

ANALYSIS OF SOCIAL ACTORS IN THE SPACE OF IN VITRO MEAT AND
ALTERNATIVE ANIMAL PRODUCTS

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ABSTRACT

This dissertation empirically examines how multiple groups of social actors—activists, animal welfare scientists, and alternative animal product "industry" insiders—are reacting to and discussing emerging food items aimed at replacing traditional animal products, with a focus on cell-based meat (i.e., in vitro meat, or IVM for short). Each of the three papers in this dissertation focuses on one of these groups. Each paper also uses a different methodology that is unique and adapted to the type of data analyzed—content analysis, discourse analysis, and semi-structured interviews. The overarching goal is to assess what sorts of conversations are happening, by whom, and how these conversations might influence the emergence of alternative animal products and existing social structures. Taken together as a single study, this dissertation presents both the depth and breadth of the alternative animal product space. The basic arguments that stakeholders for and against alternative animal products are using, what types of questions they are asking, and the problems they are working to solve, are analyzed in detail.

This dissertation finds that activist stances tend to be more black-and-white than those of alternative animal product insiders or animal welfare scientists. Of the three groups of stakeholders studied, welfare scientists show the most nuanced view, especially of in vitro meat. They are critical of IVM while also being open to its potential benefits. I found that IVM is causing a factionalization of the animal rights movement by creating a “radical” vs. reform schism that bears resemblance to factionalizations in other social movements. Professional conferences on alternative animal products tend to be business- and market-oriented in their discourse while discourse on the ethics of alternative animal products, the animals who might benefit the most directly from these products (farmed animals), or the environment are backgrounded to capital-centric narratives. There is still much unknown about IVM in particular,

in addition to if, when, and how alternative animal products might disrupt current food systems. As a result, the alternative animal product space is still attempting to build itself into an industry but does not yet constitute one.

The overall contribution and importance of this dissertation lies in its description and categorization of arguments, strategies, and values of groups of social actors instrumental in its development and future potential for success. This dissertation singles out sites of construction and stakeholders that have not been empirically investigated in terms of their contribution to the alternative animal product space.

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CHAPTER 1: INTRODUCTION

There is a growing awareness that industrial animal agriculture is unsustainable, both environmentally and in terms of biological limits being reached concerning how intensely animal bodies can be pushed for the sake of animal product production. Personal health consequences of animal product consumption are becoming more widespread and with Covid-19, industrial animal agriculture is also increasingly referred to as a public health concern. Thus, there are clearly incentives for a non-animal meat production system—at least for those with a stake in the current systems or foodways. One such proposal to address the unsustainable nature and moral quandaries of meat production is in vitro meat (IVM). Briefly, creating IVM requires obtaining animal cells, usually via biopsy of a living animal, and placing them in a growth serum that provides nutrients to the cells. Kept in controlled conditions within a bioreactor, the cells proliferate and form muscle tissue. This muscle tissue—meat—can then be formed into food products.

The first academic articles on IVM appeared in 2002 (Benjaminson et al 2002; Catts and Zurr 2002) and present diverging discourses. Benjaminson et al., invoke a sense of belief in technological progress and assert that meat consumption by humans is inevitable. Catts and Zurr are much more cautious, questioning the ethics, utility, and implications of creating living tissue assemblages outside of a living host body. Since this pair of papers was published, the literature on IVM has evolved in a number of directions. Early publications largely consisted of overviews of the general IVM production process (Datar and Betti 2010; Hopkins and Dacey 2008; Edelman et al. 2005), environmental impacts (Tuomisto and Teixeira de Mattos 2011), or of ethical issues (Pluhar 2010; Welin and van der Weele 2012). These articles tended to present IVM in overall positive terms. Around 2015 a suite of papers began investigating consumer

perceptions and possible acceptance of IVM as well as preferred names for IVM products (see Bryant and Barnett 2020 for a review).

Miller (2012) is the first peer-reviewed article openly critical of IVM. Like other critical papers that followed (e.g., Metcalf 2013; Wood 2014), Miller argues that the basis of the problems IVM purports to solve are left unchallenged, or even strengthened. He also makes several theoretical connections to animal agriculture such as the potential of IVM for entrenching “carniculture.” Similarly, more recent environmental evaluations of IVM have been less optimistic than those cited above (see Lynch and Pierrehumbert 2019). The most recent trend in the literature appears to be arguments critical of the promises (and silences) of IVM proponents, of the use of capitalism to drive IVM production and businesses, and of partnerships with animal agriculture (Helliwell and Burton 2021; Guthman and Biltekoff 2020; Poirier 2021).

Particularly important recent interventions have been assessments concerning the ability of IVM production to be scaled to levels that would be necessary to effectively rival, let alone supplant, traditional animal agriculture (Humbird 2020, 2021; Vergeer and Odegard 2021; Garrison, Biermacher, and Brorsen 2022). Such studies debate the plausibility of IVM being able to rival traditional animal agriculture. For instance, Garrison et al. (2022) conclude that if a cost of \$63/kg can be reached, IVM could potentially compete with premium-priced traditional meat. However, this price point was calculated “assuming that growth hormones can be replaced with cost effective substitutes that do not currently exist” (2022:3). Thus, the authors feel a more reasonable price would be “well over \$100/kg” (2022:6). Humbird (2020) concludes that \$25/kg of IVM would be needed for sizeable disruption of the traditional meat market. He concludes that—again under several assumptions about mediums, energy use, and cell culture processes—the price of mincemeat or nugget-style IVM at market might at best reach that of premium cuts

of meat. These results are a far cry from a disruptive future. If there are concrete limitations of IVM being able to compete with traditional meat on price, then the whole pursuit may be futile.

A problem that arises is that IVM is simultaneously both similar to and different from traditional meat. Its similarity is said to hold the potential to make it appealing to consumers in terms of characteristics such as taste and texture, while its differences are said to make it stand apart from traditional meat in terms of environmental sustainability, and animal cruelty. This ambiguous discourse can obscure how such an object (or set of objects) can hold such transformative potential while being claimed to be biologically identical to the product(s) it is purported to be superior to and supplant. For instance, IVM may appeal to meat eaters and non-meat eaters precisely because it is meat. Conversely, IVM may disgust meat eaters based on being perceived as not quite meat enough, and it may also disgust non-meat eaters because of its perceived proximity to meat (Niszczoła and Błaszczyszki 2023:10). Social forces and social actors are at play behind this construction. This ambiguity can also be noted in characterizations of IVM. Richard Giles (2022:1) describes IVM as “a force of disruptive replacement, a threat to certain industries but a ‘fixing’ of harmful practices for others, without major disruption for consumers.” Five years previously, Poirier (2017:4) described IVM in nearly identical terms as sitting “at a crossroads of animal protection and exploitation, of instrumentality and liberation, and of coexistence and extinction.” This ambiguity calls for social scientists to try to sort out just how this technology is emerging.

Thus, this dissertation seeks to name various social groups, loosely identified as stakeholders of alternative animal products, and see what types of questions each is asking and what problems they are working to solve. A general research question arises: What sorts of conversations are happening, by whom, and how might these conversations influence the

emergence of alternative animal products and existing social structures? To investigate this question, three empirical studies were devised for this dissertation. These include a content analysis of the 2018 and 2019 Good Food Conferences, a content and discourse analysis of the 2019 Conscious Eating Conference debate on IVM, and interviews with animal welfare scientists eliciting their opinions on IVM. Each study focuses on one group of stakeholders concerning alternative animal products, issues they identify, and their proposed solutions to those issues. These stakeholders are alternative animal product insiders, animal activists, and animal welfare scientists, respectively.

Here at the outset, a couple points concerning this dissertation as a whole are warranted. Richard Giles (2022) defended his dissertation on IVM in November 2022, which I was able to attend virtually and then read his dissertation in full afterward. Giles's dissertation is expansive, but he makes a particular intervention that influences my dissertation. He provides a unique and in-depth critique of IVM as an "industry." Due to the lack of almost any condition or component of a functioning industry, Giles concludes that "experiment" is a better term. An extended quotation that presents this critique is presented in paper 2 on the GFI conferences. For now, and heeding Giles's critique, in the present dissertation I do not refer to IVM as an "industry," however, nor do I use "experiment." Instead, I borrow the term "space" from human geography that refers to a general and amorphous collective involved in a particular field or topic, to varying degrees, along with the social and cultural elements involved in interactions between actors. For this dissertation, the space is that of alternative animal products, or those involved in their research, production, or promotion. As my second paper argues, this space was/is in the process of attempting to construct itself as an industry.

With that said, I am quite critical of IVM in particular and the alternative animal product space as a whole. I have made this clear in my earlier publications (Poirier 2018a,b, 2021, 2022; Poirier and Russell 2019). The goal of the chapters in this dissertation, however, do not aim to critique but strive to fairly represent the data gathered while acknowledging my biases. My goal is more on categorization and description using a more explanatory approach to sorting and analyzing discourses found by different groups with varying levels of interest and involvement in alternative animal products.

This dissertation identifies three key stakeholder groups, namely “insiders”—those directly involved in the production and/or promotion of alternative animal products and who frequently have direct stakes in their success to varying degrees, animal protectionists, and animal welfare scientists. Each of these groups occupies a relatively distinct social position and thus represent different viewpoints, and perhaps competing values, concerning the nature and “success” of alternative animal products. What follows consists of three studies that were done separately but are linked through a couple overarching concepts.

One is that of social construction. Made explicit in the second chapter below, each group has numerous unknowns concerning alternative animal products (and IVM in particular) and this had led to varying opinions between members of the same stakeholder group. Thus, the conversations that are happening now—or the ones that are *not* happening now—will shape how alternative animal products emerge into societies. A second link running through the following studies that comprise this dissertation is that each group has been under-represented in the academic literature on IVM. Therefore, the results presented herein have largely not been presented before.

Chapter 2, “‘It would be funny if it wasn’t horrifying’: A Discourse Analysis of the 2019 Conscious Eating Conference Debate on In Vitro Meat,” focuses on vegan animal rights activism. Anecdotally, through personal experience, I have found that IVM has split the vegan community (see also Gertenbach, Lamla, and Laser 2021). More radical factions tend to be against IVM while more mainstream organizations and animal welfarists tend to support it. This chapter empirically verifies such a factionalization within vegan animal rights activists does indeed exist and it shows what discourses comprise this factionalization. Mirroring the debate’s structure, I label a generalized “pro” and “con” side discourse concerning IVM and explain in detail the main arguments of each discourse. I also provide evidence that each side in this particular debate displays a lack of (critical) engagement with more than one point made by the opposite side. Essentially, the pro-side presents IVM as a sustainable savior that will solve the various problems with industrial animal agriculture, while the con side presents IVM as a humane hoax (see <https://www.cleanmeat-hoax.com/>) that only serves to distract vegan activists from their fundamental goal of animal liberation. Representative quotations from the debate are used to support these findings.

The opening chapter sets the stage for wider issues and additional types of alternative animal products. Chapter 3, “Internal Disagreements and Debates among Stakeholders of Alternative Animal Products” takes the initial Good Food Conferences as its focus. These conferences are a major event within the alternative animal product space and they are organized by one of the space’s most influential players, namely the Good Food Institute. Through a content analysis of two consecutive years of the Good Food Conferences in their entirety, I demonstrate that the range of topics discussed at these events is exceedingly wide. Most topics are also accompanied by questions and problems the space is working to solve to provide a

scalable, affordable product (or suite of products) that are consumer- and government-approved. As shown in this chapter, there are disagreements concerning how to achieve the above-mentioned characteristics. Sometimes these disagreements revolve around how particular goals should be achieved. Other times, debates occur as to which goals should be pursued in the first place.

The fourth, and last empirical chapter, seeks to understand “Animal Welfare Scientists’ Opinions on In Vitro (‘Cell-Based’) Meat.” Animal welfare scientists constitute an interesting social group as, in general, most support animal agriculture and consume animal products to an extent, yet also possess (sometimes many and deep) critiques of animal agricultural systems. Since some IVM proponents explicitly have the goal of eliminating all animal agriculture, where welfare scientists sit on this issue is an intriguing question. Further, the centrality of animal welfare is ubiquitous in the literature on IVM (from both proponents and opponents) yet is rarely defined and authors rarely make clear how they are using the concept of welfare. Therefore, allowing welfare experts to speak for themselves on this issue should help to evaluate the welfare claims and counter claims by IVM proponents and opponents. Through semi-structured interviews, I found that welfare scientists are generally open to IVM, both personally and from an animal welfare perspective, but this openness is accompanied by a cautious skepticism. Opinions varied not only between different interviewees but also frequently within individual interviews as participants presented a range of emotions, values, and opinions on IVM across a spectrum of favorable to unfavorable attitudes.

Following the fourth chapter is an overall conclusion that summarizes the key findings from the dissertation, states the overall contributions to the sociological and IVM literature, reflects on limits of the dissertation, and provides suggestions for future research on IVM.

CHAPTER 2: “IT WOULD BE FUNNY IF IT WASN’T HORRIFYING”: A DISCOURSE ANALYSIS OF THE 2019 CONSCIOUS EATING CONFERENCE DEBATE ON IN VITRO MEAT

There is an ongoing and robust debate, especially in activist circles but also among academics and the public, about overarching strategies for social change. Generally, this can be classified into two major approaches: reform and revolution. Reform movements tend to attempt to create change by working legally within existing institutions to make minor or major improvements but leaving the overall system intact. Revolutions seek to overthrow existing institutions, using illegal means when necessary, and replace them with the revolutionaries’ own social structures. Reformism can also be classified as seeking “compromise” while revolutions can be classified as “no compromise.” The debate studied in the present paper reflects this general dichotomy. We can see a reform versus revolution debate play out over how to address problems with farming of animals for meat. An abolitionist stance suggests whole-foods plant-based diets (i.e., veganism) as a solution to eliminate animal farming altogether. Some reformist approaches consist of meat alternatives that try to mimic the experience of eating meat but without animal products.

One such replacement is known as *in vitro* meat (referred to as IVM). IVM production relies on claims of improved animal welfare, sustainability, and human health (Chriki et al. 2022; Smetana et al. 2023). The purpose of IVM is to technologically grow meat from a biopsy of animal cells (as opposed to in the body of a living animal) (Melzener et al. 2021; see Chen et al. 2022 for a recent general overview). Extracted cells are added to a growth serum to supply nutrients, the most common of which is fetal bovine serum (FBS). FBS is obtained by cardiac puncture to drain the blood of fetuses from pregnant cows who are undergoing the process of slaughter (Chelladurai et al. 2021). Although plant-based serums are being vigorously researched

(Messmer et al. 2022), little is known about their use status, composition, or cost with companies. The initial term of the meat product that is created, *in vitro* meat, refers to the cells being grown inside a glass Petri dish. Subsequent names, including cell-based meat, cultivated clean meat, and cultured meat, were developed from marketing-based research (Malerich and Bryant 2022). As such, I view IVM as the most objective name while realizing that no term is completely neutral.

The research questions for this study are:

- 1) What are the basic pro and con arguments concerning IVM?
- 2) How much is agreed upon and how well do both sides “talk” to each other?

Proponents of IVM tend to focus on its potential to remove animals from being farmed, claim it will be more environmentally sustainable, and be cheaper, healthier, and tastier than traditional meat. However, detractors have critiqued all of these components, arguing that each of these claims are yet to be determined and most are based on numerous assumptions about practices or technologies that do not yet exist. Others critique the ethics of a process that claims to bypass death and harm (Alvaro 2019) or how IVM may further entrench human domination over both the living and non-living beings on Earth (Giles 2022). Regardless, both proponents and opponents tend to feel strongly about IVM.

Thus, this paper analyzes a debate on IVM which took place on March 2, 2019 at United Poultry Concerns’ Eighth Annual Conscious Eating Conference. The conference’s overall theme was, “What are the Most Compassionate Choices”? The statement that was debated was, “Cell-Based Meat is Good for Animals.” Those for the motion were Bruce Friedrich, founder and CEO of the alternative animal product think tank Good Food Institute (GFI), and Leah Garces, president of the animal activist group Mercy for Animals. Against the motion was Vasile

Stanescu and John Sanbonmastu, both professors at U.S. universities who have extensive backgrounds in critical theory and critical animal studies. All four debaters self-identified as vegan. Cell-based meat was the chosen term by the Conscious Eating Conference organizers. But while it may be more descriptive than IVM, due to debaters of both sides more frequently using IVM, along with my perceived relative objectivity of the term *in vitro* meat, IVM is used throughout this paper except in quotations.

The debate was structured as follows: After an introduction of each speaker by moderator Hope Bohanec, each debater had twelve minutes for an opening argument. Each side was then given an opportunity to respond to what was said in the opening arguments. Then the debate was opened to questions from Bohanec. Both sides were given time to answer the questions and respond to each other's answers. To end, each side was given five minutes for closing statements. The video of the debate analyzed for this paper has a total length of 120 minutes, 43 seconds and is available on YouTube.

The Conscious Eating Conference is a yearly event organized by United Poultry Concerns (UPC), a nonprofit focusing on advocacy for domestic fowl (e.g, chickens, turkeys, ducks) by raising awareness of the multiple ways humans use them and the consequences of those uses. UPC was founded in 1990 by Karen Davis, a longtime civil and animal rights activist. Davis has published numerous works that mostly focus on chicken and turkey advocacy. A recent anthology collected a number of her writings that span her career and cover the major topics on which she has published (Davis 2019).

All debates are structured to elicit thoughts on a particular topic. This debate is designed to represent the core arguments from both sides of the general pro/con debate on IVM. It presents the main issues at play over the nascent and somewhat turbulent debate within the

animal rights movement regarding IVM and other alternative animal products (Poirier 2021).

The purpose of this paper is to describe the basic debate for those who are interested in food systems, social movements, veganism, or animal/environmental protection. The debate over IVM has somewhat split the vegan community and this paper shows how, along what lines, and the discourses involved. Therefore, this paper provides the fundamental pro and con arguments to serve as an introductory paper on the topic via a detailed analysis of why some support IVM and why others are against it.

This paper categorizes both side's discourse in terms of their central arguments, evidence given, activist tactics, and how each side views the validity other side's arguments (i.e., "talks" to each other). Each of these components will be described in detail using representative quotations from those in the debate. It is demonstrated that the pro-side's argument is premised on a presumed failure of current vegan activism in the form of education and public outreach to convince large numbers of people to stop eating animal products. Implicitly this stance relies on effective altruism paradigm as a guiding principle. Effective altruism purports to use evidence-based reasoning to inform people as to which actions or organizations deserve support based on the perceived effectiveness of those actions or organizations (Adams, Crary, and Gruen 2023). The con-side challenges this rhetoric as fatalistic. They view IVM as diverting resources away from more direct and perhaps more effective forms of advocacy, such as promoting ethical veganism. I then discuss how, in general, each side leaves unaddressed key points made by the opposite side. In particular, the pro side does not adequately respond to the con side's focus on the constraining elements of existing social structure, while the con side does not directly address the pro side's emphasis on helping currently farmed animals in the short term.

LITERATURE REVIEW

This study analyzes the Conscious Eating Conference debate on its own terms, meaning that the literature used to help frame and analyze it uses the context of the debate itself. Thus, this literature review covers some contemporary debates in ethics and politics concerning social movements from general topics arising out of this debate specifically. Literature on the general framing and discourse(s) of social movements is not the focus.

This debate plays out in the space of vegan activism (Giraud 2021; Waters 2022). Here, reform strategies have taken the form of legal welfare measures or animal cruelty laws (Marceau 2019). The more revolutionary, no compromise camp favors abolishing animal farming altogether for vegan diets. While veganism is a contested term (see Dutkiewicz and Dickstein 2021), Giraud (2021) argues for retaining veganism's radicalism as much "more than a diet," a rejection of all unfair and unnecessary exploitation and use of others, human and nonhuman. Amongst the public, veganism often conjures off-putting notions of ethical superiority and moral purity. While veganism and vegans have continually been denigrated by mainstream Western paradigms, veg(etari)anism has also been devalued in light of IVM (Poirier 2018b). Veganism is consistently critiqued as being too far-fetched and exclusive (e.g., in terms of personal choice, disability, and class accessibility). In this way, veganism is viewed as too radical. Yet, radicalness is often a point of pride by those within the vegan community (Griffin 2017; Waters 2022). While veganism may be seen as a radical challenge to an unjust status quo, it is precisely for this reason that the goal of many vegans is to make veganism the mainstream paradigm through cultural transformations (Quinn and Westwood 2018). This has engendered a strong cautionary view that in doing this, though, one must be careful not to water down veganism's original intent by capitulating to existing animal exploitation industries—also known generally as the animal industrial complex (Noske 1997)—in order to have one's message gain traction

(Castricano and Simonsen 2016; Giraud 2021). As political scientist and animal studies scholar Clare Jean Kim (2015:141) states:

This is the activists' dilemma here and in many places: in order to enter the public debate and be heard, one must accede to the discursive terms set by the powerful, but in doing so, one may end up compromising that which one is fighting for.

The debate of reform vs. revolution has played out in nearly every social movement (Frey, Dietz, & Kalof 1992; Pellow 2014). For instance, Taiaiake Alfred (2005) asserts that most indigenous people (in North America at least) have become too complacent and reformist, and must become more militant in their “taking action to force change” (45). Similarly but from a Black anarchist perspective, Lorenzo Ervin (2022) and William C. Anderson (2021) proclaim that Black liberation efforts, such as Black Lives Matter and even mass street protests, are simply too reformist, ineffective and not threatening to white society. For them, if Black liberation is not rooted in anarchism, it is too reformist and not radical enough. Alfred, Ervin, and Anderson all emphasize the importance of creating anarchic and liberatory spaces, and being willing to use armed self-defense in defending the autonomy of those spaces for indigenous and Black people, respectively (although, importantly, all wish to avoid such confrontation but see it as inevitable). In the realm of trans liberation, Dean Spade and Aaron Belkin (2021) debate the 2017 ban of transgender people from serving in the U.S. military. Belkin is of the reformist perspective and advocates for trans inclusivity into dominant society. Spade takes a radical perspective by arguing that trans people should not be concerned about whether they are “allowed” to be in the armed forces; instead, trans people should be about demolishing the military industrial complex altogether (see also LaPrairie 2022).

John Clark (2013) theorizes the term “possibility” as it applies to social transformations. He breaks the term down into “actually possible” (what is doable under concrete circumstances)

and “ideologically possible” (possible according to existing social systems). Both types interact and can support or hinder each other. What is actually possible may be ideologically impossible, and what is ideologically possible may be actually impossible. Although Clark’s (2013) general formulation, furthered by Jakobsen (2019), was derived to consider anarchism as a replacement of existing social structures, it is useful to help classify and compare discourses using a rigorous theoretical framework.

There are also theoretical links between sociology, philosophy, and ecology (Bookchin 1982). Ladd (2003) critiques some underlying assumptions of humanism, namely its tendency towards anthropocentrism, dominion, control, exceptionalism, and technocracy. Ladd’s focus is on domination in general as domination in any form impedes the goals of sustainability, justice, wisdom, freedom, and community. He also views Marxism as a form of humanism which devalues nature as a stock of raw materials from which to draw on to continually expand the mode of production. Such economic relations, with their focus on never ending accumulation, in turn has only made the ecological situation worse (Pineault 2023). In what would be general agreement with Ladd, sociologist Éric Pineault promotes degrowth as a radical alternative that considers interests of humans, nonhuman animals, and the environment. Both authors aim to get at the root causes of our global ecological predicament and propose transformative alternatives that combine sociology, philosophy, and ecology.

Philosophers and philosophical works on IVM tend to endorse the technology on ethical grounds. For instance, Chauvet (2018) asserts that IVM would be no more harmful to animals than veganism would be through incidental death in cultivation. He also posits that IVM is no more *symbolically* injurious to animals than veganism as it does not infringe on their dignity any more than veganism does. In general agreement with ethicists such as Peter Singer, Tom Regan,

and others (see Robison-Greene 2023), this is based on a premise that “as long as none of their interests or fundamental rights are affected, it is appropriate to use live animals” for human purposes (Chauvet 2018:389). However, the virtue ethicist Carlo Alvaro (2019) disagrees. Alvaro places greater emphasis on the use of animals for IVM production or cell biopsies and argues that it is precisely use—humane or not—that ethical vegans should oppose. Alvaro is also skeptical that IVM will replace traditional meat and instead prop up the existing meat industry. Ultimately, Alvaro sees the desire to consume IVM as unvirtuous given the abundance of already existing vegan food. These two ethical discourses represent a microcosm of the wider debate regarding IVM.

The notion of purity politics is taken up by Shotwell (2016), using animal rights and veganism as a case study. Shotwell’s argument against a purist stance (in any domain of life) rests on a realization that to be alive necessarily entangles individuals with the wider community which entails complicity in harm. Pertaining to veganism, one must eat to stay alive and this entails the death of some—say, worms in the soil or plants themselves. There is an imbroglio of further relations within a vegan diet such as the politics of local, organic, fair-trade, or “cruelty free” vegan food (Harper 2010). All told, “purity” is an impossible ideal, what Max Weber calls an “ideal type,” abstractions or constructions from empirical observations that represent a “pure” version of a concept but are not attainable (Weber 2011). Epistemologically we cannot know reality exactly, but only approximately by comparing empirical reality to specific ideal types. As explained by Rosenberg (2016:86), Weber’s ideal types “were dynamic tools to be used in understanding and explaining the generally intended subjective meanings of lived reality, the domain of shared social experiences.” Ideal types pertain to veganism because the logic of veganism is to minimize one’s harm towards others. Taken to its extreme, this implies zero harm,

which is a practical impossibility. Thus, some advocate for veganism to be viewed as an aspiration rather than an endpoint (Gruen and Jones 2016).

Cruel optimism denotes a relation in which “something you desire is actually an obstacle to your flourishing” (Berlant 2011:1). Optimistic attachments manifest in a recurring situation, bordering on fixation, accompanied by the thought that with the addition or application of this particular thing to a given situation a desired change will result. Cruelty enters when such a striving backfires yet the agent continues to believe in success. Berlant says this is increasingly becoming the case even as the evidence mounts that many fantasies of the good life are crumbling under neoliberal economies and governance. These social forces create immense pressure that strains previous beliefs and courses of action but without ameliorating “the need for a good life” (7). She presents her analysis through the frame of the “impasse”; in Berlant’s adapted use, aspiring to create change via existing social infrastructure despite evidence of its inadequacy. She also coins “situation tragedy” in contradistinction to the familiar “situation comedy”: “In a situation tragedy, the subject’s world is fragile beyond repair, one gesture away from losing all access to sustaining its fantasies: the situation threatens utter, abject unraveling” (2011:6).

METHODOLOGY

Beyond an obvious but overly simplistic anti-capitalism versus pragmatism dichotomy, my goal was to break down each side’s discourse in detail to know their arguments and reasons for their opinions and how each side attempts to critique the other. I am also interested in similarities and blind spots of both sides. Thus, discourse analysis is employed to reveal how each side attempts to produce a certain reality regarding IVM, veganism, and activism through interaction in the context and structure of a debate (Hardy et al. 2004). I focus on the main thrust

of each side of the debate and do not attempt to categorize all that was said. This study is less concerned with particular words used than with meanings conveyed in tracts of speech (Hardy et al. 2004) and the implications those meanings might convey.

Language is particularly important because it can be a driving force between what comes to be seen as acceptable and unacceptable. Language researcher and animal activist Hanh Nguyen (2019) describes how language (Vietnamese and English) can be used to enact both great and terrible events: “Words can single-handedly set in motion a Shakespearean tragedy ... [or] convince people that it’s a good idea to go to war” (x). Thus, words invoke values, activate norms, and shape attitudes, behaviors, and social processes. Language describing specific strategies for activism can influence people to follow certain modes of action, which have effects. This is important for animal and environmental activists because they are speaking and acting on behalf of *others* who will bear the consequences of their actions.

I came to this study having already watched the video of the full debate twice. For this study, the full video was watched a third time to create a transcript. The transcript was then proofread to correct errors. Special attention was paid to what themes arose from both sides and how each side engaged the other on a given theme. Each speaker’s opening argument and evidence used to support these arguments were noted. Entire opening comments of each panelist were broken down into main points to capture the big picture each speaker was presenting. Then the transcript was revisited by following each debater’s argument through the debate to track their argument/discourse. Representative quotes were copied and pasted into a document and arranged by theme. Some quotations were minimally edited for readability but without altering the debaters’ meaning.

Concerning trustworthiness of the interpretation of quotations, video of the conference was used to supplement the text. The basis for such interpretation included voice inflection, facial/body language, eye contact, or other actions observable in the video of the moments during the quotations being described. For these cases, I note in the text below what exactly lead to uses of such descriptors.

RESULTS

In analyzing video of the Conscious Eating Conference debate, the two sides present starkly different arguments. However, the dominant theme running through the debate is that of strategy, which differs markedly between the two sides. Going forward, these two sides will be referred to as the “pro” side (represented by Friedrich and Garces arguing that IVM will help animals) and the “con” side (represented by Stanescu and Sanbonmatsu arguing that IVM will not help animals). Three subsets of differences were found: (1) small-scale vs. a large-scale focus, (2) variety of activist tactics vs. fundamentalist veganism, and (3) angry/pure vs. realistic (from the pro side’s view); realistic vs. naive (from the con side’s view). Evidence of each is presented.

In terms of underlying motivation for supporting IVM, the pro side looks at past and present animal activism and trends in meat production and consumption. Pointing to USDA data:

2018 was the highest per capita meat consumption in U.S. history. In 2019, per capita meat consumption is going to be even higher. All that despite the revolution, [in plant-based eating inspired by Francis Moore Lappé’s book *Diet for a Small Planet*] almost fifty years ago. (Friedrich)

And just keep in mind what I said before, there’s only five to six percent vegetarians right now in the United States. And that hasn’t changed for twenty years and every day more animals are being killed. (Garces)

From this, both conclude that a change in strategy is needed:

So by that thought, we are failing miserably at doing our job, Bruce and I as activists. (Garces)

It seems to me that what we have been doing for fifty years, or twenty years, or ten years [isn't working]. (Friedrich)

Friedrich and Garces see themselves as being pragmatic and focusing on what they think will be effective. As Garces emphasizes, "I think my main thought I want you to go away with is, what works? What will work?" They appear to implicitly define "effective" through the eyes of the animals they are trying to save and protect. They keep a close grounding to what might be called a micro or small-scale perspective, that is, the lives of individual animals:

We need to be very laser focused on asking the question, if I were a hen in one of these battery cages, if I were a chicken in one of these broiler sheds, what would I want my advocates to be doing and supporting? (Friedrich)

Take a biopsy the size of a sesame seed from a living turkey and grow turkey meat in perpetuity for everybody. Seems to me, if I'm a turkey on a factory farm, that's something I'm pretty excited about. (Friedrich)

I'll just close by saying it's not about "do we like it," but "does it work"? What will work? What will stop animals from being slaughtered, and that's what we have to remember. (Garces)

The con side takes an entirely different approach. They look at a larger picture, such as social, psychological, and economic forces at play:

We're not going to defeat speciesism with speciesism. (Stanescu)

In response to rising concerns about its effect on climate change, coal companies hire consultants to come up with new marketing campaigns to decrease protest, ward off government oversight, confuse consumers and activists, and most importantly to ward off the growth of actual valid alternatives such as solar and wind. Their terminology was "clean coal." Likewise, responding to similar criticism from environmentalists, animal rights organizations, and growing fears of governmental oversight and shifts to actually valid options of identically tasting plant-based options, the meat industry has started to fund a new technology it calls "clean meat." (Stanescu)

You know, many many many many many many more animals have been killed and mutilated by Henry Ford's innovation than have ever died by horse and carriage business. So you have to be aware of the unintended consequences of technology when they're in

the hands of very powerful people and where there's no democratic accountability.
(Sanbonmatsu)

And that's why Vasile and I feel strongly that we're not impugning motives here, but we are saying that it's a very mistaken strategy. (Sanbonmatsu)

The first two quotes by Stanesco highlight the role of speciesism—the favoring of some species as inherently different from and more important than others—and how he sees it as still prevalent in IVM. He draws a parallel—both in tactics and in rhetoric—to what he sees as a parallel instance of coal companies. This comparison is especially pertinent because Friedrich explicitly and unapologetically (almost proudly, even) ties IVM to clean energy in his opening argument, by saying the term clean meat is a “nod” to clean energy. The word “nod” signifies acknowledgement and respect, and he also talks about how clean energy is better for the environment, indicating admiration.

This last extract, in which Sanbonmatsu ends by pointing out the difference in strategy, leads to the second instantiation of this rift, that of the strategies chosen by each side. The pro side is clear that they view IVM as only one of many possible ways to protect farmed animals, that previous and current activism should continue:

I'm not advocating that anybody change what it is that they're focusing on or what it is that they're working on but it certainly seems to be that we should be looking at [and] we should be using all the tools in our toolkit. (Friedrich)

[Mercy for Animals is] out there protesting in front of McDonald's and we're doing undercover investigations. To be really clear, we're not saying stop doing those things. We're not saying stop being activists. (Garces)

I think that it's fundamentally important that we don't throw out any possible solution right now. (Garces)

For being careful and measured, the pro side seems to embrace capitalism as a vehicle for IVM to the point where they consider it hardly a topic of discussion:

We're not actually debating capitalism here today. I'd love to do that debate but that's not the one for today so let's just put that aside. (Garces)

Exactly what Garces means is unclear as she does not follow it up or give much context. But, since she and Friedrich have already proudly mentioned the multiple multi-national corporations they're working with to bring about IVM (Friedrich promotes his GFI conferences by mentioning how he brought together representatives from such corporations as something unique and impressive for an animal rights conference, as well as that he is "excited" about comments from executives of Tyson Foods), it does seem like this comment by Garces brushes aside critical considerations of using capitalism as a vehicle for positive change in favor of expediency (see also Garces 2022; Poirier 2021 on Garces and Friedrich, respectively, endorsing corporations and capitalism).

The con side takes the opposite approach, digging in their heels against capitalism:

Leah, you said we're not here debating capitalism and I disagree. I mean, the whole thing is going on within the matrix of capitalism — the same people who brought us colonialism, slavery, two great world wars, the destruction of all animals on earth, and also factory farming, etc, etc. That's the context. So, yes of course, this is going to preserve the commodification of animals. (Sanbonmatsu)

Smithfield claims to be the leader in animal care. And you find these same claims by Tyson and Purdue and all of them. That's capitalism. (Sanbonmatsu)

In response to Friedrich and Garces working with the meat industry, comments that IVM will help the meat industry to profit and grow, and that these companies want to "do something noble" (Friedrich), the con side replies, "I don't believe they do" (Stanescu) and "are these people going to be trusted? No." (Sanbonmatsu). Not only do Sanbonmatsu and Stanescu see capitalism as an errant strategy, they also see it as unnecessary. Instead, they suggest plant-based diets (vegetarianism or veganism), citing the availability of substitutes:

From taste to texture to nutritional quality, a cornucopia of options both natural and artificial already exist, are widely available and reasonably affordable. (Stanescu)

As Vasile said, we have so many fantastic, delicious, sustainable alternatives to animal products. We don't need synthetic meat. (Sanbonmatsu)

In short, while Sanbonmatsu and Stanescu might be perceived as radicals, their suggestion is to simply eat the foods that are already available. This hardly seems radical. Pursuing IVM when known and available solutions already exist, might be counterproductive:

There's a flavor to this of snatching defeat from the jaws of victory to some extent. And I understand veganism is hardly taking off. However, pretty much everything that you folks have said about shifting to an alternative to this system could be applied to promoting, marketing plant-based things. (Sanbonmatsu)

Shifting the focus from capitalism to plant-based diets leads into the last dimension of this central debate, and that is how each side views the other's and their own arguments. Each side views the other as emotional, and views themselves as realistic. Garces portrays the con side as being (overly) angry: "I get what it feels like to be angry about these things." She goes on to explain why their strategy of working with the meat industry is a better approach:

I have been an angry activist for like twenty years, where I'm just like beating my head. The industry sucks! We're not going to change anybody by being angry. ... So you have to put yourselves in Tyson's shoes and say what's going to make them stop killing animals. Not, "I'm angry they're killing them, I'm angry they're capitalists." ... This is my life, trying to think about how do we stop Tyson from wanting to slaughter animals and it's not going to be me sitting in the room yelling at them about the ethical — why aren't you ethical? It's not working.

However, Sanbonmatsu sees Friedrich and Garces as "frustrated" and, from that frustration, pursuing questionable strategies:

I get it. After so many years of frustration with people eating more meat, more animal suffering, we see something bright and shiny and new, a high technology item, something that has the backing of a lot of very powerful, rich, white men.

Sanbonmatsu uses the inclusive "we" here perhaps to foster some sort of shared intention on the part of all debaters. Indeed, he prefaces this comment by referring to Friedrich and Graces as "some courageous activists on the stage." But Sanbonmatsu's use of "we" seems more directed

at Friedrich, Garces, and others who he sees as pursuing IVM optimistically and perhaps uncritically.

Further, this debate gets heated a few times. Both Stanescu and Sanbonmatsu take pointed, personal shots at Friedrich for his activism concerning IVM and Friedrich seems to visibly take offense (in addressing these criticisms, Friedrich lowers his voice, looks down more, has a serious face, and sharply defends himself, including some rhetorical jabs back at Sanbonmatsu and Stanescu while ignoring Bohanec's initial attempts asking him for the microphone back). To help calm tensions about halfway in, Stanescu tries to foreground shared motivations:

I just want everyone to know I personally respect Bruce a great deal. I'm just meeting Leah but I personally respect her. And I respect every animal rights organization out there. I respect every vegan out there. I don't think that people are fundamentally different in their hearts.

Despite this, Sanbonmatsu's possible attempt at commonality, and Leah's gesture of shared anger, the two sides remain firmly at odds. So there is a continual attempt to be cohesive and present a united front concerning animal activism but differences tend to override similarities. This points to how factionalization in social movements can prohibit overall progress as it divides activists and weakens solidarity.

While there are similarities in how each side views the other and themselves, the pro side views the con side as being idealistic, pure, or fundamentalist:

Our opponents might say that meat shouldn't be eaten even if it comes from an animal that was never slaughtered, that was never harmed, that was never alive. So should we reject it for that reason? Because it comes originally from a system of injustice and exploitation? (Garces)

In Stanescu's opening argument, he ends with "what we should be fighting for is not for clean meat but for no meat at all." This is an absolutist stance that rules out IVM *a priori*. Later in the

debate, Friedrich replies with, “when Vasile says ‘we want not clean meat but no meat,’ the main thing I want to say is how’s that going for us?” This is an implicit echo of the pro side’s earlier arguments that current activism is not producing desired results, that taking a “pure” stance against meat will not lead to animal liberation because it hasn’t so far.

In the other direction, the con side views the pro side as naïve:

Ladies and gentlemen, welcome to the land of make-believe, where the Good Food Institute tells us that the two forces which have destroyed most animal life on the Earth, which are capitalism and ... the meat industry, are going to, guess what, be the solution to saving the animals. It would be funny if it wasn’t horrifying. (Sanbonmatsu)

Look at what happened to humane meat. This is basically a boutique product that yuppies buy in the cities. It’s been the most explosively profitable sector of the meat industry. And has it improved the welfare of animals? No. Has it cut down on the number of animals being killed? No. (Sanbonmatsu)

Sanbonmatsu portrays Friedrich and Garces as naïve by describing their view as “the land of make-believe.” The second quote essentially suggests that those who support IVM under the general vision of Garces and Friedrich are living in an alternate reality because previous attempts at reforming the meat industry have led to the increase in animal slaughter. This uses Friedrich and Garces’s basic argument, that current activism isn’t working, against them. Sanbonmatsu sums this up when he says “We are being treated as fools, they [the meat industry] get the gold and the animals lose.”

Friedrich and Garces identify as activists and leading activist groups. From this standpoint and given the arguments both use—that current vegan activism isn’t working—their characterization of the con side is understandable. It likely does not help Sanbonmatsu and Stanescu that their argument fundamentally promotes veganism:

As vegans we don’t believe that it is okay to use animals and torture them and experiment [on] them, even if there’s a claim that it’s going to help animals later. (Stanescu)

I don't think it's acceptable to be using FBS even if the claim is later on it might help animals. Who knows? We can't predict the future. I can tell you today, those fetuses are being taken out and hurt. (Stanescu)

This rhetoric is clearly in opposition to the fundamental message of the pro side in terms of tactics. Sanbonmatsu points out how the two sides are somewhat talking past each other: "I just want to say that we are not a contradiction between the moral purists over here and the pragmatists over there. We are arguing, at least I think we're arguing, that it isn't going to work." By "work," Sanbonmatsu means that IVM will not achieve animal liberation, not that IVM isn't technically feasible (something Friedrich misinterpreted later in the debate). They are saying that IVM can be and has been made and likely will make certain corporations and individuals a lot of money but it will not achieve the goals both sides of this debate agree on.

Perhaps because of this, the pro side seems to view the con side as moral purists:

We have to be careful as people who care so much about this. That we don't live in our bubble and we don't continue to just think we're just going to be standing on our principles and we're just going to be angry about this. (Garces)

This is not without some merit. The con side does rest on morals and vegan principles. As Stanescu says, "I can't think of a single social justice movement that has ever worked by abandoning its principles, and I don't think we should start now." Sanbonmatsu even reads a short poem by Langston Hughes called "Dreams": "Hold fast to dreams / for if dreams die life is a broken winged bird that cannot fly / hold fast to dreams for when dreams go / life is a barren field / frozen with snow." But both distance themselves from pipe dreams and ground their fundamentalist veganism in what they see as realism:

I don't think we're picking nits here. I think these are very profound, economic, social, political issues that are at stake. (Sanbonmatsu)

I don't think we're just being like angry cranks to say ... look at the history of this process and look at how the stuff is being marketed now. It's a real problem. (Sanbonmatsu)

If the pro side may seem to critique the con side as too idealistic, Sanbonmatsu and Stanescu provide reasoning to their arguments grounded in applied observations:

If you find this very attractive, glittering new thing, please be very skeptical of how it's going to end up and consider the fact that it isn't going to be in our hands. It's going to be in the hands of these incredibly powerful billion-dollar corporations. (Sanbonmatsu)

Look at any bottled water product and it will have some kind of label claiming that it's like fifty percent recycled or the one that Coke uses, that they have plants blended in with the plastic. The result of that has not been to decrease the use of plastic or bottled water. The result, because it's blended and can be marketed, has been to increase the use of bottled water. That's what's going to happen with *in vitro* meat when the companies that own it start blending it together. (Stanescu)

What these quotes show is that the con side sees themselves as trying to view the current social situation as it is and to learn from history, although a different lesson than the pro side. They consider previous (ab)uses of technology and capital in the hands of corporations, capitalists, and the meat industry and argue that IVM will be no different. This is always the dilemma of those promoting new technologies, to argue or demonstrate that *this time* and *this technology* will bring about the desired solution with minimal to no negative side effects. This is what Friedrich and Garces argue. Sanbonmatsu and Stanescu argue that there is no basis for this claim.

DISCUSSION

Overall between the two sides, there is little explicit agreement beyond the basics of the need to eradicate animal suffering and mitigate climate change. The pro side pushes the capitalist production and promotion of IVM via the meat industry, millionaires, billionaires, and other elites as a realistic and pragmatic antidote to a failing strategy of changing people's minds. The con side rejects this entirely, insisting that capitalism will not—and cannot—bring about desired results. Instead, it is argued that such an approach to IVM strengthens existing harmful industries by furthering their own logic. Both sides view themselves as realistic and view the other as misguided. As the con side presents capitalism as an unreasonable tactic that should never be

pursued under any circumstances, they would agree with Jakobsen (2019:169) that “the capitalist machinery will commercialize and emasculate all such good intentions.” Instead, IVM pursued through capitalism leaves the “hard core” of the neoliberal paradigm intact, only affecting the “protective belt” (Jakobsen 2019).

It is interesting that the pro side repeatedly brings up the animals themselves and what they might prefer, yet largely ignores or downplays structural forces such as capitalism, use of technology, and social elites. While Sanbonmatsu and Stanescu also speak about animal care, they do so much more generally and focus on structural forces. They double down on what they see as fundamentally ethical (vegan) practices while the pro side advocates a need to change or at least incorporate new tactics.

These differences suggest a factionalization of the animal rights movement. Nearly every social justice movement (and most other movements) have sharp internal debates—M. L. King and Malcom X., the splits in Black Panthers and Students for a Democratic Society, etc. In U. S. social movements, factionalism is a strong predictor of movement failure as factions compete for resources (see Frey et al., 1992). Regarding IVM, the split between radicals’ opposition and mainstream activists’ support is indicative of an existing factionalization in the animal rights movement. Those in mainstream organizations or who support mainstream tactics tend to embrace IVM and those who consider themselves radical tend to oppose it (Poirier 2021), although even this is not completely cut and dry.

In general, Stanescu and Sanbonmatsu are aligned with Alfred (2005), Ervin (2022), Anderson (2021), and Spade (Spade and Belkin 2021), and Alvaro (2019) in terms of taking an anti-capitalist, anti-statist stance on IVM. The con side has a hardline, no compromise approach that often accompanies radical factions of social movements. They take this stance while

realizing some unfortunate circumstances may arise as a result, such as longer-term change instead of saving individual animals now (incidentally, this is the crux of the debate between Spade and Belkin concerning trans military service). In contrast, Friedrich and Graces align more with reform-based social movements and a politics of inclusion within current systems (and perhaps philosophically align with Chauvet [2018]). They argue that working IVM into the current system is the best approach and are focused on protecting or saving individual animals that are alive *now* more so than hypothetical animals yet to exist.

Notable, although hardly noticeable, is that the con side concedes that IVM could be a viable strategy if done correctly, that is, accompanied by a systematic education and activist campaign. They are not absolutely against IVM but how it is being actualized in practice. This again helps distance them from accusations of being too abstract or too idealist. One way to help sort out these two approaches, and how they relate to each other, is to use John Clark’s (2013) theorization of im/possibilities. Jakobsen (2019:6) organizes these options in a table, recreated in a slightly edited form here as Figure 1.

Figure 1: Ideological versus Actual possibilities and impossibilities

		Actual	
		possible	Impossible
Ideology	possible	1.	2.
	impossible	3.	4.

Applying this formulation of both Clark and Jakobsen to the present debate, both sides would likely classify the other under cell 3, what Clark calls a “possible impossibility.” From the foregoing quotations presented above, both sides see the other as having a technically possible

position. IVM had already been made at the time of this debate in 2019 and animal agribusiness had already shown interest by investing in it. Likewise, vegans exist and nearly everyone is physically capable of living a vegan lifestyle. So technical aspects represent *actual* possibilities and are agreed on by all panelists. Yet, both sides view these technical/actual possibilities as inhibited by ideological impossibilities. The con side would say that the success of IVM is blocked by ideologies of speciesism and capitalism. Sanbonmatsu captures this succinctly when he says IVM “is going to work probably as a technical matter but it’s not going to work in terms of replacing animals. That’s my concern.” Likewise, the pro side would say veganism is blocked by a strong desire to consume animal products, as evidenced by their reference to the failure of vegan activism: “So I haven’t heard the other side attempt to argue that what we’re doing now is working” (Friedrich). This interpretation fits closest to the theoretical usage by Clark and Jakobsen of the concepts in Figure 1.

Arguably, both sides view *themselves* as advocating possible possibilities, that is, located in cell 1, being both actually and ideologically possible. Friedrich and Garces exemplify clear evidence of this:

Just think if you were in the room with Tyson and you had the chance to talk to them and this was your one shot. Really, put yourself in their shoes and what would convince Tyson executives to change? (Garces)

The reason the meat industry is investing is that’s it’s going to be more profitable and it will replace the vast majority of animal product production (Friedrich)

Friedrich is implying that because IVM will be more profitable, the meat industry will phase out farming animals for food (ideology) and Garces is asserting its practicality because she actually is at the table with the likes of Tyson, with the opportunity to influence them (Garces 2022).

Based on the differences in these two sides, the con side might say that the pro side is suffering from a sort of “cruel optimism,” (Berlant 2011) while the con side could be viewed by

the pro side as practicing purity politics (Shotwell 2016). Berlant's cruel optimism applies to relations in which the thing itself that is sought after prohibits success. In terms of this debate, this needs to be stretched some. It seems clear that both sides desire animal liberation. That would be their "object" or "scene." But what they are striving for is a "good life" for others (farmed animals), not necessarily for themselves. Whether or not they succeed in their goal, Friedrich and Garces can have a good life. Their attachment is to capitalism, not animal liberation. The ability for capitalism to lead to or produce meaningful transformative change is precisely what Sanbonmatsu and Stanescu's critique rests on. Their point is that capitalism is bound to disappoint and therefore, pursuing it as a vehicle for animal liberation will lead to failure and hence result in a cruel form of optimism.

Based on their own experiences working with meat companies, which both mentioned during the debate, Friedrich and Garces may view Sanbonmatsu and Stanescu as being caught up in a form of purity politics that draws lines of acceptable and unacceptable forms of activism in terms of radicality. This is further supported by comments by Friedrich and Garces about using a variety of strategies. Thus, the con side may view working with meat companies as not radical enough and the pro side views not working with them to not be pragmatic enough. This could be a manifestation of Shotwell's (2016) argument that we are all enmeshed in relations, some beyond our control, and this must be acknowledged. Only then can we begin to live ethically via realizing "we are compromised and we have made compromises, and this will continue to be the way we craft the world to come..." (Shotwell 2016:5). Friedrich and Garces could be said to be starting from a more fraught position entangled in webs of relationships that include meat companies. They seem to be taking a stance that engages with the world as it is and arguably would label Sanbonmatsu and Stanescu as fixated on an unattainable ideal type. Importantly,

while the pro side also acknowledges they would like to see animal farming and capitalism abolished, they also emphasize that even messy relationships can be used to make gains more quickly. In other words, to live ethically albeit necessarily impure. Sanbonmatsu and Stanescu arguably view Friedrich and Garces as at an “impasse” and embattled in a “situation tragedy,” to use Berlant’s terms: aspiring to create change via existing social infrastructure (capitalism) despite evidence of its inadequacy and viewing the pro side as viewing IVM as a last-ditch effort to remain optimistic about animal liberation.

I’ll bring this discussion towards a close by noting two points that were essentially absent from the debate’s discourse. Sanbonmatsu and Stanescu critique Friedrich and Garces for their pro-capitalist tactics. But even whole food, plant-based solutions offered by Sanbonmatsu and Stanescu have the potential to be co-opted by the high concentration and power and unethical production practices due to capitalism’s influence. Great care must be taken to try to avoid this system. Yet Sanbonmatsu and Stanescu do not address this reflexively but use it only as a critique of the pro side. They essentially present capitalism in contrast to plant-based diets, which is a false dichotomy. Sanbonmatsu and Stanescu likely know this but do not say it. Notably, Friedrich and Garces do not point this out either, which would have been advantageous for their side, perhaps due to their lack of concern about capitalism.

For overall plant consumption to increase, there would need to be a corresponding increase in plant crop production. Thus, land conversion schemes would be required. Additionally, the concentrating power of capitalism often associated with such growth and the potential for monocultures to attend to such demand, and competition for market viability, would present a fair challenge to the anti-capitalist rhetoric. In other words, a non-capitalist vision is somewhat lacking. This is a common charge against those with utopian ideals. Guthman and

Biltekoff (2020) and Helliwell and Burton (2021) make this critique of the IVM space concerning claims over “dematerialization” of inputs and opportunities for farmers who may be stripped of their livelihood, respectively (analogously, Belkin critiques Spade for being too utopian and not addressing violence towards existing transgender people brought on by their ban from the military, see Belkin and Spade 2021). This being said, see the chapters by Abrell (2023) and Simon (2023) for trenchant critiques from first-hand experience of Bruce Friedrich and GFI in terms of actions taken on behalf of both that capitulate to capitalism with the inevitable outcome of widespread animal harm for the sake of promoting alternative animal products.

Relatedly, while capitalist IVM is critiqued and plant-based foods (capitalism notwithstanding) given as a solution, non-capitalist IVM production is not discussed. Sanbonmatsu brings up public education as a necessary condition for which to support IVM but is not clear in how this would or could be disassociated from capitalism. Provided the condition of anti-speciesist education, it would seem like non-capitalist IVM may be something the pro side could support but their discourse is so strongly against IVM in general, it is difficult to conclude this based on the debate alone. The pro side would likely again take the opposite stance and insist that non-capitalist IVM is ideal but not practical because capitalism is necessary for the growth required to significantly curb animal agriculture. Indeed, they remark several times that they would like to see capitalism fall. But both sides seem to take a rather extreme position with little articulated reflection on either capitalist veganism or non-capitalist IVM. That this is essentially absent from the data makes it hard to comment but remains interesting in its absence.

At least such considerations bring ethics back into the picture. Friedrich is criticized by Sanbonmatsu for having said in a previous interview that the goal of IVM is to “take ethics off the table,” a stance Friedrich defends in this debate as a reason to support capitalist IVM

production. His point is that if meat is decoupled from animal death, then using capitalism to promote IVM is essentially harmless if not beneficial. On the con side, there are virtues lurking in the background of Sanbonmatsu and Stanescu's collective argument such as temperance, and rhetoric clearly against animal use, per Alvaro (2019). Yet the entanglement of death in vegan food recalls Chauvet's (2018) argument for IVM. At the same time, Chauvet argues that IVM kills no animals (2018:389). But this is theoretical as IVM would have to decouple itself from FBS, or any other process that might incidentally kill nonhumans, such as that which might occur while constructing new infrastructure for IVM production facilities. The charge of incidental animal harm goes both ways and again recalls Shotwell's (2016) purity politics. Not wishing to wade too deeply into this philosophical discussion, suffice it to say that capitalism's infiltration of meat, IVM, and veganism does pose interesting ethical dilemmas for activists in terms of what they support and how they frame the issues. For an extended discussion of capitalism, IVM, and plant-based meats using similar data, see Poirier (2021) for elaboration.

CONCLUSION

This paper presented an analysis of a two-sided debate on whether "cell-based meat is good for animals." The pro side believes previous and current vegan activism has not been very effective, so IVM is needed as one of many activist tactics. They envision part of this approach to entail working with meat companies to reduce the number of animals farmed and to transition toward an IVM (and/or plant-based meat) business model. Their logic is based on a capitalist impetus of helping animal agribusiness continue to make money and to stay in business as environmental and climatic factors impede the continuing expanse of animal agriculture. The con side argues completely against this line of thought, advocating staying with traditional activism motivated by a deep distrust of corporations and capitalism. The pro side is focused on shorter-

term benefits while the con side focuses on long-term abolition. Both sides view themselves as taking a realistic approach and the other side as being misguided.

Both sides agree on the importance of veganism but not how to achieve widespread veganism. It is noteworthy that the con side is not against IVM wholesale but see it as being pursued unwisely. For them, IVM could be permissible “If the public was being educated, their consciousness was being raised about what speciesism is as a mode of production, of human life, then I could perhaps get on board with this” (Sanbonmatsu). They echo the sentiment that solutions already exist (Gelderloos 2022; Warburton 2021) in this case, in the form of vegan foods. But, along with others who have investigated the alternative animal products space in-depth by interviewing people like Friedrich (Zimberoff 2021; Kleeman 2020), they are skeptical of the transformative potential of IVM advocacy and find reasons to distrust the hype, optimism, and promises.

While this debate represents two opposing sides, the actual range of orientations to IVM is multifaceted. Many are not simply for or against it. Indeed, some are on the fence, as the moderator Hope Bohanec admits at the beginning of this debate. Also, the pro side is represented by two activists, while the con side is represented by two academics. This is not representative of the wider debate; it is not that academics are generally against IVM and activists are primarily for it. The reality is much more mixed. Regardless, the Conscious Eating Debate is a great source for hearing arguments for and against IVM and, for those interested, to watch and sort through the arguments presented to decide for oneself.

Further points of analysis could have added to this study. Keyword-in-context analyses for keywords, such as capitalism, could have helped provide context for which pivotal words were used. This could help clarify each side’s position on key themes as well as provide insight

into how each side “talked” to each other concerning these themes as they occurred throughout the debate.

Lastly, this paper has made some connections to similarly divided debates within movements outside of animal or environmental protection, namely Black anarchism, decolonization, and trans liberation. The general debate and framing of the issues could be applied to numerous other movements such as police reform versus abolition (Kaba and Ritchie 2022) or green growth versus degrowth (Pineault 2023). Rhetoric and nuance of each of these debates will differ, but the general reform/abolition discourses of similar—and even not-so-similar—debates are fruitful for widening the applicability of this paper.

CHAPTER 3: INTERNAL DISAGREEMENTS AND DEBATES AMONG STAKEHOLDERS OF ALTERNATIVE ANIMAL PRODUCTS

MEAT AND MEAT ALTERNATIVES

Meat consumption is associated with many environmental problems (Crippa et al. 2021; Theurl et al. 2020). While meat has always been a component of human diets around the world, the extent of meat consumption has increased dramatically in recent eras (Warren 2018).

Although meat can be said to have positive impacts such as providing nutrients and contributing to local and global economies, many argue the negative consequences are beginning to make it more of a liability than an asset (Robison-Greene 2023; Bowles et al. 2019). Capitalism lies at the heart of many of meat's negative effects because it strives for ever increasing growth and accumulation of capital (Clark, Auerbach, and Longo 2018; York 2021). Within this context, cell-based and plant-based alternative animal products are emerging as part of the solution to many problems including issues of animal welfare, environmental degradation, human health risks from meat production and consumption (Bhat, Bhat, & Kumar 2020; Hansen and Syse 2021). Given this, it is worth examining this technology and how it is emerging.

In 2016, long-time high-profile animal, environmental and human rights activist Bruce Friedrich co-founded The Good Food Institute (GFI) and currently serves as its Executive Director. GFI is a nonprofit organization that promotes alternative, non-animal derived protein sources and food products to animal agriculture through a multifaceted approach and is a central figure in the “alternative foods” or “alternative proteins” space. This space encompasses plant-based, cell-cultured, and fermented food product development. As a leading, central figure, GFI merits special attention.

One branch of GFI's outreach is the annual Good Food Conference dedicated to the promotion of the alternative animal product space. Beginning in 2018, each year the conference

brings together dozens of leading food industry pioneers, policy experts, entrepreneurs, scientists, investors and other vested parties to discuss the various dimensions and challenges the alternative animal product sector faces. Panels consist of discussions amongst panelists, a moderator, and, indirectly, the audience (who could write questions through an app which the moderator relayed to the panelists). The analysis presented here is of both the 2018 and 2019 conferences together in their entirety, with a focus on in vitro meat (IVM) in particular. The space of academic conferences has not yet been investigated in the peer-reviewed literature on IVM. Alternative animal product conferences are an excellent space for investigating how such products are being both technically and socially constructed because those involved in various components of their construction are brought together to discuss the field's current status and how it should evolve. Thus, the question motivating this study is: What are those within the alternative animal product space talking about, and how?

Given the deep cultural significance of food, the effort to rework established and internalized patterns through the objectification of naming tied to existing stocks of knowledge is useful in understanding the strategies used to meet consumer expectations and corporate financial goals. Berger and Luckmann (1967) note how our actions, including the use of words, become objects that are then judged and internalized by those involved in the interaction. With alternative animal products, not only are those involved trying to create new food items but also a new language that fits with an old language. Noting the importance of words, Giles (2022) provides a unique and in-depth critique of IVM as an “industry.” Due to the lack of almost any condition or component of a functioning industry, Giles prefers the term “experiment.” I quote Giles (2022:46) at some length to highlight the expanse of his critique:

Companies of various stripes and foundation are still figuring out the ins-and-outs of small-scale production, with ambitions of large-scale production that are shrouded in

darkness stemming from the completely unprecedented scale and scope of their activities. The market of cultured meat is more unclear than ever, a compilation of non-profitable taste-testings, unclear prospects as to the success of its most important product-standard (structured meat), and the volleying around of high-end restaurants as a starting point, a far-cry from the promises of imminent grocery store introduction and sales. Until a day is reached that cultured meat producers can say, with assuredness, what types of products will actually be sold – and to whom they will be sold – I argue that ... Experiment is a reasonable term; it allows for the recognition of producers attempting to create a profitable production model, but makes clear that there are considerable barriers to cross before producers can safely declare success for their “industry.”

Influenced by Giles, I do not refer to the object of study as an “industry” (nor “experiment”) but a *space*, a term from human geography meaning a collection of places and people along with their social and cultural elements. This paper thus builds on Giles in presenting further evidence that the alternative animal product space was/is in the process of constructing itself as an industry but does not yet constitute one.

In what follows, I create and present coding categories resulting from a content analysis of the first two years of the Good Conferences. Three categories, “disruptor,” “social challenges,” and “consumers” are discussed in detail in terms of primary disagreements that occurred within them. This includes discussions over the naming of these products, what is meant by alternative animal products “disrupting” current food systems, and how the alternative animal product space is going about marketing to consumers. I then present two mini debates that occurred during these conferences and discuss what values each may disclose. This chapter is framed by literature on social construction. This chapter finds that the range of topics discussed at the Good Food Conferences varies widely and that GFI appears to make great efforts at attempting to cover as many issues as possible that go into creating a viable alternative animal product “industry.” While there appears to be general agreement on using free markets, incumbent industries, and industrial processes to produce and accelerate this space, there are also

many disagreements. Each of these discussions is examined below using quotations from conference participants.

LITERATURE REVIEW

IVM is one alternative meat product being created from animal cells without needing to raise or kill animals (or at least greatly fewer). Proponents have made claims that IVM can solve world hunger, nearly eliminate the need to kill animals for food, and mitigate climate change (Shapiro 2018; Bhat, Bhat, & Kumar 2020; Robison-Greene 2023). IVM relies on the self-replication of cells to grow meat without the slaughter of an animal raised exclusively for meat production. IVM production typically begins via a small tissue biopsy obtained from an animal (Melzener et al. 2021). Muscle cells are isolated and placed in a growth serum that provides nutrients to the cells. The cells multiply and form muscle tissue. IVM is emerging alongside more established plant-based products with the goal to create food products that are made to look, taste and feel like the traditional meat products they emulate (Rubio, Xiang, and Kaplan 2020).

There is a long-standing argument by proponents of green technologies that they can contribute to solving social problems, while political economic critiques question whether that can happen given constraints of social and economic forces (York and Clark 2010; Goldstein 2018). Often the debate is presented in an oversimplified form of “optimists” versus “pessimists” (Scott 2018). Reality is hardly, if ever, so clear-cut. Therefore, it is important to see exactly what those working on the technology are saying to help understand the dynamics of the evolving space of alternative animal products. Alternative animal product conferences bring dozens of stakeholders from numerous sectors of society together. Knowledge flows exist among scientific, policy, tech development, academics, entrepreneurs, investors and media (moderators were

journalists) communities. Although each exists within a network, individuals also contribute towards the formation and promotion of alternative animal products.

One way this is accomplished is through language. There is wide recognition within the social sciences that what is perceived about “reality” and our discourse about that reality are inseparable (Bourdieu 1991; Krippendorff 2019:3; Berger and Luckmann 1967). Language plays a central role in communication, one which both abstracts and reifies meaning. It allows for the transferral of knowledge to others in the present and through time (Berger and Luckmann 1967). Frank et al. (2012:493) note that the production of science is a “social act.” So, too, is product and market creation and the process of institutionalization (Berger and Luckmann 1967). Concerning alternative animal products, techniques, theories, power relations, methods and value-judgements about people, nature, and animals all serve to construct this space.

Social constructionism asserts that reality is a product of human interactions and studies the relationships between human thought and its social contexts. In other words, what passes for taken-for-granted “knowledge,” “facts,” or “reality” is the result of a “complex web of evaluation” (Latour and Woolgar 1986:159) and “a bundle of contingencies” (Burger and Luckmann 1967:135). Sociological analysis of construction entails exposing and analyzing the processes by which things come to be known. When actions become typical and performed by typified actors, this gives rise to an institution (Burger and Luckmann 1967:54). Institutions arise out of historical social interplay and serve to constrain behavior. Knowledge construction exists within a certain paradigm (Kuhn 1996). Paradigms can be challenged, particularly through re- or secondary socialization. Amid such challenges or crises, new realities can be constructed.

METHODOLOGY

Video and text of the 2018 and 2019 Good Food Conferences are qualitatively and quantitatively content analyzed in the present study (Krippendorff 2019). The approach has a latent component in that meaning beyond the literal words is used to help interpret the general discourse conveyed by rhetoric, and a manifest component that focuses on particular words (Bengtsson 2016). Initially, this study employed a directed content analysis approach using theory to develop codes prior to analysis (Hsieh and Shannon 2005). Indeed, an initial coding scheme consisting of the categories “capitalism,” “technology,” and “sustainability” was devised. On subsequent review of the data, these codes were found inadequate to cover the breadth of topics. Thus, the coding scheme was revised inductively based directly on the rhetoric of panelists.

Each panel’s video was watched on YouTube while taking short notes, from one word to a few sentences, for the entirety of their response (the coding unit). Notes were condensed into codes that distilled the essence of the panelist’s response. Coding categories were created by grouping similar-themed codes together based on their context. This led to 825 total coding units. Moderators asked panelists questions around a certain theme. Moderators were not coded because the focus of this study is on those who work directly in the manufacture and promotion of alternative animal products. To varying degrees, panelists have a stake in the success of these products while moderators play a less direct role (although, of course, they do shape the reality of alternative animal products through their media presence).

Panelists are quoted by name as the videos are intended to be publicly viewed and contain labels with all panelists’ names and organizational affiliations. The year of the

conference each quote came from is also included. Quotes were edited for ease of readability but care was taken not to alter their meaning or content.

RESULTS

Eleven major coding categories arose that collectively cover approximately 96% of coding units. An “other” category captures the remaining (and often singular) coding units. These are presented in Table 1. The categories of disruptor, social challenges, and consumers are described in further detail in the discussion and so these are briefly described here.

Table 1: Code Categories and Frequencies

<u>code</u>	<u># of coding units</u>
disruptor	115
social challenges	105
technological challenges	101
R&D	96
consumers	87
regulation	64
science	61
capital	46
environment	44
collaboration	43
health	30
other	33
TOTAL	825

“Disruptor” refers to statements that suggested the potential for alternative animal products to either make a significant impact on current food systems, or not. Codes included collaboration or coexistence with animal agriculture, replacing animal agriculture, or references to transforming food systems. “Social challenges” refers to human behavior or thought considered an issue potentially hindering widespread adoption of alternative animal products. Examples include where and how widely alternative animal products might be available, advertising strategy, and how to package, label and name these products. “Consumers” refers to comments about

consumer preferences or consumer demographics. Common codes for “Consumers” were farmers, flexitarians, consumer choice, and consumer interests (price, taste, health, availability).

Lastly, I also found two debates that took place during panels, one during each year of the conference studied. The first concerns health and the second concerns the role and responsibility of technology, topics that incidentally correspond to two of the coding categories. Such debates were not planned but arose organically which adds to the spontaneity of construction. They also present a complementary angle on the categories by providing another vantage point from which to analyze these conferences and this space. These debates are concentrated on in their own discussion section below.

DISCUSSION

Here, the coding categories of disruptor, social challenges, and consumers are discussed in some detail. They contain what I consider to be the most numerous internal disagreements. Within the other categories, panelists generally seemed to be in overall more agreement regarding their included topics.

Within the “disruptor” category, references to existing animal agriculture were the most frequent. This was often coupled with one of two opposing viewpoints: how alternative animal products can lessen or eliminate these harms by decreasing the profits or eliminating animal agriculture, or how alternative meat producers and animal agriculture can and should collaborate for mutual benefit. Some envision and push for essentially or completely replacing animal agriculture and changing how food is made:

I think to solve the really urgent challenge we have around intensive animal agriculture, it [IVM] can't be added to a menu—it has to be the only thing on the menu (Josh Tetrick, JUST, 2018)

Our mission is to completely replace animals in the food system by 2035 (Pat Brown, Impossible Foods, 2018)

our mission is ultimately ... about changing the food system (Jamie Athos, The Tofurkey Company, 2019)

Others see alternative animal products coexisting alongside traditional meat:

We're not talking about replacing meat with cell-based meat or plant-based. (Kelvin Ng, A*STAR, 2019)

alternative protein companies ... could say “I'm going to put you out of business, I'm going to render you obsolete” and that engenders backlash. Or, “I'm going to grow alongside you” (Richard Waite, World Resources Institute, 2018)

The coexistence model is premised on mutual support between alternative animal products and traditional meat. Alternative animal products could act to prop up the existing meat industry to exist at a sustainable level and provide meat replacements for when meat production and consumption goes over a sustainable level. Or, similarly, meat companies create and have a “sustainable” alternative protein wing but retain animal meat as a significant part of their business model.

Discussion of the disruptor category is kept quite brief here, but it does cover a central issue the space is grappling with. For an expanded discussion on the potential for the alternative animal product space to disrupt animal agriculture, using the same data, see Poirier (2021). There is clearly internal tension and disagreement about how the space should evolve. This lack of cohesion or a unified front may hinder the ability of alternative animal products to make a significant disruption to current food production models. However, such disagreement is not uncommon in the social construction of “facts” (Latour and Woolgar 1986). These sorts of disagreements help to establish the perceived validity of facts and set standards for fact establishment. That different (at least potential) stakeholders are having such disagreements is not a surprise; the meaning of alternative animal products is bound to differ between different networks of individuals for whom the topic has relevance (Latour and Woolgar 1986).

The next largest category is “social challenges.” By far, its largest code was “naming.” This refers to what to call IVM and plant-based products. Naming disagreements took the form of two basic questions: should these products be called “meat,” and secondly, if so, what, if any, descriptors should be included (e.g., clean meat, cell-based meat). Naming is important because it helps clarify what something is or is viewed as. Words and naming reflect the power of the person speaking them, encapsulating interactions among rhetoric, the speaker’s personal characteristics, and the institution that bestowed them with such power to speak (Bourdieu 1991). Naming can influence consumers’ purchasing behavior. With this in mind, many developers of alternative animal products favor calling the products meat. Others think they should be called something else that is more general such as protein products.

For IVM more so than plant-based products, there seems to be more of an emphasis on calling it “meat” and those in favor are often direct in their assertions:

The product we're making is meat (Uma Valeti, Memphis Meats, 2019)

It's not me saying that I want to call it meat, it is meat (Shir Friedman, SuperMeat, 2019)

These quotes show that IVM producers generally view their products straightforwardly as meat. They have strong modality as if asserting a fact (Latour and Woolgar 1986). In doing so, the myriad social forces that are part of the history of what has come to be known as “meat” are hidden, when instead, the status of IVM is a product of precisely these conversations. As Latour and Woolgar (1986:23) argue, “an important feature of fact construction is the process whereby ‘social’ factors disappear once a fact is established.” Both quotes above assert the status of IVM as meat as independent of the voices claiming it so and the values behind such claims. Yet, there seems to be little to no debate amongst IVM producers on this point:

the key thing is that our products are meat already down to the cell (Eric Schulze, Memphis Meats, 2018)

what we're producing is animal. So to say [it's] not meat [or] would be anything other than meat, would kind of be misleading and not the truth (Nya Gupta, Fork & Goode, 2019)

These examples reflect the concept of “meat” being defined not necessarily as having come from a once-living animal. Both suggest that meat arises from the proliferation of animal muscle cells regardless of the process. This focus on the end product is an appeal to scientific authority, and biology in particular. In referring to cells and “truth,” Schulze and Gupta assert that meat has a stable and agreed upon “objective” reality. Yet these very conversations show the term is contestable (Latour and Woolgar 1986).

The following extract focuses on calling IVM “meat” without adjectives:

it's not going to be called “cultured” or “cell-based” or “animal based” that doesn't require killing an animal. It's just going to be called meat because that's what it is (Josh Tetrack, JUST, 2019)

This further reflects the straightforwardness of IVM being seen as meat and also how IVM producers do not really see a debate on that issue. This contrasts somewhat with consumers who, from survey data, seem to favor the name of “clean meat”:

from the studies that have been done that I know of which experimentally compare different names and their appeal to consumers, “clean meat” has tended to be preferred by consumers (Chris Bryant, University of Bath, 2018)

It is worth mentioning that the IVM space on the whole began by calling meat grown in a lab “in vitro meat” since at least 2005 (Edelman et al. 2005) but by 2011 had largely switched to “cultured meat” (Stephens et al. 2019). In the 2018 conference, GFI originally referred to IVM as “clean meat” but switched to “cell-based meat” in 2019 (and changed again to “cultivated meat” for their 2021 conference) and has finally “officially” settled on “cultivated meat.” This shift highlights the importance of naming and signals how unsettled the community is in terms of naming IVM products.

With so-called plant-based meat there is also some internal disagreement about whether these products should be called meat or not, despite meat being the prevailing name of choice. However, there was much less conversation around whether “meat” should be used to describe products created entirely out of plants. Christopher Bryant, a 2019 panelist and sociologist who researches consumer attitudes towards IVM says, “when it comes to plant-based meat I don't know of any studies comparing terms for the most favorable for plant-based meat.” An executive at Beyond Meat prefers the qualifier “plant-based” because it brings clarity about the source of the products:

You can say “plant-based product” and it gives you a sense of what's in it. If you say something's “clean meat,” I still don't know what's in it, what it's from. It's animal, so I think there should be a descriptor that explains how you got there. I'm always going to advocate for consumers having as much information as they can (Seth Goldman, Beyond Meat, 2018)

It is unclear if Goldman prefers the adjective “plant-based” because it helps distinguish these products from actual meat. His argument rests on accurately informing consumers about the products. Others thought this argument was a waste of time:

I think it's a massive waste of time for us to be fighting this “meat” battle and we should ... make phenomenal tasting new food products [and] develop new food categories that people want. There's no reason to call it meat necessarily because it's not meat (Justin Siegel, UC Davis, 2018)

This quote illustrates how some view meat as too narrow of a term and instead see plant-based meat products as part of a wider array, and more general category, of food.

References to meat being objectively natural via cells or IVM being meat because it is animal muscle are applied usages of reification and legitimation (Berger and Luckmann 1967). Reification is the apprehension of human products as if they were not human products; they may be construed as natural laws (like the notion of institutions in Bourdieu 1991). Legitimation produces new meanings that synthesize previous meanings. This can be applied to panelists

attempting to legitimize “new” meat with traditional meat by calling it meat and thereby aligning it with what is already familiar to consumers. This is exemplified by Ethan Brown (2016), CEO of Beyond Meat: “Is meat something that comes from a chicken, cow, pig, and other animals? Is it amino acids, lipids, water and a trace amount of minerals and carbohydrate organized in a particular architecture? Yes.” From Brown’s perspective, this characterization makes sense. His goal is to convince the public that plant-based meat is not too different from traditional meat. But, if the situation is viewed from the position of a hypothetical “objective observer,” I would say Brown’s riddle would be answered “it depends”: it depends on who is speaking, from what social position, and to what end.

The “Consumers” category encapsulates references to, among less common codes, consumer behavior, preferences, and choice. Direct reference to the importance of consumers was common:

consumers are driving this, and consumers are going to continue to drive this (Bruce Friedrich, GFI, 2019)

We are very inspired by the opportunity to help shape the future of the food system, a food system that really needs to pay attention to ... everything that the consumer requires (Mohammed Oufattole, Benson Hill, 2019)

what all of us on this stage have been doing in one way or another is proving this idea that we can disrupt this trillion-dollar animal protein industry and we can meet the consumer where they are (James Joaquin, Obvious Ventures, 2019)

These quotes illustrate a positioning of the alternative animal product space as responding to consumer demands. Individuals and companies involved are simply trying to provide people with what they want. In other words, this is a consumption led movement, not production led.

These quotes then beg the questions of what do consumers “require” and where is it the alternative protein space is meeting consumers at? Answers seem to be varied, but references to consumer-led health concerns were common:

we see when we talk to consumers that the number one reason by far is it's healthier ... the other ones fall much lower (Barb Stuckey, Mattson, 2019)

health is typically the number one reason consumers say that they're eating or intend to eat more plant-based foods ... (Alison Rabschnuk, GFI, 2018)

Health is a noteworthy motivator because it generally is concerned with the individual, not society. Thus, to the extent that alternative animal products are led by consumer demand, it seems to be rather individually focused and not with a wider social consciousness of the systems that control production, cost and availability of food, or the systemic inequality that may play a role in giving consumers “what they want.”

Again, a question arises: who exactly are these consumers?

our focus is on the flexitarian consumer as research shows [it] looks like about a third of consumers represent themselves as flexitarian versus a much smaller percentage that identify as vegan and vegetarian (Alison Rabschnuk, GFI, 2018)

[The goal is] to design the products with the focus on people who love meat, which is most people (Bruce Friedrich, GFI, 2019)

The alternative protein space is looking to capture the bulk of the market, which is those who eat meat and “want” to continue eating meat. This is perceived as the best way to disrupt current food systems. However, it is also recognized that not all target consumers will be automatically on board. Other issues are at play, especially those concerning the technological nature of these food products. Genetic modification is clearly a barrier:

we can also use genetic modification or genome editing. And that comes along with its own issues which have to do mostly with consumer acceptance (Peggy Lemaux, UC Berkeley, 2018)

how are we going to convince consumers who are worried about GMOs that it's okay to eat them? (Lesly McClurg, KQED Science, 2018).

They are open to technology helping to solve that issue for them, solving it based on providing healthier products for them and providing the solutions that have an impact on climate change. So these consumers are more open to technical solutions than consumers that are a lot older have been in the past. ... Because they believe that it aligns with their

values, our belief is that we as an industry have a responsibility to them (Michele Fite, Motif FoodWorks, 2019)

Clearly this is still an open question, as evidenced by McClurg's quote above. As the third point above suggests, alternative animal products may act as a gateway for consumers to have or gain faith in technological fixes, especially younger consumers. This quote implies that as long as consumers view a technology as in line with their values, they may accept it as a solution to certain problems.

Interestingly, there may be a point here at least insofar as words like "soy" and "vegan" are commonly viewed by consumers as "dirty" words:

there's this idea that there's something wrong with [soy]... soy has become a dirty word for many consumers (Erin Brodwin, Business Insider, 2019)

We believe at GFI to play down the word vegan. It does have a lot of baggage. There was an interesting study [that asked] what words consumers like and don't like on food labels. They had 21 different descriptors and vegan was the least liked word (Alison Rabschnuk, GFI, 2018)

Despite this consumer sentiment, some still feel that vegan is the way to go: "it's important to realize that we don't really need anything we're talking about producing up here on stage. People should increase vegetable intake into [the] future" (Josh Tetrick, JUST, 2019). This quote shows there is at least some reflexivity in the alternative animal product space, a recognition that the entire enterprise is ultimately unnecessary. Solutions already exist, the problem is that people do not seem to want to utilize them. Instead of vegan diets, the public and the alternative animal product space generally seem to prefer technological approaches, even if this brushes up against consumer skepticism. Technological fixes appear as a lesser evil than soy or kale.

Tetrick is indirectly referring to re-socialization into veganism or even alternative animal products as butting up against primary socialization. Primary socialization happens early in life through trusted individuals who are close to us and transmit the most knowledge the most

intimately (Berger and Luckmann 1967). This conveyance of objective reality, internalized into subjective reality, is difficult to change. New realities “must somehow be superimposed upon this already present reality” (Berger and Luckmann 1967:140). Most consumers have been socialized into the normality, necessity and nicety of meat (Joy 2010)—a certain paradigm (Kuhn 1996), as it were. The alternative animal product space must contend with this. Indeed, these very conferences seem to be partially attempting to harmonize alternative animal products with past animal products through partial re-socialization of consumers into accepting these new products as aligned with their preferences. Partly this is done by the alternative animal product space identifying problems with the current paradigm of animal agriculture and proposing a new paradigm. This inevitably engenders challenge.

The last point to make about the Consumers category is that rhetoric relies heavily on consumer *choice*. This is frequently stated very plainly:

we have an increasing choice in our foods and we kind of see that as progress (Mark Post, MosaMeat, 2018)

people will need diversity...[they] need a choice (Ela Madej, Fifty Years, 2018)

I also want to stress that for all of us, the focus is on consumer choice (Bruce Friedrich, GFI, 2019)

the truth is that the consumer wants all kinds of different choices (Lisa Feria, Stray Dog Capital, 2019)

Thus, insiders are positioning alternative animal products as choices, presumably added choices, among already existing animal products. The free market is taken to be the ultimate arbiter of which products succeed or fail or the extent to which alternative animal products disrupt incumbent industries. However, there is somewhat of an overlooking of complications to this approach such as barriers of entry to smaller actors or government intervention which can limit consumer choices. This is partly why GFI pursues the strategy of creating partnerships with large

incumbent industries that already have the capital, research and development departments, and brand names that consumers are familiar with. These features can help overcome barriers to entry but only for larger entities. So the extent to which the free market is really free can be questioned (see Goldstein 2018). The focus on individual choice has been applied to other emergent social movements such as feminism and veganism, leading them to be termed post-feminism (Gill 2017) and post-veganism (Giraud 2021). Perhaps more commonly understood as neoliberalism, this frame of reference emphasizes individualized, consumer-driven action around “freedom of choice” instead of attention and action directed towards macro level structural social problems (an issue Robison-Greene (2023) discusses in terms of ideal versus non-ideal theory). Yet, consumer choice is ultimately constrained by what companies are willing to invest in and how they develop their products (Goldstein 2018).

In the discussions regarding what to call IVM products, as elaborated above, an appeal to scientific authority was used to legitimize claims that IVM is meat. There is also an appeal to consumer authority in guiding the alternative animal product space as a whole. In both cases, outside appeals disclose the social nature of alternative animal product construction. The public is identified as another collective stakeholder and social scientific research is undertaken involving them. As Latour and Woolgar (1967) argue, the social and scientific worlds cannot be separated. Interactions have and continually are taking place both within and outside of the GFI conferences. Even supposedly objective scientific criteria are open to flux through ongoing social interaction (Latour and Woolgar 1967).

TWO MINI DEBATES WITHIN THE CONFERENCES

Here I focus on two particular debates that arose at the conferences. The first is from the panel “From Field to Fork: The Science and Nutrition Behind Plant-Based Meat” from 2018 and

concerns the health of plant-based meat products. The second is from the 2019 panel “The ‘Why’: Mitigating Environmental and Health Risks” and is about the role of technology in creating alternative animal products. Each will be discussed using abbreviated and sometimes paraphrased quotations to save space. The discussion of debates complements the discussion of coding categories because the debates were conversations that took place continuously within a single panel in a single year of the conference, whereas the above discussion compiles somewhat disjointed quotes from various panels across both years of the conference.

In the 2018 “From Field to Fork” panel, Dean Ornish, president and founder of Preventive Medicine Research Institute questioned Celeste Holz-Schietinger, Director of Research at Impossible Foods about the use of soy hemoglobin, the plant-based source of heme used in the Impossible Burger. Ornish raises concern about the possible health risks from heme as evidenced in clinical studies. Holz-Schietinger’s response is that Impossible Foods does not believe heme is harmful and they are always reviewing the literature and will make changes if information changes. Ornish replies that “I love the fact that you’re doing plant-based burgers and they’re so much better than regular burgers” but the FDA has expressed concern about heme’s safety. Holz-Schietinger’s reply to this is “we are always exploring all options.” At this point, Bruce Friedrich comes onstage from the right (next to where Holz-Schietinger is sitting), takes the microphone from Holz-Schietinger and walks it over to the moderator and somewhat sternly says “let’s make that the last word on this topic.” The moderator then swiftly changed the subject and addressed a different panelist.

Both Ornish and Holz-Schietinger point to FDA rulings being based on data from industry to support their claims (see FDA 2022). Ornish points to three meta-analyses, as well as soy hemoglobin being a novel food product, as contributing to the FDA believing that “the

arguments presented do not establish the safety of soy hemoglobin for consumption.” Holz-Schietinger responds that “heme is GRAS [generally regarded as safe] approved through the entire FDA process which includes many, many experts reviewing all of the data on health, nutrition and safety concerns.” While the GRAS ruling on heme is verifiable as Impossible does use it in their burgers for sale for which pre-market approval is required (FDA 2022), the bulk of the data the FDA used in their ruling came from Impossible Foods itself (to read the official determination see, FDA 2018).

At least three things about this exchange are interesting. First, this discussion on the safety and regulatory validity of heme may disclose certain values in that it addresses the competing motivations of taste/flavor versus health. As discussed above, health was consistently identified as the primary consumer concern. Yet taste/flavor seem to at least partially override those concerns in this mini debate. Holz-Scherzinger’s response largely centered on defending the use of heme as a flavor component. The argument is, that in general, taste and consumer appeal may be larger priorities for Impossible than overall health. Although these products are novel (in federal regulatory terms), they do possess some nutritional shortcomings such as being especially high in saturated fats, sodium, and sugar (Tso and Forde 2021) which, as Ornish points out, are associated with several major chronic health conditions. While Holz-Schietinger leaves the door open for replacing heme and potentially saturated/fat upon new scientific evidence—a prime component of social construction in action and acknowledgement of her/Impossible’s ongoing participation in this “reality”—she twice defends the use of these ingredients on quasi-health grounds but also on taste and flavor. Particularly, for saturated fat and fat she replies, “Yes we have fat. It’s, I think, essential to have fat in your diet from a nutritional point of view and for flavor.” She does not address the amount of fat or saturated fat,

only the less controversial view that *some* fat is healthy and adds flavor. In terms of construction, both panelists appeal to previously constructed facts in medical and scientific literature (Latour and Woolgar 1967). Both health positives and negatives are used to legitimize each panelist's position. This strategy used by both panelists indicates competition in determining who should be listened to and to what degree (Bourdieu 1991).

Second, despite federal regulatory approval, this exchange represents direct dissent against a major manufacturer and mode of operation that seems to otherwise be taken largely for granted. At the 2018 and 2019 conferences, no other criticisms of the nutrition profile of plant-based products arose. Discussions of nutrition revolved around how such products were healthier than animal products which was undisputed and backed by scientific literature. Thirdly, this instance is interesting because it prompted the organizer of the conference (Bruce Friedrich) to step in to stop this mini debate suggesting that such dissent was not tolerated. As Friedrich crossed the stage to specifically hand the microphone back to the moderator (which could be inferred as a sleight of Ornish), his tone expressed displeasure that this challenge was occurring. Since this was a panel on nutrition, Ornish's concerns do not seem out of line, but Holz-Schietinger's responses leave room for healthy skepticism. Then again, perhaps Friedrich's frustration came from his knowledge of the FDA's GRAS approval and might be of the opinion that the debate occurring on stage is therefore unnecessary, perhaps a waste of time that could be better spent discussing issues that are considered as yet unresolved.

The second mini debate, from 2019, concerns the ethics and risks of using technology to create alternative animal products. This discussion involved five of the six panelists and the moderator. It began after a comment by Varun Deshpande, Managing Director of GFI India on the urgency for alternative animal products. Stephanie Feldstein, Population and Sustainability

Director for the Center for Biological Diversity replied that while important, previous technologies are at least partially responsible for the environmental situation that alternative animal products are supposed to address, so it could be counterproductive to combat technology with technology if used and developed inappropriately. Max Elder of Future Foods Lab and the Institute for the Future replies that “food is not, can't be thought of as a technology” and distances alternative animal products from other tech companies like Facebook. Then David Lipman, Chief Science Officer for Impossible Foods, extends Elder’s comment:

I totally agree with you about Facebook or Twitter ... that there were positives and obvious terrible negatives. But this is something where the games are very different and it's the only area I see since the seventies where the productivity gain can be coupled to quality of life so strongly.

Seth Goldman, Executive Chair for Beyond Meat then replies in support of technology because it has been crucial to the success of alternative animal products. Lipman again chimes in to say that “It's actually the most important problem and I think that you should hold our feet to the fire because maybe we'll get immoral in the near future. But the initial motivation was the right thing...” The moderator, Adam Rogers of *Wired*, joins in with a cautionary comment: “when companies that are in this space use the same language that those social media companies that the tech companies used but then say ‘only this time trust us,’ that's a hard pill to swallow.” The discussion then moved on to a different topic.

Like the 2018 debate over the health of plant-based burgers, this exchange is also interesting for multiple reasons. When Feldstein broached the topic, she did so by discussing some failures of previous technological development:

When you talk about some of the other advances in technology, like air conditioning, what if getting chemicals out of that had been prioritized earlier? What if efficiency had been prioritized earlier? Maybe we wouldn't have the heat islands that we see in cities in the summer caused by air conditioning.... I think we're in a position now where we know

what a lot of those opportunities are and we should be striving to embrace them as early on in this process and in this movement as we can.

This not only brings up the fact that technology has been historically problematic via unintended consequences or value judgements that went into its development, but it also suggests that the alternative animal product space can be different in not repeating the earlier mistakes. Elder furthers Feldstein's ideas that alternative animal products are different by saying that food is not a technology and puts emphasis on intentionality and rhetoric and generally being thoughtful about how the space develops. This seems to presuppose that negative consequences of technology can be avoided if the space is guided by intentionality and ethics. But which ethics? Who's ethics? This is left unsaid.

Lipman again cleaves alternative animal products from (other) technologies by calling alternative animal products something "very different" and grounds their motives in "the right thing." It is left vague as to what exactly "the right thing" refers to. Particularly interesting is Goldman's comment about the importance of technology in creating alternative animal products. He goes on to say: "technology has absolutely made the difference between this staying in the small niche of the 2 to 5% of the population versus the 93% of people buying this product also buying meat." Goldman seems to be valuing growth over technological caution. He attributes the existence of the GFI conferences to technological innovation: "I don't even know if this conference would have half the attendees that it has if we were still dealing with veggie burgers of 20 years ago." As above, this may expose a value of economic success over an overall ethical product.

These conversations, with their added detail and continuous nature as opposed to the more fragmented nature of coding categories, highlight the microprocesses of social construction (Latour and Woolgar 1967). Even interpersonal minutiae from these exchanges contribute to the

construction of this space as panelists react to each other. The differing interpretations by panelists of similar “facts” demonstrate how non-straightforward the establishment of knowledge can be. Panelists filtered previously constructed facts through their own social location and individual selectivity, influenced by personal attitudes and social pressures such as job expectations based on individual panelists’ roles (Berger and Luckmann 1967). The very presence of controversy in the form of debate shows that the alternative animal product space is involved in constructing a certain reality. Panelists utilized various power plays to have one's narrative be viewed as most appropriate (Bourdieu 1991). These debates make visible the “series of strategies take up by [panelists] in their decisions to back the construction of one or other fact and in their efforts to enhance their ability further to invest in the construction of ‘new’ facts” (Latour and Woolgar 1967:41).

Despite internal disagreements and debates—perhaps even because of them—the GFI conferences represent the alternative animal product space both drawing on and creating “common stocks of knowledge” (Berger and Luckmann 1967). They are constructing new knowledges about what food is, what meat is, what is edible. Panelists tie new terms to existing stocks of knowledge, such as linguistically and conceptually tying IVM to traditional meat or to other traditional animal products and even plants in terms of basic ingredients, while also drawing some meaningful distinctions such as improved health and sustainability. Language plays a key role because it “helps to impose a more or less authorized way of seeing the world, [which] helps to construct the reality of that world” (Bourdieu 1991:106). Through discussions at these conferences, panelists “actualize” a new world of alternative food products, products that are at once both technological and “natural.” Thus, language becomes a vector of power within the GFI conferences through the naming of products, structuring the parameters of the

discussion(s) and in attempting to have one's narrative be viewed as the most appropriate—presumably the one the “industry” as well as consumers should listen to, internalize, and adopt (Bourdieu 1991).

CONCLUSION

This paper has shown, via a multifaceted content analysis, how alternative animal products are being discussed at high-profile conferences within the space. Results show that multiple framings and motivations for these products and their technologies exist by those involved in their creation and promotion. Panelists rhetorically constructed the alternative animal product space as one where stakeholders are altruistically motivated to respond to consumer concerns. I found that the range of topics at these conferences varies widely, that numerous challenges are identified by stakeholders, often accompanied by internal disagreements, some larger than others, as to the best ways to resolve them. This situation may be contributing to the fact that there seems to be a dearth of major technological advances despite a proliferation of publications on IVM (Chriki and Hocquette 2020:n.p.). In short, the alternative animal product space is attempting to construct itself as an industry. It is these discussions that will shape how the space ultimately promotes itself and its products, and to what extent it will disrupt animal agriculture.

It is noteworthy that the cheapest cost for attending the conference in 2018 was \$300 (\$350 for 2019), with the full price rate of \$800 (\$950 in 2019). Similar conferences also typically cost hundreds of dollars. While GFI makes the videos of their conferences public, prices discourage public attendance. This lack of opportunity for consumers to be directly involved in the construction of this space is curious given the prevalence of consumer-centered rhetoric. However, as Bourdieu (1991) observes, certain people (classes) are excluded from

places considered legitimate so that groups that speak the “legitimate” language can assert theirs as *the* legitimate one.

Due to the large amount of data, this paper is limited in what it can cover. Further coding categories, or codes within categories, could be broken down in detail with representative quotations from panelists. Each category could be defined in terms of what was put under its label. Particularly, the “other” category could be discussed in terms of what topics were only infrequently mentioned as even this relatively small category contains a fair amount of diversity. Categories could be broken down across panels to see at what frequency within each panel they arose. This could give some sense as to how dispersed categories were across panels or if categories tended to cluster around certain panels. The unique codes under each category could also be tabulated to show the overall variety of topics that existed.

Within the consumers category, the interplay between health and taste could be examined more in-depth. The Ornish/Holz-Scheitinger debate reveals that these two motivations are competing and interact in complex ways with both consumers and for the alternative animal product space. This phenomenon could be discussed along with the health category. Word frequency lists could be generated for both conferences combined and each year separately, with some of the more common words discussed in terms of what they may reveal about the rhetoric at such conferences and if rhetoric may have changed between 2018 and 2019. However, all videos are available on YouTube where readers are freely able to watch, analyze for themselves, and assess the validity of this paper.

One particularly pertinent limitation of this study is that the reliability of coding categories was not rigorously tested. Typically, a second researcher applies the same coding scheme and the outcome between two researchers are compared for consistency. Or, the same

researcher could code the data twice using the same scheme to see that labels were applied and categories constructed consistently. However, at various points during analysis I quasi-randomly selected coding units to check their code and category placement were consistent with their notes taken. Early in analysis, a relative handful of coding units did have their categories changed but this amounted to a small amount of the total number of coding units. Further, I am confident that anyone repeating the methodology employed in this paper would reach similar findings as summarized in Table 1. Likely category counts would vary some between coders but the general topics and relative order would be similar.

Although more recent iterations of the conference have taken place, the initial years provide a window into a pivotal moment of the early construction of an alternative animal product space. “Facts” about IVM are still being sorted out, such as its environmental impact and how closely it should collaborate with animal agriculture. Because this space is changing rapidly, this study calls for follow-up analyses. Future studies could cover more recent GFI and other alternative animal product conferences to see how the content and rhetoric may change.

CHAPTER 4: ANIMAL WELFARE SCIENTISTS' OPINIONS ON IN VITRO (“CELL-BASED”) MEAT

Welfare scientists focusing on farmed animals occupy a position that tries to balance multiple values. They can both promote and critique animal agriculture, promote environmental sustainability, help influence animal welfare policy through research, and educate the public. While farmed animal welfare scientists often work for or with the animal agriculture industry, many also critique the industry. Some are even ethically vegetarian or vegan and favor abolishing animal agriculture. Likewise, it is through a multifaceted critique of animal farming that meat alternatives have been proposed. Animal welfare scientists may be interested in the topic of in vitro meat (IVM) because it may affect their jobs or their field as welfare scientists. It may also be in line with their industry critiques as many hope to reduce or move away from conventional intensive animal agriculture models, or even animal agriculture altogether.

This study helps fill a gap in the literature on IVM because, while animal producers' interests have been considered, and animal processors are generally supportive of IVM, literature that connects IVM and animal welfare seemingly does so without consulting those who would be the experts, or without clearly defining what is meant by “improved” welfare. Typically, three main reasons are given for supporting IVM: animal welfare, environment, and human health (these are also the three major reasons for veganism). Consumer interest studies often conclude that welfare is a key concern of meat consumers and therefore it is asserted as a prime benefit of IVM (Mancini and Antonioli 2019; Valente et al. 2019). Early examples of welfare benefits from previous literature have focused on reducing the number of farmed animals (e.g., Bhat and Fayaz 2011; Welin 2013). But authors often do not say which animals they are referring to: those who remain or those who were removed from the system, or those who simply will never exist as fewer animals are bred as commercial demand goes down. As shown below, a distinction can be

made among these groups with meaningful implications. Other arguments about the welfare benefits of IVM are often vague and are primarily in reference to industrial animal agriculture. Details as to how IVM could improve welfare tend to be scarce.

Yet, welfare remains a prominent component of IVM discourse (Dilworth and McGregor 2015; Miller 2012; Poirier and Russell 2019). Thus, this study aims to be more precise about what (animal) welfare might mean in the context of IVM. My overall objective was to understand perspectives of animal welfare scientists on cell-based meat and how that might potentially impact animal welfare. This is accomplished empirically through interviews with welfare scientists. This group's expertise is missing from welfare claims, yet animal welfare scientists are professionally (and personally) engaged in thinking about animal well-being. Thus, this paper's research questions are:

- (1) Do animal welfare scientists feel that cell-based meats are in-line with their own animal welfare critiques of agricultural models they see as problematic?
- (2) What might reducing the number of animals farmed mean for animal welfare?

The present study is similar to and builds on a previous study by Neil Stephens (2013) who also used semi-structured interviews to obtain a range of perspectives on IVM while noting the diversity as well as the similarities of responses.

A note on terminology: The population of this study is farmed animal welfare scientists. I often shorten this to "welfare scientists." This term applies to those with expertise in farmed animals, although not necessarily limited to farm animals. Similarly, "welfare" refers to farm animal welfare and "animals" refers to nonhuman animals while acknowledging that humans are also animals.

The analysis of this chapter is informed by literature on science and technology studies (STS) and proceeds as follows. First, key features of STS that are especially applicable to this

study are briefly summarized. I then provide a summary of how animal welfare has appeared in the literature on IVM, noting how welfare discourse varies and is often not presented in a well-defined manner. Next, I describe my research design involving interviews with welfare scientists. Following that, I present the range of interviewees' viewpoints along a rough continuum of more favorable to less favorable. While interviewees were generally open to IVM, special attention is paid to nuance and range of responses that arose within and across interviews. Lastly, I summarize and draw together participant responses by drawing out common themes in terms of both optimism and skepticism concerning IVM.

LITERATURE REVIEW

This chapter is informed by science and technology studies (STS). STS is a vast area of social science research. Thus, I do not attempt to summarize it here. Instead, I focus on a couple key themes in this literature that are used in the discussion section below. Namely, these themes are the role of values in technological innovation, and unintended consequences.

Scientific production is inseparable from social relations (Latour and Woolgar 1987). One reason for this is that values are built into decision making (Huesemann and Huesemann 2011; Meadows et al. 1974; Twine 2015; Jönsson 2017). Values are inserted into the results when deciding what technology to research, how to design it, and for what purposes to use it (Mumford 1963). Despite a rhetoric of appealing to “facts,” scientific results and technological innovation are not immune from the influence of values (Twine 2015). Values in scientific endeavours seem to be unavoidable and, in fact, it may be better not to hide this but to be up front about one's values to promote sound science and policy (Elliott and Resnik 2014).

Scott (2018) provides a useful overview of key terms in STS. A magic bullet targets a specific issue while leaving the rest of a system unaffected. A technological fix uses technology

to solve problems that are fundamentally social and tends to overlook root causes. Such root causes tend to be social in nature. Magic bullets and technological fixes can lead to unintended consequences, which can take two forms: (1) side effects or “trade offs”—a gain in one area is accompanied by a loss in another, and (2) revenge effects—new problems that are as bad or worse than the original (Tenner 1997). Another important phenomenon is known as “rebound effects” which occur when an increase in energy efficiency does not lead to proportional reduction of overall energy use (York, Adua, and Clark 2022). Something similar may also occur with technology, where the introduction of a new technological product does not proportionally displace current processes. Such a phenomenon has been found to exist with alternative energy and food sources (York 2021; York and Bell 2019).

Unintended consequences are a consideration for every technology and are considered unavoidable and unpredictable (Huesemann and Huesemann 2011). Consequences are not equally shared by all, least of all by those who innovate and reap profit from technology. Unintended consequences result from ecological and social interconnectedness (Huesemann and Huesemann 2011). Very rarely can humans understand all components of a system, and the whole contains complex and subtle interplays between its parts and its surroundings. As Memford (1963) noted, technological innovation frequently, but erroneously, has an epistemological premise on human separation from nature. This presumed separation can itself be considered an anthropocentric value. Without considering social and ecological embeddedness, the use of technology can overlook variables that can influence the outcomes of technological use.

ANIMAL WELFARE IN THE IVM DISCOURSE

This section surveys published academic literature on IVM concerning the welfare discourse in the space. “Space” here is being used to refer collectively to anyone involved in research, production, or promotion of alternative animal products, along with the social and cultural elements involved in interactions between actors. Stephens interviewed those involved in IVM production but paid special attention to what he called a liberation narrative. Poirier and Russel (2019) problematized this label and argue that Stephen’s usage of “liberation” is closer to that of welfare. Stephens, in interviews with researchers directly involved with IVM production, labels a variety of scenarios given by participants as exemplary of animal welfare discourse. One interviewee hypothesizes that it might be possible to “feed the world taking the umbilical cords from ten sows per year, give or take” (Stephens 2013:169). Another comments on an alternate method by culturing embryonic stem cells from pigs or cows “because they can be cultured indefinitely” (Stephens 2013:169). Evelyn Pluhar, reviewing the literature, found one quotation asserting that “a single muscle cell extracted from a living cow, for example, could in principle produce enough meat to satisfy the annual world demand for beef” (2010:463). These comments are discussed in the context of welfare discourse, that such a scenario would be better for the animals. This is representative of how early IVM proponents described the potential welfare benefits of IVM.

Others make passing reference to welfare yet rely on it as a major impetus for IVM research and development. Post (2012:298) only says that welfare is a significant concern for the public that the meat industry may be forced to respond to. Bhat, Kumar, and Bhat (2017:783) merely mention that the way animals are currently housed and slaughtered pose welfare problems. In an early and highly cited paper, Hopkins and Dacey (2008:585) say that one bad

thing about meat consumption is that animals suffer and die but IVM could eliminate this, arguing that it would be ideal to “eliminate the need to keep and slaughter animals at all” (581). Niszczoła and Błaszczyński (2023) empirically found animal welfare to affect theoretical financial investment in meat companies negatively (that is, due to perceived negative animal welfare, people shows a stronger unwillingness to invest in meat companies) but animal welfare had the opposite effect for theoretical investments in IVM companies by indicating an increased willingness to invest in them, although participant willingness to invest in IVM companies was still negative overall.

Rorheim et al. (2017) are a little more specific in mentioning the elimination of slaughter and biopsies as conditions that improve welfare. Dutkiewicz and Abrell (2021) have argued that animal welfare could be improved if cell donor animals are raised in sanctuary-like settings. Melzener et al.’s (2021) in-depth article on cell biopsies considers several conditions that might impact cell donor animals: housing conditions, biopsy technique, number of biopsy sessions and biopsies per session, number of biopsies from a single animal, recommend analgesic use, and what might happen to a cow after their use as a cell donor. However, these are informal recommendations by the authors where their primary concern is quality of cell sample, not welfare. Robison-Greene (2023:17) indicates that by switching to IVM there will be fewer animals. Pressure to grow and produce will be absent and so the remaining animals “will be allowed to flourish in the ways that are appropriate for members of their species” because they will be viewed as living beings (17). Chriki et al. (2022:41) have problematized the welfare potential of IVM by noting the multidimensionality of welfare, the link to live animals, that it cannot yet replace all types of meat, and call the current debate “more emotional than rational.” Others are cautiously optimistic that IVM can decouple meat consumption from slaughter and

suffering (Heidemann et al. 2020; Reis et al. 2020). Heidemann et al. (2020:6) consider the decrease in the number of individual animals involved in meat production “a straightforward gain in animal welfare. The animal welfare gains refer to the reduction of total animal suffering.”

The most similar previous study to this one is by Heidemann et al. (2020). The authors note how opinions about IVM of professionals involved in animal production are lacking. Heidemann et al.’s study surveyed Brazilian veterinarians and animal scientists about their attitudes towards IVM. However, this study is limited to specifically Brazilian veterinarians and animal scientists and did not necessarily include welfare experts. The survey did contain four open-ended questions, but even open-ended questions within a survey engage limited responses compared to open-ended interviews. There is not an option for clarification or to ask follow-up questions. The present study in this dissertation complements and extends the literature summarized in this review by interviewing animal welfare experts across four continents using interviews to elicit detailed and nuanced responses.

This review highlights the variety of ways welfare is used in previous publications on IVM. It should be noted that welfare is a broad term and can be defined and enacted in numerous ways in theory and practice (Fisher 2018).

METHODOLOGY

Method: Interviews

For this study, I am interested in thoughts of welfare scientists on the particular subject of IVM and animal welfare but also wanted to allow interviewees to talk about this subject however it is meaningful to them. Therefore, semi-structured interviews are particularly applicable. Semi-structured interviews allow for dialogue between interviewer and interviewee. Such back-and-forth exchange allows the conversation to evolve rather than be confined in ways that may

constrain the potency of results. This allows the topic to be developed in-depth while the particular content of that depth is largely up to the interviewee (Bernard 2011).

An interview guide, designed for 45-minute interviews, was created. Questions follow Castillo-Montoya's (2016:822-824) suggested ordering to create an inquiry-based interview that flows well. The initial questions are "safe" in that they ask about the interviewee's welfare background. Question 3 transitions to the interviewee's knowledge about IVM. This question helps glean an understanding of how much knowledge and from what sort of position interviewees approach the topic of IVM. Questions 4 & 5 directly target research questions and get to the heart of the matter about IVM and the role it should/could play in welfare. Questions 6 & 7 ask side questions that could shed additional light on the main matter at hand. The penultimate question extends the interviewee's response to the wider community of welfare scientists. A final question gives the interviewee a chance to raise any issue(s) that did not arise during the course of the interview.

I also followed Castillo-Montoya's (2016) Interview Protocol Refinement Framework. Step 1 is to align interview questions with the research questions. Step 2 is to construct an inquiry-based conversation. To achieve these steps, I derived interview questions from research questions and step 2 was explained above. Step 3 is to receive feedback on my interview guide. My interview guide was created in a qualitative methods class and commented on by the instructor. It was then reviewed by my committee members, and changes were incorporated. Lastly, Step 4 was to pilot the interview. Three practice interviews took place in July and August 2022, using animal science graduate students, as they are a similar population to my target population but with no overlap with actual subjects. These included two U.S. students who admitted they had little previous knowledge about IVM, and one student in Europe who had

extensive previous experience with IVM. Feedback immediately after the interviews was solicited to improve interview questions concerning wording, order, and content. Only one practice interviewee gave feedback on the wording of a single interview question, and this was changed accordingly for the actual interviews. Since only this one comment arose from practice interviews, I stopped at three.

Criteria for interviewees were that they are animal welfare scientists with a PhD in animal science or a related field, their primary occupation involves animal welfare, and they work with farmed animals directly. In emails to potential interviewees, it was made clear that I was interested in their perspective on IVM as welfare experts, not as IVM experts. This way I did not have to provide any materials that describe IVM to them which can introduce bias depending on how IVM is described and what it is called (Bryant and Barnett 2019; Bryant and Dillard 2019). Thus, interviewees came with their own preconceptions, which is what I was interested in. Altogether, 41 individuals were contacted for interviews (see sampling below), and 17 resulted in interviews. Interviews took place between August and December 2022 on Zoom. Audio and video were recorded for transcription. Interviews ranged in time from just under 20 minutes to 55 minutes, with the average being between 40-45 minutes. At the end of each interview, each interviewee was given a chance to make any additional comments they wished to make or to suggest a question/topic that they felt I should have asked about. This yielded few responses but some of them were suggestions for follow-up studies and limitations. These instances are discussed in the conclusion.

Sampling

This study is not intended to garner a representative sample but to initiate an investigation as to how welfare scientists think about IVM. Thus, purposive snowball sampling was used (Noy

2008). This is because the target population is not readily available via a sampling frame (Parker, Scott, and Geddes 2019). I had previously completed a graduate level animal welfare course through MSU that was co-taught by three welfare scientists from different universities. I began by reaching out to these instructors informing them of my study and asking if they could provide a set of initial recommendations. Leads who were contacted for interviews were also asked for at least one (with no upper limit) further recommendation based on my selection criteria. One of my leads suggested I check animal welfare journal editorial boards as well as a professional ethology society. I screened recommendations by looking at their institutional and/or personal webpages to make sure they fit selection criteria. From a given set of potential interviewees, individuals were purposively selected based on who seemed like they would provide helpful information considering my criteria (Griffin 2017). This can help correct for potential distortion in interviewees in terms of overrepresentation of a particular characteristic (Parker et al. 2019). Interviews continued until I detected saturation.

Interviewees

Below are the results of my “demographic” variables concerning interviewees. Each variable pertains to interviewees at the time of the interview.

Primary species of focus/expertise: dairy cattle (8), pigs (3), dairy cattle & pigs (1), sheep (1), laying hens (1), laying hens & pigs (1), horses (1), various (1)

PhD field: animal science (6), veterinary (3), applied animal biology (2), animal behavior and ethology (1), behavioral ecology (1), animal behavior (1), animal behavior and welfare (1), applied ethology (1), neuroscience (1)

Department of employment: veterinary science/medicine (5), animal sciences (5), animal and veterinary sciences (2), animal and food sciences (2), animal and dairy sciences (1), animal husbandry and rural development (1), federal (1)

All three demographic variables of the scientists were either found through an internet search while screening potential interviewees or arose during the interviews. The species classifications

derived from an interview question that asked what species the interviewee was currently working with at the time of the interview. Answers were used verbatim, hence “laying hens” instead of “chickens.” The breakdown of PhD and department are mostly used verbatim but some limited liberties were taken. For instance, any PhD that mentioned veterinary studies not in conjunction with some other title were grouped together as “veterinary.” These might include “veterinary science,” “veterinary medicine,” or “veterinary animal welfare.” It is worthy to note that for the demographic variable of PhD, areas between “applied animal biology” and “applied ethology,” inclusive, could potentially have been grouped under a title of, for example, “animal behavior.” I chose to list them as distinct because they are the terms interviewees or their professional/personal websites used which note distinct departments at various institutions. This also illustrates some of the diversity within animal welfare PhD areas.

Likewise, the department classifications as used above could be combined in various other ways. But again, this shows some of the diversity of not only where welfare scientists are employed but also how their departmental positions can differ from their PhD fields. Indeed, one interviewee (Participant 14) remarked that welfarists not trained in animal science per se and with no farm animal background have come into the animal sciences and done excellent work.

Other demographic variables were not collected, nor do I speculate on them. Partly this is because the sample is not representative and results would not be generalizable. Also, in some instances, particular demographics may result in indirect identification of interviewees, violating confidentiality. Interviewees were located in North America, South America, Europe, and Australia, but these locations do not necessarily coincide with the interviewee’s ethnicity or region of education.

Analysis

Transcripts were analyzed by locating the direct responses to interview questions corresponding to questions 1 & 2 above. The interview questions were:

- (1) Do you think that IVM could help address your animal welfare issues/concerns with animal farming?
- (2) Would you consider a reduction in the number of animals farmed to be an improvement in animal welfare?

These portions were read in full, looking for parts of answers that spoke most directly to the question(s) posed. Then the remainder of the transcripts were read to find places where these questions might have been returned to or answered out of sequence. All relevant quotations were copied and pasted from their transcripts and organized by theme.

In writing, I use the term IVM throughout because I consider it to be the most objective name. In interviews, I exclusively used “cell-based meat” because I thought this was the most descriptive term for meat grown from animal cells outside of a living body and thus more precise for interviews with experts. Participants’ terminology is retained in quotations regardless of the term they used. Also, in quoting participants, I used parts of their responses that are relevant to the topic of this paper. Many responses were fairly long and touched on numerous points. Extracts are often broken up with ellipses (...) for analysis and brevity purposes. I was careful not to cut intervening tracts of text that fundamentally altered a participant’s discourse. The following results and discussion showcase the variety of responses received.

RESULTS

With this section, I highlight the range of responses to the questions concerning IVM’s ability to help welfare scientists with their welfare concerns. On the more affirmative side, one

type of response was that IVM could push farmers to increase the welfare of animals remaining on farms.

If I had to hypothesize about what would happen if we could produce it on a large-scale system ... cell-based meat could potentially become the norm at a lower price. And then animal agriculture could potentially shift into a niche market for high-end products.
(Participant 4)

We can [make] progress on animal welfare using cell culture technology development as [an] excuse of “look, this is happening, start to make changes here.” (Participant 8)

Both participants articulate a mechanism where IVM could act as a motivation for producers to increase their welfare standards. Participants 4 and 8 both posit indirect mechanisms. They attribute the connection to IVM being potentially seen as a superior product. Thus, in order to compete, producers would need to elevate the welfare of the animals they raise. These participants envision animals remaining in agriculture to largely fall into what might be described as “high welfare” out of a financial necessity. Participant 6 gives two further examples, both more direct than Participants 4 and 8:

I do think that if it became an acceptable option, then it would help address animal welfare issues because you would presumably be producing fewer animals and you can take more time and more care and invest more resources in the animal.

I also like the idea that we might stop selecting for animals that can just grow so quickly ... and kind of go back to earlier versions of the animals that are probably more natural for them, which would then reduce a lot of health problems that are seen when somebody’s fast growing animals.

The first idea attributes increased welfare to more time, care, and resources able to be devoted to individual animals because there will be fewer of them; the second allows animals to return to a more natural state which should improve their health.

Notice the slight differentiation here: a decrease in the number of farmed animals is linked to an improvement in animal welfare sometimes in and of itself, and other times through social mechanisms to create external pressures to improve welfare.

It's I think the best solution we could ever imagine because it can potentially take animals out of animal products. ... every time someone buys a kilogram of meat that is cell-based or plant-based, it is a kilogram of meat that was not produced by killing an animal. ... And because the process is, again, intrinsically bad for the animals because it relies on killing them and this has many indirect consequences in our relationship with animals, and because the process has so many procedures and practices that could be better but are not good, so animals are also suffering because of avoidable problems. Removing them from the scheme is the best thing that we could do in my opinion. (Participant 13)

Are you familiar with the three R's in animal research? ... Almost everything you read about animal welfare with respect to farm animals is about refinement, essentially. But I think if you're looking at ... meat replacements, ... they can have a big role to play in terms of the replacement and reduction components. (Participant 17)

Participant 13 states that the system of raising animals is so bad that taking animals out of that system is considered an improvement on its own because of all the harms that are avoided.

Participant 17 refers to the “three R’s”: refinement, reduction, replacement, specifying that the latter two have roles to play in helping to improve animal welfare.

So far, participants identified ways that lowering the number of farmed animals could improve animal welfare. Most interviewees found at least some way welfare may be improved. But others, including some of those quoted above, drew more of a distinction in terms of animals absent from the system altogether and animals who remain in it.

...completely removing livestock from the equation, we're solving the animal welfare concern. But I'm thinking that alone is not helping in improving the welfare issues that we have right now in the livestock production systems. So it's two different things. (Participant 10)

I don't think it's going to change ... animal welfare problems in industrial farming. But I think cell culture is going to reduce the animals that are being put through that system. (Participant 8)

Participants 10 and 8 note that removing animals removes welfare concerns in those instances where animals would have existed, but is not a solution in and of itself. In particular, Participant 8 notes that potentially fewer animals may go through the industrial livestock system but that some animals will still endure it and those animals would be subject to the same welfare issues.

Participant 10 essentially describes a trivial welfare improvement by removing animals but notes it is distinctly different from caring for living animals implicitly saying there are still animals who have to endure production systems, relating to participant 8. Below, Participant 12 provides added detail in terms of what sorts of welfare concerns are still an issue:

... you're not going to completely remove the animal welfare aspects because lambs are still going to be castrated, cows are still going to be dehorned and things like that. So, I guess it could alleviate some of those other issues of animal welfare but it wouldn't completely remove them unless we remove the animal industry.

In other words, IVM may help address only some welfare issues while others remain. Also along this line, Participant 5 provides another categorization of the types of welfare concerns that may be addressed by IVM, namely those of the meat industry:

So I guess if we think of this on an extreme scale where everyone switches to cell-based meat, then we would have no need for animals to be farmed. Well, sorry, I'm thinking of meat. ... But then of course I think of my industry with dairy. Cell-based meat has nothing to do with dairy so I don't see it doing anything for cows, dairy cows. ... So it's not going to help me.

This comment notes species-specific issues. Indeed, IVM does not directly intervene on dairy production so animals in those processes may be unaffected.

Yet others pointed to other issues they see as more fundamental than simply removing animals from farming systems:

Well, it wouldn't, right? Because it depends, depends what the issue is. I personally don't think the issue is that we raise livestock and that is the issue that cell-based meat is trying to solve. (Participant 2)

Participant 2 draws a line between raising livestock per se, and how livestock are raised. They highlight how IVM focuses on the former when the latter may be able to be addressed without IVM and achieve the same results in terms of welfare. The next participant identifies a number of issues with IVM in terms of it being partial and misdirected:

... cell-based meat for now is just able to produce only one type of meat product which is the grounded meat like for a burger or something like that. ... And the other thing is that grounded meat comes from all types of animals but mainly beef. ... So it's really partial, it addresses such a small part of the meat products that I don't think it will have any effects on the number of animals that are raised, or in feeding habits.. ... So we first have to reduce the need, the number of animals that we need to raise. And then we'll have more space, more time, more room, more money to raise animals in a better way. (Participant 11)

Participant 11 notes that IVM would only (at least as of yet) work to replace certain types of meat which would translate into replacing certain species of animals. Instead, they focus on what they see as a more fundamental issue: eating habits. This would need to be addressed for welfare to be successfully addressed on the whole but IVM is limited in its ability to accomplish this.

Participant 9 identifies a different fundamental issue, that of the growing human population:

... we are not going to be seeing a reduction in [human] populations, that as we know, as populations grow especially in developing nations we see a larger trend towards consumption of meat products. Which means we have to have more animals on hand to meet those production demands. I see [IVM] more as a way of slowly phasing out some of that expansion that leads to the issues that we have.

Rather than affecting welfare, Participant 9 sees IVM as possibly avoiding a continual increase in the number of animals farmed but not necessarily reducing the number of farmed animals. In this instance, current welfare concerns are unaffected.

A couple participants specifically says that IVM could decrease welfare incentives: I actually think it doesn't [improve welfare]. And I say that because I think that providing an alternative meat source releases the pressure on a producer to improve their product. And I say that because instead of continuing to push for better, people instead can abandon and switch to an alternative. As opposed to those that believe in a high-end meat product continuing to purchase that high-end certified humane egg product, if there's now an alternative protein to switch to it may actually lose that marketability for that high cost product. (Participant 1)

[Concerning] animal protein that comes from traditional systems, you would get most of your consumers from the consumers that are actually more likely to get animal welfare friendly products from the shelf. So whatever is left of livestock probably will not be in the animal welfare friendly scenarios.... We will end up reversing some of the change that we have because ... if you don't care, now we have the egg that comes from

chickens that are in a cage. If you care, you buy the egg that comes from cell-based meats or cell-based protein in general (Participant 2).

In contrast to Participants 4, 6, and 8 above, participants 1 and 2 suggest that IVM can take away incentive for high welfare from both producers and consumers. If there's a high-quality alternative, there's presumably less reason to care about the welfare of those animals who remain.

Most of the positive welfare claims of IVM proponents seem to implicitly rely on their being fewer animals being farmed. But the connection between fewer animals and improved welfare is not made clear. We've seen above some speculative examples of this connection by participants. But this type of claim is common in the pro-IVM literature so it deserves consideration on its own. When asked if a decrease in the number of animals is connected to improved welfare, the content of responses shifts to one of disciplinary boundaries:

I see this topic as relevant to animal welfare but not a topic for an animal welfare scientist because my job is to understand and evaluate the quality of life of an animal. And so developing an alternative is animal replacement. [I]n our work we're trying to improve the lives of living animals and this would replace those lives. (Participant 7)

I don't think so. Because what you propose, lab meats, is an alternative. So we're not fixing the animal welfare issues from the current herds. We're removing completely the questions of welfare issues from the equation. So that's two different things. (Participant 10)

...if you're not relying on actual animals themselves, then of course there's no animals that are being raised and going through husbandry procedures. And then of course there's no actual end of life concerns like ensuring that the slaughter is done properly and stuff like that. So, yeah, it's always going to be superior in that aspect. If you don't actually have an animal involved then there's no welfare to impact. (Participant 12)

For me animals not existing is not an animal welfare challenge because it wouldn't matter from my perspective as an animal welfare scientist that we had fewer animals. Maybe it would matter in the sense that those particular animals that had they lived could have experienced welfare challenges. But the fact that they're not living means that it doesn't impact their welfare because they never had the ability to experience that.... (Participant 16)

These quotes emphasize that there is no direct connection between fewer farmed animals and welfare. In fact, there may be no connection at all, as participants 10, 12, and 16 say above. Caring for living animals and removing them altogether are “two different things.” So while IVM proponents may proffer fewer animals as improved welfare, welfare scientists largely do not see it this way: “I can’t say that because my goal is not less animals in the world or the less animals consumed, my goal is to improve those quality of lives that are being consumed” (Participant 1). In fact, one welfare scientist I reached out to who declined to be interviewed remarked in their response that it was precisely because they did not see IVM as relevant to their job as a welfare scientist as their reason for declining to participate. These quotes reveal that to at least some welfare experts, removing animals is not a welfare question. Instead, it avoids the question altogether. IVM proponents who argue that IVM will improve animal welfare by reducing the number of farmed animals are making an assumption that is not necessarily valid from a professional welfare science perspective.

However, Participant 17 stated plainly that “if you can reduce the number of animals that are undergoing these harms then that’s a positive in terms of being less negative.” This remark comes from Participant 17 believing that most farmed animals do not have lives worth living (a primary reason this interviewee got into welfare science). Therefore, on balance, using a utilitarian calculus, decreasing the number of negative experiences by decreasing the number of animals is viewed as a positive thing, or something that at least moves an overall welfare calculus in the positive direction. This is a similar description as the main result of Niszczoła and Błaszczński (2023) who found that welfare considerations made investing in IVM companies seem less negative yet not overall positive.

Beyond this, the IVM welfare argument runs into still more problems, even if there are several ways that fewer farmed animals could improve the welfare of animals who remain. Particularly, “...where are they getting the cells from? Are they going to have animals somewhere? How are they going to house those animals? How many? And also, are they using blood serum to feed these cells?” (Participant 8). These were concerns echoed by many participants. As summarized by participant 14, “Because of course animals are going to be used for generating cell-based meat, how do they live out their lifetimes?” These are questions I would argue the IVM discourse does not yet engage, and it likely will be some time before the details of what animal products are needed for IVM are clear, meaning connections between fewer farmed animals and welfare are purely speculative at this point. There is potential, yes, but at the moment that is all. As participants pointed out, it could depend on many things:

I guess in some ways it will depend a bit on the technology and where the technology can take us, as well as maybe on the environmental trade-offs that could happen....
(Participant 15)

... you're still going to have a lot of animals in one space. You're still going to have potential issues with disease and probably still issues with abnormal behaviors. And the same sorts of things about providing resources to them that might create bacterial contamination. (Participant 6).

Participant 6 here assumes there will be a lot of animals in one space. This is a point that is not yet decided but it does seem fairly likely as animals being spread out require more time, resources and interactions to coordinate. Even smaller farms do not necessarily imply better welfare than larger ones: “I've read some stuff about is welfare necessarily better on smaller farms than larger ones. I think there's no clear conclusion about that” (Participant 17). And, further, current welfare certified production systems may not actually indicate superior welfare (Reis and Molento 2019). This problematization implies that a decrease in farmed animals does not necessarily equate to improved welfare for animals who remain (under any system). The

reason answers seem to be not straightforward for welfare scientists is because of the problems that arise in using technology to solve problems. Participant 13 captures this sentiment:

I don't think it's reasonable to expect that a new technology will solve all the problems. Especially the types of things related to the way we are organized in terms of economy, they don't rely exactly on technology.

And recall participant 15's response above who called attention to trade-offs and cultural acceptability. Participant 14 brings up additional considerations, questioning if IVM

can supply the types of [needed] nutrients, if people are willing to accept it, or afford it. And who owns it? ... what kind of control does anybody have or competition does anybody have on some of this stuff? These are really huge questions [laughs] that have to be considered when you introduce this type of technology.

By way of comparison to genetically modified organisms, participant 10 notes how values can redirect a technology resulting in unequal experience of benefits and consequences:

We know that what happens is that some companies make a lot of profits and make it in the technology in a certain way that basically did not help to solve the issues but created more dependence of the farmers to specific other technologies and products. So I'm just saying that theoretically it seems to be a great idea. The reality is, do we have a system that will make it push in the goal that is intended?

This participant doesn't want to create worse problems than currently exist, such as increased dependence of farmers on technology. Further elaborating on the tendency of technology to help certain segments of the population over others, participant 7 also hints at how IVM technology might be unevenly used within agriculture:

when they reach a certain size the farmers can live better lives, right? Where they can actually take time away from the farm, they have hired help and they have the financial means to, um, I'm kind of getting outside my area of expertise now. It's just, it's just what I sense. These are the people that I see attending meetings and wanting to invest in technology and wanting to know what they can do to innovate. And I don't know that smaller farms have that luxury.

In the following extracts, participants 11 and 3 get at the multidimensionality issues at play with IVM and technology in general:

I see this as an example of a trend that we have of always relying on technology to solve our problems, which technology can be useful but I don't think it solves everything. I think that it's even dangerous to think like that. ... I think this high technology solution always relies on more energy consumption, a global market organization, a lot of resource consumption, and travel, and things like that.... it's just displacing the problem somewhere else. (Participant 11)

I think it's very simplistic to say that if we could just make more meat it will solve the problem that some people don't have enough consumption of animal protein. I think we won't change because the structures will be the same. (Participant 3)

Participant 7 is touching on how the size of a farm and the life of the farmer(s) makes a difference in ability to adopt certain welfare measures (Fisher 2018; Howard 2021, 2022), while participants 11 and 3 highlight the shortcomings and limitations in reducing social problems to purely technological fixes (Scott 2018). These elements will be discussed in the next section.

DISCUSSION

This section discusses broader themes that can be found across the interviews. There is the question of whether IVM can effectively replace industrial animal agriculture, or merely be a more intensive version of or an addition to it (Poirier 2022). Indeed, IVM is emerging through capitalism and industry stakeholders' discourse does tend to revolve around growing their business(s) (Poirier 2021). The social context in which IVM is emerging is that of a "capitalist logic in which social problems are primarily solved through market-based innovations, an isolation of a few selected mechanisms, and technical mastery" (Gertenbach et al. 2020:16). Businesses and investors are primarily concerned about turning a profit (see Poirier 2021). Welfare scientists, on the other hand, are clearly concerned about how IVM may impact animal well-being. Interviewees routinely noted how welfare policies tend to impact the economic bottom line negatively. Hence, these competing values are important for studying how IVM may impact animal welfare.

In the parlance of Scott (2018), Participant 3 above says that IVM acts as a technological fix, that there are other social issues at play that influence our present conditions but that IVM will not affect those. Participant 11's noting of the tendency of technology to displace problems elsewhere recalls Scott's (2018) notion of a silver-bullet. This kind of reductionism can lead to deep insights but may also present too narrow of a vision and ignores various connections. They seem to be viewing IVM as a silver bullet but one that is overly targeted. In this case, IVM targeting the mere existence of farmed animals is too narrow of a focus to be effective. The problem is identified as much wider or more entangled than a single component. Their examples of energy, the market, and resource use are possible trade-offs incurred.

Although not uniform in their opinions on welfare, interview participants did see opportunity to decrease the size of animal agriculture upon successful introduction of IVM. Melzener et al. (2021) note that beef cattle could be reduced from approximately 1 billion to about 20,000, a substantial reduction (by 50,000 times). This in turn should substantially decrease the amount of land needed to raise crops to feed large herds. In this way, IVM could bring about improved welfare by allowing for greater concentration on the many fewer animals who remain. Such increased attention was something interviewees frequently emphasized. However, it should be noted that Melzener et al.'s numbers are theoretical, rely on highly managed herds, and depend on additional factors the authors do not directly include.

Participants also noted that IVM, while perhaps not able to completely replace animal agriculture, could replace certain types of meat, such as ground meat, and certain types of animals, such as the species that are typically used for such meat products (for instance, perhaps not dairy cattle). In the absence of rebound effects (see York, Adua, and Clark 2022), a decline in some sectors represents overall fewer animals in the industry. From the interviews, it seems as

if the assumption is that welfare issues could also be addressed to the extent that animal agriculture shrinks in size. If certain species are replaced, so are their species-specific welfare concerns; if certain meat products are replaced, so are the welfare problems associated with producing those products; and if animal numbers are reduced overall, then there are at least fewer animals experiencing welfare problems. These comments refer to an overall reduction in animal farming and concomitant meat consumption. Such a focus could help guard against unintended consequences, such as those of revenge effects or rebound effects (Tenner 1997; York et al. 2022).

Participants frequently commented on the ability of IVM to replace certain components of agriculture, including replacing certain species and/or animal products, and in turn replacing concomitant welfare concerns. Early in this paper, Participant 6 was quoted as outlining two mechanisms for IVM to help increase welfare. But these scenarios were not without qualification: “But it would require ... people to be willing to then pay the price so the producer is not losing out.” In other words, participant 6 attributes a large component of IVM’s potential connection to welfare to consumer choice. The most fundamental act of animal agriculture—raising live animals—may be appropriated to a large extent by IVM, although participants frequently noted that at least some animals will likely remain from whom to source cells from. And these animals’ welfare matters to interviewees. However, the simple substitution of one object for another—in this case, the replacement of farmed animals for IVM—can lead to an increase in use of the object intended to be replaced (Tenner 1997).

Some of this is also contingent on animal agribusiness not buying out IVM companies (Howard 2021). This tends to have the effect and goal of growing or at least sustaining the output/impact of animal agribusinesses (Howard 2022). Many of those who view technology

critically warn about the constraining effects of capitalism and incumbent industries buying out start-ups (Goldstein 2018; Foster, Clark, and York 2010). Participant 9 articulated this scenario above. Participant 8 also sees IVM “technology being developed parallel” with traditional animal science. Thus it may be that IVM represents a way to make up for limits to growth of animal agriculture, a point many within animal agriculture realize (Reis et al. 2020). IVM may act as a supplement to or be blended with traditional meat to “commercialize cell-based products, besides maintaining conventional animal-based meat” (Reis et al. 2020:4).

Comments on the point of not breeding animals or allowing them to return to (at least a more) natural state were the most direct on how welfare could be improved via IVM. The idea of having fewer animals with more attention and resources devoted to each reflects qualitative over quantitative betterment. The latter is typically favored by larger, industrial companies as a precise way to track uniformity in and quantity of products, as well as profit (Twine 2015). Instead of seeking to increase production, numbers, or profit, these suggestions are hands-off, low(er) tech approaches to improve the lives of animals. Improved human-animal relations also go against human/nature separation as it may bring humans and animals closer together more often, in better circumstances.

The likelihood of realizing these outcomes is a different matter. Welfare scientists already face various struggles from producers and processors in getting their recommendations implemented (this was commented on by many participants but not covered for lack of space) (see Heidemann et al. 2020; Fisher 2018). Yet, as participants indicated, it may be too soon to write off the potential of IVM. Raising fewer animals more naturally seems to resonate with animal care and improved human-interaction values of welfare scientists. In line with Mumford’s (1963:430) takeaways from his study of technics and civilization, when social considerations are

taken in concert with technical ones, a “mine and move” mentality can be replaced by a “stay and cultivate” one. Raising fewer animals more naturally seems to dovetail with “stay and cultivate” and resonates with animal care and improved human-interaction values of welfare scientists. Also potentially promising here is that a more qualitative approach to animal welfare contrasts with the quantitative approach generally taken by large agribusinesses (Twine 2015).

I indicated above that participants alluded to limitations with IVM on its own. Some noted that IVM was merely a replacement that would not affect wider social structures such as consumer attitudes. This shows that welfare scientists acknowledge the social embeddedness of both animal welfare and technological development. This is an important caution not to overstate the potential of IVM to improve welfare. The same can be said, though, about the reverse, that the introduction of IVM would not necessarily imply decreased welfare either. Others noted that many decisions are going to have to be made if and when IVM begins to displace animal agriculture to a good extent. Even with increased resources to devote to the relatively few animals left, “It might not get better for the animals that remain, depending on what the human priorities are at the time” (Participant 15). Stakeholder priorities will likely be affected by the shifting terrain of animal farming and animal product consumption. It is difficult to say what priorities may be in such a scenario because “societal norms for how we manage our animals on farms are always evolving” (Participant 5).

Because of this currently being both theoretical and hypothetical, one participant concludes “I could see life improving for the remaining animals” but “It’s up in the air” (Participant 17). Echoing participants, Reis et al. (2020:9) posit two scenarios: “(A) average farm animal welfare decreases due to a pressure for low-cost conventional meat and (B) average farm animal welfare increases due to a niche-market developing for traditional meat.” Decisions made

and the values behind them will help determine which scenario is favored. These comments reflect the embeddedness of animal farming within knowledge-power networks (Twine 2015). Welfare scientists do not exist independently from consumers or from animal producers. Decisions are made through interaction between various social sectors that may have competing values.

Considerations outside the immediate scope of animal welfare were also important to participants and helped instill a sense of caution. For instance, Participant 13 stated that there is extensive downplaying of animal protection rhetoric within IVM discourse. To the extent this is the case, it is clear how this could have consequences for welfare. Evans and Johnson (2021) also note an anthropocentric framing of IVM at the federal level and suggest that such a framing will likely lead to increased levels of animal product consumption and related intensive uses of animals. Participant 7 touched on the fact that large businesses are often the first to adopt emerging technologies because they have the resources to invest in them, making it more difficult for smaller livestock producers to share in the benefits. While some IVM literature suggests ways in which livestock producers can remain viable (Bonny et al. 2015; Burton 2019; Newton and Blaustein-Rejto 2021; Melzener et al. 2021), it is frequently noted that large enterprises are most (easily) able to incorporate alternative animal products. Within such an unequal landscape, questions arise as to whose priorities IVM may serve. Control of the technology may become concentrated within the largest companies at the expense of smaller producers and alternative forms of agriculture (Howard 2021, 2022). Who controls IVM technology, their motivations and values, could be important factors. Non-democratic control tends to favor elite interests and can lead to unintended consequences as certain values are

prioritized over others (Twine 2015). Welfare scientists seem keenly aware of this and are concerned about it.

As exemplified above, welfare scientists are generally aware of the complexity of these issues, such as the politics of decision making, tradeoffs, and inequality of adoption of technology due to cultural and economic barriers. This awareness is grounded in their expertise in working with animals and the multidimensionality of animal welfare (Fisher 2018). How one defines and applies welfare in practice can depend on one's values (Twine 2015). Nuance arose as the key factor and was highlighted in detail. Many participants reflect this in their measured responses. Participants challenge simplistic and uncritical views regarding welfare and IVM. Welfare scientists are nuanced in their thinking, are ethically concerned, and raised numerous crucial issues. This shows how carefully welfare scientists are thinking about these issues—more subtly than the typical IVM discourse. They certainly reject the idea that IVM is inevitable (or what is known as technological determinism) and repeatedly mention how cultural elements of human relations with nonhuman animals and with food may act as resistive barriers to IVM's uptake. Participants were often hesitant to speculate on the future and made it clear they did not have a “crystal ball” (Participants 3 and 16 used this phrase). All but two participants reiterated that they could not make a blanket endorsement or condemnation of IVM as it pertains to welfare. Notably, two out of four welfare scientists who declined to be interviewed informed me via email of their blanket opinions, both of which were negative.

Given this discussion, although Scott (2018) positions the debate on technology as one of pessimists against optimists, the responses from welfare scientists do not seem to fit nicely in either category. They are more measured, showing traits from both sides as well as possessing critiques of both sides. Participants question if the commercialization of IVM would lead to

more-than-human flourishing, or to improve public or ecological health (Twine 2015). This somewhat ambivalent stance reflects what Scott recommends, what he calls technological pragmatism, to break the unhelpful polarized debate on technology. Scott advocates precaution and responsibility as necessary conditions for effective and positive use of technology. Many participants echo this in their concerns over what sort of trade-offs or unintended consequences might arise and in their concern over how some might “lose out” should IVM become widespread. This situatedness lends itself to a critical adoption of IVM should it become materially feasible.

CONCLUSION

This study is the first to investigate the opinions of farmed animal welfare scientists on IVM by targeting farmed animal welfare experts. It is also the first study to utilize interviews for this purpose, which provided an opportunity to obtain more in-depth responses than less interactive methods such as surveys. In so doing, this study brings to light one key node in the network of relations in which, and through which, IVM would have to navigate. Little is known both within animal welfare science about IVM, and little is known outside of welfare science what welfare scientists think about IVM. This chapter brings these relations to social and critical prominence (Twine 2015). It sought to answer the questions as to whether welfare scientists thought IVM could help address their welfare concerns with animal agriculture and how a decrease in farmed animals might relate to welfare. Participant responses were necessarily full of speculation and uncertainties. Answers to both research questions would largely be summarized by the words of Participant 16: “it could but it potentially couldn’t, and it could create new animal welfare problems.” Participants generally found room for IVM to improve welfare, but frequently saw it as likely to be limited. Some saw outright replacement as good in itself.

Overall, participants' willingness to see a place for IVM to improve welfare was accompanied by a strong current of caution and skepticism. Participants tended to think of scenarios in which traditional welfare and IVM would exist together.

On the connection between fewer farmed animals and welfare, responses were just as varied. Attitudes were mixed and participants noted that there are many considerations besides straight substitution that could affect IVM's relationship to welfare. Such cautious responses demonstrate that welfare scientists view IVM critically. Their concern for social issues beyond IVM's replacement potential could help to at least minimize unintended consequences of IVM if it becomes successful. Participants noted how IVM could potentially create new welfare problems and this is something they want to avoid. This could be a role welfare scientists play in helping IVM positively influence animal welfare if or as IVM emerges. Welfare scientists, because of their valuing of animal well-being, could act as a counter measure against agribusiness's focus on profit concerning IVM.

Participants noted how welfare could be 1) positively impacted directly or indirectly, 2) remain unaffected because farmed animals would still exist, 3) negatively associated with animal welfare, 4) irrelevant in that a decrease in farmed animals was inherently not connected to welfare at all, and 5) essentially unknowable because many wider considerations beyond IVM will likely be important. For remaining animals, welfare will depend on human values concerning sustainability, edibility (Robison-Greene 2023), human-animal interactions (Heidemann et al. 2020), and consumer purchasing behavior. This study contrasts with the findings of Hiedemann et al. (2020) who found that Brazilian veterinarians and animal scientists had generally negative attitudes towards IVM whereas the present study found largely positive attitudes. This may be because welfare scientists may have a more sympathetic attitude towards

animals, view them more as individuals, and have more critiques of animal agriculture than non-welfare veterinarians and animal scientists. All of this goes a long way towards nuancing welfare claims of IVM proponents.

Limitations

One interviewee, Participant 8, mentioned that those who agree to an interview might have more favorable attitudes towards IVM, perhaps because a more empathetic person would give me the time and therefore also see IVM more positively. This generally fits with those who gave interviews and those who declined. My sample may contain some response bias due to the sampling methodology. The reporting of findings is also limited in the numerous components of the interviews that were omitted from this dissertation for space reasons, as well as a discussion of the nuance of responses to the research questions.

Further Directions

This study is a preliminary examination and further directions could be pursued to extend the topic of this paper. Welfare is a multidimensional concept, one of both simplicity and complexity (Fisher 2018). Thus, a number of other comparisons were brought up by participants. Participant 7 inquired about differences in opinions on IVM between welfare scientists within the U.S. and those outside the U.S. because U.S. animal (welfare) scientists tend to be more sympathetic to large farms. Additionally, interviewee 17 brought up the possibility of attitudes towards IVM among welfare scientists varying by species, and Participant 17 brought up other alternative animal products. Similarly, Participant 15 wondered about the reasons why people might choose IVM over plant-based food or vice versa. Environmental concerns and how those relate to animal welfare could have been assessed more in-depth in this paper as this was brought up several times.

Several interviewees mentioned vegetarianism and veganism. There was mention that welfare scientists had higher rates of veganism/vegetarianism than the general public because they work closely with animals and this brings certain experiential knowledge of animal emotions and intelligence. Therefore, vegetarianism and veganism within welfare science could be an interesting avenue to explore, perhaps even related to IVM. This could entail talking to vegan/vegetarian welfare scientists or getting opinions on veg*ism from welfare scientists more generally and see how they may relate to welfare scientists' perception of IVM.

CHAPTER 5: CONCLUSION

This dissertation examined various stakeholders in terms of the perceptions of each (activists, “insiders,” and welfare scientists) regarding alternative animal products. Attempts were made to analyze these positions in light of what they might mean both for the emergence of the alternative animal product space but also existing social structures such as food systems. This dissertation helped to sort out who stakeholders are, and how they may affect or be affected by alternative animal products. Papers 1 and 2 are complementary. Paper 1 presents an overall simplified yet detailed overview of the core arguments for and against IVM. While somewhat simplistic in the sense that it only presents strongly supporting and strongly dissenting views (as this is how the debate was structured), it introduces readers to the basic dichotomy and factionalization that IVM has caused within animal and environmental protection. Paper 2 broadens the scope by presenting a range of issues under consideration by stakeholders of alternative animal products. It focuses on breadth over depth. Together, papers 1 and 2 present a rather comprehensive view of the alternative animal product landscape. The third paper then delves into one particular interest group, namely animal welfare scientists. The lack of nuance in the positions by debaters in paper 1 is balanced out in paper 3 which presents and sorts through the careful thinking of animal welfare scientists. Investigating welfare scientists’ attitudes towards IVM proved to be particularly interesting and potentially useful to the interviewees themselves. All three empirical papers center the words of the subjects through direct quotations. By way of conclusion, I reflect on what contributions this dissertation made to literature on alternative animal products, note its limitations, and suggest topics for further study.

Together, this dissertation analyzes arguments, strategies, and values of various social sectors and actors involved with or affected by IVM. Each paper fills a gap in the literature

shedding light on understudied components of the alternative animal product space and IVM in particular. While numerous sectors of the IVM landscape have been studied (producers, potential consumers, IVM representatives, academic and popular literature), no one seems to be looking at the conference circuit. Information from the offices and laboratories of IVM companies is becoming harder to come by as information becomes increasingly proprietary. Therefore, conferences present a space where cutting edge information can be discussed. Conferences on alternative animal products are a rather untapped source of data that relates to and comes directly from those closely involved with the creation and promotion of these products. This second paper of this dissertation brings to light some of the conversations happening in such venues. A particularly novel contribution of this paper is the mini debates that occurred during these conferences. They show that this space does not consist of a united front. Another strength of this paper is that it covered the 2018 and 2019 GFI conferences in their entirety, although space precluded opportunities to unpack the events of these conferences. Nevertheless, this provides an expansive foundation to explore rhetoric in similar academic spaces.

One major thread of discourse, made most prominent in early publications but is more of an undercurrent now, is that IVM will yield an improvement in farmed animal welfare. Presumably this is because animals need not be killed or raised in inhumane conditions to create IVM (Chrki et al. 2022). However, I have not seen any study that highlights the opinion of those who would be the experts on animal welfare, namely, animal welfare scientists. As agricultural welfare scientists, they occupy a unique position consisting of an ambivalent relation towards animal agriculture. In a fairly representative statement, Participant 67 stated it thusly: “I view myself as a scientist who does research to potentially help the industry as much as I can but also to criticize the industry because that’s what we need to do as scientists.” Thus, this group’s

viewpoint is interesting as welfare scientists could present a barrier or a boon to IVM uptake. Centering a paper around interviewing animal welfare scientists on their view of IVM begins to fill this gap and sheds light on welfare claims of proponents. As Participant 7 commented, “I’m intrigued by you doing research on this because I’ve never talked to another animal welfare scientist about it.” Half of the respondents made similar comments and specifically asked to see the results of my study. Thus, this dissertation’s research involving interviewing welfare scientists works to fill this important gap as defined by the participants themselves.

The last gap this dissertation fills is in providing a simple overview of the basic debate surrounding IVM. This has to do with whether IVM will succeed in fulfilling its promises. No one doubts IVM is technically feasible. But whether IVM will protect animals, feed the poor, or mitigate climate change are different matters. My analysis of the 2019 Conscious Eating Conference debate about IVM achieves this. Debates, structured as they are to present two opposing viewpoints, can help reveal resonances and tensions between groups of people who are strongly for (in this case) IVM and those who are strongly against it. This debate’s discourse reveals the perspectives of those who are actively trying to shape what happens concerning IVM in a way that review papers do not. This paper can serve as an accessible yet sufficiently detailed introduction to the core debate concerning whether IVM products can fulfill the promises of its promoters and producers. Academic review papers tend to provide a zoomed-out view of IVM without drawing out details of pro versus con arguments. This dissertation addresses this by leaving what might be considered secondary considerations aside and instead focusing in detail on the dominant arguments for and against IVM. Someone who reads this paper may choose to pursue more information or may think that, say, the argument against IVM is convincing enough to not need to pursue the topic further. This is in fact my suggestion.

One limitation of this dissertation is that it does not have an overarching theoretical framework. This would help to further link the chapters of this dissertation together and place IVM in a larger context in a sustained and explicit way, something Giles (2022) identifies as lacking. Numerous theories could be used, such as carnism and anthroparchy, as Giles employs. Also relevant is science and technology studies (STS) or social construction. STS could be used to help illustrate how emerging technologies are laden with values, assumptions, and necessary uncertainty. Construction theory could be used to illustrate how the larger animal product space beyond just those directly involved, such as participants at the GFI or other related conferences, contribute (or do not contribute) towards shaping this emerging space.

Another potentially relevant theory would be technocapitalism (Suarez-Villa 2009). This is especially pertinent considering Giles's (2022) labelling of IVM as an "experiment" as Suarez-Villa identifies experimentalism as the driving force of technocapitalism. Given the scope of environmental problems, which everyone on Earth faces to a degree, everyone will also be subject to the outcomes of global warming, species extinctions, and shrinking available resources. In other words, one could frame whole societies as (forced) participants and as laboratories in the experiment of IVM and corporate influence over technology (Suarez-Villa 2009). Regardless of the specific theory or theories used, *social* theory is especially important relative to, say, ethical frameworks because ethicists tend to adopt an overly narrow view of the topic of interest in any given meditation and overlook wider social forces at play (for instance, see Robison-Greene 2023).

I also see this dissertation as limited by its lack of a critical perspective. Something as foundational as food, and alternative animal product proponents' concomitant claims, visions, and rhetoric of near complete disruption of global food systems across cultures (notwithstanding

contradictions in this rhetoric) necessitates critical inquiry. Much diversity in human and natural systems are seemingly overlooked in such statements of global food transformation, something my welfare interviewees pointed out. Further, as Abrell (2023) notes, with the stakes as high as they are concerning an impending environmental collapse that could make all life on Earth precarious, the risk of IVM's failure demands constant scrutiny of this emerging space. Perhaps even worse is IVM's potential to thwart other effective actions to combat Earth's current environmental situation by channelling attention and funds away from other efforts (Abrell 2023), or to even expand upon and accelerate current domination over and destruction of Earth systems and life forms (Giles 2022).

Fourthly, this dissertation is anthropocentric—another of Giles' (2022) critiques. More attention could have been paid to “the animal” perspective, and in particular, other animals besides farmed animals such as wild animals. Bruce Friedrich and Leah Garces repeatedly refer to individual farmed animals in their statements at the Conscious Eating Conference debate, something that is not directly answered by Sanbonmatsu and Stanescu. Similarly, my animal welfare interviewees consistently frame the discussion around *living* animals. The GFI conferences are anthropocentric in their approach—in their questions and solutions—as my findings suggest. In fact, animals and ethics are barely mentioned, with environmental concerns mostly confined to panels specifically on the environment. While the many privileged people who attend these conferences discuss the space's present and future, the “outside” world continues to deteriorate and the number of farmed animals continues to increase (see Táíwò 2022 for an expanded discussion about who is “in the room” and implications this has for social change). These points could have been engaged with more in their respective chapters, especially

in such a way that critically interrogates these stated concerns about animals' lives as compared to stakeholder rhetoric, actions, and likely potential outcomes.

This dissertation is also limited in that it only covered three groups of stakeholders—animal welfare scientists, activists, and “industry” insiders. There are many other groups who could be identified as stakeholders such as traditional animal product producers (Heidemann et al. 2020), animal processors, members of national governments, and restaurant owners. Also, each of these stakeholder categories could be broken down into sub-groups and studied separately. For instance, in the 2019 Conscience Eating Conference debate, all debaters identified as vegans and as activists. Yet, two were “on the ground” activists (Bruce Friedrich and Leah Garces) and two were scholar-activists (John Sanbonmatsu and Vasile Stanesco). This represents at least two different categories of (vegan) activists and, indeed, each side viewed IVM quite differently. Similarly, Participant 13 of my welfare interviews suggested two types of welfare scientists: those more sympathetic to an abolitionist view of animal agriculture and those more supportive of animal use for food and experimentation. These two groups may view IVM differently. Such divisions may lead to potential discrepancies and were not part of this dissertation's research design.

Numerous projects could be undertaken in future research. One I would like to pursue is a meta-analysis of review papers on IVM using content analysis to quantify the pervasiveness and repetitiveness of these articles. The frequency of topics such papers cover could indicate the extent to which review articles cover the same information. If the frequency of topics is skewed towards a relative handful, this would suggest certain topics may be overrepresented relative to other ones. Conversely, if frequencies represent a more even distribution of topics across papers, this suggests an overall repetitiveness of such scholarship. The goal of this study would be to

empirically investigate the claim of Chriki and Hocquette (2020:n.p.) as to the paucity of major advances concerning IVM's development even though papers on the topic have proliferated. The authors state this but provide no evidence or a supporting argument. Giles (2022:168) addresses this by noting that Chriki and Hocquette's claim pertains mainly to technical IVM production and consumer interest surveys, but a wider critical agenda can help overcome this relative stagnation. A network analysis of authors, publications, and citations could be a pertinent component of such a study.

A second idea that seems particularly important is to discuss IVM with some indigenous people who are also thinking about this issue. The goal would be to see if, and if so how, IVM could be in line with their decolonization and sovereignty efforts. Marginalized and intersectional perspectives on IVM seem to hardly be considered in the academic literature. I have already initiated a plan with Margaret Robinson (Mi'kmaq) for a paper we plan to co-author that addresses potential problems but also possibilities regarding IVM and decolonization. Other indigenous voices may also be included in this paper. Relatedly, other marginalized voices such as African Americans would be a valued contribution, especially in light of their treatment at the hands of the U.S. state and their historical connection to farming both under slavery and as freed persons. There is also a long history of plant-based diets in the Black diaspora, combined with an intersectional lens on progressive social justice (Mercer 2021). This sort of view should be brought to IVM in an effort to see if it is or could be viewed as in line with Black liberation.

Another study could critically take GFI to task by comparing their State of the Industry Report on IVM (Bushnell, Specht, and Almy 2023) to the research articles and reports they reference therein. For instance, on p. 37 of the 2022 report on IVM (referred to as "cultivated meat"), the authors state that "the outlook of cultivated meat and seafood is bright." But this is in

reference to advances in U.S. regulatory approval, not to product development. Regulatory approval is necessary to build a successful food industry but it is not sufficient. Without a product that can be sold for a profit and at a large enough scale, regulatory approval could be meaningless. Similarly, the report references a publication from Mosa Meat (Messmer et al. 2022), an IVM company started by Mark Post, who led the research team that created the first IVM burgers publicly tasted in August 2013. The GFI report states that Mosa Meat’s research on animal-free growth serum demonstrates desired properties for cell differentiation that can be applied across species. However, GFI makes no mention that the publication referenced is riddled with assumptions and large limitations—both concerning the animal-free serum under study and wider considerations of IVM production in general—something Messmer et al. (2022) readily admit. In particular, Messmer et al. (2022) state that while their animal-free serum showed comparable cell differentiation (the changing of one type of cell into another) as FBS, they also noted a significant lack of these cells being able to combine together to form muscle. This is an obvious requirement to produce meat. Therefore, there is some rhetorical sleight of hand being performed by GFI in their 2022 State of the Industry Report for IVM. It would be interesting to flesh this preliminary analysis out into a full-fledged study that covers the entire 100-page document. Such an undertaking could make the supposed “brightness” of the future of IVM appear much dimmer.

What is both a limitation of this dissertation and a future research topic would be that of alternatives to IVM. Suggesting plausible alternatives is an important aspect of critical work. Howard (2022) briefly gestures towards agroecology, integrated multi-trophic aquaculture, increasing diversity in food systems and greater self-sufficiency as some alternatives. I have a completed but yet unpublished chapter to be included in an edited book that explores in-depth

the possibility of urban agriculture as a widespread measure of food production as an alternative to IVM. An important caveat is that proposed or supported alternatives should center *food* production, not ingredients such as protein (Thornton, Gurney-Smith, and Wollenberg 2023). The reduction of food to protein is not only erroneous but plays into long-standing rhetoric of the meat industry (Simon 2023). It can also create a sense that all proteins are equal. This is manifestly false nutritionally (Gregor 2015) and ethically (Alvaro 2019). Also, the long, global history of alternative meat products is erased by a focus on alternative protein (Simon 2023). Especially pertinent here would be literature on degrowth and anarchism as theoretical frameworks that can help usher in and sustain effective alternatives to both traditional meat and IVM.

In considering the future of IVM, I agree with Giles (2022) that it is an “experiment,” but one that will ultimately not live up to its hype by proponents. The challenges seem too big (or even physically impossible) to overcome. The heavy involvement and uncritical complicity with animal agriculture will cause IVM to veer away from its protectionist discourse and the focus on consumer choice and the free market will constrain the realization of proponents’ promises, as this strategy and capitalism seem wont to do (Goldstein 2018). I see the interest in IVM fading at some point after the space fails to produce concrete results and proponents quietly move on to other ventures. In short, the space will not acknowledge the reality of problems they face, investors will pull out (as Giles (2022) shows, some already have), companies will be bought out or dissolve, interest will fade, the bubble will burst, and things will continue to get worse.

Instead of viewing IVM as a solution to animal welfare, environmental, or human health problems, people must (re)turn to and (re)emphasize street-level activism and escalate their tactics in mass movements. There should also be an emphasis by activists on veganism and

degrowth. Animal and environmental liberationists seek to abolish the use of nonhuman animals and the environment to the best of one's ability. The path alternative animal products are on are constitute green capitalism. As sociologist Jesse Goldstein (2018) lays bare, such products become "nondisruptive disruptions" by not addressing root causes; entrepreneurs want to make impact-beyond-capital but end up making impact-as-capital; "good" investors are those who are willing to be bought out, hired, fired, and lose control of product; investors are constrained by existing markets; cleantech only makes incremental improvements; and the environment is almost always overlooked for short-term capital gains. This system clearly hinders animal and environmental liberation which is why I recommend activists completely disengage from this system. I leave it to the reader to decide how likely this alternative is to succeed.

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