The Irish Origin Green Sustainability Brand

An Evaluation of the Relevance for New Zealand

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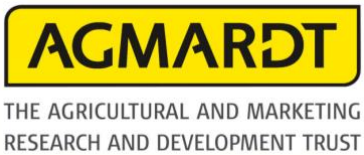

Table of Contents

Acknowledgments

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Executive Summary

This project uses the Irish beef industry as a case study to evaluate the Irish Origin Green programme, its sustainability branding and the relevance of this to New Zealand. The study of the Irish Origin Green programme provides valuable lessons for the New Zealand beef industry's and its efforts to verify and communicate its sustainability credentials. It also has relevance to the wider New Zealand food industry.

Through the work of Bord Bia and the Origin Green sustainability programme, the Irish beef industry has been proactive in developing traceability, quality assurance standards, measuring greenhouse gas emissions and promoting its sustainability brand. Origin Green has enabled the Irish beef industry to demonstrate that it is actively engaged in addressing issues of sustainability. It also provides data to verify Ireland's "green" credentials and has delivered what the beef industries large customers[1] require to meet their own sustainability agenda.

The New Zealand beef industry has lagged well behind Ireland in developing some key aspects of the Origin Green programme. For example, New Zealand has only recently developed a single quality assurance scheme for the red meat sector. Furthermore, New Zealand's National Animal Identification and Traceability scheme (NAIT) has been shown to have significant weaknesses and to have been poorly implemented. These issues are only now being addressed as a result of the recent outbreak of Mycoplasma bovis[2].

Ireland has also led New Zealand with the measurement of farm-level carbon footprints and other sustainability measures. These have been available to Irish farmers since 2011. In contrast, the New Zealand beef[3] industry currently has no comprehensive farm-level carbon footprint measurement system. This means it is not possible to give feedback to individual farmers on how their management practices affect their carbon footprint or to demonstrate progress. Furthermore, it limits the ability for the data to be aggregated to the industry level. This prevents the beef industry from validating its sustainability credentials and demonstrating progress in reducing on-farm emissions. The Environmental Strategy put out by Beef + Lamb New Zealand has set the target of reporting individual farm carbon footprints on all farms by 2022.

[1] Such as McDonalds and Tesco

[2] Mycoplasma bovis is a bacterium that can cause a range of serious conditions in cattle – including mastitis that doesn't respond to treatment, pneumonia, arthritis, and late-term abortions. (Ministry of Primary Industries, 2020). The disease was not previously found in New Zealand prior to 2016.

[3] And other red meat production systems

There has been significant progress in achieving the aims of Origin Green across various sectors of the Irish food industry. However, the Irish beef industry has some significant barriers to implementing and achieving the desired outcomes of the programme.

One significant barrier is the poor economic performance of the Irish beef industry. A lack of profitability limits the ability of the sector to respond to changes in market demand as well as invest in innovation, improve efficiency and reduce environmental impacts at the farm-level. Furthermore, the reliance on income support payment means producers tend to focus more on non-market income sources rather than market signals.

Another factor is the disconnect between producers' on-farm practices and customer requirements. This situation is affected by a lack of trust between Irish farmers and their processors and retailers. This is a result of a low level of transparency in the supply chain and farmers' weak bargaining power. These factors mean that producers perceive they are not getting a fair price for their product. As a result, they do not see a direct connection between market returns and the farm gate price they receive for their stock.

Despite these challenges, Origin Green highlights the opportunity for the New Zealand beef industry to validate and promote its sustainability credentials. In fact, the New Zealand beef industry has greater potential to introduce a sustainability brand as it does not have some of the constraints that limit the implementation in the Irish industry.

Further to this, Origin Green shows the opportunity for a national sustainability brand that not only focuses on the beef sector but brings together multiple stakeholders across all New Zealand's food industries. In doing this, New Zealand can take the lead in establishing its position as a niche food producer based on sustainable farming practices.

Support for this is demonstrated by the repeated calls from a variety of stakeholders for a New Zealand national sustainability brand similar to Origin Green. However, to date, there has been little progress in achieving this. One of the challenges identified is that New Zealand has no equivalent agency to Bord Bia that can provide cross-sector leadership on the issue. Promotion of New Zealand food exports is undertaken primarily by individual companies, industry organisations and a number of government agencies with limited overall co-ordination. Without leadership, New Zealand is likely to continue to struggle to introduce the necessary industry-wide food strategy or respond to the repeated calls for a sustainable New Zealand country brand.

"New Zealand needs to develop and market a national accreditation scheme that reflects the nature of our food production and is evidence based. We also need to consider how better to link our brand to the unique cultural identity of Aotearoa and promote our aspirational social, cultural and environmental values".

The Future of Food and the Primary Sector: The Journey to Sustainability.
(Koi Tū: The Centre for Informed Futures)

Introduction

Origin Green was launched in 2012 and claims to be the world's first national level, third-party verified sustainability programme and brand for agriculture and food (Bord Bia, 2020). Following its introduction, there has been considerable discussion in New Zealand regarding Ireland's Origin Green brand. Much of this discussion has focused on the need for New Zealand to develop a similar approach to communicate New Zealand's sustainability credentials.

For example, in March 2018, MPI director-general Martyn Dunne stated that:

> *"We have for some time been looking to find a way that would embody the aspirations that exist for Ireland's Origin Green"* (AgriHQ, 2018).

As recently as June this year a report from Koi Tū: Centres for Informed Futures called for:

> *"The development of a clear narrative around sustainable food production – development of a Sustainable New Zealand country brand, as the Irish did with their "Origin Green" positioning".*
>
> The Future of Food and the Primary Sector: The Journey to Sustainability

There is also a perception that the Irish have gained an advantage over New Zealand in staking a claim on the sustainability space with an independently verified sustainability brand (Burke, 2016). Despite these discussions, there has been little progress in developing or implementing a similar programme covering New Zealand food exports.

Aims and objectives

This project aims to evaluate the impact of the Irish Origin Green sustainability branding on the Irish beef industry. From this relevant lessons will be identified for the New Zealand beef industry and the wider food sector. This will inform ways to improve the communication of New Zealand's sustainability credentials and evaluate the potential impact of a New Zealand sustainability brand.

Objectives of the project:

1. Evaluate within the context of the Irish beef industry the implementation and effectiveness of Origin Green in achieving its objectives of:
    - Differentiating Irish food and beverage products from other supply sources.
    - Capturing value for the adopting farms and companies and the Irish economy.
    - Turn Ireland's natural advantage into a sustainable hi-value food and beverage export industry.
2. Study the experience of the Irish beef industry and evaluate the relevance to New Zealand's efforts to verify and communicate sustainability credentials to international customers.

3. Evaluate the implementation and buy-in from beef farmers, processors, wholesalers and retailers and how this might inform adoption in New Zealand of similar sustainability and quality assurance programmes.

Research plan

The project involved desktop research on the Origin Green brand to identify the history and purpose of the programme, its objectives, participants, activities, verification and auditing processes. Following this semi-structured interviews were undertaken with Irish beef producers as well as industry leaders from Bord Bia (Irish Food Board), Teagasc (Agriculture and Food Development Authority), Irish Farmers Association (IFA)[4], Meat Industry Ireland (MII)[5] and staff from the School of Agriculture and Food Science at University College Dublin (UCD) see Appendix I. These interviews were transcribed and summarised into the key themes. While there was some limitation in accessing interviewees due to the impact of Covid 19, the number and breadth of interviews were considered to be sufficient to achieve the goals of the project.

[4] The IFA is Ireland's largest farming representative organisation. Looks after the interests of Irish farmers in all sectors

[5] Meat Industry Ireland (MII) is the sector association that represents the beef, lamb, pigmeat and poultry processing sectors in Ireland

The Irish beef industry similarities and differences to New Zealand

Ireland and New Zealand are frequently compared in terms of their climate and grass-based animal production systems. This similarity is somewhat overstated as New Zealand has a much wider variation in temperature and rainfall due to differences in latitude and topography.

Climate

Most of the beef production in Ireland is located in the north-west, which has higher rainfall and cooler temperatures than the south and east. (Figure 1).

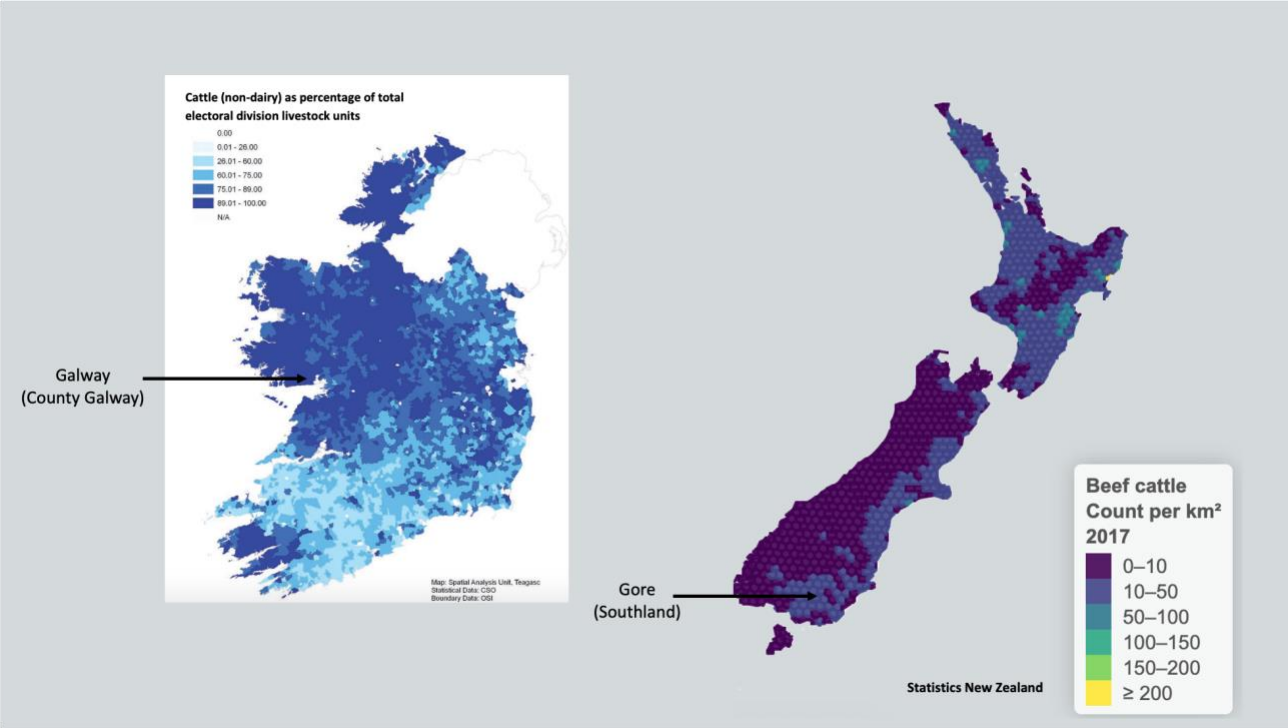


Figure 1: Cattle distribution (non-dairy) in New Zealand and Ireland and location of climate comparison sites[6].

Source: Statistics New Zealand; Teagasc

The beef producing region in the north-west of Ireland is most similar in climate to New Zealand's Southland region (Figure 1). However, the north-west of Ireland has higher summer-autumn and early winter rainfall than Southland and has colder winter and spring temperatures (Figure 2 and Figure 3). The warmer late winter/early spring temperatures in Southland enables earlier grass growth and therefore greater ability to feed animals on pasture than Ireland. Other areas in New Zealand to the north and east are significantly warmer. In New Zealand, beef breeding farms are

[6] Maps are not drawn to same scale. Total land area of Ireland is 84,421 km² and New Zealand is 268,021 km²

often located in hill country areas that tend to have low summer rainfall. The temperate climate enables Ireland to produce beef with a predominantly grass-based production system. However, the wet autumn/winter in the north-west of the country combined with less well-drained soils means most beef animals are housed over winter and fed on grass silage.

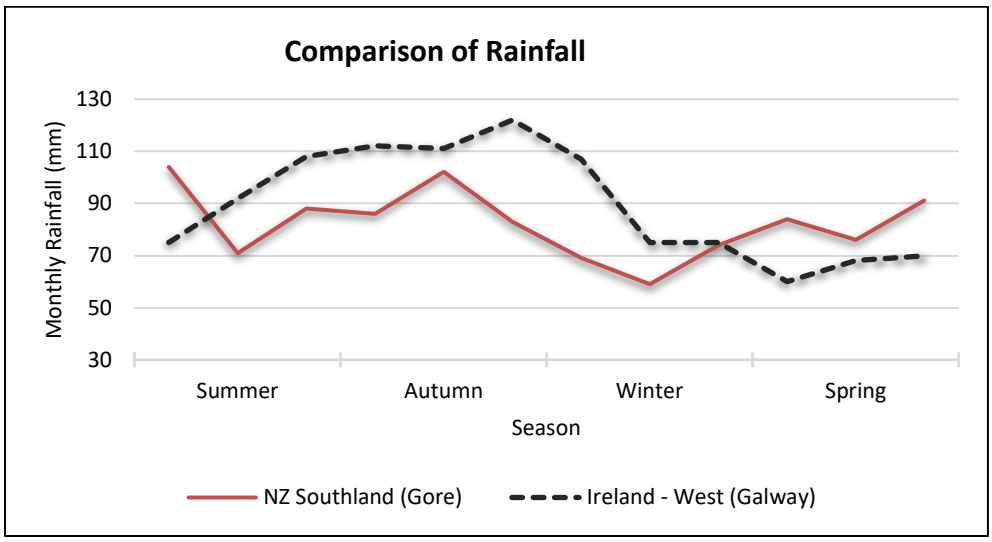


Figure 2: Comparison of mean monthly rainfall between north-west Ireland and Southland New Zealand

Source: The Irish Meteorological Service and Climatedata.org

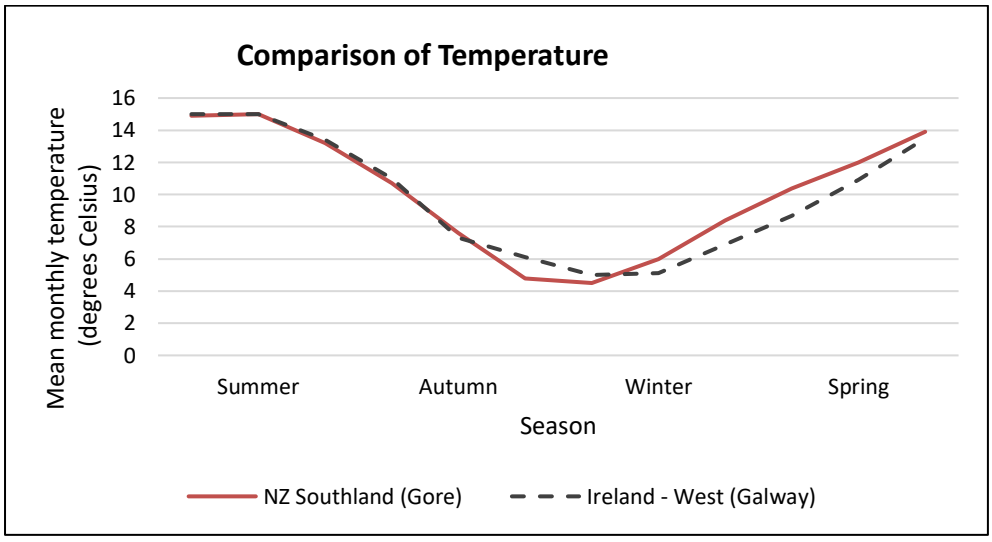


Figure 3: Comparison of mean monthly temperature between north-west Ireland and Southland New Zealand

Source: The Irish Meteorological Service and Climatedata.org

Industry comparison

Despite some differences, there are a number of similarities between the Irish and New Zealand beef industries (Table 1).

Table 1: New Zealand and Irish beef industries (2018)

Characteristic	Ireland	New Zealand
Number of farming operations	137,000	52,000
Number of beef farms	72,000	23,000[7]
Average farm size (beef)	37 ha	375 ha
Average number of breeding cows	20	40[8]
Total cattle numbers	6.6 million	10.2 million
Total Dairy cows	1.4 million	6.3 million
Total Beef cows[9]	960,000	950,000
Total beef production (tonnes)	630,000	680,000
Total beef exports (tonnes)	560,000	590,000
Value of beef exports ($ US)	2.2 billion	2.4 billion
Percentage exported	89%	87%

Source: Statistics New Zealand; Central Statistics Office Ireland

In both countries, beef operations account for approximately half of all farming businesses (Dillon, Moran, Lennon, & Donnellan, 2018; Statistics New Zealand, 2020). New Zealand and Ireland each have approximately one million beef cows and similar levels of production and exports (Table 1). The two countries are somewhat unique in the high proportion of their beef production that is exported. Both countries have relatively low populations and large areas of land suitable for cattle grazing. This results in both countries exporting nearly 90% of their beef production. In comparison, Australia, one of the world's top three exporters of beef, exports only 68% of its total beef production (Meat and Livestock Australia, 2017) and the US less than 13% (North American Meat Institute, 2018)

This reliance on exports makes the Irish and New Zealand beef industries highly dependent on international markets. Ireland is especially vulnerable as the majority of its beef exports are to European Union countries and, in particular, the United Kingdom, which takes 45% of Irish beef exports. Ireland also has significant live cattle exports with 263,281 animals exported in 2019. Most of these animals go to Spain and the Netherlands. This market provides an important outlet for

[7] This is total number of sheep and beef farms.

[8] This average is affected by the number of small part time “lifestyle farms”. For example 55% of beef farms in New Zealand have less than 50 cows but these farms produce only 7% of total production. In contrast 7% of farms have over 500 beef cattle. These farms have 45% of the total beef cattle in New Zealand (Geenty & Morris, 2017).

[9] In New Zealand these are generally called beef breeding cows and in Ireland they are called suckler cows.

unwanted male calves produced from the dairy industry and these animals comprise 76% of live exports.

The beef industries in both countries have been affected by the growth of the dairy industry. Total cattle numbers have been relatively stable in both countries (Figure 4). However, there has been a major shift to dairy production at the expense of the beef industry (Figure 5 and Figure 6). The Irish beef industry has been in long term decline and the shift to dairy has accelerated this trend. From 2016 to 2019 national beef cow numbers fell by 85,000 cows.

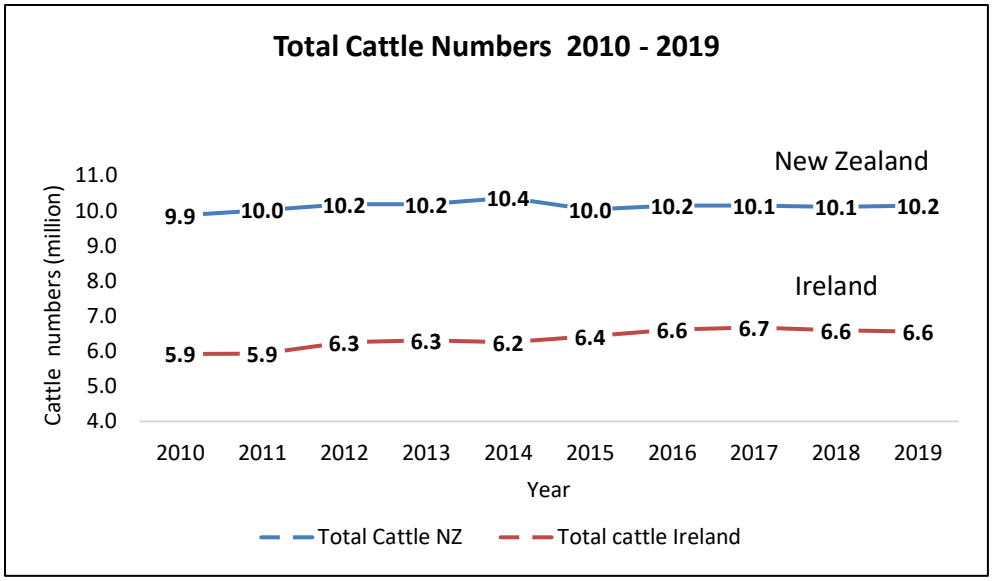


Figure 4: Comparison of total cattle numbers

Source: Statistics New Zealand; Central Statistics Office Ireland

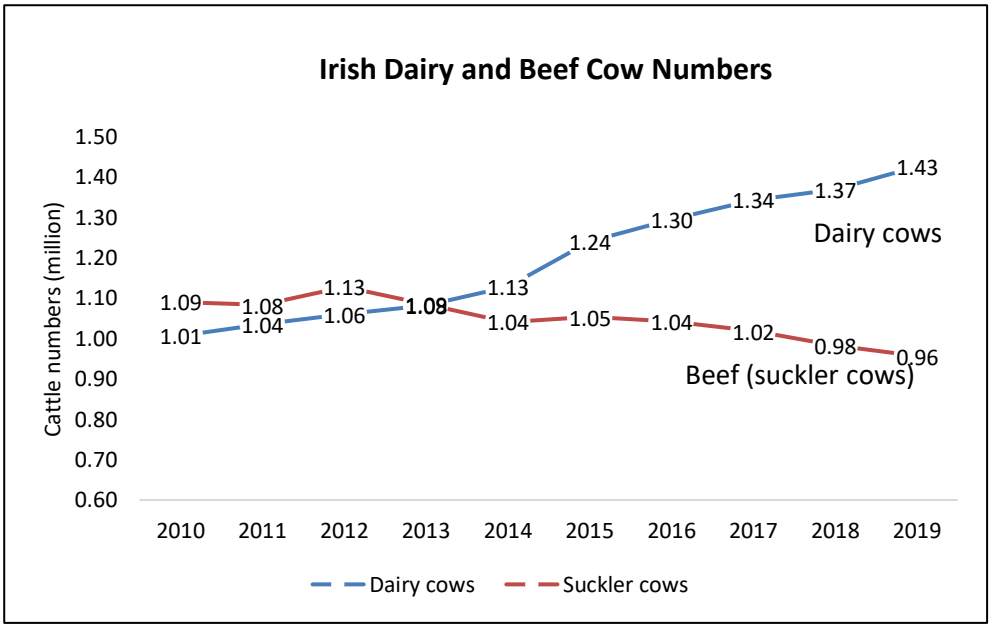


Figure 5: Changes in the Irish cow population

Source: Central Statistics Office, Ireland

New Zealand beef cattle numbers have recently reversed a period of long term decline increasing by 4.5% from 2018. Conversely, after years of rapid growth, there has been a decline in the total number of dairy cattle, reducing by 1.9% since 2017 (Figure 6 and Table A2).

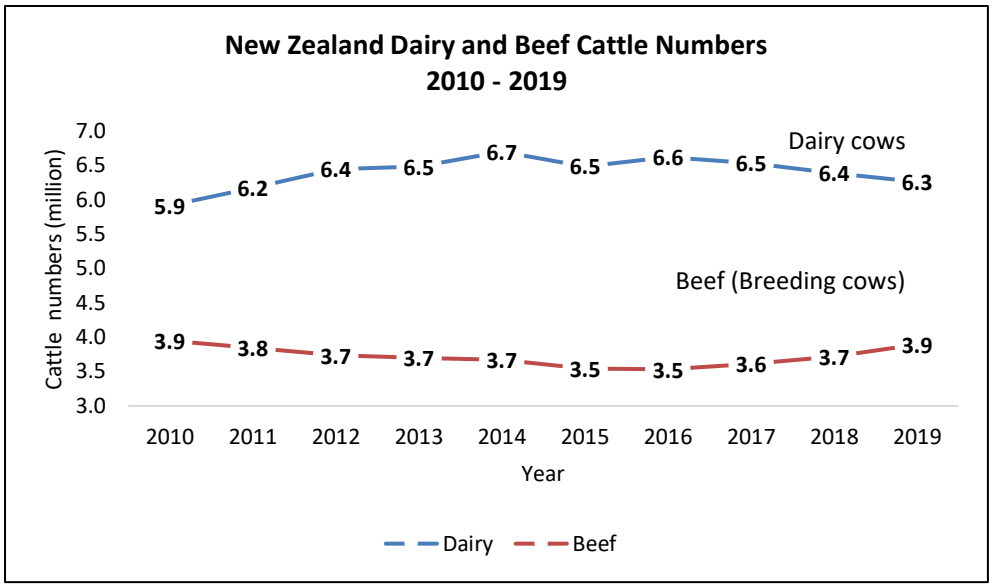


Figure 6: Changes in the New Zealand cattle population

Source: Statistics New Zealand

Though there are significant similarities in the two countries beef industries, the New Zealand industry has some distinctive characteristics. For example, there are few specialist beef farms in New Zealand as most farms include both sheep and beef in their operation. In Ireland, sheep and beef are generally run as separate enterprises. Furthermore, most sheep and beef farms in New Zealand are on moderate to steep hill country that is lower fertility and often has less summer rainfall than higher quality land used for dairy production (Geenty & Morris, 2017). Furthermore, dairy-beef bull beef calves kept and reared for beef production on sheep and beef farms make up a significant proportion (19%) of the adult cattle slaughter (Geenty & S Morris, 2017).

Economic performance

The two beef industries have significant differences in their financial performances (Table 2 and Table 3). Though the Irish beef industry is a significant contributor to the Irish economy, at the farmer level, it is characterised by smallholdings, high costs, low profitability, reliance on European Union income support payments and off-farm income (Hanrahan, 2016).

Table 2: Gross beef farm income 2018 ($NZ[10])

Component	Ireland	New Zealand
Average farm income (beef)	$61,000	$162,700
Average beef income per ha[11]	$1,567	$237

Source: Beef + Lamb New Zealand; Teagasc National Farm Survey.

Table 3: Components of average cattle rearing FFI[12] 2018

Component	Average amount
Gross income	€ 35,990
Direct payments	€ 13,098
Total costs	€ 27,680
Family Farm Income (FFI)	€ 8,310

Source: Teagasc National Farm Survey.

Beef farm income in Ireland is also supported by tariffs and quotas which protect the industry from lower-cost imports. The European Union has very limited tariff-free quotas (45,000[13] tonnes) available for beef imports. Most beef imports pay a tariff of 12.8% plus €17.68 - €30.40/kg (Table D 2). Historically these tariffs and quotas resulted in the European Union price for cattle being significantly higher than the international beef price. However, recently this price differential has become less apparent and the European beef price and the international price have become more closely aligned (Figure 7, Table 4).

[10] Currency is in reported in $NZ or both $NZ and Euros when there is a comparison between the two countries otherwise it is reported as Euros. At the time of writing 1 $NZ was worth 0.57 Euros

[11] Cattle income only.

[12] Family Farm Income (FFI), the return from farming for farm family labour, land and capital, is the principal measure used in the Teagasc National Farm Survey.

[13] Represents 0.6% of total European Union beef production.

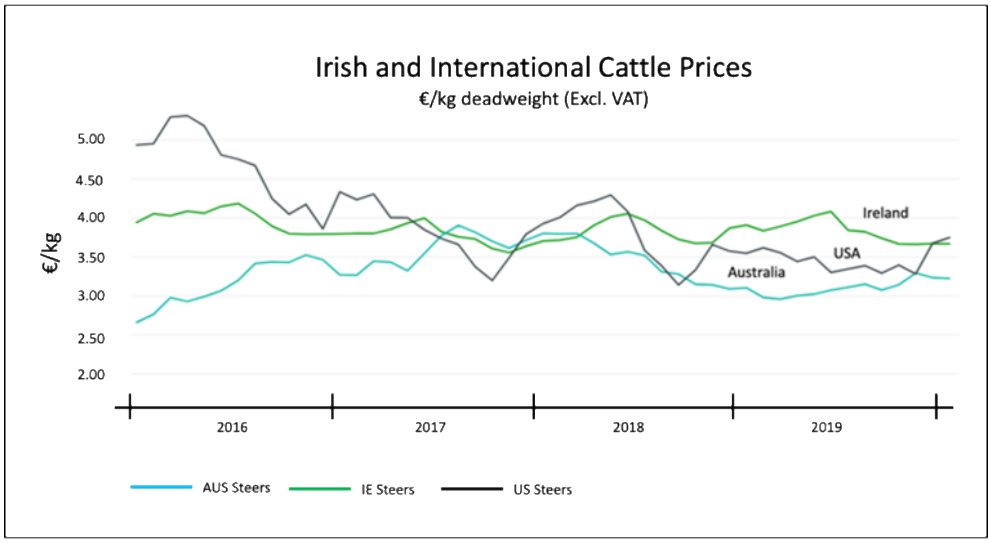


Figure 7: Comparison of cattle prices

Source: Bord Bia Cattle Price Dashboards.

Table 4: Comparison of farm gate price for prime steers (carcass weight)

Cattle type		January 2020
Irish prime steers	€3.67/kg	(NZ$6.48/kg)
USA prime steers	€3.75/kg	(NZ$6.63/kg)
Australian prime steers	€3.22/kg	(NZ$5.69/kg)
New Zealand prime steers	€3.10/kg	(NZ$5.50/kg)

Source: Bord Bia Cattle Price Dashboards; NZ Farmers Weekly

This convergence is a result of falling beef prices in the European Union due to decreasing beef consumption and increased supply (Hanrahan, 2016). At the same time, international beef prices have been rising as a result of reduced global supply and increased demand in Asian markets.

Typical beef cattle revenue in New Zealand is approximately €96,000 (NZ$162,700) per farm and €140 (NZ$237) per ha (Table 2). Revenue per ha in New Zealand is lower than in Ireland. However, total beef income is higher due to larger-scale operations in New Zealand which also have significantly lower costs. These factors contribute to a current sheep and beef farm profit before tax[14] in 2017/18 of €81,000[15] (NZ$144,000) (Beef + Lamb New Zealand Economic Service, 2020).

The production costs of Irish beef have also been compared with other beef competitors around the world, including Argentina, Brazil, the USA and Australia. Ireland was one of the highest cost producers internationally when comparing beef rearing and finishing operations. Even though

[14] Total combined income from sheep and cattle enterprises.
[15] Profit after Insurance, Rates, Managerial Salaries, Interest and Rent.

Ireland received one of the highest prices for finished animals, this was not enough to compensate for the high cost of production (Hanrahan, 2016).

The importance of the beef industry to the Irish economy

Despite the small farm size and low profitability of the beef sector in Ireland, it makes a significant contribution to the Irish economy (Table 5).

Table 5: Contribution of the Irish beef industry

Characteristic	Measure
Total value of beef production (2017)	€2,4 billion (NZ$ 4,2 billion)
Cattle slaughter	1.7 million
Beef production	630,000 tonnes
Beef exports	560,000 tonnes
Live cattle exported	190,000 head
Beef as % of Irish food and beverage exports	21%
Beef as % of the total value of exports	10%
Beef industry % of the total workforce	8%
% Beef exports to the United Kingdom	45%
% Beef exports to Non-European Union countries	2.7%

Source: Teagasc National Farm Survey: Central Statistics Office Ireland

Beef accounts for a substantial proportion of Irish food and beverage exports and a significant amount of total exports (Table 5). Ireland is also a significant player in the global beef export market. It is the world's 5th largest beef exporter[16] and the largest in Europe. The United Kingdom is the largest single market for Irish beef exports with France, the Netherlands, Italy and Germany also important destinations. Nearly all exports are to European Union markets with less than three percent going to Non-European countries. The beef industry employs almost 8% of the Irish workforce and provides 10% of the total value of exports (Department of Agriculture Food and Marine, 2018). The New Zealand beef industry has similar levels of production to Ireland, but its main markets for beef are China, USA and Japan.

[16] New Zealand is the 4th largest exporter by volume but 5th largest by value. Ireland has higher value exports due to the higher value European market prices.

Bord Bia – Irish Food Board

Bord Bia (Irish Food Board) has a significant role in the Irish beef industry. Bord Bia was formed in 1994 from the merger of the Irish Meat and Livestock Board and the food promotional activities of the Irish Trade Board. It later incorporated the promotion of the horticultural and seafood sectors. Bord Bia's primary function is to promote, assist and develop the marketing of Irish food and livestock and the marketing and consumption of horticultural produce[17]. Bord Bia aims to act as a link between Irish producers and their international customers (Appendix C). With this aim, Bord Bia has offices in London, Paris, Dusseldorf, Amsterdam, Stockholm, Milan, Madrid, Dubai, New York, Moscow, Shanghai, Singapore and Warsaw (Bord Bia 2020).

To perform these functions, Bord Bia receives approximately €70.0 million in funding. This amount represents about 0.5% of the €14.5 billion value of Irish agri-food exports. In 2018 Bord Bia received approximately €40.3 million in direct Irish government grants[18] with the remainder of government funding provided for specific projects[19]. The only non-governmental income is from a statutory farmer levy of €5.9 million. The majority of Bord Bia's income is used for marketing and promotions and the remainder is spent on specific projects and operating expenditure[20] (Bord Bia, 2018).

There is no equivalent food marketing agency in New Zealand. As a consequence, the marketing of food products is mostly the responsibility of individual food businesses. Some industry-wide marketing is carried out by industry bodies such as Beef + Lamb New Zealand[21] with funding from farmer levies. There is some government support for food marketing through various government agencies such as New Zealand Trade and Enterprise (NZTE), Ministry of Business Innovation and Employment (MBIE) and Ministry of Primary Industries (MPI). To compare the level of government support for food marketing to Ireland, an equivalent 0.5% investment of New Zealand's NZ$38 billion food exports would total approximately NZ$190 million[22].

Origin Green

Origin Green is described as Ireland's food and drink sustainability programme. It is a voluntary programme led by Bord Bia that aims to enable Ireland's food industry to set and achieve measurable sustainability targets. According to Bord Bia's 2018 annual report, the Origin Green

[17] Bord Bia Act 1994 as amended by the Bord Bia Amendment Act 2004.
[18] Drawn from the Department of Agriculture, Food and the Marine under Vote Agriculture. A significant amount of this funding is received from the European Union as part of the Common Agricultural Policy (CAP).
[19] €6.5 million is specifically provided for the Quality Assurance scheme.
[20] This includes industry contributions to joint promotions, trade fairs, information services and seminar and conference fees
[21] Beef + Lamb New Zealand have develop and are promoting their “Taste Pure Narture” Brand.
[22] In comparison Tourism New Zealand receives about NZ$111 million in government funding to promote the NZ$13 billion tourism industry. This figure represents around 1% of total tourism revenue.

strategy focuses on building awareness and engagement with trade customers in European and international markets. Origin Green certification is available to companies at any level of the supply chain if they commit to the sustainability charter and develop verifiable sustainability plans. The promotion of Origin Green is delivered through online and traditional marketing activity as well as targeted promotion and editorials in trade and broadsheet publications.

Development of Irish beef quality assurance schemes

The Origin Green programme in the Irish beef industry developed from a particular set of historical circumstances. This explains how the current Origin Green "Sustainable Beef Quality Assurance Programme" relates to earlier beef quality assurance programmes. Origin Green certification is based on Bord Bia's original beef quality assurance schemes with the addition of an estimate of a farm's carbon footprint and factors that contribute to this.

Requirements of large retailers and wholesalers

The Irish beef quality assurance scheme has a long history originating in the late 1980's and early 1990's. The initial impetus came from the removal of export subsidies and the change to decoupled[23] farm payments. This required Irish beef exports to find higher value markets within the European Union. As a result, Irish beef began to be sold to large retailers and wholesalers mostly in the United Kingdom (Tesco, Sainsbury etc.). Traceability was important for these retailers as well as other requirements such as animal health and welfare, transport standards plus the appropriate use of veterinary medicines, specifically the use of anabolic steroids. The retailers gave a clear message that Irish beef needed to improve its quality standards to be sold in their supermarkets. These requirements began the process of introducing quality assurance across Irish beef producers (K. Kinsella, personal communication, March 9th 2020).

Traceability – BSE and Foot and Mouth Disease

The occurrence in 1987 of Bovine Spongiform Encephalopathy (BSE), commonly known as Mad Cow Disease, provided further impetus for implementing quality assurance programmes in the Irish beef industry. BSE meant that producers needed to have animal movement controls, and these needed to be enforced. The European Union introduced regulations that every animal had to be tagged twice and recorded in a database. At the time, Ireland had an effective traceability system as a result of comprehensive Tuberculosis (TB) testing. This traceability system was further developed over the next ten years and is now arguably one of the best systems globally (K. Kinsella, personal communication, March 9th 2020). The success of this system was helped by the small farm size,

[23] A decoupled payment (subsidy) involves paying a farmer a fixed amount per ha rather than the payment being in proportion to production.

which enables farmers to keep track of animals more easily. Currently, any animal can be located through its ear tag. It is a legal requirement that every time an animal moves, farmers are required to enter the new location of the animal in the system.

The Foot and Mouth Disease outbreak in 2001 provided a significant opportunity for Irish beef to access the valuable United Kingdom (UK) market. The mass culling of animals in the UK increased demand for Irish beef. Sales to the UK increased from 70,000 to 200,000 tonnes between 2001 and 2006. Currently, approximately 50% of Irish beef exports (275,000 tonnes) are to the UK. These sales could only be achieved because of the Irish beef quality assurance scheme (K. Kinsella, personal communication, March 9th 2020).

Reliance on export markets

The dependence of Irish beef on export markets has also been a factor in the development of quality assurance schemes and the later introduction of Origin Green. Irish beef frequently competes with domestic beef in many of the European Union markets it supplies (Figure 8).

Retailers and consumers in Europe often have a preference for domestic products; hence Irish beef needs to meet the same or higher quality standards to be competitive (Figure 9). Having a robust quality assurance programme is especially important for the large corporate retailers and foodservice customers (K. Kinsella, personal communication, March 9th 2020). Currently, the largest buyers of Irish beef are McDonalds and Tesco.

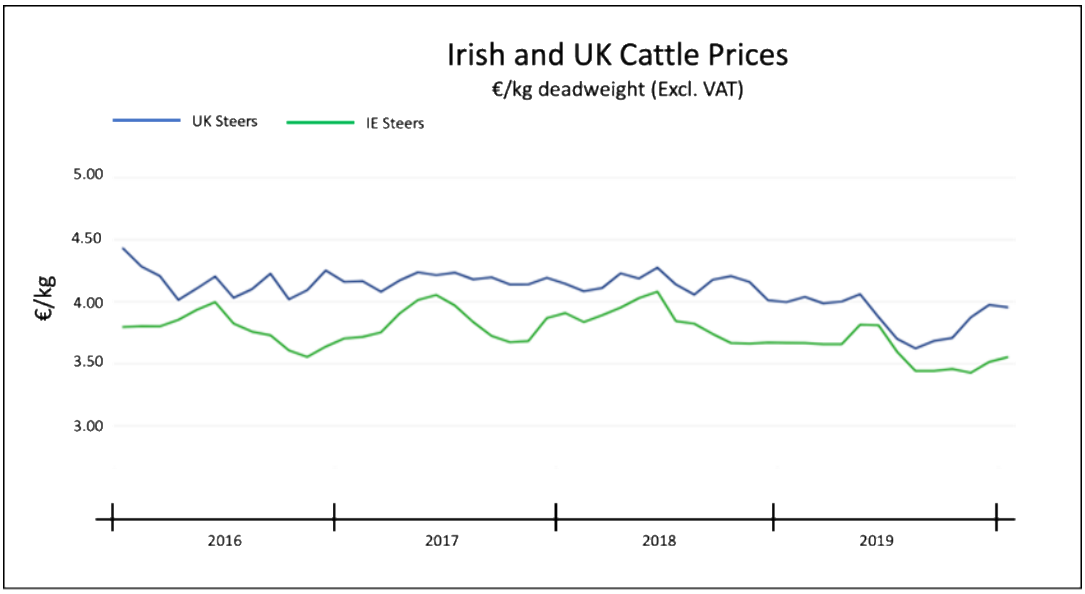
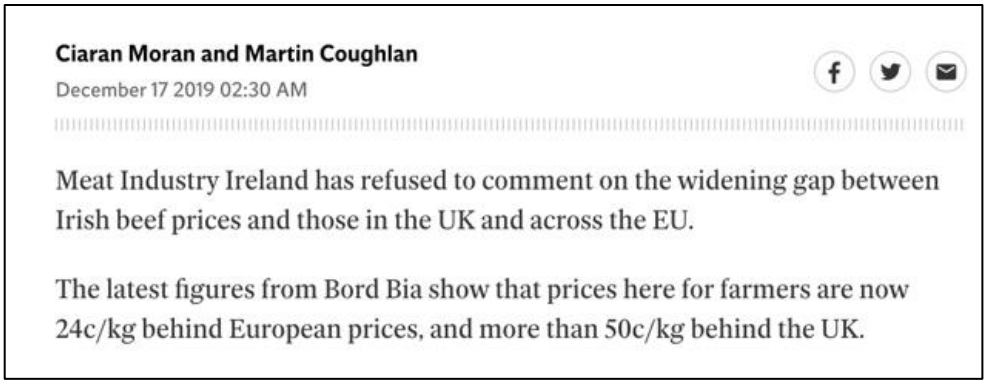


Figure 8: Irish beef price compared to UK price 2016 – 2019 (steers)

Source: Bord Bia Cattle Price Dashboards.



Ciaran Moran and Martin Coughlan

December 17 2019 02:30 AM

Meat Industry Ireland has refused to comment on the widening gap between Irish beef prices and those in the UK and across the EU.

The latest figures from Bord Bia show that prices here for farmers are now 24c/kg behind European prices, and more than 50c/kg behind the UK.

Figure 9: Media coverage of price differential between UK and Irish beef

Source: Farming Independent

Origin Green and carbon footprint

The development of the Origin Green brand in the Irish beef industry and the inclusion of the carbon footprint measurement was in response to several published studies on the impact of the livestock sector on greenhouse gas emissions such as the FAO publication "Livestock's Long Shadow" (Steinfeld et al., 2006) and others, such as studies by Crosson et al., (2011); Foley et al., (2011) and Garnett, (2009). Industry leaders felt that many of these were unreliable due to the use of secondary data and different data sets. Some reports also came out of Ireland regarding the Irish beef industry's greenhouse gas emissions. These were also thought to be unreliable by beef industry leaders. Despite the questionable validity of these reports, they were being read by the Irish beef industry's large corporate customers. Consequently, they questioned the sustainability credentials of the Irish beef production system. Without alternative data, there was no credible way to challenge the results of these publications. This lack led to plans to develop actual industry data to measure the greenhouse gas emissions from the Irish beef industry and establish a basis for demonstrating progress.

At the time, the development of the Origin Green programme received significant government support. This support was due in part to the collapse of many other sectors of the Irish economy due to the impact of the global financial crisis. As a result, the Irish government focused on agriculture as a driver of economic growth

> *"It may be that if the same thing was proposed now, the government wouldn't be as supportive."*
>
> Bord Bia, Beef Sector Manager

The Origin Green programme was introduced in 2011 and with it the measurement of a farm-level carbon footprint using Carbon Navigator[24] - a tool developed by Teagasc (Agriculture and Food Development Authority).

Origin Green's carbon footprint scheme is certified by the internationally recognised Carbon Trust and utilises methodology aligned to specific greenhouse gas (GHG) Protocol Product Standard, PAS 2050 and ISO 14067. These methodologies use a Life Cycle Assessment (LCA) approach (Casey & Holden, 2006) and are based on the Intergovernmental Panel on Climate Change (IPCC) guidelines (Appendix E). Food and drink manufacturers are independently verified by international auditors, Mabbett (Bord Bia 2019).

New Zealand sustainability certification

New Zealand does not have an equivalent food sustainability programme that includes a carbon footprint measurement. Landcare Research offers a commercial greenhouse gas emissions certification scheme[25] through their Enviro-Mark (Toitū Envirocare) business. This certification is provided to individual companies. They offer two programmes, "Toitū carbon reduce" certification and "Toitū carbon zero" certification. Both programmes issue certification following an independent audit to international standards, including ISO 14064 and PAS 2050. Currently, wineries are the only food sector businesses that have become certified.

The Ministry of the Environment calculates a national inventory of greenhouse gases to fulfil the reporting requirements under the United Nations Framework Convention on Climate Change and the Kyoto Protocol (Ministry for the Environment, 2019). This inventory estimate agricultural emission at an industry level based on standard IPPC protocols. The results of this show that greenhouse gas emissions for beef cattle in New Zealand decreased from 13.3 tonnes of carbon dioxide equivalent per tonne of product in 1990 to 12.4 tonnes in 2017.

At the farm-level OVERSEER® is one of the few tools widely used by farmers and their advisors which includes a farm-level estimate of greenhouse gas emissions. This model is primarily a tool for evaluating specific greenhouse gas abatement strategies rather than a specific greenhouse gas emissions accounting tool.

[24] An online farm management package produced by Bord Bia and Teagasc which allows participants to set improvement targets in key areas and automatically calculate the potential results on their farm in terms of environmental and economic performance (Murphy, Crosson, O'Brien, & Schulte, 2013).

[25] Landcare Research - Manaaki Whenua is a Crown research institute (CRI), one of seven in New Zealand. Landcare Research's core purpose is to drive innovation in the management of terrestrial biodiversity and land resources.

There is currently no beef industry greenhouse gas accounting system at the farm-level, and consequently, it is not possible to aggregate this up to the industry level. A future scheme for the beef industry is presented in the Beef + Lamb New Zealand Environment Strategy and Implementation Plan for 2018-22. This plan sets out specific goals:

- All farmers will know their farm emissions numbers by 2022.
- Piloting of an emissions reporting and benchmarking system will be completed by 2024.
- A system for farm-level accounting and reporting of agricultural emissions will be in place at the farm-level 2025.
- Farmers continue reducing carbon emissions, moving towards a carbon-neutral sheep and beef sector by 2050.

This strategy also has goals around water quality, biodiversity and healthy soils. Another document that outlines the commitment of primary sector industries to climate change is "He Waka Eke Noa—Our future in our hands: Primary sector climate change commitment". This proposes that all farms will have an emissions reporting system in place by 2025.

Implementation of the Origin Green programme

The implementation of the Origin Green programme requires collating data from several different sources. This includes data from the Department of Agriculture's Animal Identification and Movement System (AIMS), the Irish Cattle Breeders Federation (ICBF) database, and slaughter weights from the beef processors. Additional data is also collected from farmers during the Bord Bia Quality Assurance audit[26]. This involves farmers making available additional data which involves them recording information on all farm inputs and outputs. Industry leaders noted that there was initially some resistance to providing more data but is now generally accepted by most farmers.

Farms are measured against key efficiency areas which include extended grazing, calving rate, daily live weight gain, improved economic breeding index (EBI), nitrogen efficiency, slurry management, and energy efficiency. Following each audit, the farmer receives a sustainability report showing the results and feedback on the farm's performance, with reassessments every 18 months. This report identifies areas that can improve the carbon footprint of their farms while also improving efficiency.

The scheme was initially voluntary but is now required as part of the Bord Bia's Sustainable Quality Assurance certification. The on-farm carbon footprint has been recorded since 2010. With the

[26] Audits are undertaken every 18 months

inclusion of the measurement of the carbon footprint, the scheme was renamed to be the "Sustainable Beef and Lamb Quality Assurance" Scheme[27].

Farmer adoption

The inclusion of the carbon footprint has given the Irish beef sector the ability to measure and evaluate what is happening from an industry-wide perspective. It also provides validated data to defend the industry's environmental performance. From the farmers' perspective, it gives them feedback on their production system and benchmarks them to the average results of the other farmers in the system[28].

> *"Farmers respond to this as they don't want to be below average."*
>
> Bord Bia, Beef Sector Manager

This report enables producers to identify different areas where they are above or below the industry average and how they can improve. These areas can be broken down to focus on specific management practices such as grassland management, improving liveweight gain, age at first calving and nutrient management.

> *"It provides a basis to start the conversation around meat and the environment, meat and health or animal welfare."*
>
> Bord Bia, Beef Sector Manager

Beef industry leaders explained that it had required some work by Bord Bia to sell the idea to farmers. To improve farmer buy-in, Bord Bia introduced programmes such as the National Sustainability Awards as well as profiling top farmers and how they are embracing the programme. It was also communicated to farmers how the sustainability measures meet the requirements of customers in specific markets that place a lot of importance on sustainability such as Germany.

Origin Green also ties in with many European Union funded projects. An example is the Green, Low-Carbon, Agri-Environment Scheme (GLAS) and the Beef Data Genomics Programme (Appendix B).

Teagasc extension staff explained that some farmers resist being told they have issues through the sustainability report. However, if their results are put into context and they are told what the top 10% of farmers are more likely to accept the need to change. Additionally, if they can see that

[27] The Origin Green programme has also worked on including additional sustainability attributes such as biodiversity and water quality.

[28] As calculated using the Carbon Navigator tool.

addressing these environmental issues can also improve their farm efficiency and thus improve their gross margin, this can also motivate them to implement the recommendations.

Irish beef Industry leaders identified some of the critical lessons learned from the development and introduction of the Origin Green programme. These were:

1. The necessity to have a good structure to keep the farmers on side. This includes strong farmer organisations that can help support the process.
2. To have good technical committees that develop the programme and make it relevant to Ireland and Irish farmers.
3. To have a high-quality animal traceability system in place.

The importance of Origin Green in the marketplace

Origin Green tries to be an umbrella for all that the Irish food and beverage industry are doing in the sustainability space. Beef industry leaders stated that the Origin Green carbon footprint data is important in that it enables the beef industry to measure and demonstrate its environmental credentials. Like New Zealand Ireland has always traded on its "green" island environment. However, the Irish beef industry has found that this perception is no longer sufficient, and now they need to measure and demonstrate that this is true.

> *"It's not just about telling the story; you have to back it up. You have to be able to put some measure on it".*
>
> CEO – Meat Industry Ireland

Beef industry leaders said there had been a clear message from the market that this is what they wanted. Furthermore, they commented that pressure is coming from the European Union in terms of regulations to reduce carbon emissions. Both of these factors require the ability to prove the case for Irish agriculture and defend the performance of the industry. Farmers are aware of changing requirements for sustainability both from customers and regulations. Origin Green is seen as a way of future-proofing the sector and ensuring Irish beef continues to be competitive in this changing environment.

> *"What farmers appreciate most is that you are protecting them, that you have got their back. The fact that it was the first scheme out there means we have been able to talk about it with customers. Ireland is a small player in a big market; therefore, it gives us some confidence in discussions with these large buyers".*
>
> Bord Bia, Beef Sector Manager

"Most of the Irish dairy, beef and lamb is measured on sustainability criteria. That's pretty unique. Well ahead of other countries."

Director of Livestock, Irish Farmers Federation

Regulatory requirements

The development of Origin Green initially focused on meeting market demands for sustainability. Though this continues to be an essential aspect of the scheme, there is an increasing focus on meeting regulatory requirements. For example, the European Union is setting specific targets for member states to reduce carbon emissions. These targets will mean the Irish government will require each sector to play its part. In Ireland, as in many parts of the world, agriculture has become a hot topic in relation to greenhouse gas emissions. Industry leaders identified that this was not the case three to five years ago, but there has been a lot of recent public discussion around emissions, especially from ruminant animals. Origin Green enables Irish agriculture to show it is taking the issue seriously and not just trying to defend the status quo.

Industry co-ordination

Another valuable aspect of Origin Green is that it has been able to pull in other actors along the supply chain. This collaboration demonstrates that production, processing, distribution and retail are all working towards improving sustainability. The Origin Green programme is also able to incorporate multiple industries such as lamb, dairy, poultry, eggs, pork and horticulture. This has enabled the Irish food industry to demonstrate its quality assurance and sustainability credentials across the entire food industry.

Specific quality assurance schemes are:

- Sustainable Beef and Lamb Assurance Scheme (SBLAS)
- Poultry Products Quality Assurance Scheme (PPQAS)
- Meat Processor Quality Assurance Scheme (MPQAS)
- Retail Butcher Assurance Scheme (RBAS)
- Sustainable Dairy Assurance Scheme (SDAS)
- Feed Quality Assurance Scheme (FQAS)
- Sustainable Horticulture Assurance Scheme (SHAS)
- Sustainable Egg Assurance Scheme (SEAS)
- Pigmeat Quality Assurance Scheme (PQAS)

There are currently 572 companies signed up to the Origin Green programme with 318 Verified members (Appendix F). Certification means these companies have committed to a minimum of six sustainability targets under the Origin Green charter and have had their sustainability plans independently verified by international auditors, Mabbett (Bord Bia 2020).

Industry leaders emphasised that the principal focus of marketing the Origin Green brand has been at the B2B level rather than B2C. With the Irish domestic market representing only 10% of sales, the industry is reliant on a wide range of large international food manufacturers, retailers and foodservice providers. Many of these companies are driving their own sustainability agenda.

For example, McDonalds which is the largest buyer of Irish beef, has its own beef sustainability programme. McDonalds is a foundation member of the Global Roundtable for Sustainable Beef (GRSB) which has a goal to minimise net greenhouse gas emissions on a per unit of production basis. Origin Green is highlighted in its beef sustainability report.

> *"One of the countries involved in the pilot programs is Ireland. As the largest purchaser of Irish beef, McDonald's works closely with Bord Bia (the Irish Food Board) on Origin Green, the only sustainability program in the world which operates on a national scale, uniting government, food producers and farmers.*
>
> McDonald's sustainability report 2018

This demonstrates how Origin Green can meet large corporate customers' needs to show they are sourcing sustainable beef supplies.

Improving efficiency

The Irish beef industry has significant opportunities to improve production efficiency, which will then drive a reduction in greenhouse gas emission per kg of beef. For example, there is potential for farmers to slaughter animals at a younger age. Many traditional farmers are finishing cattle at an older age and higher weights. Consequently, the longer the animal is alive, the higher will be its greenhouse gas emissions. Age at first calving is also an area that can be improved. Other efficiency gains can be achieved through improved grassland management, silage quality and effluent management.

Benefits of Origin Green on the Irish beef industry

Beef industry leaders explained that a key benefit of Origin Green is that the Irish beef industry (and the Irish food industry) can demonstrate that it is actively engaged in addressing issues of sustainability. It also means that by addressing these issues it can contribute to some degree to future proof the industry from the increasingly strict environmental regulation.

From a market perspective, it is about ensuring that the Irish beef industry can compete and access the best markets and customers. Having access to these customers feeds back into the price received for Irish beef. Irish beef is often at a disadvantage in markets where there is a preference for domestic beef. This disadvantage is especially evident in markets such as the UK where there is the promotion of and consumer preference for British beef (Figure 10). In this situation, Origin Green has aimed to reduce the discount for imported Irish beef rather than obtaining a price premium.


Shocking that some retailers fail to stock British beef during Great British Beef Week

It is inexcusable to see some of the country's biggest retailers failing to honour their commitment to sourcing British beef, especially at a time when British prime cuts are in plentiful supply and in desperate need of a market, the NFU said today.

There are reports that prime beef stocks in some retailers, such as Sainsbury's, ASDA and Tesco, are being dominated by Irish products and it comes on St George's Day, a day of patriotic celebration and which also marks the start of Great British Beef Week.

Figure 10: Controversy of Irish beef in UK supermarkets

Source: National Farmers Union Publication

Over the past ten years, Irish beef prices have moved from below the EU average to now tracking close to and at times above the average (Figure 11). The price has been improved by having the best customers and improving access to international markets. While this shows some improvement in the price for Irish beef, it is difficult to prove to farmers that Origin Green is achieving a premium. However, despite this, from a producer's perspective by focusing on the environmental impact, they can also improve their technical and economic efficiency.

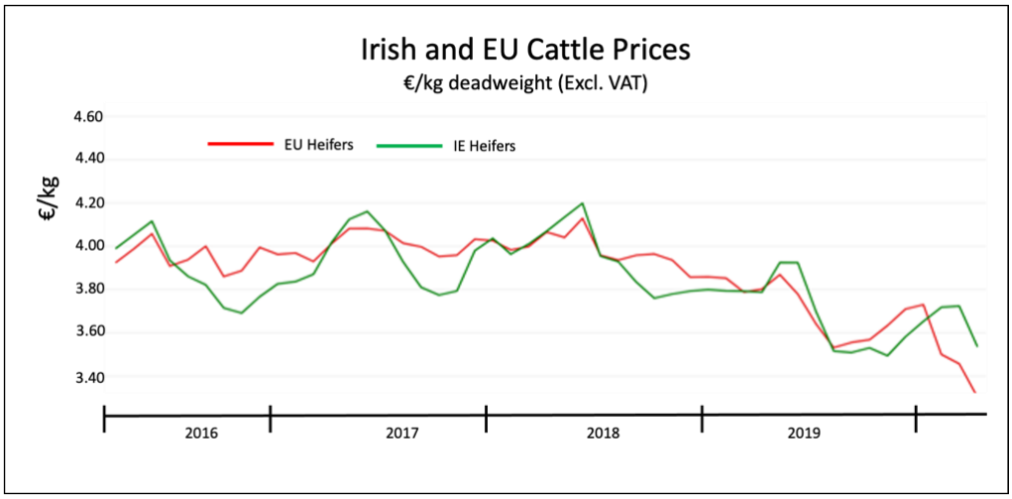


Figure 11: Comparison of EU average price to Irish beef price

Source: Bord Bia Cattle Price Dashboards.

Farmers' perceptions of Origin Green

In comparison to the existing quality assurance audits, more data was required to develop a farm-level carbon footprint measure. There were a range of reactions from the farmers interviewed to the requirement for this additional data. Some highlighted the significant increase in the recording of on-farm information. Many farmers saw the additional data collected as not very relevant. However, with the increasing environmental regulations introduced in the last two-three years, there was an increased acceptance of the need to record and demonstrate environmental sustainability measures.

Some farmers interviewed questioned if the additional effort for Origin Green is worth it, they were unsure how much it was delivering. They expressed difficulty in evaluating the impact on actual returns at the farm-level. They believe that a brand has to provide value for farmers. Farmers also commented on the disconnect between on-farm Origin Green certification and other parts of the supply chain. For example, farms maybe 100% Origin Green certified; however, the processor and retailer who may be Origin Green certified can also process or sell non Origin Green accredited product.

> *"Many farmers struggle to see that there is any premium for quality assurance and Origin Green. Farmers see big corporates grabbing everything for their advantage, then they turn around and say they can't increase the price because the Canadians or the Americans are just more efficient than you."*
>
> Director of Livestock, Irish Farmers Federation

There was an awareness that the Irish beef industry is very dependent on large corporate customers such as Tesco and McDonalds. As suppliers, they have little ability to influence their policies. In this context, these large buyers were able to set the rules and set the sustainability standards as a basic requirement for being a supplier.

> *"Farmers say they are not getting a premium for the quality assurance scheme and Origin Green, but the big corporates say it is just a pre-requisite to get into the market – If you want to get on the shelf you have to be Origin Green."*
>
> Director of Livestock, Irish Farmers Federation

There seemed much higher buy-in from those interviewed who were fulltime farmers and those who are closer to markets. For example, farmers who were supplying animals to specific programmes such as Hereford and Angus were much more aware of the importance of the benefits of Origin Green in the market. Those who were supportive of the programme agreed that in the marketplace, there was an impact in terms of the general perception of Irish beef. However, nearly all the farmers interviewed said that there had been no real impact on their farm business, though some thought it had highlighted areas where they could be more efficient. Though there may be benefits from an efficiency point of view, they felt that improving their carbon footprint purely from an environmental perspective was not as important. Some of the farmers interviewed were worried that the measurement of the carbon footprint would be used against them in the future by regulators. Many farmers struggled with the ongoing demands for environmental management and felt that the goalposts were continually shifting.

Some farmers interviewed felt that there was no real benefit to them for having a lower carbon footprint as all farmers were treated equally. They felt that there should be differentiation in the market place for beef produced with a lower carbon footprint. They believed that consumers would pay a premium for low carbon beef and that this should be reflected in the price paid to farmers who could deliver this.

> *"There has been little impact up until now. No impact at all. I think we need a whole new approach or invigoration of where we are going with Origin Green. Every farmer should get a star rating, and that should affect the price he is getting for his beef at the processor level."*
>
> Beef Farmer

Other farmers commented that they were happy when they received a good report and had noticed some specific areas they could improve. They mentioned it had made them aware of their carbon footprint.

> *"I like to receive it when it's a good report. In the past, I have bought calves from all over the country, and that was increasing my carbon footprint. So I stopped that and now buy calves locally 5 – 10 miles away. I am still waiting for the result but expect my carbon footprint to be lower because of reduced transportation."*
>
> Beef Farmer

Some interviewees questioned how accurate it was, and if producing a specific number for CO_2 per Kg Beef was the right approach.

> *"For me, it's not actually about reducing it – It's just a figure I am aware of".*
>
> Beef Farmer

There were also issues from farmers regarding the timing of the reports. Because the audit was only every 18 months, there could be a considerable delay between making management changes and seeing the result.

Meeting the goals of Origin Green

A key objective of this study was to evaluate the implementation and effectiveness of Origin Green in terms of achieving its stated objectives concerning the Irish beef industry. Origin Green aims to utilise Ireland's natural advantage to differentiate its food and beverage products, capture value and establish a sustainable high-value food and beverage industry. Achieving these objectives in the Irish beef industry has been particularly challenging as a result of a number of characteristics of the industry.

Economic performance

As discussed, the Irish beef industry is characterised by smallholdings, high costs, low profitability, reliance on EU Income support payments and off-farm income. This creates a disconnect between the market and producers. Few Irish beef producers are profitable even with significant EU Income support payments and off-farm income (Table B2). As a consequence beef producers tend to respond to non-market support payments rather than specific consumer requirements. Furthermore, as many producers are part-time, they are less focused on making productivity or quality improvements as they are both financially and time-constrained. Because of time constraints, they need to reduce the complexity of their production system and therefore are resistant to change that may add complexity to their operation. The lack of profitability also means

that there is limited revenue to invest in equipment and systems that may improve their sustainability performance. This is further compounded by the small size of operations which reduces their ability to gain the economies of scale needed to justify large investments.

Furthermore, many farmers only make improvements in their sustainability practices in response to specific EU schemes that provide payments for improving their environmental impact. An example is the Green, Low Carbon, Agri-environment scheme (GLAS). This provides on average €1,957 per farm to promote more environmentally sustainable production systems (Appendix B).

Lack of trust

Achieving the goals of Origin Green in the Irish beef industry is also difficult due to the low level of trust between producers and their processors and retailers. The processing and retail industries are highly concentrated, and farmers have weak bargaining power in the supply chain. This is combined with a lack of transparency in the supply chain once the animal is sold to the processor. The major processors are privately owned, so their margins and profitability are not publicly available. As a result, producers feel that they receive an unfair share of the price for their product. This further drives the disconnect that Irish beef producers have between market demands and their on-farm practices.

There is also a lack of trust between the beef producers and policymakers at both the national and European Union level. Many of the farmers interviewed were concerned that the carbon footprint measurements would become compulsory, and in the future, they would be penalised for their level of greenhouse gas emission.

Reliance on the United Kingdom and European Union markets.

Irish beef is almost exclusively sold in European Union markets. As discussed, in these markets, provenance is an important factor in consumers' food choices. This means that Irish beef is often at a disadvantage in these markets compared with local beef. This is especially the case in the United Kingdom, which takes 56% of Irish beef and has its own quality assurance certification (Red Tractor). As a result, Irish beef is often starting from a place of disadvantage and the benefit of Origin Green is more about meeting retailer requirements than achieving a premium for Irish beef.

Reliance on Bord Bia and other industry organisations

Producers generally support the efforts by Bord Bia to promote Irish beef and ensure it remains competitive in the marketplace. The downside is that producers see marketing and promotion as the responsibility of Bord Bia, and they only focus on meeting consumer requirements if there are financial incentives to do so.

Positive impacts

Though Origin Green may not have achieved all of its primary goals, there have been a number of positive outcomes for the Irish beef industry.

Firstly, the programme has taken a proactive approach to the environmental impacts of beef production and in particular carbon emissions. Origin Green introduced the farm-level carbon footprint measurement in 2012, which was well ahead of any other beef producing country. This provided evidence that the industry was taking its environmental impacts seriously and was making an effort to address its sustainability issues. This to some degree has helped future proof the industry as the pressure comes on the Irish agricultural sector to reduce its carbon footprint and reduce other environmental impacts. As a programme that does not only focus on beef or at the production level, it has been able to present a consistent story across different food and beverage products as well as processing, manufacturing and retail.

Secondly, it has been able to produce independently verifiable data with which to engage in the debate on the impact of beef production on the environment. Without this, the industry would be vulnerable to data produced from outside the beef industry and would have no alternative data to question the validity of these studies.

Thirdly, it has identified some key areas where farmers can make changes to their production system that not only improve environmental outcomes but also improve farm efficiency. This has had an impact on farmers who can these benefits and are willing to make changes to their farming systems and therefore contribute to improved industry outcomes.

Finally, it has helped the industry engage with stakeholders, especially the large corporate customers such as Tesco and McDonalds, and helps support them with their own sustainability agenda. This has helped keep Irish beef in a competitive position in markets where there is strong competition from local beef.

The relevance to New Zealand

Though the goals of Origin Green in the Irish beef industry may not have been fully realised, there are significant lessons that are relevant to New Zealand's efforts to verify and communicate its sustainability credentials. The efforts of Bord Bia and the Origin Green programme has enabled the Irish beef industry to be proactive in terms of its developing traceability, quality assurance, measuring greenhouse gas emissions and promoting its sustainability brand. It has also been able to extend this across all its food and beverage exports. In this respect Ireland been well ahead of New Zealand.

Traceability

Ireland has had animal traceability systems and quality assurance schemes in place since the 1980's. In contrast, the New Zealand National Animal Identification and Tracing scheme (NAIT) was introduced in 2012 to considerable opposition from farmers and farmer organisations who saw it as an additional cost on their business for no tangible gain (Federated Farmers, 2008). There was also concern over the privacy of data and how government agencies might use this. As a result, the Ministry of Primary Industries (MPI) introduced the scheme with no mandatory recording. It was not until the recent incursion of the animal disease Mycoplasma bovis that serious deficiencies in the traceability system were identified. Since then there has been a major review of NAIT with a number of the recommendations implemented to strengthen the system. These include larger penalties for non-compliance (Williams, 2018).

Quality Assurance

New Zealand has also been behind Ireland with its quality assurance schemes for beef and lamb. The New Zealand Farm Assurance Programme (NZFAP) introduced in 2017 was the first comprehensive industry-standard farm assurance programme. Before this, farmers had to meet the requirements of multiple farm assurance schemes depending on the specific processor or customer requirements. Many of these schemes were similar but often required multiple audits on the one farm.

New Zealand beef industry branding

The New Zealand red meat sector has struggled to develop a coordinated industry strategy or national branding programme that provides verifiable sustainability measures and the ability to communicate the unique characteristics of our natural production systems. Recent initiatives such as the Beef + Lamb New Zealand "Taste Pure Nature" has attempted to address this, though with limited resources and only in select markets.

Potential for a New Zealand national sustainability brand

Despite the shortcomings of Origin Green, it has shown the opportunity for New Zealand to develop a similar sustainability brand. Origin Green also highlights the potential to go beyond just the beef industry and bring together all New Zealand's food exports. This may also be an opportune time as there is both an increasing awareness of the potential for a sustainable New Zealand country brand and the impact of Covid has re-emphasised the importance of our food industries in New Zealand's economic and environmental future (Bardsley et al., 2020).

For example, the potential for a sustainable New Zealand country brand has recently been emphasised in the recent report by Koi Tū: Centres for Informed Futures. The report states that:

"In the rapidly changing post-COVID operating environment, there is a chance for a compelling and authentic narrative to be built with stakeholders both domestically and globally, leveraging the opportunity for New Zealand to become a "global thought leader" in sustainability across the entire food system. Taking a proactive approach to emphasising the qualities of sustainable, low-carbon dairy production, agriculture, horticulture, fisheries and aquaculture would be highly valuable to New Zealand" and identifies the need for *"the development of a sustainable New Zealand country brand"* (Bardsley et al., 2020).

Furthermore, the Irish experience has highlighted the need to have one agency or organisation that can provide leadership across the food sector to implement change. Without this, New Zealand is likely to continue to struggle to introduce the necessary food strategy or respond to the repeated calls for a sustainable New Zealand country brand.

Appendix A: Statistics on the Irish cattle industry

Table A 1: Irish cattle herd

Description	2017 '000	2018 '000	2019 '000	% of total Cattle	Change 2018 - 2019	
Total cattle	6,674	6,594	6,560		-34	-0.5%
Dairy cows[1]	1,343	1,369	1,426	22%	57	4.2%
Other cows	1,018	982	957	15%	-25	-2.5%
Bulls[2]	13	9	6		-3	-33.3%
Cattle male: 2 years and over[3]	173	189	206	3%	17	9.0%
Cattle female: 2 years and over[4]	248	255	261	4%	6	2.4%
Cattle male: 1-2 years	823	814	779	12%	-35	-4.3%
Cattle female: 1-2 years	969	976	962	15%	-14	-1.4%
Cattle male: under 1 year	1,009	949	906	14%	-43	-4.5%
Cattle female: under 1 year	1,078	1,051	1,056	16%	5	0.5%
Total cattle male	2,017	1,959	1,898	29%	-61	-3.1%
Total cattle female	4656	4634	4,661	71%	27	0.6%

Source: CSO December Livestock survey

[1] Dairy cows are those kept principally to produce milk for human consumption.
[2] Bulls used for breeding purposes only.
[3] Excluding Bulls.
[4] Excluding Dairy cows and other cows.

Table A 2: New Zealand beef and dairy herd numbers 2010 – 2019

Year	Beef	% Change	Dairy	% Change
2010	3.9	3.7%	5.9	2.0%
2011	3.8	-2.6%	6.2	4.4%
2012	3.7	-2.9%	6.4	4.4%
2013	3.7	-1.0%	6.5	0.6%
2014	3.7	-0.8%	6.7	3.3%
2015	3.5	-3.3%	6.5	-3.2%
2016	3.5	-0.4%	6.6	2.1%
2017	3.6	2.4%	6.5	-1.3%
2018	3.7	2.9%	6.4	-2.0%
2019	3.8	2.7%	6.4	-0.8%

Source: Statistics New Zealand.

(Beef and cattle number are in million head)

Table A 3: Average Farm Size & FFI per ha 2018

Enterprise	Size (ha)	Income per ha	Average total income
Dairy	59	€ 1,047	€ 61,773
Cattle Rearing	31	€ 270	€ 8,370
Cattle other	37	€ 391	€ 14,467
Sheep	48	€ 276	€ 13,248
Tillage	60	€ 675	€ 40,500
All	43	€ 541	€ 23,263

Source: Teagasc National Farm Survey

Table A 4: Farm size distribution

Farm size	Finishing	Cattle rearing
0 - 20 ha	23%	16%
20 - 30 ha	25%	29%
30 - 50 ha	29%	38%
50 - 100 ha	18%	13%
> 100 ha	5%	4%

Source: Teagasc National Farm Survey

Table A 5: Number of cows by farm size

Farm size	Cattle rearing (head)	% of farms
0 - 20 ha	14	16%
20 - 30 ha	20	29%
30 - 50 ha	29	38%
50 - 100 ha	37	13%
Average	23	

Source: Teagasc National Farm Survey

Table A 6: Global beef exporting countries by volume 2019

Country	Production tonnes	Export (tonnes)	% Export
USA	12,220,000	1,470,000	12%
Brazil	9,900,000	2,200,000	22%
Australia	2,210,000	1,510,000	68%
New Zealand	680,000	590,000	87%
Ireland	630,000	560,000	89%

Source: Stastica

Table A 7: Global beef exporting countries by value 2018

Country	Export value US$	% global Exports
USA	7,300,000	14.8%
Australia	6,500,000	13.3%
Brazil	5,500,000	11.1%
Ireland	2,300,000	4.8%
New Zealand	2,100,000	4.4%

Source: World's Top Exports

Table A 8: Destination of Irish live cattle exports 2019

Destination	Head
United Kingdom	8,710
Continental EU	96,095
Non-EU	2,075
Total	106,880

Source: Bord Bia – Live cattle exports

Appendix B: Farm support payments

Single farm payments

Table B 1: Average value of Direct Payments & Contribution to FFI 2018

Farm type	Direct payments	% of FFI
Dairy	€ 21,022	34%
Cattle Rearing	€ 13,098	158%
Cattle Other	€ 16,226	111%
Sheep	€ 18,980	143%
Tillage	€ 22,451	55%
All	€ 17,244	74%

Source: Teagasc National Farm Survey

Table B 2: Components of Average Cattle Rearing FFI 2018

Component	Average amount
Gross income	€ 35,990
Direct payments	€ 13,098
Total costs	€ 27,680
Family Farm Income[29] (FFI)	€ 8,310

Source: Teagasc National Farm Survey

Table B 3: Components of Average Cattle Other (finishing) FFI 2018

Component	Average amount
Gross income	€ 52,352
Direct payments	€ 16,226
Total Costs	€ 37,792
Family Farm Income (FFI)	€ 14,560

Source: Teagasc National Farm Survey

Table B 4: Average FFI for cattle rearing and finishing farms

Income	Finishing	Cattle rearing
< €5,000	33%	44%
€5 – 10,000	16%	21%
€10 – 20,000	23%	23%
€20 – 50,000	24%	11%
< €50,000	4%	1%

Source: Teagasc National Farm Survey

[29] Family Farm Income (FFI), the return from farming for farm family labour, land and capital, is the principal measure used in the Teagasc National Farm Survey.

Other Farm Support Payments

1. Green, Low-Carbon, Agri-Environment Scheme – GLAS

This scheme aims to preserve traditional hay meadows and low-input pastures and retain soil carbon. It promotes agricultural production methods compatible with the protection of the environment, water quality, the landscape and its features, endangered species of flora and fauna and climate change mitigation

Table B2: Average value of GLAS payments

Farm type	GLAS payments
Dairy	€555
Cattle Rearing	€1,957
Cattle Other	€1,500
Sheep	€2,269
Tillage	€1,300

Source: Teagasc National Farm Survey

2. Areas of Natural Constraints Scheme (ANC)

The ANC Scheme deals with areas of land which is designated as disadvantaged/constrained.

Table B3: Average value of ANC payments

Farm type	ANC payments
Dairy	€1,800
Cattle Rearing	€1,957
Cattle Other	€1,800
Sheep	€2,486

Source: Teagasc National Farm Survey

3. Beef Data Genomics Programme (BDGP)

Pays participants an average of approximately €1,000 per farm.

Participants must complete the following actions:

- Register all newborn calves within 27 days of birth, provide sire number and complete survey relating to calving ease. Complete a range of surveys relating to the calves, cows and bulls in the applicant's herd. Genotype all of the animals specified by the (ICBF).
- Implement replacement strategy: Proportion of bulls, AI, leased bulls and replacement females must be of 4 or 5 stars on the Terminal or Replacement index.
- Applicants must attend a training course relating to this scheme.

4. Agri-Environment Options Scheme(AEOS)

The objectives of **AEOS** are to meet the challenges of conserving and promoting biodiversity, encouraging water management and water quality measures and combating climate change.

Appendix C: Bord Bia

Functions of Bord Bia

The particular functions of Bord Bia, as amended by the Bord Bia Amendment Act 2004.

1. Survey, investigate and develop markets and potential markets for food and horticulture.
2. Collect and disseminate market intelligence and provide information and advice in relation to supply and demand and market trends and trade opportunities in food and horticulture.
3. Conduct or provide for the conducting of reviews, surveys, symposia, analyses and studies in relation to trade in, and markets and potential markets for, food and horticulture.
4. Provide or arrange for the provision of publicity, advertising and promotional campaigns for the purpose of encouraging the increased consumption of food and horticulture or particular categories of food and horticulture and for the purpose of expanding trade in food and horticulture.
5. Establish, equip and operate, and provide for the establishment, equipment and operation of, and assist in the operation of, exhibitions, show rooms, information bureaux and similar establishments for the purpose of encouraging increased consumption of food and horticulture or particular categories of food and horticulture and for the purpose of expanding trade in food and horticulture.
6. Publish and distribute or provide for the publication and distribution of magazines, journals, reports and similar documents for the purpose of encouraging the increased consumption of food and horticulture or particular categories of food and horticulture and for the purpose of expanding trade in food and horticulture.
7. Operate such quality assurance schemes as may in the opinion of the Board, be appropriate to the Board's functions and conducive to maintaining or improving the quality of all or part of any category or categories of food and horticulture and, if so requested by the Minister, carry out evaluations of quality assurance schemes operated or proposed to be operated by other persons or bodies and applicable to all or part of any category or categories of food and horticulture.
8. Encourage or promote the undertaking by other persons or bodies of such actions as may, in the opinion of the Board, be appropriate to the Board's functions and conducive to maintaining or improving the quality of all or part of any category or categories of food and horticulture.
9. Administer such schemes, grants and other financial facilities involving the disbursement of—
   - European Union Funds,
   - Exchequer Funds, or
   - other funds, as may from time to time be authorised by the Minister with the concurrence of the Minister for Finance.

Appendix D: Beef prices, tariffs and quotas

Table D 1: Comparison of current and historic prices between European Union, Ireland and United Kingdom.

Country	Type	April 14th 2018	April 13th 2019	April 11th 2020
European Union	Steers	€3.89/kg	€3.61/kg	€3.44/kg
Ireland	Steers	€3.93/kg	€3.65/kg	€3.45/kg
United Kingdom	Steers	€4.25/kg	€3.99/kg	€3.79/kg

Source: Bord Bia Cattle Price Dashboard

European Union High Quality Beef specifications

"Selected beef cuts derived from exclusively pasture grazed steers or heifers, the carcases of which have a dressed weight of not more than 370 kilograms. The carcases shall be classified as A, L, P, T or F, be trimmed to a fat depth of P or lower and have a muscling classification of 1 or 2 according to the carcase classification system administered by the New Zealand Meat Board."

Table D 2: Tariff rates for beef outside of quotas.

Beef cut	Tariff rate		
Carcass or half carcass	12.8%	Plus	€17.68/kg
Forequarters: bone-in	12.8%	Plus	€26.52/kg
Other bone-in cuts	12.8%	Plus	€14.40/kg
Boneless cuts	12.8%	Plus	€30.03/kg

Source: UK Agriculture and Horticulture Development Board

Appendix E: Origin Green – Greenhouse Gas Methodology

GHG Emissions for livestock[30]

Methane is produced by the fermentation of feed within the animal's digestive system. Generally, the higher the feed intake, the higher the methane emission. Although the extent of methane production may also be affected by the composition of the diet. Livestock production produces methane (CH_4) emissions from enteric fermentation and both CH_4 and nitrous oxide (N_2O) emissions from livestock manure management systems (Figure E1 and E2)

[30] CO2 emissions from livestock are not estimated because annual net CO2 emissions are assumed to be zero – the CO2 photosynthesised by plants is returned to the atmosphere as respired CO2

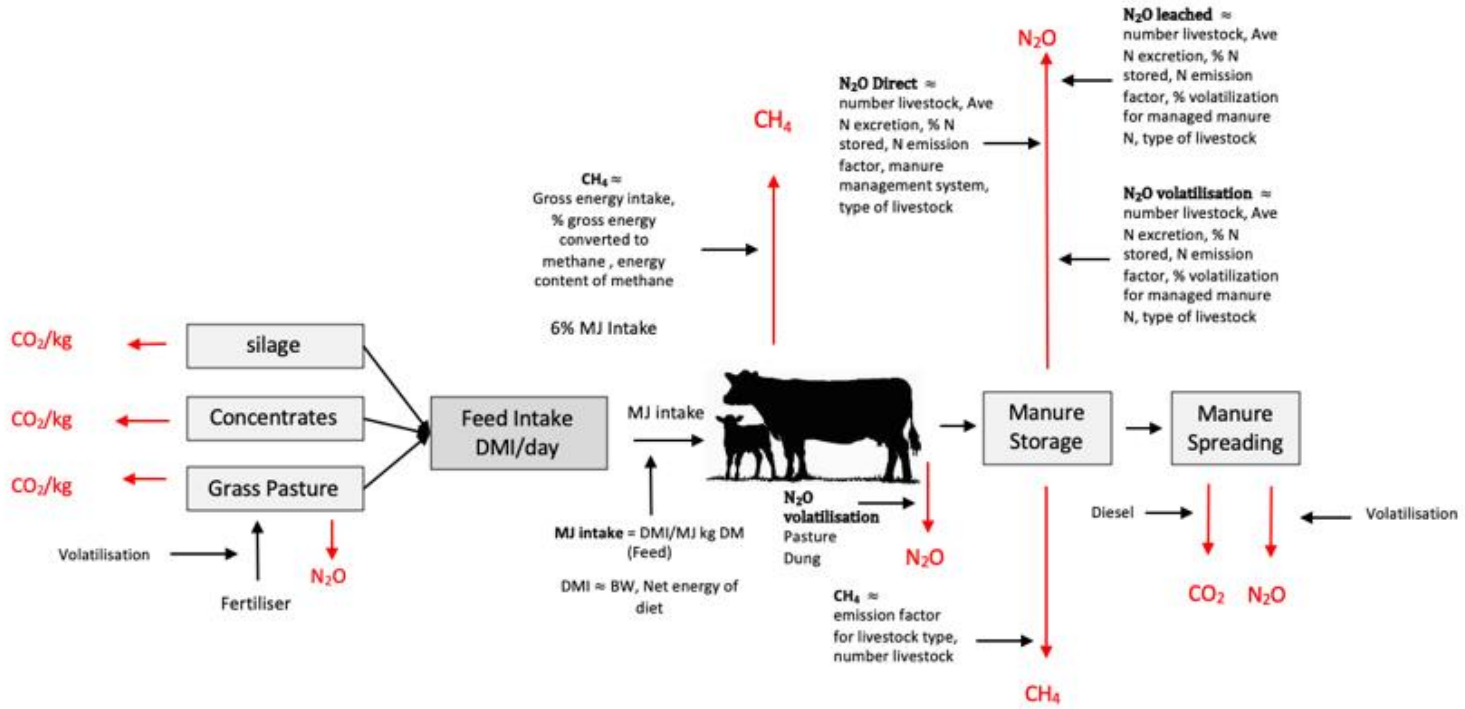


Figure E 1: Sources of GHG emissions: N2O, CO2 and CH4 in breeding cow (suckler) farming system - adapted from Casey, J., & Holden, N. (2006).

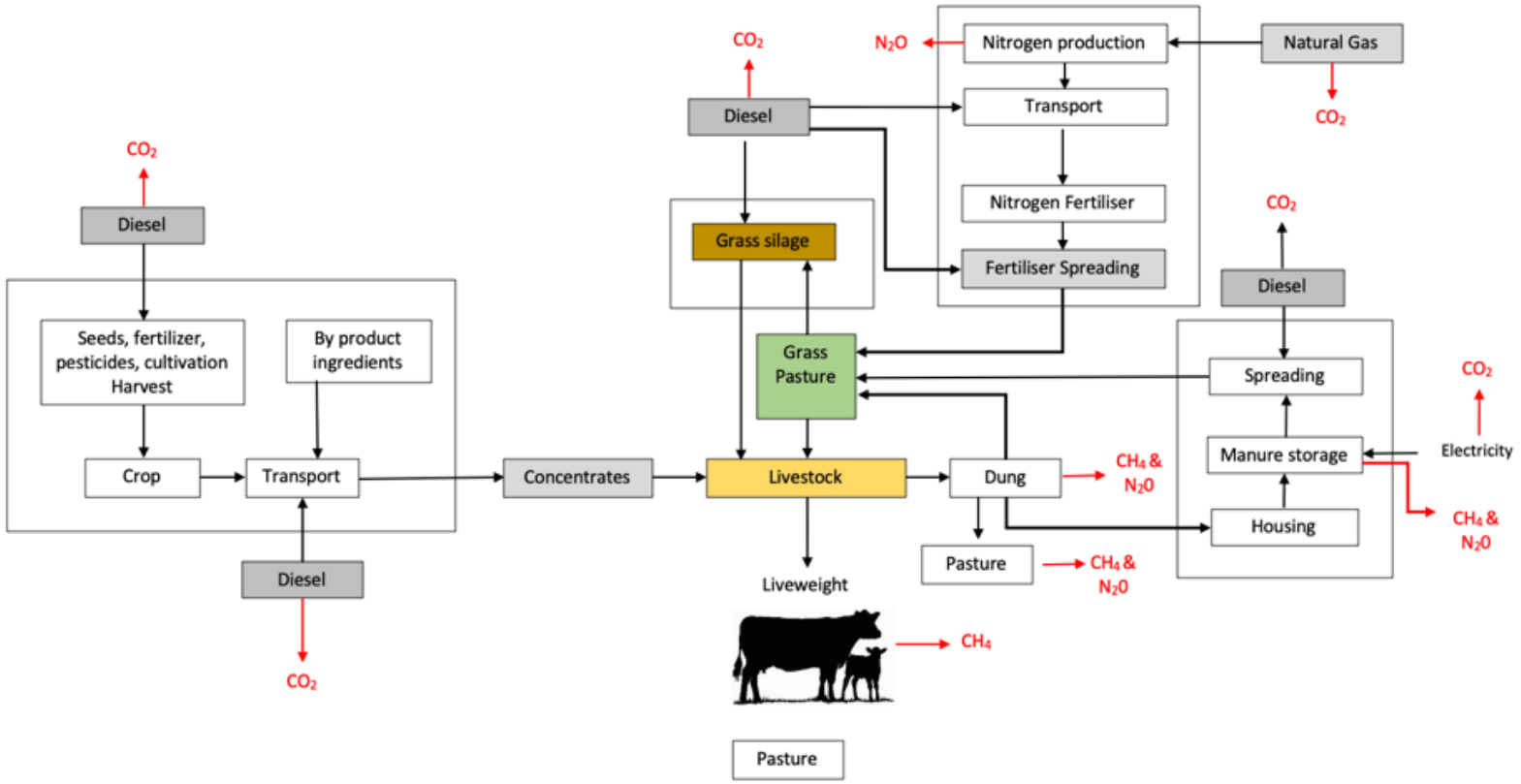


Figure E 1: Representative flow chart of a breeding cow (suckler) farming system and associated GHG emissions: N2O, CO2 and CH4 - adapted from Casey, J., & Holden, N. (2006).

The Bord Bia PAS2050 Carbon Footprint Model

Teagasc developed the carbon footprint tool to explore the effect of varying management practices on GHG emissions from pastoral beef production systems (Crosson, Brennan, & O'Kiely, 2013). Bord Bia calculates the carbon footprint for each farm based on the ISO: 17065 standard and the Carbon Trust - Publicly Available Specification (PAS 2050) methodology. Both of carbon footprint calculations use a Life Cycle Assessment (LCA) approach.

The PAS 2050 specification was developed by the British Standards Institution in 2008 and revised in 2011. It is used for the assessment of the life cycle greenhouse gas emissions for a range of goods and services (Greenhouse Gas Protocol, 2011). ISO 14067 is part of the ISO 14060 family of standards for quantifying, monitoring, reporting and validating greenhouse gas emissions.

For on-farm emissions, the Bord Bia methods and the vast majority of other methodologies and tools developed for LCA assessments are based on the reporting guidelines published by the IPCC (IPCC, 2006). The IPCC 2006 guidelines provide methodologies at three levels of complexity, called tiers, based on activity types, within defined spatial and temporal boundaries.

Tier 1

This methodology is the simplest and calculates enteric greenhouse gas emissions based on the number of animals and a standard emissions factor based on published literature. Emission standardised factors from other agricultural activities are sourced from IPCC guidelines.

Tier 2

This tier enables the use of country-specific emission factors and differentiates animal population categories by different life stages as well as feed characteristics and animal intake.

Tier 3

This the most complex methodology uses models and measurement systems with site-specific data and provides a corresponding higher level of scientific accuracy. More data is required, but it gives a higher level of scientific accuracy.

System Boundaries

The system boundary for Origin Green GHG footprint and other LCA methodologies ends at the farm gate. This measures the direct GHG emissions associated with farm activities and indirect GHG emissions associated with inputs brought onto the farm, nitrate leaching and ammonia (NH_3) volatilisation.

Data requirements

- Farm size
- Fertiliser application
- Lime application
- Herd inventory and dynamics
- Finishing age
- Manure management
- Carcass output
- Concentrate consumed

Calculations used

1. IPCC Tier 2 for N2O emissions from grazing and fertiliser application
2. IPCC Tier 2 for NH3 volatilisation from manure management, grazing and fertiliser application
3. IPCC Tier 2 for enteric fermentation
4. IPCC Tier 1 For Nitrate leaching
5. IPCC Tier 1 for N_2O emissions from manure management
6. Publicly available data and published research

Data sources for modelling

Publicly available data, including:

- EPA (2018) Ireland's Informative Inventory Report 2017
- Bretrup (2016) Carbon footprint analysis of mineral fertiliser production in Europe and other world regions
- Krol (2016) Improving and disaggregating N_2O emission factors for ruminant excreta on temperate pasture soils.
- Harty (2016) Reducing nitrous oxide emissions by changing N fertiliser use from calcium ammonium nitrate (CAN) to urea-based formulations
- IPCC (2006)
- Ecoinvent

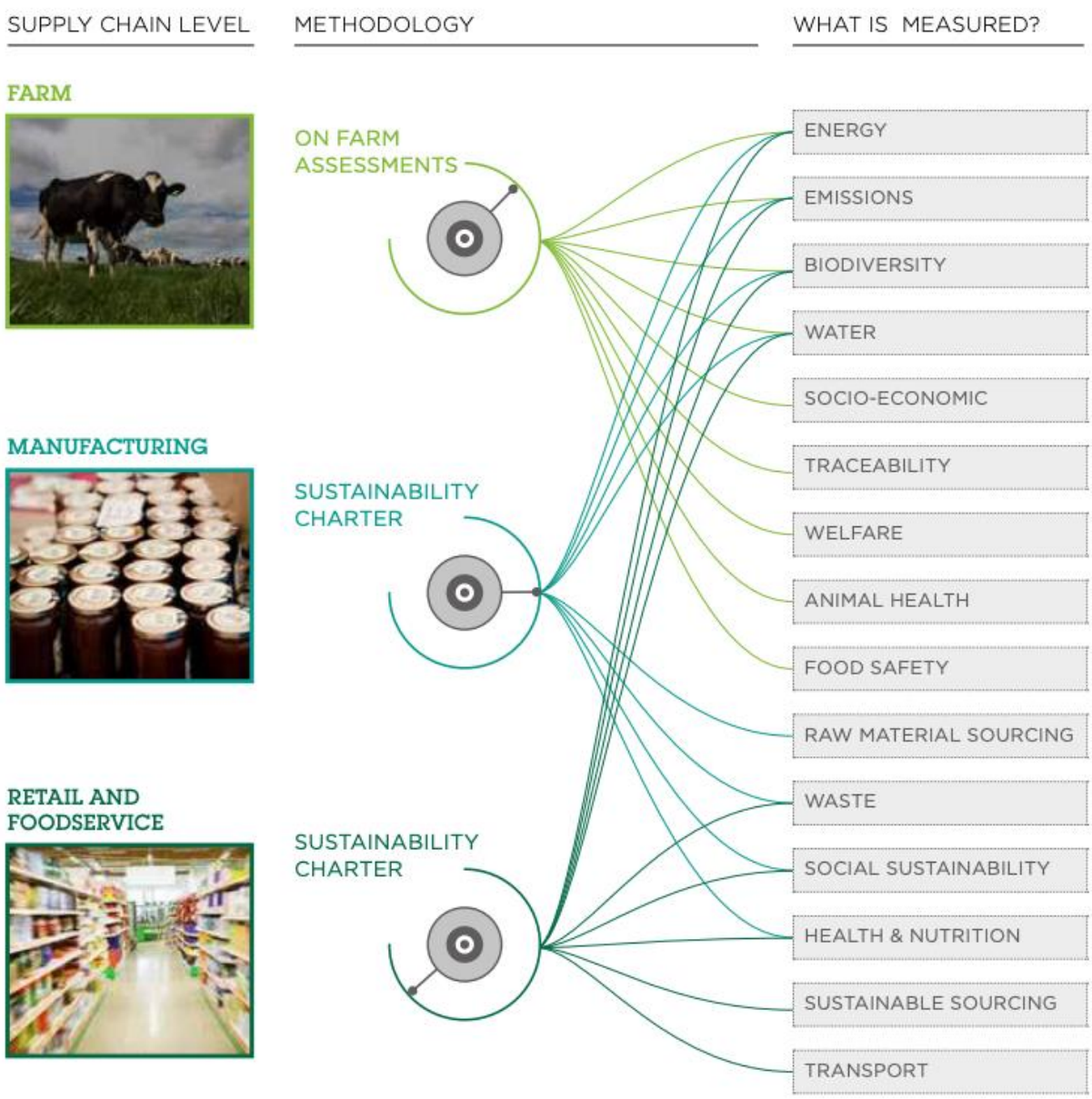
Carbon sequestration

There is a facility built into the model to include soil carbon sequestration (Soussana, Tallec, & Blanfort, 2010)

Appendix F: Origin Green certified manufacturers

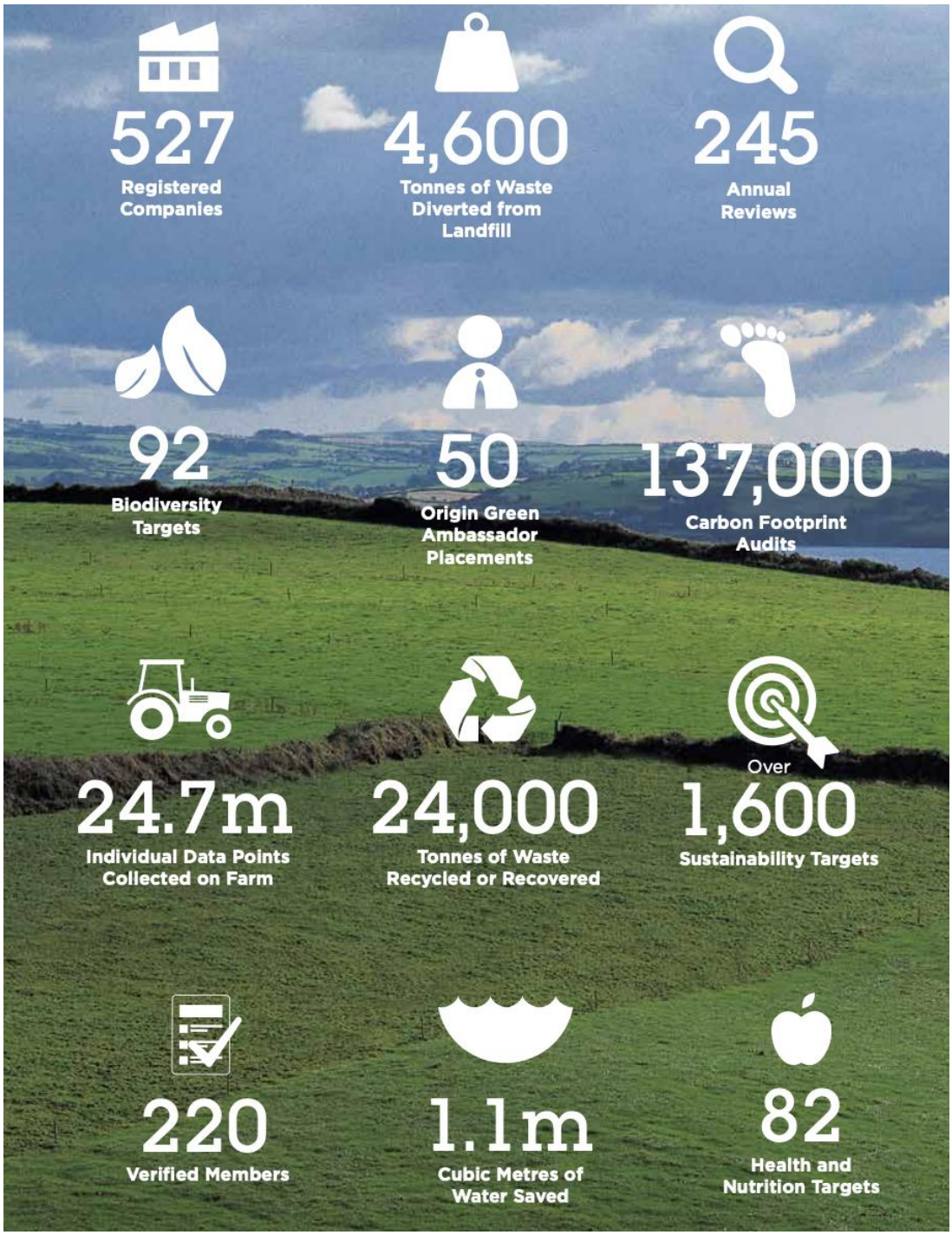
Source: Origin Green Sustainability Report 2016

Appendix G: Origin Green operation along the supply chain



Source: Origin Green Sustainability Report 2016

Appendix H: Highlights from the Origin Green Sustainability Report 2016



Source: Origin Green Sustainability Report 2016

Appendix I: Key informants (excluding farmer interviewees)

Tennyson Egar - Development Officer at Certified Irish Hereford Prime

Elenor Murphy - Origin Green Data Manager

Mark Zieg - Beef Sector Manager, Bordbia

Alan Dillon - Teagasc, Better Farm Programme Manager and Drystock Specialist

Kevin Kinsella - Director of Livestock, Irish Farmers Federation

Cormac Healy - Senior Director, Meat Industry Ireland

Dr Alan Kelly – UCD, Animal Science,

Dr Edel Kelly – UCD Agricultural and Food Economics

Dr James Breen – UCD Agricultural and Food Economics

Prof. Nicholas M. Holden - UCD School of Biosystems and Food Engineering

Pat Murphy - Teagasc, Head of Department - Environment

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