DIAMONDJUBILEE
(Est 1947)

... celebrating
60 years of service
to agriculture

NUFFIELD REPORT

Can the Irish Dairy Industry Survive Liberalisation in 2015?

Report by:
Pat Minogue, Poulagower, Scariff, Co. Clare
June2007

Irish Co-operative Organisation Society
Award 2006

Table of Contents

Acknowledgement

I would like to thank the following:
My fellow Nuffield scholar Michael Peters and Nuffield scholars in Ireland.
A special thanks goes to John Geraghty for his time, guidance, help and support.
To Frank Hayes, Kerry Group for his courtesy to Australian and UK Nuffield scholars.

Ireland
John Tyrell, I.C.O.S
Catherine Lascurettes, I.F.A.
Seamus O'Donohue, I.C.O.S.
Hugh Friel, Kerry Group
Stan McCarthy, Kerry Group
John Grogan, Farmers Journal
Joe Rea, R.I.P., Farmers Journal
Seamus Quigley, Nuffield Scholar
Pat Quirke, Nuffield Scholar
Tom Clinton, Farmer
Eddie Hughes, Enterprise Ireland
Pat Dillon, Moorepark
Thia Hennessy, Teagasc
Billy Fingleton, Teagasc

UK
John Chapple
Officers of Oxford Farming Conference2006
Officers of the Nuffield Annual Conference
Duncan Rawson, Nuffield scholar
John Stone, Director, Nuffield, UK

USA
Denis Avery, Hudson Institute
Tom Cox, University of Madison

Other countries
Swedish Dairy Breeders Centre
Brengt Lindle, Sweden
Pol Sorensen, Danske AI Co-op
Pol Johnsen, Denmark
Assendrup Farm, Denmark
Kastel Co Op, Denmark
Preben Milkelson Cattle Breeding Federation, Denmark
Frederic De Goute, France

New Zealand
Richard Dewhurst, Lincoln University
Grant Edwards, Lincoln University
Keith Cameron, Lincoln University
Peter Gaul, Lincoln University
John De Ruiter, Lincoln University
Jim Gibbs, Lincoln University
Alan Robb, Canterbury University
Ian Reid, New Zealand Co-op Association
Steve Allen, Chairman Tatua Co-op
Mike Matthews, CEO, Tatua Co-op
Phil McKinnon, International Business Manager L.I.C.
Dave Hayle, L.I.C.
Dave Haymon, L.I.C.
Deidre Brown, L.I.C.
Suzane Betrad, L.I.C.
Dr Steve Hercourt, L.I.C.
Arthur Bryan, Farmer
Neil Bateup, Farmer
John Wilson, Fonterra Director
Locky Cameron, Fonterra Shareholders Council
Rolyn Paul, Fonterra
Ian Turner, Fonterra
Alex Duncan, Fonterra
John Monaghan, Fonterra
Brendan Atril, Fonterra
Chris Glassey, Dexcel
Samuel Dennis, Lincoln University

Germany
Tersten Hemme

Brussels
Sean O'Neachtain, MEP
Simon Coveney, MEP
Michael Treacy, IFA Office
Michael Hamell, EU Commission

Those people who facilitated my participation at different conferences in Ireland.

Disclaimer

The contents of this study are the result of research, personal interviews and observations made by the author while conducting the Nuffield Study in 2005 and 2006.

The contents do not necessarily reflect the views of the Nuffield Farming Scholarships Trust or those of the sponsors of the scheme.

1 Executive Summary

"Failure to anticipate and lead change can sow the seeds of revolution over which we have no control"

John F. Kennedy, 1960[1].

Can the Irish Dairy Farmer survive liberalisation of the dairy industry?

Liberalisation of the dairy industry means free movement of dairy products throughout the world, without subsidisation and with the elimination of tariffs on products when imported. The purpose of this study is to attempt to analyse the prospects for the Irish dairy industry competing in a world where export refunds and subsidies, based on production, will no longer form a significant part of the income of the Irish dairy farmer. The United Kingdom, France, Belgium, Denmark, Sweden, Estonia, USA and New Zealand were visited to gather relevant information over the past two years.

The value of the industry in future years will be conditioned by a number of emerging factors. World population will likely be at least double by 2050. Reducing oil supplies and the increasing cost of energy, growing demand on resources such as water and the effect of increased production of food on the environment will have a major impact on the type of industry which emerges in the longer term, these developments will impact on the lives of most dairy farmers.

In analysing the industry, focus was placed on:

1. Comparisons of farms - how farmers operate their businesses, in addition to the advantages and disadvantages at farm level, in a number of different countries.
2. Impact of WTO on the dairy industry, including a review of the issues surrounding these negotiations.
3. Impact of other issues - how currency, the environment and the increasing cost of oil will affect food markets.
4. The future of the farm and processing industries with an emphasis on where the future lies for the Irish dairy sector.

Findings were based on information gained from interviewing farmers, milk processors, grassland and animal researchers and policy commentators, together with the study of published reports.

The dairy industry operates differently in the three continents visited, with varying emphasis in levels of production, protection of the environment, Government policy, social policy, outlook on W.T.O. discussions and different regulatory and economic conditions. No one continent provided all the answers but many are operating and promoting their views to give their respective local industries an advantage in world markets.

1.1 Background

The Irish dairy industry has evolved from being a cottage industry in the last century, which provided each farm with food for the family with surplus milk, to leading to the establishment of local creameries. During the last forty years, the Irish dairy industry has built up a

[1] John F. Kennedy, Former US President

reputation for quality food production with the establishment of the Kerry Gold brand becoming a household name throughout Europe, especially in Germany.

Today, three companies in Ireland process eighty per cent of the milk produced and the sector has become one of Ireland's most important indigenous industries with approximately 23,000 dairy farmers. In 2001, it had a turnover of €2.5 billion and has 9,000 employees in processing related activities. Only ten per cent of produce is consumed locally in the form of liquid milk while eighty-five per cent of the dairy produce of the country is exported throughout the world in the form of butter, cheese, casein and powder. In mid July 2005, the price received by Irish farmers for dairy products was subject to EU export subsidies and may be broken down as follows:

Product	**% Subsidy**
Butter	36.5
Skim milk powder	6.5
Whole milk powder	24
Casein	2
Cheddar Outside of Europe & the US	19

It is obvious that the removal of these export subsidies would have a dramatic impact on the incomes of Irish dairy farmers were product prices to remain static.

1.2 Comparison of Farms

In assessing farm structure in the different countries visited a number of issues were investigated including farm size, farm equity, land and labour costs, breeding and genetics and finally milk price. When talking with farmers viability was assessed from figures provided and these data were then compared with research carried out by researchers based in different countries and linked to the International Farm Comparisons Network[2]. The dairy industry in Denmark, Sweden, France and California has many similar attributes. In these countries calves are reared and cows fed indoors for the vast majority of their life span whereas in Ireland and New Zealand dairy production is predominantly grass based. An interesting aspect to dairying in New Zealand is that farmers must purchase shares in their co-operative when they start or increase production.

1.3 Impact of the WTO on the Dairy Industry

The World Trade Organisation (WTO) plays an ever important role in the livelihoods of farmers with increasing emphasis in eliminating tariffs on trade. The agricultural talks focus on three main areas: market access, export competition and domestic supports which are dependent on the reform of agricultural policies within member countries. The main negotiating blocks in the WTO are the European Union, the G20[3], the Cairns Group[4] and the USA. For European and Irish farmers the Common Agricultural Policy (CAP) mid term

[2] based in Germany and led by Dr Torsten Hemme

[3] The G20 are lead by Brazil and India and include Mexico, South American countries and a number of Asian countries.

[4] The Cairns Group are lead by Australia, New Zealand and other countries in the general Pacific region.

review in 2003 was focused on enabling the EU reach a WTO agreement. Over the past three years reforms have led to lower support prices for dairy produce and less subsidisation of exports of dairy commodities[5]. In December 2005 Trade Ministers from 149 WTO member countries agreed to a declaration that plans for an end to export subsidies with an associated time table, which if adhered to, will mean increased liberalisation of markets and reduced trade distorting policies. The G20 group of countries led by Brazil are demanding a fifty four percent reduction in tariffs while representatives from the USA are currently offering few, if any, trade concessions.

There are a number of legitimate concerns about the WTO and its future impact in achieving equitable and fair trading agreements in a number of areas:

(a) environment
(b) health and safety regulations
(c) currency
(d) employment standards

These concerns are reflected by official comments made by Peter Balas EU Deputy Director General of Trade when updating European members of parliament on WTO developments;
"I do not think it is the task of the WTO to say to Brazil or India what they should do on the environment. They are sovereign countries and can refuse to listen to us."
And many members did indeed refuse to listen and negotiate. After five years of trade liberalisation talks negotiations were postponed indefinitely on 24th July, 2006 as differences over farm aid policy could not be agreed on. Although discussions commenced following mid-term elections in the USA and it is unlikely that a final agreement will be reached by the end of 2007.

1.4 Impact of Other Issues

Energy Costs

The increasing cost of energy cannot be underestimated. The likelihood is that an ever increasing amount of farm land will be used in growing crops suitable for bio fuel production in the US. It is reported that thirty-nine new ethanol plans will be completed by July 2007 in the US[6] producing an extra 1.4 billion gallons of ethanol a year. Analysts predict ethanol output could reach 8 billion gallons a year. Driven by US Government tax concessions the bio fuel industry aims to replace the 1.6 million barrels of oil imported daily from the Persian Gulf. The amount of farm land and grain product being consumed for the production of ethanol has alarmed some food companies with Warren R Staley (Cargill Group CEO) stating that "unless we have huge increases in the level of productivity we will have a huge problem with food production". From 2007 onwards increased competition between the livestock and bio fuel industries will lead to higher grain prices. There will be resultant cost pressure on intensive ration based dairy systems. This will provide opportunities for grass based production to compete economically and Ireland is well placed to compete internationally if the necessary steps are taken now to plan and grow our dairy industry for the future.

[5] 39 per cent reduction in tariffs
[6] New York Times, June 2006

Currency

With relation to currency fluctuations many distortions take place. Production costs of grain in Argentina following the devaluation of the Argentine Peso have dropped from $114/Ha (2000) to $84/Ha (2005). The budget and trade deficits of the United States, associated with policies of the US Federal Reserve have caused a drop in the value of the US dollar affecting Irish exports of casein and other dairy products. Irish Dairy Board figures show that when the Dollar to Euro currency rate went from $1.16 to $1.26/Euro, product prices dropped by 8.5 per cent. China and the USA engage in trade agreements where the US dollar is tied to the Chinese Yuan while there is ongoing fluctuation between the Dollar and the Euro.

Global Opportunities for Food Production

Global food demand will at least double and is likely to triple over the next 50 years. The global population is increasing rapidly and affluence is growing especially in Asia. The present population of China is approximately 1.3 billion people. Chinese food imports have grown from 10.5 billion in 2002 to 25.9 billion in 2004. The resultant change in diet taking place indicates that there is huge potential for growth in dairy food consumption. Annual dairy product consumption in China has risen from 5 kg per person ten years ago to 13 kg per person today[7]. China will present the Irish dairy industry with substantial export opportunities in the future. Elsewhere Kerry Gold butter, for example, has recently begun to penetrate the lucrative Californian food market despite being subject to tariffs. It is much sought after by the middle to upper income consumer.

1.5 The Future of Dairy Farm and Processing Industries

The dairy processing industry in Ireland, despite rationalisation, is still fragmented with up to eleven different companies processing milk. The majority convert milk into commodity products such as cheese, butter and milk powder. A limited number have made in-roads into function foods and protein markets most notably the Kerry Group[8]. Many of the leading infant nutrition companies in the world are now based in Ireland e.g. Wyeth Medica Ireland and Abbott Ireland. These companies now export food products worldwide while research conducted by the research companies in conjunction with Teagasc Moorepark suggest that milk by-products contain many health attributes particular to grass based production. A coordinated and focused approach in developing value added milk products aimed at foreign markets would yield dividends.

[7] The typical American consumes approximately 100 kg of dairy product annually.

[8] Fonterra in New Zealand and Arla in Denmark and Sweden are major international players

2 Conclusions

A number of conclusions may be drawn:

1. Irish dairy farmers have a greater equity base than our competitors which will enable them to grow their farm business when liberalisation takes place.
2. Irish dairy farmers have a greater portion of land available for increased production. On average thirty seven percent of dairy farmers land is devoted to other enterprises.
3. Replacement rates are lower.
4. Compared to New Zealand our grass based industry is not as cost effective because of excessive environmental controls.
5. Population growth and increasing affluence is giving rise to increased demand for dairy products.
6. Product price is on an upward curve.
7. Increased demand for use of land from bio fuel industry will increase the cost for grain based dairy production.
8. The ECO-N concept being researched at Lincoln University, New Zealand offers economic and environmental benefits to New Zealand farmers.
9. Ireland's unique situation in Europe in relation to soil, climate, land use and farming systems contributes to lower nutrient losses.
10. The dairy processing industry is fragmented and under capitalised.
11. Debate is necessary regarding the once-off house building taking place in rural Ireland. What impact will this development have on future development of dairy farming? Will the community be willing to live with the odours and the inconvenience from dairy farming? In the US very few houses are allowed to be built outside of what is known as 'groupings' or 'small clusters'. This is also the case in New Zealand and in Germany and to a lesser extent in Scotland. The impact of scattered urbanisation in Ireland was highlighted by the Environmental Production Agency (EPA) when it stated in the Farmers Journal during 2004 that the highest level of phosphates is ground water are to be found in waters close to the centre of high populations.
12. The Irish dairy industry and dairy farmers have the ability to survive post liberalisation provided that the recommendations outlined are implemented.

Denis Brosnan[9], former CEO of Kerry Group once said eighty percent of the future is known, the other twenty percent can be determined by how we interpret the eighty percent.

[9] Denis Brosnan, former CEO of Kerry Group

3 Recommendations

For Irish Farmers to survive it is necessary for the following to take place:

1. Efficient one man operations aiming towards a minimum of 80 to 100,000 gallons by 2010 as outlined by Professor G. Boyle in a paper "Competitiveness of the Irish dairy industry".
2. Government proactive initiatives to ensure that dairy farmers have access to sufficient land around their parlour. Dairy farmers must be allowed capital gains tax relief when they sell outlying holdings to buy land adjacent to their milking parlour. Investors in the past have been given tax relief when investing in hotels, car parks etc. - why would it not be possible to make this tax relief available to Irish farmers investing in an industry which is now in the same perilous state as many other sectors were ten years ago?
3. Abolish quotas by 2010.
4. Breed cows suitable for milk production under Irish conditions.
5. Co-ordinated investment in research between all participants in the Irish dairy industry needs increased funding with duplication between Co-ops eradicated with particular focus on the attributes that the inclusion of dairy ingredients can play in health and medical care.
6. If forced to compete in a liberalised market, WTO must take account of environmental conditions, labour laws, minimum wage levels, equalisation of health and animal welfare conditions e.g. the use of the BST hormone in the US.
7. Establishment of three Co-op federations with Irish Dairy Board participation in an effort to streamline efficiencies.
8. Research in New Zealand and Sweden needs to be integrated into Johnstown Castle and Moorepark Research Stations e.g. ECO-N and genetics LIC.
9. In future research in the processing industry must be increased and focused on a number of products and their use in the food chain. Major difficulties lie in marketing branded products and considerable investment in terms of financial resources is required. We should focus on our known strengths and invest accordingly.
10. Irish Co-op's need to examine the fair share value system as operates in New Zealand with a view to maximising returns to dairy farmers. In Ireland, when farmers cease activities with their Co-ops their initial share investment is still calculated at its original value. A system needs to be put in place where retiring farmers can access the value of the business through their shareholding.

4 Overview of Countries Visited

New Zealand

New Zealand offers a different perspective of dairy farming in comparison to the USA, with a grass based system being the basis of their industry. It is a low cost system geared towards expansion at farm level with a number of farmers owning two and three herds of 400 cows upwards on different sites.

Farmers I spoke with see 300 cows as the minimum number necessary to survive in the future. They feel this number will give them the necessary scale and turnover to finance land purchase and other capital costs associated with growing a farm business.

It is not uncommon for younger farmers to buy a farm with one hundred percent borrowings, having earlier built up personal wealth through being a share milker on another dairy farm. Indeed, I met with one 27 year old Fonterra manager who represented Fonterra in China helping to establish a joint venture with a Chinese Co-op, he intended giving up his job, buying a dairy farm and milking 700 cows, mainly financed through borrowings. Because their capital value of holdings in New Zealand has increased annually, farmers feel that while their assets grow they can justify this level of borrowing but some farmers feel that this scenario can only last for a number of years before the bubble bursts.

New Zealand farmers are adamant that cows must be bred for the conditions in which they operate. For this reason, they are breeding a smaller type of cow suitable for their grass-based system and winter forage feeding routine. Farmers are very cost focused with some of their practices bordering on what is referred to, in 'European terms', as cruelty to animals.

I witnessed cows standing in standoff pads in a half metre of manure with the rain and snow falling on their backs, getting 4 to 5 hours grazing each day in the winter time, before being removed to these wintering pads. This type of grazing has led to an increasing level of nitrates in ground water and is also contributing to soil erosion. Indeed, I saw two fields of kale feeding up to 200 cows where the ground conditions were leading to extreme levels of poaching.

The photograph below shows in-calf heifers and cows grazing kale. This is representative of the situation on a large number of farms which I visited, especially in the South Island of New Zealand. In order to make lying down conditions for animals more comfortable, in some situations the farmers heap mounds of clay one metre off the ground and 10 metres in diameter so that the animals can have reasonably dry lying conditions. This process is known locally as "humping".

New Zealand

Animals grazing kale in poor ground conditions. There is a probability of leaching of nutrients and obvious poor animal welfare conditions

Many feel that this system is unsustainable, both from an environmental and animal welfare viewpoint. Because of this, research on different systems continues to take place.

With this in mind and with a view to overcoming these problems, I visited the Lincoln University where I spent 3 days talking to many different researchers. Here, I came upon a concept which was being researched and marketed at the University farm in conjunction with a fertilizer company called Ravensdown. This concept is called ECO-N. The research at Lincoln University has been led by Dr Keith Cameron.

The aim of this research is to develop a means by which nitrogen is retained in the soil when soil temperature does not allow for the take up of nitrogen in the plant i.e. grass, thereby preventing leaching of nitrogen into the ground water systems. Further examples of research being carried out in New Zealand are evident at L.I.C., Livestock Improvement Company. While at L.I.C., I spoke with the Chief geneticist, Dr Steve Harcourt, Biotechnology Programme Manager. Dr Harcourt anticipates that within 3 years, L.I.C. will be able to mark the gene vital to increasing protein in cows by means of a blood test in young bulls at 7 to 14 days of age. If this process is successful, it will no longer be necessary to keep herds of bulls for protein proofing until their offspring are milk-recorded thereby reducing costs for AI, etc.

If this can be successfully adapted to achieve better fat testing, fertility testing and other traits, a major breakthrough will have been accomplished by reducing costs to farmers and achieving greater productivity.

New Zealand farmers are open to selling their farms and retiring. This helps to free up land. Land mobility is much more prominent in New Zealand and this is helped by Government taxation policy. No stamp duty or capital gains tax applies to farmers when they sell their land. This means that a farmer can sell his farm in order to purchase a bigger farm without having to pay capital gains tax, compared with Ireland where the opposite applies. This is having a negative impact on efforts by Irish farmers to have all of their land within one boundary fence. Fragmentation is not an issue in New Zealand.

The emergence of Fonterra has rationalised the milk processing industry in New Zealand, with the majority of milk being supplied to Fonterra, although a number of smaller Co-op's have focused on niche products e.g. Tatua Co-op exporting mainly to Japan. With the stagnation of growth in milk production, strains are appearing at Fonterra due to farmers having to buy shares in Fonterra when they milk production or increase their operation. This has become so problematic to new entrants in dairying that in 2006, Fonterra facilitated the emergence of the dairy equity share which is bought by investors. This means that farmers can sell their shares associated with milk production, but the down side to this is that their milk payments no longer contain any dividends associated with the consumer or overseas divisions of Fonterra.

USA

Dairy farming in the USA operates differently to dairy farming in New Zealand. Here, cows are fed indoors throughout their lifetime with few cows surviving beyond third lactation. Yields are in the region of 10,000 litres with herds of 2,000 cows on single sites not uncommon. Cows are milked 3 times daily and are fed a diet of maize, grain and by-products of the grain and horticulture industries. Labour is cheap, especially in California, because of its proximity to Mexico.

Dairy farmers can move their operations from one location to another. Some Californian farmers are now moving to Texas because of water shortages. Farms of this scale operate on tight margins with increased levels of production continually necessary to help meet rising overheads.

The use of the BST hormone to increase milk production is very prominent although its future is in doubt because of the decision by the Starbucks Coffee chain to discontinue using dairy

products associated with the BST hormone in their coffee chains. This is likely to reduce milk supply in the short term.

Farm owners often live away from their farms, returning only to discuss farm performance with the farm managers employed. Lack of a continual supply of water is emerging as a critical issue in terms of cost and supply in California, with population growth putting increased demands on water resources. Farmers often change Co-ops and can do so freely because of the scale of their operation. The industry is totally dependent on scale and acceptance of the health and environmental conditions in which they operate.

In other sections of the report, the American dairy industry will be further analysed.

Denmark and Sweden

Denmark and Sweden are similar, in many ways, to the United States, with environmental regulations playing a leading role. Cows are mainly fed indoors throughout the year on a diet of maize silage and grain by-products. Farms visited showed high levels of automation with robotic milking machines becoming more prominent.

Denmark

Robotic milking machine – 220 cow herd. Four robotic machines doing the milking. Annual maintenance for 4 robots totals €25,000.

Such are the health regulations in Denmark that farmers must employ a veterinary surgeon to treat cows for mastitis on the first occasion as well as at the drying off period. Cows are dried off in sheds with straw bedding. When a vet treats an animal in Denmark he must sign a form on the farm and have this inserted onto a National database. This allows for total transparency and it is illegal for a farmer to buy antibiotics as they must only be administered by a veterinary surgeon.

Sweden has not filled its national milk quota for a number of years and doesn't envisage doing so in the future. Because of its long winter, production costs are excessive and only the most efficiently-run farms will survive. In order to do so, they are breeding cows suitable to their environment and their research stations are breeding cows that will be resistant to mastitis.

The genetic research programme is run by Brengt Lindhe who is regarded as one of the foremost geneticists in the world on dairy breeding. He is currently focusing on improving the health status of the Swedish Red cow -their combination of fat and protein gives a high level of kilograms of milk solids per cow and the hope is that, in time, they will establish a niche market in Europe for their product.

Sweden

Swedish red cows and in-calf heifers.

In Denmark, if farmers retire from farming and sell their farms, they must pay a sixty percent capital gains tax as well as a land tax, equivalent to 80 Euro a ha annually. This is offset against taxable income. This is representative of the high level of taxation which applies in many European countries in comparison to Ireland.

Other Countries

I have also visited France and the UK. The industries contain many aspects which are similar to their European counterparts. The UK farmer is largely dependent on the liquid supply to the multiples and has suffered accordingly, with some Co-ops having gone out of business. The UK farmers appear to lack a centrally coordinated approach which would give them a more sustainable industry.

5 Comparison of Dairy Farms

In assessing farm structure in the different countries visited, a number of issues were studied. These issues were farm size, farm equity, land and labour costs, breeding and genetics and milk price. Following discussions with farmer, viability was assessed from figures provided and this data was then compared with research carried out by researchers based in different countries, linked to the International Farm Comparisons Network[10].

The dairy industry in Denmark, Sweden, France and California has many similar attributes. In these countries, calves are reared and cows fed indoors for the vast majority of their life span whereas in Ireland and New Zealand, dairy production is predominantly grass based.
An interesting aspect to dairying in New Zealand is that farmers must purchase shares in their co-operative when they start or increase milk production.

In my tour of New Zealand farms of different sizes were visited. Cow numbers of 300 to 400 per farm were very common. In the US herd sizes of 1,000 to 1,500 were quite frequent especially in California and parts of Wisconsin. In Europe, 80 to 200 cow herds were most frequent.

Population growth will put huge demand on world resources over the next few decades. World population is predicted to double or triple over the next 50 years with the greatest increase taking place in Asia, South America, Eastern Europe and China. Resources such as water will be under pressure as well as food.

At the Oxford Farm Conference 2006, Denis Avery[11] said that a lot of the fertile land of the world is now in production. Such is the scarcity of fertile land that in South America huge tracks of land have been reclaimed in the Amazon river bases. In New Zealand, forests have been reclaimed for dairying, forcing the New Zealand Government to impose a tax of ten thousand New Zealand Dollars on land which has been taken out of forestry. Figures show how much the population has increased in some countries over the last twenty five years.
As Asian countries, plus China, become more affluent, their demand for Western type consumer goods becomes apparent with the growth in consumption of dairy products such as cheese, as well as bread and meat.

Fonterra forecasts show that New Zealand will be unable to meet the dairy needs of these countries resulting in Fonterra establishing joint ventures within these new emerging markets.
The result of this will mean less competition for excess European production. New Zealand presently accounts for approximately fifty percent of dairy products traded in the world market, with Europe commanding twenty percent to twenty five percent. Only seven percent of total production is openly traded. It is conceivable that dairy products at current supply level will become limited in the world scene leaving two options; (1) increased production or (2) price increase. Price increase appears inevitable but in the longer term, this is likely to lead to increased production, especially in countries such as Chile, where climate is very favourable for grass based production.

---

[10] based in Germany and led by Dr Torsten Hemme

[11] Denis Avery, Director of Research and Education at the Hudson Institute Centre for Global Food Issues, Washington

In comparing statistics countrywide, I linked up with the International Farm Comparison Network based in Germany and used some of their data. The statistics compared are as follows:

1. Capital Structure
2. Average farm size land costs including land rents
3. Labour rates
4. Direct payments
5. Share of direct payments on total dairy returns
6. Yield per cow

Figure 1.1 below is the model on which the above figures were arrived at and they outline the following statistics:

- percentage of land used for dairy enterprise
- milk yield per cow (kg)
- replacement rate percentage
- labour on the farm

Description	Ireland (IE)		Denmark (DK)		Netherlands (NL)		USA. - Wisconsin (WI)		New Zealand (NZ)	
Farm Size - per cow	47	93	90	150	51	90	135	700	239	447
Total hectares	34	71	91	117	32	45	259	486	104	245
% of land used for dairy enterprise	63%	81%	67%	95%	100%	100%	100%	100%	99%	100%
Milk yield (kg)	6308	5078	8086	7445	8452	8824	10006	9587	4174	4203
Supply per farm litres										
% replacement rate	30%	23%	44%	44%	34%	31%	40%	37%	20%	22%
Labour on farm - family	95%	61%	75%	67%	100%	100%	45%	14%	67%	35%
Labour on farm - other	5%	39%	25%	33%			55%	86%	33%	65%

Figure 1.1 A description of the typical dairy farms analysed (1)**.** the average smaller farm in each country; (2). the average of the larger farm in each country)

NB: to calculate the number of liquid litres, divide milk kgs by 1.0297

5.1 Capital Structure

	Ireland (IE)		Denmark (DK)		Netherlands (NL)		USA - Wisconsin (WI)		New Zealand (NZ)	
Farm Size - per cow	47	93	90	150	51	90	135	700	239	447
Equity12	95%	93%	48%	38 %	82%	80%	75%	61%	63%	45%
Liability13	5%	7%	52%	62 %	18%	20%	25%	39%	37%	55%

Figure 1.2 IFCN Dairy Report 2003

[12] Total assets – book value for machinery and buildings, market value for life stock, land and quota.

[13] Total liabilities at year end excluding leasing loans and operating loans i.e. overdrafts.

The figures compare farms of different sizes in the different countries. The level of liability on Irish farms as a percentage of net assets, is very favourable, giving potential for expansion should liberalisation take place. The high figures of liability in Denmark and the Netherlands reflect the price of quota and the price of agricultural land, especially in the Netherlands. The level of liability in New Zealand is mainly associated with farm expansion - either the extension of land base or increased cows - and debt associated with the purchase of shares in Fonterra.

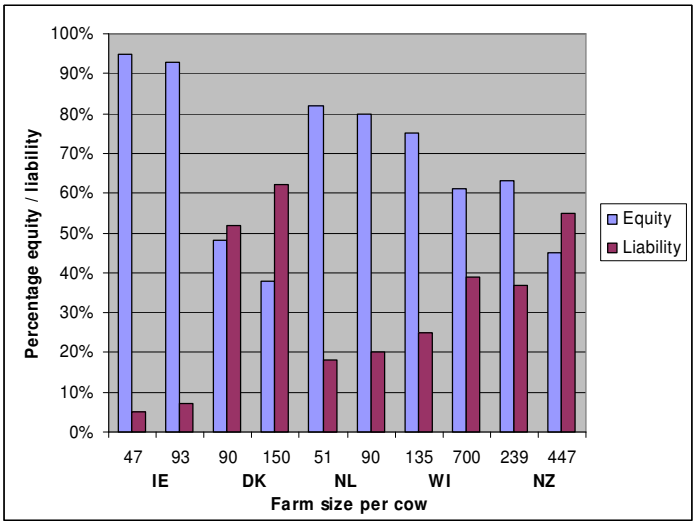

Figure 1.3 The average level of liability on different sized farms in Ireland, Holland, Denmark, New Zealand, Wisconsin

Figure 1.3 shows the average level of liability on different sized farms in Ireland, Holland, Denmark, New Zealand, USA, France and Germany. In assessing the reasons it is necessary to show some of the rationale for the differences:

1. the production systems require different capital input
2. the growth of liability under quota requires additional investments
3. farm history and land ownership

Farmers who historically owned land or inherited land have lower debt levels. However, in Denmark the farm inheritance system means that the farm is traded each generation. In New Zealand, where farmers grow by purchasing land, debt levels are relatively high. Farmers who grow by renting land and only financing investment in livestock, machinery etc. have low debt levels.

Figures 1.2 and 1.3 show that New Zealand farms have the greater liabilities. This is due to the increasing expansion of the dairy industry, creating huge demand for land and livestock. The New Zealand farmers need to continually grow because of their exposure to the variances of world market prices and currency fluctuation with the New Zealand Dollar, due to the weakness of the US Dollar.

Issues driving the cost of land in Denmark and the Netherlands include environmental issues, limited stocking rate and limited manure application rate in some countries.

Land prices are highest in the Netherlands due to limited availability.

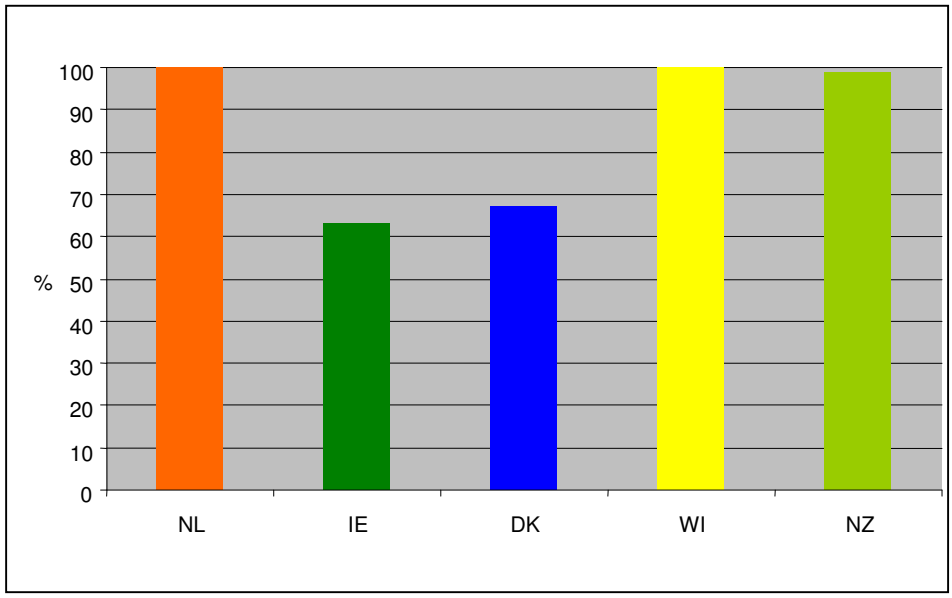

Figure 1.4 Percentage of land used for dairying on smaller farms
This graph for Ireland shows the amount of extra land available for increased dairy production. Approximately sixty percent of the average smaller farm is presently utilised for dairying.

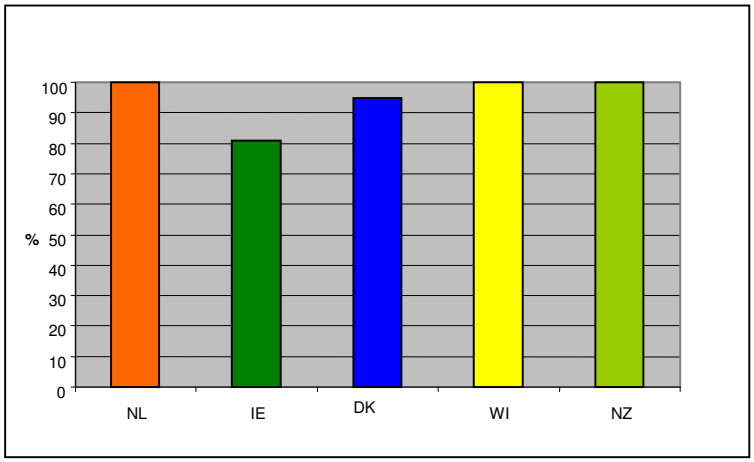

Figure 1.5 Percentage of land used for dairying on larger farms. This graph shows that as herd size increases a greater amount of land per farm is taking up with dairying.

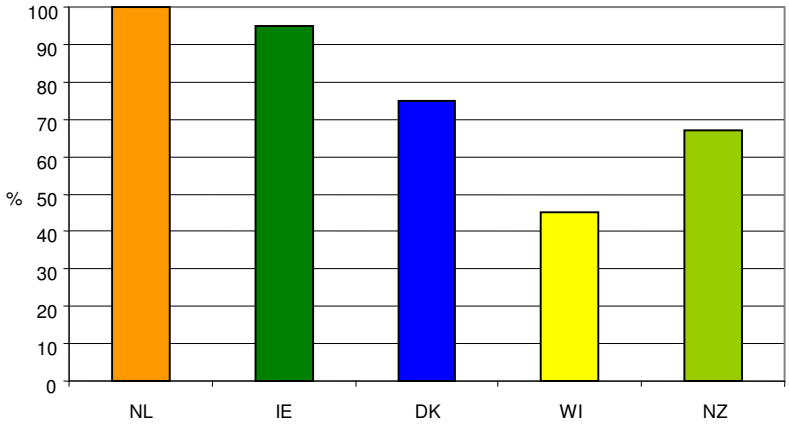

Figure 1.6 Percentage of family labour on smaller farms. This graph shows the amount of family labour running the average dairy farm in each country

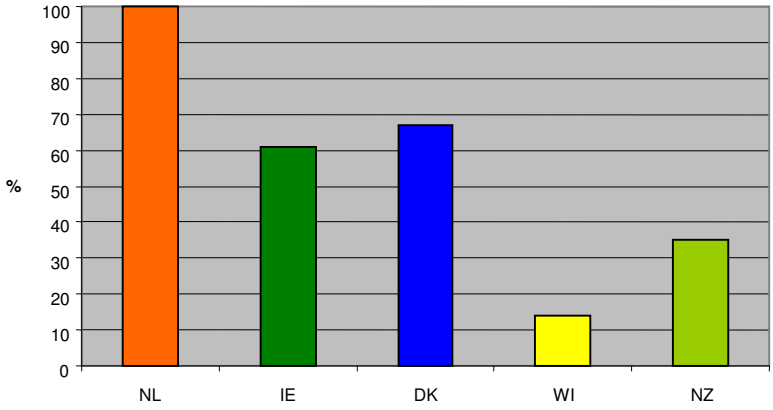

Figure 1.7 Percentage of family labour on larger farms. This graph illustrates that as herd size increases the impact of family labour on the dairy operation decreases.

5.2 Milk Prices/Milk Yields 2006

Milk prices paid to farmers tend to reflect production mix. In the EU, the price support systems (government storage of milk powder and butter at a fixed price i.e. intervention) tends to lead to similar prices. Product mix is discussed in greater detail under Processing and Markets.

New Zealand dairy farmers' milk price is a reflection of world market prices, as no price support applies in New Zealand. Most of the milk is exported as commodities. USA liquid milk plays a role in the milk price as a lot of product is consumed internally.

NL	IE	DK	WI	NZ
28	24	28	27	19

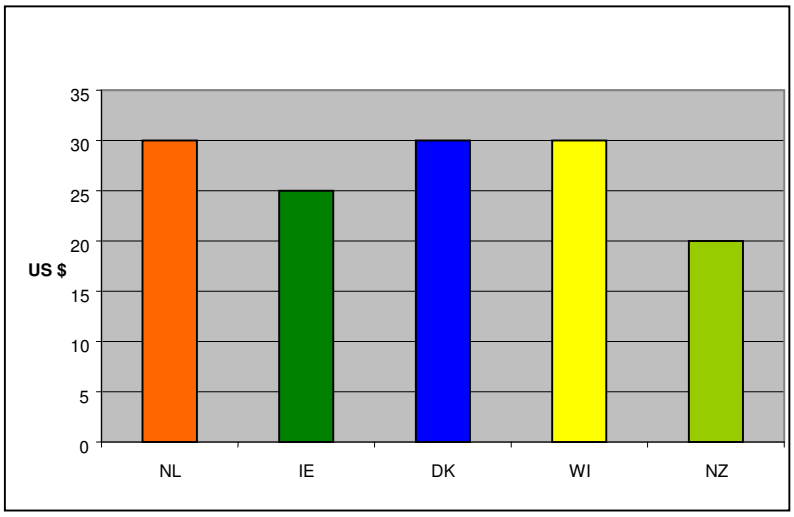

Figure 1.8 US dollars per 100 kgs ECM divided by 1.0296
NB: ECM – Energy Corrected Milk (4% fat, 3.3% protein)

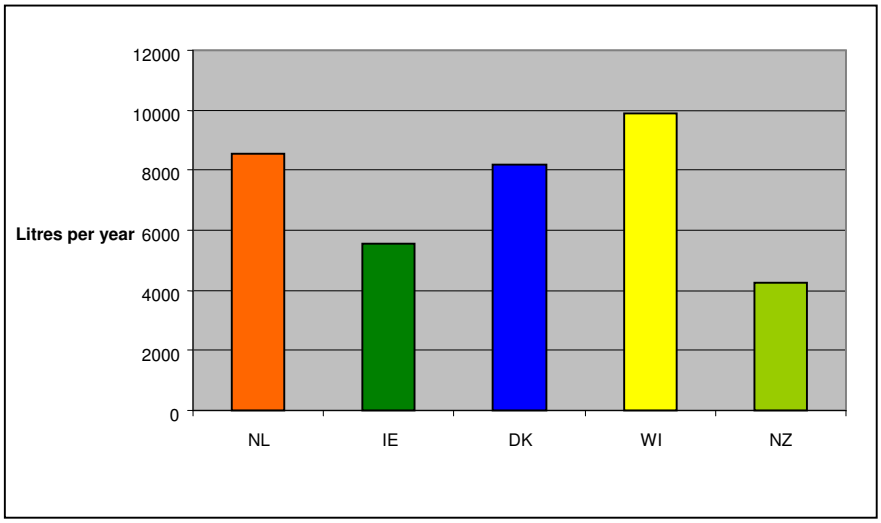

Figure 1.9 Average milk yield per cow

The milk yield per cow varies within and between countries. High yields can be found in the Netherlands, Denmark and the USA based on high inputs of grain and zero grazing. Because of the climatic conditions, cows in Denmark are housed for a minimum of six months. In the Netherlands, it is not uncommon for cows to be housed for the majority of their lifetime.

The use of maize silage has a significant impact on yields and margins. The direct payments on maize silage works out at €408 per ha (with a reference yield of 6.8 tonnes per ha). This is not applicable to Ireland, New Zealand or the USA. This payment will be decoupled in the future and if costs V price contracts, some farmers in the Netherlands and Denmark may sell

quotas and keep decoupled payments. Also, Dutch and Danish farmers will have a higher milk decoupled payment per ha because of higher yields in comparison to Irish farmers.

In the USA, there is extensive use of the hormone bovine somatrotropin (BST) in milk production. This hormone significantly increases the yield per cow. The use of hormones is not permitted in the EU.

Internally within countries, variances can be found. For example, in Ireland there is an ability for grass-based dairy farmers in the southern region to make use of excellent growing conditions by allowing their cows to avail of early grass in the months of January and February. This is in contrast with farmers in the northern region, where the climatic conditions are much more difficult, resulting in later turn-out dates. High milk yields are dependent on high inputs. The high yielding cows would be unable to perform in a solely grass-based system. The Dutch and the Danes, because of land shortage and six months growing season respectively, will always have to operate in a high-input system. Should there be a situation of lower milk price returns, as envisaged by the Fischler Mid Term Review, they will depend on increasing yields to try and meet rising costs. Commodity prices are increasing for products such as grain, steel and fuel and this will lead to higher input costs which are unlikely to be compensated for in milk price over a longer period.

Irish dairy farmers have on average much smaller levels of production than our competitors. In order to compete post liberalisation production will have to increase. Professor G. Boyle[14] outlined an approach which is probably best suited for Irish conditions. He suggested that the creation of single labour unit, efficient farms with a production capacity of 80 to 100,000 gallons is probably best suited to Irish conditions in the medium term. But as time evolves further growth in production will be required.

Average replacement rate

NL	IE	DK	WI	NZ
34	25	44	40	20

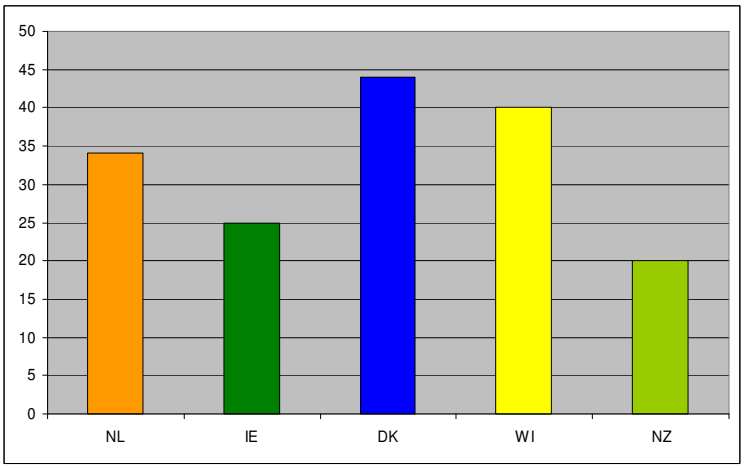

Figure 1.10 Herd replacement rate percentages

An interesting statistic in high input, high production systems is the high replacement rate found in farms.

[14] Professor G. Boyle, National University of Ireland, Maynooth, Co. Kildare. The Competitiveness of Irish Agriculture.

Commentary

As time moves on, and if EU dairy farmers are caught in a cost price squeeze, will consideration be given to the Canadian model where the Canadian milk supply management system monitors consumption of the domestic market and limits production to meet demand? It should be noted that a similar proposal to this has been mooted by the French in recent years where they have been suggesting cutting EU quotas.

Farmers in the American mid-west now consider 2000 cows to be the optimum size in economic production.

Average number of cows per herd

Description	NL	IE	DK	WI	NZ
Average number of cows per herd	58	44	76	100	254
Average milk yield per cow (litres)	8560	5560	8200	9900	4270

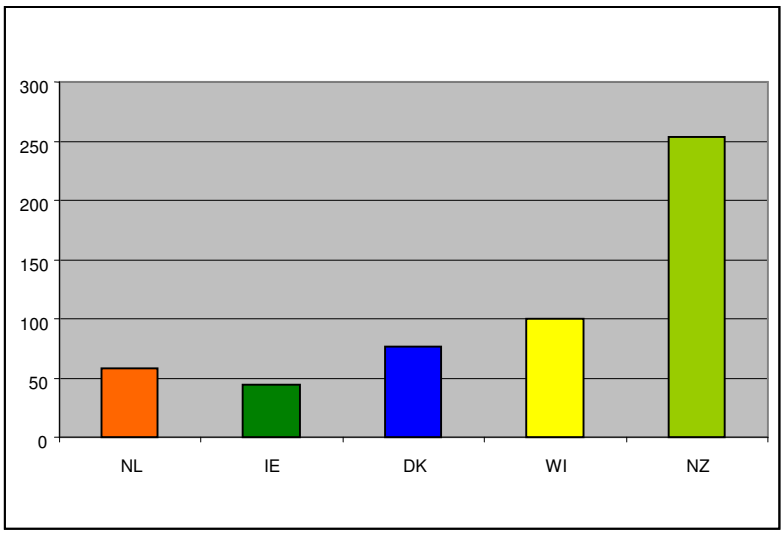

Figure 1.11 Average number of cows per herd

In New Zealand, it must be noted that milk yields are much lower due to little or no use of concentrate feeding. In Ireland, the level of concentrate feeding is, on average, much lower than that of the USA, the Netherlands or Denmark. The reason why Ireland and New Zealand tend to be grass-based systems is because of lower milk prices.

Commentary

The milk prices paid within Europe reflect the supports paid to farmers. These are in comparison with the liberated market situation in which the New Zealand dairy farms must compete without any subsidization. The price returned to the European farmers is projected to decline under the Fischler Mid Term Review proposals. This can only be corrected by greater returns from the market place brought on by increased demand or decreased levels of production. Evidence of increased demand is appearing mainly because of drought in Australia and the growing levels of affluence in Asia. If price contraction continues, European farmers will suffer serious consequences regarding their economic viability, were their costs of production to remain at present levels. As milk quotas constrain the level of

production, European farmers cannot grow their businesses at the same rate as their New Zealand counterparts to compensate for price reductions.

Because of the decline in returns, smaller farmers are likely to exit the business, creating some opportunities for others to expand their businesses. The situation could be reversed if the EU decides to increase quota sizes under the mid-term review or fast forward the abolition of quotas. These decisions are political and continue to lead to uncertainty but in any event, quotas are envisaged to disappear by 2013/2015.

Direct Payments

Description	NL	IE	DK	WI	NZ
US-$/100 kg milk (ECM)	0.6	0.2	1.4	1.55	0

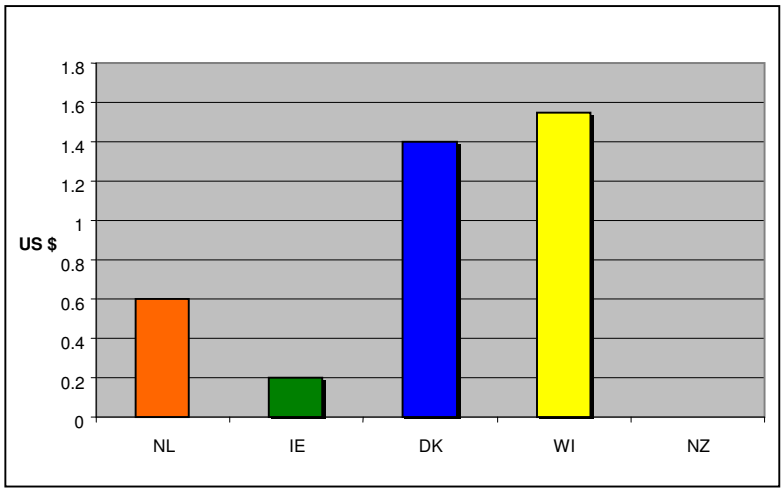

Figure 1.12 Direct payments per 100 kg milk in US$

The Direct Payments to farmers from the Common Agricultural Policy play a role in the support of milk prices. The assumption that the USA operates a liberated market and encourages free trade is not a true picture of how they operate their dairy industry. In 2002, dairy farmers received payments per kg of milk up to $31,200 per farm. This gives smaller farmers in the US a greater direct payment per kg of milk produced. Direct payments in the US decrease as the farm size increases: when a farmer reaches a herd size of 2000 cows, a direct payment of 0.3 cent is applicable. The impact of direct payments per 100 kilos of milk in US$ terms can be clearly seen in the chart above.

In countries such as Sweden and Finland, farms can receive additional payments of between $150/ha and $510/ha, depending on their location and participation in special programmes. New Zealand dairy farmers receive no direct payments from Government agencies as it is a totally liberated market – this means lower milk prices to the farmer, but this has enabled New Zealand dairy farmers to establish a foothold on world markets.

Direct payments in the Netherlands and Denmark refer mainly to payments received for maize silage. The slaughter premium for dairy cows is taken into account in Ireland, Denmark and the Netherlands. The direct payments on maize silage works out at €408/ha (with a reference yield of 6.8 tonnes). This is not applicable to Ireland, New Zealand or the USA.

6 Impact of WTO on the Dairy Industry

The World Trade Organisation (WTO) plays an ever important role in the livelihoods of farmers with increasing emphasis in eliminating tariffs on trade. The agricultural talks focus on three main areas: market access, export competition and domestic supports which are dependent on the reform of agricultural policies within member countries. The main negotiating blocks in the WTO are the European Union, the G20[15], the Cairns Group[16] and the USA. For European and Irish farmers, the Common Agricultural Policy (CAP) midterm review in 2003 was focused on enabling the EU to reach a WTO agreement.

Over the past three years reforms have led to lower support prices for dairy produce and less subsidisation of exports for dairy commodities. In December 2005, Trade Ministers from 149 WTO member countries agreed to a declaration that plans for an end to export subsidies with an associated time table, which if adhered to, will mean increased liberalisation of markets and reduced trade distorting policies.

The G20 group of countries led by Brazil are demanding a fifty four percent reduction in tariffs while representatives from the USA are currently offering few, if any, trade concessions. There are a number of legitimate concerns about the WTO and its future impact in achieving equitable and fair trading agreements in a number of areas:

(a) environment
(b) health and safety regulations
(c) currency
(d) employment standards

These concerns are reflected by official comments made by Peter Balas, EU Deputy Director General of Trade, when updating European members of parliament on WTO developments;

"I do not think it is the task of the WTO to say to Brazil or India what they should do on the environment. They are sovereign countries and can refuse to listen to us."

And many members did indeed refuse to listen and negotiate. After five years of trade liberalisation talks negotiations were postponed indefinitely on 24th July, 2006 as differences over farm aid policy proved unbridgeable. Although discussions commenced following mid-term elections in the USA, it is unlikely that a final agreement will be reached by the end of this year.

The World Trade Organisation has been a controversial organisation from the view point of Irish and European farmers. Many farmers take the view that attempts are being made by Governments to ensure that food is made available as cheaply as possible through importation from different regions where similar standards don't apply. This point was emphasised by Lord Bach, speaking on behalf of the British Minister for Agriculture in January 2006, when he said at the Oxford Farm Conference that C.A.P. is difficult to defend with the British Government determined to end the era of subsidies. But what he failed to address was "how is it possible to compete and supply top quality traceable food where standards that European farmers operate don't apply to our competitors?"

---

[15] The G20 are lead by Brazil and India and include Mexico, South American countries and a number of Asian countries.

[16] The Cairns Group are lead by Australia, New Zealand and other countries in the general Pacific region.

For example, this can be seen in Environmental regulations in New Zealand and working conditions for Mexican workers in California where they work without holiday pay, sick pay, and for 6 Dollars an hour.

When I questioned one California farmer about this he said "if the workers I have don't like my conditions they can leave and as soon as they do so another truck load of Mexicans will come looking for work". The US protects its farmers with tariffs on many products e.g. tariffs on Kerry Gold butter". Another example is where the US doesn't allow Brazil to export ethanol to the US even though Brazil can produce ethanol from sugar cane for 83 cents a gallon in comparison to the US where ethanol production from grain is much higher. The downside is that at some stage, the bio fuel phenomenon will peak and the question is where will the "dust settle"?. Sugar cane is a very efficient crop; one ha produces 85 tonnes of cane. The energy in one ton of cane is equivalent to 1.2 barrels of oil, with 1/3 sugar, 1/3 bagasse and 1/3 straw, giving substantial electricity generation potential. The sugar from 1 ha of cane is converted into 7,000 litres of alcohol, comparing favourably with the 4,000 litres produced by a 10 tonne per ha crop of maize. 1,000 litres of ethanol allows for 2.6-ton production in $C0_2$ emissions.

The Brazilian government believes that ethanol from Brazilian sugar cane is competitive with oil at US$ 35 per barrel. Current oil prices, and their outlook for the future, are encouraging further development of the sugar cane industry. The Brazilian Agri-energy & Bio fuel Committee has predicted an increase of 3 million ha in the currently planted cane area of 6 million ha over the next 5 years, with annual ethanol production increasing from 16.7 billion litres per annum to 30 billion litres. Many factories are being built or planned.
Brazil can already produce ethanol from sugar cane for 83 cents while it costs $1.09 per gallon using U.S. corn.

The New Zealand Government repealed its competition laws in order to give Fonterra a dominant position. The problem from the American view point is that Fonterra enjoys a legislated monopoly position. It also enjoys exclusive export rights in higher value quota controlled markets, again through legislation, not competition. Within Europe and the US, different companies have to compete with each other and in Ireland the competition authority would take a dim view of such a situation, as we have seen from its investigation into the liquid milk business. This has now given rise to concerns at WTO level where European and US negotiators are questioning the creation and use of Fonterra's power as a single entity.
New Zealand dairy farmers expect an average bonus of 50,000 New Zealand Dollars from successful WTO negotiations, as envisaged at the moment, but if Fonterra's legislative monopoly situation was changed this may not happen.

The following two photographs clearly illustrate the difference in effluent facilities in both countries.

	
New Zealand This image shows the facilities sufficient to handle the effluent and parlour washings from a 400 cow unit. Basically a hole in the ground without protective lining.	**Denmark** This image shows the concrete tank necessary to handle the effluent from a 200 cow herd. The cost difference between both systems is self explanatory.

In a liberated market WTO negotiators will have to take into account the impact and the costs of complying with European environmental controls. Figures produced by Tim Bennett, leader of the British Farmers Union, show that Europe imports more agricultural products into the European Union, duty free and quota free than the USA, New Zealand and Japan combined. Europe imports seventy percent of exports from less developed countries versus a figure of seventeen percent for the USA. He firmly believes that the US is operating double standards, continually offering support to their own farmers, especially grain producers, and denying others the opportunity to export to the US, citing health regulations. An example of this is beef from Brazil where "Foot and Mouth" is wide spread. The US doesn't allow imports from Brazil whereas Europe does. Indeed, the lowering of import tariffs on beef as envisaged by European Trade Commissioner, Peter Mandelson, has the potential to destroy European beef production. Also, the impact on the export of butter cannot be underestimated.

Another issue which the US is bringing to WTO talks is the subject of Carbon Miles i.e. the distance food products travel when exported. They are seeking to have this included in the formula of tariff controls. This could have serious repercussions for Irish dairy exports as Ireland exports eighty five percent of its dairy products. Indeed, the lack of importance of agriculture to the UK government and to its officials was best illustrated by Richard Parker, former Under-Secretary to the Department of Agriculture in the UK, when speaking at the Agricultural Science Association Annual Conference in 2005. He stated "the importance of agriculture has diminished; it now occupies less interest in the thinking of the British Government and that as the rate of economic development in countries increases, the importance of agriculture declines accordingly". This, he said, is the view of most developed nations of the world, especially those who favour liberalised trade. The impact of this on the Irish dairy farming scene means that as 2015 approaches, Irish agriculture will be subject to trade liberalisation with few tariff protections remaining in place. Only a small number of products being regarded as "sensitive" e.g. butter, will receive some protection.

What the remaining discussions at WTO must take account of is the difference of environmental standards, as seen in photographs on page 13 and page 34 and also wages paid as witnessed in California and a whole lot of national legislation which applies in a number of countries e.g. Forterra in New Zealand. These discrepancies give some of our competitors

extra leverage in world trade and Ireland, with our likeminded counterparts in Europe, must ensure that our natural advantages are protected in WTO talks.

When in Brussels, the power of political lobbying became apparent. There are approximately 25,000 lobbyists operating in the Brussels region making representation on behalf of their respective industries and countries for products such as coffee, rice, steel and computers. The result of these representations can often be seen in WTO discussions with many European industries encouraging liberalisation so that they can gain access to countries such as Brazil for their technology based and service industries and using agriculture as the bargaining tool. Irish agriculture faces a tough struggle within the corridors of power in Brussels to fight and sustain a case for our dairy industry. Never was it more important to invest in suitably qualified people who can represent our interests. In political terms, the real action is now taking place in Brussels where many types of legislation are being discussed and implemented which will impact on the lives of the dairy producer.

Irish dairy farmers must ensure that they have effective representation at every level of decision-making in Brussels in order to protect our industry.

7 Impact of Other Issues

All analysts that I have spoken with agree on a number of issues.
They believe that the world population is likely to at least double by 2050 with a corresponding impact on the resources of the world, leading to increased demand for food, energy and water. Figure 2.1 below gives an indication of population increase in some countries with a substantial increase in the Asian region.

1981 – 2001		
	Population growth	**Consumption of Dairy Products**
U.S.A.	+23%	+2%
India	+46%	+63%
Pakistan	+73%	+78%
China	+27%	+267%
Denmark	+4%	-16%
UK	+6%	-11%
World Population	**+36%**	**n/a**

Figure 2.1 Population Increase and Consumption of Dairy Products

In a presentation to the Oxford Farm Conference 2006, Denis Avery, Director of Research and Education at the Hudson Institute Centre for Global Food Issues, Washington, predicted that global food demand will likely triple over the next fifty years. He said that "major portions of global population are gaining relative affluence than at any time in human history. Never before in human history have we also witnessed such a rapid population surge. The population of the world today is approximately 6.4 billion, predicted to reach 8 billion by 2030".

At the same conference, John Chapple, a UK business man and Managing Director of Sino Analytical, based in China, quoted Napolean Bonaparte, early 19th Century Political Leader: "There lies a sleeping giant, let her sleep for when she wakes up she will shake the world." "Well", he said "she has awoken". To reinforce this belief, Deng Ziapoing, Chinese President 1982, said, "It is a time to prosper; China has been poor for a thousand years, to get rich is glorious". In John Chappel's eyes, China has an absolute capitalist attitude to doing business. Every Chinese person wants to improve themselves and their children. The country that it is today will probably not be what China will be tomorrow, but whatever it becomes, its impact on the world is here to stay with twenty percent of the world's population. China accounts for seven percent of the world's agricultural land. As society becomes more urbanised, with a predicted 200 million people relocating to the cities, huge demands will be placed on water, energy and imported food. The following graph shows how much its agricultural trade is changing. (Figures in billions Dollars).

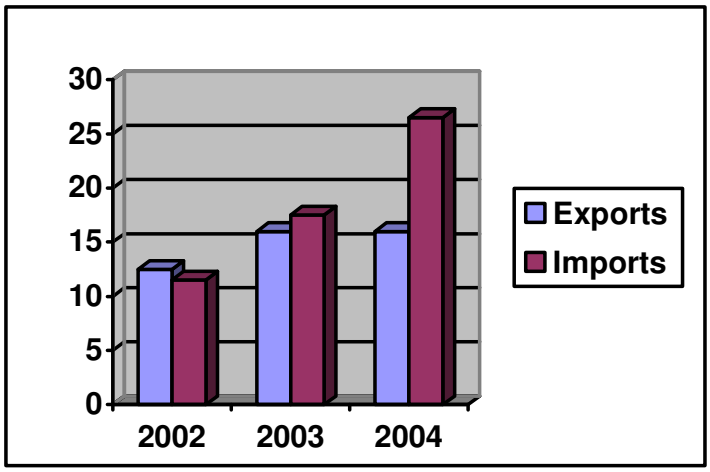

Figure 2.2. Chinese Agricultural Trade

He predicts that China will become the biggest, net food importing nation in the world especially in cereals, Soya bean and maize. China's impact in the world is already evident with huge increases in the demand of commodities such as steel, copper and oil mainly because China is rebuilding its infrastructure and economy. The wealth of its people will increase - already, changes are taking place in diet with its tastes becoming more Westernised. Already, we have seen consumption of dairy products rise from 7.5 kgs per person to 13 kgs per person over a 10 year period up to 2005. The average American consumes 100 kgs per head, per annum.

As China evolves, the potential is enormous, leading to increased demand for food and in turn, leading to increased prices. According to Avery "if Chinese people drank an extra glass of beer weekly, demand would increase by 3.25 billion gallons or the equivalent of 1 million tonnes of grain". The question is, how will this demand be met as most of the world's agricultural land is already in production?

An interesting statistic produced by Mr Avery stated "that if we still achieved yields of 1960 levels an additional 15 million square miles of farm land would be needed to produce today's food supply. Also, it would require 6 to 8 billion cattle to replace current use of 80 million tonnes of synthetic nitrogen fertilizer with organic nitrogen, giving little credence to those who believe that a return to organic farming to meet all of our food needs is possible.

It is clear that as population and affluence in China and Asia increases, demands on resources will similarly grow. The question is what impact it will have on the Irish dairy scene. The likelihood is that product at today's production levels will become scarce, leading to increased demand for dairy commodities in the medium term, before increasing supply will create equilibrium.

The natural resources of the world appear to be under pressure because of burgeoning demand in order to supply an increasingly affluent consumer. Oil is a perfect example of this, with increasing demand in China, Asia and throughout the Western World. In the US, the consumer is driving cars and other forms of transport which use expanding amounts of gasoline, known as fuel guzzlers. Statistics show that over the last 20 years, demand for energy has grown substantially. Figure 2.3 below gives an indication of the increase in usage in global terms

Coal	+35%
Gas	+43%
Oil	+25%
Nuclear	+21%

Figure 2.3 Increase in World Energy usage[17]

The former Chairman of the multinational Shell Oil Company, Lord Oxburgh, stated at the Oxford Conference 2006 that the era of cheap oil and gas is over and that the future lies in new sources. Lord Oxburgh stated two new sources as offering potential:

1. Intermittent energy sources such as wind, wave, tides and solar energy.
2. Continuous renewables, such as bio fuels and cellulostic technology, which breaks down enzymes of raw materials to produce fuel.

The increasing cost of energy and, in particular, oil, cannot be underestimated. The likelihood is that an ever increasing amount of farm land will be used in the US for growing crops suitable for bio fuel production. In the US[18] thirty nine new ethanol plans are forecast to be completed in July 2007 producing an extra 1.4 billion gallons of ethanol a year. Analysts predict ethanol output could reach 8 billion gallons a year.

Driven by US Government tax concessions, the bio fuel industry aims to replace the 1.6 million barrels of oil imported daily from the Persian Gulf. The amount of farm land and grain product being consumed for the production of ethanol has alarmed some food companies with Warren R Staley (Cargill Group CEO) stating that "unless we have huge increases in the level of productivity we will have a huge problem with food production".

From 2007 onwards, increased competition between the livestock and bio fuel industries will lead to higher grain prices. There will be resultant cost pressure on intensive ration-based dairy systems. This will provide opportunities for grass based production to compete economically and Ireland is well placed to compete internationally if the necessary steps are taken now to plan and grow our dairy industry for the future.

Global energy demands are continually increasing. Countries like China and India, which between them are home to one third of the world's population, are becoming more affluent and are striving towards better standards of living. The new EU ascension countries will also follow these trends with resultant higher energy demands in these countries. According to the US Energy information Administration (EIA) global use of oil is forecast to grow from 80 million barrels per day in 2003 to 98 million barrels per day in 2015 and 118 million barrels per day in 2030. The increased demand for energy will result in incremental oil, coal and gas prices for import-dependent countries. Across the developing world, cheap diesel generators from China and elsewhere have become a popular way to make electricity. They provide power for everything from irrigation pumps to television sets, allowing growing numbers of rural villages in many poor countries to grow more crops and connect with the wider world.

[17] Lord Oxburgh, Oxford Conference 2006

[18] New York Times, June 2006

As demand increases for the electricity that makes those advances possible, it is often being met through inefficient means, creating pollution problems in many remote areas which previously had pristine air and negligible emissions of carbon dioxide (CO_2).

The impact of ethanol production will have negative results in the long term, with the possibility of grain prices becoming too expensive. A conference paper produced by Ardan Sanderman, "Farm Futures Marketing Analyst USA" projected ethanol demand for the 2006-2007 marketing year at 2.15 billion bushels, equivalent to the total corn production in the state of Iowa grew in 2005. In the near future he predicted that more than one out of every five ears of corn produced nationwide will go into ethanol.

The ethanol boom appears to be the success story of farm investment driven by Government policy. President Bush[19] highlighted the logic behind development in a recent speech "When the demand of oil goes up in China or in India it causes the price of oil to increase. Since the US imports about sixty percent of the crude oil it uses," he stated "it causes our price to go up as well, which means the economy becomes less competitive". The US wants to become less dependent on oil imports for security and other reasons and is prepared to subsidise the building of ethanol plants by giving tax incentives. Cross party support for this policy is best exemplified by Nancy Pelosi[20], the speaker of the House of Representatives, when she said the US must fight for every independent source by investing in the Mid West, not the Middle East, by cutting subsidies for oil companies and promoting American made bio fuels.

US energy needs are expected to grow by forty percent[21] requiring that renewables need to increase by thirty percent before a decrease in fossil fuel efficiency can be experienced. Further examples of the U.S. determination to increase the use of bio fuels are evident in the President's 2007 Budget. The budget will include a 150 million dollar fund, a 59 million dollar increase over 2006 to help develop 'cellulosic' ethanol from agricultural waste products, such as stalks etc. Reports from the USA suggest that bio fuels, including ethanol grain corn stover, wheat straw switch grass and other forms of cellulose, could largely replace gasoline in the vast majority of light duty vehicles by 2050 if the right policies are put in place. Figures produced by the U.S. Department of Agriculture show bio fuel will keep 13.6 billion dollars in America that would otherwise be spent on foreign oil.

Key figures in the bio fuel industry are

- Ethanol production is predicted to reach twenty percent of yearly US fuel consumption in 2015
- Requiring 95.6 million acres of corn as apposed to the 75 million acres that are currently sown
- European Union announced a programme to make it compulsory that ten percent of fuel comes from renewable sources by 2020.

Commentary

The amount of land that will be required to grow bio fuel will put enormous pressure on grain based dairy production. The U.S. and European dairy industry are based on high grain usage with animals fed indoors most of the year. All predictions show grain prices will increase substantially putting pressure on intensive dairy systems. Other crops, such as Soya, will increase pro rata putting pressure on protein prices.

[19] President Bush, current US President

[20] Nancy Pelosi, Democratic Party, USA

[21] US D.A. Chief Economist, Keith Collins

As the World population expands and land supply devoted to food production decreases, food prices are likely to increase. This is signalled by Warren R Stanley, Chief Executive of the Cargill Group, who believes that "unless we have huge increases in the level of productivity we will have a huge problem with food production. By 2007 there will be a food fight between the livestock sector and the bio fuel industry". The grass-based dairy industry will give significant economic advantages to farmers operating this system.

As corn prices increase, this difference expands. Irish dairy farmers have a much more secure feed base to expand their industry and to control costs. This gives a major advantage to Irish and New Zealand dairy farmers.

7.1 Environment

The environment has, over the past number of years, become of great concern to consumers and governments alike. As time goes on, the environmental conditions that farmers operate under have become much more stringent throughout the world. In Europe, ground water has become increasingly polluted and many Governments are now committed to decreasing the levels of nitrates and phosphates in our water supply. This has placed restrictions on the stocking rates of animals on farms in a number of countries. These restrictions will continue with the introduction of the 170 kg/ha allowance of organic nitrates level as per the EU Nitrates Review. The restrictions have been so severe that some countries have sought derogations. Ireland is one of these countries and has based its case on scientific research derived from a number of factors including water quality and soil types.

With the advent of the nitrates regulations, the EU is determined to reduce nitrate leaching into ground water systems. This means that the amount of organic nitrogen and chemical nitrogen that farms use is controlled. These regulations will cause problems for intensive dairy farmers in Ireland with increased slurry storage systems needed and will force some farmers to reduce stocking rates.

7.2 ECO N

The dairy industry throughout the world will, in future, be subject to environmental constraints of different levels depending on which continent or country. This was evident throughout my travels, with different environmental regulations applying in Europe when compared with New Zealand and the USA. New Zealand is the country with a farming system similar to Ireland i.e. a grass based grazing. Throughout Europe, farmers tend to utilise large amounts of slurry in the growing of maize silage. The slurry is spread and ploughed into the ground in large amounts as well as farm waste being injected into the ground. In New Zealand farmers graze animals outdoors twelve months of the year and winter their animals on forage crops.

New Zealand
Cows grazing in paddock with supplementary feed. Damage to pasture is self evident.

New Zealand
Silage pit made on a clay surface with no concrete, no effluent tank and no feeding system in place. This method would be illegal in Ireland

This can lead to leaching of nutrients into ground water systems with considerable poaching of soil taking place at times. Farmers who lease their land for the growing of forage crops are becoming concerned about the level of damage being done to the soil. In the Canterbury area, some farmers no longer wish to rent their land for such grazing systems. Nitrates in ground water are increasing and Governments and Environmental organisations are becoming concerned. Because of this, research bodies in New Zealand are researching ways to minimise leaching of nitrates without affecting the competitiveness of the New Zealand dairy industry.

The Lincoln University, based in Canterbury, in conjunction with some fertilizer companies, are at the forefront of developing technology to help minimise nitrate leaching. The research at Lincoln University is headed up by Dr Keith Cameron who has written and studied many such research papers. Presently, one of his PHD students, Samuel Dennis, is researching similar technology under Irish conditions at Teagasc research station at Johnstown Castle, Co. Wexford.

The concept being investigated and marketed in conjunction with Lincoln University and Ravenstown Co-Op is called ECO-N. Basically, it is a nitrification inhibitor based on the chemical compound DCD (Dicyandiomide). Research has shown that the significant leaching of nitrates comes from cow's urine not from chemical nitrogen. Cows consume high levels of nitrogen in the grass that they eat. The higher the level of nitrogen applied the higher the amount that goes through the cow's digestive system, therefore the more that is excreted in the form of urine. Cows urinate 10-12 times a day, depending on the results from different trials. Urine volumes per cow ranged from 1.6 to 3.5 litres. The value of 3 litres has been used in the majority of research at Lincoln University. A urine patch covers 0.33 square metres and this

causes around 0.9 sq metres of pasture to show a growth response. Average nitrogen concentration per urination is around 7.8g per litre. This shows the potential of leaching when growing conditions don't allow for the uptake of nitrogen by plants i.e. grass. DCD applications increase the amount of nitrogen that remains as ammonia (more likely to be held in the soil) and reduces the amount that becomes nitrate (more likely to be leached out of the soil).

The following diagram might give a better understanding:

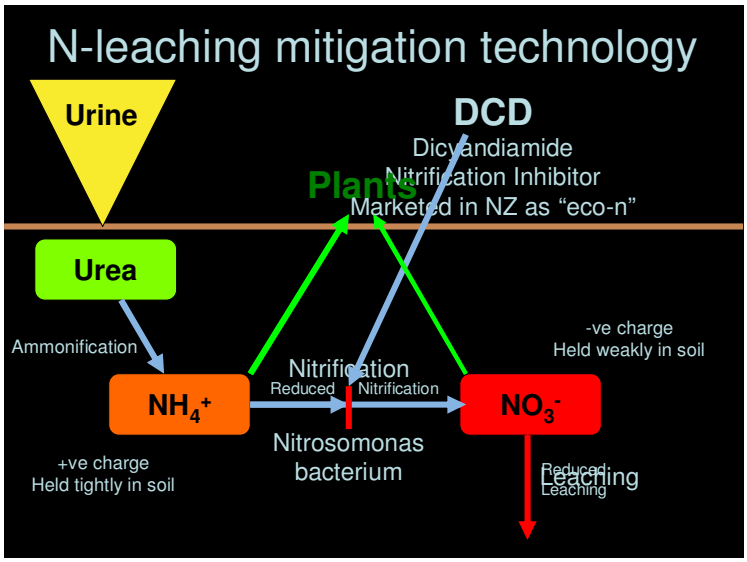

Figure 2.4 Scientific Model of DCD (ECO-N)

Urine is excreted containing nitrogen in the form of urea. A process known as ammonification takes place which turns the nitrogen into ammonia. If growing conditions aren't suitable, the ammonia is converted into nitrates which can leach from the soil. DCD when applied, slows down the process whereby ammonia is converted to nitrate. This means that when growing conditions are unsuitable, nitrogen in the form of urine is not lost and is thereby available to the plant when growing conditions improve. Ammonia is naturally held more strongly by the soil than nitrate. This is because of the change on the molecules. Ammonia ions (NH_4+) have a positive charge, while nitrate ions ($N0_3-$) have a negative charge. Many soil particles have a charge as well and for various reasons the majority of these charges are negative. For this reason, most soils are said to have a "net negative charge".

Just like with the poles of a magnet, like charges repel and opposite charges attract. This means that the positively charged ammonia ions are attracted to the negatively charged soil surface, while nitrate (negatively charged) is repelled from it. Ammonia is therefore held by the soil while nitrate remains in the soil solution (the water surrounding the soil particles) and is more likely to leach out of the soil in drainage water.

Results from trials carried out show that nitrate leaching decreased by seventy six percent in the autumn and early spring season. DCD is most effective when temperatures are below 7˚C. Trials have shown that $N0_3$ (Nitrate Nitrite) concentration in drainage water decreased from 19 m.g. per litre to 7.7 m.g. per litre. Because of the growth of the New Zealand dairy industry leading to more dairy cows, the level of green house gasses have been rising. Nitrous oxide (Mossier 1994) (N_20) is a green house gas which can cause global warming. In grazed grassland systems such as New Zealand, a (Major Jarvis 1997) source of N_20 emissions comes from animal excreta, accounting for fifty percent of the country's total N_20 emissions (de

Kleinetal 2001). Trials have shown that 2 applications of DCD can reduce N_20 emissions by eighty two percent.

Trials also show that two applications of DCD also increased herbage dry mater yield by fifteen to thirty three percent due to increased nitrogen availability to plants, resulting from decreased $N0_3$ leaching losses. Trials also show that DCD can be applied in a liquid form through irrigation systems or incorporated in fertilizer. In New Zealand terms it costs Thirty Euro per application and has a shelf life in the soil of approximately 112 days. To date no detrimental effect on the environment has been recorded as the product breaks down naturally in the soil. It appears that approximately twenty percent of New Zealand dairy farmers are now using nitrification inhibitors such as DCD in order to improve productivity. Present indications from trial results being carried out by Samuel Dennis at Johnstown Castle appear favourable, especially in heavy soils. This would mean that grazing of animals could take place in the winter period without affecting the environment thereby reducing production costs for Irish dairy farmers as is evidenced in research carried out at Moore Park Research Station by P. Dillon and L Shalloe. A comparison of a pasture-based system of milk production on a high rainfall, heavy-clay soil with that on a lower rainfall, free draining soil showed a major difference in cost base and a financial return on the farm business.

Dairy farming in Ireland depends to a large extend on the efficient conversion of grass to milk[22] and grass grazed efficiently is the cheapest feed available on most dairy farms[23]. There is a large variation in the cost of milk production in specialised dairy farms in Ireland[24] . Some of the variation in costs may be associated with variation in soil type and climatic conditions. Research results have shown a large difference in the profitability of milk production from land with high annual rainfall and heavy clay soils[25] compared to farms with well drained soil of a loam texture[26]. Figure 2.5 below shows comparable feed budget for dairy herds with three month (90 days) and five month (150 days) winter housing periods. These two housing periods would be representative of a well-drained free-draining farm in the south as compared to a less free-draining clay soil in the north or west of the country. In the free-draining soil type (90 day) it was assumed that cows were housed full time for December, January and half of the months of November and February. IN the less free-draining clay soil it was assumed that cows were housed for November, December, January, February and half of October and March. The proportion of grazed grass in the herd's diet reduces from seventy percent in the 90 day case to fifty one percent in the 150 day case. The corresponding proportion of grass silage increases from twenty three percent to thirty nine percent.

[22] Dillon et al., 1995
[23] O'Kiely, 1994
[24] Fingleton, 2002
[25] Kilmaley Research Station
[26] Moorepark Research Station

Housing period	90-day	90-day
Concentrate input (kg DM/cow)	350	536
Stocking rate (cows/ha	2.4	2.2
Nitrogen (kg N/ha)	300	250
Feed budget (kg DM/cow)		
Total CM intake	5140	5370
Grass DM intake	3590	2732
Silage DM intake	1200	2102
Concentrate DM intake	350	536
Proportions of Total DM Intake as		
Grazed Grass (%)	70	51
Silage (%)	23	39
Concentrate (%)	7	10

Figure 2.5 Influence of length of winter housing period on feed budget[27]

Figure 2.5 shows the financial comparison of a 90 day housing system compared to a 150 day system in a 454,000-litre (100,000 gal) EU milk quota scenario. The profitability of the 90 day system was 16,500 Euro greater than the 150 day system. Compared to the 150 day, the 90 day winter housing system had 11,530 Euro, 4790 Euro and 16,320 Euro lower fixed, variable and total input costs respectively but total receipts were only 170 Euro higher. This is equivalent to 3.6 percent per litre higher profit in the case of the 90 day housing requirement compared to that of 150 day duration.

	90-day	150-day	Difference
Receipts (€)	148,420	148,260	-170
Variable costs (€)	30,860	42,390	+11,530
Fixed costs (€)	49,160	53,950	+4790
Total costs (€)	80,020	96,340	+16,320
Net farm profit (€)	68,400	51,920	-16,480

Figure 2.6 Influence of length of winter housing period on farm profitability for 454,000 litre quota

The benefits of ECO-N concept on the above systems is self evident as feed costs could be further reduced and farm profitability increased giving Irish dairy farmers a further competitive advantage on their European counterparts.

7.3 Grass Growing

In 1992, Dr Michael Keane of the meteorological service, Glasnevin, Dublin, established the average number of grass growing days in Ireland. Broad and Hough (1993) consider the beginning of the growing season to be determined by an air temperature of between 5 and

[27] Based on FAPRI Ireland outlook 2003 Medium Term Analysis for the Agri Food Sector Teagasc Rural Economy Research Center Dublin ref pages 70-78

5.5˚C. Keane (1992) also determined the estimated length of the growing season in a number of countries in North West Europe using a start up temperature of 5.5˚C.

Threshold Temperature 5.5(°C)	
Ireland Midlands	280
England Midlands	265
Netherlands	245
Northern Germany	230
Denmark	210

Keane 1992

Figure 2.7 Average lengths (in days) of grass-growing season in Ireland (The length of grass growing days in parts of Europe).

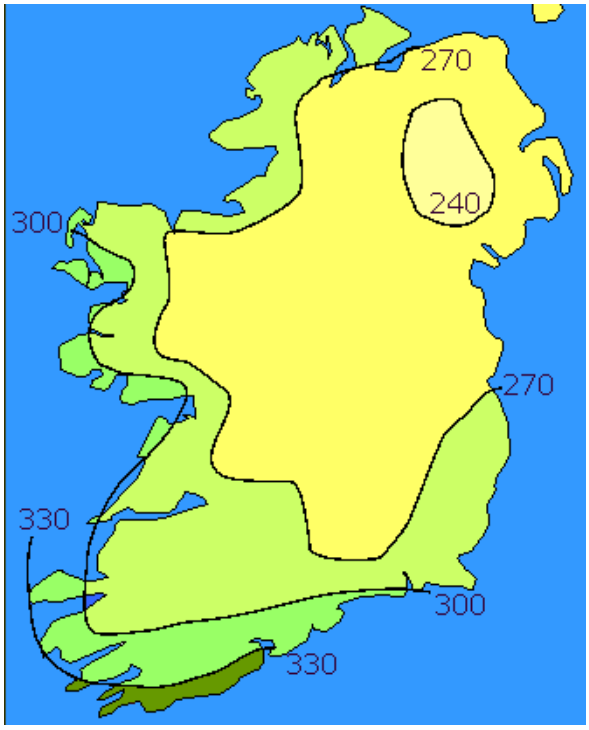

Figure 2.8 Average number of grass growing days in different parts of Ireland (From Teagasc submission for the derogation from the general limit of 170 kg of organic nitrogen per hectare per annum.)

In Ireland, recorded days of frost in winter time at Shannon Airport have decreased by 40 days over the past 5 years. This will lead to a longer growing period in Ireland, giving another plus to Irish farmers.

When discussing grass growing potential it is worth looking at soil types. Ireland has a total land area of 6.9 million ha. Dry, lowland mineral soils account for about sixty two percent of the agricultural area, while moderately wet mineral soils account for twenty percent and wet impermeable mineral soils for around seventeen percent (Coulteretal 1996). Fifty percent of the land area of the country is classified as good agricultural land.

The classification of grassland types (using climate and soil data of Europe) range from A = well suited for grassland to E = only poorly suited to grassland. Ireland has the highest proportion of Class A land category in Europe with thirty two percent compared to nine percent in the EU 10. Land in classes A & B combined represents forty five percent of total grassland in Ireland compared with twenty eight percent for the EU 10.

Soil types are very important in the context of the levels of organic nitrates allowed by the EU in the future. Because of Ireland's soil type and long grass-growing season, there is a high uptake in plants of nitrates and phosphates. Loss of nutrients is not a generally a problem with Ireland's main soil type but could be a problem on sandy soils.

Soil Types	Sandy	Clay	Peat
Denmark	62%	32%	7%
The Netherlands	50%	40%	10%
Ireland (Irish clay is defined as clay & clay loam)	9%	32% Clay Loam – 57%	Not available

Figure 2.9 Comparison of soil types between Denmark, The Netherlands and Ireland

Commentary

Should the research on DCD be scientifically proven and economically viable under Irish conditions, a major cost benefit would be available to Irish grassland dairy farmers in comparison to our grain based competitors. Continued research is needed especially when comparison is made with the number of grass growing days in Ireland compared to our European competitors. It would mean that our cows could graze longer without damaging the environment. There would be reduced nitrate leaching, reduced nitrous oxide emissions and more efficient nitrogen utilisation.

In the USA the environmental concerns continue to grow. Large farms create large amounts of manure with the potential to create large amounts of effluent, posing a risk to both water and air quality. Farms are designated as having different risk levels. Once they reach a cut-off point they have to apply for a permit, construct storage and other waste control facilities and implement discharge procedures that will avoid contamination of water sources. The costs of these programmes often run into hundreds of thousands of dollars per farm. The average annual cost for pollution control on a medium-sized farm of 200 cows is approximately $11,000. Also, farmers are only allowed to apply regulated levels of phosphates to crops (i.e. maize and corn). Any over use is heavily penalised.

In Ireland, if farmers comply with the 170 kg/ha organic nitrogen level they can avail of payments under the Rural Environment Protection Scheme (REPS)[28] as well as grants to provide housing and effluent treatment facilities. Many Irish farmers can take advantage of our long grass-growing season to lessen the period of housing and this, combined with the high uptake of nutrients (i.e. nitrates and phosphates), gives Irish farmers a further advantage in the debate regarding the optimum level of nitrates and phosphates that can be used in dairy farming. (The grass-growing season extends from 330 days in the South West to 270 days in the North East. This gives an economic advantage to Irish dairy farmers when compared with our European competitors. Ireland has:

- long growing seasons

[28] Rural Environnemental Protection Scheme is a similar scheme to the County Stuartship Scheme in the UK.

- crops with high nitrogen uptake (grass)
- soils with high de-nitrification capacity)

In the Netherlands and Denmark, because of the limited availability of land, farmers are often forced to transport farm manure and effluent long distances to farms that grow crops (i.e. maize and corn) thereby increasing their production costs.

Ireland's unique situation in Europe in relation to soil, climate, land use and farming systems all contributes to lower nutrient losses.

7.4 Water Quality

When assessing the quality of Ireland's water resources it must be noted that Ireland was not subject to the increased level of population and industrial and agricultural productivity as experienced by most of our European neighbours during the last century - a growth which has led to increased pressure on the water resources of those countries. However, in later decades, twenty percent of water sampling points in Ireland did exceed the 5.6 mg/per litre nitrates guide limit set. In Ireland's favour is the fact that there is a widespread presence of salmon and trout in Irish waters which is not matched by other European countries. This indicates that Irish waters have not been polluted at the same rate, as both salmon and trout are pollution-sensitive.

The reasonable quality of water in Ireland is illustrated in a Report on Water Quality 1998-2000 (McGarrigle et al, 2002). Approximately 13,200 km of river water were sampled and classified as in Figure 2.10 below.

A. Unpolluted	70%
B. Slightly polluted	17%
C. Moderately polluted	12%
D. Seriously polluted	1%

Figure 2.10 Classification of river water in Ireland

Ireland's water table has not suffered from agricultural production. Data on nitrate concentrations in the 25 EU Member States are summarised by the European Environment Agency and Ireland compares well in comparison to other EU States. Corresponding data for phosphates show that the concentrations recorded at Irish sampling stations are significantly lower than the EU average.

The importance that the environment plays or will play in the future is well illustrated in the Campina Annual Report, 2003. In their comments on water they state:

> *'Water is one of the key 'ingredients' in our daily production. Water consumption is extremely important at every stage of its chain. Water is used to clear and rinse storage tanks and to clean production equipment for example and is released in the making of whey and in the milk thickening process. It is also essential for the cooling stage of the production process at Campina facilities. And of course water is used at the farms of member farmers, who also take responsibilities for the ecological balance of the natural water supply. In short water is important for Campina, both in Western and Eastern Europe, where Campina aims to set an example regarding water consumption in 'the dairy chain'.'*
>
> (Campina Annual Report 2003)

Campina highlights two issues that will form practices in its sustainability policy for the coming year:

- Water
- Chain transparency

Reflection

People take water for granted in Ireland with justifiable reason, but in other parts of the world this is not the case. (Dairying is a constant user of water – without it the industry could not survive).

Further development in regions such as China and Asia, will be dependent on large supplies of water. Even in China, rivers have dried up following drought. In order to overcome this, China is currently developing two of three planned water transport canals with a budget of some 40 billion Euros in order to transport water from the south to the parched north, though some eighty percent is predicted to be allocated to industry and city use.

Crops in northern China have to be irrigated continuously if grown between March and June as there is no significant rain to replace the depleted moisture till June. In the developed world the average person uses 800 litres of water weekly while in the underdeveloped world the figure is 80 litres. In the State of New York, the price of water has increased by forty percent in the last two years.

The world can no longer take for granted a continued quality supply of this natural resource. The fact that major companies such as Campina have started to highlight the necessity to conserve supply of water emphasises this fact. Campina are involved in launching and supporting projects to conserve water consumption both at plant and farm level, e.g. they have developed a programme to collect rain water at plant and farm level.

Over the past 2 years severe drought has been experienced in Australia leading to severe problems for grain and dairy producers, with production being severely curtailed. It will take many years for recovery to take place.

Long term predictions regarding climate change suggest that parts of the world will suffer further periods of drought, especially in parts of America, Australia and Europe. Even in parts of the South Island in New Zealand, around Canterbury, irrigation is necessary during summer time to stimulate grass growth. For the first time, water levels in the above regions has fallen below the first aquafare level of 24ft, leading to question marks about the long term viability of dairying in this region and definitely reducing growth.

In California, dairy farmers have to irrigate all crops to feed their animals – a costly activity. A conversation with Cornell Kasbergen, a California dairy farmer who milks 2000 cows, illustrates the problems. He said that he was thinking of relocating to Texas because of lack of rainfall. The water tables in his wells have dropped by over 60 ft in the last three years leading to extra drilling costs. He said that he needs rain urgently or else the situation will become catastrophic.

Presently, the population of California is 27 million, projected to grow to 50 million by 2025. He says that the growing population will have first access to water and not the farmers.
Irish farmers and the industry at large presently have no such worries and this is one less obstacle in the development of the Irish industry.

The following photographs show how much climate and water can affect feed grown for animals, with cows grazing cheaply produced grass in comparison to grain-based diets in Europe and USA.

New Zealand: Grazing Early Spring

Europe: Feeding Systems

7.5 Energy Costs

Currency

With relation to currency fluctuations many distortions take place. Production costs of grain in Argentina, following the devaluation of the Argentine Peso, have dropped from $114/Ha (2000) to $84/Ha (2005). The budget and trade deficits of the United States, associated with policies of the US Federal Reserve, have caused a drop in the value of the US Dollar affecting Irish exports of casein and other dairy products. Irish Dairy Board figures show that when the Dollar to Euro currency rate went from $1.16 to $1.26/Euro, product prices dropped by 8.5 per cent. China and the USA engage in trade agreements where the US Dollar is tied to the Chinese Yuan in comparison with the currency fluctuation between the Euro and the Dollar.

Currency fluctuation can impact on interest rates which apply in different countries impacting on farm expansion. WTO has failed to take account of the impact of currency fluctuation in its discussions. While it is a difficult economic topic applying to all industries its impact on a substantial dairy exporting nation such as Ireland cannot be underestimated.

Discussions need to happen regarding the impact that a strong Dollar would have on the cost of oil for the Irish dairy industry e.g. if the Dollar and Euro were to reach parity as happened in the 90's the cost of oil as a raw material would increase substantially impacting on the cost efficiency of the Irish dairy industry.

8 The Future of Dairy Farm and Processing Industries

The dairy processing industry in Ireland, despite rationalisation, is still fragmented with up to eleven different companies processing milk. The majority convert milk into commodity products such as cheese, butter and milk powder. A limited number have made in-roads into function foods and protein markets, most notably the Kerry Group[29]. Many of the leading, infant nutrition companies in the world are now based in Ireland e.g. Wyeth Medica Ireland and Abbott Ireland. These companies now export food products worldwide, while research conducted by the research companies, in conjunction with Teagasc Moorepark, suggest that milk by-products contain many health attributes particular to grass based production. A coordinated and focused approach in developing value added milk products aimed at foreign markets would yield dividends.

The Irish dairy industry at processing level is fragmented with a much smaller throughput of product at plant level. This is evident from Figure 3.1 below.

IE	**DK**	**NL**	**NZ**
Number of companies **processing** 80% of the milk pool, 2001			
3	1	2	1
Average plant size – **cheese**, 2001 ('000 tonnes)			
12.0	8.9	24.7	31.3
Average plant size **– butter**, 2001 ('000 tonnes)			
11.6	5.7	21.7	35.2
Average plant output – **powder**, 2001 ('000 tonnes)			
9.9	18.3	16.0	69.6
Raw milk processed per **employee**, 2000(tonnes)			
560	451	881	1120

Figure 3.1 Statistics on plant operations, Prospectus 2003 Report

Other product throughput at plant level is also evident in Figure 3.1 below. It highlights the low scale at which the Irish dairy industry operates and the problems it faces as it attempts to compete with its more efficient counterparts in Europe and in New Zealand. Fonterra, because of farm scale, have more efficiency at processing level which many Irish or European countries cannot achieve. An example of this is their huge drying facility at Taranaki in Waikato where milk is transported on trains from different regions.

Going forward, investment will be required to upscale production facilities if production increases following proposed elimination of quotas. In a liberalised trading world, I believe that dairying will be the major agriculture activity taking place in Ireland with production increasing. In order for this to happen however new thinking will be required. Some of our Co-Ops are at the forefront of research in dairy ingredients, functional food and developing proteins that can be used in the medical industry.

Figure 3.1 shows the level of capital expenditure as a percentage of turnover in the respective countries.

[29] Fonterra in New Zealand and Arla in Denmark and Sweden are major international players

Ireland	2.63
Denmark	4.5
The Netherlands	2,8
New Zealand	4.8

Figure 3.2 Capital expenditure as a percentage of turnover, 2001, Prospectus 2003 Report.

This re-emphasises the low level of investment in the Irish processing industry as a whole, though some Co-ops are achieving greater levels of investment.

Up to now, Fonterra farmers must purchase shares in their Co-ops when increasing supply or commencing dairy farming in order to facilitate investment at processing level by the Co-op. This rule was believed to be stagnating dairy production in New Zealand because of the high cost it placed on dairy farmers when setting up or expanding in business.

Last year saw the emergence of the dairy equity scheme in Fonterra whereby investors, including farmers, could buy these shares and reap the returns on their investments from the returns of Fonterra's overseas operations. This has enabled some younger farmers to start production but the question remains for the dairy industry worldwide, "how to give farmers the best milk price for the least investment and when investment is required, who finances it"? Inevitably, only the dairy farmer can, as investors generally seek a higher return whether they are public or private equity investors.

The Co-op ethos always tries to give the best return to farmers through milk price but as Co-ops expanded their product base, sources of funding were required. In Ireland, Glanbia and Kerry have gone the public funding route. Some Co-ops in the US have gone the private equity route. In Europe, Co-ops are funded by farmers either through loan guarantees or share investments. In Ireland, if production expands are we likely to see the introduction of "Peak Notes"? i.e. a lesser milk price if a farmer supplies above his previous annual weekly average. Will Co-Ops try to use up excess capacity in the off peak months by encouraging increased supply in these months? Smaller Co-Ops will be unable to finance investment in stainless steel because of limited throughput.

The future, I believe, initially lies in creating three Co-op federations with smaller Co-ops retaining their identity within these federations. The aim would be to streamline operations as follows:

1. single management team running each federation
2. one research unit associated with each federation
3. milk assembly rationalised
4. agribusiness streamlined
5. other Co-Op activities streamlined within each federation to give the best return to farmers e.g. laboratory facilities for milk testing centralised
6. Co-Ops within each federation would have to devise a shareholding system which would enable farmers to benefit from their investment

All of the above is needed in the short term to ensure that the industry is capable of seeking investment from farmers or other sources to help prepare for possible expansion, come liberalisation. In order to ensure a return on their investment, a milk Council should be set up to ensure that all federations pay a milk price which represents market returns. Only when the future is more certain will firm investment proposals come forward. Some assets of the Irish

Dairy Board should be made available to help rationalise the industry pre-liberalisation, but must be used to develop and drive the industry forward and not compensate for past failure at Co-Op level.

Courage is needed, old loyalties must be put aside and to quote Martin Bennett, a prize winning New Zealand dairy farmer, "it is easier to find reason not to change than to find reason to change".

In discussion with New Zealand farmers many opinions were given about the structure of Fonterra, some of which were positive and some negative. These concerns were best clarified by Professor Alan Robb of Canterbury University who has serious reservations about Fonterra's level of debt and cash flow. Many believe that the advent of a dairy equity scheme is the beginning of the end for Fonterra as a Co-op, with a public issue of some, if not all of Fonterra's divisions, a possibility in the medium term.

When I spoke with the Head of Treasury at Fonterra he believes that private equity groups have access to huge amounts of capital and will make it very difficult for Fonterra and other food companies to expand by buying likeminded companies, as private equity groups do not have to comply with the same levels of compliance as public quoted companies. Also, many of the private equity groups take a short term view and leave their companies short of long term investment capital. This is one of the biggest issues facing Fonterra as a company as it seeks to expand in other countries.

Reflection

The bio fuel phenomenon is likely to have a huge impact on the dairy industry for the next two to three years, driving the price of grain higher and impacting on the cost of food for human consumption and feed for animals. It is impossible to forecast at this stage how long this bio fuel surge will last but I believe it will lead to increased prices for Irish dairy farmers.

The Irish dairy industry, like all other industries, will be subject to problems at different levels and how it addresses these problems will determine its future.

Proposed liberalisation is one of the biggest tests that it will face. All is not lost; Ireland has a climate which enables its dairy farmers to grow cheap feed i.e. grass. Long growing seasons are likely to prevail despite envisaged climate change. As an industry, it is presently operating close to world market prices. Expansion at farm level always happened in the past and will do so in the future. The number of farmers will continue to decline offering opportunities for the brave.

We have the potential to become the "New Zealand" of Europe, with increased production possible as our beef industry suffers under liberalisation.

Fragmentation of farms is a major issue. Extra land is available for dairying on most farms, but is presently being taken up with beef production. Research must be a top priority to help shape the future as is evident with the ECO-N concept in New Zealand. Processing needs to gradually change. The era of liberalisation can be faced provided we are prepared to adapt and create our own future - as Albert Einstein[30] said, "The significant problems that we face cannot be solved by the same level of thinking that created them".

[30] Albert Einstein, Nobel Prize Winner

9 References

Amberger, A. 1989: Research on dicyandiamide as a nitrification inhibitor and future outlook. *Communications in Soil Science and Plant Analysis 20: 1933-1955.*

Ball, P.R.; Field, T.R.O. 1982: Responses to nitrogen as affected by pasture characteristics, season and grazing management. *In*: Lynch, P.B. *ed*. Nitrogen fertiliser in the NZ agriculture. Wellington, NZIAS. Pp. 45-64.

Boyle, G, Department of Economics, National University of Ireland, Maynooth, Co. Kildare. The Competitiveness of Irish Agriculture.

Broad, J.J. and Hough, M.N., 1993. Growing and grazing season in the United Kingdom.

Breen, J. and Hennessy, T. Medium Term Analysis for the Agri Food Sector. Teagasc Rural Economy Research Centre, Dublin, Ireland.

Cameron, K.C.: Di, H. J.: Condron, L.M. 2002: nutrient and pesticide transfers from agricultural soils to water in New Zealand. *In*: Haygarth, P.: Jarvis, S. *ed*. Agriculture, hydrology and water quality. Wallingford, Oxon, Uk, CAB International. Pp. 373-393.

Cameron, K.C.: Di, H. J.: Condron, L.M. (2002a) Nutrient and pesticide transfers from agricultural soils to water in New Zealand. In 'Agriculture, hydrology and water quality'. (Eds P Haygarth, S Jarvis) pp. 373-393. (CAB International Wallingford: Oxon, UK)

Campina Co-op. URL: www.carpina.com.

Coulter, B.S., Lee, J., and McDonald, E., 1996. The status of soil survey information both conventional and GIS, LE Bas C and Jamagvem (eds), *Soil databases to support sustainable development*, joint research European Commission. INRA 61-69.

Cox, T. Agricultural and Applied Economics, University of Madison, USA.

Davies, D.M.: Williams, P.J. 1995: The effect of the nitrification inhibitor dicyandiamide on nitrate leaching and ammonia volatilization: A UK nitrate sensitive areas perspective. *Journal of Environmental Management* 45: 263-272

Denis, Samuel: Teagasc. URL: www.teagasc.i.e

Di, H. J.: Cameron, K. C. 2000: Calculating nitrogen leaching losses and critical nitrogen application rates in dairy pasture systems using a semi-empirical model. *New Zealand Journal of Agricultural Research 43*: 139-147.

Di, H. J.: Cameron, K. C. 2003: Mitigation of nitrous oxide emissions in spray-irrigated grazed grassland by treating the soil with dicyandiamide, a nitrification inhibitor. *Soil Use and Management 19*: 284-290.

Dillon et al, 1995. The effect of calving date and stockin rate on the performance of spring calving cows. Grass and Forage.

European Dairy Farmers (EDF). Analysis of farm costs throughout the World. Provider of background information for IFCN. URL: www.dairyfarmer.net.

European Environment Agency (EEA). URL: www.eea.eu.int.

Fingleton, W., 2002. The situation and outlook for Dairying 2002/2003.

Fingleton, B., Hennessy, T. Teagasc Research Economists, Rural Economy Research Centre, Dublin, Ireland.

Fonterra Co-op. URL: www.fonterra.com.

Fonterra Shareholders Council. URL: www.fonterra.com.

Food and Agricultural Policy Research Institute (FAPRI). URL: www.fapri.org.

International Farm Comparison Network (IFCN) Centre, Federal Agricultural Research Centre (FAL) Institute of Farm Economics and Rural Studies Bundesalee 50, 38116 Braunshwey, Germany. URL: www.incnnetwork.org.

Keane, T., 1992. Irish farming weather and Environment AGMET. Teagasc, 19 Sandymount Avenue, Dublin 4, Ireland.

Kerry Group. URL: www.kerrygroup.com.

Kilmaley. Teagasc Research Station, Co. Clare

McGarrigle et al., 2001. URL: www.epa.ie/Our Environment/Water/Rivers/RiveQualityReport2002.

Moorepark Teagasc Research Station, Fermoy, Co. Cork.

Oxford Farming Conference. URL: www.ofc.org.uk

Prospectus 2003. Strategic Development Plan for the Irish Dairy Processing Sector on behalf of the Department of Agriculture and Food, Enterprise Ireland, Irish Co-Operative Society, Irish Dairy Industries Association of IBEC.

Ravensdown Co-Op, New Zealand. URL: www.ravensdown.com.nz.

Schwarzer C, Haselwandter K (1996) Rapid quantification of the nitrification inhibitor dicyandiamide in soil samples, nutrient media and bacterial cell-free extracts. *Journal of Chromatography A* 732, 390-393. doi: 10.1016/0021-9673(95)01283-4.

Silva RG, Cameron KC, Di HJ, Hendry T (1999) A lysimeter study of the impact of cow urine, dairy shed effluent and nitrogen fertilizer on drainage water quality. *Australian Journal of Soil Research* 37, 357-369.

Shalloe, L., Dillon, P., O'Loughlin, J., Rath, M. & Wallace, M., 2004. *Comparison of a pasture based system of milk production on a high rainfall, heavy clay soil with that on a lower rain fall, free draining, grass and forage science*. Volume 59, Issue 51.

10 List of Figures