Investments</u>	
Land (5 acres @ \$500/acre)	\$2,500
Buildings	19,800
Equipment	9,600
Total	\$31,900
<u>Annual Fixed Costs</u>	1,950
(Bldg and Equip. Depreciation)	
<u>Variable Costs</u>	13,920
(Broilers, feed, light, taxes, etc.)	
Total variable and fixed costs	\$15,870

Gross Sales	Value
@ \$3.50/kg	\$16,800
@ \$3.60/Kg	17,280
@ \$3.70/kg	18,000

Return to Capital, Management and Labour	
@ \$3.50/Kg	\$912
@ \$3.60/Kg	\$1,392
@ \$3.70/Kg	\$2,112

*from Hunt, 1989, p. 6-13

5) Hogs

. Land currently in production: Not applicable.

. Land applied for:

No land applications were identified for hog production as an activity on the computerized land application data.

. Current production:

Filteau (1987) reports 144 hogs in Yukon. Of these 2 were boars, 12 sows and 130 were classed as "other pigs".

There is one larger scale hog operation is the process of being developed. The 1988 progress report indicated a projected production level in 1989 of between 300 and 375 weiners.

. Cost of production:

The Abattoir Study (Hunt, 1989, p.6-18) provided a cost and return model for a farrow to finish operation marketing 480 hogs per year. A summary of this information is presented in Table XIV.

Hunt made the following conclusions:-

"In the economic model the return depends on the debt structure. At full debt load with commercial interest rates, net income remains negative throughout the first eight years of operation. If the debt load is reduced by one half through owner equity, sweat equity or grants, the operation starts to show positive returns in year two."
(Hunt, 1989, p.6-23.)

. Imported product:

No information was found in the literature reviewed on importing pork to the Yukon.

TABLE XIV. COSTS AND RETURNS FOR A FARROW-TO-FINISH ENTERPRISE MARKETING 480 HOGS PER YEAR

Investment Costs

i) Land - if growing own grain 300 acres @ \$450		\$135,000
ii) Buildings		
hog barn - \$3,500/sow	\$105,000	
feed storage	6,420	111,420
iii) Equipment		15,000
Total investment costs		\$261,420

<u>Annual Fixed Costs</u>	Per Mkt Hog	Total
Building depreciation @ 5%	\$10.94	\$5,250
Feed storage @5%	.67	321
Equipment depreciation @ 5%	3.13	1,500
SubTotal	\$14.74	\$7,071

Variable Costs

Feed	\$107.23	\$51,470
Other (heat, light, vet, taxes)	10.00	4,800
SubTotal	117.23	56,270
Total costs	\$131.97	\$63,341

SELLING PRICE	GROSS SALES	RETURNS to CAPITAL MANAGEMENT & LABOUR
\$125/hog	\$60,000	(\$3,341)
\$150/hog	72,000	8,659
\$175/hog	84,000	20,689

* from Hunt, 1989, p. 6-18.

ii) Game Animals

. Land currently in production:

The report "A Compilation of Existing Data for Agriculture, Grazing and Other Land Alienations in the Greater Whitehorse Area" (Parks, Resources and Regional Planning, 1988) lists 3 game farming operations in the Hootalinqua area. These operations have a total area of 168 ha or 370 acres.

There are 6 - 8 game farm operations as of February, 1990 (Pers. Comm., D.Beckman, Director of Agriculture, Yukon Government).

. Land applied for:

A total of 3,999 acres (1,619 ha) are indicated on land use applications where game farming was given as an activity on the computer listings.

. Current production:

No published information was found on the production levels from any of the game farm operations.

. Current market and price:

A feasibility study on the Northern Splendor Reindeer Farm (Hunt, 1988) gives several economic models which could be followed for a successful reindeer operation. The models initially utilized farm gate sales for the sale of red meat, but after this initial period (of three years) the operation would require meat inspection/slaughter facilities. Hunt (p.11) used the figure of \$4.00/lb for reindeer meat in the feasibility study. Hunt further states that "prices of \$4,000 to \$5,000 a breeding pair are realistic", but "...within a 10 year time frame the breeding sale price should approach the meat sale price."

Both Hunt (1988) and Paish (1987b, p.12) indicated that "the market for antler velvet is highly volatile, while it provides income when the price is high, it cannot be relied on as a basis for a stable industry." This applies to both reindeer and elk velvet.

Paish (1987b, p.15.) suggests that it would take an initial investment of between \$400,000 to \$450,000 to start an elk farming operation. In addition there

would be \$17,000 to \$20,000 annual operating costs (including labour). Paish further states that no income could be expected for the first two years and only an income of \$20,000 could be expected afterwards.

Paish (1987b, p.53) provides an estimate of the capital investment cost necessary to start a buffalo farm. The total investment for land development, fencing, machinery and stock (20 females, 3 males) would be approximately \$251,000. Annual operating costs are estimated to be \$10,000 - \$20,000 and annual revenues of between \$12,000 - \$15,000.

Research has shown that bison are more efficient converters of low quality forage than are cattle (Bailey, 1981, p. 31).

Similarly for muskoxen (p. 55) the initial investment for land development, fencing, facilities, machinery and stock (20 breeding pairs) is estimated at \$516,000. Annual operating costs would be in the order of \$20,000. Annual revenues would be approximately \$20,000.

In summary, "high start-up costs incorporating land preparation, acquisition of stock, fencing and facility preparation make the projects uneconomic, assuming a start-from-scratch operation, and would provide a limited return on investment or labour..." (Paish, 1987b, p.18). However, Paish does suggest that "these projections would be scaled down considerably by the more typical part-time farmer who is prepared to follow life-style and rural residential objectives rather than strict economic efficiency".

e) Summary of Agricultural Land Disposition Data

Many reports have suggested that one of the main deterrents to agricultural development in the Yukon is the lack of farm land, either in private ownership or lease tenure (eg. YLAA, 1986; Filteau, 1987). A cursory analysis of the information which is available on land provides the following statistics:-

- the Filteau agricultural census lists the total area of Yukon farms as 30,511 acres (12,352.6 ha).

- a review of the data on agricultural land applications in Table XV suggests that a total of 12,897 acres (5,221 ha) of land was under application as of February, 1989. This figure does not include applications for grazing land or 21,305 acres (8,626 ha) of option lands.

- if all the land which was under application (Feb/89) was granted, then Yukon would have a total of approximately 43,408 acres (17,574 ha) of land in farms. This figure does not include the 32,450 acres (14,750 ha) of land under grazing lease (Prescott-Allen, p. 27) since this land is primarily used for outfitters.

- the estimated agricultural area required to support Yukon's population, from Tables XVI and XVII, totals 75,710 acres (30,652 ha). This suggests that there could be approximately 32,302 acres (13,078 ha) of additional land under agriculture in order to support the population of Yukon. (This assumes that all land under application for grazing is in fact required only by outfitters.)

The figure of 43,408 acres (17,750 ha) for the total farm land is likely to be high since not all the land under application for agricultural purposes will be granted, and only about 55% of the agricultural lands granted to prospective farmers are required to be put under crop cover in order to meet the requirements for obtaining title to the land.

See also table XVIII which provides a summary of the available land disposition data.

If option lands and applications for grazing lands were included in the data, the land disposition data suggests that there may be a potential for over production of most agricultural commodities. This possibility appears to be very real for horticultural production as the land

disposition data indicates that there are 647 acres more than is required to support the Yukon population (if all the land under application is granted). This trend was also recognized by Filteau when he suggested that there would be a saturation point reached in Yukon's hay production by 1988 or 1989. Note that this situation did not occur in 1989 as predicted.

This point was emphasized in "A Discussion Paper on Agricultural Development" (Anonymous, undated, p. 23-24) where it is stated-

"Given the non-competitive nature of Yukon agricultural products in markets outside Yukon great care must be taken not to overstimulate Yukon agricultural production beyond that which the domestic Yukon market can absorb. To do so would result in an oversupply which would depress prices to the extent that producers could not continue to operate. Other jurisdictions with a more advanced sector have to some extent resolved this problem through marketing boards and quotas or stabilization programs that guarantee a return at least equal to cost of production. This kind of government intervention can be expensive. In Yukon where the majority of the land belongs to the Crown, the planned release of land can have the same effect."

This over production may not occur since several of the reports, eg. A Discussion Paper on Agricultural Development (draft), 1985), have stated that part of the demand for land is generated due to the agricultural land application process. This is (or was) the main route through which land can (or could) be obtained. Reports have suggested that a percentage of the land applicants desire only to obtain rural residential property and may not necessarily develop the land for agriculture. Also, as indicated earlier, only 55% of the agricultural land released will be developed and not all agricultural land applications will be approved.

Table XV. Acreage of Various Types of Agriculture as Indicated on Agricultural Land Applications up to February, 1989*

	Acres		
		Option Land	Total
Forage	3,843	4,972	8,815
Forage/Livestock	3,169	7,598	10,767
Livestock	604	74	678
Market Gardens/ Greenhousing	558	327	885
Berries/Livestock	161	642	803
Eggs/Poultry	82	-	82
Mixed Farming**	3,279	4,894	8,173
Game Farming	1,201	2,798	3,999
TOTALS***	12,897	21,305	34,202

* From the Department of Renewable Resources computerized record of agricultural applications.

** Includes a mix of the following categories as indicated on the agriculture land applications: market gardening, dairy, forage production and livestock.

*** Note that these totals do not include the 76,434 acres of land which have been requested for grazing leases. These lands are under application from outfitters and as such they are not strictly agricultural in nature.

Table XVI. Acreage of Land Required for the Production of Meat in the Yukon.*

	No. Head	Yukon Share	Acres Required		
			Grain (Barley)	Hay	Pasture
Pork	10,000	6,700	3,500	-	-
Turkeys	35,000	24,000	360	-	500
Chicken	250,000	160,000	800	-	-
Laying Hens	30,000	20,000	625	-	-
Beef	7,500 Cows & Heifers	5,000	-	20,000	20,000
	4,800 Slaughter Animals	2,500	3,500	10,000	10,000
		Totals	8,785	30,000	30,500

Total Land Required - 69,285 acres

* From YLAA, 1986. Appendix 'D'

Table XVII. Acreage Requirements for Land Excluding Red Meat Production*

Vegetables	300 acres	
Dairy	800 acres	- barley
	1,500 acres	- pasture
	1,500 acres	- hay
Laying Hens	625 acres	- barley
Horses	1,500 acres	- hay
Poultry Meat	200 acres	- barley
Total	6,425 acres	

* From YLAA, 1986. Appendix 'E'

Table XVIII. Summary of Agricultural Land Disposition Data

Land Class	A Land in Production (Acres) (Filteau)	B Land Applied For (Acres)	Sector Total A+B (Acres)	Land Required To Support Yukon Pop.*	Short- fall(-) Surplus (+)
1. Cereals	-	-			
.barley	141	-	141		
.other				10,410	(-)8,880
cereals	1,228	-	1,228		
.greenfeed	161	-	161		
		subtotal	1,530		
2. Forages	-	12,339	12,339**		
.hay	2,456	-	2,456		
.unimprvd				65,000	(-)39,651
pasture	9,446	-	9,446		
.improved					
pasture	1,108	-	1,108		
		subtotal	25,349		
3. Horti- culture	389	558	947	300	(+) 647
4. Undevel- oped farm land****	15,582	-	15,582	-	(+)15,582
TOTALS	30,511	12,897	43,408	75,710	(-)32,302

Total Farm Land If All Agricultural Land Disposition Applications Are Approved..... 43,408 acres. Note this does not include 21,305 acres of option lands.

Additional Farm Land Which Is Required To Support Yukons' Population..... 32,302 acres.

Note: These figures do not include 32,450 acres in existing grazing leases or an additional 76,434 acres of land under application for grazing leases as of Feb. 1989.

*From YLAA - See Tables XI and XII.

**This figure may possibly include some proposed greenfeed production and/or pasture.

***From Prescott-Allen (1987)

****Undeveloped farm land acreage was arrived at by adding all the land under production (14,929) and subtracting this from the total farmland of 30,511 (Filteau).

V. Marketing

"the overall objective of marketing is to combine production with the supply of goods and services to consumers in the most efficient manner in line with the desires of society". (Theodor Dams, 1980).

"Very few producers have considered markets for their products which they intend to produce. They mainly expect that a market for their produce will be available when required." (Filteau, 1987).

a) Farmers Market

The special Committee on Food Prices (1981) received many comments from people about the need for a farmers market in the Whitehorse area. The Committee was referred to the Alberta Government's program of assistance to establishing farmers markets. It was recommended by the Committee that the Government of Yukon make a one time grant available to encourage the start-up of farmers markets in Yukon; and that farmers markets should be run cooperatively.

The report on the Assessment of Import Substitution Opportunities also recommended the formation of farmers markets as part of the "action needed" in agriculture.

Note: There were 18 Farmers Markets Held during the summer of 1989. (Pers. Comm., D. Beckman, Director, Agriculture Branch, Yukon Government).

b) Local Distribution Companies

The 1989 Northwestel telephone directory for Northern B.C. and Yukon lists five feed dealers which are located in Whitehorse. These are Circle D Ranch, Firth Farms, Master Feeds, Northwest Feed and Tack, and United Feeds.

The directory also lists four companies which are involved with nursery stock and/or landscaping: Adorna Flowers and Landscaping, Decora Landscaping Ltd., Sourdough Sodbusters, and Iditerod Landscaping.

According to the directory there are a number of companies involved in meat distribution within Yukon. Those with Yukon addresses include Burns Foods Ltd., The Sausage Factory, Whitehorse Distributors Inc. and Yukon Meat and Sausage. Companies in the directory which deal with wholesale dairy products are Burns Foods Ltd. (Palm Dairies) and Whitehorse Distributors. Companies dealing with vegetable produce are given in Table IV.

c) Export Potential

There appears to be little information available on the subject of exporting agricultural products from the Yukon. What information there is suggests that this activity would not be economic. For example, the Discussion paper on Agricultural Development (1985) states "Cost of production together with cost of transportation limits the possibility of export to the south except for specialty items such as elk or moose meat or processed products from game meat and specialty crops such as blueberries. Limited potential for sales in N.W. Territories or eastern Alaska may exist....".

The Draft Agricultural Policy of the Yukon Territory (1980) stated in its conclusions "There are no agricultural products for which Yukon can claim a natural competitive advantage". This coupled with the high costs of transportation for goods coming into the territory, which are required for the production of agricultural products, reinforce the conclusion that there would be little likelihood of export opportunity to southern markets. (1)

However, the Yukon 2000 report suggests that the encouragement of the local market would enable Yukon farmers to compete more successfully in markets outside Yukon. The report also suggests that the "Yukon and Alaskan governments could, in agreement with the Federal Government, consider the development of an agricultural exchange network". (2)

(1) Authors note: No reference was made in any of the reports reviewed of the possibility of utilizing the "backhaul" of the transportation trucks bringing goods into Yukon. Generally these trucks return to southern destinations empty.

(2) Note also that the subject of the impact of the Free Trade Agreement between Canada and the United States was not discussed in the reports which were reviewed. This agreement potentially could have a large impact, either negatively or positively, on Yukon agricultural production and marketing.

Game animals:

Both Hunt (1988) and Paish (1987) agree that, while there is a market for antler velvet in the orient, this market is "highly volatile, and while it provides income when the price is high, it cannot be relied on as a basis for a stable industry. Reindeer produce a lower quality velvet than elk." (Howard Paish, 1987, p.12).

Paish (p.12) also observes that "the high prices paid for live animals for breeding stock has attracted considerable attention in Canada as a result of the demand for Canadian elk in New Zealand. The general consensus is that this is a short-term market as breeding herds reach capacity, and eventually animal prices will stabilize to reflect the earnings which can be realized from the sale of meat."

d) Processing Possibilities

Information was found on a number of possible processing enterprises in the literature. These included feasibility studies for establishing a dairy operation, an abattoir, vegetable storage and processing and berry processing operations.

Deloit, Haskins and Sells (1987, p.89) in the dairy feasibility study for the Champagne/Aishihik band explored the feasibility of producing fluid milk and cheddar cheese as part of a Yukon Dairy operation. This report provided detailed costing for equipment, production and annual operating costs (p. 90-98) for a plant with a production volume of 700,000 liters of milk. Their conclusion was that the costs for this operation were "high in light of retail and wholesale prices." See also section on 'Dairy' in this report.

The operation of a dairy would require that an abattoir be available for the handling of culled cows and calves from the dairy. One study suggested that "a small abattoir could be self-sufficient with a kill of 30 animals weekly or 1,500 annually (based on a 50 week slaughter year). This kill could consist of beef animals, elk, reindeer, sheep and lambs." (Anonymous, p. 120, photocopy of chapter on Abattoir Feasibility (undated, untitled) in Agriculture Branch files). However it went on to conclude that animal numbers were not sufficient to make this type of operation feasible.

The above report also suggested (p.125) that "another option would be the construction of a small abattoir (although not completely self supporting) that would facilitate slaughter of

current livestock production. Such a facility may provide the impetus needed to encourage more livestock production in the Yukon". Such a facility would require the services of a veterinarian." (p.121).

The Abattoir Feasibility Study (Hunt, 1989 p. 1-33) stated that "From an economic point of view, none of the alternatives considered would result in a viable commercial (abattoir) operation, unless the Territorial Government is prepared to make the capital investment and subsidize the operational expenses of the facility."

Hunt (1989, p. 1-8) points out that " the total number of cattle or hogs required to satisfy the entire weekly Yukon demand can be slaughtered and dressed in less than one hour at any one of several Alberta processing plants."

However, he suggests that a meat industry can not develop in Yukon without an abattoir and inspection services and because of this recommends that the Territorial Government establish a kill-only mobile abattoir as the least expensive method of assisting the development of a meat processing industry (Hunt, 1989, p. 1-35).

The report on the feasibility of establishing a growers cooperative and associated vegetable storage facility (HLA, 1988) included the washing, grading and packaging of certain vegetables. This report concluded (p. v & vi) that such a cooperative would produce surplus earnings for distribution to the cooperative members. However, no attempt was made to relate these surplus earnings to the actual growers cost of production. Hence the question of viability of such an operation was not really answered.

There appears to be some opportunity for the processing of berries. Ference (1989, p. 66) quoting from a report entitled 'Reprocessing Market Feasibility Study' indicates that there is a Yukon market for cranberries and arctic cloudberrries. These could be sold as fresh whole; fresh crushed; processed juice; or processed as preserves. In 1987 the Northern Wild Berry Company of Whitehorse sold approximately 24,000 kg of fresh and crushed berries.

"A Yukon berry operation producing fresh, frozen and crushed cranberries and cloudberrries as well as organic cranberry juice would earn a net loss in the first year of operation of \$75,170..... net income is projected to increase from \$90,017 in Year 2 to \$638,040 in Year 5."

"The main difficulty with the processing plant income projections is that they are based on the assumption that all the raw berries that are required can be purchased from local pickers, yet no inventory information exists on the abundance of wild berries in the Yukon." (FERENCE, 1989, p.70).

VI. Pertinent Recommendations and Conclusions from Reports Reviewed.

The following are a selection of the conclusions and/or recommendations from the various documents reviewed which still seem to have applicability to the agricultural situation in 1990. For ease of reference they are presented by the author in chronological order.

1. Nowosad, F.S., 1960.

- p. 1. "Farming can not develop and expand without receiving at least the support enjoyed by farmers in the provinces."

- p. 2. Nowosad suggests the following types of aid for agriculture:-

"1. To draw up a homestead plan. Agricultural lands to be allotted as homestead and for sale at low cost.

2. To assist in land clearing and breaking by having available at certain points heavy machinery for this purpose at operating costs to the farmers.

3. To build access roads to sizable blocks of agricultural lands in the Territory at no cost to the farmers.

4. To provide freight subsidies on items such as farm implements, building materials, livestock feed concentrates, seeds and fertilizers.

5. To arrange and provide low interest farm loans.

6. To assist in the storage of perishable farm produce.

7. To provide agricultural extension services and assist in marketing of farm products."

2. Peake, R.W. and Walker, P.H., 1975.

- p. 59. "Attention has been drawn to the lack of equipment for clearing and breaking and the need for knowledge and care in these operations. A properly equipped and trained unit under the Agriculture Development Council will be able to clear and break at considerable saving, than would individuals with minimum equipment and funds."

Note: This was written prior to the formation of the Agriculture Branch which would now be the logical agency to administer such a program.

- p. 60. "Because of the importance of horses and dogs in the Yukon in addition to the growing cattle population a subsidized service of veterinary medicine is warranted. The service could be provided by one veterinarian assisted by one or more technicians."

3. Agricultural Policy of the Yukon Territory(draft), 1980.

- p. 17. "The Territorial Government identify agricultural reseach priorities and initiate the most economical means to meet its research priorities."

- p. 18. "Only where specific needs or opportunities are identified, should the territorial government initiate financial incentive programs."

--- "A high priority be given to efforts to generate useful statistics and information on agricultural matters."

-p. 43. "There are no agricultural products for which Yukon can claim a natural competitive advantage."

--- "The agricultural opportunities and requirements of the territory are limited by its population."

--- "There is virtually no infrastructure to assist in the orderly provision of institutional sevices to agriculturalists (eg. soils lab, research facility, extension services, inspection sevices, storage, abattoir, marketing boards, etc.)." Note: Extension services are now an integral part of the Agriculture Branch.

--- "Large scale agriculture is not considered commercially feasible in Yukon and should not be encouraged at this time."

--- " Hobby farms, small rural acreages and home gardens are all an integral part of the food production system in Yukon."

4. Resource Planning Branch, 1981. (Draft Agricultural Policy of the Yukon Territory).

- P.16. "Seek the re-establishment of a federal research presence in Yukon."

--- "Provide limited assistance to educational institutions to undertake research and/or provide courses in agriculture."

5. Kutchin Consultants, 1983.

- p. 46. "Assist with the establishment of farmers markets."

--- "Provide storage facilities for root vegetables."

--- "Assist with land clearing, fencing and irrigation projects."

6. Unauthored, Undated (1985?). A Discussion Paper On Agricultural Development. Photocopy on file with Agriculture Branch.

- p. 26. "Distinguish between agricultural land and rural residential land and make rural residential land available under an equitable pricing system."

--- "Release agriculture land on a timetable such that over production of various commodities is not encouraged."

- p. 27. "Require a five year farm management plan for all agricultural land released."

--- "Provide assistance to educational institutions to provide courses in agriculture and seek to have Canada Manpower establish short term agriculture training courses."

--- "Establish a market advisory service to producers respecting prices, demand, marketing techniques etc."

- p. 30. "Recognize the importance of part-time producers and provide the same level of extension services and advice to them as to full-time producers."

7. Howard Paish and Associates, 1987.

Phase Three, Final Conclusions and Recommendations

- p. 4. "the Yukon Government ensure that the objective of economic self-sufficiency as implied in the 1985 Green Paper as a rationale for agricultural development, allow for the special circumstances of the part-time farmer."

8. Smyth, 1988.

- p. 91. "There is the opportunity to plan and develop agricultural enterprises in a rational manner, and to develop a policy and legislative framework in a cooperative fashion that meets the needs of a growing industry, while providing fair compensation to those displaced by it. There is the opportunity to build a sector of the economy that can withstand the "boom and

bust" cycles that have been traditional in the Yukon. And there is the opportunity to experiment with the new biotechnologies that could lead the way in game and aquacultural endeavors nationally.

These are the opportunities. The challenges rest with the farmers and the public servants who are charged with managing our renewable resources and ensuring a viable future for northern agriculture."

9. Maurer, 1989.

- pp. 96-98. "Recommendations for Agricultural Development"

-- "Government support of the agricultural industry is essential. Active government involvement is probably necessary, in the form of long term subsidization programmes, if the goals of import substitution and regional self-sufficiency are to be met. Under no circumstances should a government 'sink or swim' attitude be applied to any farming enterprise. The risk of marginal farming is too high, the social, economic and environmental consequences are too great and the land resource is too scarce for farm abandonment to be the result of a lack of government support";

-- "A minimum of government supported infrastructure should include a mobile abattoir, federal and territorial approved meat inspection programmes, and mobile veterinary and agricultural consulting services; both capital and carrying cost subsidies should be applied to some forms of intensive agricultural activities";

-- "As a general rule, farm diversification and concentration should be encouraged where the soils can accomodate such practices";

-- "Government support programmes should target both large and small operators and be flexible enough to customize policies and expectations to suit a variety of agricultural activities";

-- "Accurate farm and land use inventories should be carried out annually";

-- "Agricultural activities presently operating should be ensured of government support equal to the support offered to any new operations."

10. Hunt, 1989

- p. 1-35. "The Yukon Territorial Government should commission a kill only mobile abattoir (capable of both red meat and poultry processing)."

-- "The Yukon Territorial Government should amend existing abattoir regulations to allow for a mobile slaughter facility."

- p. 1-36. "The Yukon Territorial Government should institute an extension program to educate the producers of meat products about correct handling methods for slaughtered meats."

- p. 1-38. "The Government and the agriculture community should cooperatively develop a data base of agricultural information."

- p. 1-39. "The Government and the agricultural community should cooperatively undertake a comprehensive agricultural strategy that would re-examine all areas of production and local demand."

VII. Conclusions

1. The analysis of information which is available on land currently held by farmers and land which is under application to be released for agriculture suggests that this land is a high percentage (57%) of the land required to support the population of the Yukon.

If the trend for agricultural land continues, an overproduction situation could result for most, if not all, products which can be grown in Yukon. This would appear to be the situation for the horticulture sector.

The land data also suggests that any deficiencies in agricultural development or production that exist in the Yukon can not solely be attributed to a shortage of agricultural land.

2. The literature suggests that only small scale farms and/or mixed farming operations are likely to be viable enterprises, and that part-time farming is a characteristic of an area where agriculture is just starting to develop. This is in accord with stated government policy which is to support agriculture as a life-style option where possible. These aspects of agriculture should be acknowledged and supported in government policies.

3. The type of support that is required by the agricultural community is the provision of infrastructure such as research and development, extension services, on farm planning and management, marketing, laboratory facilities, meat inspection and veterinary services. Consideration should also be given to assistance for developing farm water supplies and electricity, land clearing, general farm insurance and the provision of low interest loans for financing capital development and working capital requirements of farm operations. Several reports suggested that any assistance which is provided should not be in the form of non-repayable grants to individual farmers.

4. The provision of educational courses, possibly in conjunction with the Yukon College in affiliation with a southern university, is recommended as one way of providing information on farm management as well as providing a vehicle for the undertaking of agricultural research and development in Yukon. Several of the reports reviewed supported the idea of re-establishing a Federal government agricultural research station in Yukon. An agricultural research facility could possibly be developed in conjunction with the Yukon College in association with the proposed agricultural course curriculum.

5. Improvements are required in the agricultural information base. Generally the Yukon agricultural statistics were found to be poor and incomplete, and in some instances misleading. The Agriculture Branch should explore the possibility of developing a census program in cooperation with Statistics Canada.

VIII. List of Literature and Documents Reviewed

- Abbot, J.W., 1945. Report on an Agricultural Survey of the Dawson City-Mayo District of the Yukon Territory. Central Experimental Farm, Ottawa, Canada. January, 1946. 12 pp.
- Abbot, J.W., 1954. Dominion Experimental Substation Whitehorse, Yukon Territory. Progress Report 1945-1952. Canada Department of Agriculture, Experimental Farm Services, Ottawa. 43 pp.
- Acton, D.F. and Pringle, W.L. 1975. Report on Soil Investigations and Agricultural Potential in Parts of the Yukon Territory. Prepared for the Department of Indian and Northern Affairs. Saskatchewan Institute of Pedology Publication M24.
- Agriculture Canada, 1985. Yukon Agriculture 1984: State of the Industry. Agriculture Development Series Report No. 2, Land Resources Research Institute, Box 2703, Whitehorse, Y.T.
- Agriculture Canada, 1986. Yukon Agriculture 1985: State of the Industry. Agriculture Development Series No. 3, Land Resources Research Center, Box 2703, Whitehorse, Y.T.
- Agriculture Canada, 1988. Yukon Agriculture 1986-87. State of the Industry. Agriculture Development Series Report No. 4. Land Research Centre, Box 2703, Whitehorse, Y.T.
- A.J. Hunt and Associates Consulting Ltd. 1988. Northern Splendor Business Strategy and Plan.
- Akhurst, Kent, 1978. Impact of Possible Agricultural Development on Other Land Use Values in Selected Areas of Yukon Territory. Part 2.
- Ames, M.A., 1989. Annual Report on Yukon Agriculture Test Plots. Agriculture Branch Report Series No. 3, Yukon Territorial Government, Box 2703, Whitehorse, Y.T. 28 pp.
- Anonymous, 1898. Agriculture in the Yukon Valley. National Geographic Magazine. Vol. IX, No. 4, April, pp. 189-190.
- Anonymous. 1979. All This Land and Nowhere to Grow. Harrowsmith. No. 23, Oct., pp. 48-52.
- Anonymous, 1980. The North Feeding the North. A conference under the sponsorship of the Departments of Agriculture, Northern Affairs and Economic Development and Tourism. In conjunction with Norman Regional Development Corporation. The Pas, Manitoba.

- Anonymous. Undated,(a). Renewable Resources Commitment to Agriculture. Photocopy, Agriculture Branch files.
- Anonymous, Undated,(b). A Discussion Paper on Agricultural Development. Photocopy, Agriculture Branch files.
- Anonymous, Undated,(c). Yukon Agriculture - A Unique Resource. Photocopy, Agriculture Branch files.
- Anonymous, Undated,(d). Untitled photocopy portion of the 1981 report of the Special Committee on Food Prices to Agriculture. Agriculture Branch files.
- Anonymous, Undated,(e), Photocopy of chapter on Abattoir Feasibility Study, Agriculture Branch Files.
- Bailey, Arthur W., 1981. Forages in Northern Agriculture: Past, Present, Future. Agriculture and Forestry Bulletin, Vol. 4, No. 1, Feb., pp. 27-34.
- Beattie, Kathleen G., Bond, Wayne K. and Manning, Edward W., 1981. Agricultural Use of Marginal Lands. Environment Canada, Lands Directorate, Working Paper #13
- Bisset, C., 1988. Yukon Crop Development Project Annual Report. Published by Yukon Livestock and Agriculture Assoc.; Agriculture Canada; and Agriculture Branch, Dept. of Renewable Resources.
- Bradley, Hugh R., 1960. A Brief on the Possibilities of Mixed Farming in the Yukon. Photocopy. 5pp.
- Brimacombe, Peter, 1976. Yukon Agricultural Development: Justification, Feasibility and Policy Recommendation.
- Buckley, Helen, 1971. Appendix A. Farming for Canadian Indians. An Economists View. Reproduced by: The Indian-Eskimo Association of Canada. A Citizens' Organization, 277 Victoria St., Toronto.
- Burton, Wayne, 1971. Alaska's Agriculture. Institute of Social, Economic and Government Research. Univ. of Alaska, Fairbanks. 260 pp.
- Butler, Jim, 1986. Norths' Leading Meat Producer Expands Whitehorse Operation. Trade and Commerce, April, pp.4-7.
- Canada Department of Agriculture, n.d.; Agriculture Research in NW Canada 1965-1970.
- Carder, A.C., 1965. Northwestern Canada's Climate; Its Effect on Crop Growth and Development. Agricultural Institute Review. 3 pp.

- Carr, D. W. 1968. The Agricultural Potential Of The Yukon Territory. Ottawa.
- Creed, Murray, 1961. We Stand on Our Own Two Feet. Family Herald, No. 33, Aug 17, Montreal, pp. 8-9.
- Dams, Theodor, 1980. Challenges in Marketing Agricultural Products in the Northern Hemisphere. Agricultural Institute of Canada, "Northern Agriculture", August 3 - 7, 1980, Edmonton Alberta.
- Deloit, Haskins and Sells, 1987. Dairy Feasibility Study for the Champagne/Aishihik Band.
- Evans, Walter H., 1898. Some of the Conditions and Possibilities of Agriculture in Alaska. National Geographic. Vol 9, no. 4, Apr., pp. 178-187.
- Ference, Don and Associates, 1989. Program Priorities and Decision Guidelines. Vol. 1, Renewable Resources. Canada/Yukon Renewable Resource Subsidiary Agreement, August 1989.
- Ferguson, W.; 1945. Summary of Reports from Vegetable Growers or Cooperators in the Northwest Who Have Received Seeds from the Division of Horticulture for Trials. 3pp.
- Filteau, D. 1987. Agriculture Resource Inventory Survey. Yukon Livestock and Agriculture Association. Unpublished report.
- Fuller, Stephan and McTiernan, Timothy. Undated. Old Crow and the Northern Yukon: Achieving Sustainable Renewable Resource Utilization. Photocopy, Agricultural Branch Files.
- Georgeson, C.C., 1902. The Possibilities of Alaska Agriculture. Nat. Geogr. Mag., Vol. 13, no. 3, March, pp.81-82.
- Georgeson, C.C., 1916. Information for Prospective Settlers in Alaska. Alaska Agricultural Experiment Stations, Circular No. 1, Washington, Government Printing Office, 30pp.
- Government of the Yukon, 1988. Yukon Economic Review and Outlook 1987 - 1988. Planning and Research, Department of Economic Development: Mines and Small Business.
- Government of Yukon, 1986. Yukon Data Book. Outcrop (Yukon) Ltd. The Northern Publishers. Whitehorse, Yukon.
- Government of Yukon, 1987. Yukon Economic Review and Outlook, 1986-1988. Policy, Planning and Research Branch, Department of Economic Development: Mines and Small Business.

- Gubbels, G.H.; 1971. Response of Cabbage Grown North of Latitude 60 to Plastic Mulch. Canadian Journal of Plant Science. Jan., pp.17-20.
- Gubbels, G.H.; 1972. Effects of Plastic Mulch and Row Spacing on Carrot Growth North of Latitude 60. Canadian Journal of Plant Science, Summer, 52, pp. 660-661.
- Guitard, A.A., 1965. The Growth of Spring Cereals in Northwestern Canada and Alaska. Canada Department of Agriculture and University of Alaska. Canada Department of Agriculture Publication 1220, 11pp.
- Haliday, Sally, 1979. Why Freeze Agriculture in the North? Science Forum, Vol 12, no 3, pp. 43-44.
- Hall-Beyer, Bart, 1976. History of Farming on Shermer Creek near Carcross. Photocopy of an unpublished manuscript in Yukon Archives. 10pp.
- Harrington, Lynn, 1960. Sourdoughs in Blue Denim. Family Herald, Dec. 15, 2pp.
- Harris, Robert, E.; et al; 1972. Farming Potential of the Canadian Northwest.
- HLA Consultants. 1988. Feasibility Study On Establishment Of A Commercial Growers Cooperative And Associated Storage Facility In Yukon.
- Howard Paish and Associates a). 1987. A Policy Oriented Analysis Of The Game Farming And Game Ranching Potential Of The Yukon. Volume 1. Phase 1 A Background Overview. Phase 2 A Feasibility Anaylsis Conclusions and Recommendations.
- Howard Paish and Associates b). 1987. A Policy Oriented Anlysis Of The Game Farming And Game Ranching Potential Of The Yukon. Volume II, Summary, Conclusions and Recommendations.
- Hoyt, John P. 1983. Yukon Agriculture 1983 - Federal Lands. Kutchin Consultants, Whitehorse, Yukon.
- Hunt, A.J. and Associates Consulting Ltd., 1989. Abattoir Feasibility Study and Preliminary Agricultural Development Strategy. Yukon Territory.
- Johansen, R.L., 1989. Grazing Potential of Native Range. Unpublished internal Agriculture Branch Report.
- Leahey, A.; 1944. Report on the selection of a site for an agricultural experimental station. Experimental Farm Sevice, Ottawa, 6pp.

- Leahey, A.; 1955. Soil and Agricultural Problems in Subarctic and Arctic Canada. Arctic Research, Dec, pp. 137-142.
- Loeks, Dave. 1987. Competing Interest On Agriculture Land. Phase 1 Resource Conflicts: Defining the Issues. Prepared by Sundog Resource Consulting.
- Loeks, Dave. 1987. Competing Interest On Agriculture Land. Phase 2 Policy Options to Resource Conflicts Issues. Prepared by Sundog Resource Consulting.
- Loeks, Dave. 1987. Competing Interest On Agriculture Land. Phase 3 Concluding Report. Prepared by Sundog Resource Consulting.
- Lortie, Grant M. 1982. The Implications of Agriculture & Livestock to the Management of Large Carnivores in Yukon.
- Mackinon, C.S., 1982. The Rise and Decline of Agriculture in the MacKenzie District and Yukon. The Musk-Ox, No. 30, Summer, pp.48-63.
- Maurer, Jeanne, 1989. Agriculture in the Yukon: An Investigation into Aspects of Farming on Marginal Lands. A research paper submitted in conformity with the requirements for the Degree of Bachelor of Applied Arts (Geography), Ryerson Polytechnical Institute.
- McTiernan, Timothy, J. and Fuller, Stephan P. Undated. Emerging Conservation strategies In The Yukon: An Overview. Department Of Renewable Resources Government Of The Yukon.
- Mick, Allan, H., 1955. Soils and Agricultural Development in Alaska. Arctic Research, Dec, pp. 124-136.
- Miller, Orlando, 1975. The Frontier in Alaska and the Matanuska Colony. NewHaven and London, Yale University Press.
- Northern Resources & Associates. 1987. Yukon Mushroom Farming Potential. Part 1, Feasibility, Discussion, Conclusions.
- Northern Resources & Associates. 1987. Yukon Mushroom Farming Potential. Part 2, Financial Analyses.
- Nowosad, F.S., 1960; Memorandum on Agriculture in Yukon.
- Parks, Resources and Regional Planning, Department of Renewable Resources. 1988. A Compilation Of Existing Data For Agriculture, Grazing And Other Land Alienations In The Greater Whitehorse Area.
- Peake, R.W. and Walker, P.H. 1975. Yukon Agriculture: A Policy Proposal, R.W. Peake and Associates Ltd., Lethbridge, Alberta

- Prescott-Allen, Robert and Christine, 1987. Towards a Yukon Conservation Strategy. Framework of a Strategy for the Sustainable Development of the Yukon's Renewable Resources. Prepared for the Government of Yukon, Department of Renewable Resources.
- Pringle, W.L., 1974. Northern Agriculture. North of the 60th. Agrologist, Vol. 3/6, November/December. pp4-7.
- Raup, Hugh M., 1945. Forests and Gardens along the Alaska Highway. Geogr. Review., Vol. 35, pp. 22-48.
- Reid, Collins and Associates Ltd., 1988. Feasibility Study, Yukon Tree Seedling Nursery.
- Resource Management Consultants Ltd. (RMC). 1985. Small Scale Agriculture in the Northwest Territories.
- Resource Planning Branch, 1981. Agricultural Policy of the Yukon Territory (Draft).
- Rostad, H.P.W. and Kozak, L.M. 1977. Agricultural Potential of Selected Areas in the Northwest Territories. Saskatchewan Institute of Pedology, University of Saskatchewan, Saskatoon Sask.
- Rostad, H.P.W., Kozak, L.M. and Acton, D.F., 1977. Soil Survey and Land Evaluation of the Yukon Territory, Parts 1 and 2. Saskatchewan Institute of Pedology Publication S174.
- Rostad, H.P.W., 1979. Soil Surveys for Land Use Policies in the North. Can. Agriculture, Spring. pp. 12-18.
- Rowath, H.H. 1916. The Yukon Territory Its History and Resources. Issued By Direction Of The Hon. W. J. Roche, Minister Of The Interior. Ottawa.
- Select Committee on Agriculture and Colonization, 1903. Appendix No.2, Climate and Soil of the Yukon. Ottawa, pp. 61-78.
- Smith, C.A.S. and R.H. Filteau, 1985. Yukon Agriculture 1984: State of the Industry. Agriculture Development Series Report No. 2, Agriculture Canada, Land Resources Research Institute, Whitehorse, 46 pp.
- Smith, C.A.S. and R.H. Filteau, 1986. Yukon Agriculture 1985: State of the Industry. Agriculture Development Series Report no. 3, Agriculture Canada, Land Resources Research Center, Whitehorse, 44 pp.
- Smyth, Steven, 1988. The Administration of Agriculture in Canada's North: The Yukon Experience. The Northern Review, Vol 2, Winter, pp. 85-95.

- Stinberg, William, 1908. Agriculture in the Yukon. Alaska-Yukon Magazine, Vol. 5, Sept., pp. 389-394.
- Tarnocai, C., Smith, C.A.S. and Beckman, D., 1988. Agricultural Potential and Climatic Change in the Yukon. Proceedings of the Third Meeting on Northern Climate. September 7-8, 1988. Whitehorse, Yukon. Atmospheric Environment Service, Environment Canada, Downview, Ontario. pp. 181-196.
- The DPA Group Inc. 1984. The Feasibility of a Yukon Dairy Farm and Processing Plant. Phase I Report. Prepared for: Mr. Doug Badry and Partners.
- Tsukamoto, Joe. Undated. Photocopy, Agricultural Branch Files.
- Vaartnou, M., 1988. The Yukon Native Grass and Legume Seed Industry. 1987 Progress Report on the Selection Nursery, Breeders Seed Plots and Equipment Purchase. M. Vaartnou & Associates, Richmond, B.C.
- Whiting, Peter G., 1979. Discussion Paper on Agricultural Policy of the Yukon Territory. Department of Renewable Resources, Government of Yukon.
- Whiting, Peter, 1980. Cost of Agricultural Production in Yukon. Department of Renewable Resources, Government of Yukon.
- Yukon Achives, 1977. Sound Recording, Series 29, Tape 3, R. Tait, F. Wilcox and K. McKinnon, "Agriculture in the Yukon". 23/1/77.
- Yukon Government, 1986. Discussion Paper: Options for Protecting Agricultural Lands. Subcommittee on Agricultural Zoning and Taxation. 6pp.
- Yukon Government. 1986/87 Annual Report, Government of the Yukon.
- Yukon Government. 1986. Yukon Economic Strategy, Yukon 2000, Building the Future.
- Yukon Government, undated. photocopy of Assessment of Import Substitution Opportunities Report.
- Yukon Legislative Assembly, 1981. Report of the Special Committee on Food Prices, Legislative Assembly Office, Whitehorse.
- Yukon Legislative Assembly, 1986. Yukoners' Views on Managing Our Renewable Resources. A report by the Select Committee of the Legislature.
- Yukon Livestock and Agriculture Association (YLAA), 1986. Submission to the Select Committee of the Legislature.