

# Meat, money and messaging: How the environmental and health harms of red and processed meat consumption are framed by the meat industry

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## Authorship

K.C: Conceptualisation, Methodology, Formal analysis, Investigation, Data curation, Writing-Original draft preparation, Visualisation. N.M: Conceptualisation, Methodology, Writing-Reviewing and editing. J.M: Conceptualisation, Methodology, Validation, Writing- Reviewing and editing.

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## **Abstract**

Calls to cut consumption of red and processed meat, in order to protect both human and planetary health, are drawing increased attention from policy actors. This poses a potential threat to meat industry profits. It is well evidenced that producers of other harmful commodities (such as fossil fuels or tobacco) respond with a range of tactics to impede policy action when similarly threatened, including framing the issues at stake in a light more favourable to industry interests.

In order to investigate how the meat industry in the UK frames discussions about the environmental and health impacts of red and processed meat consumption, thematic content analysis was performed on documents sourced from the websites of 6 organisations representing the UK meat industry.

Across the dataset, four main framings were identified; 'still open for debate', 'most people have no need to worry', 'keep eating meat to be healthy' and 'no need to cut down to be green'. These frames work in conjunction to minimise the perception of harm, whilst also encouraging continued consumption. Messages were constructed using 'classic' tactics employed by other producers of harmful commodities.

These findings are of importance as they provide insight into how debates about food policy may be influenced by meat industry framing of the issues at hand.

## **Key Words**

Sustainability; Public Health; Meat; Commercial determinants of health; Food policy; United Kingdom.

# 1. Introduction

The consumption of red and processed meat is now understood to carry substantial environmental and health harms. In 2015, the International Agency for Research on Cancer (IARC) classified processed meat as ‘carcinogenic to humans’ and red meat as ‘probably carcinogenic to humans’<sup>(1)</sup>. Consumption of red and processed meat has also been linked to cardiovascular disease, type 2 diabetes and overall increased mortality<sup>(2)</sup>. Livestock accounts for 14.5% of all anthropogenic greenhouse gas (GHG) emissions<sup>(3)</sup> and has harmful effects across the ecosystem, with a reduction in production required in order to remain within a ‘safe operating space’ for global food production<sup>(2)</sup>.

As a result, a shift towards diets that are more plant-based and lower in meat has been proposed as a key policy objective.

## 1.1 Increasing public and policy attention

In the UK, there has been increased attention from policy makers to the health and environmental impacts of meat consumption. In 2016, the Eatwell Guide (an update of the UK’s healthy eating guidance) was published by Public Health England (PHE) with a recommendation to eat less red and processed meat. The protein section was retitled ‘Beans, pulses, fish, eggs, meat and other proteins’<sup>(4)</sup>, and PHE were explicit that this was to draw attention to more environmentally friendly protein options<sup>(5)</sup>. A recent House of Lords select committee report into food, poverty, health and the environment (July 2020) argued that a shift to more plant-based diets in keeping with the Eatwell Guide is required “in order to protect the natural environment and public health”<sup>(6)</sup>. A report published by the UK’s Committee on Climate Change (CCC) in January 2020 stated that the public sector should lead on

encouraging such a shift, and that if softer actions do not prove sufficient to achieve change, “stronger options” such as pricing or regulation should be considered<sup>(7)</sup>.

Nilsson and colleagues have shown that environmental policies require public acceptance to be implemented by governments<sup>(8)</sup>. There is evidence that the public are becoming increasingly aware of the footprint of their food, for example, a 2018 survey in EU member states found 80% of respondents to be willing to take into account the GHG emissions of their food choices<sup>(9)</sup>. Though meat consumption is rising globally<sup>(9)</sup>, people in the UK are eating less<sup>(10)</sup>, with annual per capita consumption of beef and veal dropping from 11.9kg in 2010 to 11.3kg in 2020<sup>(11)</sup>.

## 1.2 Meat, money and messaging

Whilst a shift towards diets lower in red and processed meat is likely to be a “win-win” for health and the environment<sup>(2)</sup>, those industries involved in the production and sale of meat stand to lose; increasing public and policymaker attention on the harms of meat threatens future revenue. Research has demonstrated that industries such as tobacco, fossil fuels and sugar sweetened beverages (SSBs) employ a variety of tactics to respond to such threats, including lobbying politicians<sup>(12),(13)</sup>, manipulating the evidence base<sup>(14)</sup>, legal action<sup>(15),(16)</sup> and attempting to influence public perceptions of the issues at stake<sup>(17),(18)</sup>. There are many examples of such behaviours impeding policy action to the detriment of public and planetary health<sup>(15),(19),(20),(21)</sup>.

There are indications that the meat industry has similarly influenced the food policy debate. For example, a Lancet commission on obesity stated, in reference to climate change, that “the enormous political power of the food and agricultural system industries has consistently overwhelmed individual and collective government efforts to promote the public interest rather than commercial interests”<sup>(22)</sup>, though no references were provided in support of this claim.

The US press has reported that lobbying by the meat industry led to advice to eat less meat being dropped from the latest US dietary guidelines<sup>(23)</sup>. In the UK, the National Farmers' Union (NFU) objected to a supermarket promotion for a vegetarian casserole, claiming the advert was 'demonising' meat and that this could negatively impact on healthy diets<sup>(24)</sup>.

Though these indications exist, on reviewing the literature, the authors have found there to be a shortage of research systematically investigating the broader corporate activity of the meat industry and the authors are aware of no peer-reviewed research analysing how the meat industry frames the issues at hand. Frames can be defined as "ideational lenses through which problems are understood and portrayed", and are important as they can determine how a topic is understood, whether it is discussed, how much attention it draws, and guides the choice of options for action<sup>(25)</sup>. For example, if consumers are persuaded that a product is safe, even when it is not, discussion about how the product should be consumed or whether it should be regulated is much less likely<sup>(21)</sup>. A Lancet review<sup>(26)</sup> and frameworks by Mialon et al.<sup>(27)</sup> and Madureira Lima and Galea<sup>(21)</sup> highlight a number of strategies employed by corporate entities to frame issues more favourably. These are summarised in Figure 1 below:

Figure 1: Industry framing stratagems

- **Avoiding products being seen as a cause for concern in the first place**<sup>(21)</sup>
- **Efforts to shape the evidence in the public arena and how it is interpreted:**
  - Partnerships with scientists to add credibility to industry claims, including developing third party 'expert' groups with a pro-industry stance<sup>(21) (26) (27)</sup>
  - Promote lower quality evidence, such as industry funded research and non-peer reviewed work that favours industry's standpoint <sup>(27)</sup>
  - Promotion only of research that favours industry, and criticize that which disagrees<sup>(21) (27)</sup>
  - Cast doubt over the reliability/integrity of researchers raising concerns about a product <sup>(21)</sup>
  - Highlight uncertainty and any lack of consensus amongst researchers <sup>(27)</sup>
  - Run events <sup>(27)</sup>
  - Produce educational materials <sup>(27)</sup>
  - Describe harmful outcomes as too complex to attribute to one cause or solution <sup>(27)</sup>
- **Focus on free choice rather than social determinants of health:**
  - Focus on individual responsibility and victim-blaming, arguing that industry is not responsible <sup>(26)(27)</sup>
  - Portraying government intervention as 'nanny state-ism' that undermines the free will of consumers <sup>(26)</sup>
- **Polishing industry's own reputation:**
  - Portray industry as well-intentioned, and focus on steps they are taking to manage harms <sup>(27)</sup>
  - Focus on other activities that industry may be undertaking outside their own field, to deflect attention away from the main issues <sup>(21) (26)</sup>
  - Promoting Corporate Social Responsibility (CSR) actions to buff their reputation<sup>(21)</sup>

We hypothesised that (A) the meat industry frames the health and environmental impacts of eating red and processed meat more favourably for themselves (i.e. to minimise the perception of harm) and that (B) this framing is created using tactics similar to those employed by other producers of harmful commodities.

To explore this hypothesis, we performed a thematic content analysis of meat industry documents, with the aim of identifying how the environmental and health harms of consuming red and processed meat are framed by industry.

## 2. Methods

### 2.1 Approach

The meat industry can be understood to be those working along the supply chain, from farm to fork. This includes: farmers, auctioneers, abattoirs and meat processors, import/export, secondary processors, wholesale meat market, butchers, shops and caterers.<sup>(28)</sup> Given the lack of prior research and to capture broader views, we focused here on industry representative bodies rather than individual companies. An industry representative body was considered for this purpose to be an organisation representing those who work at a point along the supply chain.

We included industry documents that made reference to the main health outcomes related to consumption of red and processed meat: overall mortality, cancer, cardiovascular disease and type 2 diabetes<sup>(2)</sup>. Though excessive antibiotic use in agriculture poses a long-term risk to health<sup>(29)</sup>, it was decided that investigation of industry portrayal of antibiotic use was beyond the scope of this research. In relation to the environmental harms of meat consumption, we applied the concept of 'planetary boundaries'<sup>(30)</sup>, including documents referring to impacts such as climate change, land-system change, freshwater use, nitrogen cycling, phosphorus cycling and biodiversity loss.

### 2.2 Identification of sources

Purposive sampling was used to identify relevant documents (search performed July 2019 to August 2019).

Firstly, a combination of strategies was employed to identify bodies representing the meat industry: **(A)** A Google search using combinations of key words based upon synonyms for 'representative body' and synonyms for meat or specific points of the supply chain, was

performed. The first fifty hits for each search were reviewed and potential sites accessed and reviewed against the inclusion/exclusion criteria (below). **(B)** The .gov.uk ‘approved professional bodies and learned societies’ list was reviewed, with organisations appearing potentially relevant reviewed against the inclusion/exclusion criteria. **(C)** This was complemented by a ‘snowballing’ technique, with organisations cited on the websites initially retrieved also being reviewed for relevancy. Identified organisations were included if they fitted the definition of a representative body as above, were UK-based and did not meet any of the exclusion criteria in Table 1.

Table 1: Exclusion criteria for organisations

<b>EXCLUSION CRITERIA</b>	<b>RATIONALE</b>
Locality specific rather than UK-wide	To capture debates at a national level, rather than local variations
Represent only a specific type of meat (e.g. game)	To capture debates relating to the spectrum of red and processed meats (particularly the largest and most intensely produced meat categories), rather than variations between different meat types
Organisations representing businesses selling a range of non-meat and meat products directly to end consumers. E.g. supermarkets, caterers, restaurants.	If purchase patterns of red meat changed, these businesses could diversify, without it necessarily negatively impacting on their profits. Therefore, these businesses have different pressures to those who rely on meat for their income, and thus may address the issues differently
Trade press	Though the views represented in such sources likely have a lot of common ground with those of industry itself, their profit motive is sale of the trade press rather than sale of meat, and thus there may be differences in how they frame issues
No accessible documents meeting the document inclusion criteria	N/a

The websites of each representative body were then searched systematically for relevant documents. Documents were deemed to be relevant to the research question if they referred to meat and health and/or the environment. Accepted document types included reports, guides, educational materials, fact sheets (including fact sheets presented as a webpage),



responses to relevant events and research articles. Documents were excluded if dated before 2015 (to ensure a contemporaneous understanding of industry framing). Factsheets that existed only in the form of webpages rather than as downloadable documents did not require a date, as it was reasoned that by virtue of appearing on an organisation's website it could be regarded as current and publicly available content. Documents that were not dated but had clearly been produced from 2015 onwards (e.g. because of reference to a post-2015 event) were also included.

For all representative bodies except the Agricultural and Horticultural Development Board (AHDB) all relevant documents found on their websites were taken forward for analysis. The AHDB was found to operate across several websites with multiple cross-links between them, and a total of 23 relevant factsheets were identified from across four of these sites. We selected at random one factsheet from each of the four sister sites by numbering the factsheets and using Google's random number generator.

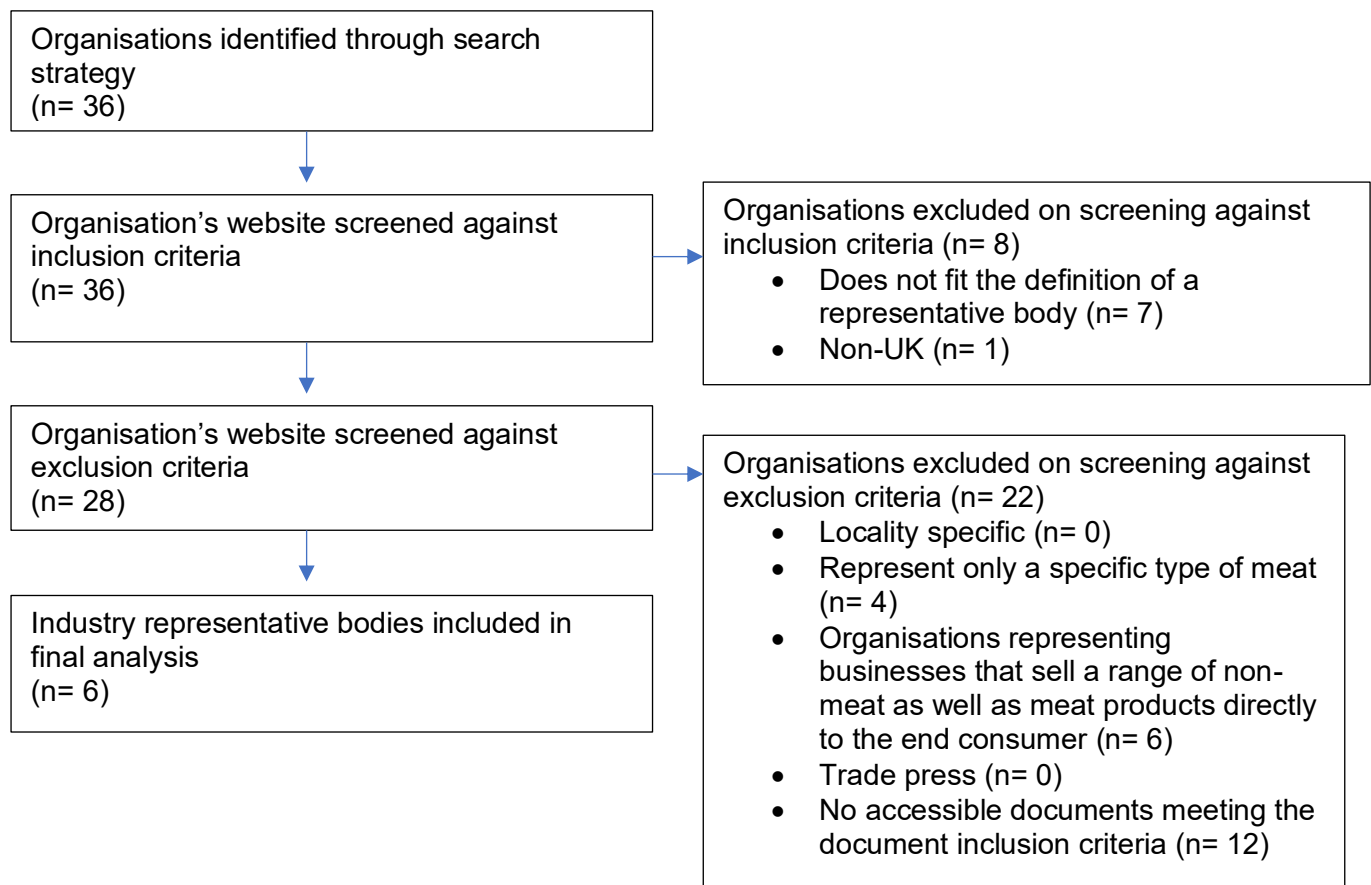
## **2.3 Analysis**

Thematic content analysis of the identified documents was performed by the lead researcher (method adapted from Flick)<sup>(31)</sup>. Coding was performed using MS Excel (Excel 2016, Microsoft, Washington, USA).

### 3. Results

37 bodies were identified, with 6 industry representative bodies taken forward after review against inclusion/exclusion criteria, as described in Figure 2:

Figure 2: PRISMA flow diagram of selection process for industry representative bodies



46 relevant documents were identified, however 24 of these were factsheets spread across 4 of the AHDB sister sites; 1 factsheet from each sister site was taken forward for analysis, along with the other 22 documents. These documents are described in Table 2. (Website links provided in Appendix A).

Table 2: Identified representative bodies and documents taken forwards for analysis

	TYPE OF DOCUMENT	DOCUMENT NAME	YEAR	ORGANISATION	DESCRIPTION
1	Teaching material	Livestock farming	N/a *	Agricultural & Horticultural Development Board (AHDB)#	Non-departmental public body, funded by levy at point of slaughter
2	Report	Landscapes without livestock	2018		
3	Report	Five a week: How much red meat should we be eating?	Post-2015 **		
4	Report	Red meat: Cutting through the confusion, a report by the Meat Advisory Panel	2016		
5	Fact page	Did you know? Healthy eating facts about pork	N/a *		
6	Fact page	Red meat and bowel cancer	N/a *		
7	Fact page	Nutrition	N/a *		
8	Fact page	Health professionals: Benefits of red meat	N/a *		
9	Response (EAT-Lancet commission report 'food in the anthropocene')	AHDB response to EAT-Lancet report	2019		
10	Fact page	Health & Nutrition	N/a *	British Meat Processors Association (BMPA)	Trade group representing British meat processors
11	Response (EAT-Lancet commission report 'food in the anthropocene')	New campaign for plant-based diets could prove very disruptive	2019		

12	Response (IPCC report 'climate change and land')	Climate Action- Farmers are ready to play their part	2019	Country Land & Business Association (CLA)	Membership organisation for owners of land, property and businesses
13	Response (government announcement net-zero by 2050)	Net-zero next steps	2019		
14	Response (IPCC report 'climate change and land')	New report recognises the positive role of meat in limiting climate change	2019	Craft Butchers	Represent independent butchers, farm shops, small abattoirs, processing and wholesale butchery operations as well as key suppliers to the industry
15	Report	British livestock and climate change: Beyond meat and methane	2017	National Farmers' Union (NFU)	Large trade body representing farmers
16	Report	The future of food 2040	2019		
17	Report	UK- A nation united by food	2018		
18	Report	United by our environment, our food, our future	2018		
19	Response (EAT-Lancet commission report 'food in the anthropocene')	National Papers: EAT-Lancet Commission report	2019		
20	Response (Sainsbury's trial)	Reaction to Sainsbury's trial to reduce meat consumption	2017		
21	Response (CCC report 'net zero- the UK's contribution to stopping global warming')	NFU reiterates its net zero aims for agriculture	2019		
22	Response (IPCC report 'climate change and land')	NFU responds to IPCC report on land use and climate change	2019		
23	Response	NFU responds to the EAT-Lancet commission report	2019		

	(EAT-Lancet commission report 'food in the anthropocene')				
24	Response (Red meat tax study)	NFU writes to The Guardian on red meat tax	2019		
25	Research article	Pasture for Life: A solution to global warming	2019	Pasture for Life (PFL)	Organisation representing grass-based farming and meat production
26	Research article	Research demonstrates the human health benefits of Pasture for Life meat	2016		

\* Webpage

\*\* This document is not dated, however the authors assume it was published after 2015, as it references work published in 2016.

# The AHDB has a web presence spread across 7 sites: AHDB.org.uk; meat matters; meat and health; simply beef and lamb; love pork; food a fact of life and meat and education (last excluded as no relevant documents). These all are owned by the AHDB and links frequently take the page user between sites. For simplicity, these sister sites are all referred to here as 'AHDB'.

On analysis, 76 unique codes were identified. Four over-arching themes were identified, illustrative of the main messages used to frame the health and environmental harms of red and processed meat; 'still open for debate', 'most people have no need to worry', 'keep eating meat to be healthy' and 'no need to cut down to be green'. 17 subthemes were drawn from these over-arching themes (Table 3).



	we should worry about more																												
	Total appearances of theme	0	0	7	50	0	15	0	1	2	1	1	0	0	0	0	0	0	0	0	1	0	2	1	1	0	0	82	
	<i>Total occurrences of deviant codes in theme:</i>																												0
<b>Keep eating meat to be healthy</b>	Meat is healthy	2	0	27	23	14	2	20	5	2	5	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	5	110	
	We should eat some meat	0	0	22	13	0	2	0	1	3	5	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	50	
	Some people could eat more	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
	We can choose healthier meats	0	0	1	7	2	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	
	Other reasons to keep eating meat	0	0	0	8	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	12	
	Total appearances of theme	2	0	55	53	16	5	21	7	5	14	4	0	0	0	0	1	1	0	0	2	0	0	1	1	1	17	206	
	<i>Total occurrences of deviant codes in theme:</i>																												19
<b>No need to cut down to be green</b>	Livestock farming benefits the environment	0	0	0	0	0	0	0	0	2	0	0	0	0	2	5	0	1	0	1	1	1	2	1	1	8	0	25	
	Reducing livestock numbers could	0	13	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	19	





## Main messages employed by the meat industry

### *Theme 1: 'Still open for debate'*

The harmful impacts of red and processed meat consumption on both health and the environment were portrayed as still being open to debate. This message was constructed from 3 main arguments:

- i. **'Lack of scientific consensus'**: Discussions around the harms of meat were framed as an ongoing debate, with valid evidence existing in dispute of 'meat is harmful' claims. For example:

“While we at BMPA advocate a balanced diet that includes animal protein, our main aim is to ensure that the debate remains balanced and that basic, scientifically proven facts from both sides of the fence are given due consideration by both Governments and consumers alike” (11)

It was claimed that there was lack of clarity, with further research needed regarding the impact of red/processed meat consumption on health or the environment. For example, AHDB document (4), which focussed on meat and cancer, is titled 'cutting through the confusion' and the NFU asserted “We do not yet understand the implications of a heavily plant-based diet ... on either our health or the environment” (12). The BMPA stated that the findings of the landmark EAT-Lancet report on sustainable diets could “easily create a false impression of scientific consensus” (11). This subtheme appeared in approximately a third of all documents.

- ii. **'Advice is of questionable quality'**: Claims were made that the harms of meat have been over-inflated; newspaper articles that declared meat eating to be damaging to

health or the environment were described as “alarmist” (4) and “sensationalist” (12) respectively. Concerns were raised about the quality of evidence used to build claims of harm, e.g. the AHDB stated that “The evidence linking red meat and CRC is very inconsistent and based on extremely weak observational studies” (4).

- iii. **‘Trust us not them’**: Doubt was at times cast over the reliability of scientists claiming that meat is harmful, particularly seen in the BMPA’s response to the EAT-Lancet commission, for example, “On a more cynical note, the campaign could open the door for new (and old) players in food and agriculture to capitalise on a lucrative new market” (11). Conversely, there were occurrences of industry implying themselves to be trustworthy by declaring themselves objective, independent or evidence-based. For example, the Meat Advisory Panel, who produced materials for the AHDB, described themselves as “tasked to provide objective and evidence-based information about red meat” (4), though they were funded by the AHDB<sup>(32)</sup> (who state that one of their priorities is to increase demand for beef and lamb<sup>(33)</sup>).

This theme was used by all organisations and appeared in 14 of the 26 documents.

*Theme 2: ‘Most people have no need to worry’*

- i. **‘As long as you don’t eat too much, it’s safe’**: Documents described eating meat up to a threshold amount to be safe, with risk only encountered above this level. For example, “There is nothing to suggest that eating red meat in line with the 70g a day cooked weight impacts negatively on health” (4).
- ii. **‘Most people don’t eat too much’**: Across the AHDB documents, we found 20 statements that the average intake of red meat is not high or that consumption has fallen over time. For example:

“4 in 10 men and 1 in 10 women eat more than 90 g of red and processed meat a day. Therefore, most people do not need to make any changes to their present consumption patterns in order to achieve the recommendation” (3)

Such statements imply that most people do not need to cut down.

- iii. **‘In some specific circumstances, consumption should be cut down’:** Where suggestions to cut down were seen, these suggestions were predominantly directed only to those who eat large amounts. This was with one exception, which advised sausages and burgers to be considered “occasional foods” (4).
  
- iv. **‘Minimisation of health harm’:** IARC classify red meat as a probable carcinogen (2A)<sup>(1)</sup>. Document (4), the AHDB’s discussion of IARC’s findings, provided examples of other 2A substances such as “very hot drinks” and “shift work”, and noted that “only one agent out of hundreds has been identified as safe [by IARC]” (4). This use of mundane comparisons and the implication that IARC is unlikely to ever class a substance as safe could be seen to build an impression that classification as 2A is not overly consequential. Document (4) went on to describe IARC’s findings as overly dramatic: “the messaging from IARC which implied an 18% increase in CRC risk with each 50-gram portion of processed meat eaten daily was unhelpful and exceptionally scaremongering”.
  
- v. **‘There are other things we should worry about more’:** AHDB report (4) and factsheet (6) both emphasised that meat eating is just one among many risk factors for colorectal cancer (CRC) (8 occasions when at least 1 alternative cause was mentioned, across the 2 documents), with other factors flagged as more important to address. For example, “Avoiding red and processed meat in the diet is not a protective

strategy against cancer ... the top priorities for cancer prevention remain smoking cessation, maintenance of normal body weight and avoidance of high alcohol intakes” (4). Both documents identified that smoking increases risk of lung cancer more than meat consumption increases risk of CRC. For example:

“Currently, in the UK, six out of 100 individuals are predicted to develop CRC over a lifetime. If these 100 individuals ate more than 50 grams of processed meat daily, this would increase to seven out of 100 cases. Putting this into context, the risk for smoking is 35 times higher so that out of 100 smokers, 20 are predicted to develop lung cancer. This is why eating meat is nowhere near as risky as cigarettes and those headline writers who said last year that eating meat was as bad as smoking got it badly wrong.” (4)

This is arguably an irrelevant comparison and could be considered misleading. A meta-analysis found the Relative Risk (RR) of smoking on lung cancer to be 8.96, but RR of smoking on CRC to be 1.2<sup>(34)</sup>, i.e. much less dissimilar to the RR of eating processed meat a day on CRC (1.18<sup>(1)</sup>).

This theme was seen in AHDB, BMPA and NFU documents. The most forceful message of reassurance was seen in document (4); “Red and processed meat do not give you cancer”, though generally the message was that red meat can be consumed safely within a limit.

### *Theme 3: ‘Keep eating meat to be healthy’*

- i. **‘Meat is healthy’**: References to red meat being healthy were prolific (15 documents). Some of these claims were generic, or made reference to meat and athleticism, while others focussed on protein, healthy fat or vitamin and mineral content and the potential benefits of these, for example “Red meat is one of the few natural dietary sources of

vitamin D ... There is emerging evidence that it [Vitamin D] protects against bowel, prostate and breast cancers, type 2 diabetes, high blood pressure and multiple sclerosis" (3). In contrast, mention of health harms occurred rarely, with 17 suggestions of harm in comparison to 110 counts for benefit (~1:6). All statements of harm were either oblique, accompanied by a qualifier or caveated, or obfuscated by undefined scientific terminology. For example; "A meta-analysis of 10 cohort studies found a 17% increased risk with every 100 grams of red meat consumed daily and a 18% increased risk for every 50 grams of processed meat consumed daily" (4).

- ii. **'We should eat some meat'**: The recommended upper limit of meat in dietary guidance was portrayed as an amount to aim to eat, rather than a limit to stay within, e.g. "Government guidelines suggest we should have 70g of red meat a day" (9). The ADHB document (3) is based around a "five-a-week" message, promoting 70g five times a week.

The AHDB portrayed meat as a solution for avoiding nutrient deficiencies and appeared to advocate for blanket advice to eat more meat:

"The evidence is clear, red meat and milk both provide important nutrients which millions of people are lacking in their diet. We should be encouraging increased intakes, not muddling messages on what constitutes a healthy balanced diet" (3)

It was also claimed that blanket advice to eat less meat could be risky; "simply accepting and promoting blanket 'eat less meat' messages could have a significant adverse impact on future diet adequacy in vulnerable groups" (3). The NFU suggested that a meat tax could lead to health inequality; "A blunt meat tax would simply make an important part of a healthy, balanced diet less affordable, inevitably hitting lower income households the hardest" (24).

Across the 26 documents there were 13 statements framing red meat as advantageous over non-red meat alternatives, such as “iron and zinc in beef and lamb are much more easily absorbed by the body than that found in plant-based foods” (10), though approximately a third of these referred specifically to vitamin B12 (which is predominantly derived from animal products).

- iii. **‘Some people could eat more’:** Statements such as “some groups such as women, girls and pre-school children, could eat more red meat” (4) appeared in AHDB documents (3) and (4).
- iv. **‘We can choose healthier meats’:** Both AHDB and BMPA documents stated that red meat is becoming lower in fat and that different preparation methods can be used to make meat healthier. PFL argued throughout document (26) that health impacts vary according to farming method, with livestock raised on pasture producing healthier meat.
- v. **‘Other reasons to keep eating meat’:** It was argued that people “enjoy eating meat” (16) and eating red meat was highlighted as the norm:

“Red meat is eaten and loved by millions of people around the world. In the UK 96% of people eat meat” (10)

Personal choice was also raised. For example, when Sainsbury’s announced plans to influence customers to purchase less meat, the NFU responded; “We are seeking urgent talks with Sainsbury’s to ensure all British produce can have pride of place on their shelves for customers to make up their own mind about what they buy” (20).

Overall, a message to keep eating meat was constructed through the delineation of potential risks of low intake and emphasis on the benefits of red meat, with little acknowledgement of health harms, and reassurance that healthier meats can be chosen. This is illustrated by the ADHB statement: “A healthy diet is all about balance, and advice on healthy eating should focus on getting the right balance between known benefits and potential risks”, i.e. that benefits are a given and harms uncertain.

*Theme 4: ‘No need to cut down to be green’*

- i. **‘Livestock farming benefits the environment’**: It was stated in 10 documents that land used for livestock can act as a carbon sink, and thus grazing animals are “part of the solution to global warming” (25). Livestock systems were also credited with “the maintenance of ... iconic landscapes and habitats”, with references to improving biodiversity also seen in (18) and (25). PFL argued that livestock grazing can “rebuild soil fertility” (25).
  
- ii. **‘Reducing livestock numbers could have negative impacts’**: ADHB document (2) ‘Landscapes without Livestock’ described how “simply cutting livestock numbers will have knock-on effects which will themselves have a negative environmental impact”, and gave examples of how reduced livestock numbers could detract from countryside aesthetics and lead to cultural loss, such as “a loss of the knowledge and traditions associated with family-based beef and sheep farming” (2).

It was also argued that cutting British production would export GHG emissions, for example, “We will not halt climate change by curbing British [meat] production and exporting it to countries which may not have the same environmental conscience, or ambition to reduce their climate impact” (21).

Whilst five documents explicitly stated that livestock can cause environmental harm (with one additional count of implied harm, and two cases of harm being presented but with a caveat) there was only one acknowledgement of possible benefits from reducing livestock numbers. This was in a case study and referred to a potential improvement in biodiversity in a very local area (2).

- iii. **‘Environmental harms from livestock aren’t a given’:** The NFU and PFL both emphasised that environmental impacts are dependent on farming method, arguing that some systems have the potential to be sustainable. For example, “Pasture-fed, grain-free production systems such as Pasture for Life, that use existing pastures or have been converted from crop production and do not involve the destruction of forests or other ecosystems, have the potential to be carbon-neutral” (25). The NFU and AHDB state that the UK already uses less harmful methods of production, for example “it is important we recognise that the British livestock industry is one of the most efficient and sustainable in the world” (23).

Industry was represented as rising to meet the threat of climate change, for example the CLA stated that its “Members around the country have been adopting best practice to help our government achieve its future net-zero ambitions” (12). However, the focus was on efficiency improvements rather than reducing production. For example, NFU document (15) presented 23 case studies describing measures taken by livestock farmers to decrease their environmental impact, none of which involved reducing animal numbers. Despite this, commitment to net-zero emissions from agriculture is reiterated, for example the NFU declares “an ambition to be Net Zero by 2040”, giving the impression that carbon neutral farming is possible without need to reduce consumption.



iv. **‘Bigger picture’**: It was argued in 7 documents that land used to graze livestock is not suitable for any other purpose, and that livestock is needed to convert grass into food that humans can eat. For example, “The only way you can turn grass into nutritious protein-rich food is to graze it with ruminant animals” (14). It was also argued that methane is a natural part of the carbon cycle or has a short half-life and is therefore less concerning, such as:

“Methane has a big immediate effect but a short lifespan, unlike carbon dioxide that persists in the atmosphere for much longer. Herds that have existed for generations at a stable size will not be adding directly to global warming with their methane emissions” (25)

These different subthemes create a message that livestock can benefit as well as harm the environment and reducing livestock numbers would not have a positive impact. The focus is on ‘British is best’ and how farming practices can be improved to diminish impact. The NFU used this framing frequently, though occurrences of this theme were seen across all of the organisations examined.

#### *Miscellaneous codes of interest*

Industry acknowledged that meat can be seen negatively, with both the BMPA and NFU stating that such a frame could affect industry interests. For example, the title of the BMPA’s response to the publication of EAT-Lancet was ‘New campaign for plant-based diets could prove very disruptive’ (11) and the article raised concerns that “Ultimately we could see changes in Government policy and legislation” (11). This article also described the EAT-Lancet recommendations as unachievable (11). **Conversely, there were examples of both the NFU and CLA presenting changing diets as a potential opportunity (in (16) and (13)).**

## 4. Discussion

### 4.1 Interpretation of the findings

Our analysis of industry documents demonstrates that, contrary to the scientific evidence on the need to reduce meat consumption to protect both human and planetary health, the meat industry frames the harmful impacts of the consumption of red and processed meat in a way that casts doubt over the extent of harm and the need to reduce consumption. This framing is created through four main themes. The first questions scientific consensus as to the degree of harm. The second attempts to persuade that there is likely no need to cut down for health reasons, whilst the third encourages continued consumption by implying that people should in fact continue to eat meat if they want to be healthy. The fourth frame, specific to environmental harms, focusses on individual parts of the scientific story, such as specific environmental benefits of agriculture and how some farming methods are more environmentally friendly than others. This distracts from the need for a net reduction, offering reassurance that it is not necessary to cut down to be environmentally responsible.

Our findings complement the existing evidence base as to how producers of harmful commodities frame the harms of their products, with many of the 'classic' industry tactics described in Figure 1 having been demonstrated in this analysis. The meat industry has been shown to foster uncertainty about scientific consensus and to cast doubt over the reliability of both researchers and the evidence, a technique that has been employed by the tobacco, fossil fuel and alcohol industries <sup>(35),(36)</sup>. Cherry-picking and misrepresentation of evidence was seen. For example, whilst the argument that different production practices have different environmental impacts is valid<sup>(2)</sup>, this ignores evidence that efficiency improvements alone can achieve a minimal reduction in GHG emissions compared to dietary shift, with net reduction in consumption of meat required to meet environmental ambitions<sup>(2)</sup>. This is illustrated by the title of document (14); "New report recognises the positive role of meat in limiting climate

change". The report referred to is an IPCC report, which does indeed acknowledge the differing impact of different farming methods, but also states that scenarios with lower meat consumption would exert less stress on the environment, and it does not present meat as a solution to climate change<sup>(37)</sup>. Similarly, industry rejected evidence discordant with their message. For example, the NFU stated that it "firmly contests" (20) research from Scarborough and colleagues<sup>(38)</sup> predicting health and environmental benefits from diets lower in meat, though no reasons for this rejection were given. The framing 'keep eating meat to be healthy' is discordant with scientific understanding of healthy diets and is constructed from statements that at times seem to have little basis in fact, for example the NFU claim that "Scientific communities agree that red meat plays a vital role in a healthy, balanced diet" (23): Research<sup>(2)</sup> and guidance<sup>(4)</sup> consider plant-based diets to be a healthy choice (whilst acknowledging that supplementation of vitamin B12 and iron may be required).

At the time of analysis, the AHDB funded a 'Meat Advisory Panel' (MAP), which claimed to be "a group of independent scientists and health professionals tasked to provide objective and evidence-based information", though as we have seen the frames they use are not in line with current scientific understanding. The MAP appears to have been a 'scientific advisory board' as described by Madureira Lima and Galea<sup>(21)</sup> - a group developed to create a dialogue more favourable to industry whilst appearing independent. The AHDB production of educational material is reminiscent of tobacco and alcohol industry efforts to build a young customer base<sup>(39)</sup>; the 'Food a Fact of Life' education material examined here is targeted at 11-14 year olds (1).

Some documents, particularly those of the AHDB, were visually presented to reinforce the key messages. Prominent, enticing looking pictures of meat, often shown with vegetables, were featured throughout the reports, creating the impression that meat dishes can be healthy. The use of images to evoke consumption has been well-documented in other industries, for

example, images of alcohol or drinking have been demonstrated to induce craving and consumption of alcohol<sup>(40)</sup>. Key messages were repeated in bubbles or subtitles, reinforcing health benefits (3). Conversely, information about harms was harder to find. In document (4), though the purpose of this document is to explain IARC's findings, it is not until p.7 that these are stated, and they are presented in a manner that may not be clear to lay readers. This has the effect of pushing the harm to the 'background', decreasing its emphasis. Similar distraction from key information has been seen in examinations of alcohol industry documents claiming to provide information about pregnancy harms and cancer and alcohol<sup>(41),(36)</sup>.

## 4.2 Policy implications

Minimising the potential environmental and health harms of red and processed meat consumption and framing these harms as 'still open for debate' may lower the position of this issue on the policy agenda. If meat is not perceived as clearly harmful, there is a risk that reducing meat consumption may not be considered an acceptable topic of discussion by the public or policy makers. As Madureira Lima and Galea explain, 'if the existing evidence around the harmful effects of a given product is ambiguous and there is no consensus around it, then there is no need for regulatory action'<sup>(21)</sup>. This could delay or preclude system-wide interventions that have been shown to be the most effective type of public health action<sup>(42)</sup>.

As we have seen, such system wide interventions, and blanket advice to eat less meat, were criticised by industry. It was claimed by the AHDB that; "There is no such thing as a 'bad' food, but there is no doubt that excluding entire food groups from the diet is a major risk for nutrient adequacy" (3). This could be seen as an attempt to shift focus to promotion of balanced diets rather than on calls to reduce meat specifically. This argument has also been used by the SSB industry, which, in retaliation to WHO recommendations to reduce sugar intake, claimed that there are 'no bad foods'<sup>(14)</sup>.

Meat industry's claims to be part of the solution to environmental issues may improve the industry's credibility and help to stave off regulation. The food industry has been demonstrated to use the same frame in their response to the obesity crisis, arguing that their self-regulatory programmes are part of the solution (despite these programmes having been found to often be ineffective)<sup>(43)</sup>. Even if industry accepts arguments that there is a need to limit global production, the frames 'British is best' and 'environmental harms from livestock aren't a given' may open the door for the British meat supply chain to argue that, as a responsible global producer, the UK meat industry should not be regulated.

The meat industry's suggestion that the consumer can choose 'greener' meats, and their implications that there is a threshold for health harm, opens the door for arguments relating to personal responsibility: In this case, the responsibility to consume a safe amount, or to eat 'less but better' meat could be argued to lie with the consumer, thus changing the 'menu' of policy responses that may be seen as most appropriate. This has been seen with the alcohol industry, which generally opposes more powerful generalised interventions such as minimum unit pricing<sup>(44)</sup> in favour of interventions such as responsible drinking education<sup>(45)</sup>.

Other 'classic' industry tactics to avoid regulation include arguments that the issue is too complex for 'one size fits all' interventions<sup>(46)</sup>, and shifting the spotlight away from scientific fact to the political arena of free choice<sup>(47)</sup>. Though these arguments are not made strongly in the documents examined, as we have seen, diets are described as a personal choice and there are implications of complexity.

This research has focussed on the UK, and thus the generalisability to the policy context of other countries is unclear. However, given that the 'classic' industry tactics described above have re-occurred between different industries, over different time periods and in different

geographies, we would expect there to likewise be similarities in the behaviour of the meat industry players in other countries.

### **4.3 Limitations:**

Our decision not to focus on individual companies reduced the available data. However, choosing to examine bodies representative of industry allowed for the distillation of the main arguments of the largest and most established industry stakeholder groups, though we cannot conclude from our results that individual industry actors will employ these framings.

This work was intended to provide a contemporary picture of how the meat industry frames the environmental and health harms of red and processed meat consumption. However, the frames identified may shift over time as the context changes, for example as new research emerges or pressure to reduce GHG emissions increases.

This research did not examine all public-facing communication routes, such as social media channels, news articles or blogs. We judged that these sources would echo the framings used within each organisation's core documents, and therefore we consider it unlikely that including such documents would have altered the key findings. However, using alternative sources to triangulate findings can be useful in establishing the consistency and variability by audience in organisational messaging, and for analysing how responsive to current events they may be.

### **4.4 Conclusions**

The meat industry has been found to frame the environmental and health harms of red and processed meat consumption through four main messages; 'still open for debate', 'most people have no need to worry', 'keep eating meat to be healthy' and 'no need to cut down to be green'.

As presupposed by the research hypothesis, the overall effect is to minimise the perception of harm.

This is the first systematic analysis into the issue and further research is required to ascertain whether these frames have impact on either consumer or policy-maker behaviour. However, the employment of 'classic' industry tactics by the meat industry demonstrated here should, given the immense environmental and public health harms wrought by the use of these same tactics by other industries, be of significant concern to those with an interest in food policy.

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## **Declaration of Competing Interest**

All authors have denied any financial or other relationship that might lead to a conflict of interest.

## Appendix A- Links to source material

Document	Archive link*
1	<a href="https://web.archive.org/web/20200910143131/https://www.foodaactoflife.org.uk/11-14-years/food-commodities/meat/farming/">/web/20200910143131/https://www.foodaactoflife.org.uk/11-14-years/food-commodities/meat/farming/</a>
2	The original document no longer appears directly on the AHDB website, however it is still referred to on the website and can be accessed through EBLEX (former name of AHDB Beef and Lamb) and is archived here: <a href="https://web.archive.org/web/20200910150412/http://www.eblex.org.uk/wp/wp-content/uploads/2013/06/Landscapes-without-livestock-report.pdf">https://web.archive.org/web/20200910150412/http://www.eblex.org.uk/wp/wp-content/uploads/2013/06/Landscapes-without-livestock-report.pdf</a> Whilst this version appears very similar in content to the version analysed, it is noted that the introduction refers to EBLEX rather than the AHDB, and we have not checked this version exhaustively against the original source material for differences in content.
3	<a href="https://web.archive.org/web/20180508145247/http://meatandhealth.redmeatinfo.com/media/8072/MAP-report-5-a-week-2017-FINAL.PDF">https://web.archive.org/web/20180508145247/http://meatandhealth.redmeatinfo.com/media/8072/MAP-report-5-a-week-2017-FINAL.PDF</a>
4	<a href="https://web.archive.org/web/20200910151138/http://meatandhealth.redmeatinfo.com/media/7687/MAP-report-IARC-findings-2016-AW-2426-.pdf">https://web.archive.org/web/20200910151138/http://meatandhealth.redmeatinfo.com/media/7687/MAP-report-IARC-findings-2016-AW-2426-.pdf</a>
5	<a href="https://web.archive.org/save/https://www.lovepork.co.uk/pork-and-healthy-eating/did-you-know/">https://web.archive.org/save/https://www.lovepork.co.uk/pork-and-healthy-eating/did-you-know/</a>
6	<a href="https://web.archive.org/web/20200910152052/http://meatandhealth.redmeatinfo.com/media/7672/18-Red-meat-and-bowel-cancer-MAP.pdf">https://web.archive.org/web/20200910152052/http://meatandhealth.redmeatinfo.com/media/7672/18-Red-meat-and-bowel-cancer-MAP.pdf</a>
7	<a href="https://web.archive.org/web/20200910153619/https://www.simplybeefandlamb.co.uk/nutrition/">https://web.archive.org/web/20200910153619/https://www.simplybeefandlamb.co.uk/nutrition/</a>
8	<a href="https://web.archive.org/web/20200914090052/http://www.meatandhealth.com/health-professionals/faqs-about-red-meat/benefits-of-red-meat.aspx">https://web.archive.org/web/20200914090052/http://www.meatandhealth.com/health-professionals/faqs-about-red-meat/benefits-of-red-meat.aspx</a>
9	<a href="https://web.archive.org/web/20200914105511/https://ahdb.org.uk/news/ahdb-response-to-eat-lancet-commission-report">https://web.archive.org/web/20200914105511/https://ahdb.org.uk/news/ahdb-response-to-eat-lancet-commission-report</a>
10	The Internet Archive's Wayback Machine was unable to archive this page. Current link: <a href="https://britishmeatindustry.org/resources/health-and-nutrition/">https://britishmeatindustry.org/resources/health-and-nutrition/</a> [Last accessed 14.09.2020]
11	The Internet Archive's Wayback Machine was unable to archive this page. Current link: <a href="https://britishmeatindustry.org/industry-news/new-campaign-for-plant-based-diets-could-prove-very-disruptive/">https://britishmeatindustry.org/industry-news/new-campaign-for-plant-based-diets-could-prove-very-disruptive/</a> [Last accessed 14.09.2020]
12	<a href="https://web.archive.org/web/20200914111242/https://www.cla.org.uk/climate-action-%E2%80%93-farmers-are-ready-play-their-part">https://web.archive.org/web/20200914111242/https://www.cla.org.uk/climate-action-%E2%80%93-farmers-are-ready-play-their-part</a>
13	<a href="https://web.archive.org/web/20200914183235/https://www.cla.org.uk/next-steps-for-net-zero">https://web.archive.org/web/20200914183235/https://www.cla.org.uk/next-steps-for-net-zero</a>
14	<a href="https://web.archive.org/web/20200914184038/https://mailchi.mp/664c1f950692/premier-news-on-the-radar-climate-change-land-report-charcuterie-live-best-small-shops-awards">https://web.archive.org/web/20200914184038/https://mailchi.mp/664c1f950692/premier-news-on-the-radar-climate-change-land-report-charcuterie-live-best-small-shops-awards</a>
15	<a href="https://web.archive.org/web/20200914184038/https://mailchi.mp/664c1f950692/premier-news-on-the-radar-climate-change-land-report-charcuterie-live-best-small-shops-awards">https://web.archive.org/web/20200914184038/https://mailchi.mp/664c1f950692/premier-news-on-the-radar-climate-change-land-report-charcuterie-live-best-small-shops-awards</a>
16	<a href="https://web.archive.org/web/20200916111724/https://www.nfuonline.com/nfu-online/news/nfu-reports/the-future-of-food-2040/">https://web.archive.org/web/20200916111724/https://www.nfuonline.com/nfu-online/news/nfu-reports/the-future-of-food-2040/</a>
17	<a href="https://web.archive.org/web/20200916112038/https://www.nfuonline.com/nfu-online/news/nfu-reports/uk-united-by-food/">https://web.archive.org/web/20200916112038/https://www.nfuonline.com/nfu-online/news/nfu-reports/uk-united-by-food/</a>
18	<a href="https://web.archive.org/web/20200929142818/https://www.nfuonline.com/nfu-online/news/nfu-reports/united-by-our-environment-our-food-our-future/">https://web.archive.org/web/20200929142818/https://www.nfuonline.com/nfu-online/news/nfu-reports/united-by-our-environment-our-food-our-future/</a>
19	The Internet Archive's Wayback Machine was unable to archive this page. Current link: <a href="https://www.nfuonline.com/news/media-centre/press-releases/national-papers-eat-lancet-commission-report/">https://www.nfuonline.com/news/media-centre/press-releases/national-papers-eat-lancet-commission-report/</a> [Last accessed 29.09.2020]



20	<a href="https://web.archive.org/web/20200929144020/https://www.nfuonline.com/news/latest-news/nfu-reaction-to-sainsburys-trial-to-reduce-meat-consumption/">https://web.archive.org/web/20200929144020/https://www.nfuonline.com/news/latest-news/nfu-reaction-to-sainsburys-trial-to-reduce-meat-consumption/</a>
21	<a href="https://web.archive.org/web/20200929144203/https://www.nfuonline.com/cross-sector/environment/climate-change/climate-change-news/nfu-reiterates-its-net-zero-aims-for-agriculture/">https://web.archive.org/web/20200929144203/https://www.nfuonline.com/cross-sector/environment/climate-change/climate-change-news/nfu-reiterates-its-net-zero-aims-for-agriculture/</a>
22	<a href="https://web.archive.org/web/20200929144343/https://www.nfuonline.com/cross-sector/environment/climate-change/climate-change-news/nfu-responds-to-ipcc-report-on-land-use-and-climat/">https://web.archive.org/web/20200929144343/https://www.nfuonline.com/cross-sector/environment/climate-change/climate-change-news/nfu-responds-to-ipcc-report-on-land-use-and-climat/</a>
23	<a href="https://web.archive.org/web/20200929144818/https://www.nfuonline.com/nfu-responds-to-the-eat-lancet-commission-report/">https://web.archive.org/web/20200929144818/https://www.nfuonline.com/nfu-responds-to-the-eat-lancet-commission-report/</a>
24	<a href="https://web.archive.org/web/20200929145215/https://www.nfuonline.com/news/latest-news/nfu-writes-to-the-guardian-on-red-meat-tax/">https://web.archive.org/web/20200929145215/https://www.nfuonline.com/news/latest-news/nfu-writes-to-the-guardian-on-red-meat-tax/</a>
25	<a href="https://web.archive.org/web/20200929145518/https://www.pastureforlife.org/research/pasture-for-life-a-solution-to-global-warming/">https://web.archive.org/web/20200929145518/https://www.pastureforlife.org/research/pasture-for-life-a-solution-to-global-warming/</a>
26	<a href="https://web.archive.org/web/20200306163919/https://www.pastureforlife.org/media/2018/10/PFL-Health-Benefits-at-14-Sept-FINAL.pdf">https://web.archive.org/web/20200306163919/https://www.pastureforlife.org/media/2018/10/PFL-Health-Benefits-at-14-Sept-FINAL.pdf</a>

\*Material was archived using the Internet Archive WayBack Machine)

## Data statement

This is a qualitative study of materials available in the public domain, the links to which are provided in Appendix A.

## References

- (1) Bouvard V, Loomis D, Guyton K, Grosse Y, El Ghissassi F, Benhrahim-Tallaa L, et al. Carcinogenicity of consumption of red and processed meat. *Lancet Oncology* [Internet]. 2015 Oct [cited 2020 Oct 16];16(16):1599-1600. Available from: [https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(15\)00444-1/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(15)00444-1/fulltext) doi: 10.1016/S1470-2045(15)00444-1
- (2) Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, et al. Food in the Anthropocene: The EAT-*Lancet* Commission on healthy diets from sustainable food systems. *Lancet* [Internet]. 2019 Jan [cited 2020 Oct 16];393(10170):447-92. Available from: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)31788-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31788-4/fulltext) doi: 10.1016/S0140-6736(18)31788-4
- (3) Gerber PJ, Steinfeld H, Henderson B, Mottet A, Opio C, Dijkman J, Falcucci A, Tempio G. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities [Internet]. Rome: Food and Agriculture Organization of the United Nations (FAO); 2013 [cited 2020 Oct 16]. 115 p. Available from: <http://www.fao.org/3/i3437e/i3437e.pdf>
- (4) Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland. Eatwell Guide [Internet]. UK: Public Health England; 2016 [cited 2020 Oct 16]. 1 p. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/528193/Eatwell\\_guide\\_colour.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/528193/Eatwell_guide_colour.pdf)
- (5) Public Health England. The Eatwell Guide: How does it differ to the eatwell plate and why [Internet]. London: Public Health England; 2016 Mar [cited 2020 Oct 16]. 6 p. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/528201/Eatwell\\_guide\\_whats\\_changed\\_and\\_why.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/528201/Eatwell_guide_whats_changed_and_why.pdf)
- (6) Select Committee on Food, Poverty, Health and the Environment. Report of Session 2019-20, Hungry for change: Fixing the failures in food [Internet]. London: House of Lords; 2020 July [cited 2020 Oct 16]. 191 p. HL Paper 85. Available from: <https://committees.parliament.uk/publications/1762/documents/17092/default/>
- (7) Committee on Climate Change. Land use: Policies for a Net Zero UK [Internet]. London: Committee on Climate Change; 2020 Jan [cited 2020 Oct 30]. 121 p. Available from: <https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/>
- (8) Nilsson A, Hansla A, Heiling J, Bergstad C, Martinsson J. Public acceptability towards environmental policy measures” Value-matching appeals. *Environmental*

- Science & Policy [Internet]. 2016 [cited 2020 Oct 16];61:176-184. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S1462901116300971> doi: [10.1016/j.envsci.2016.04.013](https://doi.org/10.1016/j.envsci.2016.04.013)
- (9) Froggatt A, Wellesley L. Meat Analogues: A proposal for the EU [Internet]. London: Chatham House; 2019 Feb [cited 2020 Oct 16]. 43 p. Available from: <https://www.chathamhouse.org/sites/default/files/2019-02-18MeatAnalogues3.pdf>
- (10) Committee on Climate Change. Net Zero Technical report. London: Committee on Climate Change; 2019 May [cited 2020 Oct 16]. 304 p. Available from: <https://www.theccc.org.uk/publication/net-zero-technical-report/>
- (11) OECD (2020), Meat consumption (indicator). doi: 10.1787/fa290fd0-en (Accessed on 19 October 2020)
- (12) O'Hara J, Musicus A. Big Soda vs. Public Health [Internet]. Washington: Centre for Science in the Public Interest; 2015 [cited 2020 Oct 16]. 13 p. Available from: <https://cspinet.org/sites/default/files/attachment/big-soda-vs-public-health-report.pdf>
- (13) Givel M, Glantz S. Tobacco lobby political influence on US state legislatures in the 1990s. *Tobacco Control* [Internet]. 2001 [cited 2020 Oct 16];10:124-134. Available from: <https://tobaccocontrol.bmj.com/content/10/2/124> doi: [10.1136/tc.10.2.124](https://doi.org/10.1136/tc.10.2.124)
- (14) Brownell K, Warner K. The Perils of Ignoring History: Big Tobacco Played Dirty and Millions Died. How Similar Is Big Food? *Millbank Q* [Internet]. 2009 [cited 2020 Oct 16];87(1):259–294. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2879177/> doi: [10.1111/j.1468-0009.2009.00555.x](https://doi.org/10.1111/j.1468-0009.2009.00555.x)
- (15) Crosbie E, Thomson G. Regulatory chills: tobacco industry legal threats and the politics of tobacco standardised packaging in New Zealand. *N Z Med J* [Internet]. 2018 [cited 2020 Oct 16];131(1473):25–41. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6490166/>
- (16) Mialon M, Swinburn B, Sacks G. A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information. *Obes Rev* [Internet]. 2015 [cited 2020 Oct 16];16(7):519-530. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/obr.12289> doi: [10.1111/obr.12289](https://doi.org/10.1111/obr.12289)
- (17) Bates C, Rowell A. Tobacco explained. The truth about the tobacco industry... in its own words [Internet]. Action on Smoking and Health; 2004 [cited 2020 Oct 16]. 74 p. Available from <https://www.who.int/tobacco/media/en/TobaccoExplained.pdf>

- (18) Supran G, Oreskes N. Assessing ExxonMobil's climate change communications (1977–2014). *Environmental Research Letters* [Internet]. 2017 [cited 2020 Oct 16];12(8). Available from: <https://iopscience.iop.org/article/10.1088/1748-9326/aa815f> doi: [10.1088/1748-9326/aa815f](https://doi.org/10.1088/1748-9326/aa815f)
- (19) MacKenzie R, Mathers A, Hawkins BR, Eckhardt J, Smith J. The tobacco industry's challenges to standardised packaging: A comparative analysis of issue framing in public relations campaigns in four countries. *Health Policy* [Internet]. 2018 [cited 2020 Oct 16];122(9):1001-1011. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0168851018303518?via%3Dihub> doi: [10.1016/j.healthpol/2018.08.001](https://doi.org/10.1016/j.healthpol/2018.08.001)
- (20) Jahiel R, Babor T. Industrial epidemics, public health advocacy and the alcohol industry: lessons from other fields. *Addiction* [Internet]. 2007 [cited 2020 Oct 16];102:1335-1339. Available from: <https://pubmed.ncbi.nlm.nih.gov/17697267/> doi: [10.1111/j.1360-0443.2007.01900.x](https://doi.org/10.1111/j.1360-0443.2007.01900.x)
- (21) Madureira Lima J, Galea S. Corporate practices and health: a framework and mechanisms. *Globalization and Health* [Internet]. 2018 [cited 2020 Oct 16];14(21):1-12. Available from: <https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-018-0336-y#citeas> doi: [10.1186/s12992-018-0336-y](https://doi.org/10.1186/s12992-018-0336-y)
- (22) Swinburn B, Kraak V, Allender S, Atkins V, Baker P, Bogard J, et al. The global syndemic of obesity, undernutrition, and climate change: *The Lancet* Commission report. *The Lancet Commissions* [Internet]. 2019 [cited 2020 Oct 16];93(10173):791-846. Available from: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32822-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32822-8/fulltext) doi: [10.1016/S0140-6736\(18\)32822-8](https://doi.org/10.1016/S0140-6736(18)32822-8)
- (23) Gostin L. Health or lobbying? Experts say U.S. Gov't caves to meat industry in new dietary guidelines. *Democracy Now* [Internet]. 2016 Jan 14 [cited 2020 Oct 16]:[about 3p]. Available from: [https://www.democracynow.org/2016/1/14/health\\_or\\_lobbying\\_experts\\_say\\_us](https://www.democracynow.org/2016/1/14/health_or_lobbying_experts_say_us)
- (24) National Farmers' Union. NFU disappointed with Tesco advert. 2019 Oct 11 [cited 2020 Oct 16]; [about 4 screens]. Available from: <https://www.nfonline.com/sectors/livestock/livestock-must-read/nfu-disappointment-with-tesco-advert/>
- (25) Smith SL, Shiffman J. Setting the global health agenda: The influence of advocates and ideas on political priority for maternal and newborn survival. *Soc Sci Med* [Internet]. 2016 [cited 2020 Oct 16];166:86–93. Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5034850/> doi:

10.1016/j.socscimed.2016.08.013

- (26) Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T. Profit and pandemics: prevention of harmful effects of tobacco, alcohol and ultra-processed food and drink industries. Lancet Non-Communicable Diseases Series [Internet]. 2013 [cited 2020 Oct 16];381(9867):670-679. Available from: <https://www.thelancet.com/journals/lancet/article/PIIS01406736%2812%29620893/fulltext> doi: 10.1016/S0140-6736(12)62089-3
- (27) Mialon M, Swinburn B, Sacks G. A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information. *Obes Rev* [Internet]. 2015 [cited 2020 Oct 16];16(7):519-530. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/obr.12289> doi: 10.1111/obr.12289
- (28) Lindgren H, Hingley M. The impact of food safety and animal welfare policies on supply chain management: The case of the TESCO meat supply chain. *British Food Journal* [Internet]. 2013 [cited 2020 Oct 16];105(6):328-349. Available from: <https://www.emerald.com/insight/content/doi/10.1108/00070700310481702/full/html> doi: 10.1108/00070700310481702
- (29) World Health Organisation. Global action plan on antimicrobial resistance [Internet]. Geneva: World Health Organisation; 2015 [cited 2020 Oct 16]. 19 p. Available from: [https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1)
- (30) Steffen W, Richardson K, Rockström J, Cornell S, Fetzer I, Bennett E, et al. Planetary boundaries: Guiding human development on a changing planet. *Science* [Internet]. 2015 [cited 2020 Oct 16];347(6223):1259855. Available from: <https://science.sciencemag.org/content/347/6223/1259855.long> doi: 10.1126/science.1259855
- (31) Flick U. *An Introduction to Qualitative Research*. 5<sup>th</sup> Ed. London: Sage; 2014. Chapter 26, Thematic coding and content analysis; p.420-438.
- (32) Meat Advisory Panel. Red meat: Cutting through the confusion [Internet]. UK: Agricultural & Horticultural Development Board; 2016 [cited 2020 Oct 16]. 28 p. Available from: <https://web.archive.org/web/20200910151138/http://meatandhealth.redmeatinfo.com/media/7687/MAP-report-IARC-findings-2016-AW-2426-.pdf>
- (33) Agricultural & Horticultural Development Board. The AHDB Beef & Lamb Plan 2017-2020 [Internet]. UK: Agricultural & Horticultural Development Board [cited 2020

Oct 16]. 20 p. Available from:

[https://projectblue.blob.core.windows.net/media/Default/About%20AHDB/Corporate%20strategies/BL\\_Annual%20Plan\\_External\\_FINAL.PDF](https://projectblue.blob.core.windows.net/media/Default/About%20AHDB/Corporate%20strategies/BL_Annual%20Plan_External_FINAL.PDF)

- (34) Gandini S, Botteri E, Iodice S, Boniol M, Lowenfels A, Maisonneuve P et al. Tobacco smoking and cancer: A meta-analysis. *International Journal of Cancer* [Internet]. 2007 [cited 2020 Oct 30];122(1):155-164. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1002/ijc.23033> doi: [10.1002/ijc.23033](https://doi.org/10.1002/ijc.23033)
- (35) Diethelm P, McKee M. Denialism: What is it and how should scientists respond? *European Journal of Public Health* [Internet]. 2009 [cited 2020 Oct 30];19(1):2-4. Available from: <https://academic.oup.com/eurpub/article/19/1/2/463780> doi: [10.1093/eurpub/ckn139](https://doi.org/10.1093/eurpub/ckn139)
- (36) Petticrew M, Maani Hessari N, Knai C, Weiderpass E. How alcohol industry organisations mislead the public about alcohol and cancer. *Drug Alcohol Rev* [Internet]. 2018 [cited 2020 Oct 30];37(3):293-303. Available from: <https://pubmed.ncbi.nlm.nih.gov/28881410/> doi: [10.1111/dar.12596](https://doi.org/10.1111/dar.12596)
- (37) Intergovernmental Panel on Climate Change. *Climate Change and Land* [Internet]. Geneva: IPCC; 2019 [cited 2020 Oct 30]. Chapter 7, Risk management and decision making in relation to sustainable development. Available from: <https://www.ipcc.ch/srccl/chapter/chapter-7/>
- (38) Scarborough P, Appleby P, Mizdrak A, Briggs A, Travis R, Bradbury K et al. Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change* [Internet]. 2014 [cited 2020 Oct 30];125:179-192. Available from: <https://link.springer.com/article/10.1007/s10584-014-1169-1>
- (39) Mart S. Alcohol marketing in the 21st century: new methods, old problems. *Subst Use Misuse* [Internet]. 2011 [cited 2020 Oct 16];46(7):889–9. Available from: <https://pubmed.ncbi.nlm.nih.gov/21599504/> doi: [10.3109/10826084.2011.570622](https://doi.org/10.3109/10826084.2011.570622)
- (40) Maani Hessari N, van Schalkwyk M, Thomas S, Petticrew M. Alcohol industry CSR organisations: What can their Twitter activity tell us about their independence and their priorities? A comparative analysis. *Int J Environ Res Public Health* [Internet]. 2019 [cited 2020 Oct 30];16(5):892. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6427731/> doi: [10.3390/ijerph16050892](https://doi.org/10.3390/ijerph16050892)
- (41) Lim A, van Schalkwyk M, Maani Hessari N, Petticrew M. Pregnancy, fertility, breastfeeding, and alcohol consumption: An analysis of framing and completeness of information disseminated by alcohol industry-funded organisations. *Journal of Studies on Alcohol and Drugs* [Internet]. 2019 [cited 2020 Oct 30];80(5):524-533.

Available from: <https://www.jsad.com/doi/10.15288/jsad.2019.80.524> doi:  
[10.15288/jsad.2019.80.524](https://doi.org/10.15288/jsad.2019.80.524)

- (42) Nuffield Council on Bioethics. Public Health: Ethical Issues [Internet]. London: Nuffield Council on Bioethics; 2007 [cited 2020 Oct 16]. 191 p. Available from: <https://www.nuffieldbioethics.org/wp-content/uploads/2014/07/Public-health-ethical-issues.pdf>
- (43) Nixon L, Mejia P, Cheyne A, Wilking C, Dorfing L, Daynard R. "We're part of the solution": Evolution of the food and beverage industry's framing of obesity concerns between 2000 and 2012. *Am J Public Health* [Internet]. 2015 [cited 2020 Oct 30];105(11):2228-2236. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4605181/> doi: [10.2105/AJPH.2015.302819](https://doi.org/10.2105/AJPH.2015.302819)
- (44) McCambridge J, Mialon M, Hawkins B. Alcohol industry involvement in policymaking: A systematic review. *Addiction* [Internet]. 2018 [cited 2020 Oct 30];113(9):1571-1584. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6100095/#add14216-bib-0027> doi: [10.1111/add.14216](https://doi.org/10.1111/add.14216)
- (45) Petticrew M, Fitzgerald N, Durand M, Knai C, Davoren M, Perry I. Diageo's 'Stop Out of Control Drinking' campaign in Ireland: An analysis. *PLoS One* [Internet]. 2016 [cited 2020 Oct 30];11(9):e0160379. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5026331/> doi: [10.1371/journal.pone.0160379](https://doi.org/10.1371/journal.pone.0160379)
- (46) Petticrew M, Vittal Katikireddi S, Knai C, Cassidi R, Maani Hessari N, Thomas J. 'Nothing can be done until everything is done': The use of complexity arguments by food, beverage, alcohol and gambling industries. *J Epidemiol Community Health* [Internet]. 2017 [cited 2020 Oct 30];71:1078-1083. Available from: <https://jech.bmj.com/content/71/11/1078>
- (47) Friedman L, Cheyne A, Givelber D, Gottlieb M, Daynard R. Tobacco industry use of personal responsibility rhetoric in public relations and litigation: Disguising freedom to blame as freedom of choice. *Am J Public Health* [Internet]. 2015 [cited 2020 Oct 30];105(2):250-260. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4318333/> doi: [10.2105/AJPH.2014.302226](https://doi.org/10.2105/AJPH.2014.302226)