20191403-JOC-FBS

The Clerk of the Joint Committee on Agriculture, Food and the Marine,
Committee Secretariat,
Houses of the Oireachtas Service,
Kildare Street,
Dublin 2,
D02 XR20

Sent by email to:
afm@oireachtas.ie

14.03.19

Re: Joint Committee on Agriculture, Food And The Marine Call for Submissions The Future of The Beef Sector

Dear Sir/Madam,

We attach a submission on behalf of An Taisce, which sets out a global overview on the future of the Irish beef sector.

We would be pleased to receive an invitation from the Committee to make an oral presentation.

Please acknowledge this submission.

Yours faithfully,

Ian Lumley,

Advocacy Officer
An Taisce – The National Trust for Ireland

Introduction

An Taisce welcomes the opportunity provided by this strategic oversight by the Joint Oireachtas Committee **("JOC**") on the Future of the Irish Beef Sector

Maintaining a habitable planet is dependent on an integrated ecosystem of land, sea and air embedded within a stable climate. This means that environmental sustainability is the overarching and all encompassing consideration which supersedes all others.

The UN Sustainable Development Goals 2015, set out the integrated and overarching framework for considering the future of all human sectoral activities, including agriculture and food production.

All industrial production sectors at national, EU and global level require strategic review to determine their future-proofing to ensure that we maintain a climatically stable and habitable planet for a still growing global population. This applies to all areas of food production as much as to consumer goods and services, energy and resource use.

The Irish Beef sector requires the same level of independent overarching foresight and oversight as the German car industry or the Polish coal sector as much as the beef industries in any other county. There is nothing that makes any Irish industrial sector "special" or exempt from strategic oversight.

At a global level, the sustainability of Irish beef production as part of future international food supply needs to be considered in the same way as oil and gas consumption, the central Asian cotton industry, the Brazilian beef or soya industry or South East Asian Palm Oil production, all of which are responsible for major land use, greenhouse gas emission or biodiversity loss impacts.

An overview of any national food production sector, such as is being advanced in this case for the Irish beef industry, needs to take a global perspective on the current, continuing and future role of that sector in the following key areas:

1. Ensuring that it is part of an overall strategy for its sector to meet the Paris Agreement Carbon Budget target of stabilizing global temperature as near as possible to 1.5°C over pre-industrial levels, which inevitably requires immediate, deep and accelerating emission cuts;

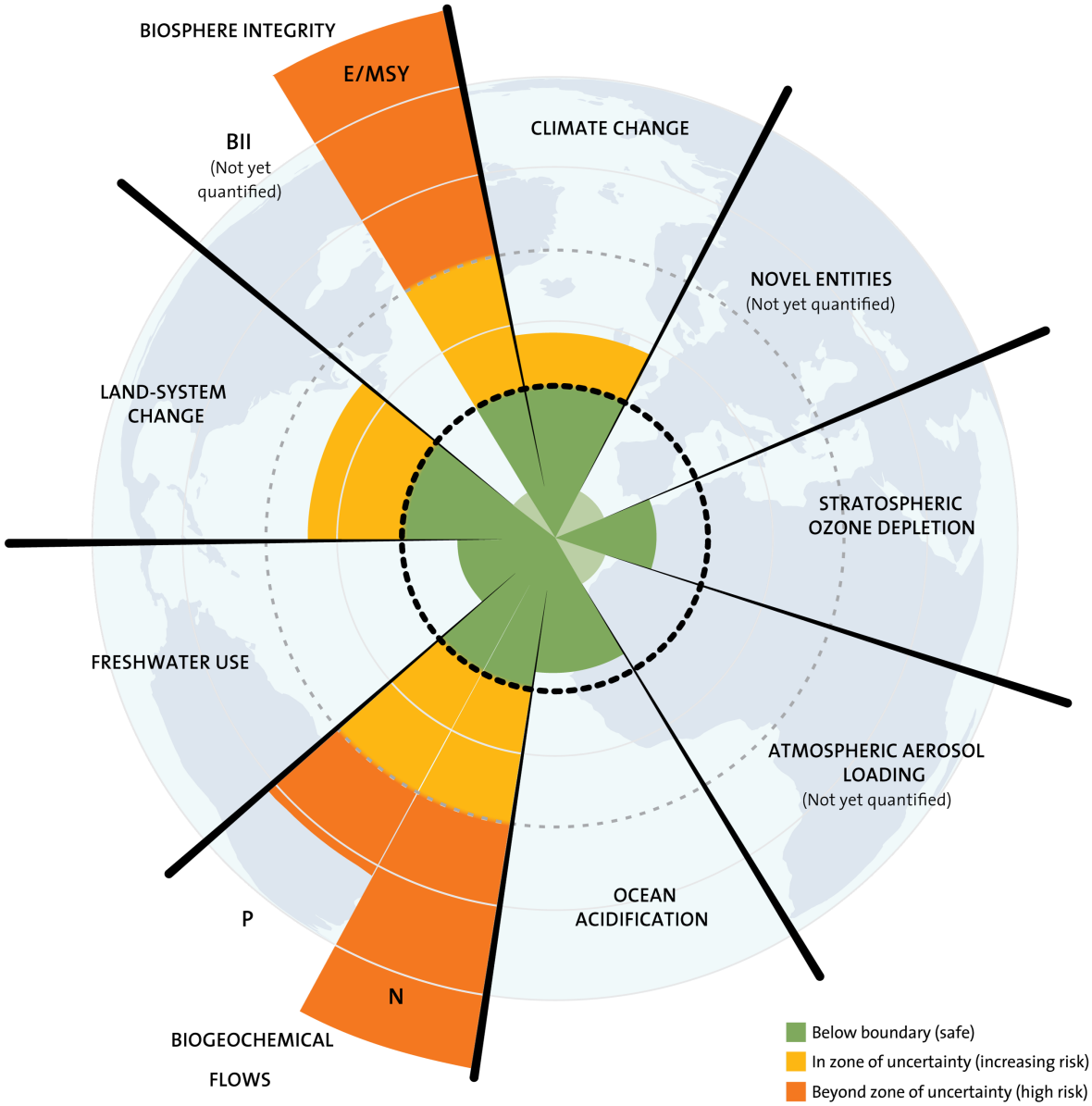
2. That it meets and does not conflict with the UN Sustainable Development Goals ("**SDGs**") including global health and well-being, sustainable consumption, climate action and reversing biodiversity loss;

3. That it is ethically justified in its resource consumption, production and consumer impact in meeting planetary nutrition needs in accordance with the Climate Justice principles which are incorporated into the Irish Climate Action and Low Carbon Development Act 2015;

4. That it advances United Nations Environment Programme ("**UNEP**") policy in achieving a more plant-based diet to meet global nutrition needs;

5. That it is future-proofed and assessed under the nine planetary boundaries, defined by the Stockholm Resilience Centre, namely:
    i. Climate Change
    ii. Novel Entities (not yet quantified)
    iii. Stratospheric Ozone Depletion
    iv. Atmospheric Aerosol Loading (Not yet quantified)
    v. Ocean Acidification
    vi. Biochemical Flows
    vii. Freshwater Use
    viii. Land-System Change
    ix. Biosphere Integrity

The diagram below shows the significant overshoot occurring in biosphere integrity and biochemical flows of the planetary boundaries (Stockholm Resilience Centre).



Objective of Joint Oireachtas Committee Call for Submissions

It is noted that the objective of the Committee '*Call for Submissions'* is to explore the following statement in relation to Food Wise 2025 :

> *" Food Wise 2025 identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Cumulatively, it projects exports have the potential to grow to €19bn per annum in value by 2025, a figure that would represent an 85% increase from the current three-year average. This export growth will be driven chiefly by expansion in dairy, beef, seafood and consumer food and drinks exports." (Food Wise 2025, p. 3)*

It is further stated that

> *"As a means of exploring this ambition, the Committee is focussing on the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis undertaken by DAFM in relation to the beef sector as part of Food Wise 2025".*

and that:

> *"On this basis, and in specific reference to the SWOT analysis, submissions should provide detail in relation to some/all of the following:*
>
> - *The extent to which the analysis undertaken in 2015 needs to be revisited in light of emerging challenges in 2019 and anticipated challenges in the future.*
> - *The measures that are/should be in place to support the strengths of the beef sector.*
> - *The remedies that are/should be in place to address the weaknesses of the beef sector.*
> - *The strategies that are/should be in place to exploit the opportunities associated with the beef sector.*

- *The measures that are/should be in place to ensure that the threats associated with the beef sector are mitigated".*

Requirement for Review of Food Wise 2025

It is submitted that the analysis and Strategic Environmental Assessment ("**SEA**") on Food Wise 2025 undertaken in 2015 needs to be revised in light of changed circumstances which area addressed further in this submission:

- The adoption of the Paris Agreement on Climate 2015;
- The Adoption of the UN Sustainable Development Goals 2015;
- The recommendation of the Irish Citizens' Assembly in 2017 on climate;
- The growing data on biodiversity and ecosystems collapse, including for Ireland;
- Ireland's accelerating failure in climate mitigation ranking 45th out of 57 developed countries in the December 2018 publication of the Climate Change Performance Index[1];
- Ireland's exceedance of EU atmospheric air pollution ammonia threshold limits from 2016 for which agriculture is 98% responsible;
- Ireland's continued failure to meet EU Water Framework Directive river and lake water quality targets;
- The 2018 drought which demonstrated the increased exposure of Irish bovine agriculture to climate variability risk, and requirement for fodder import;
- The publication of the EAT-Lancet report on global food sustainability in January 2019;
- The UN Food and Agriculture Organisation Global Livestock Environmental Assessment Model (GLEAM) Report February 2019 assessing livestock emissions.
- The increasing level of legal actions internationally and in Ireland against states, state bodies and corporations failing to take climate action.

[1] Burck et.al (2019) 'Climate Change Performance Index, Results 2019'.

Legal Obligations Under Article 10 of Strategic Environmental Assessment (SEA) Directive with regard to Monitoring and Review of Food Wise 2025

Food Wise 2025 was subject to SEA under Directive **2001/42/EC**. This imposes an obligation to comply with the legal obligations of the Directive to monitor and mitigate a range of significant adverse environmental effects.
Article 10 of the SEA Directive sets out the provisions for monitoring and remedial action:

1. *Member States shall monitor the significant environmental effects of the implementation of plans and programmes in order, inter alia, to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action.*
2. *In order to comply with paragraph 1, existing monitoring arrangements may be used if appropriate, with a view to avoiding duplication of monitoring.*

The provisions of Article 10 are not just for monitoring, but notably for the remediation of unforeseen adverse effects. Section 8.12 of the 2001 European Commission guidance states that *" Unforeseen adverse effects is better interpreted as referring to shortcomings of the prognostic statements in the environmental report (e.g regarding the predicted intensity of the environmental effect) or unforeseen effects resulting from change of circumstances."*

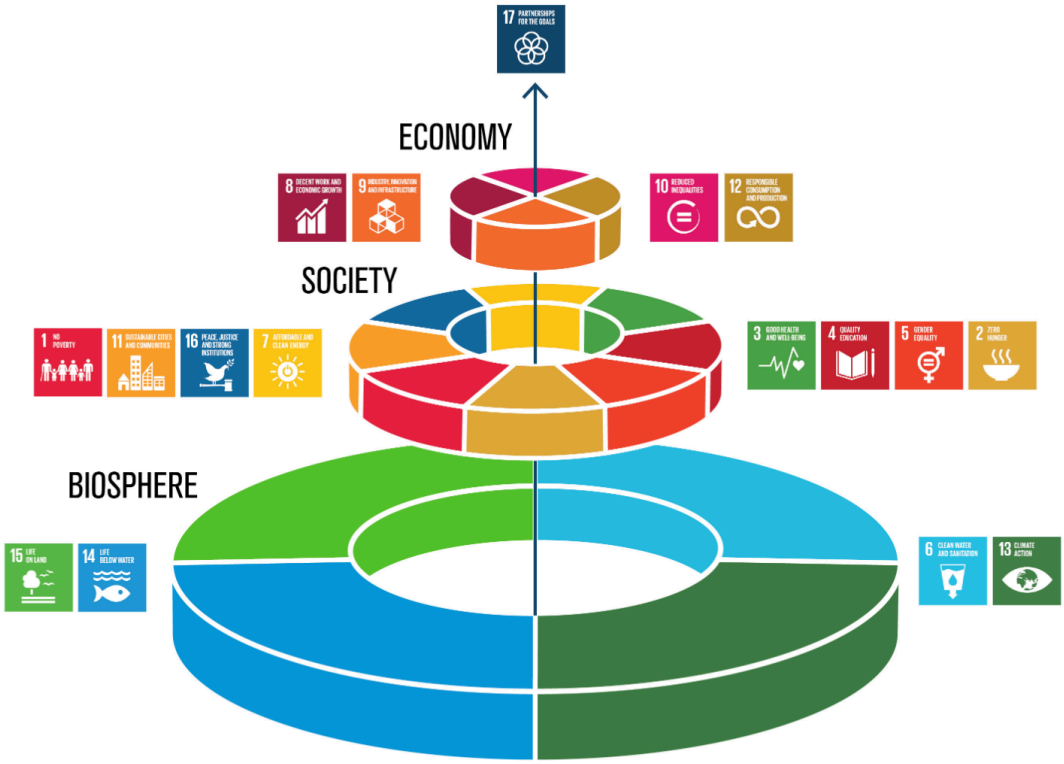
This creates potential exposure to legal challenges at national and EU level on the adequacy of monitoring and mitigation of impact of beef production and processing in Ireland.

Global Nutrition, Equity and Planetary Boundary Constraints

Speaking at the Stockholm EAT Food Forum in 2016, Director of The Stockholm Resilience Centre, Johan Rockström and Board Member, Pavav Sukhdev presented a new way of viewing the economic, social and ecological aspects of the Sustainable Development Goals.

This model changes our paradigm for development, moving away from the current sectoral approach where social, economic, and ecological development are seen as separate parts.

It was concluded that all the sustainable development goals are directly or indirectly connected to **sustainable and healthy food**. It was put forward that the goals on eradicating poverty (SDG 1) and zero hunger (SDG 2) require gender equality (SDG 5), decent jobs (SDG 8) and reduced inequality (SDG 10).



This consultation relates to Ireland's contributions to a particular food product. The future of the Irish beef sector requires the same sustainability oversight as that of the rest of Europe or North or South America, or any food production sector. The Irish beef industry model is based on recognition of the limited capacity of the European market for additional beef consumption. As with dairy products the Irish bovine agricultural sector is the beneficiary of large scale global marketing support from the Department of Foreign Affairs and Trade and Bord Bia to promote new markets including Japan, Nigeria and the Middle East. This is part of the wider promotion of the western cheeseburger diet across the globe.

There is no basis for arguing that Ireland is a "special" case. The plea is commonly made by agri-industry lobbyists that if Ireland was not continuing to produce beef at current levels that other countries would step in and do it instead. This does not recognise that the Paris Agreement specifically identifies the need for sustainable food production and that this requires an integrated global overview. With regards to a global overview, already 35% of the Earth's surface has been converted for agriculture, limiting scope for the future productivity of natural systems.[2]

The livestock sector already represents the world's single largest human use of land. Grazing land covers 26% of the Earth's surface, while animal feed crops account for about a third of arable land (FAO 2006). Almost 40% of land cover on earth has been captured for human consumption. It is unquestionably vital that a change is made to the global model of agriculture.

The "special" case being made for Ireland is further predicated on a current economic trading and marketing system based on generating consumer demand and the seeking of new markets to extend the late 20th century bovine product western diet across the planet, without addressing the planetary boundary capacity constraints or the inequities caused.

There is increasing evidence that today's agriculture and food systems are flawed. In evaluating any food production sector the key considerations are to determine its contribution to global nutrition equity in a fair share of food calorie use and its climate,

[2] Millennium Ecosystem Assessment 2005b.

biodiversity, transport generation and other footprint impacts. Statistics show that more than 815 millions suffer from hunger[3] while at the same time the developed world and the rising middle classes in developing countries are responsible for excessive food consumption and rising exposure to obesity and diabetes. Over 650 million suffer from obesity.[4]

Alexander Müller (Study Leader - The Economics of Ecosystems and Biodiversity (TEEB) AgriFood) and Paravan Sukdev (TEEBAgriFood - Special Adviser) noted that global healthy diets that embody minimal global consensus on the consumption of a few major food groups require a 25 per cent increase in the number of fruits and vegetables eaten globally and a **56 per cent reduction in red meat** whereas, overall, the **human population would need to consume 15 per cent fewer calories**.[5]

The international Food Research Policy Institute reports that our diets have now become the main burden of disease[6]. In relation to beef consumption there is the particular issue of increased exposure to cardiovascular disease which is set out in the sections below.

[3] Food and Agriculture Organization of the United Nations (FAO) et al. (2017). The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. Rome.

[4] Ng, M. et al. (2014) Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013.

[5] Alexander Müller and Pavan Sukhdev. (2018) MEASURING WHAT MATTERS IN AGRICULTURE AND FOOD SYSTEMS A synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations Report

[6] International Food Policy Research Institute (IFPRI) (2016). Global Nutrition Report 2016: From Promise to Impact: Ending Malnutrition by 2030. Washington, D.C.

Red Meat Consumption and Cardiovascular Disease

Global and Irish Context

As countries develop, the types of diseases that affect populations are shifting from primarily infectious diseases to primarily non-communicable diseases (such as cardiovascular diseases and obesity).

According to the World Health Organisation, cardiovascular diseases take the lives of 17.9 million people every year - 31% of all global deaths. According to the World Health Organisation, 85% of all cardiovascular disease related deaths are due to heart attacks and strokes.

In Ireland, cardiovascular diseases remain the most common cause of death. It is currently the cause of over one-third of all deaths (accounting for 36% of all deaths) and one in five premature deaths[7].

According to the Health Service Executive, approximately 10,000 people die each year from cardiovascular disease – including coronary heart disease, stroke and other circulatory diseases.

According to the 'Heath in Ireland, Key Trends 2018' report, prepared by the Department of Health, deaths caused by circulatory system diseases in Ireland are below EU-28 average (-13.5%)[8].

However, the burden of heart failure is set to increase. Prevalence is rising in part due to the aging of the population. The Institute of Public Health estimates that the number of Irish adults with cardiovascular disease (hypertension, coronary heart disease, stroke and diabetes) will increase by around 40% by 2020[9].

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[7] Health Service Executive
[8] Department of Health. (2019). Heath in Ireland, Key Trends 2018. Table 2.5
[9] Institute of Public Health 'Making Chronic Conditions Count – A Systematic Approach to Estimating and Forecasting Population Prevalence on the Island of Ireland'.

Rapid ageing of the population in conjunction with lifestyle-related health threats presents major challenges.

Following the publication of results from Census 2016, the estimated population growth between 2016 and 2018 was 2.0%. The numbers and proportion of the population in the older age groups continues to grow, with the number of people over the age of 65 increasing by over 20,000 a year.

By 2038, the number of people over the age of 85 is projected to increase to over 2.5 times the current figure. This will have a significant impact on the demand for health care services in Ireland. In tandem with this growth, cardiovascular disease burden is set to increase. According to international data, the majority of patients with heart failure are over the age of 65[10].

At present, heart disease costs Ireland approximately €660 million per year, of which €158 million is a direct healthcare cost to the state, equivalent to 1.2% of the total healthcare budget[11]. According to the Irish Heart Foundation, as life expectancy increases, people are living longer with cardiovascular disease and this requires greater community-based care and support services for all.[12] In tandem with the projected rise in cardiovascular disease in Ireland, the cost of cardiovascular disease to Ireland is also set to increase

Our Diet and Cardiovascular Disease

Diet is an important risk factor in cardiovascular disease, which manifests primarily as heart attacks and strokes. Many cases of heart failure are preventable through positive lifestyle changes, including a change in our diet.

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[10] National Medicines Information Centre. Chronic Heart Failure. 2012;3(18)
[11] The Heartbeat Trust, Irish Heart Foundation, NUI Galway et al. The Cost of Heart Failure in Ireland: The social, economic and health implications of Heart Failure in Ireland 2015
[12] Irish Heart Foundation. https://irishheart.ie/our-mission/our-policies/cardiovascular-disease/

According to the National Cardiovascular Health Policy 2010-2019, the national dietary profile is challenging. While there has been an increase in the recommended consumption of 5 portions of fruit and vegetables by adults daily (to 65%), 86% report that they consume more than the recommended daily servings of foods high in fats, sugar and salt. Foods such as red meat are high in saturated fats.[13] In 2016 it was reported that Sara Petersson, Nutrition Analyst at Euromonitor International highlighted that most of Ireland's calories are derived from meat.[14]

Red meat is historically related to increases in cardiovascular disease due to its saturated fatty acid content. Dietary guidance seeks to limit red meat consumption.

It is often argued that consumption of lean red meat does not impact on cardiovascular health as it is low in fat and cholesterol. However, a more recent study published by the European Heart Journal yielded additional insights into why and how regular consumption of red meat (including lean meat) can increase the risk of cardiovascular disease and the role that gut bacteria plays in the process.[15]

TMAO, short for trimethylamine N-oxide, is made by gut bacteria as they digest food. Red meat, especially, causes these gut germs to make a lot of a precursor, which the human body metabolizes into TMAO.

Certain species of bacteria cause production of TMAO when they metabolize choline, lecithin and carnitine — all of which are abundant in red meat, full-fat dairy products and eggs. TMAO convert a common nutrient found in beef into a compound that speeds up the buildup of plaques in the arteries.

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[13] Department of Health and Children. (2010) "Changing Cardiovascular Health National Cardiovascular Health Policy 2010 – 2019"

[14] Daire Courtney (2016). 'Europe's biggest carnivores' - Irish people consume equivalent of 70 steaks per year'. Irish Examiner

[15] Hazel et.al (2018). European Heart Journal. *'Impact of chronic dietary red meat, white meat, or non-meat protein on trimethylamine N-oxide metabolism and renal excretion in healthy men and women'.*

The report published in the European Heart Journal has shown that TMAO makes blood more likely to clot, therefore raising the risk of heart attacks and strokes. People who have more TMAO in their blood, which a diet heavy in red meat, dairy products and eggs contributes to, have a higher risk of heart disease. Vegetarians and vegans have lower levels of TMAO and usually also have a lower risk of heart disease than meat-eaters.

For the study, researchers enrolled 113 healthy men and women in a clinical trial to examine the effects of dietary protein - in the form of red meat, white meat, or non-meat sources, on TMAO production. All subjects were placed on each diet for a month in random order. When on the red meat diet, the participants consumed roughly the equivalent of about 8 ounces of steak daily, or two quarter-pound beef patties. After one month, researchers found that, on average, blood levels of TMAO in these participants tripled, compared to when they were on the diets high in either white meat or non-meat protein sources.

Importantly, the researchers discovered that the TMAO increases were reversible. When the subjects discontinued their red meat diet and moved to either a white meat or non-meat diet for another month, their TMAO levels decreased significantly.

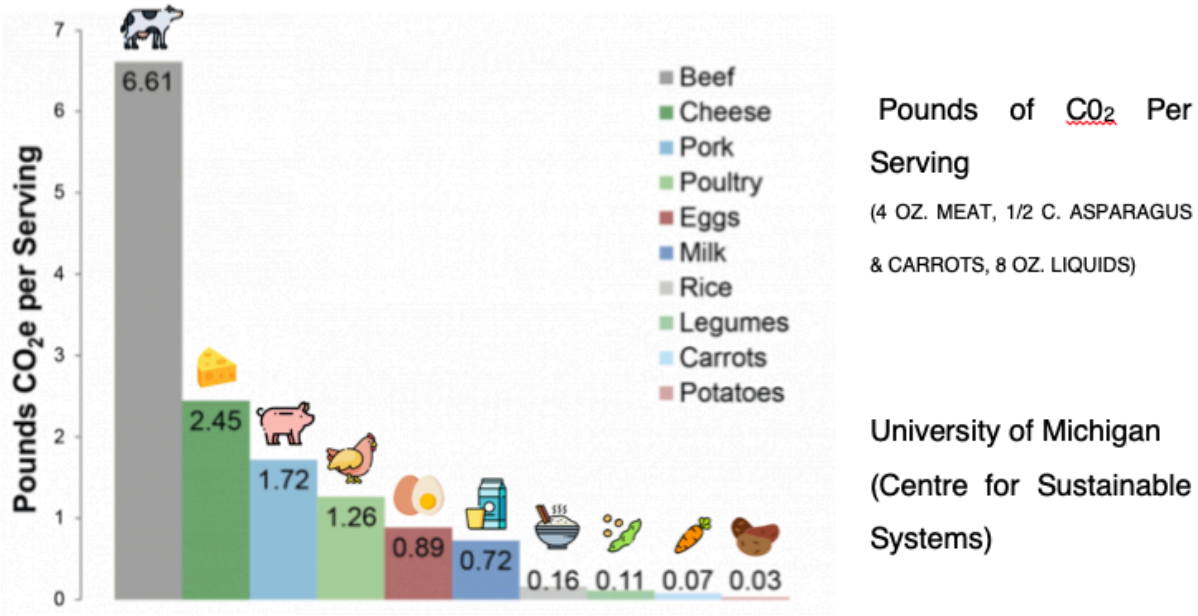
More recent research is now showing that a diet heavy in red meat not only increases the risk of cardiovascular disease but can also change kidney function and raises the risk of developing colorectal cancer (colon cancer or rectal cancer).

These findings reinforce current dietary recommendations that encourage all ages to follow a heart-healthy eating plan that limits red meat consumption.

The Climate Footprint of Beef

There is a wide range of peer-reviewed comparative climate footprint analysis of different food source types.

In all the recognised and established calculations, whether on a calorie unit or other nutrition evaluation matrix, beef is at a significantly higher level than other non-ruminant meat or plant-based protein food sources.



The *EAT-Lancet Report 2019*

In January 2019 the Lancet Commission published the EAT-Lancet Report, a global oversight of future food production to reconcile equitable nutrition and healthy diet for a rising population, while remaining within Paris Agreement Carbon Budget limits (which include calculation of methane equivalent**).** The EAT-Lancet Commission on Food, Planet, Health brought together more than 30 world-leading scientists from across the globe to

reach a scientific consensus that defines a healthy and sustainable diet. (See Appendix 1 for précis Lancet Report)

The Commission quantitatively describes a universal healthy reference diet:

"based on an increase in consumption of healthy foods (such as vegetables, fruits, whole grains, legumes, and nuts), and a decrease in consumption of unhealthy foods (such as red meat, sugar, and refined grains) that would provide major health benefits, and also increase the likelihood of attainment of the Sustainable Development Goals. This is set against the backdrop of defined scientific boundaries that would ensure a safe operating space within six Earth systems, towards sustaining a healthy planet."

The key findings are that:

"The dietary shift that is needed requires a dramatic reduction of consumption of unhealthy foods, such as red meat, by at least 50%, with a recommended daily combined intake of 14 g (in a range that suggests total meat consumption of no more than 28 g/day), with variations in the change required according to region.

At the same time, an overall increase in consumption of more than 100% is needed for legumes, nuts, fruit, and vegetables, with the changes needed again varying according to region. The Commission sets out comprehensive, multisectoral policy actions and recommendations that will support these shifts. The planetary boundaries defined by the Commission are categorised by the six environmental systems on which food systems and the way we eat have the greatest impact: climate change, biodiversity loss, land-system use, freshwater use, and nitrogen and phosphorus flows. For each of these, the Commission outlines a safe operating system and upper-limit boundaries within which food systems must remain to avoid potential ecological catastrophe.

The human cost of our flawed food systems is that almost 1 billion people are hungry, and almost 2 billion people are eating too much of the wrong food. The Global Burden of Disease Study indicates dietary factors as a major contributor to levels of malnutrition,

obesity, and overweight—all of which have become more prevalent since the SDGs were adopted—the burden of non-communicable diseases is increasing, and unhealthy diets account for up to 11 million avoidable premature deaths per year."

Irish Agriculture, Greenhouse Gas Emissions and the 'Food and Agriculture Organisation of the United Nations' (UN FAO) Global Livestock Environmental Assessment Model (GLEAM) Report

The particular case is made by the Irish bovine agricultural lobby that Ireland is a world leader in carbon efficiency, or at least has a production system that it is lower in carbon impact than many other countries. Much is made of Ireland's carbon accounting and the Beef Genome programme in touting Ireland's action in mitigating the greenhouse gas impact of the Irish beef sector.

This case has been negated by the publication of the UN FAO GLEAM Report in February 2019.

The UN FAO Report revealed that Ireland is the most carbon-intensive beef producer in Europe, and ranks as Europe's third highest on emissions from its dairy sector.

The GLEAM Report which adopted a methodology examining the full life cycle impact of food production, came as a bombshell to Ireland's Agri-industrial sector, which has long argued, using outdated 2004 data, that Irish beef and dairy is among the most efficient in the EU in terms of emissions.

Agriculture Minister, Michael Creed has repeatedly and publicly defended the expansion of Ireland's beef and dairy sectors, despite spiralling emissions, by arguing that we are '*more efficient*' than other countries so therefore it was better that we produce these intrinsically emissions-intensive foods than to have them produced even more inefficiently elsewhere.

The An Taisce Climate Change Committee's analysis of the GLEAM report concluded that:

"*The FAO baseline results for livestock agriculture's climate impact indicates that, relative to other EU nations, Ireland's livestock agriculture has very high emissions intensities: close to the worst emissions per litre of protein for dairy production and the worst for beef. Indeed, for all animal product types analysed by FAO GLEAM, including sheep and pig production, Ireland's baseline emissions intensities are worse than the EU average".*

"However, climate action requires reduction of total agricultural sector emissions, so even if emissions intensity improves, any overall increase in production wipes out any saving. The primary drivers for Ireland's increasing agriculture emissions are the rapidly increasing use of fossil-fuel derived nitrogen fertiliser, which boosts grass growth, and ever more concentrate feed per head. Climate action requires limits on production or on total fertiliser and feed usage; otherwise efficiency gains, if any, will have no effect".

The shocking findings published this week in the journal 'Biological Conservation' that global insect populations are collapsing, with intensive agriculture and the heavy use of pesticides being among the main drivers of this ecological calamity. This should give even more urgent reasons for Minister Creed and his government to call a halt to a model of agricultural expansion that is extremely emissions intensive as well as contributing to dangerous biodiversity loss and accelerating levels of fresh water pollution."

The 2017 Citizens' Assembly on Climate

In 2017 the Citizens' Assembly concluded its consideration of the topic '*How the State can make Ireland a leader in tackling Climate Change'*. The Assembly made recommendations that formed the basis of a report for which was submitted to the Houses of the Oireachtas. The recommendations were reached by ballot paper voting and followed two weekends of deliberation which focused on the energy, transport and agriculture sectors, international best practice and existing national policies and activities.

There were a total of 13 climate-related questions, each voted on separately.

Relevant to beef production, 80% of the Members said they would be willing to pay higher taxes on carbon intensive activities.

Parallel to the current consideration by the JOC on Agriculture, Food and the Marine, the JOC on Climate Action has been considering the report of the Citizens' Assembly on climate and is due to publish a report of recommendations for climate action. Environmental NGOs are advocating that at a minimum the recommendations of the Citizens' Assembly should be endorsed in the final report of the JOC on Climate Action.

Earlier this month Catherine Devitt, policy coordinator with the Stop Climate Chaos coalition stated that:

> *"'The Citizens' Assembly was a robust exercise in public participation in policy making, and is the strongest mandate the State and policy makers have ever had for taking specific actions on climate change.*' '*The Assembly provided a package of practical, yet far reaching recommendations for action on climate change that can go a significant way to closing the gap between Ireland's growing emissions and our national and international climate obligations. If elected representatives in the Committee want to reject or amend any specific recommendations, it must be replaced with a recommendation equally or more ambitious and effective".* [16]

The Stop Climate Chaos Coalition has urged that ultimately, the Joint Committee's recommendations, and the forthcoming 'All of Government Plan' must respect and represent the level of ambition called for by the Citizens' Assembly. This will require a final report which includes substantive, measurable, and immediate policy recommendations to ensure that action from now on is adequate and timely.

[16] https://www.stopclimatechaos.ie/news/2019/03/11/upcoming-oireachtas-committee-report-a-critical-li/

Agriculture and the Environment

Agriculture and Water

In relation to agriculture, the pressures relate to diffuse nutrient run-off (phosphorus and nitrogen) and sediment from land, and point source pollution associated with farmyards.

In August 2017, the EPA revealed that no effective progress has been made in meeting EU Water Framework Directive (WFD) targets to improve the quality of Irish rivers, lakes and estuaries.

Ireland failed to meet the overall 13% improvement proposed for the 2010 -2015 period and there is little change in water bodies in an unhealthy state: at 43% from 45% for Irish rivers, the 54% figure for lakes unchanged, and estuaries marginally unchanged to 69% from 70%. The report also reveals increases in fish kills in 2013-15 in comparison to previous periods.

The An Taisce submission on the Draft River Basin Management Plan in August 2017 concludes that it evades effective action in all areas affecting water management in meeting of WFD "Good Water Status" targets, in favour of continuing avoidance of effective regulation of forestry, peat extraction, water abstraction, aquaculture and other activity.

Data by the Department of Agriculture, Food & the Marine at the EPA National Water Forum in June 2017 revealed that:

- 12% of farms with a derogation are failing to comply and of the remaining 130,000 the failure rate is 30%.

This challenges Government and industry claims on the sustainability of Irish agriculture concluding that "*Overall, Irish agriculture in its current form is damaging to climate, water quality and biodiversity*" and is not contributing to global food security.

According to the EPAs 'Water Quality in Ireland Report 2010-2015' (2015), 47% of rivers, 58% of lakes and 55% of transitional water were not of good status.

The two most important suspected causes of pollution in rivers are agriculture and municipal sources, accounting for 53% and 34% of cases respectively. There was, for example, also a 5% reduction in satisfactory quality lakes (10 lakes) compared to 2007-2009 (EPA, 2015).

Agriculture is also one of the main land uses in high status catchments and is as a result one of the most important pressures and threats on these extremely sensitive water bodies.

The percentage number of high quality sites had almost halved in the 22 years between 1987 and 2012 (EPA, 2015). Only 11.5% of rivers, 9% of lakes and 3.6% of transitional waters were considered to be of high status for the 2010-2012 period (EPA, 2015).

The smallest pressure can impact on high status. Small increases in the amount of P (Phosphate) and N (Nitrogen) can damage the sensitive ecology associated with these sites (Ní Chatháin et., 2012). Identified pressures include land-use changes associated with agriculture such as field drainage and fertilisation, animal access to waters, and sheep dip pesticides (Ní Chatháin et., 2012).

Livestock manures and slurries, and access to watercourses by cattle and sheep, can lead to significant losses of bacteria, viruses and protozoa to drinking, bathing and shellfish waters. This can affect the amenity value of the water environment and pose a risk to human health (Mawdsley et al., 1995; SEPA, 2007). Escherichia coli (E. coli) is a bacterium that is often used as an indicator of faecal contamination of water. E. coli is found only in the faecal material of humans and other warm-blooded animals. Its presence indicates contamination of groundwater by faecal matter and that pathogens (disease causing organisms) may be present. The source of the contamination is generally agriculture or septic tanks. According to the EPA 'Water Quality in 2017 – An Indicators Report', Eighty-five (43%) of the 195 groundwater monitoring sites had a sample contaminated with one or more E. coli in 2017.

Plants, soil and ultimately watercourses that may subsequently be used as catchments for public water supplies may all be affected. (Mawdsley et al., 1995; SEPA, 2007). The on-going intensification of agriculture in areas with high status water bodies is a major concern and needs to be addressed urgently.

It is clear that agriculture is having a serious negative impact on water quality throughout Ireland. The EPA in the 'Water Quality in 2017 – An Indicators Report', highlights the impacts of poor water quality on fish species. Table 6 in this report, which is shown below, indicates that agriculture is the leading cause of reported fish kills between 2017 and 2017.

Table 6: Causes attributed to reported fish kills by IFI between 2010 and 2017. Numbers correspond to the number of fish kills in each catchment area covered by the relevant IFI office (Map 9).

IFI Office	Agriculture	Municipal Works	Industrial Operations	*Other	Total
Dublin	4	4	10	39	57
Limerick	18	6	1	20	45
Macroom	7	3	9	18	37
Ballyshannon	5	6	1	18	30
Clonmel	9	1	0	19	29
Ballina/Galway	4	3	0	12	19
Total	**47**	**23**	**21**	**126**	**217**

* **Other:** Cause not determined. In some incidents, high temperatures and low water levels are suspected, but the cause could also be eutrophication or disease.

Agriculture and Biodiversity

The global sixth- and this time human-caused - mass extinction of species is reflected in the data for Ireland with accelerating insect bird and bee population loss.

At the National Biodiversity Conference in February 2019 President Michael D Higgins addressing the mounting global, including Irish, biodiversity collapse stated:

"If we were coal miners, we would be up to our necks in dead canaries"

It was reported in February of this year that the current decline in insects could cause 'catastrophic collapse' of nature. Human activity is causing dramatic declines in insects, which could see **40% of species become extinct in a few decades**, a scientific study has warned. The global review of declines in insects warned that the world was witnessing the "largest extinction event on Earth" for millions of years, in the face of habitat loss, pesticides, disease and invasive species and climate change.

These are alarming indicators of a collapse of our ecosystem on which all life including the health of soil depends. Agriculture is the lead threat to Irish biodiversity. Agricultural intensification has caused significant negative impacts to Irish biodiversity. Agricultural intensification is contributing to the *"bad"* conservation status of a wide range of internationally important Irish habitats and the decline of ten key farmland birds.

Current quantity- and export-driven Irish agricultural targets as set out in Food Wise 2025 are in direct conflict with maintaining and enhancing biodiversity, as well as climate mitigation.

Food Harvest 2020 was approved without Strategic Environmental Assessment (SEA). Food Wise 2025 was subject to SEA, so that if monitoring of agricultural intensification shows adverse impacts, which is now clearly occurring, corrective action is required.

The integration of CAP farm support and Rural Development funding with Biodiversity is an overriding requirement. In 2015 An Taisce challenged the Department of Agriculture, Food and the Marine to explain why €400 million of funds allocated under the Common Agricultural Policy were diverted away from supporting marginal farmers and wildlife.

Successive EU-funded REPS, AOS and GLAS schemes have not resulted in meaningful impact on Irish biodiversity protection and enhancement and a complete re-think is required.

The coalition of Irish development, environment and faith-based NGOs forming "Stop Climate Chaos" and The Environmental Pillar which both include An Taisce published a science-based report "Not So Green: Debunking the Myths around Irish Agriculture" in 2016.

This report challenges Government and industry claims of the sustainability of Irish agriculture concluding that "*Overall, Irish agriculture in its current form is damaging to climate, water quality and biodiversity*" and is not contributing to global food security.
It concludes that "*Agricultural intensification has caused significant negative impacts to Irish biodiversity*".

Irish Agriculture, through Bord Bia promotion, is now using the marketing label of "*Origin Green*". This is not based on any independent internationally referenced standard, and is being promoted as "Climate Smart" merely because the carbon impact is being counted, but not meaningfully mitigated. Products given the Origin Green label include mushrooms produced with peat compost, and cattle using peat bedding sourced from bogs where there has been no Environmental Impact Assessment.

If Ireland is to retain the “green” image, which is part of our self-identity, this requires a new vision for land management, removing the current conflicts created by agricultural and conifer forestry intensification on water quality and biodiversity. There is an opportunity for water catchment-based and area-based initiatives for restoring the relationship with land use and nature, including peatland and flood plain restoration, wet woodland and other historic habitat restoration.

There is inadequate oversight of the impact of Irish Bovine agriculture in the land use change which has occurred in the conversion and reseeding of the major part of the country’s arable land with monoculture perennial rye grass with continuing intensive application of nitrate fertilizer. It should be noted that Irish fertiliser import and use is again now increasing reflecting the bovine herd increase. In addition there is the transboundary impact of of Ireland’s import of soya feed which is contributing to adverse impacts globally.

Hedgerow Loss

Ireland has a surviving low level of native woodland or other woodland areas of ecological value since afforestation over the last century has been dominated by non-native, short rotation and clear fell conifer plantation of poor biodiversity value.

Ireland’s extensive hedgerow network, with its wide mix of trees and other species is of major biodiversity significance both as a habitat and providing wildlife corridors.

Irish agricultural intensification, which is primarily driven by bovine agriculture is causing the continued loss of hedgerows.

The Hedgerow Laying Association of Ireland produced a report in 2018 on the implementation of the Environmental Impact Assessment (Agriculture) Regulations (SI 456 of 2011). An Taisce is a consultation body under Article 2 of the Regulations and has not been consulted by DAFM on any of the over 500 screening applications processed since the Regulations were introduced in September 2011.

Ammonia Levels

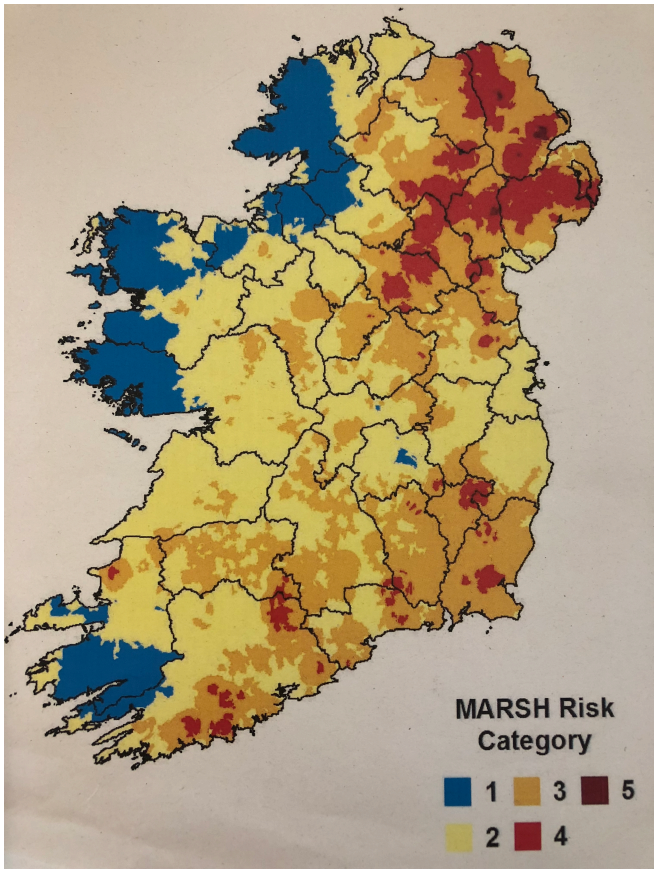
There is a particular issue with regard to Ammonia (NH3) and its associated adverse air pollution and human health impact as well as being highly damaging to ecosystems in the local receiving environment. Ammonia concentrations cause algal slimes.

Agriculture accounts for 98% of Ireland's atmospheric ammonia emissions. Monitoring of ammonia, particularly the distribution and location concentrations of ammonia emissions in Ireland, is seriously deficient There is also a significant transboundary impact because of the high concentration UK pig and poultry-intensive farming in Northern Ireland.

The EPA reported that "*Emissions of ammonia have been increasing since 2011 and were above the specified EU emission limit in 2016 for the first time*".
There are no measures in place to take the necessary corrective measures. Under current 'business as usual' policies, emissions will worsen.

The image below shows Mapping Ammonia Risk on Sensitive Habitats (MARSH). The MARSH risk categories include:

1 = 0- 0.99 ***µg/m3***.
2 = 1- 1.99 ***µg/m3***.
3 = 2- 2.99 ***µg/m3***.
4 = 3- 3.99 ***µg/m3***.
5 = >4 ***µg/m3***.



The Government Food Wise 2025 plan providing for the quantitative growth of the agri-food sector undermines national commitments and environmental sustainability in regards to ammonia as well as greenhouse gas emission reductions.

In the period between 1997 to 2011, there was a significant decrease in Ammonia NH3 emissions. Food Wise 2025 and previous Food Harvest 2020 targets have now increased ammonia emissions. Despite Food Wise 2025 being subject to Strategic Environmental Assessment (SEA) under the SEA Directive, no proper ammonia monitoring measures have been put in place and there is no programme in place for the reduction of ammonia emissions to reduce airborne ammonia.

This is going to expose the State to legal action both at national and EU level in seeking remedy for pollution to be restored to a level not causing human health or ecosystems damage.

On 13 March the European Parliament called for future CAP payments to EU farms to be linked to progress on cutting harmful air pollution including ammonia in a motion backed by an overwhelming majority of MEPs.
(http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2019-0186+0+DOC+PDF+V0//EN)

European farms are responsible for 94% of ammonia in the EU, with serious consequences for human health and the natural world. Ammonia emissions alone account for around 50% of the health impacts of air pollution in urban areas, as it is a key precursor to particulate matter.

The motion also highlighted how the agriculture sector was falling behind as other industries make efforts to tackle emissions: "*the costs of air pollution control in Europe are*

significantly lower in the agricultural sector than in other sectors where more stringent emission controls have already been implemented".

Role of Teagasc

Teagasc was established under Agriculture (Research, Training and Advice) Act,1988.

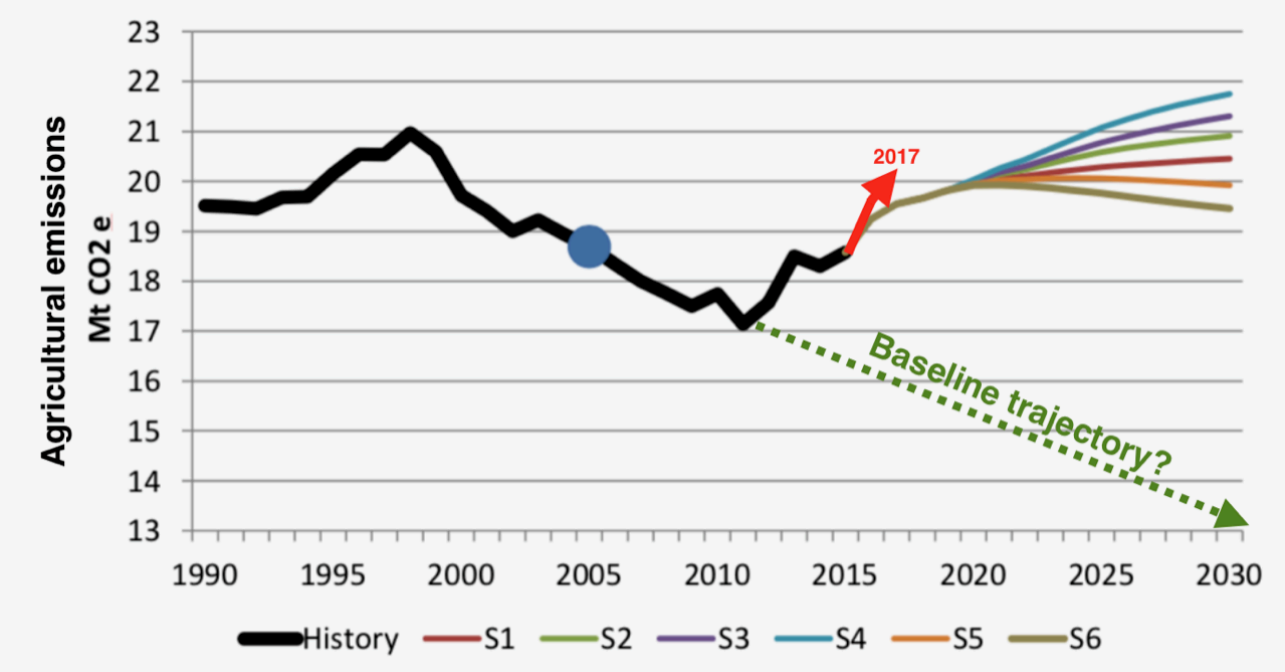
Section 4 (*b*) under "Functions of Teagasc" sets out an obligation *"to obtain and make available to the agricultural industry the scientific and practical information in relation to agriculture required by it".*

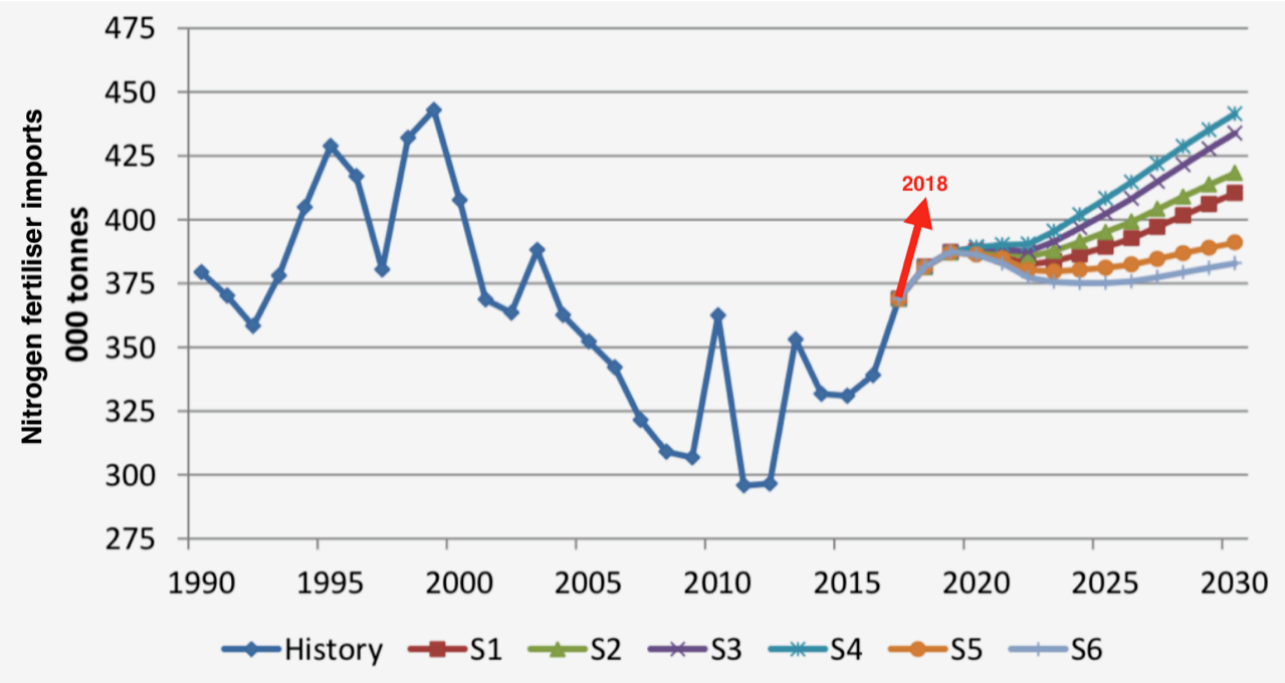
It is submitted that it is the responsibility of Teagasc to address the overarching issues relating to global sustainability raised in this submission.

Teagasc is statutorily mandated to provide independent scientific advice to Government, Government agencies and the agricultural industrial sector generally.

However, the greenhouse gas emission modelling which Teagasc is currently providing to Government, the agricultural industry, and in the exercise of its statutory function generally shows continued increase in emissions

Below is the current base chart from Teagasc showing past and projected agricultural emissions, annotated to show the baseline mitigation trajectory projected from emissions reductions achieved between 2000 and 2010. Expansionary agricultural policy has reversed and cancelled out all of this mitigation achievement. The red arrow to 2017 shows that Teagasc modelling, even over the immediate year after the modelling, has failed to project a rapid emissions increase suggesting serious flaws in Teagasc's modelling assumptions.





Above is the base chart from Teagasc showing past and projected Irish imports of nitrogen fertiliser. As with the greenhouse gas emissions reductions which occurred during the 2000 to 2010 period, the reductions in fertiliser use which occurred in fertilizer imports during the 2000s have now been reversed. Red arrow to 2018 shows that Teagasc modelling, even

over the immediate two years after the modelling, has failed to project a rapid increase suggesting serious flaws in Teagasc's modelling assumptions.

The agribusiness sector frequently suggests that climate targets are "*a challenge to Irish agriculture*" but fails to state the more policy-relevant opposite reality: that continued, and now increasing high levels of ruminant-based agriculture, due to government-endorsed, agri-food industry policy, are a direct intentional challenge to national climate targets, making them far more difficult if not impossible to achieve. The physical (as opposed to economic or political) reality of climate impacts, both in Ireland and on vulnerable communities globally, is implacable and will not respond to platitudes, hand wringing or accountancy devices, including dubious efficiency claims.

As Teagasc's own research acknowledges (Donnellan et al. 2013)[17], meeting the EU non-ETS climate targets almost certainly requires serious reductions in the cattle herd, implying the need for a long overdue focus on developing alternative scenarios for Irish farming to produce far higher net nutrition with far lower climate and environmental impact (Cassidy et al. 2013;)[18]. We urge strongly that independent and scientifically-based media releases and advice to government from Teagasc should state these findings clearly.

Ongoing "mitigation" of methane emissions consistent with the 2ºC target would require a steady reduction of total agricultural methane emissions, not just stabilising them (Persson et al. 2015).[19] In fact, contrary to this requirement, agricultural methane emissions are rising very rapidly due to government-backed dairy expansion policy. This is in direct opposition to Teagasc's stated strategy to "*stabilise methane emissions*", yet this fact goes unmentioned by Teagasc and Department of Agriculture Food and the Marine. A far better strategy for reducing livestock emissions would be to limit production of beef significantly,

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[17] Donnellan, T. Hanrahan, K., Breen, J.P. And Gillespie, P. (2013) Climate Change and Agricultural Policy Coherence: Agricultural Growth and GHG Emissions in Ireland. https://ideas.repec.org/p/ags/aesc13/158853.html

[18] Cassidy, E.S. et al., 2013. Redefining agricultural yields: from tonnes to people nourished per hectare. Environmental Research Letters, 8(3), p.034015.

[19] Persson, U.M. et al., 2015. Climate metrics and the carbon footprint of livestock products: where's the beef? Environmental Research Letters, 10(3), p.034005. http://bit.ly/2smmp1E

but also dairy, so that a production or reducing emissions cap ensures efficiencies are actually realised as actual aggregate emissions reductions.

An alternative strategy for Teagasc to consider would be to advocate for diverting subsidies away from ruminant farming and toward low-input land-use including tillage, horticulture, agroforestry, permanent woodland and solar farming. This option would offer farmers positive, genuinely "climate smart", and far more future proofed agriculture, and would likely increase rural employment.

In summary, based on the data and on Teagasc's own research, the most "*relevant policies*" for mitigating Irish agricultural emissions are planned (annually reducing) limits on beef and dairy production or on inputs (fertiliser and feed imports). In advocating for claimed relative efficiency of Irish cattle farming as a justification for expansion (a claim now strongly questioned by the GLEAM analysis), Teagasc and the Department of Agriculture claim that otherwise *'carbon leakage*" would occur enabling lower efficiency/higher emissions producers from other countries to supply global demand. This could be a valid argument if and only if Teagasc and the Department clearly articulate their preferred, enforced carbon governance mechanism to regulate, cap or price food emissions within the EU and on imports into the EU. If Teagasc and DAFM are not stating the enforceable mechanism within which to realise efficiency gains as actual emissions savings and displace inefficient producers, then neither the efficiency nor the leakage arguments can be interpreted as soundly based.

In fact, Ireland already has a target which includes agricultural emissions: Ireland's agreed 2020 ESD to limit non-ETS emissions. It is commonly recognised outside government that an agreed policy mechanism to drive non-ETS emissions is necessary and long overdue. What common per tonne CO2e carbon credit price, or set of prices for each non-ETS sector, do Teagasc recommend to meet the 2020 ESD target and the proposed 2030 ESD target? Or are Teagasc or the Department proposing to Europe some other mechanism to ensure meeting our absolute emission reduction targets? If they are not proposing an alternative mechanism to meet non-ETS targets then they are not making a valid argument.

The Global Context for Irish Agriculture

If the Paris Agreement global Carbon Budget is to be achieved to ensure the immediate and rapid reduction of Greenhouse Gases to stabilize global temperature increase to as near as possible to 1.5°C degrees over pre-industrial levels, then, with developed countries taking leadership through:

If the rapid GHG reductions required by the temperature limits and consequent carbon budget flowing from the Paris Agreement are to be achieved, then the following actions and policies are essential, especially from wealthy countries, including Ireland:

1. An effective global carbon pricing regime for all traded goods and services including food as much as energy and transport.
2. A total redirection of global investment resources, economic activity and employment into as near as possible zero carbon food energy and transport production and trading systems.
3. The curtailment of production and marketing of high carbon food, particularity red meat and dairy, and fossil fuel based energy and transport infrastructure with an acceleration of low carbon alternatives.

The transition to a low carbon, climate resilient society should be embraced as a positive opportunity to leave the legacy of a living planet for future generations. The rapid scaling up of new food and energy systems and infrastructure will be needed to supersede the redundant and polluting legacy from the past.

The crisis for the European car and vehicle manufacture industry should present a salutary lesson in looking at the future of Irish agriculture. For years European internal combustion engine manufacturers lobbied politicians at national and EU level against achieving any effective emission reduction standards, and worse still as in the Volkswagen scandal, cheated on certification of emission standards. Now European manufacturers are locked

into production line systems that will be redundant with the rapid transition to electric vehicles and the move from individual car ownership to electric vehicle hire and share which climate and sustainable transport action requires.

Fossil fuel energy and transport infrastructure and high carbon food systems generally will face rapid and large scale redundancy leaving what is now a widely accepted concept of "stranded assets".

In the past it was new energy or transport technologies or opening up of new food or cloth production sources which left existing systems redundant. A good historic example of a stranded asset was the abandonment of urban gas lighting infrastructure in cities across the world in the early 20th century as the rapid deployment of electric lighting made gas redundant. Another was the abandonment of horse- drawn transport systems with the progressive development of railways, bicycles and finally the internal combustion engine. Particularly relevant to Ireland, which was a major grain exporter in the early 19th Century, was the scaling up of wheat production in North America, which left us with a legacy of redundant water mills and fine stone grain stores which still dot the country's side in various states of abandonment or ruin . Another Irish example was the collapse of the Irish linen industry in the early 19thc. Century with the industrial production of imported cotton.

Achieving an Irish 'Just Transition' to Low Carbon Food and Energy

A key and internationally accepted principle in Climate Action is that of "Just Transition" in addressing the employment displacement required in a low carbon future.

This is global in impact affecting fossil fuel extraction distribution and servicing with particularly regions with high dependence on coal mining. In 2018 Spain set a lead example in the cessation of coal mining with an economic plan for employment in the regions affected. The overdue cessation of peat extraction for electricity generation in the Irish midlands requires a similar plan.

Ireland as a developed country now needs to set international leadership in the transition to a low carbon food production system and reducing bovine agriculture, while at the same time advance new rural employment and land use compatible with ecological constraints and maintaining an inhabited Irish country side and rural economy. The conversion of marginal agricultural land to conifer forestry plantations which is now raisng such serious community concern in Co Leitrim is not a model to be followed.

A new Irish food production strategy requires a rapid and accelerated development of plant based food production compatible with Irish climatic conditions, and the scaling up of the food protein sources identified in the January 2019 EAT Lancet report (See Appendix 1).

The moral emperative of caring for "our common home" has been communicated by Pope Francis in his 2015 Encyclical Letter "Laidato Si". The encyclical follows the message of Pope Paul VI: "*Due to an ill-considered exploitation of nature, humanity runs the risk of destroying it and becoming in turn a victim of this degradation*". He also spoke in similar terms to the Food and Agriculture Organization of the United Nations in 1970 about the potential for an "eco*logical catastrophe under the effective explosion of industrial civilization*", and stressed "*the urgent need for a radical change in the conduct of humanity*", inasmuch as "*the most extraordinary scientific advances, the most amazing technical abilities, the most astonishing economic growth, unless they are accompanied by authentic social and moral progress, will definitively turn against man*".

-END-

Appendix 1

Food in the Anthropocene: the EAT-*Lancet* Commission on healthy diets from sustainable food systems

Executive Summary:
-Global scientific targets to define a safe food production system to ensure that the SDGs and the Paris Agreement are achieved
-Produced a 'reference' diet that is based on sound scientific evidence to create a sustainable diet for the future

Strategies for a "Great Food Transformation":
1. International and National Commitment
    -Public health information
    -Sustainability education
    -Coordination between both the department of health and the environment
2. Reorientation of Agriculture
    -Increased growth of specific crops
    -Biodiversity enhancing foods
3. Sustainability increasing food production
- Reducing yield gaps on croplands
- Improving fertilizer and nutrient recycling and water usage
4. Strong Coordination between the government with lands and oceans
    -Restoration/Re-forestation
    -Management of Fisheries
5. Halve the food losses and wastes
    -Technological solutions will be needed

Introduction:
-Modern diets are leading to obesity and environmental challenges
-Approximately 60% of fish stocks are completely depleted
-"Lose- lose" diets are those that are both unhealthy, and non-environmentally friendly

Sustainable Development Goals:
-Seek to end poverty
-Protect the Planet
-Ensure that there is prosperity for all
-Eradicate hunger/malnourishment

Safe Operating Space for Food Systems:
-There are clear targets set for climate change mitigation, but there are none that are set for the food sector
-Setting these goals could help to ensure that there are healthy diets and ensure a stable earth system
-We should be applying a precautionary principle and risk perspective
    -Boundaries should be: guidelines for decision makers on the acceptable risk levels we can take for both human health and environmentally sustainable food production
-The "win-win" diet falls within the safe operating space for food systems

Scope and Limitations:
-"Food Systems" are not only limited to feeding humans
-They also affect society, culture, economy, animal welfare, etc.
-Guaranteed solutions do not exist – study is only intended to provide a 'scope'
-Reducing population growth will be essential – set to be: 9.8 billion by 2050, 11 billion by 2100

Healthy Diets: What is Considered Healthy?
-Dependant on age, disease status, vulnerability, sex, etc.
-The global average caloric intake = 2370 Kcal/day
-Increased activity should mean that there is a larger intake of foods

-Less intake should be associated with a lower BMI

Reference Diet:

2500 Kcal/day – 70kg male (30 years old)

-60kg female (30 years old) – with a moderate to high activity level

-Meat products have "High quality, high producing" amino acids

-This is required for rapidly growing youth

-Adults: do not need – could be leading to cancerous cells

-Red meats (both processed and not) were linked to heart disease mortality

-In Asia, red meat diets are difficult to assess due to red meat not being in their diets for very long, therefore the long term health effects cannot be determined

-Red meat optimal intake: 0-28g Average= 14g/day

-Chicken optimal intake: 0-58g Average= 29g/day

-Calcium optimal intake: 718mg/day

-Cardiovascular Mortality will decrease if dairy products are replaced by nuts/other plant sources of calcium

-In the Sub-Saharan Africa: 164 Kcal/capita/day from meat products

-In the USA: 995 Kcal/day from meat products

-Eating approx. 2 g/week of Omega-3 fatty acids from fish sources (which is approximately 2 servings of fish/week) might reduce the risk of heart disease by 1/3

-It is estimated that by eating the foods recommended in this reference diet, 11.1 million deaths per year could be avoided in 2030, and could avoid 11,600,000 deaths per year, or 23.6% of all adult mortalities

Fish:

28 g/day of fish

Eggs:

13 g/day or approx. 1.5 eggs per week

Nuts:

30 g/day will lead to a decrease in cardiovascular disease by 28%
50 g/day is a sufficient supplement for red meat

Legumes:

-Eating soy foods in childhood/early adulthood are associated with risks in developing breast cancer
-Because of this, the reference diet has included 50 g of dry weight of beans, lentils, peas and approx. 25 g/day of soy beans

-Cyanobacteria = can be consumed as having a very high protein content

Carbohydrate Sources:

-A higher intake of whole grains = a decreased risk of coronary heart disease
= Decrease in Type 2 diabetes
=An overall decrease in mortality
-Higher carbohydrate intake = a higher blood triglyceride level, lower HDL, higher Blood pressure
-Total intake should be 60% of daily calories or less from carbohydrates
-232 g/day of whole grains

Potatoes:
-A higher intake will lead to an increase in weight gain, type 2 diabetes and hypertension
-50 g/day of tubers/starchy vegetables

Fruits and Vegetables:
-Essential for micronutrient consumption (for ex. Provitamin A)
-Leaving out more starchy vegetables (Peas, corn, potatoes)
-300 g/day vegetables
-200 g/day fruit
-OR a mix of approx. 5 servings of fruit and vegetables a day (a mix)

Added Fats:
-There is no evidence that a decreased fat intake will decrease the risks of heart disease or cancer
-BUT replacing saturated fats with unsaturated fats (ex. Ones with omega 3 and 6) may decrease the risks of heart disease or cancer
-Rapeseed oil (canola oils) = a decreased rate of heart disease (often used in the "Mediterranean" diet)
-Replacing animal fats with unsaturated plant oils
-50 g/day of added animal fats are suggested

Sugars and other Sweeteners:
-High intake will lead to further plasma triglyceride concentrations
-Only about 5% (WHO suggests that below 10% is sufficient, but that 5% or less is even more beneficial) of the daily caloric intake should come from these sources

Young Children/Adolescents
-Being breast fed from birth to approx. 2 years old helps with cognitive abilities, healthy growth, and possibly a decrease in developing obesity later in life
-4-7 food groups are recommended when being breastfed

Pregnancy/Lactation:
-Consuming excess amounts of meat products during pregnancy has been linked to children developing obesity 20 years later
-Being vegetarian is not harmful during pregnancy, as long as all of the nutrients are being consumed
-Must consume Vitamin B12 supplements

SUMMARY OF REFERENCE DIET:
1. Protein should mostly come from plants – should be consuming fewer poultry and eggs, and much less red meats; if any
2. Fats should mostly be coming from unsaturated plant sources
3. Carbohydrates should be coming from whole grain sources, with a decrease in refined grains consumption
4. 5 servings of mixed fruits and vegetables per day
5. Moderate dairy consumption (optional)

Sustainable Food Production:
-Minimising the environmental affects and increasing/improving management region to region
-Planetary boundaries = Identify and define the biophysical safe operating space for processes that contribute to the resilience of the Earth's system. We must stay within these boundaries in order to decrease the risk of catastrophic shifts in the earth's system

Climate Change:
-Food production systems are a source of Methane and nitrous oxide-56 and 280x the global potential over 20 years of CO_2
-Methane = from ruminant livestock – cows and sheep

-Nitrous Oxide = soil microbes in croplands
-CO_2 = from tillage, burning and clearing, fossil fuels for farming equipment
-Carbon capture and store – to solve the overshooting of the amount of C in the atmosphere relative to the Paris Agreement

Probable Requirements for Maintaining 2'c Global Warming:
-Peak no later than 2020
-5 Gt Carbon maximum
-A net global source must change to a net Carbon sink (-10 Gt)

Status of Emissions with Food Production:
-Non – CO_2 = 5-5.8 Gt of CO_2 e-
-Croplands/pastures = 2.2-6.6 Gt CO_2 e-
-Biomass burning = 0.3 Gt CO_2 e-
-Agricultural Machinery = 1.0 Gt CO_2 e-
-TOTAL = 8.5-13.7 GT CO_2 e-
-Proposed that 5Gt CO_2 e- be from nitrous oxide and methane
-Zero CO_2 emissions to come from land use change
-Zero net emissions from energy use in the food supply chains

Freshwater Use:
-Hydrological cycle is associated with climate systems
-"Consumptive" water use = water removed by a water shed or evapotranspiration
-Non-consumptive water use = water that flows back into aquifers after use
-The original water boundary was set at: 4000km^3/year
-New water boundary should be 2800km^3/year – including all food production
-Agriculture accounts for 75-84% of the global consumptive water use
-Should be approximately 90% as opposed to 75-84% because agriculture accounts for almost all of the food production
-By trading water intensive foods, we may be able to maintain the integrity of water basins

Nitrogen and Phosphorus Flows:
-Atmospheric Nitrogen deposition = contamination source
-The challenge is to harmonize the maximum allowed Nitrogen and Phosphorus loading to maintain a stable earth
-Closing of nutrient loops = higher food production and recovering of nutrients in a usable form
-By improving nutrient use and re-use, this will allow for an increase in global application of nitrogen and phosphorus to close the yield gap
-Redistribution of Nitrogen and Phosphorus - Many developed countries have far too many resources, while the developing countries do not have enough (1⁄2 to 1⁄4 of that amount)

The Nitrogen Boundary: Would only require a 0.5-0.67 of the global nitrogen application; which is 90-130 TG of the nitrogen/year

The Phosphorus Boundary: Most of the phosphorus that is applied is through fertilizer usage. Phosphorus can be stored in sinks; nitrogen cannot be
-To increase crop yields, phosphorus stocks should be saturated globally, and we should be replacing any P that becomes removed during harvest
-Recycling 50% of the P from human waste and re-applying it to croplands should be done

Food Production and Biodiversity Losses:
-Agrobiodiversity = crop diversity, soil microbes and carbon sinks
-80% of all mammal and bird threats come from agriculture
-Holocene extinction rates are even lower

-Insect diversity has decreased by 75% in the past 30 years
-Uncertainty of 1-80 extinctions per 1,000,000 species (1= baseline, 80= agricultural losses)

Land System Changes:
-A decrease in agricultural lands have occurred in temperate regions
-Between 2000-2014, Brazil lost 2.7 million ha/year of forested lands
-51% of lands globally = in-tact ecosystems (a biodiversity index of above 90%)
    -15% of this has legal protection – 'natural' habitats
    -17% target for inland water areas
    -36% has no legal protection, yet still have a high level of diversity
-49% remaining = croplands and grazing
    -40% of ice-free landscapes – of this: 23% are important for carbon sequestration
-Global land use from food production should be kept below 13M Km^2
-By protecting 50% of the Earth's intact ecosystems, we can conserve 80% of the pre-industrious species richness
-The "Half-Earth" strategy = protecting the earth's remaining 50% intact ecosystems

Specific Targets for Sustainable Food Production:
Targets provide evidence for translation into science-based targets
1. Decarbonise the food value chain from production to consumption
2. Radical improvements in nutrient-use efficiency
3. Move towards zero biodiversity loss
4. Feed humans on the currently existing agricultural lands
5. Integrate 10% conservation into the already existing lands
6. Adopt a half earth strategy for biodiversity conservation by protecting 50% of the current intact ecosystems
7. Reduce food waste by 50%
8. Transform to sustainable intensification of food production

Achieving Healthy Diets from Sustainable Food Systems:
-The population's income (wealth) and GDP will also influence their diets
-We cannot just improve an entire food system to become more environmentally friendly (for example, we cannot alter the digestive system of ruminant cattle and sheep to reduce GHG emissions)
-We therefore must alter the amount and type of foods that we eat – not necessarily how they are produced

Climate Change:
-Changes in food production by 2050 = 10% fewer GHGs
-A plant-based diet change = 80% reductions in GHGs
-Food loss/waste = 5%
-It is estimated that there are approximately 500,000 climate related deaths will occur in 2050 (mostly from a decrease in fruit and vegetable availability and weight gain through unhealthy lifestyles)

Freshwater Use:
-1-9% increase could be provided if diets would switch to more plant based

Reducing Extinction Risk:
-Expanding agriculture into already existent secondary habitats or other ecosystems
-Adapting new technologies to decrease biodiversity losses
-Halving the food loss and waste by up to 33%

Human Weight:
-The healthy caloric intake for adults needs to decrease from 2,500 to 2,100
-BMI must decrease to 22kg/m^2

Policy Levers:
-At the beginning, soft policy may be applied (AKA-just suggestions)
High Income Societies:
-We should be offering less
-Smaller portions, less packaging, more choices
Lower Income Societies:
-We should increase the range and seasonality of foods by cutting waste on primary production

Community/Urban Planning:
-Address ways which low income areas interact with local food systems
-Ensure that there is adequate infrastructure for accessing sellers of healthy foods
-Foods should be costing the amount they should cost, based on the price of production
    -This means that some food prices might increase
    -An increased income via cash transfers could be done
    -Tax and subsidies should encourage healthy/sustainable diets
    -Social protection schemes, insurance programs, safety nets, removing trade barriers, international management of food stocks, revision of biofuel subsidies
    - "INFORMAS" framework = a tool for the public to monitor food labelling promotions and retail activities

Making Food Taste Good:
-In order to promote foods, such as the reference diet, we must make is healthy, delicious and affordable so that consumers will actually want to eat it

Physicians:
-Food preferences will develop early on in life
-Nutrition counselling – especially with pregnant mothers- is important

Re-orientation of the Agriculture Industry:
-From high output volumes to more healthy and higher quality foods
-Diet quality assessment tools
    -Sustainable Development Goals indicator?
-Support smaller farmers
-Provide incentives for farmers to produce more plant-based foods
    -Invest in technologies which might increase production
-Soil characteristics, water availability, climactic drivers
    -Agriculture should be more adapted to these issues
-Matching production practices to local conditions = sustainable food production
-Precision agriculture – government should provide subsidies

Biodiversity Conservation:
-Essential for ecosystem services that support agriculture
-Sparing remaining ecosystems = achieving climate boundaries

Governance of Lands and Oceans:
-Must suspend logging activities
-Community forest management
-Trade-offs in multiple ecosystem services
-Harmful subsidies to world fisheries must be removed
-SDG #14 = 10% of world's oceans should be closed to fishing by 2020
-Using the precautionary principle wherever possible is needed

Restoration Mechanisms:
-Soil management
-Planting
-Thinning/burning (to speed up vegetation recovery)

1/2 Food Loss/Waste:
-Currently, there is inadequate cooling/storing, which leads to farmers losing crops
-Infrastructure
-The "Save Food" initiative = develop policies, programs, strategies and financing to reduce wastes

Free Trade and Food:
-Natural resource endowment
-Providing compensations
-Without trade, many countries would be lacking in macronutrients and micronutrients
-Trade liberalisation = increased income and increased employment
-Trade can cause an increase in the trade of the "bad" foods – such as sweetened/processed foods
    -Could have potential for altering/slowing down the production of policies

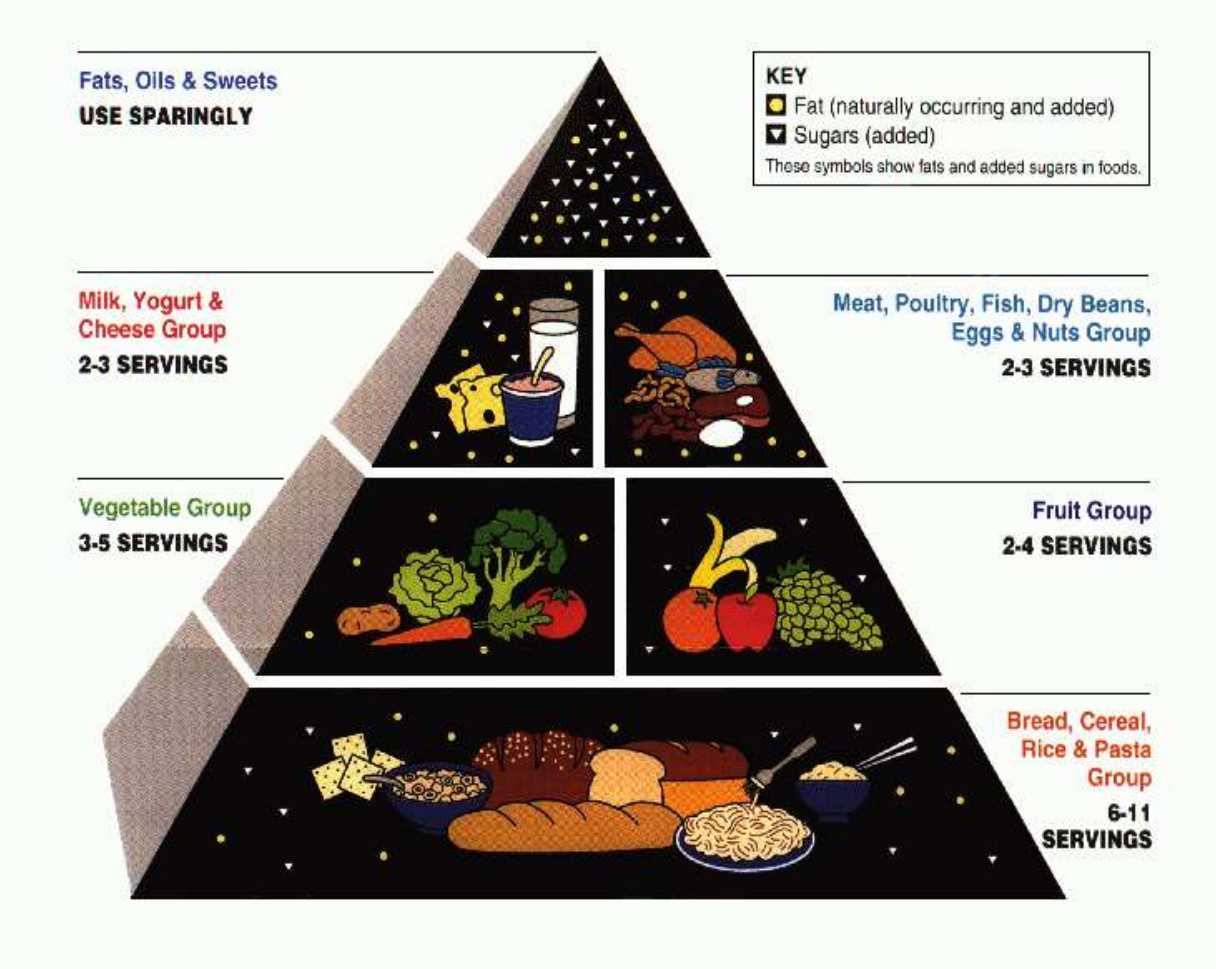
The Great Food Transformation:
-Understanding food labels – including the best before dates
-Storage practices
-Portion size changes
-Leftovers usage
-Food re-distribution
Tools:
-A single set of shared goals
-Consensus in order to gain a common agenda
-Engineering change – multi-level
-Domestic spending is required
    -donors and multi-lateral organisations need to be engaged

-There is an absence of dedicated funding to support the transformation towards a sustainable food system
-A new annual/bi-annual report on healthy diets from sustainable food sources
-The IPCC and the International Panel on Biodiversity and Ecosystem Services are attempting to narrow the gap between scientific evidence and policy making
    -Commission recommends that international bodies review whether new bodies are needed – to focus on healthy diets for all sustainable food systems

Conclusions:
-Reference diet = vegetables, fruits, whole grains, legumes, nuts, unsaturated oils
    =low to moderate: seafood and poultry
    =none to low: red meat, refined grains, starchy vegetables
- -Safe planetary boundaries (for 6 environmental processes)

1. Climate change
2. Land-system change
3. Freshwater use
4. Biodiversity loss
5. Nitrogen cycle
6. Phosphorus cycle

Food Category:	Ireland	USA	Canada	United Kingdom
Fruits and Vegetables	5-7 servings	5-9 serving	50.00%	5 servings
Whole Grains	3-5 servings	6-11 servings	25.00%	1/3 of all food
Dairy	3 servings	2-3 servings	0.00%	“some”
Meats/Beans/Nuts	2 servings	2-3 servings	25.00%	1/6 of all food
Fats/Oils/Sweeteners	Limit	Limit	Limit	Limit
High salt/fat/processed foods	Not everyday	N/A	N/A	N/A



Healthy Food for Life

www.healthyireland.ie

The **Food Pyramid**

For adults, teenagers and children aged five and over

Not needed for good health.

Foods and drinks high in fat, sugar and salt



NOT every day

! **Most people consume snacks high in fat, sugar and salt and sugar sweetened drinks up to 6 times a day (Healthy Ireland Survey 2016).** There are no recommended servings for Top Shelf foods and drinks because they are not needed for good health.

Needed for good health. Enjoy a variety every day.

Fats, spreads and oils



In very small amounts

Use as little as possible. Choose mono or polyunsaturated reduced-fat or light spreads. Choose rapeseed, olive, canola, sunflower or corn oils. Limit mayonnaise, coleslaw and salad dressings as they also contain oil. Always cook with as little fat or oil as possible – grilling, oven-baking, steaming, boiling or stir-frying.

Meat, poultry, fish, eggs, beans and nuts



2 Servings a day

Choose lean meat, poultry (without skin) and fish. Eat oily fish up to twice a week. Choose eggs, beans and nuts. Limit processed salty meats such as sausages, bacon and ham.

Milk, yogurt and cheese



3 Servings a day

5 for children age 9–12 and teenagers age 13–18

Choose reduced-fat or low-fat varieties. Choose low-fat milk and yogurt more often than cheese. Enjoy cheese in small amounts. Women who are pregnant or breastfeeding need 3 servings a day.

Wholemeal cereals and breads, potatoes, pasta and rice



3-5* Servings a day

Up to 7* for teenage boys and men age 19–50

Wholemeal and wholegrain cereals are best. Enjoy at each meal. The number of servings depends on age, size, if you are a man or a woman and on activity levels. Watch your serving size and use the Daily Servings Guide below.*

Vegetables, salad and fruit



5-7 Servings a day

Base your meals on these and enjoy a variety of colours. More is better. Limit fruit juice to unsweetened, once a day.