Nuffield Farming Scholarships Trust

The Future of Global Potato Production

A Potato Council Award

Peter Grewar 2008

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Personal Introduction / Foreword

At the start of the Nuffield process I was a 30 year old potato and cereal farmer from eastern Perthshire. I farm in Partnership with my parents and am the fourth generation to farm at Mill of Camno, prior to that the family was farming in Glenisla, only 20 miles away from our current base but 800ft higher above sea level. My father has been the first of the line though to make his full time living from the farm with both my grandfather and great grandfather having full time jobs out with the farm. We have seen tremendous growth in our farming business over the last 30 years, going from tenant farmers on 320 acres to being owner occupiers, tenants and contractors, currently on over 6500 acres. Effectively we have doubled in size every 7 years or so.

The recent major expansions have been into seed potato production, establishing a new base some 120 miles away in the Black Isle region of Scotland, and organic potato production on rented land in Perthshire and Angus.

I'd been farming full time for just over 9 years when I applied for my Nuffield Scholarship, when I left college I gave myself 2 specific goals that I felt at the time should take me a good portion of my farming life to achieve, both were financial, one referred to limiting losses in a poor potato year and the other referred to maximising profit in a good year. By the time we closed our books at the financial year end of 2007 I felt I achieved both goals that I had set. Perhaps I had not been ambitious enough at the time!

I was looking I think more than anything else for a break, in order to stand back and really look at what we were doing. To look at the big picture both within the UK industry and the worldwide industry, to really ask some questions about where I wanted the farm to be in another 30 years time?

I found myself wondering what the end goal was. Do we keep expanding in the potato sector as we have been doing? Do we look for new sectors and new crops? Are we feeding our ego's more than anything else with this constant push for larger scale?

My Nuffield Scholarship has answered some of these questions, and asked more.

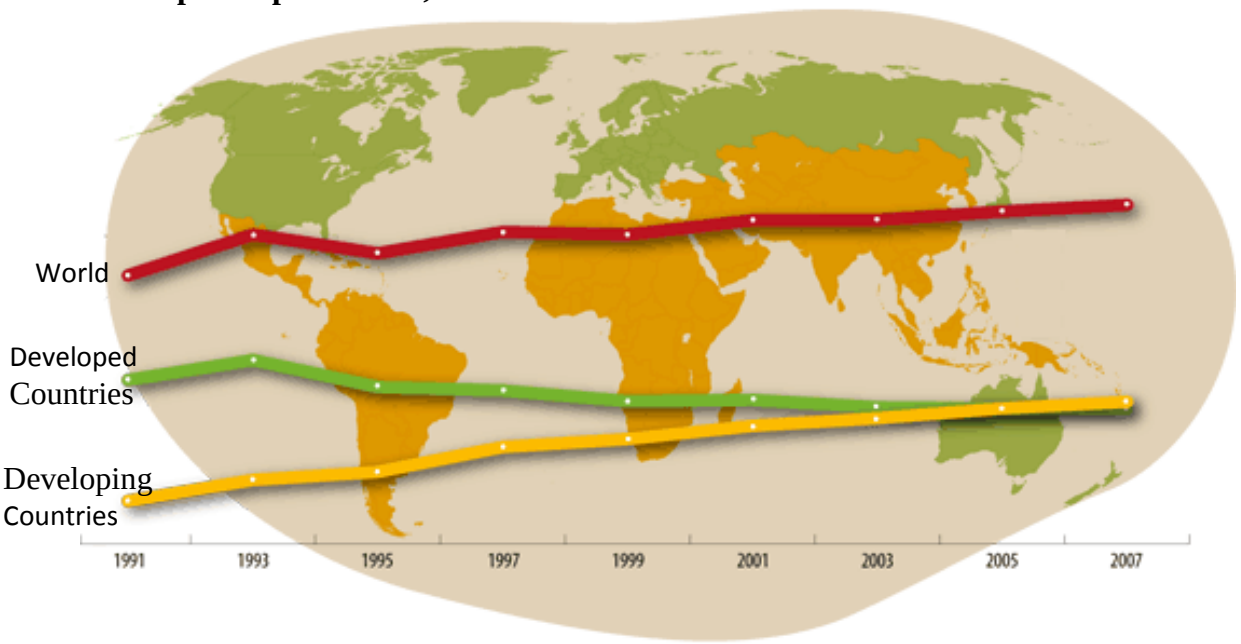
The study very much turned into an avenue through which to recognise what my personal goals are.

I now feel more confident than ever before that I know where I want to go, where I want the businesses to go and how I intend to get them there. Nuffield hasn't been the only factor influencing where I am now but it has been one of the major ones in the last two years. I am now married and have two young children and it is still amazing to me how much your mindset can change when the focus of your motivation changes from self fulfilment to that of your family.

Study Introduction

Potato production on a worldwide scale is on the increase, predominantly in the emerging superpower nations of China and India, but also throughout the developing world. These countries see the potato as a higher yielding alternative to traditional staples such as rice maize and wheat, and so with an ever increasing world population and an ever-decreasing supply of agricultural land, the simple potato is seen by many as being 'the great white hope'.

World potato production, 1991-2007



	1991	1993	1995	1997	1999	2001	2003	2005	2007
Countries	million tonnes								
Developed	183.13	199.31	177.47	174.63	165.93	166.93	160.97	159.97	159.89
Developing	84.86	101.95	108.50	128.72	135.15	145.92	152.11	160.01	165.41
WORLD	267.99	301.26	285.97	303.35	301.08	312.85	313.08	319.98	325.30

Source: FAOSTAT

Along side this you see that production in the developed world is actually in decline and has been so since 1993, but this has been continually offset by annually increasing production in the developing world. In 2005 production in the developing world was greater than the developed world for the first time.

With this in mind I aim to find answers to the following questions.

Why are these production trends happening?

Will the trends continue to happen?

What will be the ramifications for the UK potato industry as a result?

2008 The United Nations International Year of the Potato (IYP)

2008 was also the United Nations International Year of the Potato, only the second time that such a year had been dedicated to an agricultural crop. I have to admit to not being aware of the United Nations International Year dedications until the Potato was privileged enough to have one dedicated to it.

Here is the brief given on the Canadian UN website (www.unac.org)

Since 1959 the UN has designated International years in order to draw attention to major issues and to encourage international action to address concerns which have global importance and ramifications. There is a concerted effort not to designate every year - for fiscal reasons and to avoid any process of trivialization.

Some examples of previous years are listed below

1959/60	World Refugee Year
1968	International Year for Human Rights
1978	International Anti-Apartheid Year
1986	International Year of Peace
1993	International Year for World's Indigenous People
2004	International Year of Rice
2008	International Year of the Potato

The IYP mission was described as follows: Celebration of the International Year of the Potato (IYP) will raise awareness of the importance of the potato - and of agriculture in general - in addressing issues of global concern, including hunger, poverty and threats to the environment.

The fact that the UN felt it necessary and beneficial to dedicate an international year to the Potato speaks volumes for how they see the potential of the crop on a worldwide scale, and especially important for developing countries.

For the purposes of my study I have accepted the Food and Agricultural Organisation of the United Nations (FAO) definition of Developed and Developing World. The Developed World being North America and Europe, including Russia, Australasia and Japan. The Developing World being Central and South America, Africa and Asia.

Other developments along the way

When setting out on the experience of a Nuffield Scholarship I hadn't quite appreciated how many additional benefits it would have outside the study topic itself. Yes everyone told me that it would be a life changing experience but I didn't really believe them and I admit to being more than a little sceptical about just how much it could really change my life. As you will see from reading on my original scepticism has proved unfounded, and a large portion of what I take forward from my Nuffield experience will have nothing whatsoever to do with potatoes.

Contemporary Scholars' Conference
Melbourne and Echuca, Victoria, Australia
Saturday 23 February to Sunday 2 March 2008

Within a month of being granted our awards the 2008 Nuffield Scholars were bound for Melbourne for the Contemporary Scholars' Conference, where our question for the week was: Has agriculture the capacity to meet societies' demand for food over the next 10-20 years?

This question was no doubt a query of the time. Early 2008 was a brief period of high cereal prices, global food shortages and real fears about world hunger. Only two years later cereal prices are back at rock bottom and food security whilst not off the political agenda altogether is certainly not as high up on the list as it was then.

My gut feeling at the start of the week was yes, agriculture has the capacity. Then throughout the week we were presented with some of the issues that could affect the answer. The main one in this part of the world was water, both availability and cost. Depending on which area we were in and which farmer you spoke to depended whether they had had between two and nine years of drought, and there was real competition for the available water from domestic users as well as competing farmers.

One statistic from Goulburn Murray Water (the government run water storage and distribution company) was that irrigated agriculture in Australia accounts for only one per cent of the land use but fifty per cent of the agricultural output by value.

We met a typical dairy farmer of the area, Max Jelbart whose usual practice was to irrigate grass with up to 1000 mm (40 inches) per year plus their natural rainfall of 250 mm (10 inches) in order to grow the feed for his dairy cows. The cost of water had risen so much that he was trading his water rights to other farmers down or up stream and buying in hay to feed his cows. This was common practice and of course had a local effect on the price of hay. The farmers buying the water rights tended to be in higher value crops such as olives or grapes.

We also met a very frugal user of water, John Corboy of Corboy Fresh Fruit. John's mantra was that you should locate your business in the best geographical location for what you produce, or to put it another way, grow the crop that best suits your geographic location. John believed his apple and pear production could compete with any region in the world, with parts of South Africa being the only other place he'd like to be located.

John Corboy's mantra definitely struck a chord with me and when I related it back to potato production in Scotland I took great heart in that we have some fantastic geographical and climatic advantages over other parts of the world.

At the end of the conference my answer to the theme was a more emphatic yes, production may move from one region to another as local climates change and some area's may have to adapt more than others but I have every confidence that world agriculture has the capacity to meet societies' demand for food.

However, as we are arguably not currently meeting societies' demand for food due to political and economic reasons rather than agricultural ones, does the question really matter, as having the capacity to do something is not the same as actually doing it?

By far and away the largest benefit of the week and something that if that week was all I participated in during Nuffield it would have been worthwhile, was the interaction with the other 49 worldwide scholars, not one of whom was a potato farmer. All were interesting people, most had an opinion and most were prepared to debate the pros and cons of other scholars' viewpoints.

The 'think tank' downstairs at the back of the bus was the beating heart of the week for me, journeys were not so much fun when I wasn't quick enough to get a seat in that prized part of the bus. 10 seat roughly, 6 faced 4, but that was practically never how the debates sorted themselves out, sometimes we reached the end of debates by the time we reached our destination and sometimes they continued off the bus. The personnel changed slightly with every journey as the atmosphere was sometimes so intense that you needed a break every now and again. This change only made things more interesting as old debates could be fired back into life by new participants. The bar had its place to play in how that week progressed but the think tank at the back of the bus was where things were really sorted out!

Brussels
May 2008

I include this Nuffield organised trip to Brussels as there were some very good points that I took away from it. We heard and spoke to a variety of interesting people over the 3 day trip and it was a great first insight into how the wheels of bureaucracy turn, and to understand the direction that the people in Brussels are travelling in.

We were hosted partly by the British Agricultural Bureau (BAB) which is simply our Brussels NFU office. So impressed by their work and also overawed at the task they face against any number of anti-farming lobby groups that the first thing I did on my return home was sign up as a new NFUS member, a subscription which had been allowed to lapse on our farm quite deliberately over the previous decades.

I saw BAB and their Europe wide parent COPA COGECA as being the solitary voice in Brussels that is standing up for grass roots farmers and trying to shape legislation long before we even hear that it is on its way.

All of the views we heard were interesting and some were almost alarming.

Greg Williamson from the Australian Mission to the EU saw farmers worldwide as having a very short window in which to get there house in order before serious pain hits the industry with much higher input costs and relatively lower output prices.

During our session on the CAP reform process Mark Cropper's (Director General for Agricultural Rural Development) view was that if you take away subsidy tomorrow, production doesn't change!

On environmental issues, Michael Hammell (Directorate General for Environment) asks how to cut nitrogen use by 50% without reducing production, and answering a question about genetic modification and its use in future European agriculture he states that GM's currently show no evidence of increased yield, reduced water use, increased health benefits or reduced fertiliser use.

I left Brussels thinking how we could future proof the farm against rising legislative burdens, reduced support mechanisms and the serious pain that Greg Williamson spoke of?

Global Focus Programme - China
Nuffield Australia
29th June to 8th July 2008

China is the prime example of increasing potato production in the developing world. Between 1991 and 2007 Chinese production has increased by 40 million tonnes and the net Global increase in that time totalled 57 million tonnes, so it is clear that the direction China is going in will have impacts across the potato world. In 1991 China produced approximately 12% of the worlds potatoes, by 2007 that figure was up to 22% of a much larger total.

The Global Focus Programme is an integral part of the Australian, New Zealand and Canadian Nuffield scholarships which reflects their agricultural industries reliance on exports. It is basically a six or seven week whistle stop tour of world agriculture, ten days of which was in China for which I joined the one Canadian, three New Zealanders and eleven Australians (including the tour guide).

My pre-conceived ideas about China could not have been more wrong, I was expecting mass poverty and very much a third world country and found nothing of the sort.

Manufacturing Industry

Firstly we had a close look at China's world renowned manufacturing industry and saw an industry in transition.

Michael Chen's story is typical of the manufacturing industry in China at the time, he runs a Tarpaulin factory in Taishan and times were hard. His inputs prices had risen by 40% year on year and he was only able to increase output prices enough to cover half the increase, so his margin was being seriously squeezed. The reasons for this were from two different directions, firstly the oil price in July 2008 hit a record high of $147.27 per barrel, and secondly the indirect government support and lack of employment legislation was changing. The company moved here from Taiwan fifteen years ago to take advantage of lower costs of production and it was now considering another move for the same reason to either Vietnam or Burma.

His plastic raw material had increased from $500/tonne to $2500/tonne over 3 years.

The average wage for an employee had risen from $40/month to $150/month over 10 years.

Labour was becoming harder to find, wages were 35% higher in Shanghai. Cost of living in Shanghai was 60% higher but that was being largely ignored.

All employees were housed on-site with their families in company accommodation. They had to improve the standard of this accommodation and build incentives such as kindergartens to attract the workforce. Employee health care was becoming part of employment legislation that it had to be provided by the employer.

The company now paid $500/acre/year in land tax for its 33 acre site, something that was relatively new.

Subsistence Farming

In direct contrast the manufacturing sector, we visited a local farming community and found farmers thriving, though still wary of high fertiliser bills.

The entire village was 160 MU (26.5 acres) in area, and with 200 people registered as living in the village the land was divided up between them to give them 0.8 MU per person. A census was conducted every ten years and the land redistributed accordingly.

One farmer we spoke to at length was in a very fortunate position. During, the last census his two children were living at home and since then, had moved away to the city for education and employment. So in the short period until the next census he effectively had double his allocation of land. 3.2 MU for the four people in his family.

Until 2004/5 he had no option but to put all his land down to rice, in order to feed his family and 'pay' the national rice tax, which involved delivering an amount of rice to a local government store. Effectively, this was like paying a rent to the government in rice.

After 2004/5 the rice tax was abolished and he only required 1.2 MU to grow rice to feed his family, freeing up 2 MU for the growing of a cash crop. He chose to grow white melons which he traded at the local market and for the first time he had an income, which over the last few years had enabled him to build a second story on his house, buy a television, DVD player, fridge freezer and telephone. This subsistence farmer was delighted with his current lot.

His input costs were rising though just like ours, fertiliser prices had gone from 90 yuan per 50kg bag of 15/15/15 in 2006 to 300 yuan per 50kg bag in 2008. (£138/t to £461/t) A very similar rise to that seen in the UK at the time.

His profit for the 2007 crop year was 10,000 yuan (£770) across the farm and his 2008 fertiliser price had risen to 2,000 yuan for the farm so even with the massive rise in fertiliser prices there was still scope for good profits. Profits which are tax free as agricultural production in China is now income tax exempt.

Closer inspection of his fertiliser usage revealed a much lower conversion rate than the equivalent Australian rice farmer with him using twice the fertiliser to get only half the yield. We put this down to greater leaching and lack of knowledge about best practice. When he was quizzed further about possibly cutting his fertiliser use and using it more efficiently he didn't really understand the concept, to him less fertiliser meant less rice.

We left the village deep in thought and debate about the Chinese subsistence farming situation. I saw them as being in an excellent situation to cope with the food price inflation of the time, even with rising input costs their output prices could more than sustain them, and they were in full control of their staple food source.

It was the city workers that I had graver reservations about, even though they had a relatively higher income than the subsistence farmer they had all of their food to buy from it and the price of food would vary a great deal more than their income did.

Food did not appear cheap with the following prices found in a city centre supermarket.
Potatoes – 1.28 yuan/0.5kg (2560yuan/t) (£200/t)

Rice – 5.2yuan/kg (5200yuan/t) (£400/t)
Flour – 6yuan/kg (6000yuan/t) (£460/t)

Three staples approximately at 20% of the price that they would be in the UK.

Large Scale Farming

Guangzhou Fengxing Dairy Co is a large scale dairy operation based in Guangzhou itself. It is fully vertically integrated and owns around 5,000 cows as well as a milk processing plant and retail stores throughout Guangzhou. They claimed to be the sole supplier of milk products to the Beijing Olympics and indeed while we were there the processing plant was unfortunately out of bounds to us as they were packaging products for the Olympics.

Milk yields here were around 5000 litres per lactation and the company and its personnel were desperate to glean as much knowledge from our party as they could as to how to improve this. We did have dairy farmers amongst us and each was offered more than a little enticement to go and work for the company for a period of time in order to pass on western knowledge.

I have learned that 5000 litres per lactation is about half of what the better yielders in the UK or New Zealand would expect, and that heat stress was the main issue in the Guangzhou region. Fans and dribble bars were very evident in the open-sided housing that we were shown round, but this was clearly not enough to sort the problem.

They had brought in cows from New Zealand and the USA and imported feed lucerne from the USA as well. They wanted to drive yields to western levels and would do what it took to get them there.

Dairy consumption per head was expected to quadruple over the next ten years.

Here is a prime example of how a Chinese agricultural business is desperate to be producing at western levels and all it really needs is a bit more knowledge and expertise to get it there. I see this attitude being widespread across large scale agricultural in China.

Pollution

Water courses in China were one of three colours, brown, where there was an amount of soil or sewage in the water, green, where pollution had caused algae blooms or in some cases the water was clear, usually in fish farms where the silt had time to settle and pollution had to be controlled.

A prime example of pollution exportation, was seen upon a visit to Tianyu Wool Industry Co Ltd. A wool cleaning, spinning and weaving company that imports wool from Australia.

Most of the machinery used on site was imported from Australia approximately twenty years ago where it was condemned due to water pollution. The same equipment has been used continuously since being brought to China.

The wool that used to be grown and cleaned in Australia now has an extra shipment to make between Australia and Europe due to its stopover in China and although the company claim

that in recent years they have tightened up the water quality standards we did not see the waste water treatment plant that appears in their glossy brochure.

Conclusions on China

China is a country that has fully embraced capitalism. It has not embraced democracy and there is little evidence to suggest that it will do so.

Perhaps surprisingly from the limited number of Chinese people that I spoke to they were quite happy not to have voting rights as they were aware that the vast percentage of their population wouldn't necessarily know enough about what they were voting for. Also it is my hunch that as long as the standard of living keeps rising for the vast majority of people and there is enough food that their diet keeps improving then the status quo in terms of government set up should survive.

The key element of this hunch is the food supply.

Hungry people are angry people.

The Chinese government have quite obviously in recent years taken subsidies and incentives away from their manufacturing sectors and given them to their agricultural sector. It is the country's clear goal to become self sufficient in its food supply and I believe that it is willing to import knowledge and expertise in the short term so that this can be achieved. I do not think that they wish to import large quantities of expensive food over the long term.

UK-China Potato Development Dialogue
Inward Mission 2-10th August 2008

During this week there was a reasonably high powered Chinese delegation of government officials, scientists and industry representatives being given a brief tour of 'Potato Britain'. The week culminated with the Potatoes in Practice event hosted by SCRI at Invergowrie and the UN International Year of the Potato Conference in Dundee at which the Chinese delegation leader, Madam Ma Shuping, Deputy Director General, Department of Crop Production, Ministry of Agriculture, PR China, was invited to speak.

This was the best insight that I got into whether there was any future opportunity for UK seed potatoes to be exported to China. At present there are protocols in place to allow export of UK produced minitubers to China but not field grown seed. Work is still being done by SASA and others to allow an agreement on the export of Field grown seed to China which is currently not allowed due to Chinese import legislation.

The delegation toured growers, packhouses and minituber producers during the week, but the one visit where there was most attention paid by the delegation was on the trip to SASA in Edinburgh from where the potato seed certification system in Scotland is run.

China currently have no seed certification system in place whatsoever and the quality of seed is one of their major issues in limiting yield, with most small farmers keeping seed year after year and seeing a deterioration in quality with each subsequent season. Large scale companies such as PepsiCo import micro-propagated plants from the USA and multiply up mini-tubers in China at a fraction of the cost of UK mini-tuber production, have three generations only of field grown potatoes before the resultant potato crop hits the factory, therefore keeping disease levels to a minimum and yields relatively high.

China have the climate and the land to produce high quality seed potatoes, in my opinion they are looking for the knowledge to put their own certification system in place and are dangling the carrot of possible seed exports from the UK so that we provide that knowledge.

The other thing they want of course is our modern high yielding varieties, without necessarily wanting to pay royalties for the use of them.

China does however want foreign investment and expertise and in return will allow profit taking. To achieve a successful business model there must be someone based in China with good knowledge and skills that the Chinese can respect and have a personal connection with.

Farming Scotland
Forward with Farming
Carnoustie
5th February 2009

Eureka!

I had travelled all around the world by this stage and still had a major tour to the World Potato Congress to come, but one of my main eureka moments would come from a conference just up the road from home at a day organised by a local firm of chartered accountants.

There were five speakers that day but two of them struck a chord with me at the time.

Maitland Mackie CBE, Chairman, Mackie's of Scotland

A long time advocate of renewable energy and in particular wind power, simply battered it into the audience for twenty minutes that we should all get into energy production in what ever form. His argument was that effectively we are eating oil at present because that is the raw material that most western food production systems are based around. As oil runs out it becomes more expensive, as price takers we will be squeezed in the middle if we have no control over energy costs. This argument was exactly in line with some views that we had heard in Brussels the previous May.

I had looked at wind energy a few years previously at home as we have a sizeable electricity bill mainly from our refrigerated potato stores. We are located in the bottom of a valley which is the best place to be from a soil point of view but alas not from a wind point of view. We simply weren't windy enough. I had preferred wind over other renewable energy forms due to not having to source any raw material which would come at a cost. Our renewable energy plans were put on the back burner but not forgotten as our electricity bill continued to grow.

Adrian Ivory, Local beef farmer and Farmers Weekly Farmer of the Year 2008

Adrian told us all of the increasing world demand for beef; that Scotland eats 150% of the beef it produces and that bull beef was worth £140/head more than steers.

We have not had livestock at home since my Grandfather passed away over twenty years ago, like most other farms in the area we had moved from being a traditional mixed farm to an out and out arable unit concentrating on the main cash crop, potatoes. We sell a large amount of stockfeed potatoes during the year and occasionally give them away for nothing. We swap straw with local livestock farmers in order to receive manure in return as our lightish sandy loams benefit hugely from it.

As I drove away from Carnoustie I formulated a plan. Start a bull beef feed lot, utilising mainly on our stockfeed potatoes and a bit of home produced grain. Use the slurry to power an anaerobic digester and gather the methane for electricity. It was one of those moments of true clarity before all the complications of actually putting the plan into place and making it viable made things a little more difficult but certainly not impossible.

Further investigation found that slurry alone would not provide anywhere near enough energy and that we would need to add in other sources of energy. Gate fee'd waste was looked at and dismissed for the short term as being to complicated in terms of legislation and crop assurance schemes. Growing a crop is now the preferred option. We're just not sure at this stage what crop.

There are still complexities to iron out before the project can be given the go ahead, but the basic principles of energy production and nutrition through livestock manure will stick with me for a very long time indeed.

World Potato Congress 2009
Christchurch, New Zealand
22-25th March 2009

The World Potato Congress is not an annual or even a regular event, but it is held loosely every three years or so. Therefore I felt very lucky that there was to be a world congress during my Nuffield scholarship and it provided an ideal opportunity to gather more viewpoints from parts of the globe that I could not reach, over 500 delegates attended from 48 different countries.

New Zealand was a fantastic venue for the congress and the potato industry there did a fantastic job at playing host to the world.

The New Zealand potato industry is relatively compact compared to the UK industry. Around half a million tonnes are grown from 10,500 hectares, claiming the largest average yield in the world of around 50 tonnes/ha. Although one grower I visited in Canterbury commented that his yield was now in slight decline, as they were no longer on virgin soil and the quality of the seed was also not as good as historically, presumably for the same reason. The industry is roughly split 12% seed, 32% fresh and 56% processing, with South Island growing mainly seed and processing with a small amount of fresh, and North Island predominantly fresh and processing potatoes. Around two thirds of production is for the home market and one third is exported, mainly to Australia, Asia and Fiji.

Feeding 9 Billion People!

The Congress opened with David Carter MP NZ telling the congress about his future confidence for the New Zealand agricultural industry due to the world population growing at a faster rate than world food production. He talked about the recipe for food shortages and demand for food doubling worldwide over the next 40 years as the population nears 9 billion people.

It seems farmers, certainly UK farmers are continually bombarded with the message of food shortages and how can we feed 9 billion people.

My view is that in the UK and the entire developed world to some extent, we need to be very wary of how we read this message. The shortages are not likely to be in the developed world, mainly because we have the money to pay for the food, but also, the shortages are not here yet and may not be here for quite some time, so in meantime our prime focus should be on profitability which does not necessarily mean more production.

The developing world will be where food shortages are felt most severely, and indeed there are already shortages, but this has more to do with poverty and politics than it does with agriculture.

Former New Zealand Prime Minister the Rt Hon Jim Bolger told us “it is not plants or the lack of land or water that has created conditions of mass starvation from the Irish famine up until today, it is politics.”

In the developed world we should not be persuaded into overproduction by those whose interests it may serve to keep food prices artificially low, as overproduction in the developed world does not cure or even help at all the starvation issues of the developing world. Our

overproduction causes us more harm than it does them good, through lower output prices for our produce.

Potato Production in the Developed World

Historically in the developed world, potatoes have been a strong feature in people's diets. This is and has been changing for some time now. As people become more affluent they want a more varied diet that includes rice and pasta as well as potatoes. Cash rich and time poor populations perceive, falsely in my opinion, the potato to more time consuming to cook compared to the other staples. A higher percentage of processing potatoes compared to fresh sales means that there is better crop utilisation, due mainly to potatoes that do not have acceptable skin finish for the fresh market still being easily acceptable for the processing market. Potatoes are also perceived as being a food for lower socio-economic groups, due to their affordability and abundance.

Populations in the developed world also tend to be stable at best and declining at worst.

For these reasons consumption in the developed world has been falling steadily.

The developed world also has very advanced agricultural systems with high yields and highly skilled farmers able to produce, with relative ease, what the market requires. This coupled with reducing demand means that it is relatively easy for the developed world to over-produce and therefore oversupply their own local markets, therefore sending the price downwards. This is by far the biggest single issue concerning the potato producer in the developed world.

Potato Production in the Developing World

Populations are growing, and in some countries extremely rapidly. An obvious consequence of this is a rise in the demand for food. These countries are also in general becoming more affluent which means the population is changing its diet, in general away from historic staples such as rice on to foods such as potatoes, which are perceived to be more westernised and therefore more desirable as affluence increases.

Governments in developing countries are also recognising the benefits of growing potatoes compared to the other staples, maize, wheat and rice.

Potatoes are not a globally traded commodity. Whereas the other staples being wheat, maize and rice are. Potatoes are perishable when fresh, making them costly to store for up to 12 months and impossible to store fresh beyond 12 months. They also have a high water content when fresh making them very costly to transport over long distances, the extremely tight storage parameters only make this issue worse. Because of these issues there is no such thing as a world potato price on a world potato market. Instead there are regionally priced markets. For example potatoes will move freely around the UK, and can be imported from mainland Europe when market conditions permit, and north Africa and the middle east on a very seasonal basis, but extremely rarely will fresh potatoes be imported from further afield.

The quality and variety of potatoes varies widely depending on the growing region so a potato variety grown in India for example may not be acceptable to the UK market whatever the quality.

For these reasons there can be great disparity in the value of potatoes across the world.

The potato crop can bring enormous economic benefits to small farmers, who can grow a crop to sell competitively at a local market without having to worry about the world price, as can be the case with other commodities. Because of this the potato crop can be used as a good local stabiliser, guarding local food supplies against global food inflation.

The Financial Times ran an article following a conference in Cuzco, Peru that read, "Potatoes seen as answer to high cereal costs" and went on to say "The conference aims to expand the role of a crop that produces more food on less land than maize, wheat or rice…."

The potato is fantastic source of dietary energy, micronutrients and protein. Dr Robyn Williams commented in his closing remarks at the WPC - "Potato soup with a bit of added milk was a perfectly balanced diet, you got vitamin A from the milk and the rest from the Potato."

Dr Kare Nielson explains the efficiency benefits of the potato crop.

In terms of calories produced per hectare using Danish yields for cereals and potatoes, and Brazilian yield for sugarcane, potatoes produce 32 Gcal/ha, compared to 20 Gcal/ha for cereals and 25 Gcal/ha for sugarcane.

The potato is a very water efficient crop, and for every cubic meter of water applied during cultivation 5600 calories (kcal) of dietary energy is produced. This compares to 3860 kcal for maize, 2300 kcal for wheat and 2000 kcal for rice.

These are just some of the reasons that developing governments are promoting a growth in potato production. China is a perfect example of this and with Chinese government backing there has been a massive increase in potato production there from 30 million tonnes in 1990 to 72 million tonnes in 2007.

Pamela Anderson, Director General CIP, tells us in her closing comments at the WPC that, "China has targeted 95 % food self sufficiency, which means that over the next decade food production will need to increase by 100,000,000 T/year, and that 50,000,000 T/year should come from potatoes alone." Put simply she tells us "We are not going to feed the world with rice, wheat and maize."

This is a phenomenal ambition considering that current Chinese production is between 70 and 80 million t/yr and total global production is around 350 million t/yr.

Agricultural systems in the developing world are not as advanced as those in the developed world. This is clearly shown by looking at the average yield of potatoes in various parts of the world.

Developed World (not including Russia/Ukraine/Poland) average yield = 27.6t/ha

Developing World average yield = 15.5 t/ha

World Average yield = 16.8 t/ha

I will point out that there are big differences even within country boundaries when it comes to yield and the issues with are yield are reasonably complex, they can also be as much to do with local climate as they are with agricultural systems.

The biggest issue concerning the developing world is that local producers cannot supply enough food to satisfy the population's demand. Potatoes are obviously part of the whole food equation.

Seed Potatoes

Potato seed quality can deteriorate rapidly over seasons, with the influx of virus and disease which can be extremely detrimental to yield. In order to maintain high yields a continual source of good quality seed must be available. In Scotland for example it is not allowed to keep seed back from a ware potato crop for any more than one season after certified seed. This is done to maintain the quality of the overall crop by not allowing virus or disease to build up.

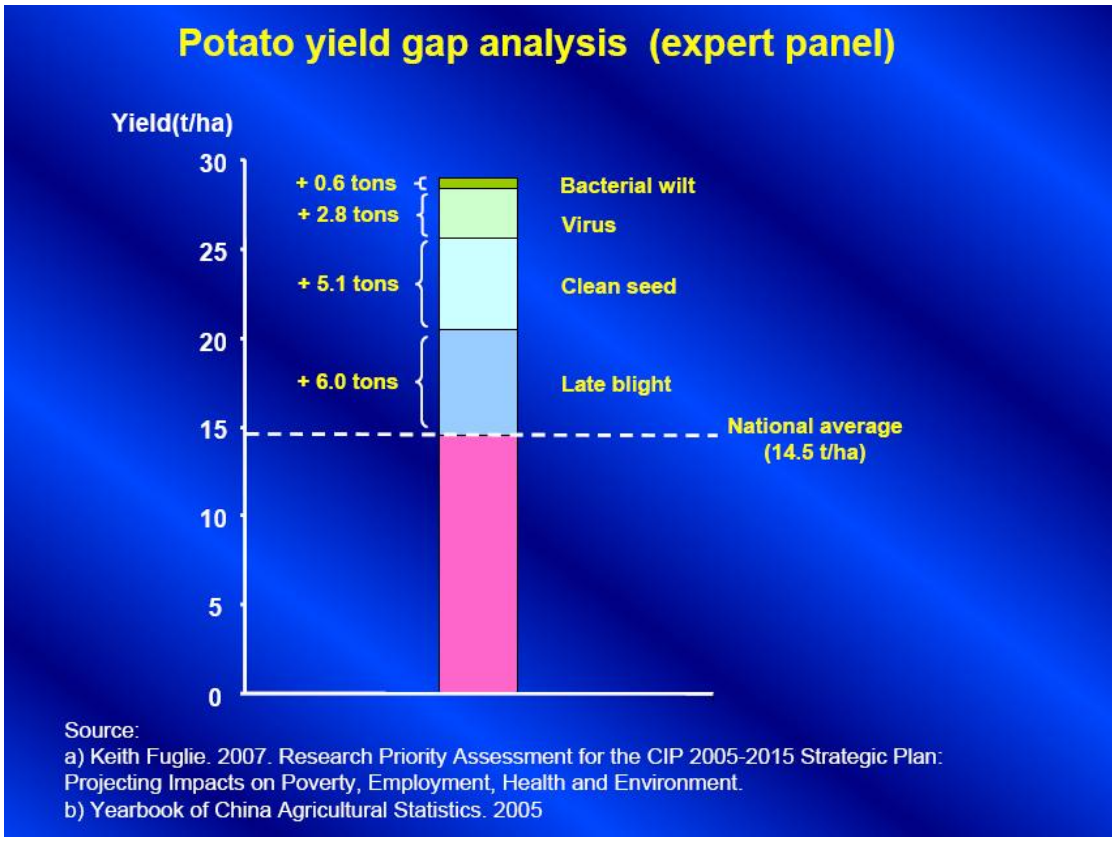
Other countries in both developed and developing worlds have more relaxed rules if any rules at all on the retention of potato seed from one season to the next.

I have already mentioned that China have looked closely at the Scottish system and recognise the importance of a seed certification system which has maximum tolerances built in for virus and disease influx.

Knowledge and climate are the two most important factors in producing seed; some countries have both and some have neither.

"Clean seed would mean a 30% productivity boost" – Pamela Anderson when talking production in Sub Saharan Africa where area grown and production is rising but the yield is falling, due in no small part to poor quality seed with Bacterial Wilt (Brown Rot)being the main seed issue.

The following graph, referring to China, is from Pamela Anderson's presentation to the 'Improving International Potato Production' Conference in Dundee, 8th August 2008.



In China clean seed is estimated to potentially add 5.1t/ha onto the average yield of 14.5t/ha, a 35% increase.

When you add to this that the virus and bacterial wilt (brown rot) issues could also be successfully tackled by higher quality seed then you can see that improved seed quality has the potential to be the biggest single factor in increasing yield.

While the UK and other developed countries have thriving export seed industries that could help some of the developing world issues the cost of this seed is in most cases too onerous.

Anecdotal evidence from Tunisian man at WPC – says that one reason that they are not eating or producing more potatoes is that the seed price is too high and that the effective food price of potatoes has been too high compared to other crops.

Tunisia is possibly not stereotypical of Africa due to its location on the Mediterranean and therefore closeness to European potato markets and their pricing.

Potato Conclusions

Q1). Why is developed world production falling as developing world production is rising?

Production is following demand.

Q2). Will these production trends continue?

Developing world production will continue to rise in the short, medium and long term following the continued rise in demand. This point is made assuming there is political and economic stability in these countries.

Developed world production is harder to call, due to the fact that demand is hard to call. My view is that the decline will level off at some stage, and indeed you could put forward an argument to say that it has levelled off already. In the future the demand will be dependent on fashionable trends and perceived health benefits as well as the ongoing price of both potatoes and substitute staples, so if we see another doubling in price of wheat and rice while potato prices stay relatively stable then demand in developed countries could actually increase.

Q3). What will be the ramifications for the UK potato industry as a result of these production trends?

Our local market is not under any great threat of mass imports. Developing world production is increasing to feed the local populations and not for export to the UK.

Our local market is most under threat from overproduction at home. This is not a new problem but the age old one. The balance here is to reduce costs of production per tonne as much as possible while maintaining them at sufficient level to maximise output quality. The best way to reduce costs of production is to increase yield.

There will be a continuing increase in demand for good quality seed worldwide. This demand for seed should grow as demand for ware and hence production of ware increases. The UK and Scotland in particular are well placed to supply part of this demand, but it won't be easy.

Some developing countries do not have the climate to produce good quality seed even if specialist knowledge is locally available.

The developing world generally does not have the money to buy relatively expensive seed, and would rather acquire the knowledge to produce the seed themselves.

China has the land and the climate to produce good quality seed. It has the cheap labour to produce min-tubers at a fraction of UK cost. All it needs is a regulated certification scheme and access to varieties and it will be self-contained.

There are trade barriers in place, sometimes under the guise of bio-security measures stopping UK origin seed imports.

Dealing with multi-national companies rather than small-scale farmers is perhaps a way round some of these problems.

Personal Conclusions

In the medium and long term find viable alternatives to ‘fossil fuel’ farming.

When looking for business expansion and growth, do so out with the potato industry.

When looking for business expansion and growth, do so within agriculture.

When looking for business expansion and growth, do so within Scotland.

Form opinions.

Get involved.

Work hard at maintaining a work/life balance, and involve your family in daily farm life.