A Licence to Farm

A preliminary study as to how Irish agriculture can maintain its social licence to operate

A report for

NUFFIELD IRELAND

Farming Scholarships

by Lorcan Allen

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Scholar Contact Details
Lorcan Allen,
No 2 Josephine Avenue, Phibsboro, Dublin 7, D07 A8X7
Phone: +353 87 7502785
Email: lallen@farmersjournal.ie

In submitting this report, the Scholar has agreed to Nuffield Ireland publishing this material in its edited form.

NUFFIELD IRELAND Contact Details
John Tyrrell,
Executive Secretary, Nuffield Ireland.
Phone: +353 87 256 3501
Email: exec@nuffield.ie

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List of abbreviations

BP – British Petroleum

CDFA – California Department of Food & Agriculture

CO2 – Carbon Dioxide

DAFM – Department of Agriculture, Food and the Marine

Defra – Department of Environment, Food and Rural Affairs

DM – Dry matter

EFSF – European Financial Stability Facility

EPA – Environmental Protection Agency

EU – European Union

GFP – Global Focus Programme

GHG – Greenhouse Gases

IFA – Irish Farmers Association

IMF – International Monetary Fund

LU – Livestock unit

NDC – National Dairy Council

NGO – Non-governmental organisation

NPA – National Ploughing Association

NPWS – National Parks and Wildlife Service

PvdD – Party for the Animals

SLO – Social Licence to Operate

SRB – Sociedade Rural Brasileira

TB – Bovine tuberculosis

UFU – Ulster Farmers Union

What is social licence[1]?

The Social Licence to Operate (SLO), or simply the social licence, refers to the ongoing acceptance of a company or industry's standard business practices and operating procedures by its employees, stakeholders and the general public.

The concept of social licence is closely related to the concept of sustainability and the triple bottom line. Social licence to operate is created and maintained slowly over time as the actions of a company build trust with the community it operates in and other stakeholders. A company or industry must be seen operating responsibly, taking care of its employees and the environment, and being a good corporate stakeholder.

When problems do occur, the company must act quickly to resolve the issues or the social licence to operate is put in danger.

[1] Investopedia.com, 'www.investopedia.com/terms/s/social-license-slo.asp', October 2018.

Executive Summary

Traditionally, the biggest challenges farmers have faced in running their businesses have been:

- Price volatility
- Weather
- Access to new technology
- Finance
- Regulation
- Adequate government support

However, a new and unprecedented threat is fast emerging that is putting the future of many farmers at risk, not just in Ireland, but across the world. Over the course of this study, this author has increasingly noticed how farmers in countries with some of the proudest agricultural heritage such as New Zealand, the UK and the Netherlands are battling a new challenge, which is societal backlash against what they do for a living.

In simple terms, farmers are losing the social licence to operate because the general public no longer trust them. It is the view of the author that farmers in many countries are losing their social licence to operate for a wide variety of reasons including:

- Environmental impact of farming
- Animal welfare in agriculture
- Climate change

Effectively tackling this new challenge is difficult, particularly when set against an increasingly urbanising global population and a growing disconnect between consumers and farmers.

In Ireland, farmers and the agri-food sector are currently in an expansion phase, spurred on by the ending of EU milk quotas and the government's Food Wise 2025 strategy. While there are economic benefits to such expansion, particularly for rural Ireland, its important Ireland's agriculture sector is cognisant that increasing primary production on this island brings with it environmental, climate and animal welfare risks that could in turn lead to a deterioration in our farmer's social licence to operate.

As such, Irish agriculture needs a new strategy for the years ahead that is fit for purpose and recognises the need to maintain and continuously reinforce a farmer's social licence to operate in this country. What is clear about social licence is that it is a concept which is earned through proactive and positive actions over time that build trust between the farmer and the general public. It is also something that can be lost in a very short space of time.

To continuously reinforce and maintain the social licence to operate enjoyed up to now, a mind-set change will be required in how agriculture approaches issues, specifically around the environment, animal welfare and climate change. If this fails to happen, the risk of losing the licence to operate is real and Irish farmers could find themselves on the receiving end of public scorn.

Foreword

When I was first awarded my Nuffield scholarship, my planned report was to investigate the viability of Ireland developing a working futures market for milk so that Irish dairy farmers could better manage their risk and exposure to dairy market volatility.

To research this topic I travelled to the UK, the Netherlands, California, Chicago, Wisconsin, New York, New Zealand and Australia throughout 2017 and early 2018 to meet with farmers, dairy processors, dairy market brokers and dairy buyers.

During my time in New Zealand in February 2018, I visited with Juliet Maclean, the chair of Nuffield New Zealand. Over dinner, I told Juliet about my Nuffield travels and all the countries I'd visited over the past 12 months.

I remarked to Juliet how during my travels I kept meeting farmers who were becoming increasingly disenfranchised from citizens in their own country. Environmental pressures, animal welfare issues and climate change were all reasons farmers cited for the deteriorating perception that many consumers had of agriculture.

From California to Christchurch, the relationship between farmers and society was in decline. Farmers, by the nature of their work, are immensely proud of what they do and losing the trust of the general public had clearly hit them very hard on a personal level.

As we discussed possibilities of how farmers could repair the relationship with the end consumer, Juliet suggested I might rethink my original Nuffield topic on dairy futures and to potentially focus my efforts on addressing the widening gap between farmers and society.

If I've taken one thing from my experience as a Nuffield scholar it's to always say yes to a challenge. Keeping with that philosophy, I decided to change my Nuffield research topic at the last hour.

While it's been challenging at times, I'm confident it was the correct decision that has allowed me a greater opportunity for thought leadership on an important issue, which is what Nuffield scholars are encouraged to do.

I would sincerely like to thank Nuffield Ireland for awarding me the opportunity to undertake this scholarship and especially my sponsors. The last two years have been life changing in terms of the places I've been and the experiences I've had. Mostly, the Nuffield journey has been all about people.

For me, a Nuffield scholarship is a people programme that opens doors to some of the most inspirational and remarkable people operating in global agriculture. While agriculture faces many challenges, meeting the calibre of people I've encountered over the last two years leaves me in no doubt that agriculture has a very bright future.

Acknowledgements

Firstly, I would like to thank my family and friends for their support and encouragement over the last two years. While it's a fantastic opportunity to travel the world as part of a Nuffield scholarship, you are often absent for important occasions or events, leaving others to fill the gap in your absence.

To Niamh for her amazing support, advice and encouragement over the last stage of the report writing and pushing me to deliver the very best report I was capable of producing. My parents Willie and Mary have been my biggest supporters and are always there when I need advice. I also wish to thank my wonderful housemates Gerry and Michelle who have been so accommodating over the last year when I've had strangers over to stay in our house from all over the world.

Secondly, I wish to thank my manager in the *Irish Farmers Journal* Eoin Lowry who has been a mentor to me since the day we started working together. Eoin has been a wonderful role model for me in my career and was incredibly supportive when I decided to take on a Nuffield scholarship.

Similarly, Justin McCarthy, CEO and Editor of the *Irish Farmers Journal,* has given me incredible support and flexibility in my role over the last two years. This report would not be possible without that internal support in the *Irish Farmers Journal.*

I especially wish to thank my mentor Karen Brosnan, who has been instrumental in my own personal development over the last two years. Karen was always there to listen to my many thoughts, fears or concerns along this journey. I've been incredibly lucky to have her guidance since I was awarded the scholarship.

I also wish to thank Nuffield Ireland, especially past scholars Geoff Dooley and Bill O'Keeffe, for affording me this amazing, life changing opportunity. I especially wish to thank John Tyrrell, secretary of Nuffield Ireland, for being a constant source of encouragement and sound advice over the last two years. Nuffield Ireland is very lucky to have you and the incredible work you put into the organisation.

I would like to thank my fellow 2017 Nuffield scholars; Bryan, Eamon, Ed, Niall and Owen. We've had a great journey together over the last two years and I count myself lucky to know you all as friends.

I also wish to mention the special group of Nuffield scholars I travelled with as part of my Global Focus programme. Luke, Alex, Matthew, Chris, Jess, Kathryn, Martyn, Geraint and Mat – it was a privilege to spend six weeks' learning and travelling all over the world with you.

A special thank you also to the many wonderful people I have met throughout this study, especially the generous hosts that have made me feel so welcome. I also owe a huge debt of thanks to all the people who generously gave up their time for interviews or meetings along the way to help inform this study.

I also wish to thank Juliet Maclean, chair of Nuffield New Zealand, who sparked the idea in me to change my report topic right at the last minute. Nothing encapsulates the Nuffield spirit like rising to meet a new challenge head on and I'm proud to say I've achieved that by delivering this report.

Objectives

The main objective of this report is to:

1. Illustrate examples of how farmers in many different countries have lost, or are losing, the social licence to operate (farm) and examine the root causes of this decay.
2. Examine the current health of the social licence held by Irish farmers today and the perception farming is held in by Irish society.
3. Assess what the greatest risks are to the social licence held by Irish farmers.
4. Illustrate examples of where farmers are successfully maintaining the social licence between them and society.
5. Analyse the proactive work that is being done in these instances and assess how it can be replicated/scaled so the wider farming sector can maintain its social licence to operate.

Introduction

In 1956, Sir Geoffrey Chandler left his position as a journalist with the Financial Times to join the British-Dutch oil giant Royal Dutch Shell. Over a 22 year career with Shell, Chandler rose to become a senior director with the company, working in exotic locations such as the Caribbean and West Africa.

What's interesting about Chandler is that he was a man well before his time, advocating as far back as the 1970's for Shell to hold itself to a higher standard and create its own corporate social responsibility principles.

Chandler's beliefs, which claimed that companies have a moral duty to behave responsibly when it comes to society and the environment, were very much contrarian for the time[2].

While it would be decades later before multinational companies first began to take his ideas seriously, Chandler got his wish in 1976 when Shell introduced a companywide code of conduct titled a *Statement of General Business Principals.*

Long after he moved on from Shell in 1991, Chandler remained a fervent proponent of the idea that businesses have a responsibility to do the right thing, regardless of whether it's beneficial to the bottom line.

Today, almost every large company the world over has a set of corporate social responsibility principals. Whether they are taken seriously or not by most companies is questionable. However, most companies do understand the need to behave in a certain manner in order to maintain their licence to operate and make profits.

Companies understand more than ever in today's connected world that the social licence to operate can never be self-awarded. Social licence is only earned over time by acting in a responsible and acceptable way that earns the trust of society.

While it takes years to build a social licence, it may take just one incident to undo that trust with society. Probably the most high profile example of a company almost instantly losing its social licence to operate is British Petroleum (BP) following the Deepwater Horizon oil spill in the Gulf of Mexico in 2010.

In the food industry, examples include the horsemeat scandal that erupted across Europe's meat industry in 2013, as well as the 2008 baby formula scandal in China when six babies died and 54,000 were hospitalised after drinking milk and infant formula tainted with melamine.

The common thread among all these incidents appears to be that trust between the general public and the offending company or industry is severely damaged. However, the examples above are just the most high profile examples of the social contract between society and companies, or an industry, breaking down.

What is much harder to do is find examples where the social licence between the general public and a company/industry remains robust, as the signs of this are far less obvious.

[2] P. Mason, 'Sir Geoffrey Chandler obituary', *The Guardian,* April 2011

During my travels for my Nuffield scholarship over the last two years, this author has noticed a breakdown or deterioration of the social contract between society and farmers in a number of countries, including the UK, the Netherlands, the US, Canada, Brazil and New Zealand.

Incredibly, these are all countries which are seen as leaders in the global agriculture sector. Some of the factors behind the declining social legitimacy of farming in these countries varies but includes the negative environmental impact of agriculture to animal rights issues to the climate change agenda. In Ireland, agriculture has largely remained unscathed from this trend and, in the view of the author, farmers are held in high regard by the general public. However, it is unwise to believe this may not change.

More than ever the general public is more aware of climate change and understand on a basic level that our planet is heating up because of human activity. Carbon dioxide (CO2) has been targeted as one of the greatest causes of climate change and countries, industries and businesses are under pressure to measure CO2 emissions and begin reducing them.

The absence of a heavy manufacturing sector in Ireland means that agriculture accounts for a greater share of Ireland's CO2 emissions than is typical in most other countries and our farming industry is coming under increasing pressure to reduce its carbon output. This is becoming a hard circle to square given that Ireland's primary sector is in an expansion phase and livestock numbers on this island are increasing.

The increasing numbers in the livestock population raises more and more questions from the general public about the environmental impact of more intensive farming in Ireland, particularly in relation to the quality of our waterways and air.

In addition, farming will always face opposition from animal rights groups who are fundamentally opposed to agriculture. In Dublin and many other urban centres around Ireland today, large billboards display messaging from vegan/animal rights groups questioning the legitimacy of livestock farming.

Faced with these threats, Ireland's agriculture sector has work to do in order to maintain its social licence to operate.

This report will present examples from other important agricultural countries where the social contract between farmers and the general public has either broken down or is in a state of decay. The value of this report is that it will throw light on a new issue that faces Irish agriculture in the years ahead. By understanding the mistakes and experiences of farmers in other countries, Irish agriculture can prepare itself today for the challenges it may face further down the road.

PART 1

Irish agriculture and society today

The global financial crisis which started in 2008 hit Ireland harder than most countries in Europe, and even the world. Our financial sector was badly exposed following a decade of credit fuelled expansion and the Irish economy duly collapsed into recession, culminating in 2010 when the government of the time requested financial support from the European Union's European Financial Stability Facility (EFSF) and the International Monetary Fund (IMF).

The collapse in the Irish economy saw thousands of jobs lost with the unemployment rate rising from 4.2% in 2007 (which was practically full employment) to almost 15% by 2012. In response to the crisis, the Irish government began to prioritise the indigenous agri-food sector as a means to create new employment and drive exports.

Irish farmers and the agri-food industry responded to the government's call to action. Between 2009 and 2016, output from the primary sector expanded by 47% to reach €6.9bn, while food and drink exports have soared by almost 80% in value, or €5.5bn, since 2009 to hit a record €12.6bn last year[3].

The increase in activity in Ireland's farming and agri-food sector has resulted in total employment in the sector rising by 17% from just over 150,000 in 2009 to reach almost 175,000 in 2017[4]. While many sectors of the Irish economy were in retreat during the recession, Ireland's agriculture and food industry remained one of the few bright sparks in the economy, creating jobs through capital investment in expansion and strong export growth year after year.

Ireland's agri-food industry regained its confidence during these difficult years as it kept the wider Irish economy ticking over through bank bailouts and fiscal adjustment in the public finances. As one of the few good news stories during the period, the agri-food industry enjoyed more attention from the national media than it had in a long time, which helped to build a positive profile for the sector with the ordinary public.

The ending of the EU's dairy quotas in 2015 was also heralded by the government and the national media as a unique opportunity to deliver significant economic benefits for rural Ireland. As a result, Irish agriculture and the food processing industry have developed a very positive relationship with the wider general public and relations are in a good place.

This is perhaps best illustrated by the record crowds attending the annual Ploughing Championships held by the National Ploughing Association (NPA), while the hugely successful RTÉ show *Big Week On The Farm* attracted some 1.3m viewers in 2017, or an average audience share of 28%.

However, while Irish farmers are in a good place right now in terms of the health of their social licence to operate, tail risks remain and the industry must be careful of complacency as Ireland's modern society is changing rapidly.

[3] Bord Bia, '2017 Export Performance & Prospects', January 2018
[4] Department of Agriculture, Food and the Marine, 'Fact Sheet on Irish Agriculture', January 2018

Ireland: what are the tail risks to farmer's social licence?

In July 2010, the Irish government published its Food Harvest 2020 document – a strategy roadmap which laid out a 10 year vision for the Irish food and drink industry[5]. The overall aim of the strategy was to grow production from the primary farming sector by an additional €1.5bn to reach €6.3bn by 2020. The strategy also aimed to grow Irish food and drink exports to €12bn by 2020, which would represent a more than 40% increase on average exports from 2007 to 2009.

This new industry wide roadmap was broadly welcomed by farmers and industry alike as the government was prioritising growing an indigenous sector that had been neglected for many years during the Celtic Tiger period. Impressively, many of the targets laid out under the Food Harvest 2020 strategy were achieved by farmers and the food industry well ahead of schedule.

In 2016, output from the Irish primary sector totalled more than €6.9bn – well ahead of the 2020 target of €6.3bn. In 2017, Irish food and drink exports grew for the eighth consecutive year to hit €12.6bn – almost 60% higher since 2010 and well ahead of the 2020 target of €12bn.

Photo 1: Minister for Agriculture Simon Coveney and Kepak's Kevin Cahill at the launch of Food Harvest 2020.

Realising the industry was expanding at a faster pace than targeted, the government reviewed its strategy and set a goal of growing primary output to €10bn and food and drink exports to €19bn by 2025. This updated strategy is known as FoodWise 2025[6].

[5] Department of Agriculture, Food and the Marine, 'Food Harvest 2020 – A vision for Irish agri-food and fisheries, July 2010.
[6] Department of Agriculture, Food and the Marine, 'Food Wise 2025 – A 10-year vision for the Irish agri-food industry, July 2015.

Meeting these targets is going to require further expansion in production from Irish farmers and food companies. What is clear is that most of the increased output today has come from the dairy industry, as farmers dramatically increased milk production since the ending of milk quotas in 2015.

In order to meet the FoodWise 2025 targets, Irish milk production may have to continue growing at double digit pace, as it has done in the last three years. However, there are already questions arising as to the environmental and economic sustainability of this strategy.

Firstly, Irish farmers are milking more cows but the industry's position as a producer of bulk dairy commodities such as butter, cheese and milk powder mean farmers are more exposed to the volatility of dairy markets than ever before and farmgate milk prices have shown they can fall below the cost of production as happened in 2016.

Dealing with the explosion of milk in recent years, particularly during peak supply months, has left the processing industry with little option but to dry the extra milk into low value powders instead of moving it further up the product value chain.

Should the milk tap continue to flow the Irish milk production curve is expected to become "peakier" and processors may be forced to dry more milk into low value powders during peak months. This will not cause farm incomes on dairy farms to increase.

Photo 2: Ireland is one of six EU member states with a Nitrates derogation aimed at protecting our waterways.

Secondly, it's just three years since the shackles of dairy quotas came off and Irish farmers could start producing as much milk as they wanted but already questions are arising as to the environmental cost of further expansion.

On top of this, Ireland is facing heavy financial penalties for missing climate change targets set out by the EU. Increasing cattle numbers in the country is not helping Ireland meet its 2020 carbon emission targets.

Like New Zealand, Ireland trades off its images as a clean, green producer of grass fed meat and dairy. However, the intensification of production and higher stocking rates on many farms is increasing the risk of environmental damage caused by nutrient or manure runoff into streams and waterways.

In May 2018, the EU Commission published a new report on the implementation of the Nitrates Directive, which is the EU policy agreed in 1991 aimed at protecting water quality in member states by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices.

The report found that the Nitrates Directive has been successful over the last 20 years in reducing water pollution across Europe caused by nitrates in both surface and groundwater. Ireland scored well in the European Commission report and was noted as one of three member states with the highest proportion of monitored water stations where there was less than 2mg of nitrate per litre of water tested.

However, Ireland cannot be complacent as the whole of the country is classified as a nitrates vulnerable zone. Ireland is also one of six member states that has a derogation within the Nitrates Directive to exceed the maximum amount of 170kg of nitrates per hectare per year from livestock manure.

With cattle numbers set to continue increasing in Ireland in the years ahead, farmers and environmental authorities will need to work very closely to ensure water quality in this country is protected at all costs.

In June 2018, more than 1,000 brown trout died in the Ballygowan River in Co Mayo[7]. The river is one of the prime spawning tributaries of the Robe River, which flows into Lough Mask. Inland Fisheries Ireland believe effluent of agricultural origin killed the fish, adding that it will take a number of years for the affected stretch of river to make a full recovery.

Another warning light for Irish farmers went off in June 2018 when the Environmental Protection Agency (EPA) published its annual report on drinking water quality in Ireland[8]. The report found that, while the quality of drinking water in Ireland remains high overall, pesticide contamination was persistent in some water supplies around the country.

The 2017 report on drinking water quality found that 48 water supplies around Ireland failed to meet standards for maximum pesticide residues at least once during 2017. This was an increase on the 2016 pesticides failure rate and confirms the trend that pesticide contamination in drinking water has been on the rise over the last six years in Ireland.

The EPA found that 80% of all failures detected were a result of contamination from the herbicide MCPA, which is commonly used to control rushes in grassland. Incidents such as these are the exception rather than the norm in Ireland but Irish farmers still need to be vigilant. Building a good reputation takes many years of hard work. Destroying that reputation can happen in an instant, especially considering the speed at which news stories (fake or real) will travel around the world today.

[7] B. Cassidy, 'Over 1,000 fish killed as agricultural effluent enters river in Co Mayo', *Irish Farmers Journal,* June 2018

[8] Environmental Protection Agency (EPA), 'Drinking Water Report for Public Supplies 2017', P28-29, June 2018

PART 2

Farming in decline: lessons from abroad

Over the last two years, my Nuffield scholarship has brought me to some of the world's leading agriculture producers including Brazil, the US, Canada, the Netherlands, the UK, New Zealand and Australia.

Agriculture is big business in all of these countries and has a proud tradition going back many, many generations. Farmers in nearly all of these countries are producing grain, oilseeds, meat and dairy for the world export market.

Given the proud tradition of agriculture in these countries, it was eye-opening to repeatedly learn that farmers in these countries were coming under increasing pressure from different groups, including government authorities, non-governmental organisations (NGOs), animal rights activists and even their fellow citizens for a whole host of different reasons.

While the specific circumstances in each country differ, there is commonality in the overarching reasons why the social contract between farmers and society in these countries is under threat. Namely, the environmental impact of intensive agriculture and animal welfare concerns is drawing greater scrutiny on farmers than ever before.

This section of the report will present case studies from Brazil, the US, the Netherlands, the UK and New Zealand where the author travelled in 2017/2018 and noticed how the social licence between farmers and the general public, in the author's opinion, has either broken down or is in a state of decay.

Environmental Concerns

Case Study 1:

Water quality in New Zealand

In February 2018, the author spent five days with New Zealand dairy farmer and 2017 Nuffield scholar Mat Hocken on his farm near the town of Fielding, on the north island of New Zealand. Mat lives in the Manawatu region of New Zealand, which takes its name from the Manawatu River and its floodplains that flows through the region.

Driving around the region one day, Mat stopped on a bridge that allowed for a stunning view of the Manawatu Gorge, a gaping canyon eroded by the river between the Ruahine and Tararua mountain ranges.

Photo 3: The Manawatu gorge in New Zealand. A stunning canyon eroded by the Manawatu River.

The view of the Manawatu Gorge is typical of the many stunning landscapes that has made New Zealand such a favourite of tourists. The gorge resembles many of the scenic shots from the Lord of the Rings trilogy that has drawn huge numbers of tourists to New Zealand since their release.

Sitting in his truck admiring the view, Mat surprised the author when he said “you wouldn’t think that was one of the most polluted rivers in the world would you?”

What Mat was referring to was a 2009 study undertaken by the Cawthron Institute[9], New Zealand's largest independent science organisation, which took a pollution measurement of 300 rivers in North America, Europe, Australia and New Zealand.

The research ranked the Manawatu River as the most polluted of all 300 rivers surveyed with the water said to be fouled with raw sewage, industrial waste and nutrient runoff from nearby farms.

What stood out, and grabbed the attention of the New Zealand media, was that the research found that the Manawatu River was almost twice as polluted as the next worst river.

Dr Roger Young, the scientist behind the report, identified leaching farm nutrient (mainly nitrogen runoff) and treated town sewage as the principal pollutants entering the river.

The report by the Cawthron Institute sparked headlines in the New Zealand media that the Manawatu River was the most polluted in the world. The Dominion Post, a Wellington-based Newspaper, carried a front page story on the reports findings with a headline declaring the Manawatu *"Our River of Shame".*

The negative media coverage quickly made the Manawatu River infamous as the world's most polluted river. Much of the resulting public anger in New Zealand was aimed at farmers, particularly dairy farmers, for their impact on the water quality in the river due to nutrient runoff.

However, in March 2012 the New Zealand Ministry for the Environment published a new report on water quality titled "Water quality in New Zealand: Understanding the science[10]."

This government report found that the Manawatu River was not the worst polluted river in the world, although it did indicate the river was "very unhealthy."

The report found that:

> *"Levels of pathogens in parts of the [Manawatu River] catchment often exceed standards for swimming and drinking. In large part this is due to rain washing manure into the river, while in many places animals are still able to defecate directly into the water."*

Dr Ross Young of the Cawthron Institute also clarified that his 2009 report did not indicate the Manawatu River was the most polluted in the world as reported by the media. Instead he noted that his method of measuring water quality was relatively new and had only been used to measure water quality on a fraction of the world's rivers.

However, Dr Young maintained that his research had shown the river to be heavily polluted compared to other rivers in the survey.

> *"[The Cawthron Institute's] research DOES NOT indicate that the Manawatu River is the worst in the western world. Nevertheless, our results do indicate that the Manawatu River is very unhealthy. Other indicators of river health such as nutrient concentrations, water clarity, faecal bacteria and stream invertebrates also indicate the poor status of the Manawatu River."*

[9] Dr R. Young, 'Water Quality in New Zealand', Cawthron Institute, November 2009.
[10] Parliamentary Commissioner for the Environment, 'Water Quality in New Zealand: Understanding the science', P60-67, March 2012

Regardless of where the Manawatu River ranks against other rivers in the world in terms of pollution, the fact remains that the river is still polluted, mainly due to nutrient runoff from farms and town sewage.

Production agriculture has grown and expanded considerably in New Zealand over the last three decades as the country has developed stronger export demand. However, the environmental impact of farming, particularly from heavily stocked dairy farms, is doing untold damage to the reputation of New Zealand's farmers.

Rather than being viewed as custodians of the land, many ordinary citizens in New Zealand now view farmers as polluters that are destroying the natural environment of the country. While no farmer sets out to intentionally damage the environment, new science and measurement is showing the impact farming can have on waterways and landscapes.

Although many farmers in New Zealand are doing really good work alongside government agencies and environmental groups to restore damaged waterways to a healthy state, it is a slow process that will take time.

Photo 3: Jacinda Ardern became Prime Minister of New Zealand in 2017 after her Labour party won the general election.

Unfortunately, many Kiwis have little confidence today in their farming community when they read results such as those from the Manawatu River.

In New Zealand's most recent general election, much of the debate was framed around a proposal by the Labour party to introduce a tax on water usage, which would have hit dairy farmers that use irrigation on the south island particularly hard.

After winning the general election, the Labour Party and Jacinda Ardern established a clean water summit to examine water pollution in the country's rivers and lakes, which is likely to deliver heavy recommendations around water regulations.

Ian Proudfoot, global head of agribusiness at KPMG, told the *Irish Farmers Journal* agribusiness conference in May 2018 that the new government in New Zealand had implemented a review of the country's dairy industry that will move to limit stocking rates on farms for environmental reasons.

> *"This is the biggest review of our dairy industry in 20 years so it's a big moment for the industry. Should the government be regulating the number of cows that are on a paddock? I don't know," said Proudfoot.*

It's certainly open to debate whether governments should be regulating stocking rates for farmers. However, the New Zealand government feel its hand has been forced in order to protect its second most important industry – tourism.

The landscape and environment is one of the major draws of New Zealand for tourists. Should the country damage its reputation as a scenic, green island due to polluted waterways, then visitor numbers will inevitably decline.

Case Study 2:

The phosphates dilemma in the Netherlands

In October 2017, Carola Schouten was appointed by Dutch Prime Minister Mark Rutte as the country's new Minister for Agriculture, Nature and Food Quality in the newly formed Dutch government. What's significant about this appointment is that for the previous seven years there was no Minister for Agriculture in the Netherlands.

In 2010, a decision was made to fold the Dutch Agriculture Ministry as a sub-division of the Ministry for Economic Affairs (Department of Business and Trade), leaving Dutch farmers with no Minister for Agriculture for the first time since the ministry was first established in 1935.

It's difficult to understand how a country like the Netherlands could operate without a Minister for Agriculture. The Netherlands exports €92bn worth of food, making it the world's second-largest exporter of food and agricultural products, after the United States, a country with a surface area almost 300 times the size of the Netherlands.

Photo 4: Dutch farmers were offered a €300/cow premium to cull dairy cows such as these MRI cows as part of a plan to tackle phosphates.

Speaking to Dutch farmers during the Global Focus Programme (GFP) in the Netherlands, many feel the decision in 2010 to abolish agriculture as a standalone ministry in the Dutch government is symptomatic of how farmers are viewed in the Netherlands today.

Farmers feel they lack strong political representation and are increasingly being dictated to by NGOs, animal welfare and environmental groups. Dutch dairy farmers believe the fall of agriculture in the political pecking order is one of the main reasons why they are now being forced to cull cow numbers as part of a new phosphates quota system.

In 2006, the Dutch government secured an 11 year exemption (derogation) on phosphate levels for farmers. However, that derogation ended in 2016 and the Netherlands has exceeded its EU phosphate limits for the last three consecutive years.

Three schemes have since been developed by the Dutch government to reach new targets directed by the EU, including a cow slaughter incentive scheme, a retirement scheme which allows phosphate rights to be sold, and lower phosphorus content in feed rations.

Under the cow slaughter incentive, farmers were offered a €300/cow premium to cull cattle in their herd. The incentive has seen the number of cows slaughtered in the Netherlands jump sharply since February 2017 to an average of c180,000 head per month. In some months, the Dutch cattle kill has hit highs above 200,000 head.

In total, about 180,000 dairy cows will need to be permanently culled under the new phosphates derogation, representing a 10% reduction in the Dutch dairy herd. This comes as a major blow to the 18,000 dairy farmers in the Netherlands, who are the EU's fourth-largest milk producers and contribute more than €7bn to the Dutch economy annually. Farmers feel the political system let them down when it came to fighting or lobbying in Brussels for a larger phosphates derogation.

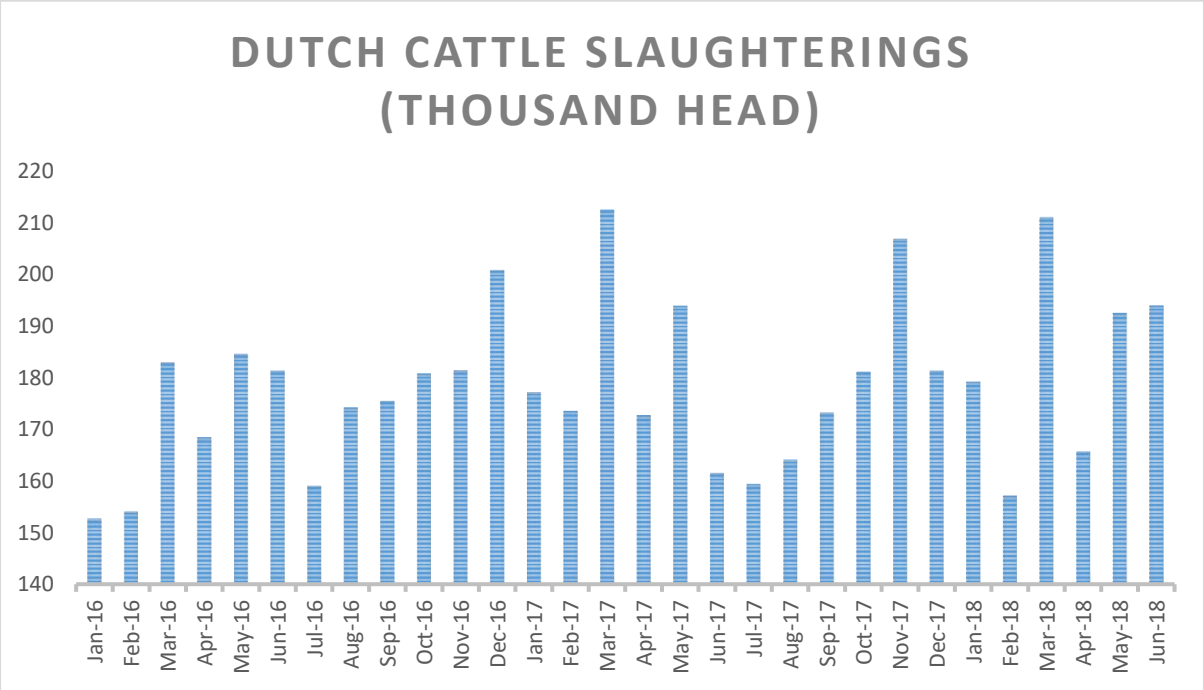

Figure 1: Dutch cattle slaughtering's January 2016 to June 2018 (source: Eurostat).

Like their Irish counterparts, Dutch dairy farmers have long been awaiting the end of dairy quotas in order to increase production. Less than two years into the dairy market liberalisation in Europe and Dutch farmers find themselves constrained by new environmental quotas they had little input or say on. Understandably, many feel aggrieved that they are being told to cull numbers just as they have invested to expand.

It has been reported in the Netherlands that some Dutch farmers, in a bid to get around the new phosphate limitations, have employed creative accounting techniques.

Under the Dutch phosphate reduction plan, a dairy cow counts as one large livestock unit (1LU). A heifer counts as about 0.5 LU. Once she calves down, she becomes a dairy cow of 1LU.

The Dutch agriculture ministry believes some farmers have manipulated their herd numbers by registering several calves to one cow as a multiple birth such as twins. The real dam of the second calf remains registered as a heifer (0.5LU) when, in practice, she is a fully-fledged dairy cow (1LU).

“This makes the farmer's livestock on paper smaller than in reality,” the Dutch agriculture ministry has noted. “This offers the farmer an advantage in the context of the phosphate reduction plan: they have to dispose of less livestock units or animals or to pay a lower levy.”

These farmers may now face criminal charges according to Dutch agriculture minister Carola Schouten.

“Any form of fraud is unacceptable and must be tackled hard. We must prevent farmers that do keep the rules from becoming the victims of farmers that tamper with the system,” warned Minister Schouten.

The Minister added that, in addition to levies and discounts on subsidies, the Public Prosecution Service will discuss whether the farms can also be criminally prosecuted. While the number of farmers in the Netherlands manipulating their herd numbers is a very small percentage of the total, such behaviour poses further risks to the collective dairy industry.

Dutch dairy farmers have pushed the bounds of production like no other group of farmers. The amount of milk produced in a small country like the Netherlands is extraordinary when compared to other European countries.

The environmental impact of such intensive production has drawn increased government and regulatory scrutiny in recent years. Unless Dutch dairy farmers cooperate with the new environmental regulations being introduced, they could further lose the confidence of their own government and society.

Case Study 3:

Shadow of deforestation looms large over image of Brazilian farming

Brazil is an incredible country in many ways. The combination of the country's tropical climate and easy availability of vast amounts of freshwater and underground water makes Brazil one of the most productive agricultural countries in the world.

The economic history of Brazil is measured in cycles, according to Joao Adrien, a director with the Brazilian farmer lobby group Sociedade Rural Brasileira (SRB). The first economic cycle in Brazil was known as the sugarcane cycle and started in the 16th century.

The next economic cycle took off in the late 17th century and is known as the mining cycle. The mining cycle was the first time that Brazilians began to colonise inland from the coastal cities.

In the 18th century the coffee cycle began in Brazil, spreading quickly as it is a low capital intensive enterprise. However, producing coffee beans requires good land as it is an intensive crop. This need for land saw the creation of the first agricultural frontiers in Brazil.

Photo 5: Rainforest cleared in Brazil to make way for farmland.

The most recent economic cycle in Brazil is known as the contemporary cycle. In the early 20th century Brazil was importing food to feed itself. However, in the 1960s the government of Brazil incentivised domestic food production in a drive for self-sufficiency.

The expansion of agricultural production began in the south of Brazil but farming soon started to move north to states such as Mato Grosso and the Mato Piba region. These were known as the new frontiers of Brazilian agriculture.

Farmers began clearing the rainforest in these states to convert land to agricultural production. By 1990, Brazil had become self-sufficient in terms of food production. However, the mind-set of expansion has remained with Brazilian farmers and vast areas of the rainforest continued to be cleared in the name of agriculture.

Between 1990 and 2000, an average of 4m acres of forestry were cleared every year in Brazil, according to Mongabay, a non-profit environmental media agency in Brazil.

However, from 2001 to 2005, this figure increased to 5.5m acres per annum. The highest rate of deforestation took place in 2004 when almost 7m acres of rainforest were cleared in Brazil.

Since 2007, Brazil's government has made efforts to curb deforestation. The average rate of deforestation has dropped to 1.8m acres per annum. Last year, just over 1.6m acres of rainforest were cleared in Brazil.

While the rate is slowing, it's still not enough. There has been a forest code in Brazil since 1965 but enforcement is almost non-existent. As such, some farmers continue to make land grabs along Brazil's agricultural frontier in Mato Grosso and Mato Piba in the name of growing Brazil's agricultural economy.

According to Joao Adrien, the new emphasis in Brazil on environmental protection is hard for many farmers to adjust to.

"Up to the 1990s the mind-set in Brazil was to expand the land area. Farmers were incentivised to expand. But then the environmental debate began and farmers were told to stop, which was difficult for them to understand," says Adrien.

However, many countries around the world recognise the importance of the rainforest to the global biosphere or climate, and they refused to trade with Brazil until it took action to prevent further deforestation.

This move, says Adrien, helped to change the mind-set of farmers in Brazil when they saw that the world market would not trade with them until they protected the rainforests.

"We still have a lot of critics, but I think we will change opinion in the years ahead," he says.

Case Study 4:

Almond production damaging California's environment

Prins family dairy is a second generation dairy farm just outside of Modesto. Milking 600 Swedish Red and Montbeliarde cows on a 370 acre farm, Kevin Prins now runs the family farm after taking over the business from his father John, who moved from Minnesota in the 1970's to start the farm.

"Right now the returns from almonds are about three times that of dairying," says Kevin Prins, who has seen many of his neighbours convert their dairy holdings over to almond trees. Like most dairy farms in this part of California, Prins dairy is surrounded on all sides with almond trees.

Photo 6: An almond tree plantation near Modesto in the central valley of California.

In the nearby town of Ceres, Gary Marchy operates a 520 cow dairy farm on a 255 acre block. While Marchy uses most of the land to grow maize corn for silage, he has converted some of the land over to almonds in recent years.

"This year I've just put about 40 acres into almonds," says Marchy. "I just see the profits that will come from the almond crops as a hedge against my dairy business."

In 2007, the California Department of Food & Agriculture (CDFA) estimated 765,000 acres in California were planted in almonds[11]. Today, that figure has almost doubled to more than 1.3m acres, according to the latest forecast by the US Department of Agriculture. During that time, the price of almonds have increased from $1.45/lb and peaked at $4/lb in 2015.

[11] California Department of Food & Agriculture (CDFA), '2017 California Almond Acreage Report', April 2018

The sharp rise in the planted acreage in California of almond trees is a reaction to the high price of almonds over recent years. California accounts for 80% to 90% of the world's supply of almonds and these high prices are a result of surging global demand.

The rise in demand for almonds is linked directly to the growing popularity of alternative or fake milk. Almonds used in milk substitutes has risen from almost nothing a decade ago close to 50m lbs (23m kgs) per annum today.

Previously, almond milk substitute accounted for just a tiny fraction of US almond production. Today, 25% of all almonds produced in the US go into making almond milk. The volume of almonds used in making fake butter substitutes has tripled since 2011.

While farmers in California are simply reacting to shifting consumer trends by putting more acres into almonds, there are significant environmental ramifications from growing almonds in California. For four consecutive years from 2012 to 2016, California experienced one of the worst droughts in its history.

This prolonged drought in California was exacerbated by a severe depletion in the underground aquifers in the central valley of California, which provide the state with almost a third (30%) of its water supply. The depletion of water reserves in California's underground aquifers has been linked to the surge in acres planted in almond trees.

Photo 7: Large canals are used to transport water from central reservoirs out to farmers in California.

Farmers in California have rights of access to water ahead of private citizens who use the water for domestic needs. The central valley of California is a maze of concrete canals and channels that run along the roads. When a farmer needs water they call the local water board and water is pumped down the canal to their farm for use on their farmland.

Irrigation on most Californian farms, be they almond or crops such as maize corn, is done via flood irrigation.

However, according to Paul Sousa, director of environmental services for Western United Dairymen, a farmer organisation in Modesto California, the almond boom is having a very negative impact on California's water reserves.

In a traditional California dairy farm, water is used to irrigate maize corn crops, which is fed to cows as forage. According to Sousa, when corn crops are flood irrigated about 30% of the water is not used by the crop and leaks back down into the underground aquifers, thereby somewhat replenishing the state's water reserves.

However, Sousa says that almond trees are an extremely thirsty crop and when they are flood irrigated they use up 100% of all the water, leaving nothing to return below to the underground aquifers. Expanding almond plantations have put an increased drain on California's water supplies and is aggravating the drought situation in the state.

The irony of the situation is that almond production in California is expanding to meet the demands of consumers who want to drink milk substitutes such as almond milk because they perceive it to be healthier and more ethical compared to conventional milk produced from cows.

However, the environmental consequences of almond production are not as obvious to ordinary citizens as the damage is taking place below ground. On traditional dairy farms in California, manure treatment, water quality and C02 emissions from cows are challenges facing farmers that has attracted significant public scrutiny.

Californian consumers see the almond tree, and by extension almond milk, as an environmentally friendly alternative to traditional dairy. It was not until Californians living in the central valley where almonds are mostly grown were forced to go without showers and running water in their homes because of the prolonged drought that questions began to arise about the state's water supplies.

And because farmers have first rights to the water aquifers underground, ordinary Californians living in the central valley began to blame farmers and their almond crops for the severity of the drought which hit the state.

Animal Welfare

Case Study 5:

Animal welfare issues in the UK dairy industry

An analysis carried out by UK Nuffield scholar Tom Levitt for the Guardian newspaper in March 2018 found that an estimated 95,000 bull calves were killed on UK dairy farms in 2017[12].

This figure represents almost 20% of all male dairy calves born in the UK last year. According to Levitt, it can cost a UK farmer up to £30 (€35) per calf to rear it and sell it on for beef or veal.

The typical length of time farmers need to rear a calf to a decent weight is two to four weeks. The cost of this is about £2 per day, although it does not include extra costs such as transporting the calf to market, registering its birth or veterinary bills. Bull calf prices in the UK market range from £25 to £40 (€30 to €45).

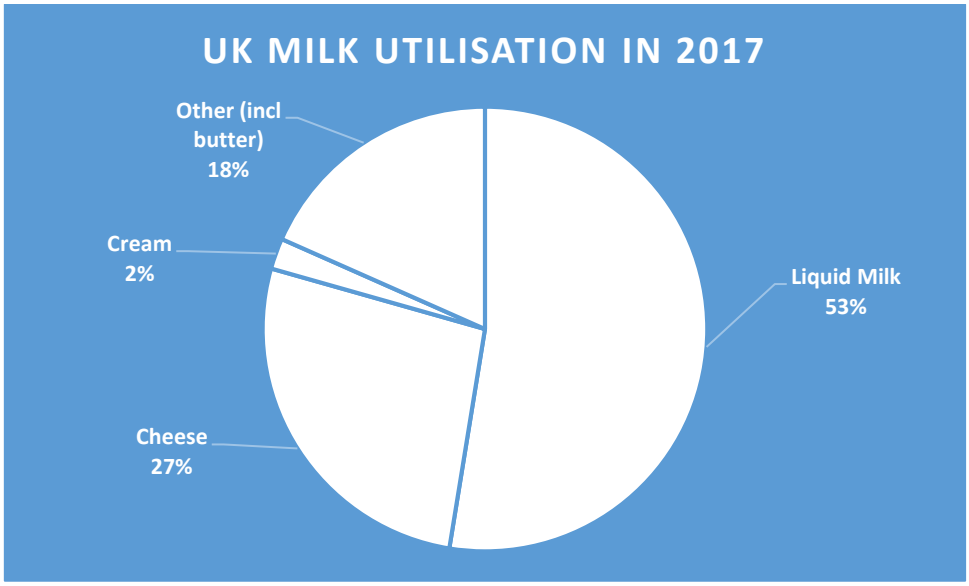

Figure 2: Milk utilisation in the UK. Over 50% of all UK milk is sold as liquid milk.

In contrast, the cost of sending the calf to a knackery for early disposal is as little as £9 (€10.50) or farmers can simply shoot the calf themselves, says Levitt. This early disposal of calves on UK dairy farms is known by farmers as the sector's 'dirty secret'.

While no UK farmer takes enjoyment from such a practice, the significant numbers of bull calves being disposed of early on UK farms is the combination of a number of factors that have left UK dairy farmers with very few options.

[12] T. Levitt, 'Dairy's 'dirty secret': it's still cheaper to kill male calves than to rear them', *The Guardian,* March 2018

Firstly, over 50% of all milk produced in the UK is sold as liquid milk[13]. Since the early 2000's, intense competition in the £185bn UK grocery retail market has forced the dominant supermarkets in the UK to use meat, fresh produce and milk as low priced/low margin goods in a bid to attract extra footfall into their stores.

This has had a downstream effect on UK farmgate milk prices, which in turn forces farmers to cut costs within the farm gate, such as early disposal of bull calves that have a low market value.

Secondly, UK dairy farmers have lost one of their main outlets for bull calves over recent years. At one point up to 500,000 calves were live exported from the UK to veal farms in Europe. However, due to intense public pressure and protests by animal rights groups this practice has largely disappeared.

In 2017, no calves were live exported from England, while Scotland and Northern Ireland live exported about 25,000 head between them.

The disappearance of the live export trade for UK bull calves, coupled with supermarket driven pressure on farmgate milk prices, has forced many UK farmers into early disposal of their bull calves.

While improvements in the effectiveness of sexed semen could make a difference down the line, many UK dairy farmers find themselves caught between a rock and a hard place. Farmers can either continue this practice, which naturally attracts public condemnation, or else fatten the calves at the risk of adding significant cost to their business for little reward.

[13] Department for Environment, Food & Rural Affairs (Defra), 'Usage of milk by dairies in the United Kingdom', September 2018.

Badger culling

The other major source of public ire in the UK is the practice of badger culling, which is carried out in a bid to reduce the spread of Bovine tuberculosis (TB). In 2017, more than 43,000 cattle across England, Scotland and Wales were identified as TB reactors and removed in an effort to control the disease. In Northern Ireland, just under 16,000 cattle were removed off farms. This process has an annual cost to the UK taxpayer of around £150m[14].

Photo 8: Close to 20,000 badgers were culled in the England in 2017, according to the Wildlife Trust.

In a further attempt to control the disease, the UK government has commenced a badger culling initiative in some highly affected areas of the UK (mainly in England). As of September 2017, a total of 21 areas in the UK have been granted licences for badger culls by the Department of Environment, Food and Rural Affairs (Defra).

According to the Wildlife Trust, an independent charity with 800,000 members, close to 20,000 badgers were culled in England in 2017[15].

Once again, this situation pits the farmer and the general public in the UK in conflict with each other. One farmer the author spoke to in the Cotswolds of England, who wished to remain anonymous, said he had been chased and harassed by animal rights protesters while participating in a badger cull sanctioned by Defra. The farmer said he feared for his life at the time.

While both sides in the debates on badger culling and the live export trade have sincerely held views, these altercations highlight the disparity between UK farmers and their non-farming fellow citizens.

[14] Department for the Environment, Food & Rural Affairs (Defra), 'Quarterly statistics on tuberculosis (TB) in cattle in Great Britain', September 2018.
[15] The Wildlife Trust, www.wildlifetrusts.org/wildlife-and-wild-places/saving-species/badgers, October 2018

Case Study 6:

Public perception of agriculture in New Zealand

New Zealand is an unusual country in that it is the only developed nation in the world where agriculture is still the backbone of the country's economy. Typically, as a country develops economically, agriculture becomes less and less important to the overall economy as people move away from farming and into higher paying manufacturing or services jobs in urban centres.

In New Zealand, agri-food exports totalled NZ$54bn (€31bn) in 2017, with food accounting for a staggering 75% of the total goods exported from the country[16]. It is therefore no surprise that Fonterra, the New Zealand dairy co-op with annual sales of NZ$20bn (€12bn)[17], is far and away the largest company in New Zealand.

Photo 9: Auckland, New Zealand. About 25% of the population in Auckland today are recent Asian migrants.

During the author's visit to New Zealand in February 2017, it is clear that New Zealand's banking and financial services industry would be nowhere near as complex as it is if it wasn't for the country's food exporters.

The majority of business done by financial services firms located in the Central Business District of Auckland is from working with agri-food exporters when it comes to international banking, insurance, foreign exchange and risk management. Despite the importance of agriculture to New Zealand's economy, public perception of farmers is at a very low ebb, according to several farmers and industry officials I met with in New Zealand.

[16] Stats NZ, '2017 Exports & Imports', January 2018.
[17] Fonterra, '2018 Annual Report, September 2018.

Ian Proudfoot, global head of agribusiness at KPMG who is based in Auckland, explained to the author how the the divide between urban and rural Kiwis has become a 'chasm'. He said New Zealand has witnessed high immigration rates, particularly from Asian countries, to its major cities over the last decade.

This means many of the urban consumers in New Zealand have no connection or understanding of agriculture's importance to the domestic economy.

> *The rural-urban divide in this country has become a chasm. We've had very high immigration in New Zealand and many people in our cities have no connection to the land anymore. About 25% of the population in Auckland today are recent Asian migrants.*

One farmer the author met with in New Zealand, who wished to remain anonymous, said that New Zealand farmers are viewed by the general public today with more disdain than politicians. According to Proudfoot, the root of farmers fall from grace in the eyes of the public is down to a number of environmental and animal welfare scandals, coupled with continued negative coverage from New Zealand's mainstream media.

> *New Zealand's mainstream media has become quite anti-farming because of water and animal welfare concerns, leaving many farmers feeling like they are farming in a fishbowl. Something we really miss in New Zealand is an understanding agriculture press.*

Because New Zealand is a small country that remains very dependent on agriculture and food to support the economy, the country's agriculture sector is far more exposed to attention from the mainstream media, particularly if it's a negative story.

Problems in companies such as Fonterra or the kiwifruit exporter group Zespri or any other large food company will inevitably make front page headlines in New Zealand's media, which has served to erode the trust ordinary consumers have in the farmer community.

In other developed countries such as the US, Germany, France, Australia, UK and even Ireland, the mainstream media tends to show less interest in farming. Admittedly, the media in these countries will mainly report on bad news stories about farming such as the horsemeat scandal or Danone's recall of infant formula due to salmonella contamination.

While still damaging for consumer confidence in farmers, those types of stories are rare in nature and the level of scrutiny and coverage from the mainstream media associated with them is rarely sustained for a huge length of time.

New Zealand's position as a powerhouse of global dairy (New Zealand accounts for 33% of all global dairy exports) means anything that threatens the country's dairy sector will make national, and often international, headlines.

Recent negative stories in New Zealand that attracted international attention include animal welfare issues around the treatment of dairy bull calves (bobby calves), the 2013 product recall caused by a false botulism scare, and environmental pollution as a result of nutrient runoff into rivers and waterways, most notably coverage of the health of the Manawatu River (see case study on P17).

Negative stories around agriculture's impact on the environment are particularly damaging to farmer reputations, particularly in a country like New Zealand where its natural landscapes are such a large draw for tourists. Tourism is generally New Zealand's second largest export behind dairy, depending on the year.

Consumers in New Zealand understand that any damage to the country's natural environment will hurt its important tourism sector and therefore this increases hostility towards farmers, even though most of the landscapes enjoyed by tourists are maintained by grazing cattle and sheep.

Photo 10: Fonterra's HQ in Auckland. Fonterra is by far the largest company in New Zealand

In his 2015 Report, titled *'Why being true to brand New Zealand is the best option for New Zealand agriculture',* New Zealand Nuffield scholar Dan Steele argued the environment is now the backbone of New Zealand's economy, and not agriculture[18].

> *Agriculture and tourism, New Zealand's two main export industries, are inherently linked and both will live or die on our environmental health and reputation. But our environment is regressing and unless this is addressed now, our economy will regress.*

Steele, a sheep and beef farmer with an agri-tourism enterprise, recommended New Zealand shift its economic focus to a balance between agriculture and tourism that placed management of the environment at the core of the strategy.

[18] D. Steele, 'Why being true to brand New Zealand is the best option for New Zealand agriculture', P30, March 2016.

Case Study 7:

Animal welfare groups have a big say on Dutch agriculture policy

For a country with such a rich agricultural tradition, farmers in the Netherlands have never found themselves so far removed from the consumer. Today, most of the 17m Dutch citizens are typically over 20 generations removed from the farm gate. Compare this to Ireland where most of the urban population is just two to four generations removed.

What's different about the Netherlands to most other developed countries where urban consumers are removed from farming is that agriculture remains very visible to the ordinary Dutch citizen. In large countries such as Germany or France, it is unusual for people living in cities or urban centres to see farming up close.

However, because the Netherlands is a small country farming is almost everywhere you turn. Farmers in the Netherlands use every inch of available land. As one farmer described it "absolutely nothing is wasted in this country".

Photo 11: Marianne Thieme, leader of the Party for the Animals in the Netherlands

As a result, farms will always be found right on the edges of towns or cities, be they dairy, pork, poultry, tillage or horticulture farms. Despite this proximity between urban and rural, a massive divide has still emerged between the Dutch consumer and the farmers in the country.

This divide is best illustrated by the rise of the Party for the Animals (*Partij voor de Dieren;* PvdD), a Dutch political party that has grown its support base considerably in the last decade.

Founded in 2002, PvdD is a single issue party in the Netherlands that mostly campaigns on animal welfare and animal rights issues. Led by Marianne Thieme, PvdD secured over 3% of the Dutch vote in the most recent 2017 general election and claimed five seats in the Dutch parliament.

The party also holds two seats in the Dutch senate and has one elected member to the European Parliament. As part of my Global Focus Programme, we spent 10 days in the Netherlands where we got the opportunity to meet Esther Ouwehand, one of the party's elected representatives to the Dutch parliament.

Listening to Ouwehand it is clear that PvdD has not developed any proper policies around economics, social protection, health, housing or transport. What drives members of the PvdD is their passion for animal rights and their wish to end intensive livestock and poultry production in the Netherlands.

Worryingly for Dutch farmers, PvdD is gaining more and more traction with Dutch consumers. They are winning over urban voters by painting farmers as cruel individuals who are exploiting animals for their own gain.

Pig and poultry farmers have come under significant pressure in the Netherlands because of the intensive, indoor nature of those production systems. When it comes to dairying, PvdD is more accepting of cows roaming in the paddock and grazing as their main policy is for all forms of farming to move to organic.

Intense pressure applied by PvdD and other animal welfare NGO's has forced the Dutch food industry to introduce a rating system on certain food products to inform consumers how high the welfare standards are on the farm the product was produced on.

Photo 12: Packaged meat in the Netherlands with a Beter Leven star rating of 1 out of 3

This is known as the 'Beter Leven' (Better Life) standard, and will give a product a rating out of three stars depending on how high the animal welfare standards were on the farm from which the product came from.

Beter Leven stars are applied to all dairy, beef, pork, poultry and egg products produced on Dutch farms. Three stars is the highest rating and is awarded for organic farms. Products produced on a traditional, intensive indoor system will be awarded zero stars.

Because of this intense consumer focus on welfare standards, particularly on Dutch pig, poultry and egg farmers, it is anticipated that Dutch pork, poultry and egg production will shrink in the years ahead.

Farmers are either getting out of the business altogether or adapting to organic standards which is resulting in lower production. Erik Stegink, a pig farmer and 2017 Dutch Nuffield scholar, is a good example of this.

By his own admittance, Erik said the consumer of today looked at him as a 'murderer' so he was forced to adapt his business. Making the animal welfare issue work to his advantage, Erik transformed his traditional pig farm into an open farm called the 'Piggy Palace', which puts animal welfare at the heart of the story.

To stay in business and maintain his social licence to farm, Erik says he had to change his mindset and adapt to the changed reality of farming in the Netherlands.

PART 3

All is not lost: What we are doing right in Ireland

While there are obvious risks to the image of Irish agriculture, it's important to realise we are doing a lot of very good things in this country when it comes to protecting the natural environment and ensuring the highest standards of animal welfare are observed by our livestock farmers.

Over the course of the last year the author has hosted Nuffield scholars from the UK, the Netherlands, Australia and New Zealand and helped organise farm visits and meetings with industry officials in the Irish agri-food sector.

While it was never the intention, organising these visits for other scholars allowed the author the opportunity to learn about the very best of Irish agriculture. As is so often the case, we often don't appreciate the brilliant work going on at our own doorstep.

In this section of the report the author wishes to highlight two case studies of where Irish farmers are doing world class work to protect the natural environment of this country hand in hand with local advisors, environmental groups, government agencies and the EU. Whether by design or not, both case studies are excellent examples of how Irish agriculture can maintain its social licence.

The challenge for the industry is how to better communicate this environmental stewardship to the general public in order to reinforce the social licence farmers have to operate.

Case Study 8:

The Burren Programme is a shining light of environmental stewardship

While there are risks to the reputation and image of Irish farming, it is equally true that there are opportunities to increase agriculture's reputation with the general public.

One such opportunity is the Burren Programme in Co Clare, which has been developed as part of a partnership between local farmers, Teagasc, the Department of Agriculture and botanists in the National Parks and Wildlife Service (NPWS).

The Burren is a very distinctive limestone landscape which extends over roughly 72,000ha of north Co Clare and south Co Galway along Ireland's mid-western coast. The region is unique in that it is home to a significant number of plant and animal species which are now rare elsewhere in Ireland and Europe. It also boasts a fascinating archaeological record which maps over 5,500 years of human activity.

Photo 13: The Burren (above) is a unique karst limestone landscape.

The Burren is probably best known for its unique mixture of flora and is believed to be the only location in the world where arctic-alpine flowers grow next to Mediterranean flowers and plants. Because it's such a unique habitat, botanists have been extremely protective of the landscape.

At first, botanists focussed their efforts on driving traditional livestock farmers out of the Burren in the belief that cattle were destroying the unique habitat for the unusual mixture of flowers that grow in the region. However, it quickly became clear that once farmers abandoned areas of the Burren the landscape slowly regressed to a natural state of scrub, which only served to dominate the landscape and choked out the flowers.

A PhD research project published by Teagasc as a book titled *Farming and the Burren (Dunford, 2001)*[19] showed that traditional pastoral systems are integral to ensuring the presence of over 70% of Ireland's native flora in the region.

Most farmers in the Burren typically winter their cattle on the upland areas of the Burren as it is low cost with no requirement for housing and concentrate feeding is minimal. After the winter period, cattle are traditionally brought down from the higher ground to the more fertile lowland grasslands of the Burren where cattle are fattened.

As a result of the Teagasc research, botanists could see that livestock farming had a part to play in the ecology of the Burren and that cattle were actually keeping the scrub under control and maintaining the landscape in a state which allowed the flora of the Burren to thrive.

Recognising the place of livestock in the Burren's ecosystem, local farmers, Teagasc, the Department of Agriculture and the NPWS have been working together since the late 1990's to develop an agri-environmental scheme to preserve the unique landscape of the Burren.

The agri-environmental scheme in the Burren is funded by the Department of Agriculture, the Department of Arts, Heritage and the Gaeltacht as well as matched funding from the EU. This allows the scheme to employ a full time team of researchers, ecologists and advisors to work hand in hand with farmers to achieve targeted and measured results for the Burren Programme.

The Burren Programme has pioneered a novel hybrid approach to farming and conservation, which sees farmers paid for both work undertaken as well as for the delivery of defined environmental objectives. Most importantly, the programme is results based.

Research has shown that flora on the Burren thrive when competition from native grasses is at a minimum. To facilitate these conditions, livestock farmers in the Burren are encouraged to clean out paddocks in upland areas of the Burren before cattle come down to the lowlands for the summer months.

Grazing out the upland vegetation creates ideal conditions for the Burren's flora to thrive during the summer months. Farmers in the Burren scheme receive tiered payments depending on how well they can clean out their paddocks before the summer.

In April 2018, the author visited Burren beef farmer Michael Davoren along with UK Nuffield scholar Geraint Powell and Irish scholar Bryan Hynes. Michael, who is often referred to as the Prince of the Burren, showed us the work he was doing on his farm and explained how he was working hand in hand with ecologists to preserve the important and rare flora native to his land.

Under the scheme, Michael's farm was mapped and divided out into paddocks. At the end of every spring, each paddock was scored from 1-10, with 10 being the highest, on the quality of the clean out.

[19] Dr B. Dunford, 'The Burren Life Programme: An Overview', March 2016.

Farmers receive payments on a per paddock basis, depending on the clean out score. The higher the clean out score, the higher the annual payment Michael will earn under the scheme. Importantly, this system encourages better farming practices, which in turn benefits the Burren landscape.

Meeting Michael and seeing first-hand the work he was doing was inspiring. The scheme had empowered farmers like Michael to be custodians of the delicate landscape in the Burren and gave them the belief that the work they were undertaking was making a difference to the environment.

Importantly, the scheme has also incentivised good farming practices and was driving farmers to constantly improve and do better.

Photo 14: Cattle being moved to the high upland areas of the Burren as part of the annual Burren winterage festival

The other great potential of the Burren Programme, which has yet to be fully capitalised upon, is the benefit it could deliver to reconnect consumers with farming. The Burren is an incredibly unique landscape that attracts thousands of visitors every year. Farming is very much a part of the Burren story, which presents an opportunity to allow visitors to experience agriculture first hand.

At the moment, the BurrenBeo Trust, a charity organisation established in 2008 to promote the Burren, organises an annual winterage walk to celebrate moving suckler cattle from the lowland grasslands to the higher ground for the winter.

This important festival puts the unique customs of the Burren in the spotlight every year but to date it has mostly attracted attention from the farming community. For me, the incredible work ongoing in the Burren, with farmers and ecologists working hand in hand, is a story that deserves wider appreciation. It could also serve as the shining light for Irish agriculture to educate citizens around how farmers play a critical role in delivering environmental good.

Case Study 9:

Dowth farm – a lesson in measuring and managing and measuring again

Perhaps the greatest long-term challenge facing agriculture globally, and not just in Ireland, will be the sectors response to tackling climate change. In Ireland, agriculture accounts for over 30% of the country's carbon emissions, which is high compared to other developed economies reflecting the lack of heavy industry in this country.

Because of its large share of Ireland's overall emissions, the farming sector is increasingly facing calls to address its carbon output to help Ireland meet its climate change targets agreed with the EU. To date Ireland's agriculture sector has struggled to come to terms with its place in the overall climate change debate, particularly in light of the expansion in primary production since the Food Harvest 2020 strategy was launched and the end of dairy quotas in 2015.

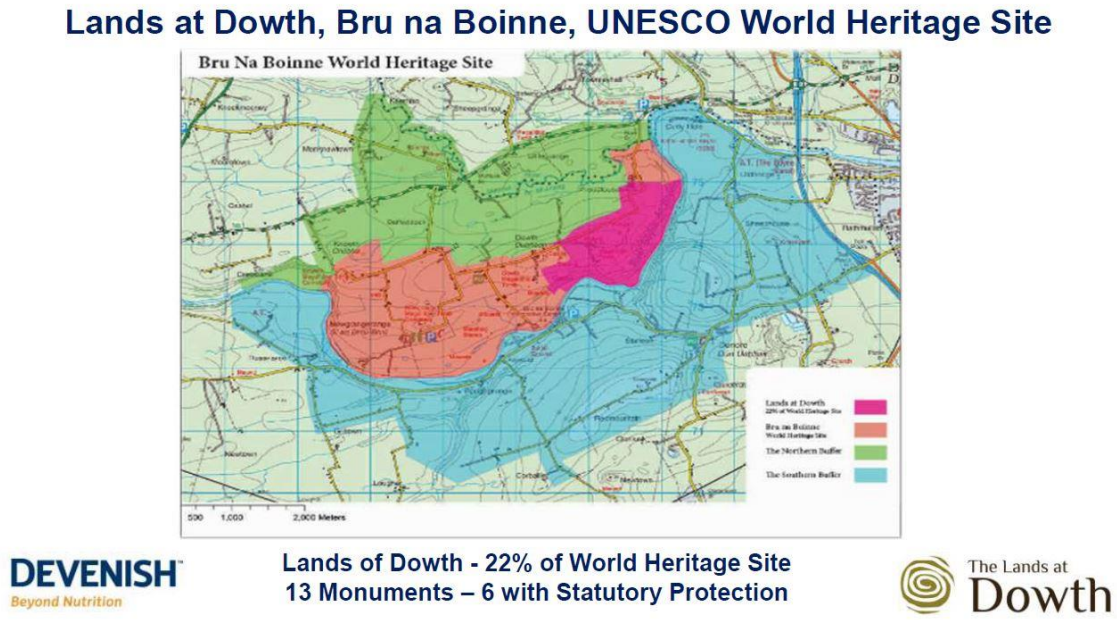

Figure 3: A map of the Lands at Dowth on the Bru na Boinne World heritage site.

In a 2013 report titled *Carbon Neutrality as a horizon point for Irish agriculture*[20], researchers at Teagasc projected that GHG emissions from Irish agriculture will rise to 22m tonnes of CO2 equivalent by 2030 in the absence of any measures to abate emissions.

This expansion has often made agriculture an easy target for environmental groups and NGO's in the climate change debate, which the sector has struggled at times to defend itself against.

On top of this, the Teagasc report forecasts that the major carbon sinks in Ireland, such as grasslands and forestry, have the potential to sequester just over 9m tonnes of CO2 equivalent by 2030. This means the emissions gap (the difference between gross agricultural emissions and agricultural offsetting) will be 13m tonnes of CO2 equivalent by 2030, or 66% of total agricultural emissions.

[20] R. Schulte et al., 'Carbon Neutrality as a horizon point for Irish Agriculture: a qualitative appraisal of potential pathways to 2050', Teagasc, December 2013.

Even worse, the report projects that by 2050 the emissions gap from Irish agriculture will continue to widen to c16-17m tonnes of CO2 equivalent, or 75% of total agricultural emissions. These projections are bad news for Irish agriculture and have left the sector exposed to severe criticism from the climate lobby.

However, these assumptions are being challenged through new research by the team at agri-technology group Devenish and the company's farm at Dowth, Co Meath. Led by Dr John Gilliland OBE, a former president of the Ulster Farmers Union (UFU), chair of the UK's Rural Climate Change Forum and now director of agriculture and sustainability at Devenish, the team at the Lands at Dowth are in the midst of a fascinating project that could reshape the debate on climate change and agriculture in Ireland.

Using the latest technologies available, Dr Gilliland and his team have been measuring and mapping the farm at Dowth (from soil health to grass growth to nutrient application and even soil carbon) since 2014.

Set on 170 hectares of grass and natural woodlands, the Devenish lands at Dowth are currently home to a herd of suckler cows and calves. One of the most unique aspects of Dowth is the sensitivity of the landscape on which Dr Gilliland and his team operate.

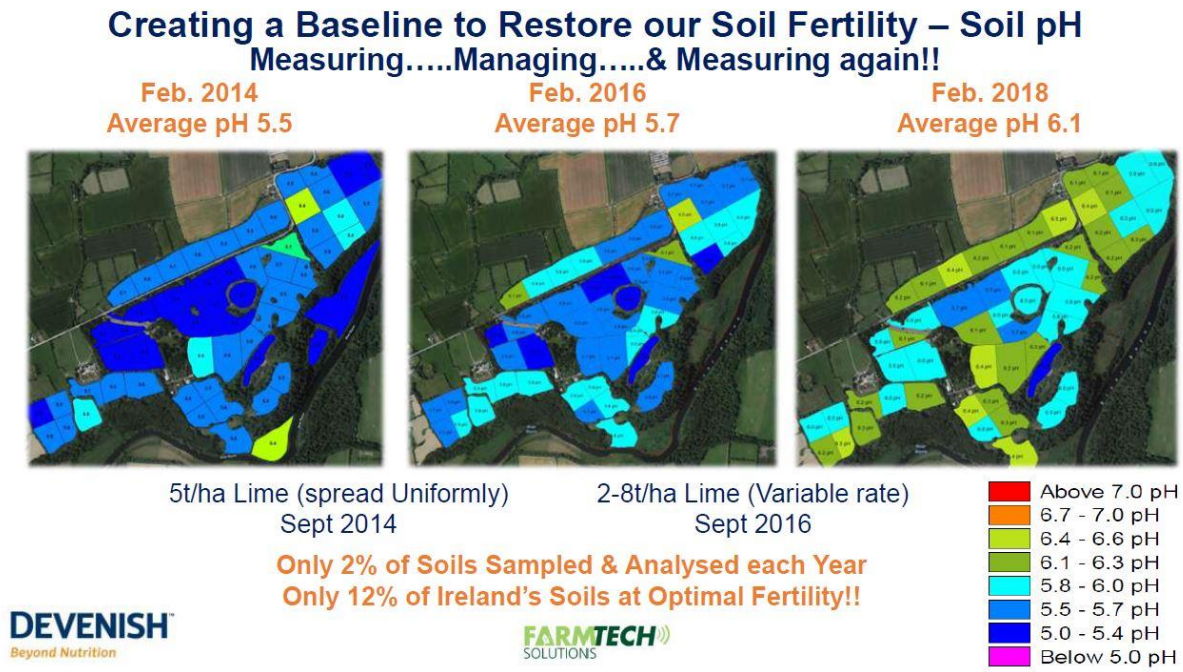

Figure 4: GPS soil sampling allowed Devenish to map the soil fertility of the farm over time.

All the lands at Dowth are part of the Bru na Boinne, which is a designated UNESCO World Heritage site. They make up 25% of the total World Heritage Site in this stunning ancient farming landscape. A total of 13 historic monuments are listed at different locations on the farm, six of which are under statutory protection.

Using a surveying method called LiDAR, which was developed by the US military to aid them during jungle warfare to see digitally under dense jungle canopies, the team at Dowth have been able to map and discover new archaeological sites on the farm landscape.

The conclusion from this work is that humans have been farming the land at Dowth for almost 6,000 years. This started in the middle Neolithic period c5,500 years ago when the passage tombs on the farm were built by early Irish farmers, right through to the Bronze Age 3,000 years ago and the Medieval period over 1,000 years ago right up to the modern day.

Despite the historic significance of the landscape at Dowth, the team at Devenish were still determined to develop a production focussed, working beef farm. Starting in February 2014, Dr Gilliland and his team set about establishing a baseline for the soil health of the farm.

What they found was that the soil health of the farm was in poor condition after many years of neglect, with the soil pH level from a brown earth soil being atrocious at 5.5. However, this initial set of precision GPS soil testing was to set the baseline for the farm, allowing the Devenish team to measure and manage and measure again, repeating this initial process every two years.

Since 2014 and through four years of soil management, the team at Devenish have been able to restore fertility in the soil at Dowth through a carefully managed programme of nutrient application (slurry and chemical).

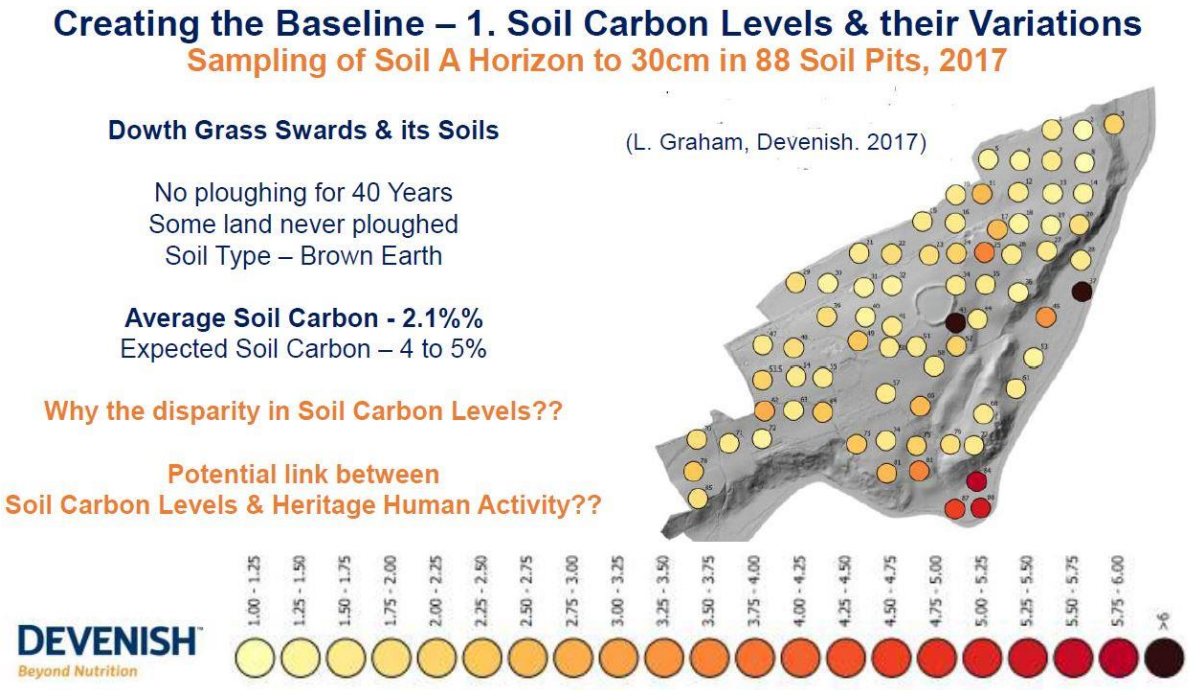

Figure 5: The Devenish team dug 88 soil pits around the farm to measure carbon levels in the ground.

As of February 2018, the soil pH at Dowth has improved to an average of 6.1, which is entering the sweet spot in terms of maximising fertiliser utilisation in the soil. It is expected that the improved soil fertility at Dowth will now allow grass utilisation on the farm to double to 10t dry matter (DM)/ha/year over the next five years.

However, aside from the focus on improving soil fertility at Dowth, Dr Gilliland and his team have been working on an exciting project to measure and manage the carbon footprint of the farm. The team have created a vision to make the farm and landscape Dowth carbon neutral and have recently completed the world's first carbon balance sheet on the farm.

To start, the team created a baseline for the carbon levels on the farm in 2017 by digging 88 soil pits located in every part of the farm to sample the soil to 30cm. The work found that the average carbon stored in the soils at Dowth was 2.1%.

It also found that the greatest amounts of carbon were stored in soils that were part of the floodplains on the farm at an average of just over 158 tonnes of carbon/ha. Woodland areas of the farm stored an average of just under 71 tonnes of carbon/ha, while soil carbon in the grazing lands was found to average just under 58 tonnes of carbon/ha.

Based on this, the Devenish team concluded the total carbon stored in the soils at Dowth to be just over 9,000 tonnes. On top of this, the team calculated that the lands could sequester an additional 146 tonnes of carbon per year.

However, not happy to stop there, the team at Dowth, in partnership with Teagasc, once again turned to LiDAR technology, this time to measure the amount of carbon stored above ground in trees and hedgerows.

The technology revealed that the total amount of carbon stored in the hedges and trees at Dowth to be just under 3,900 tonnes. The amount of carbon sequestered by the trees and hedges every year at Dowth is calculated at 54 tonnes.

Total Annual Carbon Sequestration at the Devenish Lands at Dowth

	Area Ha	Carbon Seq. Soils t/ha/yr	Total soil Seq. t/yr	Carbon Seq. Trees t/ha/yr	Total tree Seq. t/yr
Grazing ground	91.91	0.5	46		
Woodland	42	2	84	1.2	50
Flood plains	10.2				
Hedgerows	7.89	2	16	0.4	3
Total land area	156.48				
		Total Soil Seq/yr	146	Total Trees Seq/yr	54
	Total Dowth Carbon Sequestration t of C per year				200
	Total Carbon Dioxide Equivalence, t of CO2e per year				737

DEVENISH Beyond Nutrition

Gordon et al 2006, S. Green 2014, L. Graham 2017, D. Hagan 2018

One HEALTH – DEVENISH –

Figure 6: The world's first farm carbon balance sheet created for Dowth Farm in March 2018.

This means that between the land, trees and hedgerows at Dowth farm, 200 tonnes of carbon are sequestered from the atmosphere every year, which equates to CO2 equivalent of 737 tonnes per annum (see Dowth carbon balance sheet above).

From this baseline, Dr Gilliland calculated that the sequestration on Dowth farm, based on a stocking rate of 2 livestock units (LU)/ha, is able to displace 65% of all GHG's emitted by the cows and calves on the farm. At a lower stocking rate of 1.28 LU/ha, carbon neutrality is achieved on the farm.

However, the team at Devenish are focussed on production agriculture and believe carbon neutrality on the farm can be achieved at a stocking rate of 2 LU/ha. According to Dr Gilliland, the focus now on the farm has shifted to achieving carbon neutrality with a number of initiatives under way.

One method to increase the volume of carbon sequestered by the farm is to explore the potential of agroforestry.

Research shows that planting 200 poplar trees/ha in a silvopasture system will almost treble the annual sequestration of carbon on the farm on a per hectare basis, while worked carried out at AFBI in Co Armagh has shown the potential of extending soil trafficability by up to 17 weeks, creating a massive opportunity to help farmers extend their grazing season.

The grazing season is extended in a silvopasture system as the trees suck up large quantities of moisture from the ground, allowing livestock to travel on the land during periods of the season that have traditionally been too wet to let cattle out.

Over the coming years, Dr Gilliland and his team will continue to measure and manage and measure again at the farm with the aim of producing a carbon neutral balance sheet for Dowth every year. With a baseline carbon measurement now in place, the Devenish team have a starting point for their task.

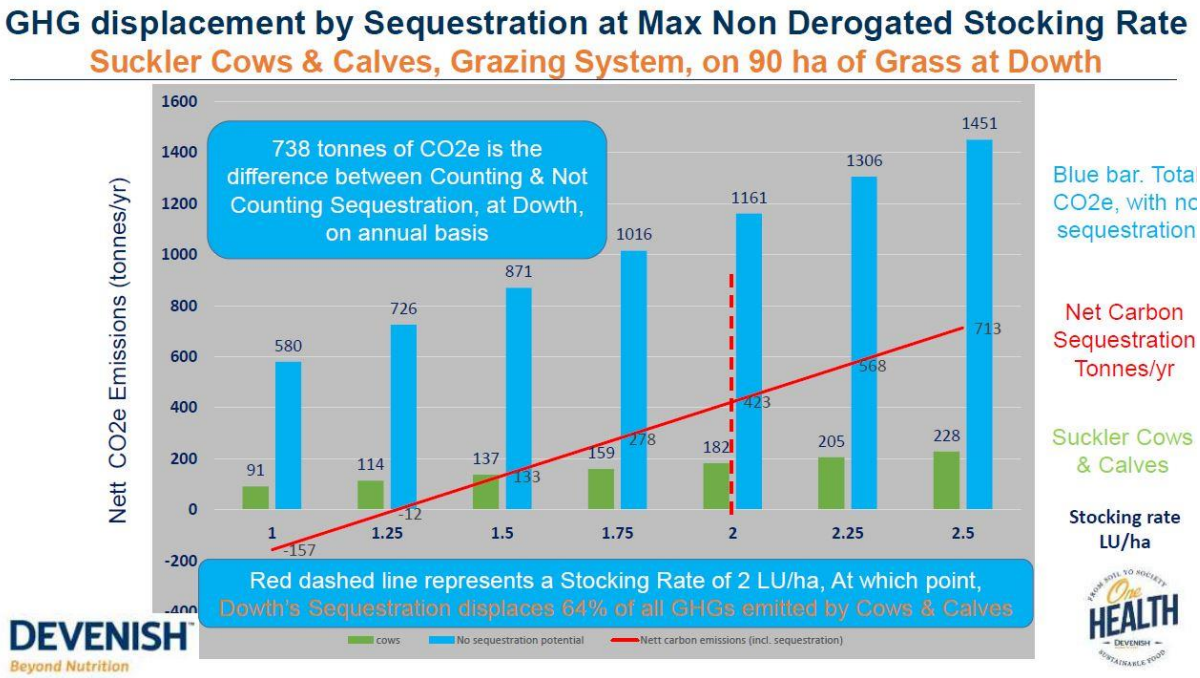

Figure 7: Greenhouse Gas emissions vs carbon sequestration on the farm.

While the work is pioneering it is still using best practice farm management techniques to achieve these results. In particular the team have focussed on soil health and fertility as the starting point, and have yet to even reseed any of the land at Dowth.

The work being pioneered by Dr Gilliland and his team has not gone unnoticed. Dowth farm has recently been selected by Wageningen University in the Netherlands as one of four international "Lighthouse Farms".

According to Wageningen University, the Lighthouse Farm project is a network of farming systems that are customised for contrasting environments, climates, farmers and cultures, initially located in Brazil, Finland, Indonesia and Ireland. Dowth has undoubtedly done this and led the development of this network given the investment in science and research to bring alive again this sensitive and historic landscape.

While production farming is still at the heart of the Lands at Dowth, Dr Gilliland and his team have used modern technology such as GPS soil sampling and analysis, and LiDAR, in a bid to accurately measure the carbon balance sheet of the farm.

With the baseline now in place, the team can work on achieving carbon neutrality on a production focussed suckler beef farm – something we thought was not possible. For the wider agriculture sector in Ireland the developments are Dowth are very exciting and offer a glimpse into a future where agriculture can proactively tackle climate change and GHG emissions.

What clearly stands out at Dowth farm is the emphasis on soil fertility, best practice when it comes to land management and the use of cutting edge technology to measure everything on the farm from soil health to annual carbon sequestration.

Discussion

Over the last two years this author has had the privilege to travel to 10 countries spread across five continents in pursuit of completing a Nuffield scholarship. During that time the author has been repeatedly struck by new pressures farmers are coming under, specifically in terms of their social licence to operate as a farmer.

Traditionally, the biggest challenges farmers have faced have been price volatility, weather, access to new technology, finance, regulation and adequate government support.

Over the course of this study, it was observed again and again how farmers in many parts of the world are battling a new distinct challenge, which is societal backlash against what they do for a living.

The world needs its farmers but equally farmers need the world. Or more specifically, farmers need the licence to operate granted by the rest of the world.

From the case studies presented in this report, it may be concluded that the cause of this declining relationship between farmers and society in many countries may be in part attributed to these three issues:

1. Environmental impact of farming
2. Animal welfare in agriculture
3. Climate change

Modern, urban-based societies in developed countries are typically far removed from agriculture and appear to have little, or no understanding, of how modern farming operates. Many consumers today have an agrarian view of agriculture and believe organic agriculture is the only sustainable way to produce food.

When these consumers do hear or read news stories about agriculture it is generally negative, as the mainstream media rarely takes an interest in agriculture outside of a major food scandal or negative story. This has created a negative perception of farming for many modern consumers.

However, it is also true that farmers in many countries have created their own problems by pushing the boundaries of production to the limit. Farmers in these countries are now paying a heavy price in terms of strict regulations and consumer backlash as a result of their intense focus on expanding production.

For Ireland, there are lessons to be learned from the mistakes of others. From this author's experience, Irish farmers are generally held in a positive light by the majority of Irish society at this current time.

The work done by Agri Aware undoubtedly plays a role in connecting urban consumers with farming. It is noticeable that no similar organisation such as Agri Aware exists in the countries highlighted in this report.

According to research conducted by the National Dairy Council (NDC), Irish consumers are generally positive on farming, although there was a slight decline in the number of people that have a very positive view on Irish farming (see below).

As the graph shows, red meat and poultry farming score worst of all sectors, with a significant number of respondents very negatively disposed towards poultry farming in particular. According to the NDC, these scores for each sector are above average compared to other countries.

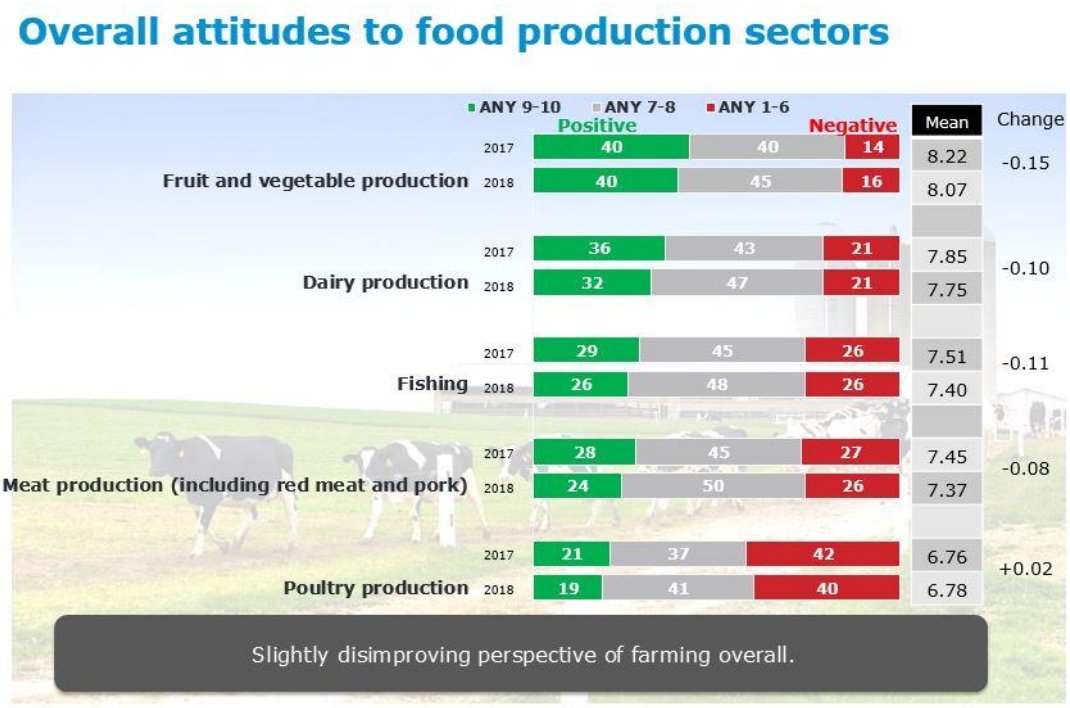

Figure 8: Overall attitudes to each farming sector in Ireland.

Much of Ireland's population is still only two to four generations removed from the farmgate so it's perhaps not unexpected that many consumers in this country still have a basic understanding of where their food comes from. However, it is very important to understand that society is changing rapidly in Ireland. It is a big assumption to make that Irish farmers will always have the goodwill of their fellow citizens.

Many people today already perceive farmers as individuals who receive large payments from the EU, pay low taxes despite accumulating large amounts of asset wealth and can always afford to send their kids to college. On top of this Irish farmers are often labelled by many people as always complaining about one thing or another.

Aside from these generalisations, there are specific tail risks which do exist for Irish farming similar to what has happened in other countries and could pose a serious threat to the sectors social licence to operate going forward. From an environmental point of view, the impact of the recent expansion in Irish agriculture has to be monitored very closely, particularly when it comes to water quality.

Should Irish farmers pollute a waterway or river in a similar way as happened in the Manawatu region of New Zealand, the clean, green image of Irish livestock farming and consumer trust in farmers will change very rapidly.

However, within that risk also lies opportunity. The many water catchment schemes ongoing throughout the country provide an opportunity for farmers to show society about the public good they can deliver in preserving water quality.

Being able to show society best practice and stringent environmental stewardship when it comes to waterways and rivers can reinforce social trust in farmers.

From an animal welfare perspective, increasing livestock numbers in this country means many farmers will have larger herds than ever before. Ensuring the highest animal welfare standards are maintained at every level of the chain is critically important to maintaining the trust of society.

In the UK, the live export trade and early disposal of male dairy calves has drawn negative attention to UK farming and helped breed distrust between consumers and farmers. Ireland also has a significant live export trade, with shipments of cattle to markets in Turkey and Libya increasing sharply over recent years.

While these live export markets provide cattle farmers with an extra source of competition for their cattle outside the beef factories, the live trade also increases the risk of poor animal welfare standards and negative media attention.

The expansion in the Irish dairy herd since 2014 has meant a sharp increase in the numbers of male dairy calves born every year in the country. Once again this increases the risk of below standard animal welfare practices on farms and exposes the sector to a similar societal backlash as seen in the UK and New Zealand.

And finally climate change. With agriculture accounting for 30% of Ireland's GHG emissions, it's becoming increasingly hard to balance the increasing livestock numbers on this island at a time when the EU is pushing Ireland hard to reduce its carbon emissions.

However, the industry has failed to make the case properly for agriculture on this island in the climate change debate and the role it has to play. We know that Ireland's grasslands, native trees and patchwork of hedgerows are sequestering carbon into the ground but we are failing to measure and communicate that element of the climate change debate.

In Dowth and the Burren I highlighted two examples where best farming practice was delivering results for the respective farmers. However, the work in both examples was also delivering enormous public good in their own way, despite focussing on productive farming in extremely delicate environments.

Based on these examples, it is my belief that a new approach and new thinking needs to be taken in terms of our approach to EU payments, climate change and production agriculture. The Irish Farmers Association (IFA) and other industry bodies have been vocal in calling for a €200/cow support payment for beef farmers in Ireland. It is argued that this support payment is necessary to support a farming sector that is not profitable in its current guise.

However, such support payments are increasingly difficult to defend or even justify. Asking EU or Irish taxpayers to support an unprofitable sector is one thing, but to do so at a time when Ireland is not even close to meeting its targets on climate change is another thing entirely.

Instead, policy makers and farm organisations need to reinvent their thinking around such support payments and innovate the business model to match the realities of modern farming. Incentivising production agriculture may be off the table in Europe but supporting farmers to deliver an environmental or public good is very much what the European Commission looks to spend its money on today.

In this regard, Ireland should seek to establish a new payment model where future CAP payments to farmers are related to benefits delivered in relation to climate emissions. This new payments model would require a new approach to CAP payments but could be made possible by taking elements from both Dowth and the Burren programme.

Firstly, the Dowth case study highlights how taking a scientific approach and using the latest technology allows Dr Gilliland and his team to measure everything on the farm from soil health to grass growth to carbon emissions. By creating the world's first all-farm carbon balance sheet, Dowth farm now has a baseline from which to work from and achieve a carbon neutral status down the line.

By rolling out such technology on a wider scale and measuring the carbon sequestration potential of individual holdings, every Irish farm could create its own carbon balance sheet and establish a baseline from which to work.

At Dowth, the plan to reach carbon neutrality is rooted in improving soil health, growing more grass per hectare and sowing trees on the farm to offset the emissions from the beef herd. If individual farms in Ireland created individual carbon balance sheets, they too could begin the process of working towards carbon neutrality in a scientifically measured way.

And just like at Dowth, the approach to achieving this would be through best farming practices and a resolute focus on soil health. And similar to the scoring system in the Burren, where farmers' payments were linked directly to the quality of the cleanout they delivered in individual paddocks, Irish farmers would receive their EU payments based on a set of measurable metrics such as improving soil health, grass growth and the volume of carbon sequestration on the farm.

Just like in the Burren Programme, farmers would receive larger payments the better they could deliver on these metrics. In that way, EU support payments would incentivise best farming practice, compel farmers to focus on improving soil fertility and maximise grass growth, while encouraging farms to aim for carbon neutrality over a long term window.

The other aspect of this approach is that it delivers two important results. Firstly, linking payments to an on-farm carbon balance sheet and compelling farmers to focus on soil health as a starting point delivers enormous public good and return on investment from a taxpayer perspective. Climate change is one of the greatest challenges facing humanity and being able to demonstrate a proactive way of tackling could be rewarded.

And secondly, this system would not seek to limit or curtail production on farms. Instead, improvements in soil health would allow the farmer to grow more grass every year, which will sequester extra carbon but also allow for a suitable stocking rate. The additional grass grown on the farm would also reduce feed costs.

However, and perhaps most importantly, a system that puts reducing climate emissions at its core would help farmers maintain their social licence with society through delivering a significant and measurable public good. Taxpayers in Ireland and Europe would be able to see a measurable return on their investment in farm supports for Irish farmers under such a system and be safe in the knowledge that agriculture was playing a proactive role in reducing its carbon output.

This would enable farmers to defend themselves better in the climate change debate and equally give them a better footing to stand on when it comes to looking for additional financial supports from the EU.

Other strategies for earning the social licence to operate

Maintaining the social licence to operate is a new challenge for Irish agriculture and one that will require constant work. Other strategies to maintain and enhance the current social licence enjoyed by farmers in Ireland include:

1. Teach the carbon cycle to all children in schools in a similar way to the water cycle.
2. Develop a network of food and farming trails across Ireland.

The Carbon cycle

Climate change is one of the most complex scientific fields in history. So much so that scientists themselves regularly debate and challenge the assumptions around climate change. If this is the case how are ordinary citizens meant to understand such a complex scientific phenomenon.

Unsurprisingly this has resulted in the climate change debate being boiled down to one, simple to understand statement, i.e. the planet is heating up because the level of CO2, or carbon emissions is heating up the atmosphere.

While this is true, it's important to understand that carbon is an important element in the planet and moves in a lifecycle. Teaching school children about the 'carbon cycle', which would be a similar concept to the water cycle, would be a simple method to communicate the role of carbon in the planet's atmosphere and how it is created and sequestered across the planet (see diagram below).

What the Carbon cycle looks like:

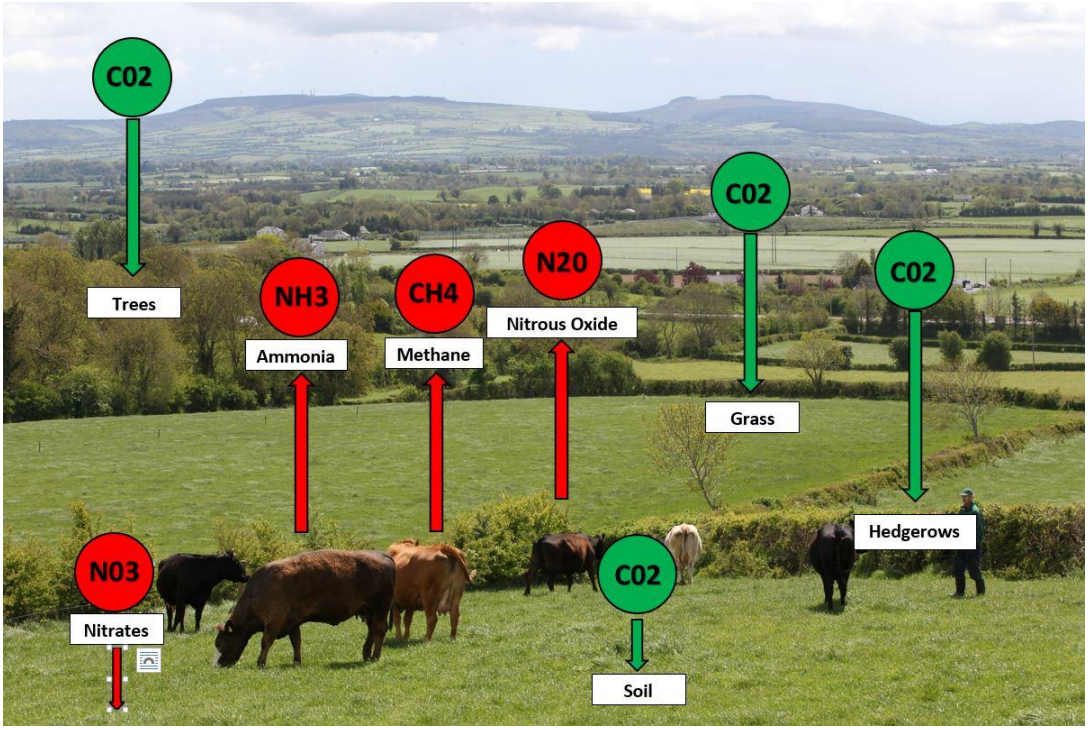

Figure 9: The Carbon Cycle diagram.

From an agriculture perspective, teaching the carbon cycle would help explain in simple terms the role of carbon in creating plant life and how farming has just as much a role to play in sequestering carbon as it does in creating it.

Most importantly for Irish livestock farmers, the carbon cycle puts the ruminant cow at the centre of the story as the animal best suited to grazing grass and converting a protein source that is no good to humans into a nutritious protein source of meat and milk that we can consume.

In this cycle the cow also plays a role in its ability to graze grass, which then encourages the grass plant to begin growing again, and in the process, sequester more carbon from the air and into the ground.

Food and farming trails

Consumers today are looking for experiences. Yet the widening gap between ordinary consumers and farmers is because many citizens that are becoming more removed from the farm gate have no experience of farming or agriculture.

Creating a series of food and farming trails through different parts of Ireland could allow visitors and tourists over one or two days to take in the experience of a working Irish farm, an artisan food business, whiskey distillery or historical monument that would tell the story of Ireland as a proper food and drink island.

Connecting farmers with society in the modern world

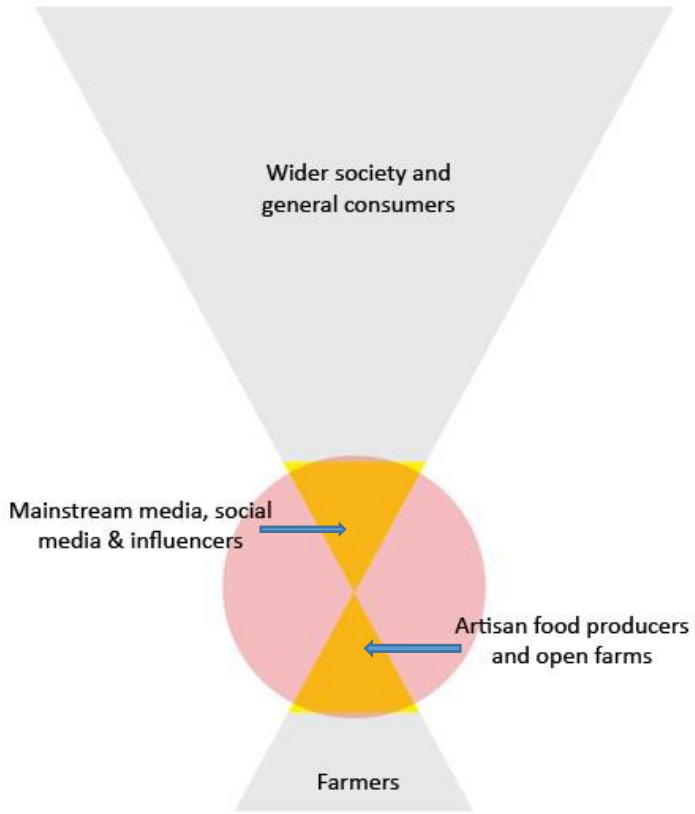

Figure 9: How to connect farmers and wider society.

Over the course of researching this report, the author has always found the farm visits to be the most enjoyable visits. Ordinary consumers should feel the same as it allows them to meet the person behind the term farmer and learn how their food is produced.

Like the Wild Atlantic Way, these food and farming trails would not only encourage tourists to use them but also ordinary Irish people looking for a day or weekend trip. In this way, farmers would benefit from ordinary citizens engaging in a positive way with an open farm, which would reinforce the social licence between those visitors and the wider farming sector.

As can be seen in the diagram above, the wider agriculture sector stands to benefit from the interactions between tourists and visitors and the small number of open farms and artisan food producers that would be along these food and farming trails.

Allowing ordinary consumers this gateway to a positive experience of a working Irish farm would help maintain and even strengthen the social licence for all farmers in Ireland and also help bridge the gap to urban consumers who do not understand where their food comes from.

Social licence is earned

In summation, the social licence to operate is earned and cannot be taken for granted. Farmers are becoming increasingly distanced from their end consumers because of globalisation, urbanisation and consolidation of farmer numbers.

To maintain a social licence going forward, Irish farmers will have to work harder than ever before to preserve the goodwill of wider society. We can see from a number of examples illustrated in this report that social licence can deteriorate quite rapidly if neglected or taken for granted, no matter how proud the farming tradition in a country.

Based on these learnings, Irish farmers must always be proactive in maintaining the trust of their fellow citizens because a social licence to operate is not a given. It is earned.

Conclusions

- Maintaining the social licence to farm is a new threat that Irish agriculture must deal with in the years ahead.
- Farmers in countries with proud agricultural heritages such as the UK, the Netherlands, New Zealand, the US and Brazil are already struggling against this new challenge and facing significant backlash from their local communities.
- The recent expansion of Ireland's primary sector brings with it higher environmental, animal welfare and climate related risks that could lead to a breakdown in farmers social licence to operate.
- There are world class schemes and research projects already underway in Ireland that maintain and reinforce the social licence to operate.
- Social licence is not a right. It is continually earned through a proactive approach and building trust with the community and local stakeholders.

Recommendations

How Irish farmers can continue to maintain their social licence to operate

1. Farm organisations and bodies need to reinvent their thinking around maintaining social licence. A proactive approach is the only way to maintain social licence. To do this, farmers should propose to link EU CAP payments to the delivery of climate change targets. By being proactive in this area, Irish agriculture can take a lead on climate change and develop a results based payments system that delivers for the farmer, the taxpayer and most importantly the climate. This system would also have the added benefit of showing agriculture as a sector that was taken its role in the climate change debate seriously by incentivising individual farmers to strive to be carbon neutral.

2. A serious drive needs to start to accelerate the adoption of new technologies on farms such as in Dowth to measure all things on farms and be able to track improvements on a farm over time. In this way, farmers can scientifically prove they are delivering a public good by sequestering carbon as well as acting in an environmentally responsible fashion. Once again this helps reinforce the public good farmers can deliver through measured data and helps preserve society's trust in farmers.

3. To better educate society about agriculture's role in climate change and provide a means to better defend the ruminant cow in the debate, a new educational tool called the 'carbon cycle' should be developed to explain in simple terms the lifecycle of CO2, or carbon, and how agriculture has significant capacity to sequester carbon and not just emit it. The carbon cycle could be taught to children in schools just like the water cycle.

4. Establish a new task force with representatives of Irish agriculture, food and the tourism industry with the express aim of developing a new tourist initiative around food and farming trails. Today's consumer is looking to collect experiences so let's give them the experience of farming and help reconnect urban citizens with farming so they can learn where their food comes from.

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