Analysis of the Narrative Grammars of Cultured Meat in UK Food and Farming Media

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Abstract

Cultured meat (CM), meat produced through animal-derived cell cultures, has garnered considerable media attention. At the moment, there is a set of 'loud' voices and particular 'grammars' that primarily dictate the current media framings of CM. To date, very little research has attempted to understand what the food and farming sector think of CM and, moreover, its potential impacts on farmers, their livelihoods and the farming sector more broadly. This study looks to bring to the fore these more marginalised and understudied food and farming voices, in the form of their legacy media and social media narratives, to explore and analyse the construction and circulation of the grammars of CM in digital, online spaces. To this end, through an iterative sampling procedure, we collected and qualitatively and quantitatively analysed the framing grammars of 147 pieces of online discursive and visual media discussing CM from 2017 to 2023. Analysing the discursive grammars of CM suggested three prominent grammars of CM: 1) CM is a 'solutionist' technofix for the UK and explicitly Britain post-Brexit, 2) CM is a 'virtuous' technology given its environmental and food security possibilities, and 3) CM is 'in tension' with the farming sector as well as consumers' health and taste buds. Farmers in particular perceive CM as an existential threat to their livelihoods and livestock farming, with some of these grammars verging on the conspiratorial. Yet, some farmers did not see CM as a realistic or potential threat. A final grammar surrounded the affordability of CM.

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Introduction

Although not yet widely available as a commercial product, cultured meat (CM),[1] meat produced through animal-derived cell cultures, has garnered considerable media attention. A great deal of this coverage has focused on the 'possibilism' of 'clean meat' (e.g. Dutkiewicz and Rosenberg, 2021), fuelled in large part by the headline-grabbing sums of mostly private capital investment in the technology – which as of 2022, reportedly totalled $2.8 billion (GFI, 2023) –, as well as the science-fiction-like future visions of eating 'slaughter free' meat (Reis et al, 2020) grown in bioreactors. The United Kingdom's (UK) Food Standards Agency (FSA), the institution tasked with ensuring food safety, added its voice to the public conversation when it published a series of 'news alerts' in 2022 reporting that 'a third of UK consumers are willing to try lab-grown meat' (FSA, 2022). When the California-based company Eat Just launched its cultured chicken products at a high-end Singapore restaurant in 2020 – the world's first ever commercial sale of a CM product –, its 'no-kill, lab-grown meat' was described as a 'landmark moment across industry' (Carrington, 2020). According to Josh Tetrick, the CEO of Eat Just, the approval of these CM products was, rather spectacularly, '. . . one of the most significant milestones in the food industry in the last handful of decades'.

There is currently a set of 'loud' voices and particular 'grammars' – i.e. the discursive frames through which media narratives are constructed and circulated (Goodman and Jaworska, 2020; Jaworska et al, 2024) – that primarily dictate the current media framings of CM. Specifically, the majority of the elevated media voices pronouncing on CM are those of CM scientists, financial investors, CEOs and/or industry-related promotional organisations (e.g. The Good Food Institute), in addition to organisations like the FSA that give voice to 'potential' CM consumers via public surveys. These contemporary media grammars of CM are those that, almost without exception, extol the future, 'promissory' virtues, 'magical disruption' and virtuous markets of CM (Guthman and Biltekoff, 2021; Sexton et al, 2019).[2] Through this framing, the transition to CM is said to address the 'matters of concern' (Latour, 2004) surrounding animal protein production and consumption and their association with climate change, environmental pollution, biodiversity loss, food 'scares', and detrimental human and animal health (Willet et al. 2019). As Sexton and Goodman (2022: 176) argue, CM is heralded because of

> *. . . its revolutionary potential in dealing with the ongoing and increasing crises of the Anthropocene, particularly those related to conventional livestock's impact on the environment. [These products] promise to be 'good for people, animals and the planet' (Clara Foods, cited in Sexton et al 2019) [through] a total fix that replaces the perceived inefficiencies of biology with the control and efficiency of technology.*

Since the early 2010s, however, the media hype bubble surrounding CM has at times been punctured by counternarratives. More recently, these have come increasingly from institutional voices (e.g. IPES-FOOD) and a small number of high-profile exposés that hint at an industry built too much on promises rather than on scientific reality about to be caught out by its own technofix-fuelled hubris (e.g. New York Times, 2024). The longest-standing counternarratives have come from the incumbent food and farming industry, a group of actors for which CM's success poses potentially existential threats. Early examples include livestock industry lobby groups in Australia and the United States (US) and holistic farming organisations like the Sustainable Food Trust in the UK (Sexton et al, 2019). The reactions have not been unanimous, however. Sexton et al (2019) highlight that the dividing lines between buy-in – sometimes literally through investment and corporate acquisitions – and opposition to CM from agri-food stakeholders often correspond to size of operation, business model, and place within the food supply chain. In other words, as a general rule, companies operating on larger (i.e. multinational) scales, with industrialised business models, and in the middle to end of the food chain (i.e. processing, retail) have been much more likely to show interest and support for CM. Farmers and food producers, especially those with smaller to medium-sized businesses and operating more holistic

[1] While we discuss the differential naming of cultured meat by different media below, in this paper, we use the term 'cultured meat' and its abbreviation of 'CM' to denote meat that is created through animal-derived cell cultures.

[2] This is a similar phenomenon to the promises of precision made in discourses of agriculture or food 4.0, which tend towards making grand, epochal claims of revolution. See Miles et al (2019) and Kuch et al (2020) for more.

agricultural practices, have been less visible as supporters of CM. This overall lack of support from farmers can in part be attributed to their disproportionate absence from both academic debates and mainstream media stories on CM. Despite potentially having the most to lose (or benefit) from CM, farmers are one of the biggest missing voices from public conversations about CM.

To date, very little research has attempted to understand what the food and farming sector thinks of CM and, moreover, its potential impacts on farmers, their livelihoods and the farming sector more broadly. Our research and analysis look to bring to the fore these more marginalised and understudied food and farming voices, in the form of their legacy media and social media narratives, to analyse the construction and circulation of the grammars of CM in digital spaces. In this paper, we narrow our field of focus to that of the media produced by the UK food and farming sector, as well as online farmers' forums, and look to analyse how CM has been framed in the UK. This complements our earlier research that engaged with UK farmers from different agri-food sectors about the potential impacts and/or benefits they perceived in the development of a large-scale CM sector (Manning et al, 2023). In this current paper, we are specifically interested in how CM has been framed as an 'opportunity' and/or a 'threat' in the grammars of the UK's food and farming sector, and by 'online' farmers, through the key print and digital media platforms they use to report on, represent, discuss and debate CM.

Understanding the media grammars of CM in the UK is important because of the dearth of studies on the food and farming sector's framings of CM and the wider lack of attention paid to the mediascapes produced by food and farming actors. Our analysis of the grammars of CM in the UK looks to situate these influential voices and their framings of CM within the broader context of: the contemporary cultural politics of food (e.g. Goodman and Jaworska, 2020) and of alternative proteins and CM specifically (e.g. Sexton and Goodman, 2022; Driessen and Korthals, 2012; Dickson and Clay, 2024; Dilworth and McGregor, 2015; Van der Weele and Driessen, 2013; O'Riordan et al, 2017; Chiles, 2013); the 'reconfigurations' of animals within food systems (Holloway, 2022); the shifting political economies of food production (e.g. Goodman, 2023; Rose et al, 2022); and the politics of food sustainability in the face of the climate crisis (e.g. Sage, 2022). In short, understanding the mediated framings and grammars of CM provides crucial insights into the position of the UK's food and farming sector as to the potential impacts of CM on the future production and consumption of food in an increasingly climate-changed world.

Situating the Media Grammars of Cultured Meat

Food media and mediated food

Recent research has sought to explore various important aspects of the media narratives and dynamics – and the relationships of power, inequality and intersectionality they produce and circulate – surrounding food. Started in earnest through Signe Rousseau's ground-breaking work on social media (2012a) and celebrity chefs and food (2012b), work by Leer and Paulson (2018: 17) has sought to capture the 'heterotopia' of food media to illuminate the 'complex vision of the politics of media food' in such a way that it 'pluralises' its 'relations to [audiences'] identities and practices of many sorts'. Phillipov and Kirkwood (2018) explore the ways in which narratives of 'alternative food networks' (Goodman et al, 2012) have moved into more 'mainstream' mediascapes across television cooking programmes, digital foodscapes, food justice projects and the advertising and labelling strategies of major food retailers and manufacturers. As they argue, '[a]t the intersection of food politics, media texts and everyday material practices, we are seeing media's increasing power as a key actor in food systems debates and as a motor of food system transformation' (Phillipov and Kirkwood, 2018: 2).

Goodman, Johnston and Cairns (2017), and an accompanying array of papers in Geoforum, spotlight the 'mediated biopolitics' of food and eating. As they state, food media is not just mere 'spectacle', for

> *the concept of mediated biopolitics enables a critique of the ways that food media solidify, facilitate and*

> *govern 'the politics of [food] life itself'. (162) [Thus], '[an] analysis of the mediated biopolitics of food examines how particular food discourses come to be legitimated as "truths" and sheds light on aspects of the foodscape these truths obscure' (163).*

Specifically, as they and others (e.g. Barnes, 2017; Hollows, 2022) have argued, nowhere are the power and politics of food truths, narratives and discourses more fraught than in the form of 'food celebrities' (Johnston and Goodman, 2015), such as celebrity chefs and food influencers who seem to multiply, spread and intensify their influence across both legacy and social media.

Given its increasingly powerful significance and almost inescapable presence, food across digital media landscapes, or 'digital foodscapes', has come in for particular scrutiny and analysis. Through Digital Food, an all-encompassing treatise on everything from social media's 'ordinary food imagery' and amateur food and cooking videos, to gendered performances of online food culture, to digitally-mediated ethical food consumption and the 'doings' of food politics, Lewis (2020) shows how food, the digital world and everyday life are 'thoroughly intertwined'. In earlier writing, Schneider et al (2018: 1) and other colleagues worked to '…contemplate what happens when food, this visceral and enlivening matter, goes digital – and particularly what happens when activism surrounding food moves into the digital domain'. Digital food activism, they argue, foregrounds 'connective action' rather than 'collective action', such that the 'ontological experiments' of digital foodscapes '…have the potential to reclassify food, shift accountability relations and disrupt prevailing market framings' (21). Bringing to bear both cultural studies and food studies in order to foreground and examine 'digital food cultures', both Lupton and Feldman (2020) and Feldman and Goodman (2021), as well as the authors of their joint collections, explored the contemporary imbrications of the digital world, food cultures, power and inequality, and everyday lives, livelihoods and lifestyles. From the gendered, raced and classed politics of digitally-mediated 'healthy' eating (e.g. Conor, 2021; O'Neill, 2021), to online representations of various forms of 'good food' (Feldman, 2021), food and digital culture are 'mutually implicated in the contemporary processes of, and debates around, knowledge production and power distribution' (Feldman and Goodman, 2021: 2) within agri-food systems and societies more broadly.

Expanding on the mediated productions of the politicised constructions of digital foodscapes, Goodman and Jaworska (2021) analysed the so-called good food grammars created and circulated by UK-based 'digital food influencers' (DFIs). These DFIs included both more established influencers such as Jamie Oliver, Gordon Ramsay, Nigella Lawson and Lorraine Pascale who have expanded into digital foodscapes, and newer influencers such as Ella Mills (known as Deliciously Ella), Izy Hossack, Madeleine Shaw and 'The Body Coach' Joe Wicks, who all rose to prominence in online spaces as digital food 'originalists'. From their analysis, DFIs have produced a series of 'good food' grammars, the notion of which we are directly building on here with our analysis of mediated CM grammars, that are defined as '. . . a set of [language, discursive and narrative] norms and practices that . . . interact with wider audiences and . . . dominate the digital foodscape' (184).

Goodman and Jaworska (2021) found that the grammars of the DFIs they analysed produced the stable, 'normalised' and highly shared notion that 'good food' was constructed as 'clean' or 'free from', and part of a wider fitness regime that supported a much broader, heathy, aspirational, 'good' lifestyle. As they argue, 'DFIs as our consciences and our muses give us not just instructions on how to cook up good foods but how to cook up the perfect, caring, "normal" and "right" lifestyle" (192). The outcome of these grammars, the authors argue, is to re-enforce and strengthen the already-hegemonic 'whiteness' and middle- and upper-class aspirational proclivities embedded in the digitally-mediated narratives of 'good food' put forward by DFIs. Building on these findings, in this paper we analyse the CM grammars that have been created by and circulated across the UK's food and farming media landscapes and the media outlets and influencers inhabiting them.

Cultured meat media grammars

Previous research on the multiple framings of CM has explored its 'promissory narratives' pushed by the sector and its boosters (e.g. Sexton et al, 2019), the visual representations of CM (e.g. Stephens and Ruivenkamp,

2016), and the public perceptions and (future) acceptability of this 'alternative protein' (e.g. Errmann et al, 2023; Tsvakirai et al, 2024). Parallel outputs have explored the views of farmers (e.g. ProVeg International, 2024), meat scientists (Choudhary et al, 2023), and CM actors and organisations (e.g. Broad and Biltekoff, 2023), as well as the regulatory and policy narratives that currently surround it (e.g. Evans and Johnson, 2021).

To date, only a few studies have considered the framing of CM in the media, and the use of discursive analysis of CM framings has been limited. Early media framing research (Goodwin and Shoulders, 2013) sought to get a snapshot of how CM was being framed in US and EU news outlets between 2005 and 2011. Only 34 articles in the news mentioned 'Cultured Meat,' focusing mainly on its potential benefits, history, and methods of production, as well as how long it would take to come to market, and concerns over livestock production, including a sense of scepticism about the technology. The authors (Goodwin and Shoulders) concluded:

> *[c]urrently, the support of [CM] in print media is outweighing the opposition. Therefore, it is likely that consumers will also develop favourability toward the product if support continues to be demonstrated by the media. The meat industry and larger agricultural industry should work to create effective media strategies and continue to monitor how [CM] and other agricultural topics are being covered in the media. As with the issue of [CM], it is important that the agricultural industry make strides toward communicating in a proactive manner. (449)*

Hopkins (2015) explored media coverage in the US, Canada and UK of the infamous London CM tasting event in 2013 where Google's Sergey Brin spoke about the £250,000 he had invested in the five-ounce CM burger, created by Professor Mark Post of Maastricht University. The tasting was covered live by several TV channels and made quite a splash across international media. Looking at online news, magazine coverage and advocacy sites, the analysis suggested that concerns over taste and flavour were prevalent in the coverage, in addition to narratives around the rationale for the development of CM, its benefits in relation to the environment and the so-described 'world food crisis', as well as the potential health impacts of eating CM versus livestock protein. In his analysis, Hopkins (2015) suggests that there was also an over-representation of the narratives and voices of vegetarians and vegans commenting on the many animal, or animal-free, related aspects of CM in the coverage of the tasting event. He suggested that future coverage should be targeted at including meat eaters' perspectives to promote the 'positive image' of CM.

More recent analysis of the media grammars of CM from Painter et al (2020) looked at six years of news coverage in the US and UK 'traditional media' from 2013 to 2019. This resulted in a total of 255 articles on which they performed quantitative and qualitative analysis. Importantly, they analysed the sources quoted in the articles, suggesting that there was an 'over-representation' of industry actors quoted. They found that 222 industry representatives were quoted '… compared to the second highest number, academics or scientists at 91 (2388), and government, government bodies and politicians appearing in only 13% of the articles (2389). Significantly, they noted that 64% of the articles had positive narratives associated with CM, such as its potential to lower greenhouse gas (GHG) emissions, to contribute to animal welfare, and to 'feed the world'. Counternarratives on consumer rejection (23%), higher cost (19%), and a combined series of framings (18%), ranging from CM's potentially negative nutritional impact to its being a distraction to wider transitions to a plant-based diet, and to arguments over whether or not CM is vegan, were also present in the articles (2391). Their sentiment analysis of the tone of the framings showed that 49% of the articles had a positive or promotional tone, '…compared with just 3%...which showed a negative or oppositional tone', with the remainder (48%) being neutral or balanced (2392). The authors argued that

> *[t]he industry dominance in news coverage of CM found here is a concern. On [the] one hand, it fails to provide the public with a realistic account of the current capabilities of this emerging technology. On the other, it may have unintended consequences on public sentiment if CM is slow to realise its promise or if the public begins to lose trust that start-ups and established meat companies will protect consumers' interests and produce a healthy and safe product. (2392)*

This media analysis of CM by Painter et al (2020) has been taken forward by Helliwell and Burton (2021), who analysed 455 traditional and sectoral news media articles between January 2011 and September 2020, 26 hours

of online video materials from a range of CM and protein companies (e.g. Memphis Meats, Finless Foods, Bond Pet Foods), as well as 49 different CM-sector company websites and online promotional materials. Building from 2016 onwards, their analysis suggests that CM is framed across the following categories: (1) replacing 'inefficient' animal bodies, (2) replacing livestock farming as an '… environmentally destructive and ethically problematic system…' (184); (3) working to 'restore' nature and biodiversity by removing large numbers of animals from landscapes, (4) fulfilling the protein demands of the future; and (5) relocating and localising the sites of protein production to urban areas and, in doing so, supposedly (re)connecting people to the food they eat. The authors also stressed the 'narrative silences' of CM in this media coverage and industry-produced material. In terms of the loudest voices, similar to Painter et al's (2020) findings, Helliwell and Burton (2021: 185) found that news media coverage was dominated by 'industry-affiliated scientists, advocates, and company representatives', while oppositional voices were represented far less, particularly around environmental and rural narratives. But what narratives did they find were 'silenced' or missing from the media they analysed? First, there was very little on what a transition to CM might mean for rural communities and their potential de-population through the '…disruption, rural decline and desertion' (186) of these landscapes, driven by the delivery of CM's environmental promises and its potentially much smaller footprint in terms of land use and animal-derived inputs. Second, there was very little on the potential impacts of CM on biodiversity conservation, sustainable agriculture, agroecology and regenerative farming (see Klerkx and Rose, 2020) as well as the management of rural cultural heritage and landscapes that are produced through livestock farming. In short, they ask 'what would the decline of animal agriculture mean for these landscapes, the tourists and recreational activities that they support?' (186).

Researching Cultured Meat in the UK's Food and Farming Media Landscape

Our methodological and analytical approach combined both quantitative and qualitative media data collection and analysis of the grammars of CM in UK food and farming media. We first developed a list of media outlets, profiles and organisations we felt would best capture the CM-related grammars being communicated both within, and to, the UK food and farming sector. This list was developed: (a) iteratively through online searches that allowed us to target where these grammars were appearing within a UK context; (b) through reflective discussions about what outlets we thought might be playing historical and/or current host to these grammars and media constructions of CM; and (c) through the expertise of the research team, several of whom have previously worked closely with UK food and farming media outlets where these narratives have taken shape. For legacy media outlets that started (and have also continued) as print media magazines, e.g. Farmers Weekly and The Grocer, we used the digital versions of the publication to facilitate our searches and access to the material. We did likewise with online newspapers such as The Guardian and Daily Mail which have hosted a considerable number of these grammars as national news outlets. In addition, we included an online discussion forum frequented by UK farmers, known as the 'The Farming Forum', to capture any conversations about CM by these 'online' farmers, and thus to bring their voice into the conversation and allow us to consider their perspectives on CM. Early on in the data collection process we removed CM and alternative protein advocacy groups from our list as we felt they might bias our sample too much towards overtly positive constructions of CM. The full list of media outlets and profiles is in Appendix 1. The final set of media outlets in our study cohort consists of those voices that are the most significant in creating, framing and sharing the grammars of CM within the UK food and farming sector and, specifically, UK farmers.

Each outlet, profile and forum was then searched in detail using the following set of terms to identify articles, posts or grammars on or around CM: Vat Meat, Cell Ag, Cellular agriculture, Cultivated meat, Cultured Meat, Clean meat, Lab meat, Lab-grown meat, Lab grown meat, In vitro meat, In-vitro meat, Cell-based meat, Cell based meat, Cellular meat, Artificial meat, Synthetic meat, Frankenmeat, Franken-burger, Franken burger. This search yielded a total of 259 'pieces' of media from 2017 to late 2023, across all media formats and platforms on our list.[3] These individual outputs discussing CM (169 online articles, 76 tweets and 14 Farming Forum

[3] These data were collected by Wylie from 14 February 2023 to 5 March 2023, with data from the Farmers' Forum collected between 1 and 3 June and again in October 2023.

posts) were entered into a spreadsheet and attributed to an outlet and date of publication. Texts were extracted and analysed both quantitatively and qualitatively to portray the prevalent media grammars of CM within the individual and collective narratives.

We tallied the number of outputs about CM by outlet or profile to get a general sense of the differential 'volume' of CM-related voices and grammars on our list. This analysis was designed to understand the greatest and/or relative size of the media 'footprint' of the grammars of CM across the broad swath of the UK's food and farming digital mediascape. In short, this analysis allowed us to understand and determine who or what was the loudest voice in producing the greatest number of statements and narratives about CM in this media landscape. Yet, equally importantly, we wanted to know what was being said about CM and how these grammars were being produced to frame the ways audiences should understand CM. Thus, our analysis, based on grounded theory (Flick, 2018), draws on the techniques of content analysis (Krippendorff, 2019), and linguistic narrative and discourse analysis (Jones, 2019). Through these forms of analysis, we manually coded the 259 'utterances' about CM through an iterative, inductive and reflective coding process that brought to the foreground what we found to be the most prevalent grammars of CM. These dominant codes, messages, narratives and meanings surrounding CM where then grouped into a series of predominant, broad themes that then began to outline and define the grammars of CM appearing in UK food and farming media. We describe, discuss and further analyse these voices and themes – and the media grammars that they create and define – below.

Quantitative analysis: relative volumes and predominant terms used to name and discuss cultured meat

Outlet and profile volume

Overall, legacy food and farming media in the UK (e.g. *The Grocer, Farmers Guardian* and *Farmers Weekly*) produced the largest volume of articles and other material about CM. These outlets were thus the loudest, and they spoke about and constructed the media grammars of CM within the UK. This included 68 online articles and 17 tweets, most of which were announcements about, and links to, existing articles in their magazines that discussed CM. The second loudest set of outlets was made up of the category of general food and farming media outlets (e.g. Farming UK, New Food, and Food Ingredients First), which included 48 online articles and 44 tweets that, yet again, provided links to existing published articles. Other outlets, such as The Farming Forum (14 posts) and the FAO on Twitter (9 tweets) produced much less content about CM.

George Monbiot, a high-profile and well-known UK journalist for The Guardian, author, and environmental and social progressive, published three opinion articles and numerous tweets, all of which generated extensive engagement and debate across the entire UK food and farming mediascape (more on this below). The 'quietest' outlets and online profiles discussed CM very little, if at all. These included farming organisations and associations (e.g. National Farmers Union, National Beef Association, National Sheep Association), meat sector organisations (e.g. British Meat Processors Association) and the UK government (e.g. FSA and DEFRA), although the latter are often tagged in tweets and other forums where debates over CM are happening. They did not respond when tagged or mentioned.

The naming of Cultured Meat

As linguistic and critical scholars articulate (e.g. Lakoff, 2010; Goodman et al, 2016), and what most people attuned to media will already know and experience, is that the way something is 'named' and narrated is fundamental to how it is understood by audiences. Equally importantly, and as articulated in this paper, its naming can work to outline the grammars through which a topic is, might be or, indeed, should be narrated and discussed. Thus, it is crucial that we understand how CM has been named and framed in the grammars being produced by the UK food and farming media as the sector talks to itself, as well as wider audiences.

To this end, we found that the most predominant terms used to name CM were 'cultivated meat' (268 times), 'cultured meat' (205 times), 'lab-grown meat' (145 times) and 'cellular agriculture'. The latter is an umbrella term originally coined by the sector, that encompasses CM, along with dairy and other animal food products made via cell culture (New Harvest, nd), and was used only 38 times. Seen another way, when CM was being discussed across these mediascapes, the term 'cultivated meat' was used 36% of the time, cultured meat 28%, lab-grown meat 20%, and cellular agriculture 5%. The terms 'clean meat', 'in-vitro meat' and 'synthetic meat' were used very little across the UK food and farming mediascape. See Appendix 2 for a more detailed breakdown of the terms used to describe CM, and their prevalence. Importantly, constructing CM through the predominant grammars of cultivated meat, cultured meat or lab-grown meat has the potential to signal very different sets of meanings, understandings and imaginaries to the audiences of these media.

Qualitative analysis: the narrative grammars and predominant voices of cultured meat

Discursive analysis of cultured meat grammars

Through our qualitative discursive analysis of the UK mediascape regarding CM, a series of three predominant, iterative themes emerged. These themes and their related 'nested' sub-themes are explored in turn.

The first and most predominant theme that emerged in our analysis was defined by the proposed 'solutionist' technofix (e.g. Guthman et al, 2022; Guthman and Butler, 2023) that CM can provide for the UK, and explicitly Britain. This solutionist grammar followed two different but related storylines and appeared primarily in the legacy and industry food and farming media. Specifically, coverage pushed CM as an innovative solution that could support and boost economic growth, especially post-Brexit, within the UK and British food sector. For example, Food Ingredients First (Green, 2023) interviewed a co-founder at a cultured fat company, who stated that they 'thought the UK has this amazing opportunity now to push forward and become a world leader in alternative protein'. Markets for UK-based CM companies needed to be 'opened up' with the deregulation of food safety protocols and, echoing pro-Brexit narratives, a drive to cut EU 'red tape' to allow more CM products to be produced in Britain. As one particularly strident piece published in February 2023 in The Grocer proclaimed:

> *The UK's novel foods approval process currently matches the EU's: lengthy and complicated. Could the FSA's new, Singapore-inspired approach cut red tape and allow British innovation to thrive? (Warner, 2023).*

A representative from Ivy Farm Technology, a British CM startup, articulated the same ambition in clear boosterist, patriotic terms in New Food Magazine: 'We believe our technology is among the best in the world and that we can fly the flag for Britain' (Parrett, 2021). Broadly speaking, the tone, affect and language used in this grammar was saturated with the imprimatur and terminology of neoliberal capitalism in the service of the British and UK CM industry. For example, terms and phrases we repeatedly observed included: deregulation, investment and investment opportunities, the future, market nimbleness and competition, entrepreneurial spirit, pushing markets forward, market development and market 'players', global market leader and market potential, stepping up 'the game' and innovation.

A second prominent grammar within the broader solutionist storyline of CM extolled the technology's virtues along environmental and food security grounds. Most often combined with the neoliberal language mentioned above, CM's environmental grammar comports closely with the promissory narratives of CM described by Sexton et al (2019), and with the pronounced, contemporary narratives of sustainable development and green capitalism that support the 'three P's' of people, planet and profit (see e.g. Fletcher, 2023). For example, The Grocer, in both an article and a tweet, quoted the food multinational Nestlé saying that: 'CM tech could ultimately lead to more environmentally friendly products' (White, 2021a). New Food Magazine, similarly, wrote and tweeted about how '#CultivatedMeat could cause 93% less #globalwarming than its conventional counterpart' (Minchin, 2021; New Food Magazine, 2021). Current regulatory mechanisms were identified

as a key bottleneck of 'novel foods' innovation in the UK, with the stated effect of stopping British CM companies and their backers from '…investing in solutions to the environmental and hunger crisis' (The Grocer, 2023). Other articles featured more positive tropes, suggesting that '…there are some really exciting developments in CM, that [deliver] in terms of food security and sustainability…' and that 'there are some fantastic opportunities about [CM as a] future [solution] to feeding the nation' (White, 2021b).

A third set of related grammatical themes that emerged from our analysis was made up of those that constructed CM as being 'in tension' with the farming sector, as well as with consumers' health outcomes and taste buds. In these themes, CM was presented as a possible threat to UK farmers in their 'stewardship' of British landscape management and, again in a post-Brexit UK economy, something that should or might be resisted as a future normalised food for consumers. In particular, from 2021, Farmers Weekly played host to many of these grammars. For example, in an article asking the question "Is lab-grown meat a threat to traditional livestock farming?", the magazine quoted Glyn Roberts, president of the Farmers' Union of Wales (FUW), who argued that '…advocating an "industrial route" out of the climate crisis, where food is produced in factories, should not replace natural farming and food production' (James, 2021). The article continues:

> *'Our beef and lamb [are] grown naturally, sustainably and consumers can trust in the knowledge of our farmers to deliver a product of excellence' says Mr Roberts of the FUW. 'Look at the family farms here in Wales, they produce food in a non-intensive way and have done so for centuries. I think this is what most people want: beautiful farms with thriving nature producing excellent food' (James, 2021).*

In a quote from the representative of the National Beef Association in Farming UK magazine, UK beef was said to be

> *… one of the most sustainable methods of food production. … We are all aware that processed food as we know it today is not good for us, so it is illogical to believe that highly processed chemical-based lab outputs will be our nutritional answer (FarmingUK, 2023).*

Indeed, one of the key tropes was an attempt by farmers and their institutional and media advocates to subvert the current 'good food/bad food' narratives that have been pushed by CM advocates, framing CM as 'good food' given its supposed low carbon intensity, less use of water, lack of 'complication' through animal welfare concerns, potential food safety and control benefits, and ability to feed growing populations. Instead, farmers and their advocates have worked to present livestock farming as 'good food' that is sustainably produced, maintains and conserves the countryside, supports the small-scale and 'traditional' farming sector, families and communities, and most importantly, is not processed and is 'healthy' and 'natural'. These tensions and arguments over what 'good' and 'bad' food is have played out extensively across the CM, alternative protein and livestock sectors for a while now (e.g. Sexton, 2018). Such narratives not only precede those explored here, but, as we show, have now become the established grammars of how actors within and beyond the CM industry feel the technology should be narrated and framed in public debates.

Farmers, when quoted in media and through The Farming Forum, generally perceive CM as an existential threat to their livelihoods, and livestock farming as a business and substantial part of the food system in the UK and Britain. For example, a farmer commented that 'It is the biggest threat we will ever face, I bet 50% of us are not farming in ten years' time due to this' (TFF (1), 2022). Others critiqued CM as 'lab-grown factory slop' and stated they would '…not [eat] 100% adulterated food to hand more profits to food giants' (TFF (1), 2022). One claimed that CM was made of 'tumour cells that keep dividing forever, at a much faster rate than healthy cells' and quipped, with apparent sarcasm, that this 'sounds delicious' (TFF (2), 2023). Statements about the potential threats of CM to farming livelihoods and farmers' positions within the food system focused on the ways that it, and other powerful actors, might push them out of business:

> *Once removing every last penny of profitability they will snap up the farms for the real goal of greenwashing and all the profit that entails. Bill Gates, cough. (TFF (2), 2022).*

> *Big massive business is behind it all with government support. Follow the money and thou shall see. (TFF*

(2), 2022).

This 'threat' grammar aligns with our findings in our previous research with UK farmers (i.e. Manning et al. 2023). Historically justifiable, imaginary, or (n)either, these and many other similar grammars verged on the conspiratorial. It was repeatedly suggested that farmers were being purposefully pushed out of business through green, rewilding and other regulatory measures coming from government or high-net worth individuals like Bill Gates, a frequent 'bogeyman' in conspiratorial narratives, but, importantly, also one of CM's highest profile early investors. Within our sample, CM was framed by several farmers as one of the latest threats to their livelihoods and to everyone across the farming sector. A poster compared CM to the plot from the 1973 ecological dystopian thriller Soylent Green:

> ***Puts on tinfoil hat** Whenever I hear about lab meat, I think of Soylent Green. The film was set in 2022, where 'the cumulative effects of overpopulation, pollution and global warming have caused severe worldwide shortages of food, water and housing'. It's all starting to make sense..... (TFF (1), 2022)*

Another poster brought Soylent Green into the discussion about the environmental imaginaries of George Monbiot:

> *Basically, he wants the UK to look the way it was before the dark ages, possibly back to prehistoric times while food is provided to the masses from massive factories producing in the same sort of scale and system as projected in the great classic film 'Soylent Green'. This would, of course, concentrate food production into the hands of giant conglomerates rather than diverse small businesses competing with each other and providing overall food security. (TFF (3), 2022)*

One of the farmers shared a digital article entitled 'Synthetic meat investor Bill Gates calls for rich countries to shift entirely to synthetic meat', which they introduced with the comment: 'Here's one of many articles on this megalomaniac and his agenda'. In response to the article, another poster remarked 'that's fine Mr Gates if you don't like beef, soylent green anyone?' (TFF (4), 2022).

In addition to direct mention of Bill Gates, many of the TFF posters engaged with and critiqued opinion pieces, statements and tweets directly produced by Monbiot. In the face of the climate crisis, Monbiot has been a vocal supporter of rewilding to address biodiversity collapse, turning farmland into more biodiverse and forested landscapes, facilitated by the production of large-scale, plant-based, vat-produced fermented meat-analogous protein (Monbiot, 2022).[4] To be clear, Monbiot's current advocacy is not for CM per se (although it has been in the past), but rather for protein analogues that can be 'brewed' through fermentation at large-scale. In addition to 'triggering' reactions from many in the farming sector with this push for rewilding and/or alternative proteins, many of those in TFF use Monbiot as a 'foil' around which to argue against CM and for continued livestock farming. For example, based on a 2023 piece in *The Guardian* by Monbiot (2023) arguing for alternative proteins, a poster on the Forum stated that:

> *… having read the article, it's clear he wants us all to eat lab-grown factory slop and ban farming of any sort. … Much the better for it George? So you think people are better off eating processed food than real food? You might wanna check with the medical professionals on that one George. Even they're starting to work it out. (TFF (2), 2023)*

This grammar aligns with the emerging and growing contested narratives of natural foods versus ultra-processed foods. These debates with and against Monbiot have spilled over onto X/Twitter with Gareth Wyn Jones, a Welsh celebrity farmer whom the BBC has called 'the nation's favourite farmer' and who has, amongst many other media appearances and coverage, been one of the presenters on BBC's The Family Farm. While, as of February 2024, Jones had 66,000 followers and Monbiot had close to 600,000, they have had several different X/Twitter 'wars' most often prompted by statements from Monbiot, that Jones then responds to and tags, with Monbiot then replying and tagging Jones, etc. They have, in effect, become the hyper-polarised 'muse-like' stand-ins for the supposed environmentalist-versus-farmers debates that roil from time to time, with both deploying different and/or controversial scientific data to either boost their arguments or debunk

[4] See the Reboot Food campaign for more on this and Monbiot's involvement: https://www.rebootfood.org/.

the points made by the other.

A subsequent set of tropes put forward by farmers were those that *did not* see CM as a realistic or potential threat. This position is articulated in the following two quotes from a TFF conversation:

> *It is not something I would consider a threat to agriculture. I am sure CM will have some major challenges soon enough. (TFF (1), 2022)*

> *I don't see it taking over […] they will come up against lots of problems and can't really compete with Ag when it comes to volume of food produced. (TFF (1), 2022)*

In this vein, one particular article from the New Scientist in 2023, stating the relatively controversial position that 'Lab-grown meat could be 25 times worse for the climate than beef' (Klein, 2023), got a great deal of traction and attention on TFF. Responses and discussion around this article allowed many to cement their narrated position that livestock farming is more sustainable than CM and that its production should be supported rather than that of new markets and businesses for CM.

The final grammar that came to the fore was that of the affordability of CM in light of its current high costs to produce, the need to 'scale-up' to reach economies of scale, and the promissory narratives promulgated about its climate change, environmental, health and hunger-reducing benefits. Food Ingredients First, Food Navigator Europe and New Food led these grammars with quotes and statements by CM company representatives, as well as their own statements. 'Affordable,' 'affordability' and 'cheap' are used with companies, funders and researchers seeking to make their CM products accessible and viable on the consumer market. For example, the CEO of Multus Biotechnology (formerly Multus Media) stated that

> *… while cultivated meat promises to benefit human and planetary health, there is also a significant financial opportunity. … Our goal is to make cultivated meat the affordable and sustainable choice for everyone (Davies, 2023).*

The co-founder and CEO of Aleph Farms stated:

> *[w]e are taking steps to drive economies of scale and achieve price parity with conventional meat products, including developing specific technological modules in our production platform and establishing strategic agreements across our supply chains (Poole, 2023).*

Food Ingredients First spoke to Ed Steele, the co-founder of Hoxton Farms which is attempting to make cultured animal fat. As they put it,

> *Steele says that flavourings are 'a huge cost and given the flavour that you get from cultivated fat, you no longer need significant flavourings in plant-based products. So, all of that will allow us to reduce the cost of meat alternatives in the long term, especially given the circumstances around inflation and the cost of living crisis,' he comments. 'And if we're going to make the dent that we want to make as a company, we can only do that by enabling people to buy it, and people can only buy it if it's cheap enough' (Green, 2023).*

Understanding the Grammars of Cultured Meat in UK Food and Farming Media

Reflecting on our findings above, we wish to make several notable points. First, much like previous research, some of which is close to a decade old, we found that there is relatively little media coverage of CM in quantitative terms in the UK. In the coverage that does exist, there is an ongoing narrow set of voices and storylines constructing the grammars of CM. The persistent and growing ossification of grammars, voices and stories is apparent in the predominance and relatively high 'volume' CM-industry boosters promoting the economic, environmental and social benefits of CM or the ways it could be made more cost-effective through further market and scientific developments. Crucially, this narrowing of voices and stories about CM has itself been boosted by the use of the same set of stories and/or direct press releases, that were either copied and published verbatim or slightly edited across numerous different outlets in our sample. Furthermore, the 'facts'

or data, mostly generated by the CM industry with varying levels of transparency, presented in the majority of these industry aligned articles, are those predominantly about industry investment, size and potential for market growth and/or models of the potential environmental benefits of CM. In some senses, this is industry 'self-talk' and/or continuation of 'hype-like' public relations campaigns that have been at the forefront of CM grammars for a long time, largely devoid of rigorous public debate. Thus, in our sample and analysis, and based on a direct comparison to previous studies (e.g. Goodwin and Shoulders, 2013; Hopkins, 2015; Painter et al, 2020; Helliwell and Burton, 2021), the overt media grammars about CM in UK food have continued mostly to replay the predominant boosterist voices and 'promissory narratives' of its industry-led champions. This has been to the exclusion of other voices, such as those from the IPES-Food, broader food systems, and food justice perspectives, the majority of farmers, or even from outside the Minority World.

The growing 'push back' to the miracle of CM by non-farming sector organisations and farmers, both 'offline' (Manning et al, 2023) and online, suggests that we might be entering the next phase of the 'hype cycle' of CM. Here we are referring specifically to the Gartner Hype Cycle, a graphical representation created by the American IT firm Gartner that plots five phases of a new technology's maturation ('Technology Trigger', 'Peak of Inflated Expectations', 'Trough of Disillusionment', 'Slope of Enlightenment', and 'Plateau of Productivity') (Gartner, 2024). We might characterise the last decade of largely positive media grammars as part of the 'Peak of Inflated Expectations'. Recent high-profile media pieces, such as in The Counter (Fassler, 2021), New Scientist (Klein, 2023) and New York Times (Fassler, 2024), represent the tentative beginnings of a broadening of media grammars on CM to include more sceptical takes on CM's potential to deliver on its many grand promises. It is too early to say conclusively, but such shifts in tone may signal a tipping from peak hype about CM to Gartner's so-called 'Trough of Disillusionment,' a period defined by waning public and investor interest, expressions of public backlash to aspects of the proposed technology, and the first round of mass attrition (or acquisitions) amongst the sector's start-ups. At present, however, the overtly optimistic discussion about CM that conspicuously continues to fully foreground and normalise the industry and its boosters' loud positive spin on CM, remains the dominant framing that is shown here to be replicated across the UK's food and farming mediascape. This lack of a 'deeper', critical discussion of the potential benefits and drawbacks of CM is concerning, given the UK food and farming sector's continuing vulnerability to the climate-change-driven ecological crises, an unstable political and regulatory landscape, a volatile post-Brexit and post-Covid global economy, and the directive influence of venture capital funding.

Second, the debates about CM and the extant grammars that facilitate them across the wider UK food and farming mediascape are becoming increasingly polarised and siloed. This is particularly acute due to the desire of different CM-factions to define, or re-define, CM through the simplistic narratives of either 'good' or 'bad' food, based on their economic, social and material position with respect to the technology, its promises and its potential future. Some of this is a function of how media outlets work to gain attention in an increasingly diffuse and overwhelming communications environment by reporting on and 'manufacturing' conflict to gain audience share. Given his controversial views and communication style, there is little wonder that the anti-CM campaigns of the 'celebrtised' farmer (Phillipov and Goodman, 2017) Gareth Wyn Jones have gained so much media attention and traction. With Jones' celebrity status and growing platform, the particular CM grammars he advances have been amongst the loudest in UK food and farming circles, further amplified by a media format that promotes more extreme opinions. Crucially, these particular views of CM should not be seen as necessarily representative of the whole of the UK farming community. This polarisation of grammars is driven by the ways in which social media tends to select, either purposefully through algorithms, or psychologically by amplifying extreme voices, conspiracy, anger and outrage. These more extreme positions are very often devoid of subtlety as they are purposefully designed for maximum affective engagement (cf. Rose-Stockwell, 2023) which accelerated in breadth and depth during the Covid-19 lockdowns and is now embedded in the post-Covid world. These broader technological, cultural and political shifts may explain the louder, more extreme, and sometimes conspiratorial views expressed about CM and alternative proteins in online food and farming communities.

Thus, to summarise, the UK food and farming media grammars about CM, and the debates, discussions and politics they define, are distinguished by two extremes: on the one hand, the continuing loud voices of industry boosters singing the promissory praises of CM; on the other, an emerging and increasingly loud selection of voices of a relatively small, but vocal, slice of farmers articulating the threats (or non-threats) of CM to their livelihoods and their consumers. At the latter end, some of the most extreme grammars are reinforcing beliefs from established and highly influential conspiracy theories.

Our third observation is that many of the articles and grammars of CM have coalesced around the increasingly stable and hegemonic name of 'cultivated meat'. Specifically, the cultivated meat moniker is one that has been developed and promoted by the CM industry to associate the CM sector and its products with the 'normal', 'natural' and longstanding 'cultivation' of food products. Through this naming convention, cultivated meat is 'cultivated' just like other more 'natural' foods, such that it is propagated and grown like any other 'naturally produced' food product or produced through a fermentation process similar to that of wine or beer. To cultivate a plant or animal through farming brings the act of care to the forefront of the imaginary and is often associated with the rural idyll full of vibrant, deeply verdant, fecund farming landscapes, producing a bounty of food for all to eat. And while these equally socially constructed, wholesome images of farming should themselves be critically evaluated and questioned in a contemporary context (i.e. Sage, 2022), the association of the notion of 'cultivated' with CM is, we argue, attempting to normalise, naturalise, de-mystify and reframe it as a 'good', 'cared for', and/or 'cared about' food, produced by a 'considerate' and 'growing' industry for the everyday consumer. A possible alternative interpretation here involves the ways that 'cultivated' is a synonym for everything from artistic, to enlightened, civilised, educated, refined, sophisticated, scholarly and intellectual. Could it be that with the industry-led, purposeful naming of CM as cultivated rather than 'cultured' meat, consumers may identify with and construct themselves through these very positive and expansive characteristics if they buy and eat CM? This is certainly a possibility and one worth pursuing through more dedicated and detailed consumer and 'eater' studies focused on CM (Cf, Hart Research Associates, 2017).

Another important component of the naming grammars in our sample narratives was the usage by different media of the terms 'cultured meat' and 'lab-grown meat'. Both stand in relative contrast to the 'natural' meanings conferred by the term 'cultivated' to describe CM, and to the notion of 'naturally' derived animal protein using existing farming methods. Cultured and lab-grown convey the imaginaries of meat being 'grown' and/or 'created' through the use of synthetically-driven, 'less-than-natural' scientific processes. More specifically, CM is defined by, and situated in, its process, that is, cell-culture conjuring up the image of meat being grown in a petri dish or flask in an artificial medium and/or culturing substance. The same could be said of the use of the term 'fermented meat'. In the early days, this emphasis on process was a reason many involved in the technology's development were in favour of the term, on the grounds that it communicated to various publics (e.g. consumers, regulators) a sense of transparency over the origins of CM (Stephens et al, 2019). Moreover, in parallel to the broader definitions of 'cultivated', there is also the possibility to read 'cultured' to mean a sense of refined or 'good' taste as well as its associated synonyms of educated, intelligent and sophisticated, a further benefit recognised by proponents of the term within the CM industry.

Alternatively, the term lab-grown meat is situated in the location of the production of CM in the generic 'lab', conjuring up an imaginary of a formal, sterile and pristine environment facilitated by the precepts, materialities and processes of a nebulous but hegemonic 'scientific process'. And while there is perhaps less chance of lab-grown being associated with erudite or culturally sophisticated tropes, it does convey a particular sense of formalistic control and power, combined with care and flourishing, reminiscent of that communicated by both the notions of cultivated and cultured. For many of the advocates of CM, the fact that it can be cultured and cultivated in the lab, that is, devoid of the 'contamination' and 'uncontrollability' of natural landscapes, environments and food chains, is one of the key benefits of CM as a 'good' food worthy of further investment, of more predictable financial returns, and of a friendly regulatory regime (Sexton et al 2019).

Conclusions

This paper represents an important step in the quest to understand what agri-food system actors – and specifically those located in the UK – think about CM. Media grammars around CM focus on both opportunity and threat, with the potential for greater economic growth, environmental benefits and food security, as well as disruption to farming communities and perceived lack of affordability.

If 'just' agri-food transitions are to be achieved with substantive stakeholder inclusion, they must include accessible fora for a variety of diverse voices within and outside of the food industry. Our analysis of media grammars surrounding CM illustrates that the voices of CM-industry actors tend to dominate, with farmers' voices tending to be absent from debates, apart from selective loud, celebritised individuals,. On the one hand, these findings could be partly explained by our research approach, with specific farmers' views investigated on the basis of social media reach. We acknowledge that our research approach in this article has foregrounded the views of some farmers over others, and that it highlights the need for further studies seeking to capture the views of 'harder-to-reach' (Hurley et al., 2022) actors from both within and outside of food systems. Capturing a greater diversity of views may help to shine a spotlight on less frequently discussed topics around CM, which could include issues related to access, affordability and food security, beyond the dominant contexts of increases in food production, whether cultured or not.

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Appendix 1

Sectoral Farming organisations and associations
National Sheep Association
National Beef Association
National Pig Association
British Poultry Council

General food and farming magazines, organisations and associations
Food Navigator
Red Tractor: Assured Food Standards
Campden BRI
Leatherhead Food Research
Fera science
AgFunder News
Food & Drink Federation (FDF)
Institute of Food Technologists (IFT) and/ or Institute of Food Science and Technology (IFST)
Food Ingredients First
Food Manufacture
Food and drink network uk
Euractiv (section 'Agri food')
Meat Management
New Food
Scotland Food and Drink
Scottish Craft Butchers
SRUC (academic)
SAC Consulting

Sustainable farming organisations and associations
Green Alliance
Sustain
British Pig Association
Rare Breeds Survival Trust
Soil Association
Linking Environment and Farming (LEAF)
The James Hutton Institute
Pasture for Life
Nature Friendly Farming Network
Sustainable Food Trust
Nourish Scotland
Wicked Leeks

Farmer/farming forums
Farming Forum
Farming UK
Farmers Guide
Farm Business
Farming Monthly Magazine
Indie Farmer

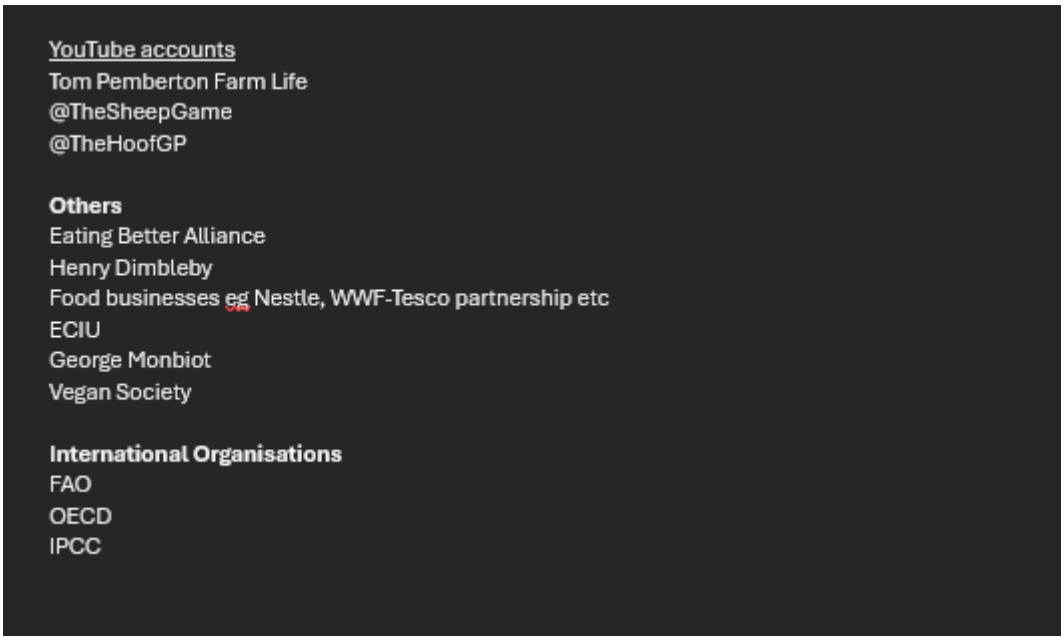
AgriChat (Twitter)
#Club Hectare (Twitter group)
The Farming Community Network (FCN)
The DPJ Foundation

Government
Food Standards Agency
DEFRA
HSE (health and safety executive)
BEIS (business, energy and industrial strategy)

Other national media organisations
BBC - @BBCBreakfast

UK Celebrity Farmers and/or key farmer UK Celebrity Farmers and/or key farmer influencers
Twitter accounts
@herdyshepherd1
@FarmersOfTheUK
@1GarethWynJones
@IrelandsFarmers
@redshepherdess
@willpenrievans
@wheat_daddy
@No1FarmerJake
@Farmer_Tom_UK
@agricontract
@theblackfarmer
@farminghub
@WyeFarm
@ProagriLtd
@GeorgeMonbiot

Instagram accounts
@girlaboutthefarm
@thechiefshepherdess
@globetrottingfarmgirl
@bentheoandrews
@emmafoot724
@adamhenson
@thehoofgp
@thefemalehooftrimmer
@cooper_kaleb
@mel_irvine
@thesheepgamevlog
@emmagrayshepherdess



Appendix 2

Quantitative analysis of search terms – most used

Search Term	Times used	Where	Who - Twitter	Who- online
Cultivated Meat	268	Online 233 Twitter 35	General Food and Farming; Sustainable Farming UK Celebrity Farmers and Influencers; Monbiot; International organisations; Others.	Food and Farming Legacy Media; Sectoral Meat General Food and Farming; Sustainable Farming Government; International organisations; Others.
Cultured Meat	205	Online 181 Twitter 24	Food and Farming; Legacy Media; General Food and Farming; Influencers; Monbiot; Farmers and Forums; UK Celebrity Farmers; Others.	Food and Farming Legacy Media; Sectoral Meat; General Food and Farming; Sustainable Farming; Farmers and Forums; Government; International organisations; Others.
Lab-grown meat	145	Online 122 Twitter 23	Food and Farming Legacy Media; Farming Organisations and Associations; General Food and Farming; Sustainable Farming; UK Celebrity Farmers and Influencers; Monbiot; Government.	Food and Farming Legacy Media; Sectoral Meat; Sectoral Farming; General Food and Farming; Sustainable Farming UK Celebrity Farmers and Influencers; Monbiot; Farmers and Farmers forums; Government; International Organisations; Others.
Cellular agriculture	38	Online 34 Twitter 4	UK Celebrity Farmers, Influencers, Monbiot.	Food and Farming Legacy Media; General Food and Farming; Sustainable Farming; International organisations.
Cell-based meat	29	Online 29		Food and Farming Legacy Media; Sectoral Meat
Lab grown meat	20	Online 14 Twitter 6	General Food and Farming UK Celebrity Farmers, Influencers, Monbiot.	Food and Farming Legacy Media; Farmers and Farmers Forums; Government

Quantitative analysis of search terms – least used

Search Term	Times used	Where	Who - Twitter	Who- online
Lab meat	8	Online 5 Twitter 3	UK Celebrity Farmers; Influencers; Monbiot.	Food and Farming Legacy Media; Sustainable Farming.
Synthetic meat	8	Online 7 Twitter 1	General Food and Farming.	Sectoral Meat; General Food and Farming; Sustainable Farming.
Cell Ag	3	Online 2 Twitter 1	UK Celebrity Farmers; Influencers, Monbiot.	Food and Farming Legacy Media; Sustainable Farming.
Clean meat	3	Online 3		Food and Farming Legacy Media; Sectoral Meat.
Cell based meat	3	Online 1 Twitter 2	UK Celebrity Farmers; Influencers, Monbiot.	General Food and Farming; Others.
Cellular meat	2	Online 2		Food and Farming Legacy Media.
In vitro meat	2	Online 2		General Food and Farming.
In-vitro meat	2	Online 2		Sectoral Meat; General Food and Farming.
Artificial meat	2	Online 2		General Food and Farming; Sustainable Farming; International organisations.
Franken-burger	1	Twitter 1	Sectoral Farming	