National Beef Conference 2023

Improving our Beef Sector's Green Credentials

Tuesday,
21st November

Shearwater Hotel,
Ballinasloe, Co. Galway

Teagasc
Agriculture and Food Development Authority

Future Beef

Sustainable Cattle Production

DAIRYBEEF 500

Sustainable Dairy Beef Production

SIGNPOST

Farmers for Climate Action

Teagasc National Beef Conference 2023

"Improving our Beef Sector's Green Credentials"

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Agriculture and Food Development Authority

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Chaired by:	*M.J. Clery, Midlands 103*
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Chairperson and Speaker Biographies

Session 1:
"Implementing Sustainable Technologies on Beef Farms"

***Chairperson:* MJ Cleary** – *Host of Country Life, Midlands 103*

MJ Clery is a beef farmer from Birr in Co. Offaly. MJ presents Countrylife on Midlands 103 serving counties Laois, Offaly and Westmeath. The programme broadcasts live weekly where MJ keeps abreast of all matters affecting the agri-community. The environment, policy decisions and global trends are some of the matters up for discussion each week.

Dr. Paul Crosson - *Beef Enterprise Leader, Teagasc, Grange Research Centre*

Dr. Paul Crosson is a Principal Research Scientist with Teagasc and Beef Enterprise Leader at the Animal & Grassland Research and Innovation Centre, Grange. His research work involves the economic and environmental assessment of beef cattle systems. He has collaborated with Bord Bia (the Irish Food Board) in the development of a national-scale farm carbon audit initiative. He was on industry technical working groups established by the Irish Cattle Breeding Federation which led to reviews of the beef breeding indexes used in Ireland. He was an expert contributor to Technical Working Groups of the Sustainable Agriculture initiative (SAI) Platform – a global food industry initiative, and is a member of the Animal Feeds Technical Advisory Group of the UN FAO LEAP Partnership. He is past-president of the Irish Grassland Association and an Editor of the international Elsevier scientific journal Agricultural Systems.

Ellen Fitzpatrick - *Teagasc Johnstown Castle Research Centre*

Ellen completed her PhD, which investigated dietary strategies for optimising the efficiency of dairy cow performance at Queen's University, Belfast and Teagasc, Moorepark in 2022. She currently works as a research technologist at Teagasc Johnstown Castle, investigating the interactions between pasture type and animal maturity on animal production performance for dairy calf-to-beef heifer systems. Her research interests and specialist areas include animal nutrition, grassland management, animal health, the role of legumes in reduced nitrogen fertiliser use, animal production performance and environmental sustainability.

Dr. Maria Guelbenzu - *BVD & IBR Programme Manager, Animal Health Ireland*

Maria Guelbenzu is Programme Manager for BVD and IBR with Animal Health Ireland since May 2018. Prior to that, she was Head of the Disease Surveillance and Investigation Branch in the Agri-Food and Biosciences Institute (AFBI). After graduating, Maria gained five years of experience in mixed practice in Northern Ireland before joining AFBI as a Veterinary Research Officer. She was awarded a PhD from Queens University, Belfast, in 2015 for research on BVD.

Chairperson and Speaker Biographies

Session 2:
Increasing our competitive advantage on the global stage

***Chairperson:* Margaret Donnelly** - *Editor, Farming Independent*

Margaret Donnelly is the Farming Editor with the Irish Independent. She is originally from a beef and tillage farm in Offaly and has worked in agri-journalism for over 20 years. Margaret originally started her agri-journalism career in Independent News and Media as a journalist on the Farming Independent before working as an Editor across a number of specialist agri-media. She returned to the Irish Independent, heading up its digital farming platform before taking over as editor of the Farming Independent in 2019. Margaret has a Degree in Journalism and a Masters in Marketing from the Michael Smurfit Graduate Business School.

Dr. Siobhan Kavanagh - *Signpost Programme Communications & Engagement Specialist, Teagasc*

Dr Siobhán Kavangh is Communications and Engagement Specialist with the Signpost Programme since July 2021. The Signpost Programme is a farm sustainability programme, led by Teagasc and supported by over 60 stakeholder organisations in the Agricultural sector. The programme is designed to support and enable farmers to improve farm sustainability - economic, social and environmental. Siobhán is responsible for communications from the programme to stakeholders, Signpost demonstration farmers and all farmers. Previously, Siobhán was Regional Advisory Manager in Wexford, Wicklow, Carlow and Waterford Kilkenny. For 14 years, Siobhán was the national Ruminant Nutritionist with Teagasc. Siobhán holds a Masters and PhD in Pig Nutrition, having graduated from UCD in 1994.

Anaïs L'Hôte – *Project Manager at Idele, French Livestock Institute*

Anaïs holds a Master's degree from AgroParisTech. After a final-year internship in the field of agricultural development in Armenia, she worked at the French grassland association and then she joined the environment department of the French Livestock Institute in 2021. Anaïs has managed the European LIFE Carbon Farming project for two years.

Rupert Claxton - *Meat & Livestock Director, GIRA*

Rupert has worked as a strategy consultant in the food sector since joining Gira in 2003, with a high level of specialisation in global meat and livestock markets. He spends a considerable amount of time analysing the evolving nature of international meat demand and the supply systems that provide it, as well as their internal organisation. For the last 20 years, Rupert has produced the Asian sector of the annual Gira Meat Club report, and for the last 12 years managed the Gira Asian Meat Club. In the last few years, he has been actively researching developments in the global pork supply chain, as the impacts of ASF, Covid and the war in the Ukraine have disrupted key markets and resulted in issues for producers and traders. Rupert's personal background in UK farming affords him a balanced outlook on the increasingly globalised meat industry, between the commercial drivers that control the processing industry and the complex cultural heritage that farming has evolved from.

Foreword

Welcome to the 2023 Teagasc National Beef Conference. The last 12 months have once again been challenging for beef farmers with the impact of prolonged periods of wet weather, stubbornly high input costs and beef prices below what is being achieved across Europe. The challenges that are facing the industry are similar to those across the agriculture sector with an increasing emphasis on how the target reduction in greenhouse gas (GHG) emissions that have been set for agriculture are going to be achieved over the coming years. The theme of this year's conference "Improving our Beef Sector's Green Credentials" aims to address some of the technologies that beef farmers can implement to play their part, while at the same time increasing the returns they achieve from their enterprises.

In 2023, Teagasc launched its latest Marginal Abatement Cost Curve (MACC). This identifies the most cost-effective pathway to reduce GHG emissions and enhance carbon sequestration in the Agricultural, Land-Use, Land-Use Change and Forestry sectors plus (Bio) energy. One of the key drivers within beef farming that has the potential to reduce our emissions significantly is the earlier slaughter, on average, of our prime cattle. Two papers in our conference directly address the technologies that can be employed on farms to work towards this earlier finishing age. We also have a very interesting paper on the progress that has already been made in reducing emissions over a relatively short time on our beef demonstration farms that are part of the Teagasc Signpost initiative. These farms are our shop window for other farmers to see how practical solutions can make all of our beef farms more environmentally sustainable into the future.

Healthy animals that are thriving are essential if farmers are to meet performance targets and maintain output at optimum levels. There is also an increasing emphasis across Europe on tackling some diseases that are common to many different countries. Infectious Bovine Rhinotracheitis (IBR) is one such disease in cattle. Some EU countries have now been declared 'IBR Free' with others currently working towards achieving that status. Animal Health Ireland (AHI) are discussing with stakeholders across the industry what an IBR control programme might look like in Ireland, and we are delighted to have a paper on this topic, which will be both informative and helpful in gaining a better understanding of this important disease.

Finally, this year we have two international speakers at our conference. As farmers and the industry improve their knowledge on topics such GHG emissions and carbon sequestration, there is an increasing number of questions on what the potential is in the coming years for generating an income from reducing emissions at farm level. A pilot project to reward farmers for 'carbon credits' is already in place in France, and how this is achieved will be explained this evening. Our final paper looks at the world stage and how events across the globe that are happening today, and into the future, have an impact, not only on the beef price farmers achieve, but also the impact they are likely to have on the price farmers may have to pay for their most important inputs.

I would like to take this opportunity to thank all of our chairpersons and speakers who have given up their time to make our conference what it is today. I would also like to thank all of my colleagues in Teagasc involved in putting together and organising a conference that addresses many of the different challenges and opportunities that now face the Irish beef industry. I hope each one of you can take something from the presentations and discussion, and that you leave with an improved understanding of the many different areas that can make your farm more profitable and environmentally sustainable into the future.

Professor Frank O'Mara, Director, Teagasc

An overview of updates to the Irish suckler beef breeding indexes

Paul Crosson[1], Siobhan Ring[3], Alan Twomey[2], Margaret Kelleher[3], Ross Evans[3] and Donagh Berry[2]

[1] *Teagasc, Grange Animal & Grassland Research and Innovation Centre, Grange, Dunsany, Co. Meath.*

[2] *Teagasc, Moorepark Animal & Grassland Research and Innovation Centre, Fermoy, Co. Cork.*

[3] *Irish cattle Breeding Federation, Link Road, Ballincollig, Co. Cork.*

Summary

- Breeding indexes are tools, which provide an expected profit value for the progeny of breeding animals by combining individual animal estimates of genetic merit transmitting abilities for a range of performance traits, each weighted by their respective economic importance.
- Irish cattle receive two index values each: 1) a Terminal Index to help identify candidate parents to generate calves for meat production, and 2) a Replacement Index to help identify candidate parents to generate the next generation of replacement heifers for entering the suckler herd.
- Both breeding indexes were recently updated to include new traits (e.g., age at finish, tuberculosis resistance), revised economic weights (to reflect changes in prices and costs of production) and trait-specific weights to reflect their carbon cost. In addition, a new method to evaluate calving difficulty, called a single step genomic evaluation has also been implemented.
- The updates to the Terminal Indexes aims to reduce costs of finishing cattle by reducing feed consumption and finishing age, while increasing the focus on carcass value.
- The updates to the Replacement Index aims to reduce the cost of suckler cows by reducing feed costs, predominantly by selecting for smaller cows and increasing fertility, while concurrently emphasising the importance of generating 'quality' and profitable progeny.

Introduction

Breeding indexes are tools that collapse the genetic merit of individual animals for a range of traits into a single value. The emphasis each trait receives in an index directly reflects its contribution to profit – be that either revenue or cost of production. The genetic merit of each trait is estimated from information on the animal itself, its ancestors and its descendants. Because each profit index is the sum of a range of different traits, two animals could achieve the same profit (index) through different avenues; therefore, animals with the same index could have different expected performances for each trait. Thus, farmers and breeders alike must not only select animals on their overall index, but also how the expected performance of the animal for the constituent traits of that index suit the herd in question.

Two indexes are available for Irish suckler beef cattle: the Terminal and Replacement indexes. The Terminal Index ranks breeding animals on the basis of the efficiency and profitability of their progeny in calf-to-beef finishing systems. The Replacement Index ranks breeding animals on the basis of the efficiency and profitability of their female progeny as suckler cows (i.e. easy-calving, fertile and low maintenance requirements), as well as being capable of generating profitable progeny in calf-to-beef finishing systems. Research has indicated the effectiveness of these indexes in improving profitability on Irish beef farms. Twomey et al. (2020) found that suckler cows which ranked higher on the Replacement Index had superior performance across a range of key maternal traits. Furthermore, Kelly et al. (2021) showed that, for each unit change in Terminal Index and Replacement Index value, gross profit per livestock unit increased by €1.41 and €0.76, respectively.

Both beef breeding indexes were last updated in the year 2015 and thus, given price, policy and technological changes since, a comprehensive exercise to revise and future-proof the indexes commenced in 2021. Key elements of these revisions were: 1) derivation of new economic values for each of the performance traits according to prevailing prices, 2) inclusion of new traits, such as *finishing age* and *bovine tuberculosis resistance*, and 3) inclusion of greenhouse gas emissions mitigation associated with improvements in performance traits. The purpose of this paper is to describe these revisions.

Approach used to derive production economic and greenhouse gas emissions values

The economic values for each trait in both breeding indexes were generated using the Teagasc beef farm systems model (Crosson et al., 2006; Taylor et al., 2020), which is a whole-farm budgetary simulation model of Irish suckler beef production systems. The model is initialised by specifying the farm area, percentage of the cow herd calving in each month, breeding policy (natural mating or artificial insemination), cow replacement rate, cattle trading strategy (month/age at sale), as well as the appropriate feeding system and various price variables. Using the French net energy system (Jarrige, 1989) modified for Irish conditions (O'Mara, 1996), animal feed requirements are calculated and, based on herd feed requirements, grass and silage intake is calculated. For the generation of the economic values, the farm system assumed was as described by Taylor et al. (2018) and Teagasc (2020). This suckler beef production system selected was considered to be the current prototype suitable for immediate implementation on farms, and for which evaluation has been completed (by means of systems research experiments at Teagasc, Grange). The modelled spring-calving grass-based production system involved finishing steers and heifers at 22 and 19 months of age, respectively, and was operated at a stocking rate of 165 kg organic nitrogen (N) per hectare. Table 1 outlines the key descriptors for the base scenario.

To generate economic values for the performance traits of interest, it was necessary to generate scenarios where the scenario was identical to the baseline scenario with the exception of the trait of interest. The performance of the trait of interest was either increased or decreased within a realistic range, and its economic value quantified by comparing the financial performance of the baseline scenario with the modelled scenario. Thus, the economic value is equal to the change in profitability divided by the biological change in the trait of interest, holding the performance metrics of all other traits constant.

Table 1. Details of the baseline scenario for derivation of economic values for suckler beef breeding indexes for Irish suckler calf-to-beef production systems

Farm area (ha)	50.0
Number of cows calving	67.8
Weaning weight[1] (kg)	331
Carcass weight[1] (kg)	361
Mature cow weight (kg)	670
Age at first-calving (AFC; months)	24
Grazed grass in the annual feed budget	68%
Grass silage in the annual feed budget	26%
Concentrate in the annual feed budget	6%
Mean annual R3 steer price (€/kg)	4.53
Protected urea price (€/t)	550
Concentrate feed price (€/t)	380
Gross output per ha (€)	1977
Gross margin per hectare (€)	1039
Net margin per hectare[2] (€)	491

[1]Mean of male and female progeny.
[2]Excludes land and labour costs

The environmental performance of food production is under increasing scrutiny and, although this encompasses issues such as biodiversity, nutrient surpluses, water quality and ammonia emissions, greenhouse gas emissions are of particular interest at present. Society and consumers are increasingly basing consumption decisions on such issues and therefore, the beef sector must urgently seek to reduce greenhouse gas emissions reductions. There is now also a legislative imperative for greenhouse gas emissions reductions; Ireland has set legally-binding targets to reduce nationally-reported emissions by 51% by 2030. Consequent to the setting of these national level targets, sectoral emissions ceilings were established with agriculture given a reduction target of 25% to be achieved by 2030.

The beef sector can contribute to meeting these emission targets by increasing the biological efficiency of production systems. Improving the genetic merit of the beef herd is key to production efficiency improvements and greenhouse gas emissions reductions. Indeed progress in improving the genetic merit of the national beef herd (Figure 1) is likely to already have had a substantial impact on the greenhouse gas emissions intensity of Irish beef.

With this in mind, a key update to the beef indexes was the inclusion of greenhouse gas emissions (i.e. 'carbon'); such a strategy has already been adopted in the two dairy breeding indexes in Ireland. The approach taken was to assess the impact of a unit change in each performance trait on farm emissions. The Teagasc beef systems model has recently incorporated a greenhouse gas emissions sub-model (Taylor et al., 2020) to quantify emissions from modelled beef cattle production scenarios. Emission sources include enteric fermentation, slurry storage and application, chemical fertiliser application, deposition of excreta from grazing animals at pasture, silage effluent and on-farm diesel use. Emissions from the manufacturing of purchased concentrate feed, chemical fertiliser, diesel and electricity, in addition to nitrous oxide emissions, resulting from N leaching and ammonia volatilisation, are also included. In the present analysis, it was assumed that there was no effect of the different scenarios evaluated on soil organic carbon; thus, effects of soil carbon sequestration or loss were not considered. The greenhouse gas emissions associated with changes in performance for each trait were quantified on a per animal basis, and converted from carbon dioxide equivalents to monetary values by assuming a carbon price of €80/tonne (t). This was considered to be representative of the price paid for carbon on the EU Emissions Trading Scheme (range from €15/t in March 2020 to €100/t in March 2023; Statista, 2023) and is consistent with what has been used in the dairy breeding indexes in Ireland.

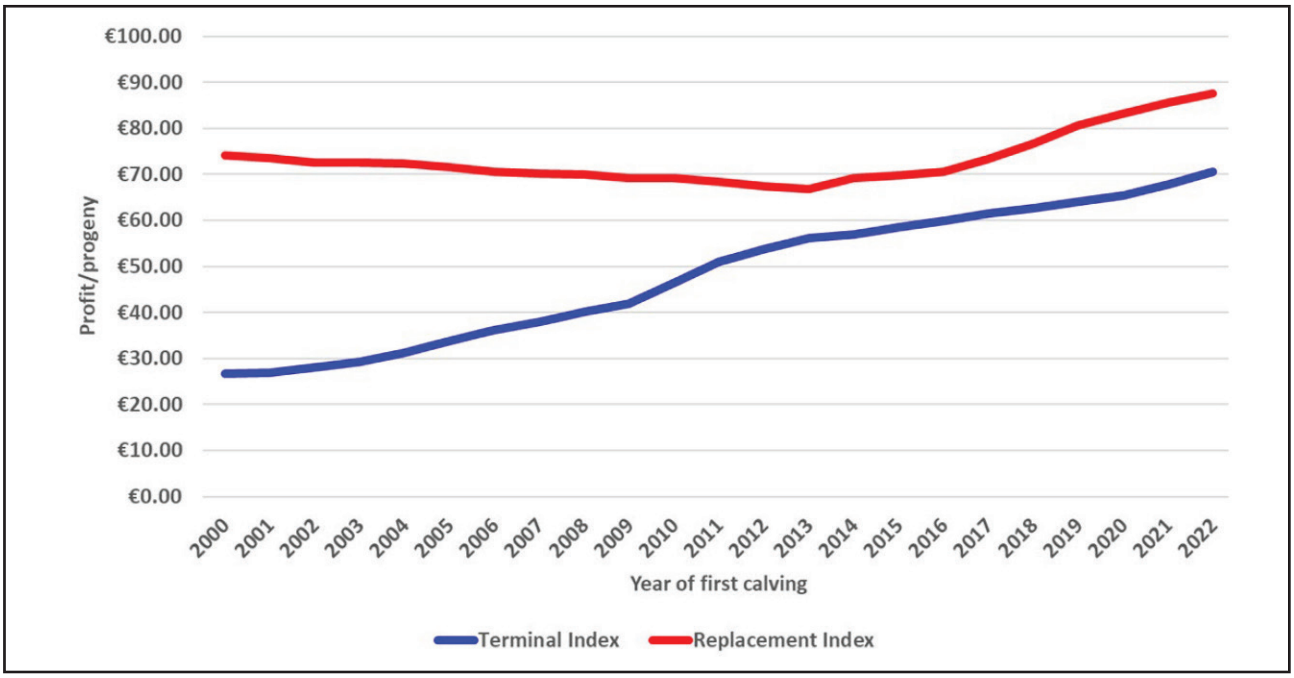


Figure 1. Genetic trends for the Replacement and Terminal Indexes in the Irish beef herd.

New traits included in the Irish beef breeding indexes

Three new traits were included as part of the index updates being; *finishing age*, *TB resistance* and *carcass specifications*.

Reducing finishing age of animals in the Irish cattle herd has been recognised in the Irish Climate Action Plan and the Teagasc Marginal Abatement Cost Curve (MACC) as a cost-effective measure to reduce agricultural greenhouse gas emissions. Animal genetics has a key role to play on reducing finishing age (Berry et al., 2017), with 23-26% of the variability observed in the age of finish within breed being attributable to genetic differences. Including carcass weight in the breeding indexes along with age-at-slaughter ensures that earlier finishing age is not associated with a concomitant reduction in carcass weight. Good progress has been made in reducing finishing age at farm-level in recent years with reductions of almost one week per year achieved between the years 2011 and 2021. Importantly, this has been achieved with almost no reduction in carcass weight (341 kg in 2011 vs. 338 kg in 2021). This has led to a reduction in costs on farms, particularly feed, while retaining output and reducing greenhouse gas emissions. Indeed, it is estimated that, by finishing cattle two months earlier, approximately 430,000 t carbon dioxide equivalents are abated annually. In this present analysis, data were obtained to quantify the effect on carcass weight and traits (conformation and fatness) of each day unit change in finishing age. These data were then used to parameterise the Teagasc beef model, permitting the production and greenhouse gas emissions economic values to be generated.

The herd incidence of bovine tuberculosis (bTB) in Ireland has increased from a historic low of 3.3% in 2016 to 4.3% in 2022 (More, 2023). Bovine TB is a substantial cost to the exchequer (estimated at €2 billion over the past 20 years; More, 2023), and also gives rise to financial hardship on affected herds. Moreover, the trauma inflicted on farm families in the case of culling or depopulation is immeasurable. Recent analysis has indicated that, on average, 7% of cattle in a herd outbreak situation test positive for TB infection. Furthermore, this analysis showed that there is large variation in the likelihood of sire progeny testing positive for TB infection, such that the genetics explained 14% of the likelihood of an animal testing positive. The data used in the TB genetic evaluation include only data from herd-management groups that have several confirmed TB reactors, thus the genetic merit does not solely indicate which bulls have been used in TB hotspots. The TB trait definition can be interpreted as the expected prevalence of TB infection in an animal's progeny where they are exposed to the TB bacterium; the genetic merit for TB typically ranges from 1 to 14%, with lower values more desirable (i.e., expect fewer TB reactors). This data informed the development of a *TB* trait with the updated indexes with an economic weight of -€0.97.

The meat industry have communicated the desired specifications for beef carcasses in respect of weight (between 280 and 380 kg), conformation (greater than O=) and fatness (between 2+ and 4+). Carcass price data has demonstrated that beef price reduces for carcasses outside these specifications and therefore, a new trait, *carcass specification* was included in the revised indexes (e.g. Table 2). The specifications imposed relate to carcass weight, conformation and fat score. The introduction of a minimum (and maximum) carcass fat specification into the index replaced the previously used carcass fat trait, which was assumed to have a linear effect.

Table 2. Price penalties implements for the 'carcass specification' trait in the beef index updates. Penalties are expressed in cents per kilogram.

Tier	< 220 kg	220-250 kg	250-280 kg	380-410 kg	410-440 kg	>440 kg
Penalty	45	12	6	3	6	12

Updates to the Terminal Index

The three new traits described above are included in the updated Terminal Index. In addition, the existing traits within the Terminal Index have been updated, as described hereunder.

Carcass gain per day of age

The carcass gain per day of age trait (otherwise known as *carcass weight*) describes the genetic potential of beef progeny to have a heavier carcass at a given age. This trait is expressed as an increase in carcass weight. The economic value was calculated as the increase in prime beef sales per animal finished, accounting for seasonality of beef price, divided by the increase in carcass weight (€4.68/kg carcass). Greenhouse gas emissions associated with carcass weight are captured within the *progeny feed intake* trait.

Progeny feed intake

The progeny intake trait describes the increase in feed intake associated with heavier animals. The economic value generated in this case reflects the dietary proportions and relative feed costs of grazed grass, grass silage and concentrate ration in the feed budget of suckler beef progeny. Thus, the economic value was calculated as increased feed costs divided by increased feed demand (€0.18/kg DM). Greenhouse gas emissions due to each additional kilogramme of feed consumed was valued at €0.06/kg DM.

Gestation length

Gestation length refers to the duration of pregnancy. Gestation length assumed in the baseline scenario is 286 days. The impact of increasing gestation length is to:

- Increase replacement rate as a result of increased barrenness (empty rates). Where suckler cows have a longer gestation length, the amount of time available for breeding is less and therefore, the probability of becoming pregnant is lower. This results in a greater number of cows that are not pregnant at the end of the breeding season. Each day increase in gestation length increases barrenness/replacement rate by 0.24% (Amer et al., 2001).
- Reduce weaning and slaughter weight. Since it is assumed that weaning date and slaughter age is fixed, then longer gestation lengths result in suckler progeny being younger (and lighter) at weaning with this lower weight largely retained to slaughter (Drennan and McGee, 2009).
- Reduce the length of the grazing season for suckler cows. As it is assumed that suckler cows are not turned out to grass in spring until after calving, longer gestations reduces the proportion of grazed grass in the total feed budget, a key factor influencing profitability.

The combination of these three factors means that longer gestation lengths result in, on average, lower profitability. The economic value was calculated as the change in net margin per cow per day increase in gestation length (€3.01/day). The above factors also contribute to an increase in greenhouse gas emissions, and thus a carbon value of €0.03/day.

Calving difficulty

Calving difficulty can range from no assistance to where a caesarean section is required. Calving difficulty can have a substantial impact on farm profitability due to increases in labour costs (farmer and vet) and cow replacement costs (based on cows not going in-calf in the next breeding season due to calving difficulties and a small proportion that die as a result of calving difficulties). Calves that die during calving are not included in this trait, but are captured in a calf mortality trait that is quantified separately. Calving difficulty is partitioned into two components: direct calving difficulty and maternal calving difficulty. Direct calving difficulty describes the level of difficulty associated with the characteristics of the calf itself (e.g. body size and shape) inherited from its sire and dam. Maternal calving difficulty describes the level of difficulty associated the characteristics of the dam giving birth (e.g. pelvic size, calving ability and maternal effects on birth weight) and indicates how easily a sires'/dams' daughters will calve. Updates to the *calving difficulty* economic value included the costs of veterinary call-outs (from a survey carried out and published by the Irish Farmer's Journal), the impact on subsequent performance and updated costs from the bioeconomic model.

Other traits

Other traits included in the Terminal Index include carcass conformation directly (as well as via a minimum specification), polledness, docility, calf mortality, and a breed bonus for Angus and Hereford cattle. All have been updated to reflect changes in prices and costs of production in the past eight years.

Updates to the Replacement Index

The Replacement Index is composed of traits expressed by the female progeny of a breeding animal when that female progeny enters the suckler herd (i.e. the cow traits), as well as the traits expressed by the progeny of that suckler cow when finished to beef. The latter category of traits are the same as those described in the Terminal Index and account for approximately 40% of the total emphasis in the Replacement Index. The remainder of this section describes just the cow traits within the Replacement Index.

Maternal weaning weight

The maternal weaning weight trait describes the impact of suckler cow milk yield on the live weight (and consequently, carcass weight) of her weanling progeny. A recent meta-analysis of the international literature has demonstrated that cow milk yield is a major determinant of calf live weight gain pre-weaning (Sapkota et al., 2020). These findings have indicated that the calf growth response to each additional kilogram of milk is approximately 0.04 to 0.07 kg live weight with the upper end of this range assumed in the analysis to maximise the value of higher milking dams. However, higher cow milk yield is also associated with increased feed energy requirements (Jarrige, 1989; O'Mara, 1996) and economically, this partially offsets the additional live weight advantage of calves from cows with higher milk yield. The additional cow feed energy costs were calculated based on the energy requirement (0.45 UFL) of each additional kg of milk (O'Mara, 1996) and the cost of grazed grass.

Data from livestock marts indicates that there is a premium paid for weanlings at sale (150 to 300 days of age) compared to the prevailing beef carcass price i.e. the price per kg live weight at weaning is greater than equivalent the price per kg live weight at slaughter. This price premium is not captured within integrated calf-to-beef systems and therefore, must be factored in. Thus, the maternal weaning weight economic value was calculated as the increase in output value taking account of a weanling premium minus the cost of added milk production divided by the increase in weaning weight. This equated to €2.71/kg live weight. There is also an increase in greenhouse gas emissions associated with the higher feed demand of suckler cows and progeny where maternal weaning weight (i.e. milk yield) is greater, and this carbon value offset the production value by €0.83/kg weaning weight.

Mature cow live weight

The mature cow live weight trait is based on varying the live weight of the mature cow herd and quantifying the impact of this on feed costs. The value obtained was €0.32/kg live weight. Changes in mature cow live weight also have implications for cull cow carcass weight and associated cull cow value (€3.95/kg carcass). The additional income from sales of heavier cull cows partially offsets the added cost of heavier mature cow live weight; however, the overall impact is to reduce profitability. Replacement heifer live weight also increased accordingly (first calving cows required to be 90% of mature weight immediately post-calving) and this was quantified economically as the increase in heifer feed costs per unit change in cow live weight (€1.27/kg mature cow live weight). Given the increase in feed costs associated with heavier mature cow weight, greenhouse gas emissions also increase with the increase in carbon values calculated as 0.19 and 0.34 per kg cow live weight.

Survival

Survival describes the ability of suckler beef cows to remain in the herd over a number of years. Thus, lower values for survival mean that the heifer replacement rate of a suckler herd is higher than a corresponding herd with higher survival rates. There are multiple effects of lower survival on the profitability of suckler beef production:

- The value of prime beef sales are lower because (1) more of the heifer progeny are needed as replacements rather than being sold as beef, (2) average carcass weight for the herd is lower since more of the progeny are from primiparous (first-calvers) cows, and (3) the 'beef' merit of sires used on first-calving cows (heifers) is lower i.e. selection of sires is prioritised towards calving traits rather than beef (carcass weight and conformation) traits.
- The labour required for primiparous cows is greater, especially at calving time, than that required for multiparous cows.
- Offsetting the reduction in prime beef sales is the increase in sales of cull beef cows.
- The dietary proportions of grazed grass, grass silage and concentrate rations for the farm change because of differences in the numbers of replacement and finishing heifers, which have different feed budget requirements.

Survival was modelled as a change in replacement rate for suckler beef herds with an economic value of €2.22 obtained. There was no greenhouse gas emissions impact obtained; the higher emissions association with retaining heifer progeny for longer in the herd (since first-calvers are assumed to calve at 24 months of age, compared to 'finishing' heifers leaving the herd at 19 months of age) was offset by lower emissions from a lighter herd and progeny (both due to a greater number of first-calvers).

Calving interval

Calving interval describes the length of time between successive calvings for a cow. The target calving interval for a suckler cow herd is 365 days; however, data from ICBF indicates that the average calving interval for suckler cows in Ireland is 390 days. In the longer term, an increase in calving interval results in a different calving pattern for a suckler beef farm; in other words, the mean calving date for the farm will slip. Where mean calving date slips (and assuming it was originally at the optimum date for a particular farm) two factors must be taken into account:

- Weaning and slaughter weights are lower because progeny will be younger (and lighter) at weaning and at slaughter.
- The length of the grazing season for suckler cows is reduced because it is assumed that suckler cows are not turned out to grass until after calving. Thus, the proportion of grazed grass in the total feed budget decreases and feed costs increase.

The overall effect of longer calving intervals is to reduce profitability for suckler beef farms. The analysis was carried out using national breeding data and stratifying herds based on varying percentages of the herd calved in the first 75 days and varying calving intervals. The effect of using industry-based data in the model is to delay mean calving date thus, reducing carcass weights and to increasing feed costs when compared with the baseline Grange research farm scenario. The economic value was calculated as the change in profit divided by the change in calving interval, which equated to €3.55/day increase in calving interval. As with *survival*, there was no greenhouse gas emissions impact obtained for calving interval, with lower emissions from lighter progeny offset by higher emissions associated with longer indoor feeding periods.

Age at first-calving

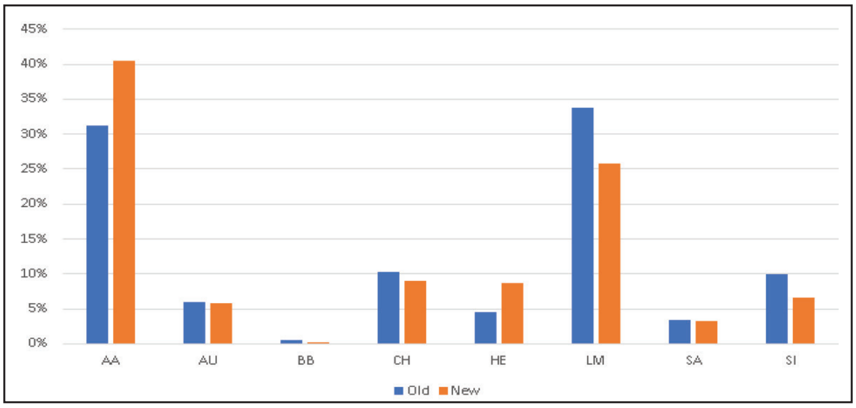
Age at first calving is the age at which replacement breeding heifers calve for the first time. In economic terms the optimum age at first-calving for seasonal calving suckler beef production systems breeding replacements from within the herd is 24 months (McGee et al., 2022). In this scenario, heifers calving for the first time at 24 months of age and 36 months of age (because of seasonality of calving) were compared. The economic value was calculated as the change in net margin per heifer calving divided by the difference in age at first calving with the resulting value of €1.76/day obtained. Greenhouse gas emissions associated with delay in first-calving were quantified as a carbon value of €0.11/day.

Impact

A key consideration for suckler farmers is the choice of sire and dam for breeding cattle for finishing or for breeding females as suckler cows. It is desirable to select sires that are ranked highly on either the Terminal or Replacement Index depending on the intended use of the resulting progeny. In the beef breeding indexes, star ratings are provided with one-star indicating animals in the bottom twenty percent and five-stars indicating animals in the top twenty percent. The animals used to derive the within- and across-breed star ratings are updated in the first evaluation run every year. In spring 2023, the Department of Agriculture Food and Marine opened the Suckler Cow Efficiency Programme (SCEP), an agricultural scheme, which aims to provide support to beef farmers to improve the environmental sustainability of the national beef cow herd. An important pillar of SCEP is to maintain a high proportion of high-genetic merit animals on-farm defined as calves sired by four- or five-star bulls.

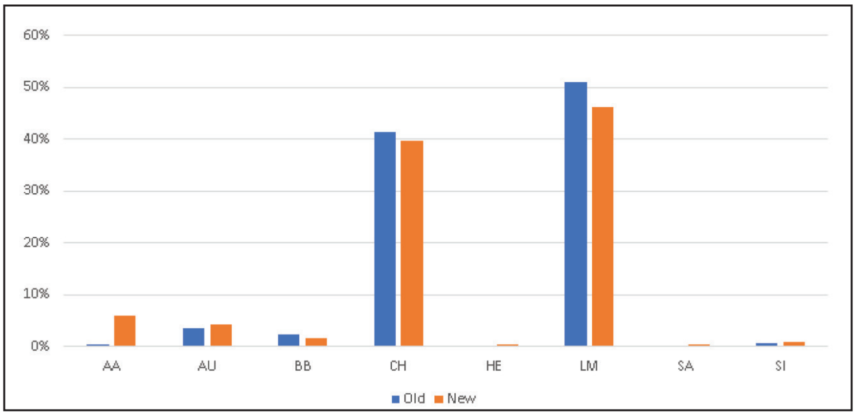
Given that most farmers have a breed preference, it is important that there is a wide availability of sires across breeds that meet this criteria. Figure 2, focusing on the Replacement Index, indicates that, although there is some change in the percentage of sires for the main breeds achieving four- and five-star status, a wide choice of sires remains for each breed. Limousin and Aberdeen Angus remain the most numerous four- and five-star sire breeds, followed by Charolais, Hereford and Simmental.

Figure 2. The percentage of male breeding animals which are four- and five-star across breed on the Replacement Index based on the current formulation ("Old") and after the updates presented in this paper ("New") are implemented.



Similarly Figure 3, focusing on the Terminal Index, shows that although there is some change in the percentage of sires meeting four- and five-star criteria, a wide choice of sires remains for each breed, with Charolais and Limousin being the dominant sire breed.

Figure 3. The percentage of male breeding animals which are four- and five-star across-breed on the Terminal Index based on the current formulation ("Old") and after the updates presented in this paper ("New") are implemented.



Summary

The economic values for the beef breeding indexes were previously calculated in 2015 and, in the interim, seismic changes have occurred in the market and policy environment. The farming sector has experienced extraordinary volatility with prices now appearing to have settled at a baseline much higher than heretofore. The policy environment has seen a sharp focus on the environmental footprint of food production with greenhouse gas emissions mitigation seen as a priority area for action. The updated economic values, summarised in Table 3, incorporating price changes and greenhouse gas emission values much better reflect this new situation.

The new economic values are more representative of the impact that advances in production traits have on the profitability of Irish suckler beef production systems. The updates to the Terminal Indexes aim to reduce the costs of finishing cattle by reducing feed consumption and finishing age, while increasing the focus on carcass value, particularly as regards producing carcasses that best meet industry guidelines. The updates to the Replacement Index aim to reduce the cost of suckler cows by reducing feed costs, predominantly by selecting for smaller cows within breed, and increasing fertility. The calf traits within the Replacement Index, will also benefit from the updates to the traits as described in the Terminal Index.

The inclusion of carbon in the breeding indexes has a relatively modest impact on the economic values (on average thirteen percent of the combined economic value is carbon) and on the relative emphasis of traits within the Terminal (six percent of which is carbon) and the Replacement (ten percent of which is carbon) Indexes; however, it creates an additional focus for the index. It provides a message to society in terms of the commitment of the beef sector to reduce emissions and creates a global-first framework for tangibly including environmental variables in a composite breeding index. In future, it is envisaged that direct methane transmitting abilities will be included in the indexes once the data collected is sufficient to capture the full range of animal types (growing and finishing animals, suckler cows) and diets (grass and TMR diets).

Table 3. Summary of economic values, for the traits with the highest emphasis, obtained in the updated analysis for the suckler beef breeding indexes in Ireland

	Economic value	Carbon value	Combined value
Terminal Index			
Direct weight for age (€/kg carcass)	4.68	-	4.68
Progeny intake (€/kg DM)	-0.18	-0.06	-0.24
Gestation length (€/day)	-3.01	-0.03	-3.04
Finishing age	-1.66	-0.26	-1.92
Replacement Index			
Maternal weaning weight (€/kg carcass)	2.71	-0.83	1.88
Mature weight – cow (€/kg live weight)	-0.32	-0.19	-0.51
Mature weight - heifer (€/kg live weight)	-1.27	-0.34	-1.60
Mature weight - cull (€/kg carcass)	3.95	-	3.95
Survival (€/% decrease)	-2.22	-	-2.22
Calving interval (€/day)	-3.55	-	-3.55
Age at first-calving (€/day)	-1.76	-0.11	-1.87

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Low-input, high-output grass-based dairy-beef heifer systems

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Summary

- Dairy-beef heifers consuming herbage from perennial ryegrass (PRG)-only swards, PRG + Clover (CLOVER) swards, and multispecies swards (MSS) achieved carcass weights of 243, 250 and 249 kg, at 19.6, 19.2, and 19.2 months of age, respectively.
- Similar herbage production was achieved for all three pasture types, despite a 75 kg/hectare (50%) reduction in annual chemical nitrogen (N) application to the CLOVER and MSS treatments.
- Incorporating legumes and herbs into pasture reduces the requirement for chemical N fertiliser, and concentrate supplementation, in grass-based dairy-beef heifer systems.

Introduction

Nationally, dairy-beef heifers have the highest probability of failing to meet 'overall' carcass specifications (i.e. weight, conformation score, fat score and age at slaughter) (Kenny et al., 2020). This reduced ability to meet carcass specification has likely contributed to the relatively older age of these heifers at slaughter (i.e. between 24 and 26 months, generally during a 'second' winter indoors or a 'third' grazing season). Research has shown that younger slaughter ages are possible, during the 'second' grazing season or following a shorter indoor feeding period, although at a lower carcass weight compared to dairy-bred steers or suckler-bred cattle. Despite a comparatively lower carcass weight potential, grass-based dairy-beef heifer systems have the potential for very high carcass output/hectare (ha) due to increased numbers of animals finished at younger ages from pasture, thus eliminating or reducing the need for an indoor finishing period. Carcass output and the level of inputs needed can be optimised by grazing highly productive and high nutritive value pastures.

In recent years, there has been an unprecedented rise in the cost of fertiliser, feed and fuel, which has subsequently resulted in significantly increased cost of feed production on beef farms. In a study conducted by Doyle et al. (2022), the cost of producing one tonne grass dry matter (DM)/ha in 2022 was €121, representing an increase of 29% on 2021 prices. As feed provision accounts for 75% of total variable costs on Irish beef farms (McGee et al., 2017), thus, efficient utilisation of the cheapest feed source, grazed grass, is vital for the financial resilience of dairy-beef farms. However, nationally many farms are only achieving 50-60% of their grass growth potential (O'Donovan et al., 2021), indicating scope for improving pasture production, and consequently animal and farm performance.

Perennial ryegrass (PRG; *Lolium perenne L.*) is the most commonly sown grass species in Ireland, with the potential to grow up to 15 tonnes of DM annually of a highly-digestible forage over a minimum of 10 years (O'Donovan et al., 2011). However, PRG pasture is highly dependent on the application of chemical nitrogen

(N) for growth, which can have a negative impact on ground water quality and gaseous emissions. Nitrogen fertiliser is also one of the most expensive input costs in a grass-based system (Wall et al., 2014). One of the key factors in addressing the sustainability challenges associated with ruminant livestock production is reducing reliance on inputs of chemical fertilisers. This is reiterated in the EU Farm to Fork Strategy, where there is a commitment to reducing chemical fertiliser use by 30% for all EU member states by 2030 (EC, 2020). This policy has led to renewed interest in incorporating legumes and herbs into pasture-based production systems.

Clover-based swards have shown many benefits in terms of sward nutritive value, animal intake and performance, and increased biological fixation of N (Enriquez-Hidalgo et al., 2018). Similarly, multi-species swards (MSS) containing clover have shown potential to increase sward DM production under reduced chemical N application rates (Grace et al., 2018). However, the herbage composition of more diverse swards changes throughout the grazing season and over the years and there is limited data available on the persistency of mixed swards in livestock production systems, especially when a 10-year grazing cycle is the aim. Thus, the performance of dairy-beef cattle consuming contrasting pasture types requires further investigation.

Johnstown Castle Study

The objective of the study was to evaluate the physical and financial performance of early-maturing breed dairy-beef heifers consuming pastures based on PRG, PRG and clover, or multi-species swards (MSS). In 2021 and 2022, 105 and 108 dairy × beef heifer calves, respectively, were purchased at approximately 20 weeks of age and were assigned to one of three pasture treatments: 1.) PRG-only, receiving 150 kg total N/ha/annum (i.e. on the grazing + silage land area), 2.) CLOVER (red and white; *Trifolium repens* and *Trifolium prantense*), receiving 75 kg total N/ha/annum, and 3.) MSS (PRG, red and white clover, plantain (*Plantago lanceolate*), and chicory (*Cichorium intybus*)) swards receiving 75 kg total N/ha/annum. The sire breeds were Hereford and Angus and all progeny were from Holstein-Friesian dams. The calves were balanced across treatments based on breed, date of birth (mean 16 Feb), and live weight (mean 159 kg at arrival on farm). Each pasture type had its own independent 'farmlet' of 10 ha. All treatments were stocked at 2.5 LU/ha equivalent to 182 kg organic N/ha. The individual paddocks were evenly distributed among the different sward treatments to account for varying soil types and conditions. The online tool "PastureBase Ireland" was used as an aid for grazing management for each pasture treatment.

During the first grazing season, calves were supplemented with 1 kg of concentrate (fresh weight basis) daily and fresh herbage was offered every 48 hours. Swards were rotationally grazed. The target pre-grazing herbage mass offered to the calf and yearling heifers during the grazing season ranged from 1300 to 1600 kg DM/ha. Pre-grazing herbage mass was measured in each paddock prior to grazing. The target post-grazing sward height was 5 cm for all pasture treatments, and this was measured using a rising plate meter. Botanical composition of the CLOVER and MSS swards was measured prior to each grazing, by cutting and separating herbage samples into grass, legume and herb fractions, followed by drying to determine the DM proportions.

Calves were housed indoors in November, when grazing conditions deteriorated or when target closing farm cover (450 kg DM/ha) was achieved. During the first winter, the calves were offered grass silage *ad libitum*, from their respective pasture treatment, along with 1.25 kg concentrate/head daily. Yearlings were turned out to pasture in early March, and were weighed fortnightly over the grazing season and drafted for slaughter when they reached a target fat score of between 3- and 3 +, determined by body condition scoring. Carcass conformation and fat scores were determined using the EUROP grid classification system. Any heifers not slaughtered off grass were housed in October, and commenced their 'finishing' diet of 4 kg concentrate /head daily and silage *ad libitum* until slaughter.

Herbage production

There were no significant differences observed for pre-grazing herbage mass, pre-grazing height or post-grazing height (Table 1). In 2023, the PRG, CLOVER and MSS pastures produced similar DM yields of 11.9, 11.5 and 11.4 tonnes of DM/ha, respectively. Despite an additional fertiliser application of 75 kg N/ha to the PRG treatment compared to the CLOVER and MSS treatments (i.e. 150 vs. 75 kg N/ha), the similar annual

DM yields for the three pasture types implies that the inclusion of legumes and improved species diversity can reduce the need for chemical N application. This is a huge benefit in terms of reducing costs and the environmental impact of dairy-beef production.

Table 1. Effect of pasture type - perennial ryegrass-only swards (PRG), PRG plus red and white clover swards (CLOVER) and multispecies swards (MSS) - on grazing characteristics

	PRG	CLOVER	MSS	sem	Significance
Pre-grazing herbage mass (kg DM/ha)	1455	1638	1578	127.8	NS
Pre-grazing sward height (cm)	8.2	8.4	9.0	0.30	NS
Post-grazing sward height (cm)	5.0	4.9	4.9	0.09	NS
Density (kg DM/ha/cm)	480[a]	489[a]	384[b]	34.3	*

The monthly clover percentage in the CLOVER pasture is presented in Figure 1, and the average botanical composition of the MSS pasture in 2023 is presented in Figure 2. Over the entire grazing season, the average clover content was 22% and 21% for the CLOVER and MSS pastures, respectively. These clover proportions are similar to the inclusion recommendations (20%) by Andrews et al. (2007) necessary to achieve an animal performance production benefit. The botanical composition of the CLOVER and MSS swards changed throughout the year. Both treatments observed peak clover content in July at 30.8% and 37.3%, for CLOVER and MSS, respectively. The plantain and chicory content of the MSS pasture peaked in March and October, respectively.

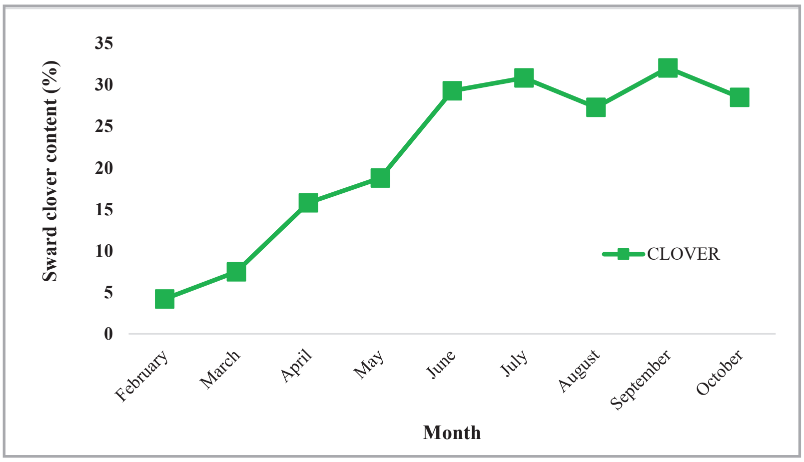

Figure 1. Monthly clover percentage in the CLOVER pasture during 2023.

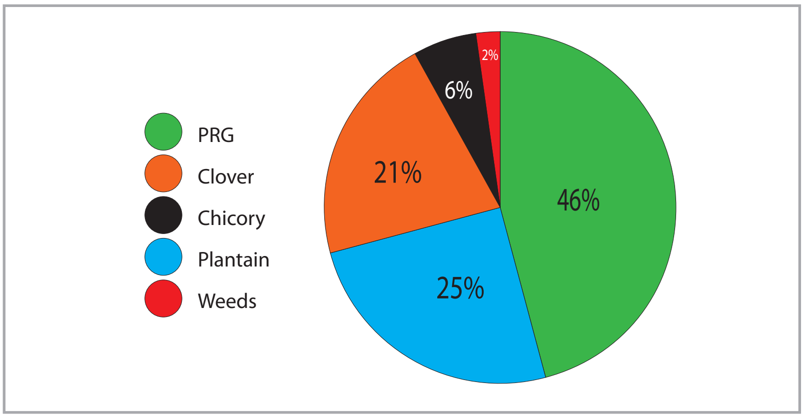

Figure 2. Average botanical composition of the multi-species swards (MSS) for the 2023 grazing season.

Throughout the grazing season, the average herbage DM concentration was lowest for MSS (16.6%), intermediate for CLOVER (18.5%) and highest for PRG (19.3%) pastures, with this ranking observed throughout most of the grazing season (Figure 3).

Despite, agronomic and animal performance benefits of more species-rich swards, the long-term persistency of clover and herbs needs to be evaluated under Irish production conditions, as the benefits of these more diverse swards may only be evident for five years or less (Li et al., 1997). There is also concern among farmers regarding the lack of availability of a post-emergence herbicide for swards containing herbs.

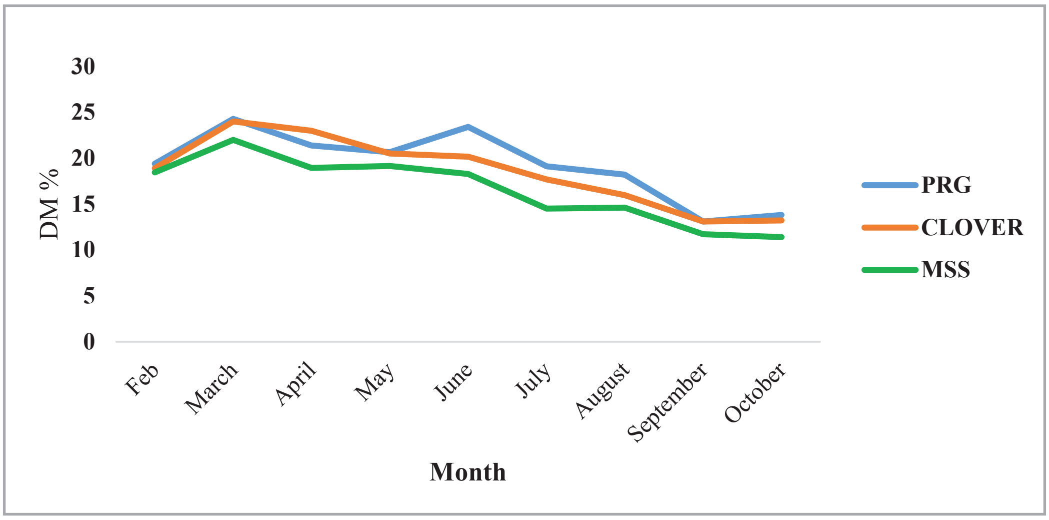

Figure 3. Average monthly dry matter percentage of the three pasture types - perennial ryegrass-only swards (PRG), PRG plus red and white clover swards (CLOVER) and multispecies swards (MSS) - in 2023.

Animal performance

The effects of pasture type on animal live weight gain and slaughter traits are presented in Tables 2 and 3, respectively. The results of the current study indicated that dairy-beef heifers achieved the greatest performance as calves on the MSS pastures, while as yearlings they performed best while consuming the CLOVER herbage (Table 2). Although the PRG treatment performed similarly to the other two pasture treatments during the first indoor winter period, performance at pasture for PRG was lower than that achieved by the MSS treatment during both the first and second grazing season, and lower than the CLOVER treatment during the second grazing season. Overall, this resulted in a lower lifetime daily live weight gain, and a numerically higher age of slaughter for the heifers consuming the PRG herbage. This lifetime daily live weight gain advantage of the CLOVER and MSS treatments over that of the PRG treatment is in line with studies conducted by UCD at the Lyons research farm (Boland et al., 2022).

Table 2. Effect of pasture type - perennial ryegrass-only swards (PRG), PRG plus red and white clover swards (CLOVER) and multispecies swards (MSS) - on daily live weight gain (ADG, kg) of dairy-beef heifers slaughtered from pasture.

	PRG	CLOVER	MSS	sem	Significance
ADG (kg)					
1st grazing season	0.61^{a}	0.62^{a}	0.79^{b}	0.052	***
1st winter	0.65	0.65	0.68	0.031	NS
2nd grazing season	0.81^{a}	0.92^{b}	0.87^{b}	0.019	***
Lifetime	0.74^{a}	0.78^{b}	0.79^{b}	0.010	**

Overall, a greater number of heifers were slaughtered off pasture for the CLOVER and MSS treatments, compared to the PRG treatment (86 vs. 75 vs. 68%, respectively). Thus, the indoor finishing concentrate requirement was lower for the CLOVER (25 kg) and MSS (34 kg) treatments compared to PRG (62 kg), which represents a significant saving in feed costs and housing-related costs. Despite more PRG heifers requiring housing and higher concentrate inputs to achieve the target fat score of between 3- and 3+, they were still half a fat grade leaner ($P<0.05$) than the CLOVER and PRG heifers (Table 3). The CLOVER and MSS heifers were heavier at slaughter compared to the PRG heifers, resulting in a heavier carcass ($P<0.05$).

Thus, a 'potential' blueprint for dairy-beef farmers would be to have a proportion of the farm with MSS pastures for the calves to graze during the 'first' grazing season, and to have clover incorporated on the remainder of the grazing area for the yearlings to graze during the 'second' grazing season.

Table 3. Slaughter and carcass traits of dairy-beef heifers finished from the three pasture types - perennial ryegrass-only swards (PRG), PRG plus red and white clover swards (CLOVER) and multispecies swards (MSS)

	PRG	CLOVER	MSS	sem	Significance
Slaughter age (months)	19.6	19.2	19.2	6.5	NS
Slaughter weight (kg)	482^{a}	492^{b}	490^{b}	5.4	*
Kill-out (%)	50	51	51	0.1	NS
Carcass weight (kg)	243^{a}	250^{b}	249^{b}	2.7	*
Conformation score (1-15)	5.0	5.2	5.2	0.11	NS
Fat score (1-15)	8.0^{a}	8.5^{b}	8.6^{b}	0.19	**

Conclusions

Reduced chemical N fertiliser use, and improved lifetime ADG and carcass weight of cattle, are key mechanisms for improving both profitability and the environmental footprint of pasture-based dairy-beef production. The incorporation of clover into PRG swards offers farmers an opportunity to improve efficiency, while also striving to meet sectorial climate targets.

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IBR: impacts and control

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Summary

- Infectious bovine rhinotracheitis (IBR) is a highly infectious respiratory disease of cattle.
- Infected animals typically recover but become carriers of the virus. Under stress, they may start shedding virus and infecting other animals.
- Approximately 75% of Irish herds contain animals that have been exposed to IBR and are carriers.
- Irish suckler herds involved in the BETTER Farm Beef Programme that participated in the Pilot IBR Programme had 30 animals tested for IBR per herd (snapshot test).
- Results showed that over 50% of the tested herds had a negative snapshot test, indicating the absence or low number of IBR-positive animals in the herd.
- Snapshot testing can be used to get an initial indication of the herd's IBR status, providing information to better manage risk, improve biosecurity and inform decisions on vaccination at herd level.

Introduction

Infectious bovine rhinotracheitis (IBR) is a highly infectious disease caused by a virus called bovine herpes virus-1 (BoHV-1). In Ireland, IBR is mostly involved in respiratory infections, being one of the viral agents involved in the Bovine Respiratory Disease (BRD) complex. Infection with this virus is widespread, with an estimated 75-80% of both beef and dairy herds containing animals that have been infected. In this article, we will explore the impact of IBR and discuss effective control measures that Irish farmers can implement to protect their herds and the wider industry.

Clinical signs of IBR

The severity of the clinical signs can vary and is influenced by a number of factors such as the husbandry system, secondary bacterial infections, immunity status, degree of stress and the age of the affected animal.

Clinical signs typically appear after housing, transport, sale, calving or other stressful events. Affected animals may be dull, off their feed and develop a high temperature (107-108°F/41.7-42.5°C). They typically have a watery discharge from the nose and eyes and may present with red nose and eyes. In severe cases, ulcers develop on the muzzle and lining of the nasal passages, which can form scabs as they heal. The windpipe will also be affected, leading to coughing and noisy breathing if severe enough.

While most affected cattle will recover, a low percentage will die. Although infection is relatively uncommon in very young calves, infection may spread beyond the airways to the gut (producing scour), brain (producing nervous signs) and other internal organs, and as a result death rates in this age group are often higher than in older cattle. Infection with BoHV-1 has also been associated with abortions.

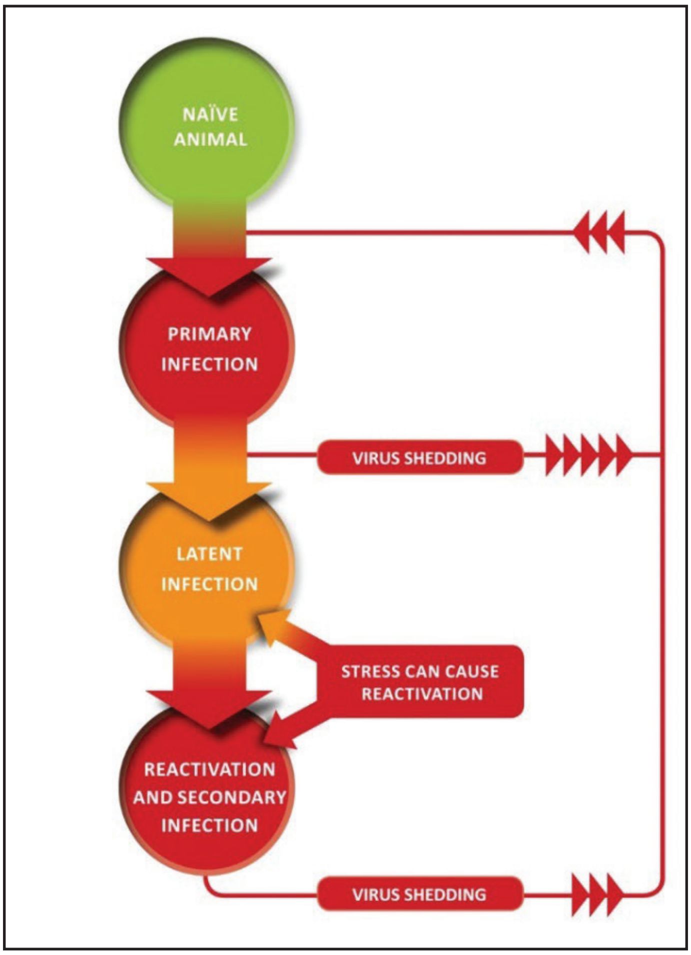

Figure 1. Phases of infection of IBR in an individual animal.

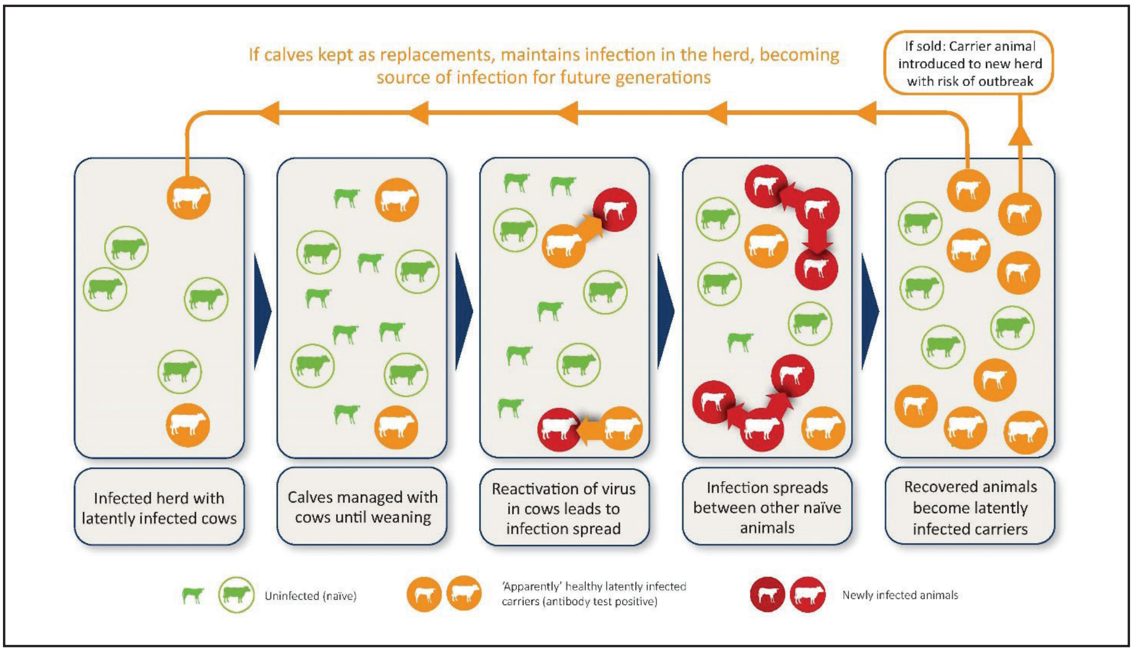

Figure 2. Spread of IBR in a non-vaccinating suckler herd following reactivation and shedding of virus from carrier to naïve (susceptible) animals.

Latently infected carriers of IBR

Animals that survive infection recover, produce antibodies and also develop a 'latent' or hidden infection, becoming lifelong carriers (Figure 1). This latent infection typically becomes established in the nerve cells within the animal's brain. During this latent period the carrier is not shedding virus. However, at times of stress the virus may be reactivated and can begin to multiply and be re-excreted, generally from the nose and eyes. This leads to new infections in other susceptible cattle, which in turn will also become latent carriers (Figures 1 and 2). These latently infected carriers play a central role in maintaining IBR in infected herds, where they act as a reservoir of infection, and in spreading infection between herds.

The virus is mainly spread directly by close contact between animals. The nasal discharge from infected animals can contain very high levels of virus and, as a result, infection can spread rapidly through a herd when susceptible cattle come in contact with infectious cattle or items contaminated by them, such as feeders and drinkers. The virus can also be shed from the reproductive tract, including via semen, resulting in venereal transmission. Airborne spread may also occur over distances of up to 5 metres. Indirect transmission within or between herds can also occur through movement or sharing of contaminated facilities, equipment or personnel.

Impact of IBR

IBR can have a significant impact on cattle health and welfare and therefore, a negative impact on animal productivity. So typically, diseased animals may have poor weight gain, reduced milk yield, abortion etc. This reduction in animal productivity is then reflected in increased on-farm costs, increased use of antibiotics (to treat secondary bacterial infections) and reduced farm profitability.

IBR-infected animals (and any associated products such as semen or embryos) cannot be traded to many regions and countries in the EU that are officially recognised as free of IBR (i.e. Denmark, Germany, Austria, Norway, Finland, Sweden, Czech Republic and regions of Italy) or have an approved IBR control programme (i.e. Belgium, France, Luxembourg, regions of Italy and regions of Slovakia). Of particular concern is the possible approval by the European Commission of the IBR eradication programme currently underway in The Netherlands, and the consequences it will have for calf exports. In addition, many 'third' countries have IBR-specific requirements for live exports.

Animals that have antibodies to IBR (even if as a result of vaccination) are legally prohibited from entering semen collection centres. These herds are recommended to have eradication programmes in place (if not already IBR-free). Potential AI sires should not be included in vaccination programmes and vaccinating herds require careful planning to prevent accidental exposure of bulls to vaccine virus.

Pilot IBR programme

During 2018, herds participating in Phase Three of the Teagasc/Irish Farmers Journal BETTER Farm Beef Programme enrolled in the first phase of a Pilot IBR programme. The IBR programme was developed by Animal Health Ireland's IBR Technical Working Group (TWG) in collaboration with Teagasc. The pilot comprised of sampling and testing the herds for IBR ('snapshot'), the application of an IBR on-farm veterinary risk assessment and management plan (VIBRAMP), and the provision of biosecurity and disease control advice.

Participating farms were initially screened by applying a herd 'snapshot', which required the sampling of 30 randomly selected animals over 9 months-old that were used or intended for breeding. Animals were tested with an IBR gE (marker) test that allows differentiation between vaccinated and infected animals. This sampling strategy has been applied in other IBR programmes (e.g. Belgium) as a cost-effective means to obtain an initial indication of the level of infection in a given herd and allows herd owners and the vets to review the biosecurity and make informed decisions on vaccination.

Pilot IBR results

Between 15 and 44 samples were submitted per herd, totalling to 909 samples. A large proportion of the seropositive results were from older, non-homebred animals (Figure 3). Fifty nine percent (17) of the herds had a negative snapshot test (defined as having only 0 or 1 seropositive animal - see “Interpretation of a snapshot test” below), of which 11 herds had zero seropositive animals and six herds had just one seropositive animal. The remaining 41% (12) of herds had a positive snapshot test (defined as 2 or more seropositive animals), of which three herds had two seropositive animals, eight herds had between 3 and 7 seropositive animals, and one herd had 14 seropositive animals.

Figure 3. Percentage of negative and positive IBR gE (marker) individual results by year-of-birth within the Pilot IBR programme.

Herds with positive snapshot tests had, on average, a greater number of animals than negative herds, and also had a greater number of animals introduced directly from other herds (moves from farm). One-third of herds that had a negative snapshot test, and 77% of herds with a positive snapshot test, were vaccinating for IBR. Most of the vaccinating herds reported carrying out the vaccination to prevent clinical disease and to be vaccinating young stock only.

DAFM’s National Beef Welfare Scheme

DAFM’s National Beef Welfare Scheme (NBWS) is a support measure designed to enhance animal health and husbandry on suckler farms. The scheme includes two mandatory actions: meal feeding suckler calves in advance of and after weaning, and testing for the presence of IBR.

As with the Pilot IBR programme, the IBR snapshot in the NBWS 2023 is a cost-effective means to obtain an initial indication of the IBR status of the herd and the effectiveness of any control measures in place in a given herd. The snapshot test requires the sampling of 20 randomly-selected animals over 9 months-old that are used or intended for breeding. As with the Pilot IBR, animals are tested with an IBR gE (marker) test.

Interpretation of an IBR snapshot test

A direct correlation exists between the proportion of positive animals detected in the snapshot test and the actual proportion of positive animals in the herd (within herd prevalence). This information, together with analysis of the age of seropositive animals if detected, provides useful information to assess the risks and review the biosecurity of the herd to control IBR or to prevent re-introduction of the disease.

Low or zero prevalence herds

If the result of the snapshot test includes either zero or a single positive animal, the prevalence of infection within the herd is estimated to be between 0-15%. These herds have the option to test the remainder of the herd and either confirm freedom from IBR or identify and remove any positive animals, and to review vaccination and biosecurity measures.

These herds should review their biosecurity to minimise the risk of introducing the disease and, under veterinary guidance, consider introducing/extending/maintaining vaccination to the whole herd to reduce the impact from a reintroduction of the virus. Vaccination will not always be required.

Medium-to-high prevalence herds

If more than two seropositive animals are identified by the snapshot test, the within-herd prevalence of infection is likely to be greater than 15%. For these herds it may not be feasible to immediately achieve freedom from IBR by testing and removal of all seropositive animals. Nevertheless, a vaccination and biosecurity plan can be put in place to control the disease, leading to a reduction in prevalence until the point where this does become feasible.

Control of IBR

It is important to know whether you have IBR in your herd or not so that you and your vet can design the most appropriate health plan. In the absence of control measures, IBR usually remains in a herd for a long period once it is introduced, because all infected animals become 'latent carriers' for life.

Herds with medium-to-high levels of infection should consider introducing whole-herd vaccination. Over time, with appropriate biosecurity measures, the prevalence should decrease as carrier animals leave the herd and are replaced by uninfected animals.

Herds where animals are purchased from multiple sources and are mixed after purchase are especially at risk of respiratory disease outbreaks, with IBR being one of the key viruses involved. Transport and mixing can result in outbreaks of IBR following reactivation of latent infection and spread to susceptible animals. Vaccination, (ideally in advance of movement or on arrival on farm), along with measures to reduce stress during transport and following arrival can help control these outbreaks.

The benefits of IBR control include improved herd health and production, increased efficiency in terms of greenhouse gas emissions, reduced antibiotic usage, the ability to sell animals into semen collection centres, and the ability to export live cattle to countries that are IBR free (or which have recognised control programmes).

Preventing IBR getting into your herd

Closed herds have the lowest risk of introducing IBR but if you have to bring animals into your herd (including animals returning from shows or the mart), isolate these for four weeks and test for IBR antibodies before they join the herd. Only negative animals should enter negative herds.

Avoiding mixing 'home' stock with cattle from other farms at pasture, housing or during contract-rearing will help prevent accidental introduction of infection. As the virus is also capable of being transmitted indirectly through equipment and people, it is important to maintain good hygiene of shared equipment and facilities, use separate clothing or ensure appropriate cleaning and disinfection of boots and clothing.

Good building design, ventilation, stocking density, ensuring good nutrition and low stress environments are key.

Vaccines

IBR vaccines are very good at preventing clinical signs and reducing the amount of virus shed following infection and reactivation, but they do not prevent viruses from causing a limited infection. A range of IBR vaccines containing either live or inactivated virus are licenced for use in Ireland. All of them are ‘marker’ gE-deleted vaccines. This means that, when used with an appropriate test, it is possible to distinguish between animals positive due to vaccination and animals positive due to infection with IBR.

Vaccination makes it less likely that a latent carrier will reactivate and shed the virus, and less likely that a naïve animal will become ill and spread the virus after exposure (Figure 4). Vaccination of negative herds can also be used as a way to reduce the impact of virus introduction, should this occur.

Since animals remain infected for life, older animals in a herd are more likely to be latently infected. Therefore, if we want to prevent those animals being the source of infection for other, typically younger stock in the herd, we must include them in our vaccination plan.

Whole-herd (including all breeding animals) and regular vaccination (according to manufacturers’ recommendations and with the herd’s veterinary practitioner’s advice), will lead to a decrease in the percentage of infected cattle in a herd over a period of time, as older, positive cattle are displaced by younger, uninfected stock. This way, we reduce the risk of re-activation of the virus by positive, typically older cattle.

Decisions on which product and vaccination strategy to use in a particular situation should be made in consultation with your veterinary practitioner. Always read the datasheet provided with the vaccine to make sure that it is stored and used correctly, including being administered by the correct route (which may be up the nose, into the muscle or under the skin).

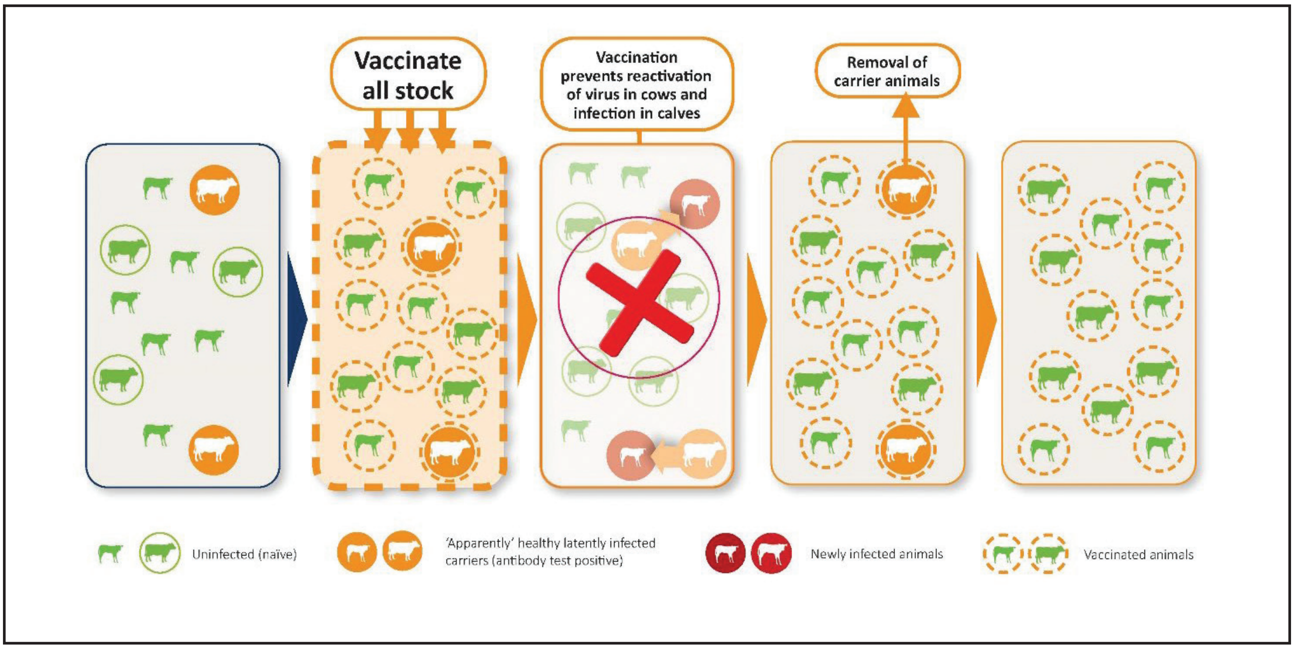

Figure 4. IBR control in a herd vaccinating all stock.

Further information

Detailed information leaflets on IBR and herd biosecurity, along with answers to frequently asked questions on IBR and specific guidance for herds with bull calves that are potential AI sires, are available on at http://animalhealthireland.ie/?page_id=377.

Leading the way in emissions reduction technology adoption on Signpost cattle farms

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Summary

- The Signpost cattle farmers have adopted many of the climate mitigation technologies recommended by Teagasc, but there still exists scope to further reduce greenhouse gas (GHG) and ammonia emissions on these farms.
- Signpost cattle farmers have a lower carbon footprint per kg live weight produced than reported for the average Irish cattle farmer, showing what is possible for all farmers.
- The Signpost Programme has identified 12 steps to reducing gaseous emissions on cattle farms. These steps include actions to reduce reliance on chemical nitrogen fertiliser use, switching to protected urea, reducing age-at-slaughter and improving animal breeding performance.
- It is advised that all cattle farmers check their position regarding each of the recommended actions. A worksheet is available to help identify possible actions to reduce on-farm GHG emissions at:

https://www.teagasc.ie/media/website/environment/climate-change/signpost-programme/Looking-After-the-Environment-on-Your-Farm-Beef-Worksheet.pdf

Background

The Signpost Programme is designed to support and enable cattle farmers to farm more sustainably. This paper aims to benchmark the uptake of recommended climate mitigation practices for the cattle farmers participating in the programme and describe changes over the first two years, (i.e. 2021 and 2022). These results include the metrics for 19 suckler farms participating in the Future Beef Programme, and 12 dairy-beef farmers participating in the DairyBeef 500 Programme.

Results

Family farm income on the Signpost cattle farms in 2022 was €605 per hectare (ha), or 11% higher than the previous year. Compared to the 'average' cattle farmer in Ireland (National Farm Survey, 2022), family farm income on the Signpost cattle farms was over 70% higher. Signpost cattle farmers are making significant progress in the adoption of key technologies to reduce emissions. Progress on the steps to emissions reduction on the Signpost farms is presented in Table 1.

- Reducing reliance on chemical nitrogen (N) fertiliser use is one of the key technologies available to reduce emissions. This is achieved by:
  - Optimising soil fertility: On Signpost cattle farms, 26% of all soils are optimum for pH, phosphorus (P) and potassium (K). This compares with a national average of 13%.
  - Applying lime to correct low soil pH, which will release N from the soil: the Signpost Farms were extensively soil sampled in late 2021 and early 2022. The farmers have used the results to target lime applications during 2022 – on average, 42 tonnes of lime was spread per farm, equivalent to 0.75 tonnes per hectare farmed.
  - Better use of slurry: The adoption of low emission slurry spreading (LESS) on Signpost farms has doubled between 2021 and 2022 - over three-quarters of the slurry applied in 2022 was by LESS.
  - Using clover: Forty percent of the Signpost cattle farms clover-scored their farms in 2022 - 82% of the grassland area assessed had some clover in it.

Table 1: Performance of Signpost cattle farms in 2022 compared to 2021

	2021	2022	Target
Family Farm Income (€/ha)	543	605	
Reducing chemical nitrogen (N) reliance			
Soil samples with optimum fertility (%)	-	26	90
Lime usage (tonnes/farm)	28	41	Soil pH 6.2+
Slurry spread using LESS (%)	38.5	77.2	100
Grassland with some clover* (%)	-	82	100
Chemical N fertiliser application (kg/ha)	115	98	86
Total chemical N as protected urea (%)	19.7	38.6	>85
Production efficiency			
Days at grass	238	237	250
Replacement Index (€)	106	112	111
Calves per cow per year	0.93	0.91	0.95
Heifers calved between 22-26 months (%)	59.4	62.6	100
Beef output			
Suckler beef output (kg/LU)	355	359	NA
Dairy-beef output (kg/LU)	577	570	NA
Suckler beef output (kg/ha)	660	697	NA
Dairy-beef output (kg/ha)	1368	1455	NA
Age at slaughter (months)			
Bulls	16	16	16
Heifers	23	22	22
Steers	24	24	24
Physical changes			
Hectares farmed	53.4	55.8	NA
Livestock units farmed	99.3	101.1	NA

*40% of cattle farms were clover-scored

- Signpost farmers have started to reduce their dependence on chemical N fertiliser use - application rate was 15% lower in 2022 compared to 2021. The quantity of protected urea used doubled, despite the fact that product supply and availability was an issue.
- Signpost cattle farms have a relatively long grazing season, with stock at grass for 237 days in 2022.
- Replacement Index for suckler cows increased by €6 in 2022 - the target is an increase of €5 per year.
- Almost 63% of the heifers calved at 22-26 months in 2022, up from 59% in 2021.
- Slaughter age of heifers on Signpost farms decreased by one month, with no change for the bulls and steers, which were already very good.

The building blocks of improved animal breeding, grassland management and herd health management are all being implemented to allow further progress in this area.

Gaseous emissions on Signpost cattle farms

Total GHG emissions, GHG emissions per ha and ammonia emissions for the Signpost cattle farms are presented in Figure 1. Total GHG emissions for these farms is 370 tonnes CO_2 equivalents (CO_2-eq) per farm, equivalent to an emissions per ha of 6.75 tonnes CO2-eq. The national average for cattle farms is 4.4 tonnes CO2-eq per ha, which have a comparatively lower stocking rate. The carbon footprint for the Signpost cattle farms is 8.5 kg CO_2-eq per kg live weight produced (Figure 2). This is 10% lower than the carbon footprint of beef production on the average cattle farm in Ireland.

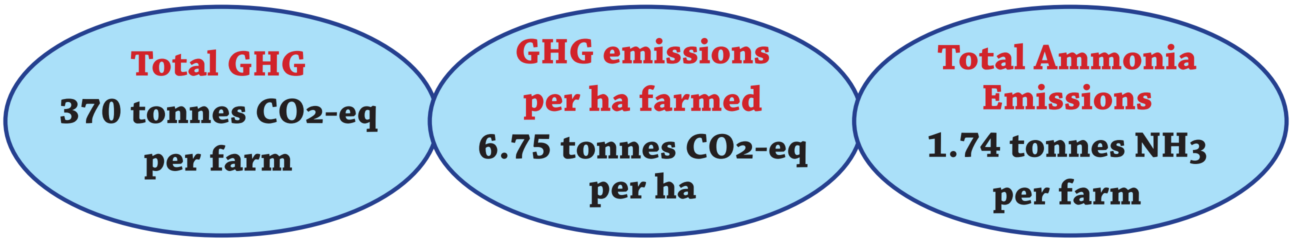

Figure 1. Greenhouse gas (GHG) and ammonia emissions for cattle Signpost farms in 2022

The key drivers of emissions on the Signpost cattle farms are illustrated in Figure 2. Key findings include:

1. There was a change in the total quantity of chemical N applied in the 'composition' of fertilisers used (Table 2). In 2021, 65% of the chemical N was applied as calcium ammonium nitrate (CAN) and associated compounds, with this reducing to 40% in 2022. A reduction in CAN and compound use contributes to a reduction in GHG emissions. The quantity of straight urea used in 2022 increased by 6 percentage units compared to 2021. Although this increase has no impact on GHG emissions, it does increase ammonia emissions. The quantity of protected urea almost doubled between 2021 and 2022, corresponding to 39% of total chemical N applied in 2022. An increase in protected urea is positive in terms of reducing both GHG and ammonia emissions. The combination of reducing chemical N use by 15% and doubling the use of protected urea has led to a 2.2% reduction in total gaseous emissions on the Signpost cattle farms.

Table 2. The percentage of chemical nitrogen (N) fertilisers used on Signpost cattle farms in 2021 and 2022

	2021	2022
CAN and other compounds	65	40
Urea	15	21
Protected urea	20	39

2. Average lime usage increased from 28 to 41 tonnes per farm between 2021 and 2022, resulting in a 1.6% increase in farm GHG emissions. The application of lime is recommended despite this initial GHG 'cost', as optimum soil pH will ultimately permit lower fertiliser N application rates and increased N and P use efficiency.
3. There was a slight in increase in livestock numbers on the Signpost cattle farms in 2022, leading to increased GHG emissions of 1.5%. In a number of cases, this was due to an increase in farm size, and in one case was due to a herd health issue preventing the sale of animals.

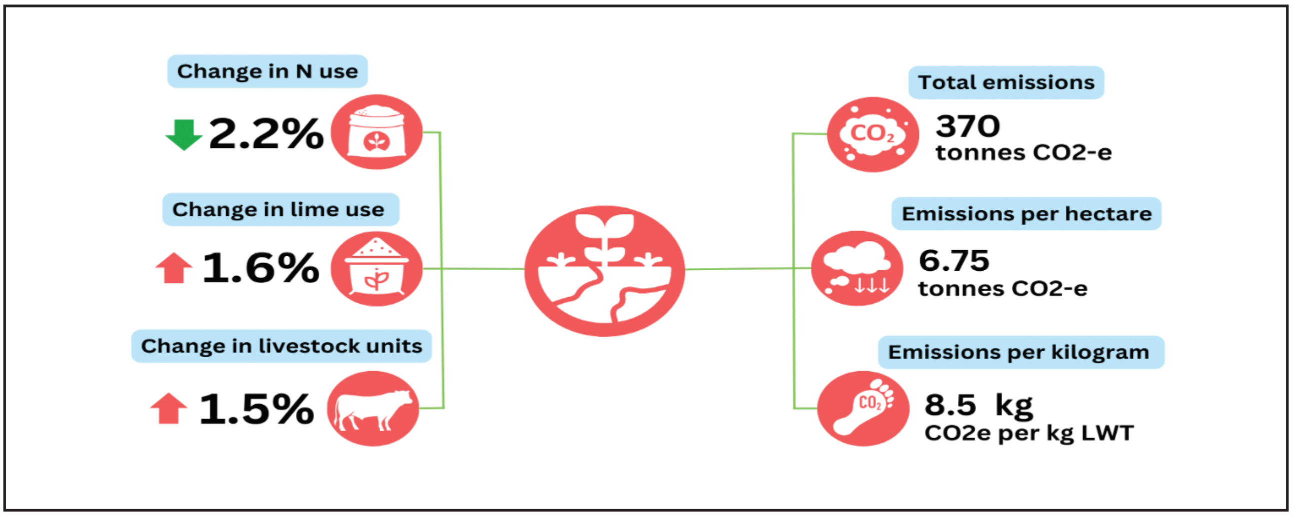

Figure 2. Drivers of greenhouse gas (GHG) emission reduction on Signpost cattle farms in 2022

Conclusion

Considerable progress has been made on the Signpost cattle farms to implement the technologies to reducing GHG and ammonia emissions. There is more potential to reduce total GHG emissions on the Signpost farms. This can be achieved by further reducing chemical N use, and increasing the proportion of chemical N applied as protected urea. Other areas for improvement include reducing age-at-slaughter and age at first-calving. The Signpost farms show what is possible in terms of the use of climate mitigation technologies, and Teagasc believes that they can point the way forward for all farmers. The primary focus for the Signpost Programme, is improving the pace and scale of adoption of climate mitigation technologies, both on Signpost and all cattle farms.

Certification schemes in France - Paying farmers for their carbon footprint reductions

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Summary

- The Carbon Agri method, which is based on the French Label Bas Carbone created by the Ministry for Ecological Transition, certifies low-carbon projects on beef, dairy and tillage farms.
- These low-carbon projects last five years. After an initial carbon audit on the farm, a mitigation action plan is generated by the farmer and advisor. The tons of CO_2-eq 'avoided' (i.e. reduced or removed) by the farmer is determined from a final carbon audit.
- France Carbon Agri, a company created by breeders' associations, makes the link between the farmers, advisory organisations, the Ministry and the funders of low-carbon projects.
- By the beginning of 2024, approximately 2500 low-carbon projects on farms will be certified by the Ministry, with an average of 550 tonnes of CO_2-eq avoided per farm.
- Companies that have funded Label Bas Carbone projects have various strategies, including reducing value chain emissions, and offsetting or contributing to the low-carbon transition.

Introduction

In 2015, the French Government published its national low-carbon strategy, a road map to achieve the national objectives in terms of emissions reduction. France aims to reach carbon neutrality by 2050, which means a fourfold reduction in the level of greenhouse gas (GHG) emissions of 1990. Within the context of this national strategy, the French Ministry for Ecological Transition developed a strategic plan to convert these goals into concrete actions. Among them is the "Label Bas Carbone", which was created in 2018. This certification framework is managed by the Ministry and its decentralised administration. Its goal is to certify low-carbon projects in France, across sectors, and to attract funding toward these projects. Through this framework, the French Government wishes to encourage all sectors to reduce GHG emissions, and/or to increase carbon sequestration, as in the case of forestry and agriculture. The first method (scheme) validated by the Ministry for Ecological Transition was the Carbon Agri method, which involves beef, dairy and 'cash-crop' farms.

How does the Label Bas Carbone work?

In the 2018 'decree', a Label Bas Carbone project is defined as a project with a limited lifetime that reduces emissions or stores carbon. The tons of CO_2-eq 'avoided' (i.e. emission reduction or sequestration) is determined by comparing a situation where a low-carbon project is implemented with one where there is no change. The latter situation corresponds to a baseline scenario i.e. the position before the implementation of the project. The decree also explains the requirements of the Label Bas Carbone to ensure the quality of the projects. They must be additional, i.e. go beyond the regulation and would not have been implemented without the Label. Emissions of GHG and carbon sequestration must be monitored during the lifetime of the project, and at the end, verified by an external auditor. Additionally, other indicators must be followed to assess the impact of the project on socio-economic or other environmental aspects. Furthermore, the method proposals need to account for the risk of non-permanence. Even if it is probable that the low-carbon practices will remain after the end of the project, it is important not to ignore the possibility that they may be discontinued. For example, grassland could subsequently be ploughed for a motorway project.

All sectors can submit a method. Stakeholders and experts will study the submission before validating it. Once it is validated, new projects can be implemented. These projects get the Label Bas Carbone. Finally, the emissions reductions achieved are verified by an independent auditor, and then recognized by the Ministry.

To date, the following 13 sectorial methods have been approved by the Ministry: three in the forestry sector, two in the building sector, one in the transport sector, one in the marine environment and six in the agricultural sector. These six agricultural methods concern livestock farms, tillage farms, orchards, and hedgerows.

The Carbon Agri method

The farms that can use the Carbon Agri method to certify low-carbon projects are the beef, dairy and tillage farms. In this method, the overall farm is considered to assess the tons of CO_2-eq avoided, through Life Cycle Analysis, including the production and the transport of inputs to the farm. The analysis ends at the farm gate (i.e. activities beyond the farm gate, such as product processing, are excluded), and the functional unit used is the kg CO_2-eq per kg of product. This steps in this process are outlined in Figure 1.

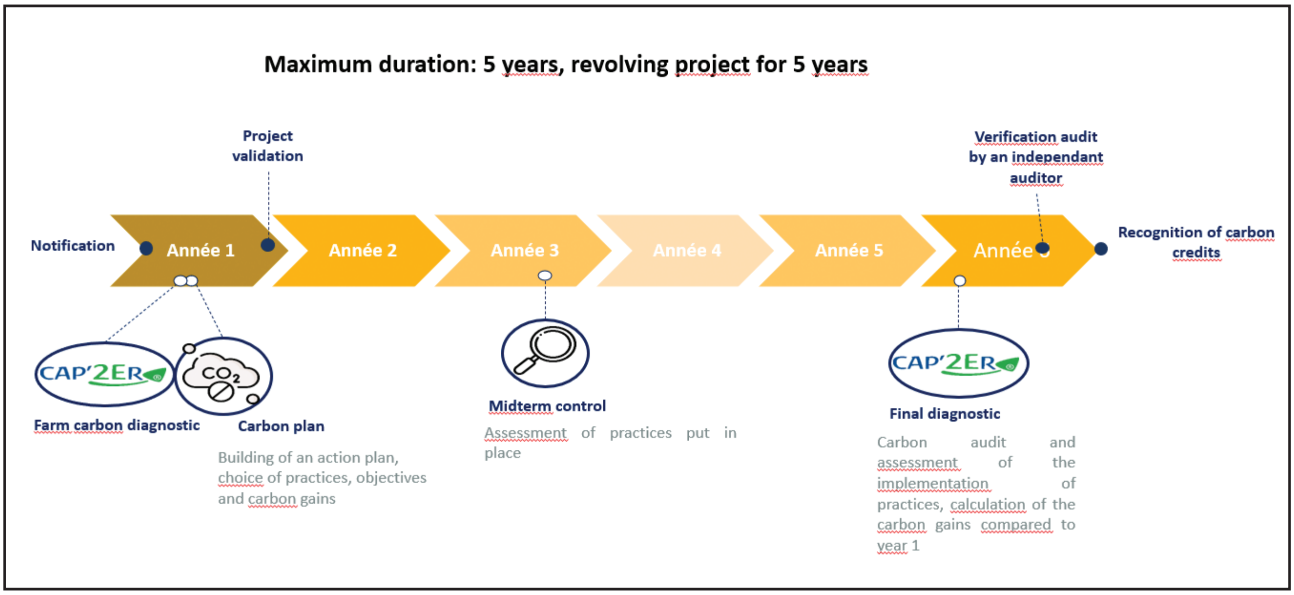

Figure 1. The different steps of a Carbon Agri project

The baseline scenario is determined from an initial carbon audit of the farm, which is carried out by an advisor using methodology validated by the Ministry. Once the baseline is determined, the farmer and the advisor build a mitigation action plan by choosing the most appropriate practices from a list of available options, based on the results of the initial carbon audit. These practices cover all aspects relating to the 'technical' working of the farm, including inputs, fuel and electricity consumption, crop management, fertiliser application, herd management, feed and manure management, in order to reduce GHG emissions, and land management to increase carbon sequestration. The project lifetime is five years. During this time, implementation of the mitigation practices on-farm is supervised by the advisor, with a mid-term visit to assess if the farmer is on-target and if he continues with the low-carbon project or not.

At the end of the project, a final carbon audit is carried out by the advisor to determine the amount of carbon avoided (i.e. reduction and removal of emissions). This calculation is expressed per production unit. A simplified version of the formula is as follows:

- GHG gains of the dairy production unit: Initial milk carbon footprint × Initial milk production – Final milk carbon footprint × Final milk production.
- GHG gains of the beef production unit: Initial beef carbon footprint × Initial beef production – Final beef carbon footprint × Final beef production.
- GHG gains of the cash crops production unit: Initial crops carbon footprint X Initial crops area – Final crops carbon footprint × Final crops area.
- Carbon sequestration gains: Initial carbon sequestration × Initial area – Final carbon sequestration × Final area

The complete formula also takes into account the year of implementation of the low-carbon practices. Indeed, the earlier a practice is put in place, the greater an impact it has to reduce GHG emissions. Furthermore, to meet the requirements of the Label Bas Carbone framework, other indicators are monitored in the Carbon Agri projects: biodiversity, ammonia emissions, water quality, renewable energy production, soya consumption, irrigation, surfaces with plant cover, and quantity of products sold through direct distribution.

Involving farmers in low-carbon strategies

Through several European, national and regional programs, French beef farmers have been involved in low-carbon projects. Most of the time, the recruitment and the follow-up of these farmers is carried out by local organisations such as regional Chambers of Agriculture, breeders' associations, cooperatives and advisory companies.

The European LIFE Beef Carbon project and its adaptations into regional programs permitted the quantification of the meat carbon footprint in France, and the assessment of the best practices to reduce GHG emissions and increase carbon storage. To achieve this, the advisors use the CAP'2ER tool developed by the French livestock Institute in accordance with IPCC main guidelines. The assessment is on a farm-scale and takes into account GHG emissions coming from inputs, barn and feeding management, manure storage management, and crop management. It also evaluates carbon sequestration.

Case study of a French beef farm

The first steps of a low-carbon project on farm consist in assessing the initial situation of the farmer and building a carbon action plan. For instance, one of the farms certified with the Label Bas Carbone in 2021 had the following baseline:

- 95 suckler cows.
- 185 hectares (ha) including 20 ha of cash crops and 32 ha of permanent grasslands.
- Age at first-calving: 36 months.
- Stocking rate: 1.2 livestock unit/ha.
- 291 kg of 'live meat'/livestock unit.
- Initial carbon footprint: 14.1 kg CO_2-eq/kg 'live meat'.

The farmers and the advisor built a mitigation action plan aiming at increasing the area of catch crops from 12 to 27 ha, reducing the use of chemical fertilisers, improving animal nutrition and management to reduce the calving interval from 395 to 380 days, and producing renewable electricity with photovoltaic panels.

To evaluate the impact of this action plan, the advisor carried out a simulation in CAP'2ER. In this case, the farmer should achieve an emissions reduction from 14.1 to 12.1 kg CO_2-eq/kg 'live meat', and from 1242 to 564 kg CO_2-eq/ha of cash crops. Furthermore, the nitrogen (N) surplus should be reduced from 87 to 55 kg N/ha of utilised agricultural area (UAA). In terms of tonnes of CO_2-eq avoided, this project should avoid 608 tonnes of CO_2eq, including 30 tonnes due to carbon storage and 578 tonnes due to emissions reduction.

How to pay farmers? FCAA, an example of a national aggregator.

One of the main objectives of the Label Bas Carbone is to attract funding towards French low-carbon projects. To this end, the French breeders' associations decided to create France Carbon Agri (FCAA), a company whose role is to make the link between the farmers, the advisory organisations, the Ministry for Ecological Transition and the companies buying carbon credits (Figure 2). In this way, the decisions regarding the funding of low-carbon projects (e.g. setting the carbon credits price) remain in the farmers' hands, and are not managed by downstream companies.

Therefore, FCAA endorses several roles:

- Acting as a representative for the farmers. This means that it carries out the administrative process to propose farmers' files to the Ministry to get the labelling. Thus, FCAA plays a role of 'aggregator' on a national scale by working with the local stakeholders following the farmers. This role of aggregator is time-saving for farmers as they do not need to manage the submission of their projects to the Ministry. Moreover, it is cost-saving as the independent audit is collectively managed: instead of auditing each project (as it would be the case if farmers submitted independently their dossiers), the external auditor verifies a sample of farms.
- Managing the submission to the Ministry to get the Label Bas Carbone certification and the recognition of carbon credits. It also involves exchanges with members of the Ministry to tailor the method and the legal requirements to be more practical.
- Making the link with the external auditor to ensure the implementation of the emissions reductions verification.
- Proposing low-carbon projects to companies wishing to contribute to the low-carbon transition by funding the farmers. On FCAA's side, it involves providing a map to locate the farmers' projects, outlining the tons of CO_2-eq avoided and a description of the actions implemented and the co-benefits of the projects.

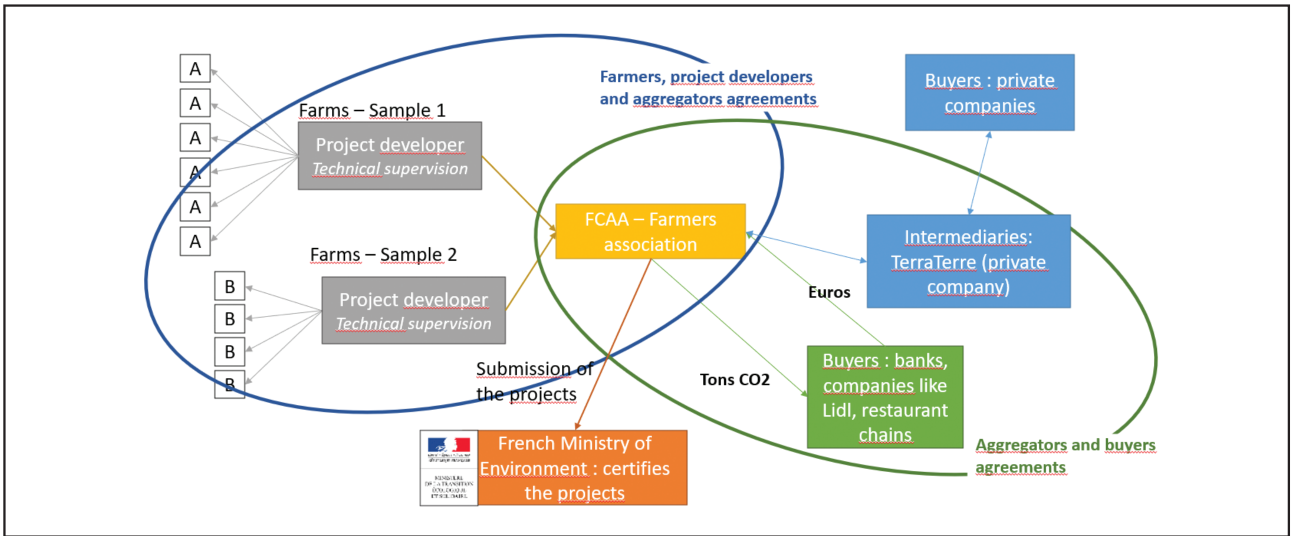

Figure 2. FCAA, an aggregator for collective low-carbon projects, making the link between farmers, buyers and the Ministry

To formalize these partnerships, FCAA draws up an initial contract with the farmers and the organisations ensuring the technical follow-up, and a second contract with the companies buying the tons of CO_2-eq avoided. These contracts specify the obligations of all parties, including the price of the carbon credit sold by FCAA. Today it is at €40/tonne of CO_2-eq including €32 for the farmer, €5 for the advisory company and €3 for the FCAA.

Three collective projects have been submitted to the Ministry, and a fourth one will be submitted at the beginning of December 2023. These four projects gather 2500 farmers, in all the regions of France, with an average carbon gain of 550 tonnes per farm for the five years of the projects; it represents a profit of €17,600 per farm. Between four and five practices are put in place, especially for land and herd management. FCAA also started working with farms specialised in crops.

Strategies of different companies: offset or contribution?

The Label Bas Carbone certifies emissions reductions. The purchase of these certificates by companies or public organisations is considered as the purchase of a service delivery, namely, the offsetting of the residual emissions of a company or its voluntary contribution to the climate change mitigation. For this reason, the Label Bas Carbone certificates are sold on the voluntary carbon market.

In order to avoid double-counting, once the certificates have been purchased by a company, they are not transferable to another one, and the identity of the funder is published on a register of the Ministry.

The companies buying these certificates are from a wide variety of sectors, including agri-food industries and restaurant chains, but also banks, luxury and energy companies etc., and have diverse low-carbon strategies. On the one hand, companies aim to reduce the GHG emissions on all of their value chain, including scope 1 (emissions directly caused by the activity of the company, and that can controlled by it), scope 2 (to simplify, emissions caused by the energy used by the company) and scope 3 (emissions related to the production and transports of inputs used by the company, and also the use of the company's products by the customers). For example, Lidl France chose to pay its beef suppliers to implement low-carbon projects on their farms. To do so, Lidl decided to fund Label Bas Carbone projects. On the other hand, other companies buy these Label Bas Carbone certificates to voluntarily offset their residual emissions or to communicate their involvement in a low-carbon transition.

Nevertheless, even if these Label Bas Carbone certificates are used on the voluntary carbon market, the distinction between voluntary and mandatory markets starts to become unclear as evident from two recent laws approved by the French parliament. The first law stipulates that airlines will have to offset all the emissions generated by local flights from 2024; the second law targets emissions from coal-fired power plants. Indeed, with the current energy crisis, the French government authorized some of these plants to extend their functioning for the winter, but on the condition of offsetting all their emissions. The price defined by the government for this offsetting is of €50 per tons of CO_2-eq, and it is mandatory to fund French low-carbon projects.

Certification schemes in Europe –
Proposal of the European Commission and LIFE Carbon Farming project

In 2022, the European Commission published its proposal for a Union certification framework for carbon removals. Like the Label Bas Carbone, this framework would work with a panel of experts verifying the methods submitted and verification by an external auditor. Furthermore, it would take into account general indicators of sustainability, not only those related to GHG, and it would deal with the issues of additionality and long-term storage. However, contrary to the Label Bas Carbone, this framework would only certify carbon sequestration and not emissions reductions.

At the same time, several European projects have commenced with the objective of implementing low-carbon projects in farms on a large-scale. Among them, is the LIFE Carbon Farming project coordinated by Idele, which lasts from 2021 to 2027. It involves six countries: France, Belgium, Germany, Spain, Italy and Ireland, with Teagasc. The goals are to reduce the carbon footprint of farms and to reward farmers for the tons of CO_2 avoided. A result-based rewarding mechanism is being built to have a common framework between the six countries of the project.

As low-carbon projects already exist in France, this pilot project will enable the building of a common European methodology to assess carbon gains, and to give field feedback to the European Commission.

Conclusion

Funding the transition towards a low-carbon agriculture is an integral part of the European strategy to become the first neutral continent by 2050. The Label Bas Carbone created by the French Ministry for Ecological Transition is one of the ways to earmark funds towards low-carbon projects in France. It also ensures the quality of these projects by verifying the emissions reductions and monitoring other environmental indicators. Today, 1250 farms have got the Label Bas Carbone through the Carbon Agri method implemented on beef, dairy and crops farms. On a larger scale, the European Commission decided to create a certification framework too. However, this framework will only concern carbon removals and not emissions reductions. This also raises the question of the existing standards: how will they be integrated to this European framework? Furthermore, alongside the increase of low-carbon projects, rules must be clarified regarding funding opportunities, and how they are considered between offsetting, contribution or emissions reduction.

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Irish Beef in a Global Market

Rupert Claxton
Gira

2023 has been a remarkable year for the Global beef industry. Considerable headwinds at the end of 2022 in the form of both rising costs for producers and industry, combined with inflation pressure on consumers and a real decline in disposable incomes. The European industry is also under pressure from the sustainability agenda, which is both increasing costs and limiting investment potential in beef production, as mid-term uncertainty around environmental restrictions make planning difficult.

The expected result was a meat consumption shock over the winter of 2022-23, that would be reinforced by high energy costs in the wake of the Ukraine war. The reality was different, the demand for beef has held up remarkably well under the circumstances, although some volume has been lost to other meats, notably chicken.

At a global level, poultry meat is the winner. Driven by its cost-competitive position to the consumer, and ease of investment for the industry, growth in poultry dominates. It is now the most produced and consumed meat. However, beef production continues to grow at a global level, bolstered by a recovery in Australia, but also growing interest in beef in the Asian markets.

In terms of the global beef outlook, production becomes the main story, with weather, rather than cost, the main driver. US production is in decline after 2 years of drought led to significant cow culling in 2022, and ongoing dry conditions in 2023 prevented rebuilding. On the other end of the spectrum, Australian beef production has largely recovered from the drought that led to a significant reduction in their herd in 2018-19. The resultant surge in Australian beef production has driven both their and the Brazilian price down, making them more competitive in export markets (Figure 1).

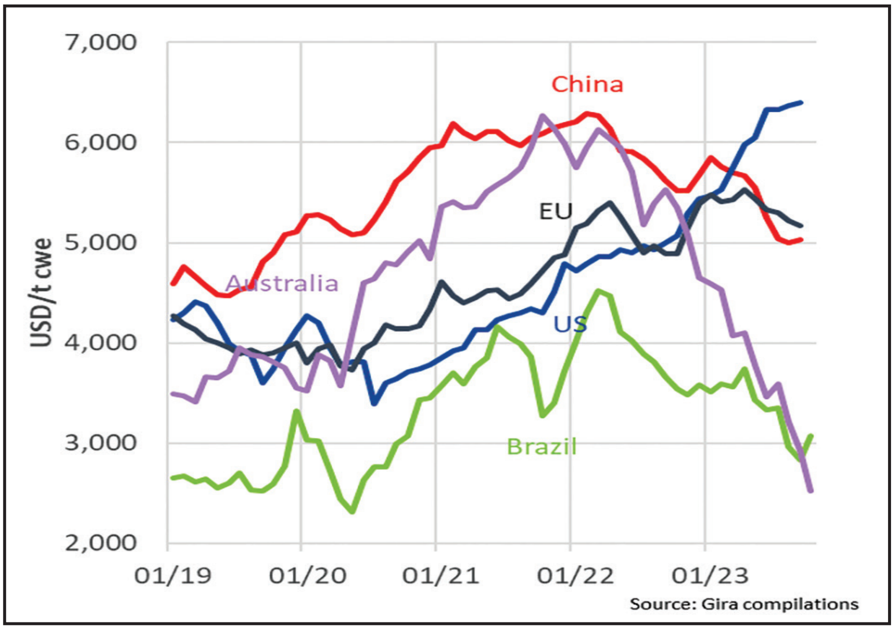

Figure 1. Key Cattle Producer Prices – Monthly

The overall decline in EU beef production is linked to the long-term trend, as well as the significant dairy base. Low milk prices in 2023, have contributed to a deep cow cull, the result of which will be a further decline in calf availability in 2024, and less beef in 2025. This short-term pressure reinforces the long-term trend of low confidence in beef production, especially in the face of increased regulation. Will European dairy farmers reinvest?

Focusing world trends onto the Irish market helps understand the long-term potential for Ireland. Global beef consumption is good, and rising demand for high quality and manufacturing beef in many Asian markets points to future market potential. Increased regulation on environmental issues will be most stringent in Europe, and applied here ahead of other major producers. But Ireland has abundant natural capital on which to further develop its sustainable story.

Gira's outlook is therefore for a small mid-term decline in production, reflecting downturns in the dairy cycle, rather than a real structural shift out of cattle. However, little upside is seen as this is now limited by environmental regulation. Ireland remains export focussed, and the neighbouring markets of the UK and EU27 are the key outlets (Figure 2). Demand for Irish beef in the UK remains strong, and a shortage of slaughter cattle in the UK is seen in high UK farm gate prices. This suggests more mid-term potential to supply the UK, as UK production itself struggles with the increased regulation, ageing farmer base, and competition for farm land from other uses. The current price differential suggests a strong import pull into the UK, in at least the first half of 2024.

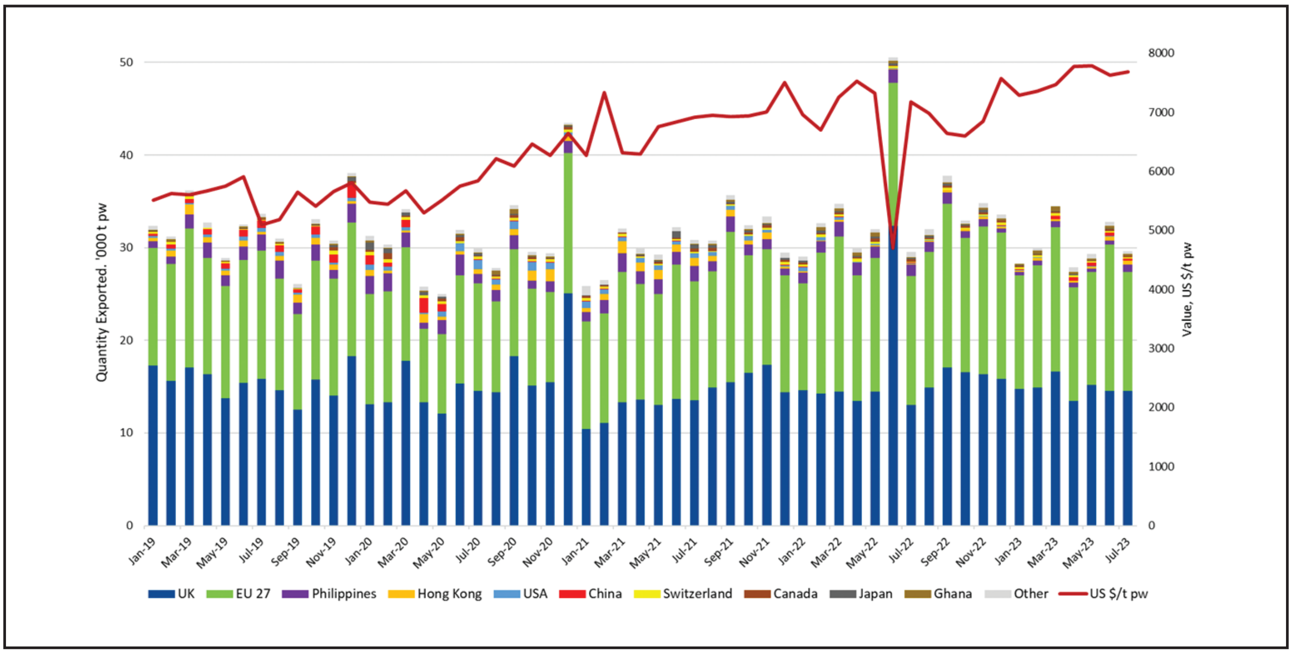

Figure 2. Irish Beef Exports

There are undoubtedly challenges to beef demand today in the EU27 and UK as the twin negatives of environmental messaging, and the high relative cost of beef, pressure consumers to look to other meats. However, the mid-term outlook is more positive. Beef is still important in the diet, as demonstrated by having held market share at high prices through a difficult 2023. The challenge will remain to keep beef at a price that is both incentivising to the industry to invest, and not so high that base consumption is lost.

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