



## McDonald's Europe Flagship Farms

# Dairy – Eoghan McCarthy, Ireland

### Introduction

The focus of this case study is to show how a farming family can run a successful and sustainable milk production enterprise while maintaining good animal welfare standards and improving the surrounding natural environment.

The key initiatives undertaken by Eoghan McCarthy can be summarised as follows:

- Eoghan has carefully managed his breeding programme to synchronise calving and grass growth, with 80% of the herd calving in a six week period beginning in early February. This allows the dairy herd to produce milk mainly from a diet of grass which is supplemented with 650kg of concentrates per cow.
- The farm is a member of a Herd Health Programme which helps monitor health, fertility and productivity, with the emphasis being on improving individual animal immunity levels and reducing disease incidence.
- The herd is achieving a calving interval of 366 days and a herd replacement rate of 18 – 20%. The herd currently has an Economic Breeding Index (EBI) of €171, which places the herd among the top 100 dairy herds in Ireland ranked on EBI.
- Good calf health is a high priority and shortly after birth (within 2 hours) all calves are fed a minimum of 3 litres of colostrum from the dam. This procedure aims to provide the calf with a sufficient quantity of maternal antibodies to ensure adequate immune support for the first 3 – 4 weeks of life. Good calf-care routines have resulted in calf mortality rates of 2%.
- Through effective management, breeding and infrastructure, dairy cow mobility is maintained to a high standard throughout the herd. Providing well maintained tracks to pasture, good floor hygiene and housing conditions, high nutrition standards as well as a strict regime of foot-bathing, has helped the farm control this potentially chronic condition.
- Eoghan has adopted a milking routine to focus on hygiene and maintaining udder health, this ensures that the milk meets the necessary quality parameters and animal health is protected. In 2012, the average Somatic Cell Count (SCC) was 101,000/ml and the Total Bacteria Counts (TBC) averaged 14,000/ml.
- All dairy replacements are bred on the farm, avoiding the risk of introducing new diseases onto the farm by purchasing cows or heifers with sub-clinical health problems.
- Milk recording takes place every seven weeks and the data generated provides information on individual cow health (i.e. SCC) and productivity (milk yield and quality). In 2012 the herd produced an average yield of 6,280 litres of milk over a 262 day lactation period. Average milk solids produced per cow was 491kg comprising of 3.48% protein and 4.12% butterfat.
- The farm participates in the Rural Environmental Protection Scheme (REPS) which provides funding to allow the farm to undertake a programme of environmental measures. A section of the farm has also been designated a Special Protection Area (SPA).

“The main focus of my farming business is to make a living from running the family farm. Obviously I need to do this as efficiently as possible whilst protecting and enhancing the welfare of the cows and respecting the natural environment. The focus is to grow high quality pastures which the cows have good access to, therefore enabling them to produce as much milk as possible from grass.

It is great that McDonald's recognises the importance of sustainable primary milk production. I was really pleased to have been selected for inclusion in the Flagship Farm Programme. ”

Eoghan McCarthy



## Summary of actions and benefits

The table below summarises the key areas of good practice displayed by Eoghan McCarthy, and the benefits (EN environmental / EC economic / ET ethical) that arise from taking these actions.

	Action	Benefits
Husbandry	Good cow mobility	<ul style="list-style-type: none"> <li>EN Good mobility is maintained via a good hoof care routine, along with well maintained and clean tracks</li> <li>EC The cost implications for a single case of lameness is around €275 per cow</li> <li>ET Ensures animal health and welfare are not compromised</li> </ul>
	High quality calving facilities and care	<ul style="list-style-type: none"> <li>ET Straw bedded, clean calving facilities are provided and CCTV monitoring enables swift response to any calving problems</li> <li>ET All cows, except first calvers are fed a mineral/vitamin supplement immediately post calving to help reduce post calving health problems and improve appetite</li> </ul>
	Good calf care and management	<ul style="list-style-type: none"> <li>EC Maternal immunity provided by colostrum, reduces rates of morbidity and mortality and their associated costs</li> <li>ET Calves are provided with 3 litres of colostrum within 2 hours of birth to provide an active immune response in the first 3–4 weeks of life</li> <li>ET Young calves are grouped according to their milk drinking speed and size, reducing competition and ensuring all calves receive adequate nutrition</li> </ul>
Genetic Selection	Genetic improvement using AI and genome testing of calves	<ul style="list-style-type: none"> <li>EC Currently, the herd's Economic Breeding Index is in the top 3% of the national herd index at €171</li> <li>EC Ensures the farm continues to improve the productivity, fertility and the health of the herd all of which contribute to increased profits</li> </ul>
Food Safety	Good hygiene routine	<ul style="list-style-type: none"> <li>EC Helps maintain udder health and prevents costly intra-mammary infections such as mastitis</li> <li>ET Ensures the production of high quality, safe milk</li> </ul>
Input Costs	Herd replacement rates of 18%	<ul style="list-style-type: none"> <li>EC Breeding programme, management and infra-structure helps improve cow longevity and reduces culling rates</li> <li>ET The genetic selection of animals improves cow longevity and reduces culling rates due to disease, and poor health</li> </ul>
	Milk from grass	<ul style="list-style-type: none"> <li>EN Utilising land in a high rainfall area to produce forage which can be converted into milk for human consumption</li> <li>EC Good quality pasture provides the most cost effective and economic form of nutrition for the dairy cow producing milk.</li> <li>ET A natural feed type for the dairy cow helping to maintain a healthy and functioning rumen which reduces digestive disorders</li> </ul>
Livestock Disease	Milk recording every 7 weeks	<ul style="list-style-type: none"> <li>EC Provides bespoke and targeted management of each cow</li> <li>ET Monitoring for sub-clinical mastitis infection (via SCC levels) enables efficient treatment and reduces the spread of disease</li> </ul>
	Herd Health Programme	<ul style="list-style-type: none"> <li>EC Reduces occurrence / severity of illness and cost of treatment</li> <li>ET Reduces morbidity or mortality rates by improving the immune response of the animals therefore reducing their susceptibility to disease</li> </ul>
	Biosecurity	<ul style="list-style-type: none"> <li>EC Operating a closed herd reduces the risk of new diseases being introduced into the herd with associated cost implications and potential loss of productivity</li> <li>ET Reduces/prevents adverse potential impacts on animal health</li> </ul>
Energy Efficiency	Using plate heat exchanger to pre-cool milk	<ul style="list-style-type: none"> <li>EC Water from the farms well is used in the plate heat exchanger which removes a significant amount of heat from the milk, thereby reducing energy requirements for milk cooling</li> </ul>

<b>Water Use Efficiency</b>	<b>Using water from plate heat exchanger</b>	<p>EN Water used in the plate heat exchanger is then re-used to wash the milking parlour which reduces farm water requirements</p>
<b>Soil Fertility</b>	<b>Soil testing for phosphate, potash &amp; pH</b>	<p>EC Ensures that the application of P &amp; K and lime is undertaken in line with soil requirements</p> <p>EN Provides data to avoid over-application of nutrients and losses to the environment</p>
<b>Habitat &amp; Species Conservation</b>	<b>Member of the Rural Environment Protection Scheme (REPS)</b>	<p>EN Hedgerows and trees are being planted, and bird boxes erected for nesting sites. Waterways have been fenced to stop livestock access which can damage river banks and cause water pollution</p> <p>EN New grassland is being re-seeded with a pasture mix containing high levels of clover, which increases protein intake for grazing cows and also fixes atmospheric nitrogen into the soil</p>
<b>High Conservation Value Land</b>	<b>Special protection area (SPA) on farm</b>	<p>EN The SPA is of special conservation interest for many bird species and is considered an important site for wintering waterfowl i.e. Red throated diver, sea duck and light bellied goose etc.</p>

“Producing high quality milk from grazed grass is one of the key aspects which helps make this family run dairy farm sustainable. With a long grass growing season, the low input system is central to the farm’s economic viability, and the astute investments which Eoghan has undertaken in the farm’s infrastructure has provided the foundation to achieve this now and into the future. The focus on cow health and welfare is crucially important; the comprehensive vaccination policy and good disease control measures reduce animal health challenges and support cow performance. Environmental stewardship has also become more of a focus for the farm, with several initiatives being undertaken to help maintain and enhance local biodiversity levels.

Eoghan is keen to share his good practices, experience and knowledge, which is why he is a great addition to the McDonald’s Flagship Farms programme. ”

Karl Williams, Flagship Farms Programme Manager, FAI



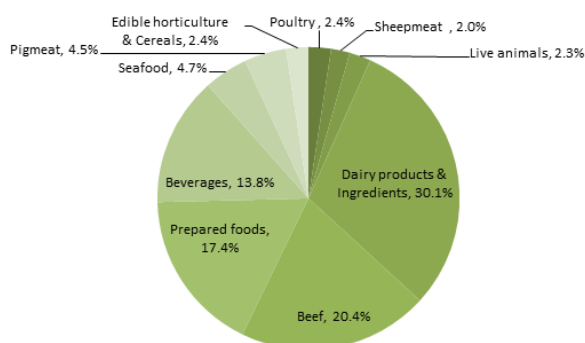
## Background

### The agri-food sector in Ireland

The agri-food sector continues to be a key manufacturing industry in Ireland. The sector currently generates 10% of Ireland's total exports and €24 billion for the country's economy, representing 7% of Ireland's GDP. Agriculture directly employs 7.7% of the working population. When processing and marketing are included this figure reaches 10% (150,000 people).

In 2010 there were almost 140,000 farms in Ireland, averaging around 32.7 hectares in size, and in total covering over 4.5 million hectares (65% of total land area). Agriculture in Ireland is a resource-rich and primarily grass-based industry with 80% (3.6 million ha) dedicated to pasture, hay and silage. As a result beef and dairy production constitute near to 58% of total agricultural output.

**Figure 1. Composition of Agri-Food Exports  
Bord Bia Performance & Prospects 2011–2012**



Currently, Ireland exports 85% of its food, mostly to the UK and Continental Europe, generating a total of €8.85 billion. Dairy produce contributes 30% of this exported produce, worth €2.7 billion in 2012, making Ireland the 10th largest exporter of dairy produce in the world (see Figure 1).

Dairy farming is traditionally an important agricultural sector in Ireland, with the temperate climate and grass-based systems making it a profitable enterprise. In 2011, there were over 1.1 million dairy cows across 18,548 farms in Ireland. A total of 5.4 billion litres of milk were produced in 2011/2012.

### Eoghan McCarthy's Farm

Eoghan McCarthy's Farm at Callinafercy West, Milltown, Co. Kerry has been in the McCarthy family for three generations. After finishing agricultural college in 1996 Eoghan rented the farm adjacent to his father's farm and started his own business rearing dry stock. In 2001, Eoghan took over the family farm of 51 hectares, and has also continued to rent the adjacent farm of 24 hectares. The McCarthys' current herd consists of 96 cows (70% Holstein / 30% British Friesian genetics).

The milk from Eoghan's farm is used in the production of milk protein in the Kerry Group plant in Listowel. The milk protein is then transported to a Kerry Group plant in Coleraine where the cheese slices are produced for McDonalds. The milk protein is a key functional ingredient in a cheese slice and a tasty compliment for a McDonald's burger.

As a member of the local branch of the Irish Farmers Association (IFA), Eoghan is an active participant in the farming community. He is both a member of the Kerry Co-Op Advisory Committee and a participant in the local dairy farm discussion groups.

During the period 2001 – 2010 Eoghan was selected by Kerry Agribusiness and Teagasc (the state Agricultural Advisory Service) to participate as a monitor farmer in the Focus on Profit Programme. Working closely with the monitor farmers in the implementation of new farm technologies the programme seeks to extend the adoption of profitable and environmentally sustainable farming practices to other dairy farmers in the catchment area. Eoghan hosted many events on his farm during this period.



## Husbandry

### Good cow mobility

Lameness is a multi-factorial disorder which can be caused by a variety of injuries or infections of the foot and leg that can lead to an abnormal gait when the animal moves (see Table 1 below). Generally, dairy cow lameness is caused by poor quality flooring in housing facilities, poor cow tracks, cows standing for long periods on hard surfaces, poorly-designed cubicles (reduced lying times), infectious hoof diseases and poor nutrition.

It is estimated that 10% of cows in the Irish dairy herd are affected by lameness every year. The direct costs associated with lameness include vet bills, increased labour time and a reduction in milk output as well as indirect costs such as loss of appetite, loss of condition and reduced fertility. The average cost of lameness is considered to be around €275 per affected cow (see Table 1 below).

#### Facts: Impacts of lameness

Lameness affects the economic performance of dairy cows in various ways, such as:

- Reduced production (milk yield), caused by stress, and reduced feed intake
- Reduced fertility rates and extended calving interval
- Increased veterinary treatments and costs
- Increased culling rates
- Increased labour costs

Source: DEFRA, Dairy Cattle Lameness; TheBeefSite, Lameness in Cattle; Forage & Nutrition Guide 2012, Economic Cost of Lameness in Irish Dairy Herds

**Table 1. Causes of lameness and associated costs**

Type of lameness	Digital	Inter-digital	Solar Ulcer	Average cost per case
Prevalence (%)	45	35	20	–
Total cost of a single case (€)	282.85	136.12	504.58	275.26

(Source: Cusack, G. (2012) Forage and Nutrition Guide 2012. Economic Cost of Lameness in Irish Dairy Herds, XLVets.)

Eoghan aims to maintain good levels of mobility within his herd through a number of management practices and preventative measures, described below.

- **Good access tracks**

The basis of milk production from the McCarthy herd is derived from grass production, and to be able to access the pastures, cows have to walk from the main unit, where they are milked twice a day, to the fields. Therefore providing good access on well-maintained tracks is crucial to support and protect foot health. The tracks are constructed to be as straight as possible, as this improves cow flow and reduces the time required to move cows from pasture to milking and back again. The tracks are well made and maintained to reduce the risk of hoof damage.



Well made and maintained tracks are crucial for access to pasture and foot health



- **Hoof health & zinc**

Every four to six weeks (or fortnightly if a problem occurs), the cows walk over mats saturated in a solution of copper sulphate. This helps to reduce the incidence of infectious hoof conditions, such as digital dermatitis. The copper sulphate solution helps to harden hooves and kills any bacteria present on the surface of the foot. The benefits of a mat over a footbath are that they are quick and easy to install, the cows are happy to walk over them (badly designed footbaths can cause cow flow issues), there is minimal splashing of the udder, and they reduce chemical use. Once the cows walk over the mat they move into the housing (onto a clean floor) which allows the chemical to dry on the hoof, providing time for the solution to take effect.

In addition, Eoghan provides the cows with supplementary zinc in their diet to help improve claw structure and hoof strength whilst reducing the risk of infection, particularly foot rot.

Zinc has been highlighted as an important mineral for the growth and maintenance of healthy keratinised tissues of the hoof.

Several studies have shown that organic zinc improves claw integrity. In a year long study cows fed an additional 200 mg per day of organic zinc had fewer cases of foot rot, heel cracks, inter-digital dermatitis and laminitis than cows not fed zinc.

*(Moore et al., 1989)*

- **Good cow comfort**

Poor cow comfort at lying is a major factor which should be considered when trying to improve dairy cattle mobility. Studies have shown that foot trauma causing mobility problems increases when cubicles are uncomfortable, or when cows are standing for long periods on hard surfaces. Providing sufficient and comfortable lying facilities was one of the fundamental characteristics about which Eoghan was aware when he invested in the new housing facilities for the cows.

The barn was fitted with 120 cubicles, with rubber matting provided as the lying surface for the cows. The cubicles have been well designed and this is illustrated clearly by the good occupancy rates with the majority of cows lying down. In addition, the cows have 55 metres (180ft) of feeding space, which reduces competition at feeding, further improving cow welfare.

Together these preventative measures and management practices have ensured mobility of the herd is good, this improves cow health and welfare, reduces costs and maintains optimal productivity.



A large feeding space reduces competition and improves cow welfare

#### High quality calving facilities and care

The calving facilities are kept to a very high standard of hygiene and farm routines have been modified to ensure cow and calf health are optimised. The cows calve in a straw-bedded pen with closed-circuit television (CCTV) enabling constant surveillance throughout calving, which is particularly helpful for monitoring cows calving at night.

All calved cows, except first-calvers, are fed a vitamin and mineral supplement in their drinking water immediately post-calving. The supplement contains yeast, magnesium, calcium, potassium and niacin to provide the cow with crucial nutritional elements which speed up recovery after calving. The transitional period between calving and early lactation is a crucial time for the cow, and providing a nutritional boost helps the cow recover from the stresses of calving, in particular rebalancing blood calcium levels following birth and helping to prevent milk fever. In addition, the supplement helps increase appetite, encouraging proper rumen function and reducing the risk of abomasum displacement. Yeast in the formula helps to re-populate the beneficial bacterial population in the gut and also helps rumen activity; this limits the risk of post-partum metabolic disorders.



Post-calving supplements help improve cow health



### Good calf care and management

Good early calf management and care is therefore critically important to protect health, safeguard development and assure future performance. It is important to make sure calves are fed an adequate quantity of colostrum within six hours of birth as the ability of the small intestine to absorb colostrum is most efficient during this period. At 24 hours this capacity to uptake immunoglobulins reduces to only 10%.

Eoghan separates the calf and dam shortly after birth; and bucket/teat-feeds them at least three litres of colostrum. Reducing the dam/calf interaction helps minimise distress when the calf is removed from the dam. Calves are teat/bucket-fed in individual pens for the first 2–3 days to ensure each calf is drinking well and is healthy. They are then moved into straw-bedded pens and batch-reared in small groups dependant on their milk drinking speed and size. Whole milk is fed up to around 7–8 weeks of age when the calves are weaned.

### Facts: Benefits of colostrum

Colostrum contains key elements necessary for growth and disease protection; most notable of these are immunoglobulins (Igs). Igs are complex proteins present in colostrum that provide passive immunity to the calf from the dam. As new-born calves have no active immunity they are highly vulnerable to any infections which may be present on the farm. The passive immunity provided by colostrum ensures protection against disease for the first three to five weeks of life, and is vitally important to maintain calf health, and reduce morbidity and mortality.

Colostrum also contains multiple non-immune factors that provide nutritional support for the calf. These include higher concentrations of growth factors, fats, protein, vitamins and minerals compared to normal milk. Colostrum management is therefore a key factor in determining calf health and its future productivity.







## Genetic Selection

### Genetic testing & improvement

Eoghan uses artificial insemination (AI) to breed superior quality replacement stock and therefore improve the production, health and economic output of the herd. Data from HerdPlus (see box) are used to match the female stock within the herd to high merit breeding bulls identified through the GENE IRELAND Programme.

In the GENE IRELAND Programme, operated by Irish Cattle Breeding Federation (ICBF) & National Cattle Breeding Centre (NCBC), 100 young bulls are selected each year from matings of high EBI sires & dams. Eoghan participates in this programme and some of the male calves from his herd have entered the testing programme with potential to be identified as elite sires at AI. Sires are genomically tested to improve the reliability of their EBI. In this process DNA samples are collected from young male calves to evaluate their breeding potential by searching for genetic markers within the DNA that are associated with particular characteristics assigned within the herd.

When superior quality animals are identified through this process additional income is provided to the farm supplying the animal.

Eoghan has been using the EBI system for 15 years and this enables him to make detailed decisions about the selection of breeding animals. Currently the herd has an EBI value of €171, putting the farm within the top 3% of the most profitable breeding herds in Ireland. The farm

currently produces 6,280 litres of milk/cow over a 262 day lactation length. Average milk solids produced per cow is 491kg, with a milk composition of 3.48% protein and 4.12% butterfat.

Good herd fertility is achieved through good management, nutrition and heat detection. Since Eoghan's dairy production system relies on grass growth, there has to be a compact service period to achieve the necessary tight calving cycle, which is currently 12-weeks. Calving starts in February, with 80% of the herd having calved within the first 6 weeks, this matches seasonal grass growth and availability, helping to maximise efficiency and economics of the enterprise.

The farm's maiden heifers have an EBI value of €206 and any surplus animals are sold as breeding stock. An Aberdeen Angus bull is used to mate with any cows not selected for AI, and helps to produce good quality beef calves which are sold at three weeks of age at the local market for rearing for beef production.

### Facts: HerdPlus

HerdPlus is an on-line database provided by Irish Cattle Breeding Federation (ICBF), that uses milk recording information and other data to provide a range of farm management tools to monitor the performance of Irish Dairy & Beef Herds. It enables accurate identification of superior breeding animals and facilitates improvement in breeding programmes. HerdPlus provides the Economic Breeding Index (EBI) calculated as the overall reproductive value (€) of the animal. This is defined by multiple weighted criteria including milk production, fertility, calving performance, beef carcass, maintenance and health (see Appendix 1). For each animal within the herd the EBI is generated by monitoring and recording values for these criteria based on typical figures for the national herd. Similarly EBIs are generated for breeding bulls through on-farm data collected from their offspring.

“EBI is a single figure profit index aimed at helping farmers identify the most profitable bulls and cows for breeding dairy herd replacements.”

(Source: ICBF)

EC

Eoghan's herd has an EBI value of €171, which places him among the top 100 dairy herds in Ireland ranked on EBI

## Food Safety

### Good Hygiene Routine

Milk is made by cells inside the mammary gland and is almost completely sterile when it is secreted into the alveoli of the udder. Bacterial contamination generally occurs from three main sources; inside the udder, outside the udder, and from contaminated equipment coming into contact with raw milk. Cow health, the animal's environment, milking procedures and equipment cleanliness can therefore all have an effect on the level of microbial contamination in raw milk.

For these reasons, the McCarthy farm has put in place various hygiene routines to minimise the possibility of contamination:

- **Housing hygiene**

When the herd is housed, the rubber mats in the cubicles are cleaned and limed daily to help reduce environmental bacteria. This reduces the risk of bacteria infecting the udder while the cows are lying. Slatted passages between the cubicles are scraped three times a day to keep the housing area clean and reduce the risk of animal manure splashing onto the udder (and also to reduce animal manure contact with the hoof).

- **Milking routine**

Before cows are milked their teats are sprayed with a sanitiser and then wiped clean, which helps reduce the spread of intra-mammary infections. As the teat canal remains open for around one hour after milking, there is the risk of mastitis-causing pathogens entering the teat and causing an infection. The teats are sprayed post-milking with a germicide as this is one of the most successful and cost effective means of controlling mastitis and can reduce new mastitis infections by 50%. Anti-bacterial teat spraying is particularly effective against *Staphylococcus aureus* and *Streptococcus agalactiae* strains that can pass between cows during the milking process.



### Facts: Mastitis

Mastitis is an inflammatory condition caused by bacterial growth and colonisation of the mammary gland. The udder becomes inflamed, painful and ceases to produce milk. Limiting intra-mammary infections can greatly improve cow welfare, and reduce economic losses.

- **Equipment / plant hygiene**

Eoghan's management of the dairy ensures that good hygiene is maintained for all equipment which comes into contact with raw milk. There is a fully automated plant wash system, which has a fail-safe mechanism to stop plant washings entering the bulk tank and this also controls wash water temperature, chemical input and wash time. The automated system is simple to operate and ensures that when relief staff are milking the same high standard of plant hygiene is maintained.

## Input Costs

### Low herd replacement rates

Culling unproductive and unhealthy animals is an essential management practice in dairy herds. However, high culling rates can represent a significant cost to dairy farmers. Culling is estimated to be the biggest herd expenditure following feed and forage costs. Despite the cost, culling unhealthy cows is essential for the management of herd health and welfare, which in turn benefits the efficiency and economic productivity of the business. The most common causes of culling in dairy herds are infertility (usually early in lactation), mastitis and lameness (later in lactation).

The McCarthy's maintain a herd replacement rate of 18%, culling 10% of cows with low fertility and 8% for non-reproductive reasons. The farm adopts good herd management practices (as listed within this case study), allowing Eoghan to achieve a viable culling and replacement rate. As a result, the farm ensures high productivity and economic return from the herd, whilst minimising the undesirably high costs of rearing replacement.

“ Infertility is the most common reason given for culling, accounting for 15–40% of the total, with mastitis being the second most common reason, accounting for 5–15% of cows culled. ”

Source: *Maintaining Herd Replacements: Rates and Costs*. DairyCo Publication.

### Facts: Cost implications of culling

The process of culling and rearing a replacement heifer has multiple cost factors. Firstly, conceiving a replacement heifer calf requires siring a cow with a dairy bull, not a beef bull. Dairy bull semen is more costly and any male dairy bull calves born have a reduced economic value against their beef-sired counterparts. Additionally, a well reared heifer will take at least two years to reach its first lactation and begin contributing to farm productivity. The rearing costs throughout this period including forage feed, veterinary expenses, labour and bedding must all be accounted for. The estimated cost for rearing heifer replacements in Ireland is averaged at €1,451. Young heifers also generally produce 20–25% less milk in their first lactation compared to the average herd cow, lowering overall productivity of the herd.

### Milk from grass

Common to all systems of milk production throughout the world is the process of converting animal feed ingredients into milk. Consequently animal nutrition costs are critical to the economics of the dairy business with high commodity prices impacting greatly on some production systems.

The geographical position of Eoghan's farm and the areas climate is particularly favourable for grass production with a growing period of almost 300 days per year. The production of milk is dependent on the availability of high quality grass and clover pastures which provide the cows with a natural and cost effective feed source.





To ensure the herd is able to maximise pasture utilisation it has been crucial to guarantee that calving is synchronised with grass/clover growth. Through careful management and breeding Eoghan has succeeded in calving 80% of the herd in the six week period starting at the beginning of February.

To safeguard the nutritional requirements of the cows in particular during early lactation the pasture based diet is supplemented with 650kg of supplementary concentrates per cow.

A calving interval of 366 days demonstrates Eoghan's ability to optimise the natural advantage for grass growth and utilisation on his farm.

“A well-established stand of 30–40% clover in a pasture can replace around 200 kg of nitrogen per hectare per year. At the same time, grass mixed with clover increases the intake of grazing animals by 10–20 % and distributes the production more evenly over the summer, due to clovers different growth pattern to grasses.”

Source: *More Milk From Grass; The Danish Agricultural Advisory Service*

## Livestock Disease

### Milk recording

To be able to manage cows efficiently and effectively requires close monitoring of the animals and the ability to continuously review any relevant health measures. Measuring milk constituents (% butterfat, % protein, SCC) for each individual cow within the herd can provide direction for specific management decisions, such as treatment, breeding and culling.

The health status of the udder can be monitored through testing for Somatic Cell Counts (SCC) in the individual cow's milk. Cows suffering from mastitis infection (clinical or sub-clinical) have increased numbers of immune cells within their milk, and figures over 200,000 cells per ml are an indicator of mastitis. This painful inflammatory condition drastically reduces milk quantity and quality and high herd levels have been found to have a major impact on the profitability of the business (see Table 2). Cows which are frequently infected with mastitis or have high SCC results can be selected for culling.



McCarthy milk has a low SCC and excellent composition

**Table 2. Inverse relationship between net farm profit and SCC on a farm producing 450,000 litres of milk annually.** (Source: Teagasc/Moorepark)

SCC cells/ml	<100,000 cells/ml	100,001– 200,000 cells/ml	200,001– 300,000 cells/ml	300,001– 400,000 cells/ml	>400,000 cells/ml
Net farm profit, €	31,252	26,771	19,661	16,936	11,748



A representative from the Herd Health Programme visits the McCarthy farm every seven weeks to collect a sample of milk from every cow, which is then sent for laboratory analysis. Regular milk recording and detailed use of results have aided management and breeding decisions in the McCarthy herd as demonstrated by the low cell counts and good milk composition.

Analysis of McCarthy farm data shows the compositional quality of the milk is good: on average each cow produces 491kg of milk solids, consisting of 3.48% protein and 4.12% fat. Last year (2012) the average SCC for the herd was 101,000/ml and Eoghan works to maintain these low levels.

### Herd Health Programme

The greatest advances in dairy health have been achieved through shifts towards disease prevention (as opposed to treatment) and through strategies focused at herd level (in contrast to focussing on individual cows). In particular, improving herd protection against several bovine infectious diseases has been made possible with the development of effective vaccinations.

The McCarthy farm is a member of the Herd Health Programme to monitor the health status of the herd. The programme assesses the herd for the prevalence of BVD, IBR, Leptospirosis, Neospora, Liver Fluke and Stomach worms, which between them can drastically affect the fertility and productivity of the herd. The herd is vaccinated against Salmonella, Leptospirosis, BVD and Calf Scours.



### Facts: dairy vaccination targets

Key vaccination programmes for dairy are targeted at Bovine Viral Diarrhoea (BVD), Leptospirosis and Infectious Bovine Rhinotracheitis (IBR). These diseases have serious implications for the welfare and productivity of the herd, and Leptospirosis is a zoonotic disease which also poses a risk to staff working with infected animals. The cost of a BVD outbreak has been estimated to range from €19 to €600 per cow. Vaccination is thought to improve fertility and lower the incidence of late embryonic mortality and abortions.

*Source: Teagasc. Management of infectious diseases in split-calving dairy herds, 2009. Byrne, N. BVD Case Study Teagasc Research Farm Ballydague, 2010*

### Biosecurity

Since 2007, Eoghan has bred and reared all the herd replacements on the farm. The benefit of this system is that it eliminates the risk of infectious disease being brought onto the farm by other animals. Along with thorough disease testing, the vaccination policy has been an instrumental strategy in preventing key infectious diseases that can severely compromise welfare and cause considerable economic losses. Eoghans herd has been tested free of all the major Animal Health conditions that cause economic loss on dairy farms.

## Energy Efficiency

### Plate Heat Exchanger

To ensure milk can be stored safely without adversely affecting its quality the temperature needs to be reduced from 37°C to 4°C as quickly as possible. A refrigeration system can do most of this cooling but this requires a significant amount of energy. To reduce the electricity usage, Eoghan has fitted a plate heat exchanger in the system. This allows water and milk to pass either side of heat conducting plates enabling the water to partially cool the milk. This method of cooling can remove large amounts of heat from milk in a very short time.



Cost of milk cooling has been significantly reduced by using the plate heat exchanger

To be effective, the plate area needs to be maximised and the ratio of water to milk flow needs to be as high as possible. The electrical costs of milk cooling have been significantly reduced by using this system.

Plate heat exchangers can reduce milk cooling costs by as much as 50%.

*(Source: Milk Development Centre, Gelli Aur College, 2011)*

## Water Use Efficiency

### Plate Heat Exchanger water recycling

Eoghan uses water from the farm's own well in the plate cooler. This water is then collected in a 3,000 litre storage tank and used to wash down the parlour after milking. By re-using this water Eoghan has reduced the farm's water requirements, and this also means there is less waste water to dispose of.

## Soil Fertility

### Soil testing

In line with sustainable farming practices Eoghan undertakes soil analysis on the farm every 3 years to monitor soil PH, phosphate and potash levels which enables accurate assessments of fertiliser requirements and reduces the risk of environmental contamination and input losses. Animal manure is recycled on to recently cut or grazed pastures which helps reduce synthetic fertiliser use. The farm currently applies a total of 170kg of nitrogen per hectare per year (either in the form of animal manure or synthetic fertiliser). This level of fertiliser use is in full compliance with the EU Nitrates Directive (S.I. No. 788 of 2005).



## Habitat and Species Preservation

### Rural Environmental Protection Scheme (REPS)

The farm participates in the Rural Environment Protection Scheme (REPS), which aims to encourage farming practices that reduce environmental impacts, improve habitat conservation for local species and protect the rural landscape.

Eoghan has undertaken a regime of hedgerow and tree planting on the farm along with erecting nest boxes for birds, the aim being to encourage wildlife and improve biodiversity. Fences have been installed along watercourses to prevent livestock damage to the river banks.

The farm has also been planting new pastures with a grass seeds mixture, which contains clover. There are nodules in the root system of clover which converts atmospheric nitrogen into a form which can be absorbed by the plants root system. The majority of nitrogen from clover is recycled via grazing animals which helps improve soil fertility and reduce fertiliser inputs. The farm receives subsidies for these practices through the national government scheme as part of CAP payments, to encourage more environmentally friendly farming practice.



## High Conservation Value Land

### Special Protection Area on Farm

A section of Eoghan's farm is also designated a Special Protection Area (SPA) under the Birds Directive 2009/147/EC. This Directive requires the designation of sites known as SPA's in each member state to protect birds at their breeding, wintering and staging posts along their migration routes. This SPA is of special conservation interest for many bird species and is considered an important site for wintering waterfowl i.e. Red throated diver, sea duck and light bellied goose etc.

## Appendix 1

**2013 Economic values and % emphasis for traits in the EBI** (Source: ICBF)

Sub-Index	Trait	Economic Weight (€)	Trait Emphasis	Overall Emphasis
Production	Milk	−0.09	9.9%	32%
	Fat	1.01	3.5%	
	Protein	6.26	18.6%	
Fertility	Calving Interval	−11.89	23.5%	35%
	Survival	12.05	11.6%	
Calving	Direct Calving Difficulty	−3.52	3.4%	10%
	Maternal Calving Difficulty	−1.73	1.5%	
	Gestation length	−7.59	4.5%	
	Calf Mortality	−2.58	0.6%	
Maintenance	Cull Cow Weight	−1.49	7%	7%
Beef	Cull Cow Weight	0.15	0.7%	8%
	Carcase Weight	1.38	4.1%	
	Carcase Conformation	10.32	1.7%	
	Carcase Fat	11.71	1.5%	
Management	Milking Time	−0.25	2.1%	4%
	Milking Temperament	33.69	1.9%	
Health	Lameness	−54.26	0.7%	4%
	SCC	−43.49	0.7%	
	Mastitis	−77.10	0.9%	



## Appendix 2 – Good Practice Matrix for Eoghan McCarthy

The following matrix has been developed by McDonald's to help assess the sustainability of the agricultural production within the supply chain. Flagship farms have been identified that demonstrate best practice in one or more of the 17 key areas in the matrix, whilst also operating to general high agricultural standards in all other areas.

A ✓ in the matrix below indicates good practices demonstrated in this case study.

### Ethical (acceptable practices)

**Human health & welfare** ✓  
i Employee health & welfare  
ii Food safety ✓

**Animal health & welfare** ✓  
i Nutrition ✓  
ii Medication & growth promoters  
iii Genetic selection ✓  
iv No animal cloning  
v Husbandry ✓  
vi Transport  
vii Slaughter

**Business ethics & supplier relationships**  
  
**Rural landscape preservation** ✓

### Environment (protecting the planet)

**Climate change** ✓  
i Greenhouse gas emissions  
ii Energy efficiency & renewables ✓

**Natural resources – soil** ✓  
i Soil fertility & health ✓  
ii Soil erosion, desertification & salinisation  
iii Soil contamination

**Natural resources – water** ✓  
i Water pollution  
ii Water usage efficiency ✓

**Natural resources – air**  
i Air emissions

**Agrotechnology**  
i Agrochemical usage  
ii Bioconcentration & persistent organic pollutants  
iii Genetically modified organisms

**Ecosystem protection** ✓  
i High Conservation Value Land (HCVL)  
ii Habitat & species preservation ✓

**Waste**  
i Production waste  
ii Hazardous waste  
iii Waste to landfill

### Economics (long-term economic viability)

**Sufficient high quality production** ✓  
i Producer income security & access to market  
ii Agricultural input costs ✓  
iii Crop & livestock disease ✓

**Community investment**  
i Local employment & sourcing  
ii Support for community programmes