



Characterisation of Case Studies

Bottom-up approach for services/dysservices linked to dairy farming

Northern Ireland

Main actors in the case study area, concerned by the services and dysservices provided by local dairy farming

- **Research:** Agriculture, Food and Biosciences Institute (AFBI).
- **Training and Knowledge Transfer:** College of Agriculture, Food and Rural Enterprise (CAFRE).
- **Policy makers:** Department of Agriculture, Environment and Rural Affairs (DAERA), Northern Ireland Environment Agency (NIEA).
- **Farmer organizations and associations:** Ulster Farmers Union (UFU), Dairy Council for Northern Ireland
- **Food chain organisations and milk processing industry:** Northern Ireland Grain Trade Association (NIGTA), Lakeland Diaries, Dale Farm.
- **Territory or environmental actors:** Linking Environment and Farming (LEAF), Royal Society for the Protection of Birds (RSPB), Northern Ireland Environment Link (NIEL), Rivers Trusts.

Description and key figures

Northern Ireland is characterised by unique terrestrial, water and marine landscapes and geology, and a variety of species of national and international importance. With a population of 1.8 million Northern Ireland is the smallest of the UK's devolved administrations.

- Northern Ireland population at the last Census (2011) was 1.811 million residents, Northern Ireland is 2.9% of the UK population (1).
- The population of N. Ireland is projected to increase to 1.95 million by 2028 and to 1.99 million by 2043 (1). The population is also projected to age with the 65+ and 85+ age groups projected to increase by 56.2% and 106.4% by 2043. The population of children is projected to fall by 10.8%.
- N. Ireland employment rate is 72.3% (4.3% below the UK average) (2). The unemployment rate is 2.4%, below the overall UK unemployment rate of 3.9%.
- The average gross income in N. Ireland is £22,493, which is £6,516 below the UK average (3). The average agricultural gross income is £16,200.
- Average house price in N. Ireland is £140,190 which is approximately 29% below the UK average (4).
- Tourism accounted for £968 million of expenditure in N. Ireland in 2018 (5). Tourism accounts for approximately 4.9% of N. Ireland GDP, and sustains over 40,000 jobs.

- The climate in N. Ireland is temperate oceanic (mild winters, cool summers), dominated by the maritime winds. The average daily high temperatures in July-August are 18-19°C with average daily low temperatures 11-12°C. Average daily high temperatures in January-February are 8°C with average daily low temperatures 3°C (6). Annual rainfall totals are approximately 800-1200 mm, but up to double this amount falls on upland areas in the west of N. Ireland.
- N. Ireland occupies 5.7% of the total UK land area. 72.2% of the N. Ireland land area is farmland, 23.0% is natural, 3.5% is built on and 1.3% is green urban area (7).
- The coast and seas of Northern Ireland host a wide range of biodiversity. The wide range of ecosystem services is of significant economic and cultural value to Northern Ireland residents and visitors.
- The land area of N. Ireland is 1,353 thousand hectares (8). Farm land accounts for 1,022 thousand hectares common grazing for 34 thousand hectares with N. Ireland Forest Service utilizing 75 thousand hectares (8).
- 70% of the N. Ireland agricultural area is classified as LFA (less-favoured area) (8). 56% of dairy farming land is LFA.
- N. Ireland has a diversity of landscapes and soils. Average farm size is 41 ha (8).
- N. Ireland has approximately 25,000 farm businesses, of which 11% are mainly Dairy businesses (8).
- Agriculture accounts for 2.6% of total civil employment (8) with 22,000 people employed.
- Employment in the N. Ireland food and drinks processing sector was 26,065 in 2017 with a further 3,740 people employed in the agricultural supply sector (8).
- Average farm business income measured across all farm types was £33,870 in 2017/18, a rise of £13,664 on the previous year (8).
- Milk output at 32% is the largest contributor to the total value of agricultural gross output at £680 million in 2018 (8). Milk is much more important in N. Ireland than in the UK where milk accounts for only 17% of gross output.
- N. Ireland raw milk production in 2018 was 2.344 billion litres, a record level (8).

Main economic issues in the territory

Northern Ireland's economy is mainly driven by its manufacturing and food industry, with exports accounting for more than 25% of Northern Ireland's Gross Domestic Product (GDP). 70% of Northern Ireland's seaborne trade is handled by Belfast Harbour. Small and Medium Enterprises constitute 99.9% of private sector enterprises in Northern Ireland, accounting for 75% of private sector employment and 74% of turnover; higher than the UK average (of 60% and 47% respectively).

- Gross Domestic Product (GVA1) in 2018 was £48.8 billion or £25,981 per head representing an annual growth in 'real' GDP per head of -1.1%. This equates to only 81.2% of UK average GDP per head (9).
- By sector the main contributors to GVA were: Wholesale, Retail and Motors £5,806m, (13.8%); Real estate £4,794m, (11.4%); Health and social work £4,473m, (10.6%); Public Administration and Defence £3,555m, (8.4%); Construction £2,816m, (6.7%); Education £2,280m, (5.4%); Manufacture of Food, Beverages and Tobacco £2,186m, (5.2%); Professional, Scientific and Technical Activities £1,677m, (4.0%); Financial and Insurance Activities £1,676m; Transportation and Storage £1,631m, (3.9%); Information and Communication £1,462m, (3.5%); Administrative and Support Services Activities £1,327m, (3.1%); Accommodation and Food Service Activities £1,046m, (2.5%); Agriculture, Forestry and Fishing £770m, (1.8%) (10).
- The employment rate in Northern Ireland was 72.4% with 782,670 seasonally adjusted employee jobs to October 2019, up 39,000 jobs and 2.9% over the year. The unemployment rate was 2.3% representing 20,000 unemployed individuals, down 11,000 and 1.3% over the year. The economic inactivity rate was 25.9% or 573,000 individuals, down 22,000 and 2.0% over the year.
- The Northern Ireland Economy is characterized by a high proportion of jobs in the public sector. The share of employee jobs between public and private sector in 2018 was 552,897 in the private sector (73%) and 2016,461 in the public sector (27%).

¹ Value of goods and services minus the cost of inputs used to produce them, it's a measure of productivity

- The number of people employed in Headline Industry Sectors in Northern Ireland in 2018 (excluding agriculture) was, Services: 625,967 (82.4%); Manufacturing: 86,519 (11.4%); Construction: 35,498 (4.7%); and Other: 11,374 (1.5%).
- There are 75,490 VAT and/or PAYE registered businesses operating in N. Ireland (2019) of which 33,200 (44%) have a turnover <£100K; 28,520 (44%) £100-500K; 5,780 (8%) £500-999K; 6,015 (8%) £1-5M; and 1,975 (3%) £5M+. The majority of large business is located in urban areas, while micro and small business predominate in the rural areas. Contrary to the UK figure, micro and small businesses employ more people than medium and large businesses.
- Tourism accounts for approximately 4.9% of N. Ireland GDP, and sustains over 40,000 jobs. Tourism accounted for £968 million of expenditure in N. Ireland in 2018 (5). 44% of visitor trips were made by domestic N. Ireland tourists, with 29% coming from Great Britain, 12% from the Republic of Ireland and 16% from overseas. Exhibits, natural scenery and Historical Sites accounted for the Top 10 visitor attractions in 2018.
- Northern Ireland has an impressive digital economy with the industry supporting 28,000 (3.5%) jobs. Superfast broadband is now available to 85% of all premises and 57% of premises in rural areas.
- There are many uncertainties surrounding Brexit and how it will impact Northern Ireland and trade in dairy and food products across the border with the Republic of Ireland into the EU.

Main social issues in the territory

- Between 1969 and 1999, almost 3,500 people died as a result of political violence in Northern Ireland, which is one of four component “nations” of the United Kingdom (UK). The conflict, often referred to as “the Troubles,” has its origins in the 1921 division of Ireland and has reflected a struggle between different national, cultural, and religious identities. Protestants in Northern Ireland (48%) largely define themselves as British and support remaining part of the UK (*unionists*). Most Catholics in Northern Ireland (45%) consider themselves Irish, and many desire a united Ireland (*nationalists*).
- Despite a much-improved security situation since 1998, full implementation of the peace accord has been challenging. For many years, decommissioning and police reforms were key sticking points that generated instability in the devolved government. In 2007, however, the hard-line Democratic Unionist Party (DUP) and Sinn Fein, the associated political party of the Irish Republican Army (IRA), reached a landmark power-sharing deal.
- Northern Ireland continues to face a number of broader challenges in its search for peace and reconciliation. These challenges include reducing sectarian strife, fully grappling with Northern Ireland’s legacy of violence (often termed *dealing with the past*); addressing lingering concerns about paramilitary and dissident activity; and promoting further economic development.
- Brexit also may have significant political and economic repercussions for Northern Ireland. The future of the border between Northern Ireland and the Republic of Ireland was a central issue in the UK’s withdrawal negotiations with the EU and has posed a key stumbling block to approving the withdrawal agreement in the UK Parliament. Brexit also has renewed questions about Northern Ireland’s status within the UK in the longer term.
- Northern Ireland has 13,000 millionaires and 376,000 people living in poverty. The percentage of those living poverty is similar to that of GB, and is a little higher than before the recession. However, Northern Ireland has not experienced the same employment performance as the rest of GB. Average weekly pay is lower in NI than a decade ago (after inflation). However, the composition of those in poverty in Northern Ireland has changed over the last five years. There are more working-age adults, particularly young people, more private renters and fewer pensioners in poverty.
- Waiting times for medical treatment in hospitals and doctors surgeries - many individuals in N. Ireland are concerned and frustrated by the length of waiting times in GP surgeries. Mental health problems are much more widespread than in the rest of the UK and affect one in five people in Northern Ireland. Post-Traumatic Stress Disorder (PTSD) and suicide rates among young men are particularly concerning.

- In terms of education, Northern Ireland's academic performance, as measured by international benchmarks, emerges as only a little above the average. The unavoidable truth is that the main factor which influences the selection of children is their social background, and the system is designed to measure performance in this way.
- The education system in Northern Ireland is still heavily segregated along religious lines, with 93% of children attending a school which is predominantly, or entirely, attended by children from the same religious background.
- The Northern Ireland Audit Office reported that in 2014-15 there were 71,000 surplus places in the system, at the same time as almost 300 primary schools who were below the Department of Education's enrolment thresholds for sustainability.

Main environmental issues in the territory

- Northern Ireland provides an abundance of natural conservation areas. The area of lands protected in Northern Ireland is approximately 172,768 hectares, 12.34% of the total area.
- At 31 March 2018, a total of 111,159 hectares across 394 sites had been declared as Areas of Special Scientific Interest (ASSI), 85,900 hectares across 57 sites as Special Areas of Conservation (SACs), 114,600 hectares across 17 sites as Special Protection Areas (SPAs) and 77,700 hectares across 21 sites as Ramsar sites.
- In Northern Ireland, the main sources of greenhouse gas emissions arise from;
- Agriculture (27%); Transport (23%); Energy (17%) and Residential use of fuel (13%). In 2016 greenhouse gas emissions were estimated to be 20.6 MtCO₂e, a reduction of 15.9% since 1990.
- There are 18 air quality monitoring stations in Northern Ireland. Levels of carbon monoxide, nitrogen oxides, sulphur dioxide, particles, ozone, benzene and polycyclic aromatic hydrocarbons are monitored at many of these stations and are measured against UK Air Quality Strategy objectives and EU Air Quality Directives. Weather conditions can be a contributing factor to some periods of poor air quality and subsequent elevated levels of air pollutants. In 2017, annual mean levels of the pollutant, nitrogen dioxide stood at 33.4 µg/m³, representing a positive change compared with the 2014 baseline year (35.6 µg/m³).
- Northern Ireland's River Basin Districts include 450 river water bodies in total. There are 21 lakes, 25 transitional and coastal water bodies, and 74 groundwater sites in total. In 2015, just over 37.4% of all water bodies were at 'good' status. The current interim classification update indicates there has been a slight decline from 2015 where 37.4% of all water bodies were at 'good or better' to 36.6% at 'good or better' in 2018.
- Northern Ireland Water Ltd (NIW) is responsible for supplying the public with clean drinkable water. To achieve this NIW uses 90 percent of all water abstracted in Northern Ireland. Dairy farms, of which there are over 3,000, can be users of abstracted water.
- River levels are monitored by the Rivers Agency with a network of over 110 permanent river flow gauging stations across the province. Lough Erne and Lough Neagh are also monitored for water levels. River and groundwater level information for Northern Ireland may be viewed on the National River Flow Archive.
- Flooding in Northern Ireland in recent years has had significant impacts on communities, businesses, infrastructure and the environment. The flood risk management plans highlight the flood hazards and risks in the 20 most significant flood risk areas in Northern Ireland from flooding from rivers, the sea, surface water and reservoirs.
- In 2017/18, 2,876 gigawatt hours (GWh) of electricity in Northern Ireland was generated from indigenous renewable sources. This was equivalent to 36.4% of total electricity consumption in that period, an increase of 9.3 percentage points on the previous 12 month period which has also seen the highest 12 month increase recorded. In 2003, the Department commissioned a detailed wind mapping exercise to help identify the areas of particular potential. This exercise confirmed the very significant wind resource in Northern Ireland.
- In 2017/18, Northern Ireland's household recycling rate was 48.1%. This was a 6% point increase on the 2014/15 level. Therefore, household waste recycling is considered to have made a positive change since the baseline year of reporting. Since 2007, total household waste arising in Northern Ireland has fallen by 6.9%.

Main agricultural / dairy issues in the territory

- There are approximately 3,428 farms with dairy cows in Northern Ireland (2017). The average herd size is 92 cows (27).
- The dominant breed is Holstein, average annual milk production per cow is 7,434 kg (27). The calving pattern extends for most of the year.
- The grazing period, on farms where cows are grazed, is from generally from March/April to October (28).
- The number of dairy herds grazing is declining, as milk yields rise and as herd size gets larger and outgrows the grazing platform (area of land accessible for grazing) size.
- Lack of succession planning combined with the increasing age of farmers has been identified as a limiting factor in increasing land productivity in N. Ireland (29). In a recent survey of 440 farmers over the age of 50 years old, 48% had not identified a successor.
- Lack of farm succession planning and agricultural land inheritance tax regulations which encourage retained ownership of agricultural land after family agricultural activities have ceased result in land mobility issues in N. Ireland (29).
- Land tenure - 27.6% of agricultural land in Northern Ireland is rented under the conacre system of short term lets of under one year duration (27). The proportion of conacre land on dairy farms is higher at 41.7% according to data from CAFRE dairy benchmarking (28). The high proportion of conacre land leads to fragmented farms, which increases road travel between areas of farm land which increases operating costs.
- The conacre system also has an impact on soil fertility (30). Where farmers have no security of land tenure, they are unlikely to invest in lime application to maintain the correct soil pH. If the conacre land is distant from the livestock buildings, farmers will be less likely to transport slurry to conacre land leading to reduced soil fertility on conacre land and potentially surplus soil nutrients in owned land close to the farm buildings.
- Milk production in N. Ireland is high relative to local consumption with only 28% consumed within the region (27). As a result, a high proportion of the local milk production is processed into commodity products for export. In recent years with the removal of EU market support measures, this has led to a high level of milk price volatility (31). With a high proportion of milk products exported, currency fluctuations and the value of sterling can have a large impact on milk prices.
- To help farmers manage milk price volatility, most local milk processors have offered fixed milk price contracts for a proportion of milk produced on the farm (32).
- Dairy farmers in N. Ireland regularly report shortages of quality labour (33). Working conditions, seven day working weeks, physical demands on farm labour, pay and conditions and the availability of other work are some of factors making dairy farm working less attractive to the rural workforce.
- Poor marketing of produce. In 2013, The Agri-Food Strategy Board in its report: Going for Growth (34) called for the establishment of a single Agri-Food Marketing Organisation for Northern Ireland to consolidate all marketing and promotional activities for the industry with a clear food promotion strategy comparable to Bord Bia in Ireland and Scotland Food and Drink.
- Over 30% of milk is exported across the Irish border for processing in the Republic of Ireland (35). According to Dairy UK, there is insufficient capacity to process all milk produced in N. Ireland (36).
- Profitability in the N. Ireland dairy industry would be wiped out by a no deal Brexit as 50% of milk produced would be subject to tariffs of at least 40%, either as it crossed the Irish border for processing or was sold as finished product like butter, cheese and yoghurts, to EU markets (37). A post Brexit trade liberalisation scenario has been forecast to reduce milk prices in N. Ireland by 7% (38).

- Sales of veterinary antimicrobial products in the UK across all food producing animal species was 32.5 mg per population correction unit (PCU) which was just 30% of the average use across 31 European countries (39). The mean antimicrobial sales across 332 dairy farms in England in 2016 was 22.22 mg/PCU with a median of 17.25 mg/PCU (40). The responsible use of medicines in agriculture alliance (RUMA) have set a target of 21 mg/PCU for dairy cows (41). No comparable data is available for N. Ireland dairy farms.
- Dairy farms in N. Ireland face considerable difficulties in obtaining planning permission to develop new facilities on their farms (42) due to restrictions relating to ammonia emissions. 91% of ammonia emissions in N. Ireland relate to agriculture (43). Work is ongoing by DAERA to develop an ammonia emission policy strategy for the agricultural sector.

New challenges for dairy sector sustainability in Northern Ireland

Date of the Workshop: 28th of August 2019

Type of participants	Number of participants
Farmers	3
DAERA economics and policy	2
Agri-food industry	3
CAFRE Advisors and Technologists	9
Government water quality (NIEA)	1
NGO	2
Others: Farmers Union (UFU)	1
Researchers (AFBI)	2
TOTAL	23

SWOT Analysis

STRENGTHS	WEAKNESSES
<p><u>Economic</u></p> <ul style="list-style-type: none"> • Entrepreneurial nature of NI dairy farms. • Brand recognition of NI dairy industry. • NI farmers are hardworking. • Move towards forward pricing of milk which helps to level peaks and troughs. • Market demand for NI Dairy products and good demand from processors. • Maximising production per hectare. • Competitive supply chain. • Viable milk price. • Potential for low/medium cost milk production • Sophisticated processing sector. • Family farms more resilient to difficult markets and prices. • Established route to market. • Gearing on many farms is low/medium. <p><u>Social</u></p> <ul style="list-style-type: none"> • Family farm structure. • Sustains farm families, local businesses and rural communities. • Cooperation amongst farmers. • Generates wealth in the rural economy. • Tradition of dairy farming. <p><u>Environmental</u></p> <ul style="list-style-type: none"> • Temperate climate good for grass growth. • Contribution of grass to efficient production system and sustainable feed. • Low carbon per litre milk produced. • Better utilisation of slurry and nutrients, soil health and nutrient management planning. • Emphasis on environmental sustainability. • Carbon calculator and knowledge to exchange to reduce emissions and increase efficiencies available. • NI farmers are very adaptable and innovative towards changing weather conditions. <p><u>Agricultural/dairy</u></p> <ul style="list-style-type: none"> • World leading food safety and welfare standards. • Family owned farms. • Commitment to agriculture. • Milk buyers and processing capacity. 	<p><u>Economic</u></p> <ul style="list-style-type: none"> • Competition for land. • Lack of security in land leases. • Tax incentives not as attractive as ROI for land rental and leasing. • Poor marketing of produce. • Short and longer-term market and supply chain disruption from no-deal Brexit. • Rise of food trends such as Veganism. • Costs of production increasing. • Reliance on exporting produce to other countries. • Availability of funding. • Processor capacity. • Global dairy production. • High cost of investment required to establish and upgrade dairy enterprise • Lack of business analysis. • Loss of connection between consumers and their food. • No deal Brexit leading to lowering of import tariffs <p><u>Social</u></p> <ul style="list-style-type: none"> • Poor social interaction. • Working hours of farm family members. • More could be done to educate a larger percentage of farmers and the public. • Work life balance needs addressed. <p><u>Environmental</u></p> <ul style="list-style-type: none"> • Nitrogen and Phosphorus loadings from fertiliser, slurry and manures. • GHG and Ammonia emissions. • Biodiversity loss. • Soil health/quality. • Slurry waste management could be improved through infrastructure and adopting best practice. • Payments for public goods over production post Brexit. • Need to establish a baseline for soil carbon • Farmers lack of understanding of carbon sequestration • Environmental mitigating measures enforced on farms.

<ul style="list-style-type: none"> • A very high percentage of the top PLI Herds in the UK are from NI. Producing more from less. • Very focused on breeding high profit cows. • New technologies such as sexed semen, genomically tested heifer calves, bull improvements enabling improved milk butter fat, protein and yields. • High level of stockmanship. • Resilience of dairy production systems. • Lower dependence on subsidies than other sectors. • Good research and development and technology transfer. • Larger machinery becoming more efficient. • Good collaboration between government, industry and farmers. • Good infrastructure in place i.e. slurry storage, silage • Scale of dairy farming businesses • Suitable land base. • Ability to grow grass all year round. • Ability to produce milk from grazed grass and grass silage based production system. • Ability to make some very high quality silage to maintain milk outputs. • Control of feed silage indoors (Land availability and weather control) 	<ul style="list-style-type: none"> • Meaningful action for biodiversity is not incentivised by the supply chain • Move towards cows being indoors all year - premiums for grass produced milk doesn't outweigh the drop in production. • Reliance on grain feed/ concentrates etc. to maintain production. • Machinery size getting bigger to the point smaller fields need to be made larger, thus changing the structure of the countryside. • New technologies such as sexed semen could increase production, increasing pressure on the environment. <p><u>Agricultural/dairy</u></p> <ul style="list-style-type: none"> • Labour shortage • Lack of succession planning. • Milk price. • Hard to get new entrants. • Adapting to the impacts of climate change on production system. • Fragmented farms (roadwork costs money) • Lack of willingness from older farmers more set in their ways to be open to innovation • Processing capacity. • Product diversification. • An unwillingness of non-profitable farmers to give up. • Loss of connection between consumers and their food. • Production driven rather than market led. • Farm policy from government.
<p>OPPORTUNITIES</p>	<p>THREATS</p>
<p><u>Economic</u></p> <ul style="list-style-type: none"> • Some opportunity for expansion through contract heifer rearing and contract cereal growing and specialization on dairy farms. • Big opportunities exist in the health sector, milk is a natural product and more needs to be done to promote it. • Ability to satisfy an increasing demand for high quality protein to local and a growing global population • Better collaboration between sectors. • Potential to attract young trained farmers. • A younger generation unwilling to work for nothing might make the industry more business orientated. • A Northern Ireland Food Marketing Body which effectively incentivises and rewards exemplary environmental practise. • Exploiting economic and environmental benefits of milk from grass. • Growing the share of UK milk production supplied from Northern Ireland. • Using good research and development, and technology transfer infrastructure to lead in early adoption of new technology and management practices for economic and environmental gains. • People are willing to invest in new technologies. • Milk contracts. Less volatility plus opportunity to for constituency pricing. • Improved relationships with anaerobic digesters. • Forward buying and forward selling. • Potential to market the product better. • Use the origin of milk as a sale point • Use nutrition and health status in the marketing of milk • Improving organic milks markets share. <p><u>Social</u></p> <ul style="list-style-type: none"> • Labour efficient tech based farms. • Robotics could offset labour, more time could be available for cow management. 	<p><u>Economic</u></p> <ul style="list-style-type: none"> • Brexit remains a major threat to a small exporting country like Northern Ireland. and the continuing relationship with EU (ROI). • Brexit exposure to cheaper markets and uncertainty what will happen. • Anaerobic digesters driving land price up so dairy farmers cannot compete. • Beef farms converting to dairy. Production driven and potential to reduce milk price. • Currency exchange unfavourable. • Political instability. Lack of Assembly. • Potential for new trade deals to be damaging to competitiveness. • Negative impact of regulators on business expansion, planning permissions etc. <p><u>Social</u></p> <ul style="list-style-type: none"> • Worsening of public negative perception of dairy farms and products. • Pensions and retirement planning. Needs to be encouraged and the benefits shown. • Continuing expansion effects on social aspect of work life. <p><u>Environmental</u></p> <ul style="list-style-type: none"> • Increasing environmental legislation could well make it difficult for many farms to continue. • Climate change could lead to difficult farming conditions. • Continuing expansion without sufficient land resource for the additional nutrient. • Biodiversity loss. • Soil quality and soil health.

Environmental

- With increased research and development farming practices and be adapted to help environment issues and also increase profitability.
- Drawing link between animal health, soil health, biodiversity and productivity.
- Greater use of green infrastructure on dairy farms such as agroforestry.
- Opportunity to address issues such as ammonia, water quality, soil quality and biodiversity
- Nutrient management planning for dairy farms.
- Potential to capture new markets through efficient low Carbon production systems.
- Using LIDAR to measure Natural Capital.
- Using precision farming technologies and apps.
- Using herbal leys for more diverse swards.
- Collaborating with grass based beef and sheep production in Northern Ireland to alleviate environmental pressures from manure.
- Potential for Carbon sequestration.
- Potential to reward farmers for farming in a sustainable manner.
- Extending the life of the dairy cow will lower the environmental footprint of dairy farming.
- Offloading nutrients for redistribution, education on the usefulness of slurry and manures

Agricultural/dairy

- Increasing agri-technologies and genomics.
- Wider range of production systems.
- Reaching productivity gains.
- Improvement in animal welfare and health.
- The ability to produce milk from forage and especially grass in the Northern Ireland climate.
- Collaborations between farms and other sectors.
- Low/medium cost grass based milk production
- Grass fed milk seen as welfare friendly
- Brexit may increase land availability for dairy farming
- A reduction in the need for grain feeding or to source grain from local sources - this would incentivise more arable production, creating a mixed landscape. It would also close the loop as farmland manure/slurry could be used for the benefit of arable production.
- Perception of Irish farming systems.
- Family farm basis of the production system.
- The opportunity to look after the land.
- Good work ethic.
- Value of milk as a food and energy source.
- Good advisory back up.
- Development of breeding technologies (e.g. sexed semen) to speed up genetic improvement and allow more cows to be bred to beef bulls will add value to surplus calves and support beef sector as suckler herd continues to diminish.
- Grass based dairy system which is a marketing advantage.
- Local research to find local solutions.
- Producers could be offered contracts on the basis of meeting consumer needs.
- Potential to improve efficiency on farms who are expanding.
- Northern Ireland could model best practice and monitor improvements.
- Embracing new technologies such as soil sampling and silage sampling.

- That lower emissions per unit of production are used to justify unsustainable expansion.
- Climate change education, net zero rather than gross zero.
- Nutrient enrichment of waterways from intensive farming.
- Environmental mitigating measures to reduce ammonia emissions and achieve carbon zero.
- Restriction on the horizon. Legislation on the environment (like Dutch - quota for ammonia). Cap on cattle numbers.
- Failure to adequately address environmental pressures from milk production.

Agricultural/dairy

- Increased input costs.
- Competition for land, especially horticulture.
- Diseases.
- Unsustainable milk price
- access to land / finance for expansion Or new entrants.
- Succession planning, making dairy farming attractive to the next generation.
- High cost of buying and renting land.
- Environmental regulations restricting development.
- Legislation adding costs to milk production systems.
- Antimicrobial resistance, potential to be a major issue.
- Vegan misreporting general welfare and environmental issues on dairy farms.
- Continuing expansion on welfare and health of animals.
- Too many people unwilling to change.
- The public's perception of dairy farming and their lack of understanding.
- Growing influence of anti- livestock lobby.
- Animal health, over use of antibiotics.
- Not enough focus on areas that will help shape the future.
- Access to labour.
- Lower regulatory standards.
- Minimum milk from grass quotas.
- Profitability drives the entire sector.

List of issues ranked by importance (percentage of the attendants who voted the issue)

Strengths

1. Sophisticated processing sector, product development, competitive in global market.
2. Family farms that are resilient to difficult markets and prices, family may provide low cost labour.
3. Temperate climate good for grass growth.
4. Low Carbon per litre milk produced and continued improvement.
5. World leading food safety and welfare standards.
6. A very high percentage of the top PLI Herds in the UK are from Northern Ireland.
7. New technologies, sexed semen, genomically tested heifer calves, bull improvements enabling improved milk butter fat, protein and yields.
8. Good collaboration between Government, industry and farmers.

Weaknesses

1. Reliance on exporting produce to other countries.
2. Short and longer term market and supply chain disruption from no-deal Brexit.
3. Land availability from competition with anaerobic digesters
4. Lack of security in land leases, terms too short. Land tenure dependence on conacre.
5. Labour shortage.
6. Lack of succession planning and age of effective responsibility.
7. Water quality from increased nitrogen and phosphorus loadings from fertilizer, slurry and manures, GHG and ammonia emissions, biodiversity loss soil health/quality.
8. Rise of food trends such as Veganism.

Opportunities

1. A Northern Ireland food marketing body which effectively incentivises and rewards exemplary environmental practise.
2. Increasing agricultural technologies and genomics.
3. Potential to reward farmers for farming in a sustainable manner, with regards to carbon and the environment.
4. Northern Ireland could model best practice and monitor improvements.
5. Education of the consumer and increasing awareness.
6. The ability to produce milk from forage and grass in the Northern Ireland climate.
7. Collaborating with grass based beef and sheep production in Northern Ireland to alleviate environmental pressures from manure.
8. A reduction in the need for grain feeding or to source grain from local sources.

Threats

1. Potential for new trade deals to be damaging to competitiveness local product.
2. Succession planning.
3. High cost of buying and renting land. Anaerobic digesters driving land price up so dairy farmers cannot compete. Growing grass to fuel anaerobic digesters.
4. Environmental regulations restricting development.
5. Legislation adding costs to milk production systems.
6. Antimicrobial resistance potential to be a major issue.
7. Growing influence of anti-livestock lobby.
8. Unsustainable milk price

Services and dysservices and indicators used to measure them

Category	Description	Indicators	Specific dairy farming systems (if relevant)
Provisioning of resources	<p>Services</p> <ul style="list-style-type: none"> • “Public goods” provider, tree and hedgerow landscape maintenance, environmental custodianship, biodiversity enhancement, Water quality, landscape amenity. Flood protection. Agri environment schemes rewarding farmers for public goods. Carbon sequestration. • Supply of safe and high quality food protein to processing industry & UK consumers. • High quality and value added products such as ice-cream, cheese. • Traceable and with high standards of production, safe (animal welfare and residue free) minimum guarantee from certified farms. Ethically produced food, no air miles. • Supply of dairy products of high quality from forage based systems of lower carbon footprint. • Meat products, leather, niche interest in raw milk. • Novel products for the emerging biotechnology sector • Production of beef calves and cull cows for the beef industry • Production of slurry/ manure used to improve soil fertility and maintenance of soil organic matter. • Renewable energy generation on farm, feedstock for Bio-Energy (AD), photovoltaic panels (solar farms) and wind turbines. • Cultural amenity/ social & education amenity techniques. • Farm labour opportunities, • Processing industry jobs and • Supply industry jobs. • Supporting a viable rural economy. • Produce dairy products for export into the GB market, Europe and beyond. A major generator of export income for N Ireland <p>Challenges</p> <ul style="list-style-type: none"> • Brexit and cross border movements • Holstein bull calf culling. • Availability of and managing labour. • Climate change. • Ammonia, water quality, nutrient management, soil health, biodiversity loss, and carbon footprint. • Not enough value added products produced by the milk processors (product diversity). • Marketing. Poor organisation of marketing strategy and trying to compete on a world market. Price and return volatility arising from importance of commodity products in overall output mix • Overproduction of milk verses the national consumption. • Lack of self-sufficient production, less mixed farming, importing feed and exporting milk will continue to become an issue for public concern which needs addressed. This will involve increased capacity to home produce the feed required to produce milk. • The management of wastes (both food and excess slurry/ manures). • Countering Veganism • Too small on global stage. 	<ul style="list-style-type: none"> • Soil organic matter / carbon footprints / water nutrient loadings / natural capital / air quality / biodiversity. • Production levels • Quality assurance schemes. • NI Food Marketing. • Proportion slurry/mineral fertiliser. • Number of farms with AD. • Use of precision farm technology. • Number of jobs in the sector. 	Farms with AD

	<ul style="list-style-type: none"> • Challenge to maintain and develop industry while continuing to reduce emissions which impact on air and water quality. Lack of financial benefit from environmental improvement • Education of public and farmers • Processing capacity. • Producing better beef cattle. • Marketing of biogas, cheaper gas • Genomic selection of stock to produce specific milk • Using available space to harness renewable sources. 		
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Category	Description	Indicators	Specific dairy farming systems (if relevant)
Rural/regional vitality	<p>Services</p> <ul style="list-style-type: none"> • Employment and income from operations along all stages of the production chain. Ancillary services supported. • Landscape Management. Tourism and farm diversification. • Cultural link to livestock production in Northern Ireland. • Income to rural areas that benefits the area more generally. Dairy farms are the economic hub for the rural area. • Vibrant communities. • Helping community. Farmers have a wide and varied skill set. <p>Challenges</p> <ul style="list-style-type: none"> • Reduced margins in conjunction with increasing wage bill for all of the above staff. • A living wage for the farm family and reduced reliance on unpaid family labour. • Reduced profitability and knock-on impacts on spend. • Brexit. • Farm size increasing. • Environmental challenges. • Skilled on farm labour/ stockmanship and farm management ability. • Skills to deal with ongoing bureaucracy and legislation. • Skilled factory operatives particularly in event of no deal Brexit. • HGV drivers for milk collection and delivery. • Lack of suitable qualified labour. • Volatility of the sector and the associated peaks and troughs. • Increases in technological efficiencies impacts upon farm jobs. • Globalised nature of the supply chain may mean we miss opportunities for shorter supply chains, better connection to local suppliers in rural areas etc. • Brexit and potential disruptions to trade arrangements. • Health and Safety. • Consolidation of milk processors - lack of competition. 	<ul style="list-style-type: none"> • Dairy farming employment rate. • Average household income. 	All especially those with non-family employees.

Category	Description	Indicators	Specific dairy farming systems (if relevant)
Environment	<p><u>Services</u></p> <ul style="list-style-type: none"> • Habitat creation, planting trees and hedges. Agro forestry and associated biodiversity. • Dairy farms are those who invest most in soil fertility and soil condition and therefore provide efficient production of food per hectare. • Nutrient planning. improved water quality through efficient nutrient management and proper storage of animal wastes. Reducing nutrient surplus. Nitrogen fixing swards. • Soil carbon sequestration & carbon preservation in soils, hedgerows, peat lands. Could dairy production be carbon neutral if properly measured. More efficient than dairy sectors in other countries and has a lower carbon footprint per unit of production. • Producing renewable energy such as anaerobic digestion. • Good animal health and disease control. • Providing high quality nutrient rich milk and meat protein helping maintain human health produced under Quality Assurance Scheme. • Aesthetics. Dairy farming fits in with the current view of the NI landscape. Managing the landscape. <p><u>Challenges</u></p> <ul style="list-style-type: none"> • Continued tightening of nitrates legislation will also create issues for some • Ammonia deposition damage to habitats Improved soil structure and soil health. Reducing GHG emissions. • Lack of understanding and education. • Antibiotic usage. • Less than a third of our freshwater bodies are in good or better status. Agriculture is a contributor. To stay within nitrates limits, correct use of sprays. • State of nature. Soil biodiversity, not enough trees planted • biodiversity Loss. Monocultures, infestation, hedgerows neglected or under managed. Protection and enhancement of habitats to support biodiversity. • Inputs from outside of Northern Ireland export environmental footprint elsewhere e.g. grain, concentrates, fertiliser. 	<ul style="list-style-type: none"> • Biodiversity indicators. • Number of farms using renewable energy. 	

Category	Description	Indicators	Specific dairy farming systems (if relevant)
Cultural heritage and quality of life	<p>Services</p> <ul style="list-style-type: none"> • Farming sense of community. Provides a network of social contacts. Livestock farming is tied to the social fabric of many rural areas. Mental wellbeing from working with livestock. • Showing of stock can provide recreation for some. Agricultural shows, and groups and society. • Development of local dairy product brands such as Dromona cheese, Glastray ice cream, Clandeboye yoghurts. Niche dairy products. • Support of rural communities without the requirement for off farm employment. • Provides both fulltime and part time employment. • Farming maintains landscape features in countryside such as hedgerows, stone walls and water ways, shapes the landscape for tourism and carbon benefits of maintaining our most natural resource. Promotes green grass image of Northern Ireland. <p>Challenges</p> <ul style="list-style-type: none"> • Larger farms becoming more spread out and more isolation for families. Isolation especially older farmers. • Dependence on commodity manufacturing. • The necessity to increase intensity of production to ensure farm income remains steady (efficiency treadmill). • Increased incidence of housed production systems. • Lack of access and the benefits of sharing the countryside with the wider population. • Dairy farmers run businesses from their farms and therefore there is conflict with public wishing to access the countryside and experience all that is positive from dairy farming in Northern Ireland. • Small fields and farm size. • Poor succession planning strategy. • Lack of diversification. • Image tarnished by minority with housed herds, poor welfare, poor nutrient management. • Specialisation, technological increases and global supply chains among other developments mean that local participation in the dairy sector has declined. • People no longer have as strong a connection to where their food comes from. 		All

List of Innovative practices likely to improve sustainability and competitiveness of dairy farming

Innovative practices	Factors that prevent the adoption	Types of farms that have developed these practices or that are interesting regarding these innovative practices
Enhancing services		
Improving efficiency in order to reduce concentrate usage. Soil analysis plus nutrient management planning. Lime applications. Soil aeration. Could be part of future environmental schemes to encourage uptake and action. Advice from agronomists.	Feed sales representatives and nutritionists.	
Apprenticeship programmes to attract correct calibre of operatives and drivers.	Farmer attitudes to developing others.	
Programmes to encourage and support dairy managers from non-farming or rural areas coming into the industry e.g. profit share arrangements, incentivised salary scheme - need fresh thinking to attract the correct calibre of individual into dairying. Better working conditions, contract rearing opportunities.	Funding. TB and veterinary issues.	All
Bespoke dairy management training in practical stockmanship skills and business training.		
Continued support for farming discussion groups to reduce social isolation. Simply giving the farmer the chance to meet up and talk.	Lack of time for farmers to attend.	
Herbal leys to boost soil health, stock health, biodiversity and reduce inputs.	Lack of research.	
Screening of buildings using tree planting more trees and hedges.		
End use pricing of milk. Forward pricing of milk price and concentrate to allow easier forward planning for farmer. Some sort of income insurance scheme to leave farmers less vulnerable in the low milk price times. Schemes for farm businesses who wish to sign up to a reasonable 'living wage milk price' and fix this for a number of years with their processor.	Funding Returns from world milk product commodity markets.	
Adoption of new technologies to improve work life balance as well as mental health.	Profitability, mind sets.	
Sustainable farming practises to be mainstreamed through CAFRE courses. Research and development to seek interventions which benefit farm businesses and the environment, including biodiversity. Knowledge transfer to ensure good practise is shared.		
Genomic analysis and milk recording to improve fertility and disease resistance.	Costs	Pedigree breeders, the most progressive farmers, farms selling surplus milking stock.
Production of higher quality forage to limit concentrate use. More use of protein crops. Nitrogen fixing crops.	Contractors charging per acre.	Leading grassland focused farmers.
Heath and lifestyle. Bespoke products which extol health benefits, protein milk, added vitamins and minerals, low lactose products.		
Exploring options for market. penetration and price premiums based on a recognised sustainable production system. Market opportunity for niche markets, promoting our natural advantages.	Lack of NI Food Marketing Body.	
Move away from Holstein genetics. Use sexed semen and don't "dispatch".		
Branding.		
Winter crops to reduce surface runoff.		
Proactive farming unions and industry bodies.		
Identify the correct markets and cultivate longer term trading relationships. Find unique ways of differentiating ourselves from similar products. Opportunities presented by Brexit to supply more retail product to GB supermarkets.		
Investing in Natural Capital could have significant economic benefits locally.		
Development of a comprehensive production model that delivers a guaranteed level of sustainability against a number of relevant measurable indicators.		
Working towards a 'real' N loading of 170kgN/ha would ensure less intensive production.	Regulation enforcement.	

Innovative practices	Factors that prevent the adoption	Types of farms that have developed these practices or that are interesting regarding these innovative practices
Reducing challenges		
For antibiotic use, red tractor assurances, genetics to be disease resistant, society more responsible as a whole.		
No restrictions on cross border movements.		
More community engagement events to build knowledge and appreciation for agriculture. NI food promotion agency, open farms weekends, School groups.		Open farm weekends UFU
Building capacity to cope with climate change. Create ponds as a mini reservoir, water source in times of stress. Sow drought resistant grasses species.		
React to vegan propaganda. More engagement and collaboration with stakeholders with environmental and animal welfare interests.		All
Encouraging the use of generating electricity through solar panels. More grants for greener farming. Wind turbines, solar, biogas.	No subsidy schemes, capital costs	All
Agroforestry to help with carbon mitigation and also supply timber.		
Innovative trials on dairy farms to test and evaluate interventions.		
Covered slurry tanks Use of LESSE to reduce ammonia emissions. Lower phosphate and protein feed. Flooring systems to limit ammonia release. Assistance with costs involved with Ammonia issues. Exporting manures to less intensive farms or areas.		
Development of opportunities for controlled access to the countryside and production facilities. Increased promotion of agriculture tourism, open farm weekends etc. to allow public access to farms in a controlled manner.	Lack of farmer incentives.	All
Increasing the country's capacity to grow and feed concentrate feeds for milk production and reducing the reliance of the industry on imported concentrate feeds. Growing cereals on farm closing the nutrient loop (must work economically) Schemes to encourage this.	Land quality and climate limitations.	
Better education of consumer in regards to food production. This educational piece could be generic and rolled out at various events including national and local agricultural shows.		
Encourage long term leasing of land for 5 years plus. List of farms with no designated farmer available to lease long term. Reform of conacre to ensure that tenant farmers can manage land for a longer period of time.	No political representation, lack of dissolved tax varying powers.	
Cutting down on waste and waste plastic.		
Producer control should be maintained.		
Low carbon footprint milk products. Energy efficient milking and cooling systems to reduce carbon emissions.		Heat recovery and variable speed vacuum pumps becoming standard in new parlours.
Effective regulation which adopts the polluter pays principle.		
Feed using a diet feeder. Analysis plus formulating diets. Health monitoring of cows. Medicating through forage plus more vaccinations		Progressive dairy farmers
A commitment for 5-10% of all dairy farms to be managed well for nature.		

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