Winston Churchill
Memorial Trust
Fellowship

David Charles Ford
July – September 2009
Dairy Cattle Breeding
Canada
Section 1

Aim

My aim was to learn more about the agricultural industry over in Canada and in particular dairy cattle breeding. I also planned to do this across the whole of Canada, by starting in Vancouver on the far west side of the country and making my way across to Halifax on the far east side of the country in a period of 10 weeks, also experiencing the different cultures and ways of life in the 9 different provinces i intended on passing through on my once in a lifetime adventure.

The adequancy of the grant and suggestions for future fellows

The money awarded was sufficient enough, and allowed me to travel the distance in relative comfort, whilst also allowing me to explore off the beaten track a little to. My sugestions to future fellows would be to seeze the opprtunity given by the trust and plan well in advance. Try and have a clear idea of the trip you intend to make and research the areas that you intend to visit so as to enable yourself to make the most of the opportunity whilst you are there. Try to integrate some tme into your schedule to reflect and make some notes on what you have seen and buy a good quality camera so you can take lots of photos as this is something that you can refer back to after you have completed your fellowship, and will be helpful when writing up your report.

So far the Farmers Weekly and Farmers Gaurdian newspapers seem very keen to do write ups on my churchill fellowship. I have also contacted local newspapers such as the Knutsford Guardian and Sanbach Chronicle who as i am writing this have just published an article each with two different punchy headlines from each newspaper.They were very keen to find out what i had learnt and acheived from this experience. I have also been asked to do a write up for the Cheshire County Federation of Young Farmers Clubs magazine so that young farmers across the county can have an insight into what i learnt on my travels. My fellowship allowed me to access a great deal of information and knowledge that is very relevant to the agricultural industry. This kind of information is of much interest and disseminating it will be continuous for a number of years to come.

Introduction

Having spent my childhood and teenage years growing up on a Cheshire dairy and potato farm and also helping on the farm during my school holidays and during busy harvesting periods, i left school and enrolled at Harper Adams University College in Shropshire to study Agriculture with Land and Farm Management. After working on a number of different farms around the country which involved, working on a large sheep farm in Wales and also on a large arable farm in Oxfordshire to name just two during the easter and summer holidays, i graduated in 2008. The experiances i gained at harper on how different farming businesses are run allowed me to put into perspective what i wanted in the future. I decided that after finishing university that i wanted to work within the farming sector. After reading the farmers weekly i came across an advert from the Winston Churchill trust advertising travelling fellowships for 2009. I had always been interested in Canada as a country to visit one day and with the idea of combining this with my interest in the farming sector.
**Itinerary - Vancouver to Halifax**

Manchester to Vancouver – Flight  
Vancouver to Banff – Bus  
Banff to Red Deer – Bus  
Red Deer to Calgary – Bus  
Calgary to Regina – Bus  
Regina to Winnipeg – Bus  
Winnipeg to Sudbury – Bus  
Sudbury to Kingston – Bus  
Kingston to Toronto – Train  
Toronto to Niagara Falls – Train  
Niagara Falls to Montreal – Train  
Montreal to Quebec City – Train  
Quebec City to Charlottetown – Train  
Charlottetown to Halifax – Train  
Halifax to Truro – Car  
Truro to Haifax – Car  
Haifax to London – Flight  
London to Crewe – Train  
Crewe to Home - Train
My Journey across Canada from Vancouver to Halifax.

Having flown into Vancouver on the 3rd July 2009 to start my 10 week Churchill Fellowship tour of Canada, I was to be met by outstanding weather conditions. Although quite humid the sun was out in full force, which meant for ideal outdoor weather. With no definite plan of where I was going to be staying I decided to find accommodation in Vancouver's Downtown area which is where I stayed for the next 4 days. As well as getting a good insight into the city of Vancouver, I visited Stanley Park which is famous in Canada as a major attraction, as people travel far and wide to walk around this 1200 acre area of parkland. When I first started to walk around I saw the coastal mountains from Vancouver's Harbour Front and was amazed at some of the views that I was able to see while standing at the harbour. What caught my attention the most was the vastness of where I was and how huge the mountains were in comparison to everything else.

In the summer a lot of Canadians decide to go on "Vacation" and decide to hire a rental vehicle and take it across Canada for a break. This amazed me as Canadian people think nothing of driving 10 hours in a day to get from one place to another. The bridges, rocks, waters as well as other features I saw as I walked around were spectacular. As I came to the end of my walk around Stanley Park it levelled out into a beach area, from here I could see far into the distance and was able to see a selection of boats passing from Vancouver over to the nearby Vancouver Island. Vancouver Island itself is a similar size to the whole of the UK. This was just a glimpse into the distance and magnitude of the journey ahead in the coming weeks.

Visit to The Elora Dairy Research Unit

The Elora dairy research unit has a unique combination of tie and free stalls with access to a common parlour, physiology, maternity and biotechnology wings. A separate barn at the station serves as the heifer rearing facility for replacement animals, housing 154 heifers in 26 pens. There are 124 stalls in the tie stall barn and 48 stalls in the free stall barn. The maternity barn consists of 12 box stalls, adjacent to which are 3 calf nurseries, each housing 10 animals in individual pens. There also exists in total 64 tie stalls between the biotechnology and physiology wings. The parlour is a 16 unit, double eight herringbone design equipped with automatic cow identification.

Picture 1. Batch of 6 young calves waiting to be fed.
take offs and production recording. Currently the station milks twice daily and has approximately 150 mature cows and 160 replacement heifers. The physiology wing is served by a pipeline and the maternity area by a bucket milking system, allowing for collection of colostrum and milk.

**Fistula Cows**

One of the studies being carried out at the centre on Fistula cows was the use of a cordless system for continuous recording of ruminal pH in dairy cows. This looks at different techniques to measure ruminal pH and to assess rumen (cows main stomach compartment) acidosis in cattle. Rumen acidosis is often caused by over feeding of highly fermentable carbohydrates and low fibre diets to meet the high demand for milk production. Rumen acidosis is classified as acute and sub acute. Sub acute ruminal acidosis (SARA) is defined as repeated bouts of depressed rumen pH from 5.2 to 5.6, and is associated with mild transient anorexia, decreased milk production, intermittent diarrhea, poor condition and laminitis. The common techniques used to measure ruminal pH include rumenocentesis, oral stomach tube and cannulation.

Rumen cannulation is considered more accurate as it provides direct access to the rumen. Rumen pH is evaluated by either collecting rumen fluid samples through the cannula or by positioning an indwelling probe inside the rumen. The latter method provides a more accurate tool to evaluate the diurnal variation in pH and the severity of the SARA based on the three daily pH profiles.

The system was designed to enhance the accuracy and reliability of continuous rumen pH recording by implementing more advanced software and hardware bearing in mind cow comfort. This system allows researchers to record pH under different management settings such as free stall operations or during grazing.

Picture 2. Shows Fistula Cows eating.
Picture 3. Having the opportunity to look at a Fistula Cow and rumen contents at the Elora Veterinary Research Unit in Guelph, Ontario.

Picture 4. A Veterinary Researcher explaining what Fistulas are for and why they are useful in scientific research.
Picture 5. Time for me to assess the contents of this cow's rumen while it is eating fresh maize silage. The cow is unfazed and unaware of my presence.
Tuesday 4th August 2009 was a very proud day in my life so far as I was presented with an award of recognition from The Honourable Leona Dombrowsky (Minister of Agriculture in Canada) for my success in being awarded a Winston Churchill Memorial Trust Fellowship in 2009. I was invited to the minister’s office where I was presented with my award scroll and certificate. We then sat down and discussed agriculture and the many differences between British and Canadian agriculture and how agriculture was a huge part of the Canadian economy. After a series of discussions with the minister, I was taken to a number of very productive and profitable farming enterprises. I was given a guided tour of the farms and told about what plans these farms had for the future and how they planned to cope with the Canadian economy. That evening I was invited to have dinner with the Canadian minister and another guest at one of the top restaurants in Guelph. After dinner I was driven and dropped off at an all expenses paid accommodation residence for visitors of the minister. This had been arranged for me to stay in over night.

![Picture 6. Receiving my Certificate award at the University of Guelph, Ontario.](image)

**Semex visit, Gencor and trip to Frank and Don Donkers Fradon Herd**

After staying over in Guelph University Accomodation. I was picked up the following morning by Doug Green who is Dairy Genetics officer for a company called Gencor which is part of the Semex alliance in Canada. Firstly we drove to the Gencor headquarters in Guelph where I was given a guided tour. It is here that semen is collected from the bulls between 7am and 10am everyday between Monday and Friday. This is carried out by 13 full time barn staff. There are 531 bulls of different breeds presently housed at Gencor. The bulls are all fed hay, corn silage, balage and a ration which contains 15% protein. All the bulls are bedded using shavings for there pens, which are
Ardross Sterling – A 14 month old bull said to be a very promising up and coming bull for the future.

10x14 for the older bulls and 10x10 for the younger ones. All the bulls have an ear tag identification, which includes their name and bullcode aswell as registration numbers. All bulls are photographed when they arrive at Gencor. The bulls start to be collected from when they are 10 months of age. They are collected until they reach about 5,000 doses unless they are royally or high LPI bulls. These bulls usually get collected until 7,500 doses. They are housed here until they get a proof which usually takes 3 years. While here all the bulls get groomed. They are clipped and have their hooves trimmed when they arrive for their picture. The bulls get routine hoof trimming and are clipped regularly. Gencor currently has 550 acres of land in which they harvest corn and grow hay for the bulls.

Picture 7. Ardross Sterling – A 14 month old bull said to be a very promising up and coming bull for the future.

After we left the Gencor headquarters and headed to Frank and Don Donkers farm, which is based near to Branchton in Ontario. They use the prefix Fradon (Fra-Don). This was a herd with some excellent cow families and a combination of Black and Whites as well as Reds. They used a lot of semen from the Semex Alliance for the breeding and improvement of their animals, so they were continuously looking for animals with better traits to help improve their show cattle. This was a well-established dairy operation that had been running for a number of generations. It was managed by Frank and Don who are brothers and Don’s son as well as a number of farm staff. A lot of the animals I saw were show animals and a lot of time and preparation went into the grooming of these animals so that they could be taken to shows as the family has a long-standing reputation for showing their animals and also selling genetics from their own animals.

Agra Point Farm Consultancy

AgraPoint’s team of consultants uses its knowledge and expertise on a wide variety of on-farm and project work that advances agriculture. They work with large and small farms (conventional and non-conventional), processors, industry associations, governments, and other companies servicing the agriculture and agri-food community. They offer a suite of specialized production and business services including production advice, product and research trials, nutritional services, and food safety and quality assurance training, HACCP planning and auditing.

I had been in touch with Dan Mosely for a number of months and he kindly took me under his wing for 10 days showing me about his life as a dairy consultant in Nova Scotia and allowing me an insight into his life over in Canada. Here is a bit about Dan and a colleague of his Bill Thomas who I spent time with.

Dan Mosely – Dairy Consultant

Dan provides professional ruminant nutrition and husbandry advice to farmers including feed plans, herd health recommendations and support to the dairy industry. As well as a wealth of experience in the beef and sheep sectors, he was also raised on a Nottinghamshire dairy farm in England. He studied ruminant nutrition at Harper Adams University. He provides nutritional advice on farm and to feed companies as well as working with vets to maximise herd health potential. Dan also has a keen interest in younstock and the transition cow.

Bill Thomas – Field Crops Specialist

He has worked as the provincial forage specialist for 16 years having also lectured at the Nova Scotia agricultural college. Bill specific expertise lays in grazing management. Forage quality and nutrient management.
**A bit about dairying in Nova Scotia**

In 2008 there were 259 dairy farms in Nova Scotia, with the average farm having 85 head which makes for a total of 22,015 cows more than 96% are Holstein, but there are also Ayrshire, Jerseys, Guernseys and Brown Swiss. On the whole the average dairy cow produces 9,200 litres of milk a year. Milk production in Nova Scotia reached 167 million litres in 2008. Approximately 24% of which went into cheese production. It takes approximately 10 litres of milk to produce one kg of cheese.

There are hundreds of varieties of cheese being made in the world today. With many varieties of milk cow, sheep, goat, water buffalo and even reindeer! Those made in North America are an ingenious blend of European influence and innovation. Certain cheeses are made using milk from a single herd. Like Foxhill Cheese House. In these cases the land, pastures and breed of cow in addition to the duration of method of production and ageing play a decisive role in the balance, intensity and persistence of the overall flavour.

Dairy farmers of Canada, the federal organization, along with dairy farmers of Nova Scotia are responsible for the safe production and distribution of milk in Canada. The Quality Milk logo featuring the likeness of the little blue cow identifies dairy products made with 100% Canadian milk.

FROM SEED – TO GRASS – TO MILK – TO CHEESE

![Picture 8. Assessing Maize Silage quality at a farm in Nova Scotia.](image-url)
Foxhill Farm and Cheese Plant

Foxhill Farm a sixth generation family farm and is home to foxhill cheese house aswell as a modern dairy unit which supplies the cheese preparation and manufacturing area, which is based directly behind the shop via a pipeline from the farms dairy. Nestled in the beautiful annapolis valley beside tides of the minus basin and just 1 hour from halifax. At Foxhill, all cheeses are made from own fresh, high quality milk which is drug and hormone free. They are licensed with both the Nova Scotia natural products marketing council and the canadian food inspection agency. Foxhill specialises in stirred chedders, plain and herbed gouda, plain and herbed havarti, fresh quark, fresh curds, feta and a number of selected imported cheeses.

Whats Quark?

Quark is a fresh unripended, smooth textured cheese that is prepared in a fashion similar to cream cheese. It is spread on bagels for breakfast and used instead of cream cheese.

Nova Scotia Agricultural College

Picture 9. Classroom at the agricultural college where students are taught with an area at the front of the class where a live animal can be brought in and discussed mid lecture. Such as the dairy cow or a young undeveloped calf.
Visit to Summitholm Holsteins

It is hard to comprehend the fact that Canadian dairy farmers pay a quota cost of $30,000 (£16,470)/kg of butterfat a day. With an average butterfat at just over 1kg, you are looking at a bill of $45,000 (£24,706)/kg of butterfat a day.

The average herd size is only 68 head producing 29kg a day and a butterfat of 3.7%. With 94% of Holsteins, 3% Jerseys and 3% Ayrshires making up the Canadian dairy population, genetics is the key consideration in most enterprises, "genomics" being the new buzzword for many farmers.

When visiting the province of Ontario, Canada, some farms were about 10 years behind in animal welfare, with 65% of cows still housed in tie stalls and veal crates still widely used. Traceability of cows is not compulsory unless animals are leaving the farm or are registered to a herd book or milk-recording service, so it seems a far cry from the red tape surrounding UK dairy farmers.

Consumers and supermarkets are most definitely not the driving force in their industry, rather it is the farmers themselves who are pushing for change change in legislation and better traceability throughout the whole system.

One farmer keen to protect his own destiny, making a more transparent industry, is Ben Loewith of Summitholm Holsteins. Milking 330 cows three times a day, he is not the average Canadian dairy farmer, but believes you need to be expanding to drive revenue.
Raking and bedding four times a day is labour intensive, but good for cow welfare.

Milk components at 3.8% butterfat and 3.25% protein, means adding one more cow to the herd would cost about $45,000 (£24,706), currently buying in 1.45kg of quota.

But Mr Loewith believes high tariffs prevent milk being imported into Canada. "There are zero subsidies for dairy farmers, so 100% revenue is from the market place. It is dairy farmers choosing not to have subsidies, and with regard to quotas I'd sooner keep them. Looking at those countries having lost quotas, it never seems to have benefited the farmer," he says.

Mr Loewith, who farms with his father Carl and uncle Dave, is chairman of Dairy Farmers of Ontario (DFO), a milk marketing board financed and controlled by farmers, establishing prices for raw milk and administering supply management.

"Farmers have a big input into the industry and because of this control we get less government interference. Through DFO we can command a good deal, creating price stability. Currently we are getting 70 cents/litre."

This price stability means investment is more common because there is less risk, and with quotas representing 75% of total equity, it is no wonder growth is slow and often internal.

For Mr Loewith 95% of revenue is from milk, the other 5% comes from cow sales. "Although this is only a small percentage, this 5% represents 20-25% of all profit on farms," he says.

In 1999 more than $2m (£1.09m) was invested into a new barn and parlour. But there is nothing fancy about this operation. There is no electronic identification and all heat detection is done visually. The system is proving successful conception to first service is at 39% and average days open is 112.
But for this simply-run unit cow welfare is paramount in meeting their mission statement: "To meet the needs of every cow, every day."

Cows are housed in stalls with no brisket board, allowing them to lunge forward freely. Sand bedding is raked four times a day and dry sand added on top, which Mr Loewith admits is inefficient from a labour perspective, but great for animal welfare.

The 12 cows in the herd which have given more than 100,000kg in their lifetime and nine giving more than 90,000kg is indicative of the care given. Cows are averaging 128,000kg in 305 days, the average cow lasting 3.2 lactations.

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<th>Production figures – Ben Loewith</th>
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<td>Number of cows milked</td>
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<td>Number of milking a day</td>
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<td>Milk yield</td>
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<td>Butterfat and protein (%)</td>
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<td>Average number of lactations</td>
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Dry cow management is important. First-calved heifers are dried off 60 days before calving and mature cows at 55 days. "Heifers are housed separately, so there is no social conflict," he says.

Cows are dried off on maize silage and straw with a mineral supplement and intakes are usually 13-13.5kg. Any cow with a somatic cell count above 200,000 is tubed with an antibiotic and Orbaseal and those below receive Orbaseal only. Dry cows are stocked at 100%, so there is no competition for space.

Heifer rearing is also important and heifers are bred on weight rather than age, average breeding age being 12.5 months at 360-380kg. All animals are bred by AI, with 2.3 straws used on average a conception.

"If a cow has not taken by 70 days they are given a prostaglandin injection. But hormone injections are not given routinely," he says. "Infertility is the number-one reason for culling 8% of cows being culled because of this.

![Standing in the parlour at Summitholm Holstiens just before afternoon milking.](image)

"I want there to be a transparency about my practice. Consumers wouldn't like to drink milk with the knowledge that cows are receiving hormones routinely, so this is why we only do it when needed. This is why we have another mission statement saying we will profitably produce a wholesome and nutritious product that the market demands," he adds.
Tie stalls not bad for welfare?

A wholesome and nutritious product is certainly what the consumers are demanding in Canada, with advertising on healthy eating paramount. Animal welfare isn't something featuring widely in consumers' minds, as 65% of cows are still housed in tie stalls. But do tie stalls necessarily mean bad welfare?

One of the most successful dairy farmers in Canada uses them and believes they maximise animal health and welfare. John Bos, Cambridge, Ontario, is milking 150 cows and averages five lactations a cow and has won several awards for his breeding success.

Mr Bos' approach is to breed a balanced cow, with good feet, legs, udders, size and strength. "I don't see tie stalls as an issue in respect to animal welfare," he says. "When constructing the new parlour two years ago it was built with comfort in mind."


In Canada, 65% of all dairy cows are still housed in tie stalls

"There is never any cow competition, which means intakes are maintained at 26kg a day. Milk yield averages 10,500 litres at 4.2% butterfat and 5.33% protein on twice-daily milking. Cows are housed on rubber matting with straw bedding on top. The tail is held up by a wire so udders are kept clean, meaning udder health is maintained. But mastitis still occurs and average somatic cell counts are about 200,000," he says.

Genetics is something Mr Bos' herd excels in, with 52 cows registering as "Excellent" and 30 "Good Plus".
**Production Figures – John Bos**

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<td>Calving interval (months)</td>
<td>13.4</td>
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<tr>
<td>Somatic cell count</td>
<td>200,000</td>
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"We are using Goldwyn, Baxter and Talent and use an AI technician who comes on call. We have exported live embryos from the Rose family, but this is only on demand. Bull calves are only kept when the AI companies are interested and the rest go to veal. Most sales are 90% private, selling about 25 cows a year and flushing about 2-3 a month."

Mr Bos reckons Germany is one of the biggest markets for embryos.

Cows are fed a TMR, and cows are housed outside during the dry period and supplemented with silage and hay with all feed home-grown except for protein.

Maintaining cow health and welfare is what Mr Bos attributes to maximising his genetic and breeding success.
Picture 15. Taken of a baby calf who was born with a broken leg after a difficult calving. It had its leg bandaged up and a plastic support tube put on its leg to enable it to walk.

Picture 16. A cow grazing lush grass on a summers day on a farm in Guelph, Ontario.
Dairy Farmers of Nova Scotia

Picture 17. Taken outside the offices of the dairy farmers of Nova Scotia, where I met Brian Cameron who is general manager for the DFNS.

Brief History
The Dairy Farmers of Nova Scotia organization was created through legislation enacted in 2001, and replaces the former Nova Scotia Dairy Commission. The organization exists under the umbrella of the Natural Products Marketing Council of the Department of Agriculture.

Main Activities
Dairy Farmers of Nova Scotia provides a regulatory and administrative service to Nova Scotia's dairy producers.

Working in cooperation with Natural Products Marketing Council, DFNS licenses producers and milk transporters, sets the farm price for milk, administers the production quota system which is a cornerstone of the supply management system, and represents the province's producers on the committees administering the National Milk Marketing Plan and two interprovincial milk pools.

DFNS has approximately 250 members located on farms from Port Morien to Yarmouth. Together, they produce over 165,000,000 litres of high-quality milk each year. This represents revenue at the farm of approximately $120,000,000 per year, and over 550 on-farm jobs.

The majority of the milk is destined for the fluid market, but the province's six processors and two producer/processors also make yogurt, ice cream, cheese, butter, and skim milk powder.
Prince Edward Island Potatoes

Any drive or walk across Prince Edward Island during the spring, summer or fall reveals a landscape dotted with potato fields. The potato fields are next to fields of barley, wheat, oats and forage crops like Red Clover and timothy. Easily seen are the many warehouses used to store, grade and package potatoes before shipment to market.

Although Prince Edward Island is small (total area 1.4 million acres), the island annually produces more than 30% of the total Canadian crop. Potatoes are Prince Edward Island's primary cash crop. In 2006 the island grew 97,000 acres of potatoes. With an average yield of 300 cwt/acre, production in 2006 was approx 28 million cwt.

The first record of potato production in Prince Edward Island comes from a report sent by the colonial governor to England in the report, he describes the year's potato crop as a phenomenal success. By 1770, island farmers were exporting small quantities of potatoes to the neighbouring colonies of Nova Scotia and New Brunswick. By the 1830s, considerable trade in potatoes existed between Prince Edward Island and the West Indies via local ports. Production and export of certified seed potatoes commenced over 80 years ago.
Today the potato is the world’s largest food crop. One reason for this popularity is its high food value. The potato can produce more food energy and protein/ha than any other food crop except sugar and soybeans. Potatoes are high in nutrients, low in fat content, and contain a good balance of the eight essential amino acids.

Potato varieties grown have changed over the years with new varieties developed as the demand for seed, table stock and processing potatoes changed. The most popular potato on PEI, the russet Burbank, is for frozen french fries and as a baking potato. Other varieties grown include shepody, kennebec, superior, yukon gold, goldrush, century russet and chieftain. Currently more than 30 varieties of potatoes are grown to supply customers in north and south america, europe and mid east and africa. Potatoes are loaded on vessels at one of prince edward islands four deep water ports for shipment overseas.

The processing industry uses approximately 50% of the potatoes grown on prince edward island. Most potatoes are processed into frozen potato products made from PEI potatoes either for Cavendish farms of McCain foods. Frozen potato products made from PEI are available across the country and are also exported. Small fry snack foods manufactures potato chips that they distribute in eastern canada.

The basic seed for all potato varieties on prince edward island originates from pathogen free plantlets grown in tissue culture. In the spring, plantlets are transplanted into greenhouses and/or screenhouses for growth in a protected environment. Progeny tubers from these plantlets then become the first generation of field grown potatoes the following season.

Potato planting generally begins in may, although some areas may start in late april. Planting may not finish until early june, depending on soil and weather conditions. Harvesting takes place in the
cooler weather of early fall and is generally under way by mid September and finish before the end of October. Growers store their crops in modern temperature and humidity controlled warehouses for grading, packaging and shipping during the winter months. Potatoes can be stored for up to ten months before being processed.

Crop rotation, the growing of different crops in sequence over several cropping seasons, is an essential component of sustainable potato production. The rotation crops break pest life cycles, reduce pesticide use, allow for the control of weeds and help maintain and improve soil structure.

There is no one perfect crop rotation sequence for potato production. However a common rotational scheme for potato production occurs over a three year period. The potato crop grown in year one is followed in year two by a spring cereal, usually barley. The barley can be used for livestock feed on the farm, or sold as a cash crop to livestock producers or feed mills. In the third year, a forage crop usually a mixture of red clover and timothy (legume/grass mixture) is grown and harvested as either hay or silage for cattle feed. The forage mixture fixes atmospheric nitrogen in the soil for following crops and contributes to soil organic matter. Year four would see a return to potatoes.

Prince Edward Island enjoys the reputation as Canada’s leading potato producing province. Producers are continually making improvements to meet the changing demands in world potato markets.

Aknowledgements
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Dr John, Isabel Turner and family – Kingston, Ontario.

Dr Ken Leslie – Ontario Veterinary College part of the University of Guelph. keleslie@ovc.uoguelph.ca

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Doug Green – Gencor Product Support, Dairy Genetics. Semex Allience. dgreen@gencor.ca

Julie Brook – Harper Adams University College.

Brian Beaton – Potato Specialist for the Dept of Agriculture on Prince Edward Island. bwbeaton@gov.pe.ca

All the many Farmers and other people who allowed me an insight into there work over in Canada.