The relationship between climate change and agriculture is a contentious, complex and important one. In this series of twelve blogs, UCD Adjunct Professor Frank Convery will explore the context, challenges and potential solutions for dairy, beef and sheep farming in Ireland. Each blog presents key evidence to underpin informed debate and the series seeks to help plot a sustainable future for the sector.

Responses are invited via earth.institute@ucd.ie and the UCD Earth Institute will host a workshop in association with the UCD School of Agriculture and Food Science and the National Economic and Social Council at the end of the series in December 2022 to discuss the evidence and its implications.

Professor Tasman Crowe, Director, UCD Earth Institute

5. Climate Performance by Irish Ruminant Farming (Dairy, Beef, Sheep): USA – Climate Policy Developments and Consumer Choices in a Key Market for Irish Food

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*"Ireland will become a **world leader** in Sustainable Food Systems over the next decade. This will deliver significant benefits...and will also provide the basis for the future competitive advantage of the sector".*

Food Vision 2030[1]

News & Events


Mountain Research Group Workshop and Field Trip


Earth Institute Artist in residence Deirdre O'Mahony presents 'Sustainment Experiments' in Kilkenny


Irish Research Council funding for research on hemp

"One works by simple observation, looking into things. It's usually called insight and out of that comes your view -- not that you have the view first and then squash everything to make it fit."

Margaret Atwood

Some Key Points

It is clear from its positioning on the global stage and from its step change in domestic policy ($20 billion for ag climate and conservation action in Inflation Reduction Act 2022) that the US could become a global leader in the carbon performance of its dairy and beef sector, where 'performance' in the first instance is measured in Kg of CO2e emissions per Kg of product – its 'carbon footprint'. In some instances it could be possible and desirable to extend this canvas to other impacts, including biodiversity, water and air quality. If the US starts using carbon footprint as a verifiable metric that is available to consumers, it could consider a border tax adjustment that requires exporters to meet their standards or pay a penalty. The metrics will be decided by the US. If Ireland is to 'become a world leader in Sustainable Food Systems (SFS)', its food products in the US market will have to come close to matching the carbon intensity of food produced by US producers who are likely to be the main source of such carbon-footprint competition in this market. The decision by a leading major ENGO (Environmental Defense Fund) to support methane reduction in the sector is significant. Learning by doing is the best way to learn. For over a decade, California has done so, reducing greenhouse gas emissions from dairy farming, albeit in places causing local air, odour or water pollution, challenges which need to be successfully addressed. California could well emerge as the location where state mandated information on climate performance is available on key dairy products, and where California's consumers have independent data on such performance to consider as they make their choices.

Introduction

After the setbacks of the Trump years, the US has emerged again as a climate policy leader generally, and especially regarding agriculture forestry and land use. These developments are important globally, and, since the US is the third largest market (after the EU and UK) for food from Irish ruminant agriculture, they are very relevant for this sector.

Below, I touch first on the evidence that informs the market issue, then turn to developments on the policy front, and conclude with my assessment as to what this evidence implies.

Evidence

Markets

The US is the largest beef producer in the world – 12.73 million metric tons (carcass weight) in 2021 (details Table 6, Blog 3) – and the second largest cow milk producer in the world – 102.2 million metric tons in 2021 (Table 2, Blog 3). This means that the main competition facing exporters of milk and beef products in this market is local.

Ireland's ruminant farming exports to the US in 2021 totalled almost half a billion euros, with dairy products comprising 92% of Ireland's total ruminant exports to this market; beef (7.7%) and sheep (0.3%) barely register.

Table 1. Ruminant Farm Exports to the US (000 €) 2021 IRELAND

Destination	**ROW**	**DAIRY**		**BEEF**		**SHEEP**		**TOTAL**	
		Value (000 €)	%	Value (000 €)	%	Value (000 €)	%	Value (000s €))	%
US	(1)	431,197	8.5	36,206	1.5	1,547	0.4	468,950	6.0
GRAND TOTAL	(2)	5,059,581	100	2,406,477	100	385,250	100	7,851,308	100

Source: Abstracted from Table 2 in Blog 1, which was compiled from a response by Carol Forrester, International Trade in Goods Section, Central Statistics Office Ardee Road, Dublin 6. to request sent to: Trade@cso.ie

While Irish beef sales to the US were very modest in 2021, I gather that access for Irish beef labelled as 'grass-fed' has recently been successfully negotiated. While based in Manhattan (2014-2018) I observed the high price premium that the 'grass fed' label secured; if Irish producers can secure a toe hold in this market in the future, it could be very attractive

Table 2. Top 5 Dairy Export Destinations, by Value and Volume, 2020

Destination	Value (€ 000)	Volume (Tonnes)	Per Tonne €
UK	990,375	467,362	2119.1
Netherlands	680,238	273,636	2485.9
China	520,924	108,204	4814.3
Germany	408,827	109,423	3736.2
US	346,812	55,680	6,228.7

Note the US ranking of 5th in Table 2, rather than 3rd as noted in Blog 1 and elsewhere. This is because: the latter ranking uses 2021 rather than 2020; data aggregates all member states including Netherlands and Germany under one EU27 heading; between 2020 and 2021, value of sales to the US increased sharply, while sales to China declined. For details of 2021 export data, see Table 2, Blog 1.

Given that the US is the second largest producer of cow milk in the world, it is a considerable achievement to have a significant presence in this market.

Between 2015 and 2021, volume increased by a factor of 2.09 and value by 2.31, and this asymmetry is reflected in the increase in the average price per ton over the period – from €5953 in 2015 to €6603 in 2021 - an increase per ton of over 11 per cent. (Table 3).

Both the absolute value of the average price and the trend in the US stands in contrast with their equivalents for 'all dairy exports' from Ireland, where the latter price in 2021 was only 46% of that secured in the US, and the trend since 2015 is downward

Table 3. Dairy exports to the US, Volume, Value and Average Price per Ton, 2015-2121, and average Price per Ton, all Dairy Exports, Ireland

Category	2015		2016		2017		2018		2019		2020		2021	
TO USA														
	Vol	Val	Vol	Val	Vol	Val	Vol	Val	Vol	Val	Vol	Val	Vol	Val
Unit	Tons	Mill €	Tons	Mill €		Mill €		Mill €		Mill €		Mill €		Mill €
Dairy Prod	31245	186.33	34648	180.581	38197	191.383	48259	293.473	52961	332866	55680	346.812	65306	431.197
Val/Ton (€)	5963		5212		5011		6081		6285		6229		6603	
All dairy exports														
Val/Ton (€)	3280		3281		3421		3205		2947		2981		3065	

Source: Compiled from data kindly supplied by Carol Forrester, International Trade in Goods Section, Central Statistics Office Ardee Road, Dublin 6, to request sent to: Trade@cso.ie

Also, for last row, see 'Value per Ton (€) 'All Dairy Exports' in Row (3),

A leading Irish supplier to this market is Ornua ('Kerrygold'). Elizabeth G Dunn (Bloomberg) observed that "It's often displayed alongside Plugrá, a European-style butter produced in the U.S. by the Dairy Farmers of America Inc.; Lurpak, imported from Denmark; and Président, a French offering—all of which come in half-pound slabs, priced at a

premium to Land O'Lakes and other mainstream domestic brands". (See more detail on Dunn's views in Blog 2). There is no hint that US consumers would transfer their loyalty to Brazilian suppliers if there was a reduction in Irish product.

Developments in Climate Policy

There are developments at both federal and state levels that have implications for climate performance including total emissions and carbon footprint (emissions per Kg of product)

Federal

Global: From its earliest days, the Biden administration decided to prioritize action on climate change, including methane abatement both domestically and internationally. In the Global Methane Pledge (30% reduction by all sources by 2030),[2] President Biden specifically targeted methane from agriculture.[3] An important context were the proposals for the incoming President and Congress developed jointly by the main farm organizations and a couple of Environmental Non-governmental organizations; these suggested a range of voluntary, incentive-based tools for farmers, ranchers and forest owners to maximize the sequestration of carbon and the reduction of other greenhouse gas emissions and increase the resilience of the land.[4] More recently, this focus has been given real substance: **Inflation Reduction Act (IRA), 2022:** On August 24, 2022, President Biden signed the Inflation Reduction Act (IRA), 2022 into law.[6]

The big picture as regards IRA's contribution to advancing climate policy for agriculture, forestry and land use is as follows:[7]

1. **Department of Agriculture's Partnerships for Climate-Smart Commodities program, 2022**: $2.8 billion in funding to 70 pilot projects (of which 7 are dairy projects) that develop and expand markets for crops and livestock farmed in ways that reduce greenhouse gas emissions and/or sequester carbon.[5]

2. $20 billion toward agricultural conservation programs and nearly $14 billion toward clean energy for rural America - climate mitigation is now a stated priority for these conservation programs, with guidance in the bill to prioritize practices that reduce methane and nitrous oxide and help sequester carbon in soils.
3. It creates a strong foundation for the next Farm Bill - a mammoth bill that comes up every five years which will be written in 2023 and provides an opportunity to develop and implement creative ideas to advance climate-smart farming
4. $300 million for USDA's Office of Energy and Environmental Policy to set up a program to measure the climate impact of conservation programs managed by the Natural Resources Conservation Service. These funds can be used for aggregating and analysing existing data or conducting new research to improve on-farm and regional measurement, reporting and verification.
5. $14 billion investment in helping farms and rural electric coops transition to clean energy, which will create 90,000 jobs and make rural electric grids more reliable and resilient.
6. A total of $5 billion is allocated to forestry, of which $2.25 billion goes to the National Forests, with an emphasis on fire hazard reduction, and $2.75 billion to non-federal forests.
7. On ag methane there is a mention that Under the Conservation funds the Sec will prioritize innovation proposals that reduce enteric emissions (Sec 21001).

California

California is the largest cow milk producer in the US, supplying 19% of total national production. I visited family and friends in California in spring 2022, during which time I met with some folk who are active on climate and environmental matters, and attended a very informative workshop: "Methane, Dairies and Livestock, and Renewable Gas in California" on March 29; this was hosted by the California Air Resources Board (CARB) which leads the implementation of the state's climate policies. I was struck by how pervasive the concerns around climate change were, animated in part by forest and brush fires, emerging water scarcities, and the associated dangers to life and property.

California has long been a leader in the US in taking direct action to address environmental challenges, and many of its initiatives later became federal policy[8]. Today, it is the US leader in the development and implementation of climate policy, and this includes policy for agriculture; it is emerging as a global leader in the design and delivery of effective climate policy for ruminant farming. In 2011 and then in 2015 it initiated and implemented policies directed at reducing emissions from ruminant farming at scale, and legislation was passed in 2016 which under certain circumstances, requires methane

emissions from agriculture to be reduced by 2030; it has discerning consumers, who are actively involved in understanding the qualities of what they eat, and proactive in challenging sustainability claims; it is a source of technical and policy innovation.

Low Carbon Fuel Standard: Since 2011, California has been running a policy called the low carbon fuel standard (LCFS), which includes incentives for dairy farms to convert methane into energy to fuel vehicles by enabling them to sell offset credits. The idea is to reduce farm emissions while allowing fossil fuel companies to buy these offsets. The number of anaerobic digesters used to produce the biogas has surged in the state especially among large dairy farms. While this has been successful, critiques have emerged, to the effect that the policy is encouraging the emergence of ever larger dairy farms, who can capture economies of scale, and this has negative environmental and social spillovers, and the financial rewards for farmers are so generous that it is encouraging expansion[9]. Environmental Justice advocates argue that the externality of this methane targeting policy is increased concentration of operations and related air and water pollution in vulnerable communities.

Grand-Aided Emissions Reduction: Since 2015 funding from the Department of Food and Agriculture has been awarded on a competitive basis, with matching funds provided by beneficiaries, to reduce non-enteric emissions of methane and nitrous oxide by livestock in California (Dairy Digester Research and Development Program and the Alternative Manure Management Programme)[10]. Emissions have been reduced by 3.5 million tons, at a cost (Public subsidy and private investment combined) of US$1 billion.[11]

Legislation: Senate Bill No. 1383 Chapter 395, 2016: if certain circumstances are met, this requires a 40% reduction in methane emissions from agriculture by 2030.

Discerning and proactive consumers: It is no accident that the class action suit challenging Ornua's ('Kerrygold') 'grass fed' claims were challenged in a California[12].

Innovation Culture: Frank Mitloehner (UC Davis) remarked that "There is a 'gold rush' in California to get into technologies to reduce methane because 'there is money to be made', along with becoming greener" [13]. Typical of such developments is Blue Ocean Barns which was co-founded and is led by Joan Salwel[14]. The company developed and implemented the business model for 'Brominata' which she calls the 'world's first commercially available asparagopsis product', for which they have received a US patent. They are growing this variety of seaweed and began feeding it on farm in California on June 6th, and they have secured a listing on the Verra Carbon Registry. The California Department of Food and Agriculture (CDFA) provisionally authorized the use and sale of Brominata throughout the state[15]. The latter is a key step because health issues around bromoform had been raised.[16] The University of California, Davis is a hub for both technical innovation and assessment and critique of policy[17].

The Role of Environmental Non-Governmental Organizations (ENGOs)

The Environmental Defense Fund (EDF) is one of a small number of ENGOs founded in the US who have the funding[18], scale and ambition to aim to help maximize the prospects of achieving emissions reduction at scale[19]. It does so by: prioritizing a small number of major ambitions in areas where there has been relatively little effort at scale thus far; identifying the essential elements that are most likely to deliver emissions' reduction at scale; learn by doing as it supports these elements; pragmatism; persisting over a long time when this is justified, and cutting its losses when it is not. It was the key ENGO supporting the creating of a US-wide emissions trading system for greenhouse gas emissions. When this failed in 2010, it decided to prioritize reducing methane emissions at scale from the oil and gas industry. It discovered early on that the data on methane emissions in the US was of poor quality; led by chief scientist Steve Hamburg, it coordinated a series of research explorations to fill the data gap, insisting that all findings be published in peer-reviewed journals; helped the State of Colorado regulate emissions from its Oil and Gas industry; used the learnings from this to help the federal government to act, then to extend action to include Canada and Mexico, and thence to Europe and beyond. It has led the concept and development of the world's first customized methane measuring satellite (MethaneSat) which is expected to launch in 2023. After more than a decade of progress on controlling methane emissions from the oil and gas sector, it has decided to add reducing methane emissions from farming at scale to its portfolio:

Ambition: Rapidly accelerate the global livestock sector's movement towards low-methane production.

Challenges: 1) lack of political will; 2) insufficient focus on deployment and adoption of available solutions; and 3) insufficient research and development investments in new technical solutions.

Actions:

- Increase political will by making the scientific, economic and technical case to key government decision-makers that methane reductions are urgent, possible (without jeopardizing economic development or national dietary sovereignty), and in some cases even profitable (through increased productivity).
- New Political commitments are expected to clear the way for *incentives* to increase uptake of solutions and spur *additional technology innovation*.

Scope: EU, U.S., China and India, four regions that account for more than one-third of livestock emissions and more than half of global meat and dairy trade.

Assessment

Output

- If Ireland is to 'become a world leader in Sustainable Food Systems (SFS) over the next decade' its food products in the US market will need to come close to matching the carbon intensity of food produced locally.
- As is the case with EU27 and the UK, local producers are the main competition for Irish produce being exported into this market, i.e., indigenous suppliers are likely to be the main source of carbon-footprint competition.
- California could well emerge as the location where state mandated information on such performance is available on key dairy products, and where California's consumers have independent data on such performance to consider as they make their choices. Whole Foods is a food retailer headquartered in San Francisco; its niche is meeting the needs of customers who are very discerning as regards animal welfare, health and climate and environmental performance. In Blog 7 (New Zealand) I will touch briefly on how Atkins Ranch, a lamb processor and exporter, supplies this premium market with lamb from a network of NZ farmers who meet Whole Food's standards.
- If Irish suppliers into this market make claims such as 'we are a world leader in sustainable food systems' they need to be ready to successfully defend these in court.
- The following case does not stand up to scrutiny: that if Irish supply to the US market were reduced, it would, in this market, be displaced by milk that is produced on farms whose carbon footprint is 'the average emission intensity globally'.[20]
- Most grocery stores in the US, including Walmart, provide (more expensive) grass-fed beef as an option. While living in New York (2014-2018) I regularly looked out for Irish beef on grocers' shelves, but never found it but there is good news. Agreement has been reached with the US authorities to allow Irish beef labelled as 'grass-fed' to have access to its market

Developments in Climate Policy

- For over a decade, California has designed and delivered policies that reduce greenhouse gas emissions from dairy farming. This progress is not without its environmental and other costs, but there has been lots of learning by doing. Over the same period, we have faffed around, all the time echoing Queen, with some of us singing to ourselves 'We are the Champions'.
- Effective policy is also learning by doing; it needs to adapt as new insights emerge.
- It is clear from its positioning on the global stage and from its step change in domestic policy (Inflation Reduction Act) that the US could become a global leader in the carbon performance of its dairy and beef sector.
- If the US does so, it could consider a border tax adjustment that requires exporters to meet their standards or pay a penalty. The metrics that decide what and how emissions are measured and assessed in its market with be decided by the US.

- As is the case in the EU with Bovaer, it is possible, and perhaps likely, that the means that are developed to reduce emissions at scale and at low cost in the US are best suited for use in indoor containment systems, and that this would put pasture-based systems at a competitive disadvantage.
- It is no coincidence that Denmark (dairy) has signed a memorandum of understanding with California.[21] Perhaps Ireland should consider doing likewise.
- There is a case that Ireland's Consul General in San Francisco should devote a lot of time to understanding what is emerging in California in terms of climate policy for farming and the associated technologies, get to know the key players at all levels – farmers, retailers, politicians, administrators, academics, business, environmental non-governmental organizations - what they are doing, thinking and where they may be going. These players may be helping decide the economic and social future of rural Ireland.

Header image credit: Jonathan Hanna on Unsplash

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Biography

Frank Convery has degrees [B. Ag and M.Ag (Forestry)] from UCD. Encouraged by the late Seamus Sheehy, he went to the US and took a PhD in Forestry Economics (State University of New York). After a distinguished academic career in the US (Duke University) he returned to Ireland as research professor at ESRI before being appointed as Heritage Trust Professor of Environmental Studies at UCD where he led the successful application for the funding of the UCD Earth Institute. He chaired the boards of the Sustainable Energy Authority of Ireland (SEAI) (2002-2007), Comhar Sustainable Development Council (2006-2010) and served on the Climate Change Committee (2016-2020) chaired by John FitzGerald, and the AgriFood 2030 Committee chaired by Tom Arnold. The latter produced *Food Vision 2030*. From 2014 to 2018, he was chief economist with the

Environmental Defense Fund, New York. His passion is finding ways to bring the weight of learning down to where things are done; his ambition for the sector is the same as Food Vision 2030's: "Ireland will become a **world leader** in Sustainable Food Systems (SFS) over the next decade. This will deliver significant benefits…and will also provide the basis for the future competitive advantage of the sector".

Footnotes and references

[1] gov.ie - Food Vision 2030 – A World Leader in Sustainable Food Systems (www.gov.ie) p.9

[2] Homepage | Global Methane Pledge

[3] "At the President's urging and in partnership with US farmers and ranchers, the US Department of Agriculture is working to significantly expand the voluntary adoption of climate-smart agriculture practices that will reduce methane emissions from key agriculture sources by incentivizing the deployment of improved manure management systems, anaerobic digesters, new livestock feeds, composting and other practices. The US Congress is considering supplemental funding that would support many of these efforts".

[4] The Food and Agriculture Alliance – Joint Policy Recommendations Layout 1 (agri-pulse.com)

[5] See infographic on the US Department of Agriculture website here. See also: https://www.edf.org/media/usda-makes-historic-28-billion-investment-agricultural-climate-solutions

[6] More details on IRA can be found in: What's in the Inflation Reduction Act for agriculture? | TheFencePost.com

[7] From Ben Thomas August 12, 2022. To address climate change, U.S. makes historic investment in rural America | Growing Returns (edf.org)

[8] Examples of the latter include setting mandatory emissions standards for pollutants from motor vehicles in the 1960s and adoption of energy efficiency standards for appliances in the 1970s.

[9] Younes, A. and Fingerman, K. (2021). Quantification of Dairy Farm Subsidies Under California's Low Carbon Fuel Standard. Arcata, CA 24-lcfs-wkshp-dec21-ws-AHVSN1MhVlpXNQRl.pdf (ca.gov), commissioned by the Union for Concerned Scientists.

[10] CDFA - Office of Environmental Farming & Innovation (OEFI) (ca.gov)

[11] CARB 2022. Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target (March 2022) (ca.gov)

[12] On February 3, 2019, Judge Marilyn Huff found in favour of Ornua; she was influenced by the quality of the evidence from the "Sustainable Dairy Assurance Scheme (SDAS)" and its timeliness

[13] Air quality scientist: 'We have to rethink methane' - Agriland.ie

[14] blueoceanbarns.com

[15] See details of CDFA's decision in: https://www.cdfa.ca.gov/is/ffldrs/pdfs/QuarterlyFeedUpdate_2022_Q3.pdf, p. 4. This decision includes the following: "To analyze the Blue Ocean Barns product for safety, the CDFA Feed Inspection Advisory Board (FIAB) and the FIAB Technical Advisory Subcommittee approved a proposal from Blue Ocean Barns to conduct a 40-day feeding trial with technical assistance and regulatory oversight from CDFA's Commercial Feed Regulatory Program and CDFA's Safe Animal Feed Education Program to sample and analyze the project for safety in a commercial setting."

[16] Seaweed as a methane inhibitor is not free of risks - WUR

[17] E.g., for the emissions-reduction case for asparagopsis as an inhibitor of methane emissions see: Roque, B. M., Salwen, J. K., Kinley, R., Kebreab, E., 2019. "Inclusion of Asparagopsis armata in lactating dairy cows' diet reduces enteric methane emission by over 50 percent". *Journal of Cleaner Production*, 234: 132-138. For critique of California's Low Carbon Fuel Standard, see: Aaron Smith. 2021. "What's Worth More: A Cow's Milk or its Poop?" asmith.ucdavis.edu/news/cow-power-rising

[18] Its total operating support in fiscal 2021 was $371 million. Environmental Defense Fund, Incorporated (edf.org), p. 7.

[19] Declaration of Interest. I was chief economist at EDF from 2014-2018, based at its headquarters in New York city.

[20] This has been suggested as a relevant counterfactual - see Blog 2.

[21] California and Denmark Sign MOU on Climate Smart Dairy Collaboration | Dairy Business News