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(doi: 10.1423/115300)

Rassegna Italiana di Sociologia (ISSN 0486-0349)

Fascicolo 4, ottobre-dicembre 2024

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## **Cultured meat as «food for the future»?** Contentious perspectives between science and publics in the Anthropocene

by ALICE DAL GOBBO, NICCOLÒ BERTUZZI

### *1. Introduction. Cultured meat in the context of sustainable food transitions*

Cultured meat represents a technological innovation in the food sector which promises to revolutionise the production and consumption of meat and animal proteins more generally (Melzener *et al.* 2021). Its potential implications are vast, primarily for the reduction of the environmental/climate impact of farming and the mitigation of animal suffering. However, there are numerous challenges to be overcome, including high costs, scalability, and regulatory and consumer acceptance.

Although the very idea of producing meat from cells is long-standing (Jönsson 2016), cultured meat gains significance in the context of ecological crisis and the necessity of sustainable food transitions (Sexton, Goodman 2021). Food production systems, particularly animal farming, are key contributors to climate change and environmental degradation, hence they come to the forefront of mitigation and adaptation strategies (Hinrichs 2014). Animal farming is also questioned because of its ethical implications: especially in its industrial variant, it implies the treatment of sentient beings as objects functional to capital accumulation, whose conditions are becoming unacceptable for many citizens/consumers (Bonnet *et al.* 2020; Bertuzzi 2022). Practicable, healthy, and largely accessible alternatives have been proposed,

*Although the present work is to be understood as emerging from the common effort of both authors, paragraphs 2, 3.2, 3.3, 4.1 are to be attributed mainly to Niccolò Bertuzzi, paragraphs 1, 3.1, 4.2., 4.3 are to be attributed mainly to Alice Dal Gobbo. The conclusions were written jointly.*

such as the reduction of animal protein intake, the transition to vegan and vegetarian diets, agroecology (Frison, Clément 2020, Reisch *et al.* 2013).

Yet, overall meat consumption is increasing on global scale, although with relevant differences across countries and social strata (Blanchette 2018; Schneider 2017). This argument is often used to suggest that hoping for dietary change is misguided: people will not change their tastes and habits to protect the environment so, the argument goes, other «solutions» are needed for food sustainability. «Alternative proteins» have a special role in this. A largely misleading narrative of protein-deficiency in transition imaginaries has been constructed (Sexton *et al.* 2019; IPES-Food 2022), justifying the proliferation of alternative goods and overshadowing the fact that human and planetary health problems are due to an *excess in* animal protein consumption (MacDiarmid *et al.* 2012). Cultured meat would be most interesting in this context, since it is claimed that its proteins are identical to the ones found in ‘traditional’ meat (Sexton and Goodman 2021) – for the first time without killing animals (Stephens 2013), and with a huge ecological advantage (Melzener *et al.* 2021).

Social science contributions in this field have often accepted the desirability and usefulness of cultured meat, with many studies dedicated to understanding and fostering its acceptability among potential consumers (e.g. Bryant, Barnett 2020; Piochi *et al.* 2022). Still, a fruitful critical debate is emerging around the role of cultured meat in shaping trajectories and imaginaries of food systems transformations. One key contribution regards food tech in the context of the Anthropocene and its multiple crises. Emerging food technologies claim to bring «magical disruptions» that, in line with eco-modernist expectations, advocate dematerialisation, delinking the production of nutritious food from its material bases (Guthman, Biltekoff 2021). These are typically «Anthropocene» narratives: solutions to the wicked problems of the present are developed by the same techno-scientific apparatuses that have historically informed a model of development responsible for ecological crisis (Sexton, Goodman 2021; Dal Gobbo 2023). For instance, a narrative based on the argument of efficiency holds that producing the piece of meat directly instead of rearing a whole animal would imply an advantage, considering the living organism as a waste of energy and nutrients that surrounds it (Jönsson 2016). This technology is thus presented as a *natural*

continuation of a process of rationalisation of production that is typical of the industrial era (Fairbairn *et al.* 2022).

While initial research on cultured meat's environmental impacts seemed to support these projections, recent estimates tend to be more conservative. While the environmental advantage over beef is evident, in as far as energy consumption is concerned, cultured meat does not perform any better (sometimes worse) than animal foods, particularly poultry (Tuomisto 2019). Similarly, despite an imaginary of animal free production, animal bodies are still present, and this implies ethical issues (Ferrari 2024). In this respect, existing research has highlighted the important role of «promissory narratives» in fostering cultured meat acceptance and future food imaginaries. These are narratives based more on «future orientated projections than tangible product» (Stephens *et al.* 2018: 369). Indeed, while it is far from being mainstreamed, accessible and available to the public due to technical and economic barriers, proponents tend to represent it optimistically as ready-to-come food. The expectation is that technoscientific innovation will be able, through further research, to overcome all present obstacles (Jönsson 2016). The construction of such a promise is performative in several ways: it sustains revenues and the trust of investors in the field (Fairbairn *et al.* 2022); it produces a public of potential consumers (Mouat, Prince 2018); it supports profit by creating a new production-consumption niche, similarly to what happened with the increasing marketisation of veganism (Bertuzzi 2022). Finally, and possibly most importantly, it disempowers discourses over food systems and dietary transformation since it proposes a technological solution that does not require a radical change in the system or in people's practices (Sexton and Goodman 2021).

Technological solutionism suggests that what human beings are not capable of doing out of their own will, technology will deliver through the invention of efficient tools. The image of technology as neutral reinforces the idea that potentially sustainable innovations should be pursued irrespectively of wider social and political considerations (Almazán, Prádanos 2024). But like any other technology, cultured meat raises important questions about ethics, sustainability, and the future of food in the Anthropocene. Especially in the fields of political ecology (e.g. Hornborg 2015) and degrowth (Pansera, Fressoli 2021), it has been emphasised that while technological instruments are

critical for socio-ecological change, they risk being ineffective and even damaging without a wider and deeper change in the structures and dynamics shaping current forms of production and consumption (Paulson 2024). One key concern in this respect regards the justice implications of innovation: How are benefits and damages distributed? In the interest of whom? To what extent the logics embedded in food tech reproduce – or challenge – those governing the current system?

While, as seen, the critical debate on cultured meat does engage with these questions (e.g. Jönsson 2016; Guthman, Billekoff 2021; Mouat, Prince 2018; Sexton, Goodman 2022), we find that there is a gap in the sociological literature regarding the science-public controversies that emerge around this novel food (but see for an example: Driessen, Korthals 2012). We believe that investigating this issue is crucial to promote *just* as well as effective transitions: for science and technology to contribute to inclusive and participated processes of transformation, different voices and political positions should be considered. Still, especially in Italy, the debate has been represented in a polarised way as a conflict between science and obscurantism (Dal Gobbo 2023). This dynamic mirrors a wider tendency in the relationship between science and publics, whereby dissenting voices are depicted as ignorant and irrational (Neresini *et al.* 2024; Lello *et al.* 2022). Looking at the narratives produced by different subjects gives the opportunity to show the complex motivations for support to, and critique of, cultured meat, highlighting their *political* nature. Subjects actively contextualise technoscience in a complex socio-political field that both shapes and is shaped by innovation. Inquiring into these voices allows to go beyond an easy dichotomy between techno-optimism and technophobia and to reflect on innovation interpretively, from a perspective that emphasises subjective perspectives, socio-ecological implications and collective uses.

Our study contributes to the literature reflecting on the role of technology for promoting just socio-ecological change. It shows how science-public controversies can be instrumental to politicise innovation by making it a subject not merely of technical evaluations, but also of collective deliberation (regarding, e.g. human-non-human relations, democracy, socio-economic systems, etc.). We more specifically ask: (a) what role is technoscience attributed in the context of sustainable food transitions? (b) what

are the political implications of this – i.e. are such transitions imagined as a reformist improvement of the current system, or is technology understood as part of a necessarily radical socio-political and economic re-organisation? (c) how far do concerns around justice and just transition shape transitions imaginaries? Our analysis is based on interviews from a spectrum of key stakeholders in the debate around cultured meat in Italy (activists, members of civil society organisations, scientists).

## *2. Science as a framing battlefield*

Since our interest was to interpretively investigate how socio-political actors mobilise, organise, and advocate for their interests in relation to an emerging technology, we found the dialogue between Science and Technology Studies (STS) and Social Movement Studies (SMS) particularly fruitful. Indeed, scientific controversies – including those around food innovation – are not isolated debates within the scientific community, nor are they just about conflicting theories or experimental results: they are shaped by political and social dynamics, collective action, and power struggles (Nelkin 1995; Pellizzoni 2011). They are contested terrains where socio-political actors mobilise, organise, and advocate for their interests and objectives – be them institutionalised such as political parties, lobbying groups, large associations, private companies, university departments; or informal such as grassroots social movement organisations (SMOs) and civil society organisations (CSOs). While STS are more interested in studying conflicts within laboratories and/or at the level of public debate, SMS have focused on the mobilizations/protests/contentious politics around science, including the registers and strategies of counter-movements or those players that oppose social movements' claims (Duyvendak, Jasper) 2015; Fligstein, McAdam 2012). The examples of contributions coming from STS to SMS on a theoretical level are extremely numerous, ranging from some «classics» (e.g., Collins, Pinch 1998; Latour 1987; Gieryn 1999) up to more recent scholarship (Jasanoff 2012; Bucchi, Trench 2021; Bucchi, Neresini 2022; Neresini *et al.* 2024).

Reversing the disciplinary perspective (i.e., observing the issue from the viewpoint of STS and considering the contribution of SMS), one can argue that, while social movements have

traditionally focused on issues such as civil rights, environmental justice, and labour rights, they also play an increasing role in shaping scientific controversies (McCormick 2009; Pellizzoni 2011; della Porta, Pavan 2017), including those referred to food (e.g. Giménez, Shattuck 2011; Motta 2016). In many cases, controversies between movements and countermovements, or more generally between different players in complex arenas (Duyvendak, Jasper 2015), arise when established scientific paradigms are challenged by dissenting voices. These dissenters often face resistance from dominant groups within the scientific community, who wield power through institutional authority, funding, and publication outlets (Jasanoff 1996). This includes the identification and the exclusion of so-called critical citizens from public discourses and governance processes (Norris 1999; Melucci 1996; Haenfler *et al.* 2012). Operations of language capture are also involved, such as semantic reversals and the redefinition of key concepts of progressive struggles to serve the interests of dominant groups (Foucart *et al.* 2020). Such a phenomenon is even more evident in the wider crisis of neoliberal democracy and in a post-democratic scenario where science and technology are used as a justification for policymaking (Rosanvallon 2008; Crouch 2004).

Overall, by understanding the cultural and social factors that shape complex societies, SMS can help explain why certain knowledge is accepted or refused: this includes norms, values, and historical contexts that influence public perception (della Porta, Diani 2015). In this respect, it is relevant to study how «refused knowledge» is «manufactured» within these debates (Neresini *et al.* 2024). On the one hand, in fact, the motivations and frames used to criticise established scientific knowledge are rooted in complex and informed political positions and rationales. On the other, any dissenting voice is constructed as merely «irrational» or even a «dangerous mindset» (*ibid.*, p. 4). An SMS lens allows to re-focus on the skilful and agential action of different social subjects (della Porta and Pavan 2017). By framing socio-technical issues in specific ways, they bring to the fore the contested and non-neutral position of science with regards to future trajectories of development and transition. This counteracts functionalist approaches that read these phenomena as pathologies, deprivation, or lack of integration into the social fabric (Gurr 2015).

The intersection of STS and SMS is even more relevant in the context of the present debate around climate crisis and cli-

mate justice. Historically, social movements in the environmental field have critiqued the positivism of mainstream science and re-evaluated alternative worldviews and epistemologies. But in recent years they have increasingly relied on expert knowledge to support their claims (Pellizzoni 2011). Cultured meat is a very telling case. It is depicted as sustainable, ethical, feasible and desirable by the large sectors of academia and progressive public opinion – including many environmentalist and antispeciesist social movements. Yet, emerging controversies show that different social subjects can treat novel foods as political matters, that emerge from, and responds to, sustainability challenges in positioned ways. Hence cultured meat can be seen as a contested field, both from inside and outside of the scientific community (Sexton *et al.* 2019).

To map this complexity and understand the specificities of the political debate surrounding cultured meat in the context of sustainability transitions and their justice implications, we draw on a typical SMS theory: framing theory. Popularised by Ervin Goffman (1974) and applied to SMS especially by David Snow and his collaborators (Snow *et al.* 1986; Benford and Snow 2000), frame analysis has been used in a plethora of studies (for a critical review, see Van Dijk 2023), including scientific controversies (Nisbet 2009; Jasanoff 1996). Framing theory focuses on how socio-political actors frame their grievances, goals, and identities to garner support and mobilise action (Benford, Snow 2000). Frames are ways of organising reality that emerge from the interpretations of individuals and groups, configuring sense-making operations about more or less controversial topics: they contribute to the creation of social and sociotechnical imaginaries (Taylor 2004; Jasanoff, Kim 2009). The literature has mainly focused on diagnostic, prognostic and motivational framing promoted by social movements (Snow *et al.* 2018). Through diagnostic framing, SMOs, CSOs and individual activists identify and critique perceived flaws in accepted knowledge, while prognostic framing offers alternative viewpoints or solutions, and motivational framing galvanizes public support by appealing to shared values and emotions. By analysing framing processes, it is possible to understand the impact of frames on different audiences, as well as counter-framing efforts. This comprehensive approach elucidates the dynamics of knowledge contestation, explaining why certain knowledge is refused and how these refusals shape societal dis-



course and action. As such, it resonates with, and contributes to, the study of technological and scientific controversies. In our research, frame analysis allowed to evaluate how different diagnostic and prognostic frames shape specific pathways of (just) sustainable transitions in the food sector.

### 3. *Methods*

#### 3.1. *Socio-political context*

Our research emerged in the context of a heated public debate in Italy when, on 28th March 2023, a draft bill was published by the Italian Council of Ministers that would put a ban on production, commercialisation and consumption of cultured meat. This bill was ratified on 16<sup>th</sup> November 2023, but the TRIS procedure was blocked by the EU Commission because the law was approved before the three months necessary to prove the compatibility of the local legislation with the EU law<sup>1</sup>. Media and public discourses represented a totally polarised debate, characterised by either completely favourable or completely adverse positions. Much of the agricultural world – especially those close to the main category association, Coldiretti<sup>2</sup> – and a portion of public opinion and conservative right-leaning media have championed this battle in the name of valorising tradition and promoting Made in Italy. In contrast, many «progressive» movements have contested the draft-bill and strongly advocated for supporting this technology. But this apparent polarisation was due to the partial representation of the social field, where only privileged subjects were given voice: scientists carrying out research on cultured meat on the one hand, and, on the other, farmers and their representatives, as

<sup>1</sup> The TRIS procedure stipulates that a Member State, before adopting legislation, must wait for a certain period («standstill period») after the initial notification to the European Commission. This period is necessary to allow the Commission to verify that the legislation does not affect the internal market, a step that Italy did not observe.

<sup>2</sup> Coldiretti (National Confederation of Direct Farmers) is the largest association representing and assisting Italian agriculture. This association, on one hand, represents most of the Italian agricultural sector and plays a fundamental role in political processes due to its significant lobbying influence; on the other hand, it is contested by a segment of local small farmers who feel that their interests are not well represented compared to those of large agricultural groups.

well as politicians and experts. These two positions were highly connotated in political terms: the techno-optimist sitting on an ideal centre-left spectrum of reformism and progressivism, the traditionalist identifying with the right-wing government that supported this law. Yet, paradoxically, a depoliticization happened: polarisation prevented the articulation of an open and non-reductionist discussion over farming, the role of technology, the very uncertainties that this innovation – like all others – involves (Dal Gobbo 2023). Despite their complete opposition, both views indeed supported the status quo. Conservative discourses reproduced contemporary farming and consumption practices without questioning them, idealising Italian agriculture as natural and humane. Techno-optimists endorsed innovation uncritically, supporting an idea of technosolutionism rather than facing the need for deep transformations.

### *3.2. Data collection and analysis*

Considering this context, we opted for a qualitative research approach, which allowed us to delve into the political, technological, epistemological, and ontological issues that inform controversies surrounding cultured meat. We therefore adopted a theoretical sampling strategy (Flick 2022) and reached out for some of the most important Italian SMOs and CSOs among those engaged in discussions around food transitions and animal ethics. We also interviewed several scientists directly involved in research related to cultured meat in Italy. Despite their limited number, our interviews cover almost all the key actors of a very niche research sphere. The sample is thus not representative of either the general population or the associative and research fields. However, we believe that the spectrum of interviews collected fairly reflects the extreme variety of positions on this issue.

We conducted 29 semi-structured interviews between December 2023 and March 2024. Of these interviews, 19 were conducted with activists (marked as A in the attached Appendix 1) belonging to SMOs and CSOs engaged in political ecology, environmental justice, and antispeciesism<sup>3</sup>; 7 with «STEM sci-

<sup>3</sup> In this paper, we use the term «antispeciesism» in a generic sense to refer to groups belonging to the wide spectrum of activism related to animal welfare, rights, and

entists» (StS) working on cultured meat-related issues; and the remaining 3 with social scientists (SoS) whose work was particularly salient for the matter discussed in this paper (see Appendix 1). Most of the interviews were conducted online, except in a few cases: one respondent replied in writing (Int\_08), and three other interviews were conducted face-to-face due to geographical proximity (Int\_14, Int\_15, Int\_27). Interviews were all individually conducted, but one, involving two respondents (Int\_14). The interviews had an average duration of 53 minutes and were organised according to a guideline and related semi-structured questions. The guidelines were partially different for researchers and activists, although several points overlapped (see Appendix 2 for the English translation of the interview guide). They included questions over subjects' involvement with the topic, their knowledge about it, their sources of information, envisaged role for technology and politics in the context of food transitions, future food scenarios. There was a fair distribution of interviews across the national territory, with a prevalence in the regions of central and northern Italy; educational backgrounds were generally high, but this is influenced by the fact that researchers were also part of our sample; despite attempts at gender balance, 21 interviews were conducted with men and 8 with women; the age of the respondents varies in a range from 16 to 74 (average: 43); the professions – apart from those of the researchers – are quite varied. In Appendix 1, we provide a summary overview of the main socio-biographical data regarding our set of interviewees. Interviews were recorded and fully transcribed.

Analysis was conducted as a frame analysis, for the reasons discussed in §2. Data were inductively coded according to emergent themes, among which we isolated core ones that allowed us to address our research interests: the role of technoscientific innovation in the context of environmental crisis and inter-species relations; promissory narratives; visions of the future; political and ethical considerations; sustainability and transition. We looked at how these different themes were articulated by differently positioned actors. In what follows, we develop an account at the crossroads of scientific and lay discourses, treating them in a non-hierarchical way and inquiring into the political issues

liberation. We are aware of the debates and controversies surrounding this term, not only in Italy, as well as the various theories associated with animal advocacy (Bertuzzi 2019).

that they raise. Our discussion is organised in three sections, each tackling key questions over the future of this novel food: §4.1) the possibility of addressing the ecological crisis through technological solutions; §4.2) the actual nature of cultured meat as a solution or as an option; §4.3) perspectives on food justice.

### *3.3. Our positioning*

Before presenting the analysis, we consider appropriate to briefly define our positioning as researchers. Over the years, both of us have been interested, albeit from different perspectives, in topics such as critical consumption, alternative lifestyles, food policies, political ecology, everyday practices, conflicts over technoscience, degrowth, anti-capitalist movements, animal advocacy, and ecofeminism. We have both addressed issues related to the role of non-human animals in contemporary societies from political, ontological, and ecological perspectives. The intersection of these different interests and research paths has led us to focus on the specific topic of cultured meat as a field of contention among socio-political actors that we have previously studied in relation to other issues. We tried to do this with a Weberian value-free approach, while being aware of the impossibility of completely shedding our personal backgrounds as researchers and citizens.

In fact, we both perceive ourselves as engaged scholars. Our direct involvement in activist and academic environments related to some of the issues analysed in the paper has contributed to defining the research objectives, preparing the fieldwork, contacting interview subjects, and reflecting on the results. While reaffirming the academic nature of the paper, we also consider it important for engaged social researchers to have a voice and find space in debates beyond strictly scientific ones, particularly on crucial topics such as the future of food, the environment, and democracy. This would allow to reach wider segments of the population and produce critical thought useful to social movements and the wider civil society.

#### 4. *Analysis*

##### 4.1. *A technological fix for ecological and interspecies crises?*

The general problematisation by which cultured meat is framed throughout almost all our interviews regards the troublesome nature of animal farming in contemporary, industrialised, food systems, and the urgency and necessity of a transition towards sustainability, ethics, and/or justice. This regards ecological consequences and the huge sacrifice of animal bodies and lives, but also the labour conditions of people involved in this industry (Int\_01, Int\_03, Int\_08, Int12, Int\_14, Int\_22, Int\_24). Yet, as Benford and Snow (2000, 616) notice, «consensus regarding the source of the problem does not follow automatically from agreement regarding the nature of the problem» (diagnostic framing), and, we might add, the possible responses (prognostic framing). In this section, we identify two different framings on the role attributed to technology in responding to the challenges identified, which in turn mirror a wider view over the dynamics underlying both ecological and inter-species issues: one sees cultured meat as a «technological fix» and positive answer and one, conversely, identifies this discourse as a dead end that reproduces existing (capitalist) social, political, and economic dynamics.

The first framing process is most proper of scientists, the majority of antispeciesist and some of the environmentalist groups (for example the Fridays for Future, who are younger and generally more technophilic). Such frame, in line with the tradition of technological modernization in the environmental field, sees this innovation as an awaited technofix that would allow to reach the tipping point hypothesised in the Kuznets environmental curve. This says that technological progress is harmful for the environment up to a certain point, but then becomes the main ally of environmentalism (for a critical explanation of this theory, see Hickel, Kallis 2020). Those who defend this type of position do so both for epistemological reasons, considering that «science and technology are not aligned on one side or the other» (Int\_10), and for political positioning of their own group, in some cases considered as «spokespersons for science» (Int\_09). This framing explicitly refers to efficiency (Int\_12, Int\_24, Int\_25) and sometimes to the valuing of a Promethean approach for which the pursuit of technological development is

good in itself, since it allows human beings to expand their power and potential (Int\_17). Scientific development is constructed as a value regardless of its motivations, since it is seen as always bringing improvements, in the original field or close ones. For instance, cultured meat, even in case of a complete market failure, would bring benefits to biotech research with applicability in the medical field (Int\_14, Int\_21, Int\_28).

Within this framing, there is a general distrust in democratic processes and the socio-cultural component of ethical alternatives, to the point of stating that «scientific and technological progress has always historically been the best tool to increase the level of ethics of human beings» (Int\_08) and that «when a solution has been found, it is in the direction of more technology» (Int\_17). There is also a distrust in the capacity of human beings to change their own practices. Especially within the scientific community (Int\_21, Int\_22, Int\_25), but also for some activists (Int\_03, Int\_08), the fact that meat consumption continues to increase despite calls for its reduction is seen as evidence for the need of such a techno-fix: «some groups in the population would find easier to buy cultured meat instead of adopting more balanced diets» (Int\_14). Projections regarding the increase in world population are used deterministically to create scenarios of an unsustainable rise in meat consumption levels. This justifies the idea of researching into an alternative that might be palatable to subjects who are not willing to give up meat:

30, 40, 50 years from now, we will reach 10 a billion people, at least by FAO estimates. And the risk of [...] the way to feed all this population cannot continue to be the exploitation of land, water, and intensive livestock farming. (Int\_25)

Particularly within the antispeciesist area, ethical considerations are drawn upon to emphasise the positive effects in terms of animal welfare and rights, since there would be the opportunity «to reduce the number of animals raised and slaughtered» (Int\_12). Some do recognise ambivalences, for instance regarding the intensification of corporate control over food production, or possible adverse environmental consequences. Yet most antispeciesist SMOs explicitly claim (rather contradictorily) to be concerned only with (certain) non-human animals (Int\_16), and they claim that technology can play a positive role in this

(Int\_12). Similarly, environmentalists see this innovation as good because it might help curbing the impact of industrial farming, while political considerations are seen as less urgent:

There will be medium and big corporations that want to carry on with this business [...] and this is used as a critique but this is not a reasonable ground for not doing it, because we need a transition, we must realise a food transition because meat has huge impacts. (Int\_09)

In opposition to these promissory or Promethean narratives (i.e. those linked to technoscientific development as, respectively, a means or an end in itself) are those positions that use rhetorical devices typical of the degrowth, political ecology and agroecology fields, including some radical antispeciesists. The arguments are economic, cultural and epistemological. They criticise the idea that technology can ever lead to a decoupling between economic growth and environmental damages. But also, they interpret growth and technoscientific advancement as a social construction that has «colonised the imaginary» (Int\_04, Int\_19), rather than as simple economic facts. With this expression, recalling Serge Latouche verbatim, our interviewees indicate a process whereby social imagination becomes stuck on just one representation of what is a good life and the direction of human development, which becomes regarded as natural, rather than political. This space traces our second framing, which emphasises the social determinants of ecological crises and the political implications of innovations, warning that a technology, in itself, cannot change the underlying logics and relations that have made the food system unsustainable:

The transformative role is never of a technology, and of a technology embedded in a neoliberal system where those who make it must only strive for profit and the multiplication of this innovation. (In\_16)

Apart from scepticism on its effective scalability (Int\_19, Int\_27) and very scant comments about possible health risks, the warnings concentrate on the wider costs and side effects of this «techno-fix», since it would perpetuate and relaunch a capitalist model of development seen as inherently damaging (Int\_11). The questioning of technology is interlaced with that of capitalism, in the need to «overcome the idea of the neutrality of science and technology [...] there is always the risk of leaning towards

positions that use technology for the reproduction of existing power relations» (Int\_18), since «a portion of scientific research is directed, managed and financed, aimed at developing knowledge for the profits of a few» (Int\_11).

Activists within this field are also concerned that this technology will take human beings further apart from nature, promoting forms of «agriculture without the land» (Int\_15) that favour neither ecological relations nor food sovereignty (Int\_02, Int\_04). As such, it would promote an idea of sustainable transition that is concentrated on specific technical issues such as CO<sub>2</sub> reduction rather than a wider and thoroughgoing rethinking of the relationship between human beings and the rest of nature: using concepts developed in scientific literature, they literally talk about a «fetishization of CO<sub>2</sub>» (see also Swyngedouw 2018), which would be in line with the «climatization» of the entire environmental discourse (Aykut *et al.* 2017) (Int\_11, Int\_13, Int\_16). Radical antispeciesists are concerned that:

Endorsing this is a mistake, we must remember the fact that animal sacrifice is always envisaged in this stuff anyway, and that in short, getting down to earth a bit, it would not be in the terms in which we are sometimes told. (Int\_01)

Radical antispeciesism is based on a struggle to end animal exploitation but also on the willingness to introduce a new egalitarian and non-anthropocentric socioeconomic paradigm. The risk is that this is replaced by pragmatic solutionism and a utilitarian outlook typical of the first antispeciesism (Singer 1975): «what we knew in the fights against vivisection, where there is no mass extermination comparable to the benefits» (Int\_01).

#### 4.2. *From solution to option*

Having considered these different framings, we now concentrate on how different actors envision the space of this technology within current, or better future, food systems. Those who most believe in this novel food generally think that it will be able to replace a significant part of industrialised meat production, thus targeting its most ecologically impactful and ethically questionable forms:



The purpose of cultured meat is not to supplant pasturing or such practices. It's to reduce the impact of intensive farming, both in terms of the environment, ethics, and health. (Int\_14)

This implies – in line with technoscience's «promissory narratives» (Jönsson 2016; Stephens 2013) – that cultured meat will be (a) easily scalable, (b) largely accessible, (c) palatable and (d) that its commitments to animal welfare and environmental sustainability are effectively realised. These expectations are, nevertheless, based mostly on projections rather than on sure development pathways (Stephens *et al.* 2018) – something that our StS interviewees indeed recognise. One key finding from our interviews is in fact that the promises of cultured meat are most strongly voiced and reproduced by activists rather than scientists. Be this in the construction of enthusiastic future «post-animal» (Datar *et al.* 2016) scenarios (Int\_07, Int\_08), or in the fearful idea that these easily produced and distributed products will soon flood supermarkets and wreck the agricultural field (Int\_29), those who most seem to believe in technoscientific promises are those who do not see them 'from within'.

Scientists do support the positive function of (this) innovation, but they are also among the ones most explicitly acknowledging its limitations, technical obstacles, and acceptance issues (Int\_14, Int\_21):

Something that works on a laboratory scale is not so easily translatable to a medium-industrial scale [...] and therefore those who are scared of having cultured meat in supermarkets... I think in the next 10 to 20 years it will be difficult. (Int\_22)

Scalability problems, the need for important capital investments, high costs, continued reliance on bovine serum, energy-intensiveness of the overall production process, etc.: these perplexities are often solved by replacing them with further promissory narratives on the power of research and technological upscaling – like with the recurrent metaphor of telecommunication technologies that in a few decades changed from being niche to becoming a key feature of daily life (Int\_03, Int\_14):

Sp1: clearly we all say that there is hope that we can develop protocols.

Sp2: come on there is certainty, come on...

Sp1: there is in fact exact certainty on the... well!

Sp2: exactly we're not talking about hope, it's certain that we just need to increase the research a little bit, but we're already at a good level and in a very short time... (Int\_14)

Nevertheless, scientists' projected scenarios for this technology are not monolithic and shift in accordance with the rhetorical objectives pursued. For instance, despite arguing that it would be a substitute for industrial farming, they also say that (at least for some decades) it will not be mainstreamed but rather remain a niche product for committed consumers:

We see absolutely no competition between this product and Italian excellence. This will be a niche product, an alternative, it will mainly be liked, it will be consumed by vegetarians and vegans who appreciate this type of product. (Int\_25)

As such, cultured meat's projected role changes: from solution to climate crisis and interspecies relations, to a further *option* in the field of consumer choice, including high-brow gourmet restaurants (Int\_17): not «a substitution market, but rather as a parallel market for meat» (Int\_04). On these grounds, the development of this technology is supported via a typically neoliberal discourse of freedom of choice in the market, whereby consumers should have the right to choose whatever is not dangerous for their health (Int\_10): if there is the possibility «*why not?*» (Int\_14). Finally, it emerges from the interviews that beyond market challenges, cultured meat might find a useful application in space travel (Int\_21, Int\_24, Int\_25).

All this is problematic for those who believe that technology is not a neutral enterprise: this is not just *one* option, but one that «serves the market and profit» and not «the needs of the population» since it «clearly does not come from below» (Int\_19):

The same entities that drive animal production also economically drive vegan alternatives [...] and they're the ones conducting research and experimentation... So they're doing it solely to broaden the spectrum of protein production, seeking to engage different stakeholders. (Int\_20)

If cultured meat were to be additive to, and not substitutive of, 'traditional' meat then its ecological advantages would be extremely limited, if not negative (Int\_19). Also, it would not contribute to eliminating – possibly not even reducing – animal

suffering (Int\_16). It would represent a new conquest ground for the capitalist market to expand, rather than shrink. Cultured meat would thus be a form of greenwashing, «one of the various false solutions to both the climate crisis and the unsustainability of the food system that is proposed by an economic sphere of large industries» (Int\_15).

Within this framing, cultured meat tends to be represented as a good that will remain very expensive and niche, targeted to privileged people while the masses are left with increasingly unhealthy and unethical industrial meat (Int\_05, Int\_27). It is understandable that this scenario is articulated by those who most explicitly mobilise objectives of social, environmental and inter-species justice: they are more sceptical of the promises of technology, they see the interests of meat corporations to continue with their business-as-usual, they read the field of food production as shaped by differences in power and access to resources, with a trend towards the cheapening of meat as part of the devaluing of labour and life (Int\_02, Int\_10, Int\_11). In contrast, those most aligned with techno-solutionism convincingly mobilise promissory narratives that suggest a rapid escalation of cultured meat's production and its price decrease, so they more easily imagine its cheap mass production. Also, they consider socio-economic (in)justices secondary to sustainability and animal welfare, so this dichotomy between an ideal food for the masses vs. food for the elite is not a matter of concern (Int\_07, Int\_08, Int\_09, Int\_12). This is not always the case, though:

My fear is that food of this kind, which is now a novelty, costs so much, etc., will be destined for the poor. It will be destined for the poor so that the rich, the shrinking part of the rich population, will have access to real food, quality food, peasant food. (Int\_05)

#### 4.3. *Working towards food justice: questioning the politics of cultured meat*

The above quote well introduces the topic of this final empirical section, which regards the political economy and food justice implications of cultured meat as a «food for the future». It must be said that, with regards to justice, cultured meat is not understood as an unproblematic technology by *any* of our

interviewees. For instance, scientists working in this field, despite favouring its development, not only consider the question of food justice as secondary (as seen above) but are also sceptical about cultured meat's capacity to promote it in the first place (Int\_25, Int\_28). Among the most technophilic positions there still is a concern regarding the regimes of property and value shaping research and production, especially for its strong reliance on huge private investments. This resonates with the diagnostic framings of the political ecology field of activism (Int\_16, Int\_20, Int\_24). The methods and aims of the scientific enterprise are not questioned, yet its political economy is. So, one prognostic framing in this context advocates public interventions in research to ensure that knowledge and technologies can favour the wider community and that research efforts are best employed:

We have huge private investments, disproportionate to public investments [...] which then means that firms keep it to themselves, they replicate efforts unnecessarily. [...] It is a highly inefficient process and above all there is no guarantee for the public that when these things are discovered they will then be used for the common good, but simply for the sake of profit, because that is how the market works. So it is absolutely fundamental if we want to look at this as one of the many solutions to the problems we are experiencing in our time, that we change the paradigm, that we go back to work above all in the university. (Int\_21)

Those interviewees who position on a middle ground with respect to this technology also feel that it might be useful only if positioned within a wider *political* – rather than market – project, «framed by a policy of food transition: something that does not exist anywhere in the world, much less in the European Union» (Int\_16).

In this framing, public institutions, the media, and the educational system should have a pedagogic role in initiating people to novel technologies and their risks and benefits, «educating people, children, and even adults to find solutions and actions to undertake at the societal level, to bring everyone to be more aware» (Int\_24). Even in this case, the promissory element remains central, but the promise requires sufficient public preparation: without such support, it seems impossible to fulfil it. This view is grounded on an information-deficit model for which people who do not support given innovations are considered «ignorant» (Int\_14; Int\_22; Int\_25; Int\_26). For this reason, there is also a

certain distrust towards (grassroots) democracy and a scepticism towards empowering individuals and communities, which are seen as needing guidance from above, rather than solid scientific instruments to autonomously judge pieces of innovation:

I think a mistake was made: talking immediately about this thing here, not because it's not right to talk about how to replace a system or how to remedy something, but the fact that if you start talking about cultured meat or start talking about the laboratory, etc., without a work of education, of preparation for the public, automatically people get scared. (Int\_12)

Differently, the sceptical emphasise that available, accessible, and more desirable solutions are already present, which also involve more open, democratic, and accessible technologies (e.g. Int\_02, Int\_15, Int\_19, Int\_20, Int\_27). As seen above, this framing problematises the Western idea of development and growth as inherently good, re-opening the space for a public debate over the reasons, objectives, and means of scientific development. While this position is often associated by other framings as Luddism, and deemed excessively fearful of technology, according to whom «we would still be hunting, gathering berries» (Int\_21), interviews underline that the problem is not technology *in itself*, but rather its forms and uses. Within their framing, this enterprise is not only practically shaky, but also politically problematic and unjustified in terms of collective needs and benefits. In contrast to the «why not?» question of scientists, activists within degrowth, agroecology and political ecology state that «the question that I find most problematic [...] is really why do we have to do it» (Int\_19).

From this, a prognostic framing that defines alternatives to food tech emerges. Resources and collective intelligence should be dedicated to the development of technologies that favour food justice and access rather than enclosure, privatisation, and centralisation, for instance:

The concept of convivial technologies that is kind of the alternative that we are trying to bring forward [...] it means technologies in which the control of the end user is high [...] it can be remodelled by the end user, by those who need it and those who use it for their needs basically. (Int\_19)

Agroecology, peasant movements and farmers associations are more specific in their articulation of a scenario of tech-

nologies from below. They believe in a reconnection between humans and the rest of nature, as well as local communities (Int\_02), increasing intermingling among living beings rather than distancing them via technologies. Socio-technical innovation in the context of climate crisis should go in the direction of a heightened control over the means of subsistence, towards a deeper contact and dynamic metabolism with the land (Int\_13, Int\_15, Int\_29). Peasant movements claim to concentrate on the accessibility of basic services supporting health and wellbeing rather than on high technologies which, despite their promises, tend to produce very limited marginal value (Int\_15). The shift would need to be both political and cultural, going against the mainstream construction of food transitions as in need of innovative foods. Against the obsession with novelty and «this sort of protein myth» (Int\_02), the sufficiency of more frugal diets and already existing sustainable techniques of food production are emphasised:

[Our] position can be very much related to [...] local and peasant food networks. Within this proposal, right now, we don't see cultivated meat. [...] And this is precisely what we see as a possible rebalancing of the food system, bringing the food system back into the hands of local communities, while others instead see the globalised food system and agro-industry as a food system that can become more sustainable. (Int\_23)

Finally, radical antispeciesism underscores the importance of inter-species struggles for justice. While veganism has already developed strategies and practices (Int\_01), cultured meat would not really change existing inter-species hierarchies, since it «does not dismantle the idea that the animal body can still be a substrate, a raw base, a passive matter – which is the root of speciesism» (Int\_27). Even from a «eco-cyber-trans-feminist and antispeciesist» perspective, instead of uncritically embracing techno-science, priority should be directed to «all those things that might be done to reduce inequalities and grant a common wellbeing for humans and non-humans» (Int\_27), increasing access to basic services such as healthy food rather than favouring food tech niches.

## 5. Conclusions

The communication and research hype that surrounds cultured meat is due to its apparently disruptive character and its promises of solving ecological and ethical issues raised by animal farming in the Anthropocene. As such, this innovation follows a wider trend whereby technological artefacts are developed to change the future (and present) of food, improving human consumption of animal protein: this is a true culinary-cultural flagship of the modern West. The specificities of this technological innovation, however, lay in the ethical, environmental, and political controversies (and peculiar fractures) that it raises. This relatively uncharted field is what we addressed in this article, contributing to critical scholarship on the role of food technologies and innovation to foster sustainability transitions (e.g. Sexton *et al.* 1029; Sexton, Goodman 2022; Fairbairn *et al.* 2022). While existing literature concentrates on discourses and the (cultural) political economy of cultured meat, we concentrate on the controversies surrounding this novel food as a way of (a) politicising techno-scientific innovation in the context of sustainability transitions and (b) reasoning around the justice scenarios that it opens (or forecloses).

We managed to show that sceptical voices, which are «manufactured» as «refused knowledge» by the scientific establishment (Neresini *et al.* 2024) are not the expression of ignorance but informed and articulated political positions, showing concerns not so much about the technology in itself, but rather about its social uses and consequences. Although our sample was relatively divided in two fronts – favourable and sceptical – these were not properly opposing ones, and even showed different nuances within the single interviews. Framings of technology include different views on models of development, current relations of (re) production, appropriate ways of being-in-the world. These have impacts on the envisaged politics of ecological transitions – from sustainable development to (de)growth to anticapitalism. Some, like STEM scientists and part of the activists from the environmentalist and antispeciesist field, take for granted the inevitability and desirability of a linear path of progress and development, which would necessarily improve living conditions via scientific and technological innovations. Others question this idea. In the face of the shaky promise of a solution offered by cultured

meat, they emphasise that sustainable forms of producing and consuming proteins already exist, which involve the construction of different socio-ecological relations.

We also looked at how the position of cultured meat in future scenarios of dietary transition is constructed. We want to summarize and underline *three important results*. First, while cultured meat is presented as a disruptive alternative that might revolutionise the sustainability and ethics of meat, our interviews suggest that it is rather configuring as an *option* that will co-exist with ‘traditional’ meat. Techno-enthusiasts use this rhetoric reassuringly, in order not to alienate a potential audience, defending product complementarity as a further space for consumers’ freedom of choice. The most techno-sceptical see this as a betrayal of the very promises of cultured meat: a greenwashing rhetoric would simply create a market niche to support capitalist profit. The second important result specifically regards those who decidedly endorse (this) innovation: among them, interestingly, it is mainly scientists who raise *doubts* about the actual scalability, economic and environmental costs, and accessibility – showing some limits of the promissory rhetoric around cultured meat. Finally, and possibly most importantly, it should be emphasised that almost none of the respondents see the development of cultured meat as an element of *food justice* (if not possibly in relation to the inter-species justice variable): for some, this represents one of the main reasons for opposing such innovation, while others consider a pragmatic, utilitarian, and reformist approach more appropriate, due to the urgency of the current and future ecological and climate crisis.

We acknowledge some limitations of our study. First, while our sampling strategy aimed at being as inclusive as possible to reach out for the many different voices enlivening the Italian debate, surely some are missing, and further research will be precious in mapping them. Second, our frame analysis aimed at being as broad as possible to trace the main trends within our interviews. This means that some nuances might be missing, something we hope might be developed in the future. Still, we believe that our scoping work has been important in bringing to light the complexity of the political stakes at the heart of debates around cultured meat as a «food for the future». Our analysis resonates with present work being done in the field of the «political ecology of technology» (Almazàn, Prádanos 2024;



see also Pellizzoni 2023) and intersectional post-growth perspectives on techno-science and innovation (Pansera, Fressoli 2021; Paulson 2024). First, they show that whenever social subjects are concerned about promoting just forms of sustainability, they contextualise innovation in a complex socio-economic and political transformation of society. Their criticism to novel foods is thus not so much a critique of science and technology, but rather of *techno-solutionism*. This, typical of the Anthropocene Master Narrative (Barca 2021), contributes to the idea that crisis can be fixed via technical measures while obscuring the systemic issues (Swyngedouw 2018). Second, our findings show that a more nuanced self-depiction of technoscience would probably favour more informed and less polarised debates. Publicly recognising uncertainty and engaging in a dialogue with politically and scientifically grounded concerns might contribute to avoid polarisation, fears, and an us vs. them struggle. Engaging with innovation from the perspective of SMS suggests that a deep embedding of innovation within social processes and the collective deliberation of future trajectories might thus be the leeway not only to juster transitions, but also for a more democratic form of science (Jasanoff 1996; McCormick 2009). We hope to help sensitise scientists, communicators, and policy makers to the fact that social actors are not just «ignorant» people who need to be fed an expert knowledge presented as neutral, but rather knowledgeable and agential subjects that contest such neutrality and claim a stake in the definition of the pathways of transition amidst socio-ecological crises in the Anthropocene.

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### **Cultured meat as «food for the future»? Contentious perspectives between science and publics in the Anthropocene**

Cultured meat is one of the most disruptive – and discussed – food technologies in the making, raising a number of ethical, political and ecological issues. The debate is particularly lively in Italy after the government led by Giorgia Meloni has promoted its ban. But while this has been represented in a polarised and simplistic way as an opposition between techno-optimism and techno-phobia, positions across civil society and experts are highly varied and nuanced. In this paper, we present a frame analysis, a typical method in social movement studies, to map the controversy articulating in Italy around this novel food at the crossroads of different knowledges and political positions. Our intention is to show how different framings of the role of cultured meat in the context of Anthropocene challenges are based on deeply held and skilfully articulated (political) convictions, which trace the battlefield around this contested object. We discuss material from 29 semi-structured interviews conducted across Italy between December 2023 and March 2024, including scientists working in this field, activists engaged in relevant struggles (environmental, antispeciesist, ecologist/agroecologists), and social scientists working in cognate fields. The discussion is articulated around three thematic nodes that emerged from data analysis: cultured meat as a contested response to food system crises; its space as solution or option within the futures of food; perspectives on food justice. The conclusions summarise the results, highlight limits and further avenues of research, suggest ways to look at controversies that might support, instead of limit, democratic debate over food transitions.

*Keywords:* Cultured meat, Anthropocene, Social movements, Contentious science, Food justice.

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*Appendix 1*

Interview no.	Group	Gender	Age	Education	Occupation	Province of residence	Activist/ Hard Sciences/ Social Sciences
Int_01	Resistenza Animale	M	48	Higher education degree in Philosophy	Civil servant	Milano	A
Int_02	Crocevia	M	37	Higher education degree in Communication	NGO's responsible of communication	Roma	A
Int_03	Essere Animalì	M	47	Higher education degree in Herbal medicine	Private employee	Milano	A
Int_04	Presenza	M	23	High school diploma	Student	Brescia	A
Int_05	APAB	M	60	PhD in History of science	Director of a training institute	Firenze	A
Int_06	GreenPeace Italia	F	48	Higher education degree in Natural sciences	Employee	Roma	A
Int_07	Ribellione Animale	F	14	N/A	Student	Brescia	A
Int_08	End the Slaughter Age	M	33	Higher education degree in Cinema	Accountant	Pisa	A
Int_09	Fridays For Future	M	26	Higher education degree in Psychology	Student	Roma	A
Int_10	Italia Nostra neto	M	74	Higher education degree in Chemical engineering	Business executive	Venezia	A
Int_11	Ecologia Politica Parma	F	24	Higher education degree in Gastronomic science	Student	Parma	A
Int_12	Animal Equality Italia	M	39	High school diploma	Executive of an animal rights NGO	Milano	A

Int_13	Genuino Claudestino	F	57	PhD in Forestry ecology	Family farmer	Bologna	A
Int_14	University of Trento, CIBIO	M, M	48, 53	PhD in Biotechnologies	Associate Professors	Trento	StS
Int_15	ARI - Associazione Rurale Italiana	M	30	Higher education degree in Agronomy	Civil servant	Trento	A
Int_16	N/A	F	47	PhD in Philosophy	Independent researcher	Germania	SoS
Int_17	AIT - Associazione Italiana Transumanisti	M	63	PhD in Sociology	Lawyer	Milano	A
Int_18	Medicina Democratica	M	38	PhD in Research, health and welfare	Researcher	Bologna	A
Int_19	MDF - Movimento per la Decrescita Felice	M	36	Higher education degree in Medicine	Medical Doctor	Brescia	A
Int_20	Legambiente	M	64	Higher education degree in Agronomy	National executive of an environmental NGO	Marina di Grosseto	A
Int_21	University of Turin, DBMSS	M	36	PhD in Biotechnologies	Associate professor	Torino	StS
Int_22	University of Trento, CIBIO	F	28	PhD in Biotechnologies	Scholarship recipient	Roverchiara	StS
Int_23	University of Gas-tronomic Sciences of Pollenzo	M	46	PhD in Philosophy	Associate professor		SoS
Int_24	Polytechnic University of Turin, DIMEAS	F	45	PhD in Industrial bioengineering	Associate professor	Torino	StS



Int_25	University of Rome Tor Vergata, Biology Department	M	52	PhD in Biology	Associate professor	Roma	StS
Int_26	University of Tuscia, DIBAF	M	67	PhD in Zoology	Associate professor	Viterbo	StS
Int_27	Ca' Foscari University of Venice, Department of Philosophy and Cultural Heritage	F	52	PhD in Philosophy	Associate professor	Palermo	SoS
Int_28	EFSA	M	49	PhD in Food science and technologies	Unit coordinator on nutrition and novel foods	Cavriago	StS
Int_29	Movimento dei "trattori"	M	21	High school diploma	Farmer	Lonigo	A

## *Appendix 2*

### *Cultured meat interview guide – STEM scientists*

What are the first words that come to your mind when I say ‘meat’?

#### INTRODUCTION

What is your research specialisation?

How did you approach cultured meat research and how are you working on it now?

#### TECHNICAL DETAILS

Tell me about the production process of cultured meat

How does it tie in with existing research?

What is the state of the art of cultured meat research?

Is it currently considered a feasible technology? What products are there at the moment?

What are the main technical obstacles to its realisation? And where is the research on these?

Do you think it is feasible in market terms (or might it be in the future)?

And in terms of ecological impact?

What are the health risks involved?

#### VALUES

Do you think it is important to do research on cultured meat today? Why?

Do you think it can have a positive impact on the sustainability of the food system, including greater equity?

What do you think are the main obstacles to its diffusion?

Why do we need it?

#### CONTROVERSIES

What ethical issues do you think cultured meat involves?

Why would anyone oppose cultured meat?

What do you think about what is happening in Italian politics? risks, benefits, ...

What role is politics playing today with respect to this innovation?

And what do you think its role should be with respect to food issues (individual choice, market or institutionally directed)?

#### CLOSING

General assessment of cultured meat

What do you think are the future scenarios for this technology?

What do you imagine the future of food/food of the future to be in: 5-10 and 30 years?

## SOCIODEM

Age, residency, education, occupation

### *Cultured meat interview guide – movements*

What are the first words that come to your mind when I say ‘meat’?

## INTRODUCTION

Can you briefly talk about yourself and the reasons behind your activism?

What are the issues you have been mostly engaged in?

## CULTURED MEAT

What do you know about cultured meat? Where did you get your information?

In general, what are the main sources of information you use? (Newspapers, or the Internet, and on the Internet what?) When you get across a piece of news, how do you try to understand whether it is reliable news or not?

## MOVEMENT POSITIONS

Position regarding the climate crisis

Is the issue of cultured meat a hot topic in your movement/organisation, and more generally in your spheres of activism? Is it talked about? What is being said?

(if not already mentioned in the previous answer) How does your movement/organisation stand towards meat consumption?

Have there been any mobilisations on this issue?

## CONTROVERSIES

Do you think this technology could be useful in addressing the challenges of the ecological transition?

if not: what is your alternative?

What risks do you think it entails?

Are there ethical issues that cultured meat raises/solves?

Why would anyone oppose/support cultured meat?

Do you think that the spread of cultured meat could have consequences in terms of jobs? Do you think there are socio-economic issues related to access to this product?

## POLITICS

What do you think about what is happening in Italian politics?

What role is politics playing today with respect to this innovation?

What is and what should be the role of politics with respect to food issues (individual choice, market or institutionally directed)?

What role do and/or should science and technology play in addressing/solving ecological and climate issues?

#### CONSUMPTION

Where do you mainly go shopping? (supermarket/organic shop/Solidarity Purchasing Groups/fair trade shops/e-commerce/...)

Based on what criteria do you choose the products you use? (inc. health, environment, ethics, politics, etc.)

#### CLOSING

General assessment of cultured meat

What do you think are the future scenarios for this technology?

What do you imagine the future of food/food of the future to be in: 5-10 and 30 years?

#### SOCIODEM

Age, residency, education, occupation

#### *Cultured meat interview guide – social scientists*

What are the first words that come to your mind when I say ‘meat’?

#### INTRODUCTION

I will start by asking you to introduce yourself: who are you? what do you do for a living? what are your main fields of interest?

Besides your intellectual and research work, are you part of social movements or are you engaged in other areas of social transformation?

If yes, which ones?

If no, why?

#### CULTURED MEAT

What do you know about cultured meat? Where did you get your information?

Do you think the subject of cultured meat is relevant to your research topics? Is it something that is talked about in the debates you attend? What is said about it?

Are there any explicit positionings? Can you help us map this reality?

#### CONTROVERSIES

Do you think this technology could be useful in addressing the challenges of the ecological transition?

if no: what is your alternative?

if yes: what might be the risks?

Are there ethical issues that cultured meat raises/solves?

Why should anyone oppose/support cultured meat?

Do you think there are 'food justice' issues in both production and access to this product?

#### POLITICS

What do you think about what is happening in Italian politics?

What role is politics playing today with respect to this innovation?

What is and what should be the role of politics with respect to food issues (individual choice, market or institutionally directed)?

What role do and/or should science and technology play in addressing/solving ecological and climate issues?

#### CLOSING

General assessment with respect to cultured meat

What do you think are the future scenarios for this technology?

What do you imagine the future of food/food of the future to be in: 5-10 and 30 years?

#### SOCIODEM

Age, residency, education, occupation