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The Dublin Declaration: Gain for the Meat Industry, Loss for Science

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ABSTRACT

We critically analyzed the "Dublin Declaration of Scientists on the Societal Role of Livestock" (DD), a document promoting animal farming, and its implications for public discourse and policy. Our analysis reveals that the DD is scientifically problematic, particularly in its neglect of issues such as meat overconsumption in high-income countries and the dominance of industrial animal production, thereby downplaying associated risks and harms. We also show that the DD's authors essentially suggest that societies should simply rely on technological progress to fix any "challenges" associated with the sector, a suggestion that aligns with the authors' private interests. We identify several academically questionable practices, including denial of credentials to dissenting actors, omission of significant conflicts of interest, and excessive self-edition and self-citation, all while purporting to provide a scientific and balanced overview. Relatedly, we bring into view conflicts of interests of the Irish semi-state authority Teagasc, which hosted a DD-related summit, and of *Animal Frontiers* and the animal production science associations behind it, which published a special issue edited by the DD's authors containing the DD. We explore potential responsibilities by these organizations, the DD's authors, and *Nature Food*, which published a follow-up correspondence by two of the DD's authors. Our perspective contributes to the growing literature exposing the influence of the meat industry on science and its representation in public discourse. We discuss broader policy measures to mitigate and counteract this influence.

1. Introduction

In recent decades, scientific evidence has been mounting that transitioning away from animal-based food to alternatives, particularly in wealthy countries, would realize significant societal and environmental benefits (see e.g. Steinfeld et al., 2006; Ripple et al., 2014; Watson et al., 2019; Willett et al., 2019; Mbow et al., 2019; and Romanello et al., 2023). This evidence base threatens the profitability and viability of large-scale animal production, and thus significant resources are spent by private interests, including agribusiness corporations and industry associations, to maintain a sociopolitical environment favorable to large-scale animal production. For instance, in the past decade, eight of the major United States (US) dairy and meat companies have issued at least 545 lobbying reports on environmental and climate-related issues

(Lazarus et al., 2021). These and related efforts are often epistemically harmful, in that they deny, obfuscate, or distract from the harms caused by the industry (Hannan, 2020; Ceryes and Heaney, 2019; Rose et al., 2021; Sievert et al., 2021; Clare et al., 2022; Carter, 2024; InfluenceMap, 2024), including the health impacts of (excess) meat consumption (Fernández and Almiron, 2023). Some industry actors also seek to cooperate with academics to strengthen their influence on public discourse, including scientific discourse (Legg et al., 2021a). This is well-illustrated by a recent study which shows that academics have been financially supported by industry actors in conducting industry-favorable activities, e.g., downplaying the animal farming industry's climate impacts (Morris and Jacquet, 2024). We here contribute another case study where associations between the industry and academia led to an epistemically questionable outcome.

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We focus on a recent manifesto, “The Dublin Declaration of Scientists on the Societal Role of Livestock” (DD), launched in October 2022 and signed by roughly 1200 signatories at the time of writing (Ederer et al., 2023a). In Section 1, we show how the DD’s content closely follows the discursive frames developed by the animal production industry in lobbying documents. We discuss how these highly industry-friendly frames and associated statements are scientifically problematic. In particular, we show how the DD’s authors misleadingly neglect well-established scientific evidence pointing toward a need to significantly reduce meat production and consumption in high-income countries. We also quantify the high degree of self-citation behind the DD and show that the DD is unconstructively divisive.

We further explore the ecosystem around the DD (Section 2), including the *Animal Frontiers* Special Issue (AFSI) which features the DD (Ederer and Leroy, 2023). In doing so, we examine the financial and institutional connections between these outputs and the animal production industry, synthesizing previously underexplored information to highlight significant conflicts of interest (COIs), such as ownership of industry consultancies. We expose how these COIs were and partially still are obfuscated, and discuss the role of applied animal production research in the DD. Lastly, we expose a high level of self-editing, arguing that the AFSI cannot be seen as adhering to the rigorous standards expected of peer-reviewed scientific research.

Regarding the impacts of the DD, we show how the DD was uncritically promoted by several influential media outlets, and that it plausibly may have had a detrimental effect on EU policy (Section 3). We also explore the significance of the *Nature Food* Correspondence (NFC) of the two editors of the AFSI and main co-authors of the DD that was published in 2023 (Leroy and Ederer, 2023). Based on our analysis of the characteristics and impacts of the DD, we argue that the DD overall is epistemically damaging. Finally, we discuss possible policies for the way forward (Section 4). Among other issues, while we acknowledge that academia-industry ties can and often do yield benefits for scientific production, e.g., valuable knowledge exchange, we advocate for implementing policies that could mitigate detrimental industry influences on science.

1.1. The DD’s content: industry-friendly, scientifically problematic

We analyzed the content of the DD with the help of a framework developed by Clare et al. (2022), who examined several documents disseminated by organizations representing the meat industry (reports, fact pages, teaching materials, and responses to scientific publications and reports). Across these documents, Clare et al. identified four main discursive frames in support of animal production and consumption. We found that three of these frames are present in the DD, as well as most of their sub-frames as identified by Clare et al. Screening the remaining text, we identified an additional major discursive frame that we call “Animal farming is what humans do,” as well as two associated sub-frames, which we discuss in Section 1.4. Fig. 1 shows that most of the DD’s sentences employ these discursive frames. We scrutinize and challenge these frames in Sections 1.1 to 1.4, and summarize our findings in Section 1.5.

1.2. Frame #1: “Keep eating meat to be healthy”

The authors frame meat as a healthy and vital dietary component. They raise arguments that correspond to the two subframes identified by Clare et al. (2022): *Meat is healthy* and *We should eat some meat*. For instance, the authors assert that “livestock-derived foods provide a variety of essential nutrients and other health-promoting compounds, many of which are lacking in diets globally, even among those populations with higher incomes” and that “the regular consumption of meat, dairy and eggs, as part of a well-balanced diet is advantageous for human beings.” Similarly, the authors claim that “livestock-derived foods are the most readily available source of high quality proteins and

several essential nutrients for the global consumer.” At the same time, the authors warn that “heavily restricting meat, dairy and eggs [...] should not be recommended for general populations, particularly not those with elevated needs [...]”

How is this frame problematic? Most importantly, the DD omits the key reason why the scientific community calls for a significant decrease in meat consumption when it comes to health, i.e., the prevalence of meat overconsumption (e.g., Springmann et al., 2020) and its negative impacts on human health (e.g., Clark et al., 2019; Farvid et al., 2021; Grosso et al., 2022). The most prevalent and globally harmful nutrient deficiencies are not due to animal product underconsumption, but due to the underconsumption of fruits, vegetables, whole grains, nuts, seeds, and legumes (Afshin et al., 2019; Springmann et al., 2020). The latest report of the Lancet Countdown initiative, which gathers 114 scientists from 52 research institutions and UN agencies, estimates indeed that about 7.8 million deaths in 2020 were attributable to insufficient consumption of plant-based foods,² and that excess consumption of dairy and red and processed meat accounts for 1.9 million deaths (i.e., 16 % of all diet-related deaths) (Romanello et al., 2023). Relatedly, the warnings of the DD regarding diets low in meat are inconsistent with the available evidence on the positive effects of substitution of animal-based with plant-based foods on cardiometabolic health and total mortality, as confirmed in a recent systematic review by Neuenschwander et al. (2023). While (predominantly) plant-based diets can lack certain nutrients, fortified foods and dietary supplements, which are broadly accessible in high-income countries, can appropriately minimize or eliminate deficiency risks in the case of adequately planned diets (Koeder and Perez-Cueto, 2024). Public policy should be sensitive to the above issues, especially in high-income countries, where the largest need for reductions in animal consumption and a high accessibility of alternatives coincide (a fact omitted by the DD). For example, regarding dietary guidelines, while this does not imply that everyone should be recommended a (predominantly) plant-based diet, it implies a more nuanced and informative approach than to categorically exclude such diets in recommendations as the DD seems to suggest.

Second, the DD, by positing that animal products are the most readily available nutrient source for the “global consumer,” also conflicts with recent scientific findings indicating that predominantly plant-based diets offer cost-effective means of meeting nutritional requirements in low-income countries. For instance, Hirvonen et al. (2020) show that the most affordable nutrient-adequate diet (considering 20 essential nutrients) in low-income countries contains very limited amounts of dairy (42 kcal/day), meat, eggs, and fish (113 kcal/day), accounting in total for only 6.2 % of the daily energy intake (see Table S10). This is not to deny that animal products can currently play a significant role in food security in some specific regional contexts. For instance, the EAT-Lancet report (Willett et al., 2019), which recommends an extensive reduction in meat consumption worldwide, states that the “role of animal source foods should be examined carefully” in regions that “still face severe burdens of undernutrition and malnutrition.” Regarding high-income countries, the EAT-Lancet diet (which is predominantly plant-based) is estimated to cost 6.1 % of mean household income per capita, which makes it highly accessible for a wide range of the population (Hirvonen et al., 2020). In addition, the relative cost-effectiveness of predominantly plant-based diets relative to those rich in meat would be actually

² Minimally-processed plant-based foods as well as some traditional processed foods such as tofu and tempeh are generally seen as the gold standard for healthy diets. Novel plant-based animal product alternatives can compare negatively to this gold standard, e.g., due to higher sodium contents, yet many if not most such products can provide adequate or even high-quality nutrition as part of balanced diets (Gastaldello et al., 2022; Messina et al., 2022; Nájera Espinosa et al., 2024). Some extreme outlier products do exist which clearly contain too much salt and arguably should not be consumed on a regular basis (Nájera Espinosa et al., 2024).

Frame: Still open for debate	Frame: Keep eating meat to be healthy
Advice is of questionable quality	Meat is healthy
<ul style="list-style-type: none"> • "Livestock systems must progress on the basis of the highest scientific standards. They are too precious to society to become the victim of simplification, reductionism or zealotry." 	<ul style="list-style-type: none"> • "Livestock-derived foods provide a variety of essential nutrients and other health-promoting compounds, many of which are lacking in diets globally, even among those populations with higher incomes." • "The highest standards of bio-evolutionary, anthropological, physiological, and epidemiological evidence underscore that the regular consumption of meat, dairy and eggs, as part of a well-balanced diet is advantageous for human beings." • "Livestock-derived foods are the most readily available source of high quality proteins and several essential nutrients for the global consumer."
Trust us not them	We should eat some meat
<ul style="list-style-type: none"> • "This declaration aims to give voice to the many scientists around the world who research diligently, honestly and successfully in the various disciplines in order to achieve a balanced view of the future of animal agriculture." 	<ul style="list-style-type: none"> • "There is a call to increase the availability of livestock-derived foods (meat, dairy, eggs) to help satisfy the unmet nutritional needs of an estimated three billion people, for whom nutrient deficiencies contribute to stunting, wasting, anaemia, and other forms of malnutrition." • "Well-resourced individuals may be able to achieve adequate diets while heavily restricting meat, dairy and eggs. However, this approach should not be recommended for general populations, particularly not those with elevated needs, such as young children and adolescents, pregnant and lactating women, women of reproductive age, older adults, and the chronically ill."
Frame: No need to cut down to be green	Frame: Animal farming is what humans do
Livestock farming benefits the environment	Animal farming is tried and true
<ul style="list-style-type: none"> • "Furthermore, well-managed livestock systems applying agro-ecological principles can generate many other benefits, including carbon sequestration, improved soil health, biodiversity, watershed protection and the provision of important ecosystem services." • "Sustainable livestock will also provide solutions for the additional challenge of today, to stay within the safe operating zone of planet Earth's boundaries, the only Earth we have." 	<ul style="list-style-type: none"> • "Human civilization has been built on livestock from initiating the bronze-age more than 5000 years ago towards being the bedrock of food security for modern societies today. Livestock is the millennial-long-proven method to create healthy nutrition and secure livelihoods, a wisdom deeply embedded in cultural values everywhere." • "For millennia, livestock farming has provided humankind with food, clothing, power, manure, employment and income as well as assets, collateral, insurance and social status."
Reducing livestock numbers could have negative impacts	Many people depend on farming animals
<ul style="list-style-type: none"> • "While the livestock sector faces several important challenges regarding natural resources utilization and climate change that require action, one-size-fits-all agendas, such as drastic reductions of livestock numbers, could actually incur environmental problems on a large scale." 	<ul style="list-style-type: none"> • "With strong population growth concentrated largely among socioeconomically vulnerable and urban populations in the world, and where much of the populace depends on livestock for livelihoods, supply and sustainability challenges grow exponentially and advancing evidence-based solutions becomes ever more urgent." • "Livestock ownership is also the most frequent form of private ownership of assets in the world and forms the basis of rural community financial capital. In some communities, livestock is one of the few assets that women can own, and is an entry point towards gender equality."
Environmental harms from livestock aren't a given	
<ul style="list-style-type: none"> • "Advances in animal sciences and related technologies are currently improving livestock performance along all above mentioned dimensions of health, environment and socio-economics faster than at any time in history." 	
Bigger picture	
<ul style="list-style-type: none"> • "Farmed and herded animals are irreplaceable for maintaining a circular flow of materials in agriculture, by recycling in various ways the large amounts of inedible biomass that are generated as by-products during the production of foods for the human diet. Livestock are optimally positioned to convert these materials back into the natural cycle and simultaneously produce high-quality food. Ruminants in particular are also capable of valorising marginal lands that are not suitable for direct human food production." 	
Unclassified extracts	
<ul style="list-style-type: none"> • At the same time, some methods and scale of animal production systems present challenges with regards to biodiversity, climate change and nutrient flows, as well as animal health and welfare within a broad One Health approach. • For that, scientists are asked to provide reliable evidence of their nutrition and health benefits, environmental sustainability, socio-cultural and economic values, as well as for solutions for the many improvements that are needed. • Today's food systems face an unprecedented double challenge. 	

Fig. 1. Extracts from the Dublin Declaration, classified via our extended version of the framework of Clare et al. (2022).

even more favorable to the former if the externalities of food products were properly internalized and thus reflected in the shelf prices of products (Funke et al., 2022; Springmann et al., 2021). Overall, the notion of a “global consumer” used in the DD is inadequate: different countries face different constraints leading to different dietary recommendations. However, it is well-established that the most affordable diets, especially if we internalize the social cost of externalities, are low in animal-based products.

Third, when considering the health impacts of different diets, the differing impacts of food production on human health should also be considered. For instance, several works have documented the impact of animal production on air pollution through the emissions of methane and ammonia (e.g., Domingo et al., 2021). Recent work estimates that the global adoption of plant-based diets could reduce exposure to ozone pollution by 4 % and particulate matter (PM2.5) by 8 %, potentially preventing 236,000 premature deaths worldwide (Springmann et al., 2023). Animal production also poses significant health risks via water pollution (Mallin et al., 2015; Li et al., 2022) and zoonotic diseases

(Espinosa et al., 2020; Hayek, 2022; Li et al., 2024). The DD omits these issues.

Finally, the DD features a numerical assertion linked to the *We should eat some meat* subframe which is inaccurate and misleading: “There is a call to increase the availability of livestock-derived foods (meat, dairy, eggs) to help satisfy the unmet nutritional needs of an estimated three billion people [emphasis added], for whom nutrient deficiencies contribute to stunting, wasting, anaemia, and other forms of malnutrition.” This statement appears to be a modified version of a statement found in the joint statement of the Solution Cluster on Sustainable Livestock at the UN Food System Summit 2021 (Section 1.5). The solution cluster posits a “need to increase the availability of livestock derived foods to satisfy the unmet nutritional requirements of an estimated 3 billion people^[3], and contribute to reducing stunting, wasting and anaemia^[4]” [superscript in the original text] (UN Food Systems Summit, 2021). However, this statement is misleading. The cited reference (in superscript 3 of the original text) (FAO, 2020) merely indicates that more than 3 billion people in the world could not afford a

healthy diet in 2017. From this assessment it does not necessarily follow that the availability of animal-based food needs to or should be increased for 3 billion people, considering that often there are other paths available to reduce nutrient deficiencies which are associated with fewer tradeoffs (e.g., increasing the accessibility of healthy plant-based foods and/or supplements).

1.3. Frame #2: “No need to cut down to be green”

The authors of the DD suggest that reducing animal consumption or production is not necessary or even helpful to sufficiently limit the environmental impact of the food system. They do so by employing four subframes identified by Clare et al. (in italics). First, they suggest that *livestock farming benefits the environment* by proclaiming that “well-managed livestock systems applying agroecological principles” offer various ecosystem services and that “sustainable livestock” would provide solutions to “stay within the safe operating zone of planet Earth’s boundaries.” Second, they claim that *reducing livestock numbers could have negative impacts* (“drastic reductions of livestock numbers could actually incur environmental problems on a large scale”). Third, the authors suggest that the *environmental harms from livestock are not a given* by writing that “advances in animal sciences and related technologies are currently improving livestock performance [...] faster than at any time in history.” Fourth, they bring forward statements that can be seen as calls to consider a *bigger picture*. They stress the “irreplaceable” role of livestock in “maintaining circular flow of materials in agriculture” and the role of livestock in valorizing by-products of agriculture and lands which are “not suitable for direct human food production.”

How is this frame problematic? The DD essentially conveys a misleading picture of today’s animal production as largely environmentally beneficial and ecologically integrated. This effect is achieved mainly by highlighting the benefits which agro-ecological farming can generate without duly contextualizing the issue, e.g., noting that much of animal production today is not ecologically integrated and instead degrades natural ecosystems. For example, a 2013 study³ estimated that 76–79 % of the total global supply of pigs, poultry, and eggs was produced by industrial systems (Herrero et al., 2013), systems which typically are supplied by animal feed from monoculture fields (Weis, 2013). In effect, the DD masks the environmentally harmful character of much of today’s animal production, and the pressing need for reductions in animal consumption in wealthy countries to allow for an ecologically sustainable food system (Müller et al., 2017; van Zanten et al., 2018; Springmann et al., 2018; Rööß et al., 2022). Indeed, the environmental impacts of the lowest-impact animal products typically exceed those of plant-based foods (Poore and Nemecek, 2018), including processed plant-based products (Nájera Espinosa et al., 2024). These impacts include outsized land and water requirements, which degrade ecosystems by resulting in deforestation, less opportunities for reforestation, and reduced water availability for terrestrial and freshwater ecosystems (Machovina et al., 2015; Poore and Nemecek, 2018; Theurl et al., 2020; Pendrill et al., 2022; Lucas et al., 2023). Besides its disproportionate land and water use, today’s animal production also disproportionately contributes to climate change and the acidification and eutrophication of the environment (Poore and Nemecek, 2018). Notably, the outsized climate impacts of animal production are acknowledged by the Intergovernmental Panel on Climate Change (IPCC). For instance, Chapter 5 of the IPCC “Climate Change and Land” report (Mbow et al., 2019) states that there is “robust evidence with high agreement that the mixture of foods eaten can have a highly significant impact on per capita carbon emissions, driven particularly through the amount of (especially grain-fed) livestock and products” (italics from the original text on the IPCC

website).⁴ The report also states that there is “significant potential mitigation (high confidence)” associated with shifts toward diets “higher in plant-based foods.” These issues are not acknowledged in the DD; it is merely admitted that “some methods and scale of animal production systems present challenges with regards to [several dimensions].” This vague admission is not further elaborated.

Given the above-mentioned points, the DD’s warning about potential environmental problems that could emerge should livestock numbers decrease is misleading. The starkness of this warning (arguing that it could lead to “environmental problems on a large scale”) is especially noteworthy, and seems to stem from one article in the *Animal Frontiers* Special Issue (AFSI) (Thompson et al., 2023), in which it is claimed that an agricultural system without livestock “would significantly expand the consumption of resources (land, water, energy) as well as of emissions per nutritional unit (kilocalories, protein, etc.) (van Zanten et al., 2018).” However, the work of van Zanten et al. cited by Thompson et al. (2023) does not support this claim nor the warning of the DD. It merely indicates that, compared to a global phaseout of animal production, including some animal products in human diets would require less cropland because livestock can valorize grasslands as well as agricultural by-products and (potentially) other leftovers. Actually, the findings from van Zanten et al. (2018) even contradict the DD’s warning: van Zanten et al. note that “significant reductions” in animal consumption in Europe, Oceania, and the Americas would be necessary to minimize cropland area. This argument is based on the observation that the current levels of animal consumption in these regions far surpass the theoretical capacity of producing animals solely from grasslands and leftover streams. In fact, the work by van Zanten et al., in accordance with the findings by Poore and Nemecek (2018), suggests that a food system without animal-based food production/consumption would require less cropland than required currently. Thus, the work by van Zanten et al. (2018) has been misrepresented by Thompson et al. (2023).⁵

The degree of misrepresentation of van Zanten et al. (2018) by Thompson et al. (2023) is even higher when considering the details of the study by van Zanten et al. Exploring these details is informative not only for evaluating the piece by Thompson et al., but they also further underscore the inappropriateness of the *No need to cut down to be green* frame. First, the approach by van Zanten et al. is solely aimed at minimizing cropland area, as cropland is seen as environmentally undesirable. However, as van Zanten et al. discuss, livestock production from grasslands is not without environmental trade-offs either: (i) ruminants typically emit more CO₂ equivalents than they sequester; (ii) to reach biodiversity conservation targets, grazing would likely need to cease on some of the land currently used for grazing. To these considerations we can add that ecosystem restoration enabled by pasture reductions would sequester significant amounts of CO₂ (Hayek et al., 2021). Moreover, many pastures are currently overgrazed (Tiscornia et al., 2019; Filazzola et al., 2020; Minea et al., 2022; Centeri, 2022). Relatedly, limiting grazing to levels which do not degrade biodiversity would entail a significant decrease in global pasture yields (Resare Sahlin et al., 2024). These points all are in favor of keeping fewer ruminants and therefore eating less meat and dairy than the approach of van Zanten et al. (2018) would suggest. Moreover, regarding the valorization of leftover streams, van Zanten et al. note that technological developments could make leftovers such as agricultural by-products increasingly available for human consumption. This is particularly relevant in the case of oilseed

⁴ Note that “robust evidence with high agreement” stands for the highest level of agreement and evidence quality in the IPCC framework.

⁵ Note that five of the six authors of Thompson et al. (2023) seem to be signatories of the Dublin Declaration. To the best of our knowledge, none of the authors from Van Zanten et al. (2018) are signatories of the Dublin Declaration (Date of last consultation: September 3, 2024). Notably, van Zanten has co-authored a comment critical of the DD (Bryant et al., 2024).

³ This is the most recent estimate we found on this issue.

cakes, which currently are fed to livestock and are typically classified as agricultural by-products not suitable for human consumption, e.g., by Rööfs et al. (2017), whose study was used in the approach by van Zanten et al. (2018).⁶ However, oilseed cakes actually can be used for human consumption, for the production of meat analogues, beverages, pasta, and bakery products (Razavizadeh et al., 2022; Zhang et al., 2023).

Finally, by stating that the livestock sector advances faster than “at any time in history,” the DD’s authors suggest that societies can rely on technological progress to solve the issues posed by the sector. However, only relying on technological approaches would imply accepting unnecessarily high levels of risks and harms to planetary health. It is far from clear that technological changes alone can solve the problems caused by the sector, much less that they can solve these problems within a reasonable time frame. It would be unreasonable from a public interest perspective to accept such risk and harm levels by neglecting to explore potentials for achieving dietary shifts. This is illustrated by the results of a recent systematic survey of 210 climate scientists across 48 countries,⁷ to which one of the authors of this perspective piece contributed (Harwatt et al., 2024). Rather than technological approaches, most experts rated reducing human consumption of animal products and reducing the number of livestock animals as the most promising ways of reducing the sectors’ climate impacts (Harwatt et al., 2024). It also should be noted that technological changes in the sector are often associated with trade-offs. For example, while so-called “sustainable intensification” strategies can reduce the sector’s GHG emissions and land use, they are poorly compatible with agroecological approaches and prone to increasing zoonotic disease risks (Clay et al., 2020; Hayek, 2022; Li et al., 2024).

1.4. Frame #3: “Animal farming is what humans do”

We identified a frame in addition to the frames identified by Clare et al., which we call *Farming animals is what humans do*. This frame encompasses appeals to animal agriculture as being an integral part of society, and to the various social benefits it purportedly confers in that role. Although Clare et al. (2022) did not explicitly feature a discursive frame dedicated to tradition and socioeconomic factors, they did observe appeals to tradition in their dataset, exemplified by a warning of “a loss of the knowledge and traditions associated with family-based beef and sheep farming.”

In service of the *Animal farming is tried and true* subframe, the DD’s authors emphasize that animal farming has played an instrumental role in humanity’s past (“for millennia, livestock farming has provided humankind with food, clothing, power, manure and income as well as assets, collateral, insurance and social status”). They further suggest that today’s animal production plays similar roles as in the far past (“livestock is the millennial-long-proven method to create healthy nutrition and secure livelihoods, a wisdom deeply embedded in cultural values everywhere”). In service of the *Many people depend on farming animals* subframe, the DD’s authors convey a picture of a widespread economic dependence on animal farming, with an emphasis on socioeconomically disadvantaged groups. For instance, they assert that livestock ownership is “the most frequent form of private ownership of assets in the world and forms the basis of rural community financial capital.” They also proclaim that “[i]n some communities, livestock is one of the few assets

⁶ In the case of soybeans, which is the predominant oilseed crop (Zhang et al., 2023), soybean meal can represent more than half of the total value of soybean plants (Iowa Farm Bureau, 2022). Soybean meal therefore can be seen as a main product of soy production rather than as a by-product.

⁷ Harwatt et al. (2024) had invited more than a 1000 experts to the survey, whom they identified “primarily through their contributions to major climate and agriculture reports including those from the IPCC, UNEP and FAO, and additionally through a journal article search.” See the Methods and the Sample Characteristics sections for more details.

that women can own, and is an entry point towards gender equality.”

How is this frame problematic? Generally, the *Animal farming is tried and true* subframe neglects that animal production and the social-ecological context it operates within have changed dramatically over time. Relatedly, the DD conveys a picture of animal production as a monolithic phenomenon, emphasizing positive qualities associated with some types of animal agriculture as if these characterized the sector as a whole. Again, this masks the scale and impacts of industrial animal production, including its dependence on and contribution to the growth of industrial crop production (Weis, 2013). Notably, industrial food production currently tends to crowd out other modes of farming due to its low production costs and the fact that the corporations dominating the food system (e.g., JBS) have an interest in promoting industrial food production as well as the power to shape markets, policies, and technology use in their favor (Clay et al., 2020; Sievert et al., 2021; Béné, 2022). Thus, the DD’s authors should have clearly distinguished between industrial production and smaller-scale agricultural phenomena if they indeed sought to support these smaller phenomena. It is also worth noting that industrial animal production typically is prevalent in the same countries where meat overconsumption is prevalent (Weis, 2013), and/or that in such countries, meat is imported from industrialized countries (Hansen, 2018). For example, it is estimated that 98 % of pigs and 70 % of cows in the United States are raised in concentrated animal feeding operations (Ritchie, 2023). Thus, ensuring that reductions in animal consumption come at the expense of industrial animal production rather than subsistence farmers is an available political choice. Generally, policymakers can and should implement policies ensuring that shifts toward more plant-based diets are socially just. Many people depend on farming animals, yet these dependencies are at least partially the result of and subject to political processes. Politics can and should act in ways that do justice to the issues associated with animal production while preserving or even improving the welfare of vulnerable social groups who (currently) depend on the sector for social or economic opportunities (Blattner, 2020; Verkuijl et al., 2023).

It also bears noting that the conveyed picture of socioeconomically disadvantaged groups benefiting from farming animals neglects the ways in which animal production is harmful to these groups. To take the DD’s example concerning gender equity, while some women do benefit from livestock farming, women are also likely to be in charge of the least-valued tasks (e.g., milking, care), increasing their workload, while men might retain control over decisions and the associated income (Salmon et al., 2018). To include other examples, working in animal production in the US has been found to incur higher rates of injuries than is average within US agriculture (Ramos et al., 2022), and working in larger-scale animal production facilities is associated with high risks of respiratory health problems (Sigsgaard et al., 2020). In addition, slaughterhouse work is correlated with poor mental health outcomes (Slade and Alleyne, 2023). It is not only workers who are affected: intensive animal farming facilities often are built close to less-wealthy neighborhoods, whose inhabitants thus suffer disproportionately from the localized impacts such facilities can have, such as air pollution (Chamanara et al., 2021), reductions in house prices (Lawley, 2021), and higher crime rates (Fitzgerald et al., 2009). More generally, it is clear that the impacts on human and environmental health mentioned in the previous sections harm virtually everyone, most of all less wealthy populations.

Finally, it is worth noting that the authors almost entirely neglect one of the most ethically significant aspects of animal production, namely the suffering of farmed animals, which is especially pronounced in the case of industrial animal production. Again, it is merely admitted that “some methods and scale of animal production systems present challenges with regards to [...] animal health and welfare,” without elaborating further. However, taking into account animal welfare seriously yields a strong case for deintensifying the industry (e.g., Espinosa and Treich, 2021; Kuruc and McFadden, 2023; Espinosa, 2024), requiring fewer animal welfare compromises and more animal-welfare

enhancement opportunities (see for example the recommendations of the [EFSA Panel on Animal Health and Animal Welfare \(2023\)](#)). Given the larger resource (e.g., land) requirements of such higher-welfare animal farming, transitioning toward it would necessitate reductions in animal production.

1.5. Frame #4: “Still open for debate”

The DD starts by asserting its authors’ scientific credentials, and discrediting those who come to different conclusions than the DD. The authors proclaim that livestock systems must be analyzed “on the basis of the highest scientific standards” and that livestock systems are “too precious” to “become the victim of simplification, reductionism or zealotry.” Further, the authors write that the DD aims “to give voice to the many scientists around the world who research diligently, honestly and successfully” and who have a “balanced view” on the matter. Clare et al. observed that the practice of elevating oneself (*Trust us not them*) while discrediting opposing viewpoints or sources (*Advice is of questionable quality*) aligns with a strategic goal of portraying the ongoing scientific discourse surrounding meat reduction as inconclusive.⁸

How is this frame problematic? First, we want to highlight that the self-elevation and the implicit denial of credentials of those who come to different conclusions than the DD sets up an “us-vs-them” divide solely based on differing findings. Indirectly, these statements suggest that researchers who disagree with the DD’s authors (i.e., those who call for significant reductions in meat consumption/production) would not conduct honest and good-quality research. Thereby, the DD undermines actors who more accurately report on the current state of science, including scientific institutions such as the IPCC. The use of emotionally charged terms like “zealotry” and “precious” adds to this damaging aspect of the DD. Indeed, this aspect of the DD may have a “chilling effect,” as actors may be more conservative about communicating evidence for fear of being labeled or perceived as “zealots.” Relatedly, actors may be more wary of publicly scrutinizing systems which are associated with terms such as “precious,” “victim,” or “wisdom.”

Regarding the question whether the scientific debate is still open, as we have shown in the preceding sections, there exists high-quality scientific evidence and statements with robust scientific legitimacy supporting the expediency of significantly reducing meat consumption/production, particularly from intensive production systems, and particularly in high-income countries. These relevant facts are not acknowledged in the DD, as would be appropriate in scientific discourse. Given that the DD claims to express prevalent sentiments among scientists with relevant expertise, the DD can thus be seen as misrepresenting the current state of science.

1.6. Industry-friendly, scientifically problematic

The above analysis shows that the DD, despite its proclaimed goal of contributing to “a balanced view of the future of animal agriculture,” effectively favors large-scale animal production at the expense of public interests. Most centrally, the DD conflicts with well-established scientific

⁸ That conveying such a picture is indeed a goal of the DD is confirmed by the content of the Nature Food Correspondence (NFC) in which two of the DD’s authors, Leroy and Ederer, followed up on the DD: “We cannot identify firm agreement among scientists, neither on the place of animal-sourced foods in human nutrition, the role of animal agriculture in achieving ecological balance, the contributions of livestock to livelihoods and societal prosperity, nor on the ethical aspects of animal production” (Leroy and Ederer, 2023). It is worth adding that Ederer and Leroy apparently have not conducted a systematic expert survey, nor did they cite any such survey in the NFC, DD, or AFSI. Though the complex epistemology of science should not be reduced to the (appearance of) agreement among scientists, such an inclusion would have had epistemic value.

findings on the externalities of meat production and consumption. Relatedly, the DD ignores many issues relevant to its central themes, such as meat overconsumption in high-income countries and increasingly so in many middle-income countries, the preponderance of industrial animal production in the global supply of animal products, and the harms and risks associated with these phenomena. Moreover, following the DD’s suggestion to merely rely on the sector to technologically solve the issues it is causing would imply unreasonably high levels of public risks and harms. In the case of transitioning toward agroecological farming specifically, the DD in addition disregards the political process such a transition would demand.

Finally, the DD also features discrediting rhetoric toward sources who disseminate less industry-friendly messages and findings, and emotive language which adds to this damaging aspect of the DD. Except for the use of emotive language, these characteristics align with the findings by a recent systematic study by [Legg et al. \(2021a\)](#) on corporate influence on science. Legg et al. identified common strategies of corporate involvement in science such as misrepresenting evidence bases and attacking industry-unfavorable science. [Legg et al. \(2021a\)](#) also identified conducting “safe research” as an industry strategy, which consists in undertaking methodologically sound research that produces outcomes that would not harm the industry (e.g., investigating other competing causes of diseases). Ultimately, such safe research distracts attention from industry harms, frames industry and industry products as part of the ‘solution,’ and promotes interventions that minimize damage to product sales” (Table 1, p. 7). The DD serves all these purposes. For instance, it promotes technological fixes, which, contrary to dietary changes, do not significantly diminish product sales. That [Legg et al. \(2021a\)](#) did not note the use of emotive language may reflect the fact that their study was not solely focused on the animal production sector, which is highly culturally contested compared to other sectors ([Myland et al., 2019](#); [Sievert et al., 2022](#)). It may also be relevant that the private interests of a few individuals may have played a greater role in the DD than the interests of (large) corporations (Section 2.1).

There are two more aspects regarding the DD’s content which support a view that the DD is primarily designed to benefit the industry rather than to further rational discourse on the topic.

First, while it would be inappropriate to expect a manifesto to be written like an academic article, it nonetheless should be pointed out that the DD, with one exception,⁹ does not feature in-text citations. This absence makes it more difficult for readers to verify the DD’s claims or to simply understand what the authors are alluding to exactly. For instance, the authors state that the “highest standards of bio-evolutionary, anthropological, physiological, and epidemiological evidence underscore that the regular consumption of meat, dairy and eggs, as part of a well-balanced diet is advantageous for human beings,” yet it is unclear to what this nebulous phrase refers precisely. The DD website provides two references in support of the DD as a whole, however, these documents do not substantially alleviate the above-described burdens on the reader. On the contrary, the main reference, the AFSI, is at least once strongly misleading in terms of content, as shown by our discussion in Section 1.2. Moreover, as we discuss in Section 2.2, the AFSI is opaque regarding (potential) conflicts of interest (COIs), potentially misleading the reader about the AFSI’s degree of scientific legitimacy. While a comprehensive analysis of the AFSI would go beyond the scope of this perspective, we have analyzed the degree of self-citation of the AFSI, and found that its articles arguably feature a questionably high degree of self-citation (Table 1).

Second, the DD seems to feature modified sentences from the joint

⁹ The authors note that the “wording” of the DD’s last paragraph is from “the Solution Cluster on Sustainable Livestock at the UN Food System Summit 2021.” It should be noted that this is inaccurate, given that this paragraph was written not by the solution cluster as a whole but by one of its three stakeholder groups, namely stakeholder group A (cf. [UN Food Systems Summit, 2021](#)).

Table 1

Characteristics of the seven articles and the perspective piece (last row in table) published in the *Animal Frontiers* Special Issue (AFSI), one out of two references in support of DD claims. For this table, we have categorized a citation of a given document as self-citation if any of the AFSI’s editors or contributors was a co-author of that document or if the document was published by *Animal Frontiers* or by the AMSA. The data underlying this table as well as information on how to reproduce it are available on request. PE: P. Ederer, FL: F. Leroy, RP: R. Polkinghorne, MK: M. Koohmaraie, DT: D. Troy, CK: C. Kaster.

Article/Perspective	DD initiators among authorship (AFSI editors in bold)	Self-citations in the reference list (fraction of total references in bold)	Self-citations in in-text citations (fraction of total citations in bold)
The role of meat in the human diet: evolutionary aspects and nutritional value	FL	16 (40 %)	35 (56 %)
Non-communicable disease risk associated with red and processed meat consumption—magnitude, certainty, and contextuality of risk?	FL	11 (27 %)	24 (35 %)
Ecosystem management using livestock: embracing diversity and respecting ecological principles		6 (19 %)	9 (20 %)
Challenges for the balanced attribution of livestock’s environmental impacts: the art of conveying simple messages around complex realities	PE	19 (27 %)	22 (25 %)
Affordability of meat for global consumers and the need to sustain investment capacity for livestock farmers	PE	5 (18 %)	11 (27 %)
Is meat eating morally defensible? Contemporary ethical considerations		13 (25 %)	22 (31 %)
“Cellular agriculture”: current gaps between facts and claims regarding “cell-based meat”	DT	10 (59 %)	12 (57 %)
Challenges and opportunities for defining the role and value of meat for our global society and economy	RP, MK, CK, DT	12 (50 %)	19 (56 %)

statement of the Solution Cluster on Sustainable Livestock at the UN Food System Summit 2021, which reflects the industry-friendly nature of the summit (Fakhri, 2022), yet is much less contestable than the DD. For example, the joint statement reads that “many methods and scale of livestock production systems around the world present severe tests to stay within the safe operating zone of planetary boundaries” (UN Food Systems Summit, 2021). It appears the authors of the DD have taken this and other statements (for another example see Section 1.1), made them more industry-friendly (e.g., by changing “many methods and scale” to “some methods and scale”), and removed the in-text citations. Transparently building on the joint statement arguably would have better served the DD’s authors purported aim of contributing to “a balanced view of the future of animal agriculture.”

We argue that the Dublin Declaration (DD) and its problematic aspects are to a large degree the result of the industry-adjacent background of the DD, to which we turn next.

2. The DD’s background: industry-adjacent, partially obfuscated

2.1. Industry associations

As we detail below and illustrate in Fig. 2, there are many associations between the animal production industry and the DD, primarily related to applied research and consultancy services. This includes associations via the *Animal Frontiers* Special Issue (AFSI) as well as the “International Summit on The Societal Role of Meat” in Dublin in 2022, at which 14 contributors of the AFSI presented their work (henceforth the “Dublin Summit”) (Ederer and Leroy, 2023).

How was the industry institutionally involved in the DD, the AFSI, and the Dublin Summit? Most importantly, *Animal Frontiers*, the journal in which the AFSI was published, is a joint venture between four major animal production science associations, each of which is directly funded by corporations involved in animal production (Zinn, 2014; EAAP, 2023; ASAS, 2024; CSAS, 2024; AMSA, 2024). *Animal Frontiers’* operations moreover are funded by sponsorship and paid advertising by the industry (Zinn, 2014). The AFSI in particular was given by the American Meat Science Association (AMSA), whose funders include meat corporations such as Cargill, JBS, and Tyson Foods (Ederer and Leroy, 2023; AMSA, 2024).

The Dublin Summit was hosted and partially funded by Teagasc, the Irish semi-state Authority for Agriculture and Food Development, which notably is invested in the Irish dairy sector and generates income from livestock trade and providing services to the industry (Teagasc, 2022). Moreover, a networking event at the summit was sponsored by AMSA and the North American Meat Institute (which is funded by meat corporation suppliers) (Boren, 2023; Meat Institute, 2024). The involvement of the meat sector in the conference and the research agenda of the community were significant, as made clear by the editors of the AFSI who wrote about the Dublin Summit: “At the Summit we were fortunate to welcome close to 200 leading decision makers from the global meat sector, hailing from public administration, associations, the meat and livestock production industries, and the sciences. Across four workshops, they provided invaluable feedback for refining the line of reasoning and avenues for further investigation” (Ederer and Leroy, 2023). Finally, the DD website is hosted by the International Meat Research 3 G Foundation (IMR3G), a non-profit entity with commercial goals, including providing consultancy services for the meat industry (International Meat Research 3G Foundation IMR3G., 2024a). The core members of IMR3G include Teagasc, the Polish Beef Association, Meat & Livestock Australia, and the meat industry consultancy Birkenwood (Ederer et al., 2023b; International Meat Research 3G Foundation IMR3G., 2024a).

What are the industry associations of the individuals behind the DD and the AFSI? According to the DD’s website, the DD was initiated by the six members of the organizing committee of the Dublin Summit (Ederer, Leroy, Polkinghorne, Koohmaraie, Troy, Kaster) (Ederer et al., 2023b). These six persons also co-authored six of the eight pieces featured in the AFSI (Table 1). Moreover, Ederer and Leroy also edited the AFSI (Ederer and Leroy, 2023). Five of these six individuals are leaders of structures that have close financial/commercial connections with the meat industry: (i) Kaster is the CEO of the aforementioned AMSA (Ederer et al., 2023b); (ii) Polkinghorne has founded and (co-) leads the aforementioned meat industry consultancy Birkenwood (Birkenwood, 2023); (iii) Ederer owns the Global Food and Agribusiness Network, and declared to *The Guardian* that he “ha[s] clients in the livestock sector” (Carrington, 2023), he e.g. produced a video for a German dairy association (DeSmog, 2024); (iv) Koohmaraie since 2008 leads the “Meat Division” of IEH Laboratories & Consulting Group (IEH LandC, 2023); (v) Troy has been the director of research at Teagasc and the academic leader of Meat Technology Ireland (Ederer et al., 2023b), a “industry-led” research programme hosted by Teagasc which is co-funded by several Irish meat processing companies (Enterprise Ireland, 2024; MTI, 2024a). Troy now serves as an assistant director of

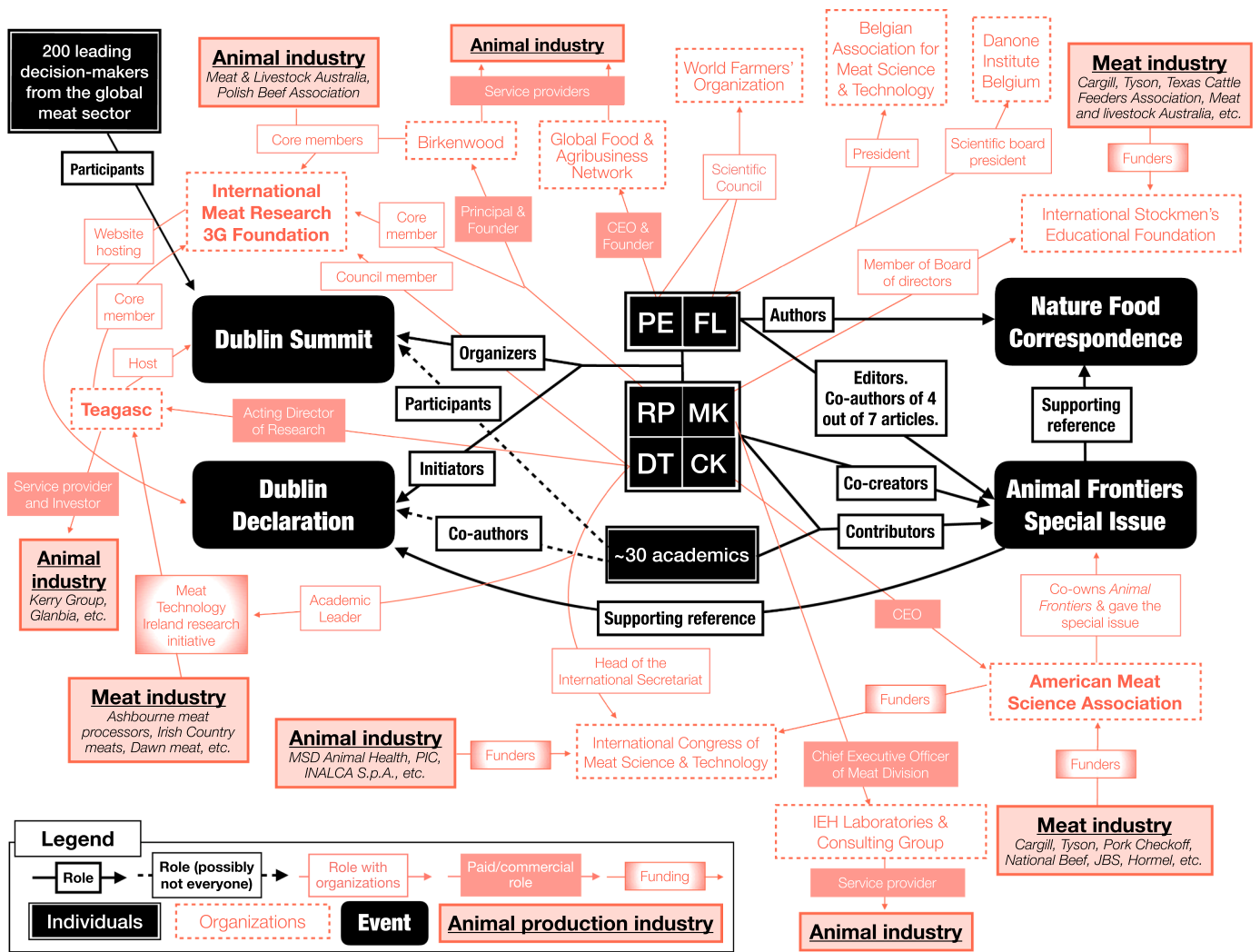


Fig. 2. Visual summary of main roles and industry associations relating to the Dublin Summit, Dublin Declaration (DD), the Animal Frontiers Special Issue (AFSI), and the Nature Food Correspondence (NFC) at the time of publication of the DD (based on publicly available information, mainly the authors' statement on the DD's website, but also information from journalistic investigations, the institutions' websites, and the AFSI's editorial; see Section 2.1). PE: P. Ederer, FL: F. Leroy, RP: R. Polkinghorne, MK: M. Koohmaraie, DT: D. Troy, CK: C. Kaster.

research at Teagasc and leads the “Meat Quality” theme of Meat Technology Ireland (Teagasc, 2024; MTI, 2024b). In addition to these paid/commercial roles, several individuals hold non-remunerated positions in organizations with industry associations. Most directly connected to the DD, both Troy and Polkinghorne are council members of IMR3G (International Meat Research 3G Foundation IMR3G., 2024a). Troy also is associated with the industry-sponsored International Congress of Meat Science and Technology, and Koohmaraie with the industry-sponsored International Stockmen’s Educational Foundation (Ederer et al., 2023b; ICoMST, 2023; ISEF, 2024, p. 10). Ederer and Leroy sit in the scientific committee of the World Farmers’ Organization (Ederer et al., 2023b). Leroy served as a president of the scientific committee of the Danone Institute Belgium until 2023 (VUB, 2024). Lastly, Leroy also is the president of the Belgian Association for Meat Science and Technology, which until September 2021 was engaged in a project funded by the food industry which aimed to set up a “Meat Advisory Panel” and “communication strategies around specific topics and the role of meat in this regard” (funding arrangement unclear) (Flander’s Food, 2024).

What is the role of applied animal production research? Most of the above-mentioned affiliations of the DD’s initiators, including Teagasc (Teagasc, 2022), are engaged in coordinating or conducting applied research and/or offering related consultancy services. Relatedly, Troy,

Leroy, Koohmaraie and Polkinghorne have all published research in the animal production sciences (we use this as an umbrella term for animal science, meat science, dairy science, etc.). Moreover, *Animal Frontiers* and the science associations behind it are part of these sciences. The animal production sciences have a close historical relationship with the industry and typically are concerned with optimizing industrial animal production (Twine, 2010). These associations are not scientifically problematic per se, however, they present (potential) conflicts of interest (COIs) when it comes to assessing what the future of the food system could or should look like. Reading the DD in light of this context is instructive. In particular, one can explain why problems are framed as technological challenges rather than fundamental issues that call for changes in public policy and dietary patterns. Such a framing, besides casting the sector as part of the solution, can help secure public and private funds for research. Indeed, Polkinghorne, Koohmaraie, Kaster, and Troy in the AFSI perspective piece call for more resources for the animal production sciences (Polkinghorne et al., 2023).

2.2. Misleading appearance

As we showed above, the industry is associated with the DD in many ways. However, the DD’s website did not originally contain any authorship or COIs statement from its launch in 2022 until October 2023

(International Meat Research 3G Foundation (IMR3G), 2023). This information was only added after investigations by *Unearthed* and *The Guardian* (Boren, 2023; Carrington, 2023). Legg et al. (2021a) have pointed out that concealment of industry involvement in scientific messaging works in service of a strategy to manufacture trust in the industry. The omission of the COIs statement on the DD website presents a serious concern, whether it was a deliberate act of concealment or not. Moreover, the DD's website still lacks essential information regarding the COIs of the DD's initiators, namely that the AMSA is funded by the industry and that Koohmaraie works as a meat industry consultant.

There are other aspects of the DD's context which are still misleading in a way which inflates the DD's appearance of scientific legitimacy. The DD's authors, "[f]or scientific evidence," point to "presentation recordings from the [Dublin Summit]" and the AFSI. Of these two references, the AFSI clearly is the more important one and the only one which plausibly may confer some scientific legitimacy to the DD. Indeed, the AFSI appears to be peer-reviewed literature, e.g., it features a list of reviewers. As such, the AFSI at first glance appears to contribute some scientific substance and legitimacy to the DD. However, as we showed in Section 2.1, *Animal Frontiers* has large COIs when it comes to questions directly relevant to dietary change. In addition, Ederer and Leroy were also the sole editors of the AFSI and co-authored four of its seven articles (Ederer and Leroy, 2023). Given that *Animal Frontiers* and two of the DD's authors had a large influence on the AFSI (including a large influence on the selection of reviewers), it cannot be regarded as adhering to the rigorous standards expected of peer-reviewed scientific research. However, these deficiencies are not made transparent. The fact that Leroy and Ederer also are the editors of and contributed to the AFSI is not mentioned on the DD website (Ederer et al., 2023b). Similarly, it is not mentioned on the DD website nor anywhere in the AFSI that *Animal Frontiers* has COIs regarding the questions explored in the AFSI. Moreover, the COIs of AFSI contributors may not be adequately declared, for example, in Ederer et al. (2023c), no COIs are declared, even though Ederer has clients in the industry (Section 2.1). These omissions obfuscate issues which raise concerns regarding the scientific legitimacy of the DD and the larger project around it, including the issue that the DD and the AFSI actually are largely the product of the same small team with close industry ties. In this context, it bears noting that on the website of the DD, it is claimed that "The authorship for the Dublin Declaration lies with the entire group of 36 scientist co-authors who contributed to" the AFSI (Ederer et al., 2023b). However, we found that not all of the contributors actually signed the DD (International Meat Research 3G Foundation IMR3G., 2024b).

3. The DD's impact: epistemically damaging

The issues highlighted in the preceding sections, especially in their combination, strongly support a view that the DD constitutes another example of epistemically harmful activity strongly associated with animal production, in particular industrial animal production. There are three major ways in which the DD is epistemically harmful. First, the content of the DD is scientifically problematic, in particular, it is misleading in many ways (Section 1). Second, the DD and the larger project around it appear more scientifically legitimate than they are and project an undue sense of scientific authority and independence (Sections 1.4, 2.2). This not only lends undue weight to the DD, but also unduly strengthens the perceived scientific authority of its creators and their associates. Third, these first two factors, in their combination, are

prone to undermine epistemic trust in experts and institutions that communicate more accurately on the topic.¹⁰ This epistemically harmful effect (Intemann and de Melo-Martín, 2023, p. 7) is magnified by the discrediting and emotive rhetoric in the DD (Section 1.4). This aligns with the findings of Legg et al. (2021a), according to whom corporate involvement in science typically works to "maximize the volume, credibility, reach, and use of industry-favourable science, and to minimize those same aspects of industry-unfavourable science" (p. 16).

There is evidence that the DD has been used at the highest levels of European policymaking. For instance, shortly after its launch, the DD has achieved a positive recommendation in a tweet from the European Commissioner for Agriculture (Wojciechowski, 2022). Notably, European agribusiness groups referred to this tweet in a letter to the commissioner, in which they lobbied against a plan to end public funding for the promotion of red and processed meats (Boren, 2023). It is also worth noting that some of the DD's authors in 2023 attended events in Brussels and Warsaw where they had met with members of Wojciechowski's team (Boren, 2023; ATF, 2023). The DD also evidently held credibility and was used in the European Parliament, as it was referenced in its "European protein strategy" resolution of October 2023 (European Parliament, 2023). Thus, the DD has influenced EU policy discourse and plausibly has contributed to a policy environment favorable to industrial animal production (alongside other efforts, see InfluenceMap, 2024). For instance, in February 2024, the EU was criticized for watering down a range of environmental regulations including measures that could have reduced greenhouse gas emissions from industrial animal production (Zimmerman, 2023).

The DD was also positively received by many news outlets. For instance, *The Telegraph* featured an article titled "Meat is Crucial for Human Health, Scientists Warn" (Knapton, 2023). This article uncritically quotes one industry representative referring to the DD and/or the AFSI as "peer-reviewed research," illustrating the effectiveness of their misleading appearance. This article, as well as many others, including a *The Guardian* opinion piece (Carlin, 2023), frame the DD as an authoritative source and report on it rather uncritically (Carter, 2024). The DD's divisive rhetoric paired with its uncompromising pro-meat stance (Section 1.4) also yielded results, as is illustrated by the title of a *New York Post* article reporting on the DD (Keane, 2023): "Scientists blast 'zealots' pushing plant-based diets, argue meat is crucial for health." While the DD's impacts on public discourse arguably should not be overstated, it certainly has contributed to a larger media environment which often vilifies initiatives toward dietary shifts (Garcia et al., 2019; Sievert et al., 2022).

Due to the relative success of the DD in terms of signatures, its authors Leroy and Ederer were also put in a position which evidently allowed them to publish the Nature Food Correspondence (NFC). Publishing the NFC further has inflated the appearance of scientific authority of the DD and the ecosystem behind it. While the NFC features all of the DD's discursive frames, it features at least one contestable statement which goes beyond these frames and which constitutes an additional type of epistemic harm: The authors claim that it is an "ethical reality" that "the animal needs to give its life in favor of the human species." This ambiguous claim can be understood in light of the fact that Ederer and Leroy in the editorial of the AFSI quote Aristotle on the topic (Ederer and Leroy, 2023). However, Aristotle's notion that animals exist to serve humans is pre-scientific and at odds with evolutionary theory.

Does the DD offer any significant epistemic benefits? Contributions that challenge established scientific notions can be valuable when

¹⁰ Indeed, Polkinghorne, Koohmaraie, Kaster, and Troy in the AFSI perspective piece decry that "mass media and policy makers reference publications in high-ranking scientific journals, often including a long list of authors from high profile institutions (e.g., Willett et al., 2019), to make an unbalanced case against meat, presenting it as an unhealthy food choice" (Polkinghorne et al., 2023, p. 76).

fostering healthy academic debate. However, due to its unconstructively divisive nature, misleading aspects, epistemically questionable foundations, and nebulous statements, there appears little reason to consider the DD suitable for advancing the debate, much less for advancing it in an effective manner. Rather than providing a foundation to build on, the DD causes epistemic damage, setting back progress on the topic and necessitating efforts to repair the harm (for two such efforts, see the *Nature Food* pieces by Herzon et al., 2023 and Bryant et al., 2024). We find no significant epistemic benefit to the DD except that it serves as an entry point to examine the influence of the meat industry on science, policy, and public discourse, a benefit which presumably was not intended by its authors. Indeed, the only media reporting on the DD that we deemed to advance the debate were critical investigations of the DD's background (Boren, 2023; Carrington, 2023; Hussain, 2023). In this context, it bears noting that in their piece, Herzon et al. (2023) suggest that the authors of the NFC provide an epistemically valuable contribution by "emphasizing the need for further rigorous research on societal roles of animals [...]." We deem the piece by Herzon et al. (2023) as overall helpful, however, this particular assessment appears inaccurate. Ederer and Leroy do not advocate for rigorous research on the societal roles of animals in the NFC, DD, or the AFSI. On the contrary, they assume a highly opinionated stance on the societal roles of animals, as illustrated by the NFC statement that "the animal needs to give its life in favor of the human species." The NFC, as the DD, merely promotes applied research for optimizing animal production, i.e., a line of research where the role of animals is largely predetermined rather than a research question. For instance, the NFC reads (emphasis added): "If the urgency for action is high, a view we share, then it is not the best option to do something actionistic with poorly understood consequences, but to step up the research and *develop better solutions.*"

In summary, our analysis indicates the DD to be epistemically harmful while unlikely to offer any significant epistemic benefits, much less any benefits which could outweigh or justify its harms. When considered alongside the accumulation of the involved COIs, we believe this presents a deeply concerning picture with implications for science policy.

4. Ways forward

First, we encourage signatories and, more broadly, supporters of the DD to reconsider their position. Many signatories might not have had time to thoroughly scrutinize the DD and its context, and some elements may have been partly inaccessible to them due to the initially missing conflicts of interest (COIs) statement. In addition, the actors co-responsible for the DD, particularly its authors, *Animal Frontiers*, the animal production science associations behind *Animal Frontiers*, and Teagasc, could acknowledge the issues associated with the DD. This includes acknowledging issues associated with the AFSI, and possibly retracting it. It also includes improving upon the COI statements on the DD website and the AFSI articles (Section 2.2) - indeed, the situation calls for comprehensive and accessible COI statements as discussed by Grundy et al. (2020) and expanded upon by Legg et al. (2021b). Moreover, for *Animal Frontiers*, AMSA and Teagasc it appears crucial to ask whether the DD reflects their views and policies in any way and whether institutional measures such as changes in mission statements may be in order to rectify the situation. For example, Teagasc arguably should seek to reduce its COIs in respect to its public mission as a charity by divesting from the industry, or at least diversifying its portfolio (Teagasc, 2022) toward non-animal-based food producers. Further, *Nature Food* could retract the NFC or subject it to post-publication peer review. On the one hand, publishing the NFC helped bring the issue to the attention of the wider scientific community. On the other hand, it is a scientific journal's duty to ensure that professional norms vital to the integrity of scientific discourse are respected in their publications and in the elements these publications may promote or rely upon (in this case the DD and the AFSI as well as the processes which produced and promoted these

documents).

Second, the DD and the AFSI illustrate a general need for more robust, comprehensive and systematic approaches regarding COIs in science and science communication. We follow Legg et al. (2021b) in recommending the development of an author-centric database of researchers' financial interests which also includes editors. We moreover suggest that one could also consider the development of an organization-centric financial interests database, including journals and research centers. Relatedly, online portals of organizations should increase the availability and accessibility of financial interest information. As a last point on transparency, based on our arguments in Section 2.1 and Section 3, we argue that research activity in the animal production sciences should be seen and declared as a (potential) COI in respect to issues which may threaten large-scale animal production. It is important to note however that increasing transparency is not a panacea to tackle the problems associated with conflicts of interest, not least because nondisclosure unfortunately is often an option (Thagard, 2007; Legg et al., 2021a). We therefore suggest that institutional review boards could (more often) be employed to ensure the scientific integrity of research programs where COIs or track records of researchers would indicate heightened risks of infringement of vital professional norms. We also want to highlight the "Food Research risk (FoRK) guidance and toolkit," which can help researchers and organizations decide whether and how to interact with the commercial food sector (Cullerton et al., 2024).

Finally, there is a need to strengthen public knowledge systems, i.e., to reduce the space for and counteract questionable initiatives such as the DD. This could entail boosting deliberative food democracy (Thompson et al., 2020; Behringer and Feindt, 2024) as well as research into how the food system could be transformed away from large-scale animal production toward more just and equitable systems (Morris et al., 2021; Blattner, 2020; McDermid et al., 2023; Verkuil et al., 2023). At the same time, as we have pointed toward, there already is a robust evidence base in strong support of dietary shifts away from animal-based food, at least in wealthier countries. This evidence could and arguably should be communicated more assertively. In our view, especially the issue of zoonotic risks and associated threats to human security receive too little emphasis in food policy discourse, to the benefit of industrial animal production (cf. Bernstein and Dutkiewicz, 2021). The scale and intensity of today's animal production poses great threats and harms to human health and security. These threats should concern every scientist, including those who receive benefits from the sector, be it financial benefits, career perspectives, prestige, influence, or community.

CRediT authorship contribution statement

William Ripple: Writing – review & editing. **Edel Sanders:** Writing – review & editing, Investigation. **Richard Twine:** Writing – review & editing, Investigation, Conceptualization. **Romain Espinosa:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Jochen Krattenmacher:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: The career perspectives and/or funding opportunities of the authors could expand if the recommendations for research in Section 4 were to be followed. ES and WR declare no other competing interests. JK has minor direct and indirect investments in non-animal based food producers around Europe, with no particular focus on Irish companies (together constituting less than 5 % of the total value of his portfolio). RE serves as the Director of the French CNRS research group "Animal

Welfare Research Observatory” (uncompensated), and sits in the advisory board of the research group “Animal Welfare Economics Working Group” (uncompensated). RT has a non-financial competing interest as Chair of the Research Advisory Committee of The Vegan Society (UK). No funding or other material support has been received from any third-party source, whether private or public, to arrange, coordinate, co-author or publish this article (JK furthermore worked on this article entirely in his free time).

Data Availability

Data will be made available on request.

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