

# Sanctuary to table dining?

## Cellular agriculture and the ethics of cell donor animals

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Cellular agriculture – the process of growing animal tissue from stem cells – is a novel technology touted as a potential alternative to conventional animal agriculture. While it is frequently described as cruelty-free or animal-free, however, cellular agriculture will, for the foreseeable future, require living livestock as a source of cells. The arguments in favor of cellular agriculture, usually rooted in utilitarianism, are clear: its widespread adoption would reduce the harms caused by animal agriculture, including reducing the number of animals killed for food. What is less clear is whether cellular agriculture offers a path toward animal liberation or decommodification, least of all for cell donor animals. This article examines how the use of cell donor animals might be ethically justified and practically enacted. We argue that cell donor animals should be raised in settings akin to animal sanctuaries where minimal harm can be squared with a broader goal of decommodification.

*Keywords:*

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### INTRODUCTION<sup>2</sup>

In Ursula K. Le Guin's (1973/2017) short story "Those Who Walk Away From Omelas," the residents of Omelas enjoy a joyful life of order and plenty and tolerance, thriving without want, police, or rulers, but at a cost. For the unlikely utopia to exist at all, a single child is kept locked away in darkness, underfed and abused. It is not that the residents of Omelas do not know about the child and live in blissful ignorance. No. They know. And they realize that they must accept the child's fate so that they can live as they do, so the greatest good is achieved for the greatest number. Most choose to shoulder this burden or rationalize it or repress it, and those who cannot simply walk away, leaving their poisoned utopia behind. But no one rebels, no one rescues the child, no one dares jeopardize the good thing Omelas has going. The status quo is too powerful, even for those who see through it.

Animal agriculture claims the lives of just under ten billion land animals a year in the United States and just over 70 billion globally, not to mention the trillion-plus sea creatures killed every year to sate human appetites. A long-running argument among opponents of animal agriculture is that this wide-scale social complicity in the mass violence of animal agriculture is due to most consumers not knowing how their meat is produced (Dutkiewicz, 2018; Pachirat, 2011; Vialles, 1994). Behind

Behind the fetish of the commodity, animals' lives and deaths happen out of sight and out of mind. The political-ecological and marketing process of the "meatification" (Weis, 2013) of the human diet has played out, for the most part and for most consumers, and especially in the Global North, behind a veil of ignorance.

But as awareness of the many harms of animal agriculture gains mainstream traction, including its harms against animals, and also its contribution to climate change, deforestation, and exploitation of labor, some consumers have either eschewed meat as part of their diet and/or proven willing to try alternatives to farmed meat. The plant-based meat alternative industry is growing rapidly, appealing to both omnivores and vegans, and currently constituting a \$1-billion retail market (as compared to \$95 billion retail sales for conventional meat) (Polinski, 2020). But while many may be willing to try plant-based alternatives to farmed meat, these alternatives are limited. As plant-based facsimiles, they can mimic meat, but cannot directly match it in terms of taste, mouthfeel, or form (Abrell, 2021b; Adams, 2018). A promising technology that does not suffer from this limitation is cellular agriculture, or the process of growing animal fat and muscle from stem cells, thereby genetically replicating animal meat with (theoretically) no animal slaughter required.

Many ethicists and animal advocates have embraced the idea of cellular agriculture as a way to reduce or outright eliminate animal agriculture (Hopkins & Dacey 2008, Mattick 2018, Pluhar 2010), and perhaps even achieve something like animal liberation (Stephens, 2013). This promise, however, comes with one hitch: the need to keep some animals as cell donors, at least in the short- to medium-term as the technology to immortalize cells (replicate them without the ongoing need for animal donors) develops. If we are to keep eating flesh, even grown from cells, these animals may be doomed, like the child in Omelas, to suffer so that other animals may be saved, but without the public being able to deny their existence and to pretend they do not exist. While the utilitarian argument for using a small number of animals – perhaps a few thousand or a few tens of thousands – to prevent the horrible suffering and slaughter of billions of others is clear, it is less clear whether this is desirable from the standpoint of achieving animal liberation or from the perspective of respecting the individual interests of donor animals. But is it possible to imagine a way of raising donor animals that addresses these concerns? Is there a non-instrumental and non-harmful – or at least minimally instrumental and minimally harmful – way of incorporating cell donor animals into food production value chains without treating them as if they were merely commodities? What would the life of donor animals look like in this scenario, and what duties would be owed to them?

In this article, we suggest an animal sanctuary model of animal life as an ethically defensible, but not altogether ethically satisfactory, way to approach the question of donor animals in cellular agriculture. This article is premised on the argument that cellular agriculture is, on balance, a desirable technology, but that if it is to deliver on its promise of being a cruelty-free alternative to conventionally-produced meat, it should adopt the model we propose for animal treatment into its production practices. The success of cellular agriculture is not guaranteed (due to issues as diverse as pricing, consumer acceptance, and regulatory climates in different countries), and the technology raises a host of other important questions (including corporate control of food production, impacts on foodways, and the role of technology in addressing complex socio-environmental problems), so the scope of this article is limited to sketching out an ethically-acceptable model for animal treatment in cellular agriculture production. Whatever other solutions and alternatives exist to shifting away from conventional meat production, and whatever other theoretical or prac-

tical problems cellular agriculture raises – or whether it achieves widespread success or not – we argue that it must be premised on removing animals to the maximum extent possible from physical circulation as commodities even as their cells remain commodified. The article's first section introduces cellular agriculture production technology and the ethical debates surrounding its adoption and its relationship to animal liberation. The second section lays out the ethical argument for using the animal sanctuary model of care as the basis for raising cellular agriculture donor animals and outlines what this model would look like in practice in terms of animal treatment. We conclude by reflecting on the impossibility of completely reconciling cellular agriculture with a vision of complete animal liberation as long as it requires donor animals.

### THE ETHICS OF DISCARNATED MEAT

It has increasingly become clear that conventional animal agriculture is an ecologically and ethically untenable industry. The mass-scale rearing and killing of animals in an increasingly global, industrialized meat value chain causes myriad harms to animals, humans, and the natural environment, and is widely considered to be pulling agricultural production outside sustainable planetary boundaries (Springmann et al., 2018). In the United States alone, close to 10 billion animals are killed for food annually, including 9 billion chickens, 120 million pigs, and about 3.25 million cows. Between the production of animals and their feed, the livestock industry contributes approximately 15% of all global greenhouse gas emissions, leads to widespread land-use change including rapid deforestation, contributes to groundwater depletion and the pollution of waterways, and increases the risk of future zoonotic pandemics. As industrialized animal production expands globally through the “meatification” of the agricultural value chain – e.g., through the use of grain and oilseed monocultures for feed to the mass-scale rearing of farmed animal monocultures (Weis, 2013) – and growing global demand for “cheap food” (Moore & Patel, 2008, p. 22), the range of harms associated with it expands, not least in terms of the number of animals raised and slaughtered.

A growing chorus of voices, spanning different academic fields as well as international organizations, has called for the reduction of animal source food (ASF) production and consumption to reduce the harms associated with conventional animal agriculture and keep agriculture within planetary limits (EAT Lancet, 2019; IPCC, 2019). These voices chime in with long-standing

arguments in environmental ethics that environmentally harmful practices should be curtailed. These arguments have recently been expanded to include intensive animal agriculture (Schlottmann & Sebo 2019), and public health concerns about agricultural practices and land use that increase the risk of zoonotic diseases (Akhtar et al., 2009; Benatar, 2007; Bernstein & Dutkiewicz, 2021).

This critique, in turn, bolsters the voluminous critique of animal agriculture rooted in ethical claims about animal welfare and animal rights. While the range of arguments in favor of extending some degree of moral consideration to animals is vast, most revolve around the notion that animals are either bearers of rights or deserve to have their interests taken into account (Dunayer, 2001; Fischer, 2019; Gruen, 2011; Palmer, 2010; Regan, 1983; Singer, 1975). Ignoring such interests, many argue, stems from speciesism, or the preference given to members of one's own (human) species over that of others, which manifests at both the level of individual action and institutional frameworks (Horta, 2010; Singer, 1975; Wolfe, 2003). Animal agriculture, and specifically industrialized animal agriculture, is speciesism incarnate, trampling on virtually any consideration of animals' interests and denying them any rights they might have as individuals or species. Resultant normative ethical claims tend to suggest that alternative, meat-free diets are morally desirable (Pluhar, 2010).

The strongest version of the pro-animal ethical argument – and the one that will be central for our analysis in this article – is the abolitionist position that calls for the total elimination of the production and consumption of animals by humans. Abolitionism, or what might be termed a maximal animal rights position, eschews creating or participating in instrumental relations with animals. Central to this position is not only opposition to particular instances or even particular systems of violence committed against animals, but rather opposition to animals' use as means for human ends (Regan, 1983) and their commodity status itself (Francione, 2010, 2012). The duties typically imposed on humans include veganism as a moral imperative (Steiner, 2013; c.f. Dutkiewicz & Dickstein, 2021).<sup>3</sup> Abolition has long been the ethical and political project of hardline animal rights activists and scholars, who argue that humans have no right to impinge on animals' negative rights by placing them in captivity, causing them injury, slaughtering them, or condoning their legal status as commodities.

But for all the growing, multi-faceted critiques of animal agriculture – be they rooted in arguments about

environmental, individual, public, or animal health or ethics – efforts to curtail it have been for the most part ineffective. Despite growing social awareness about the plight of farmed animals and a very slightly increasing rate of vegetarianism and veganism, global demand for meat shows little sign of abating. (A recent dip in demand during the COVID-19 pandemic likely points as much to consumers linking meat production to zoonotic disease outbreaks as it does to simple disruptions in the value chain – caused by COVID outbreaks at slaughterhouses – and attendant price fluctuations.) In fact, projections suggest that meat consumption will increase in the short and medium term, driven by expanding production and consumption in the broadly-defined “developing” world (FAO, 2018). Piecemeal efforts by governments and NGOs to promote more sustainable and healthier consumption have shown little effect (IFICF, 2020), and there is little to suggest that concerted efforts to promote veganism would fare any better, especially given that even so-called “ethical consumers” rarely make coherent shopping decisions reflecting their ostensible values (Carrington et al., 2010; Johnston, 2008). For the most part, ethical arguments – be they about animals, workers, or the environment – have fallen on deaf ears, drowned out by the habituated consumption of flesh, reinforced through ubiquitous advertising and availability, and attached to cultural and individual identities, prejudices, and pathologies.

In the face of this intransigence, one of the most hyped avenues for changing consumer behavior and reducing the consumption of animal source foods has been the emergence of so-called alternative proteins. These can be roughly divided into two groups: various plant-based meat facsimiles – ranging from traditional foods like tofu and seitan to novel products like the Impossible Burger and Beyond Burger – and real meat grown from animal stem cells via the process of cellular agriculture. The market for plant-based meat alternatives is rapidly growing, and proponents suggest they may replace animal-derived meats. Whether or not this is the case is an empirical question, but from an animal ethics perspective, plant-based meat alternatives pose virtually no inherent ethical problem. The problem, as noted earlier, is that plant-based alternatives do not perfectly mimic meat, and so impose a switching cost on consumers who would have to give up animal-based meat and replace it with plant-based facsimiles. Cellular agriculture, meanwhile, in theory minimizes switching costs by giving consumers a one-to-one analog, but also raises a very real challenge to animal ethics.

Meat produced from animal stem cells has made rapid strides since early prototypes were taste-tested in the early 2010s, with technology improving and costs falling as private and state funding bolsters the growth of a nascent “clean meat” value chain (Stephens et al., 2019). The first commercial sale of cellular agriculture products took place in December of 2020 in Singapore, the first country to grant regulatory approval to the technology (Sciopini, 2020). The technology’s moonshot promise, much hyped by its boosters, is that it is animal-derived meat, albeit grown from stem cells rather than cut from the carcass of a butchered animal. The theory is that as a virtual one-to-one biological equivalent, if it can reach price and taste parity with conventionally produced meat, it will allow consumers to seamlessly transition to an orders-of-magnitude less harmful product without changing their individual habits or cultural culinary practices. Of course, consumer willingness to buy such products is itself an empirical question (c.f. Bryant & Barnett, 2018; Bryant et al., 2019), but our aim here is not to adjudicate claims about the promises of cellular agriculture or prognosticate about consumer behavior, but rather examine and address its ethical dimensions.

The most straight-forward version of the argument for cellular agriculture is articulated by Patrick Hopkins and Austen Dacey, who write that:

If arguments are not working, then why not change the physical reality of the situation to allow new options? In arguing for cultural change, we do not limit our moral options to conventional cultural mores, so why limit our moral options to conventional biology? And why not think that a solution mediated by technology is just as good for some purposes as a solution mediated by difficult moral argumentation? Perhaps for the purpose of cleansing our souls it is not, but such virtue-related ideals are not our only considerations. If technology can accomplish the goal of reducing animal suffering even by appealing to our selfishness, then at least animal suffering is reduced. (Hopkins & Dacey, 2008, p. 589)

The best solution, in other words, is one that works at the largest scale and asks the least of consumers, not one rooted in ethical appeals and personal sacrifice. Versions of this argument are frequently deployed in the academic and non-academic literature to support the development and adoption of cellular agriculture (Mattick, 2018; Mattick & Allenby, 2013). The technology has also

gained support in philosophical and ethics literature, including suggestions that cellular agriculture is not only ethically permissible but desirable, even for supporters of animals’ interests and vegans (Milburn, 2019; Schaefer & Suvaescu 2014). This includes claims that doing away with animal slaughter may bring about a paradigm shift in human-animal relations as the perceived necessity of animal suffering is decoupled from human nutritional and gustatory needs and desires (Heidemann et al., 2020), thereby effecting a step toward “a form of liberation for animals” (Stephens 2013, 160).

As a novel biotechnology with potential to disrupt status quo food production, promoted through the sort of hype economy (Sunder Rajan, 2006; Wurgaft, 2019) that tends to accompany pathbreaking technologies, cellular agriculture has been the target of extensive academic scrutiny, with books and articles about its emergence far outpacing its actual physical emergence. This has included a broad range of critiques ranging from cellular agriculture’s too-comfortable fit in contemporary neoliberal biotechnological capitalism (Mouat & Prince, 2018), to the challenge it poses to “contemporary food economies and ontologies” (Jönsson et al., 2019, p. 72), through to its uncertain environmental impact compared to conventional meat (Lynch & Pierrehumbert, 2019; Santo et al., 2020). But the technology has also received a mixed response from those concerned with the plight of animals in the modern food system. A number of scholars have argued that cellular agriculture fails to challenge and may even further entrench human dominance over animals (Cole & Morgan, 2013; Lance, 2020; Sinclair, 2016), thus rendering it incompatible with the goal of animal liberation (Miller, 2012; Poirier & Russell, 2019; Stanescu & Twine, 2012). These arguments are rooted in two primary sets of claims: theoretical ones about the impact of cellular agriculture on interspecies relations, and empirical ones about the physical use of animals in cellular agriculture production. The former set of claims is rooted in the premise that while cellular agriculture might diminish direct violence against animals, it would do little to change the underlying structural and epistemic violence that undergirds the use of animals, leaving anthropocentrism and speciesism unchallenged. The empirical claims revolve around the fact that animals are still required in cellular agriculture, both as a source of stem cells and as a source of fetal bovine serum (FBS) used in some growth formula.

Currently, most cellular agriculture prototypes rely on FBS, extracted from dead cow fetuses and sourced from conventional cattle production. This problem can

likely be overcome in the short term with synthetic, animal-product-free serum (Kolkmann et al., 2020). Of course, if this proves impossible, then cellular agriculture would require the slaughter of cows, which would fail the abolitionist animal ethics test. It is, however, highly likely that synthetic serum, prototypes of which already exist and have been used to grow cell-based meat, will be used in market-quality cellular agriculture products, not least due to the necessity of such serum for being able to credibly market “animal-free” or “cruelty-free” or even “vegan” cell-based meat.

But cellular agriculture also requires base cells, which for species like cows, pigs, and chickens need to be obtained from (unwilling) donor animals. (Fish have immortal cell lines and thus cellular aquaculture can be produced without animal input once a producer has created a cell bank, which from an abolitionist animal ethics perspective should pose no ethical problems.) As such, cellular agriculture aimed at replacing the most-eaten, land-based meat animals will for the foreseeable future require biopsies to be taken from donor animals (a term of art that we employ in line with common usage, but that is also a misnomer, suggesting animals’ willing participation in the process). As the industry develops and ramps up production, the number of these animals will grow.

Given the nascent state of the industry, it is difficult to estimate the number of necessary donor animals. Low estimates suggest that biopsies taken from one cow could replace 400 cows over her lifetime. However, improved capacity to multiply cell populations leads some researchers to suggest that one biopsy from a cow could replace up to 13 million cattle (Melzener et al., 2021). Regardless, populations of donor animals like cattle would have to be kept above minimum viable breeding populations, which means that about 20,000 donor cattle might be required to completely replace the beef from the global cattle population (Melzener et al., 2021). This would be the case at the very least in the short and medium term until scientific progress allows mammalian cell lines to be immortalized or synthesized. However, this might prove impossible or prohibitively expensive, in which case donor animals would be required as long as cellular agriculture exists.

This brings us to the ethical and political quandary motivating this article. From the utilitarian perspectives usually used – sometimes explicitly (e.g., Pluhar, 2010) and often implicitly (e.g., Hopkins & Dacey, 2008; Matlack & Allenby, 2013) – to support cellular agriculture as an alternative to animal consumption, the fact that a

small number of animals might be harmed to disrupt the consumption of a larger number of animals is not a disqualifying fact given that the aggregate benefits outweigh the costs. On these views, the development of cellular agriculture should be pursued if it can meaningfully reduce the number of animals raised and slaughtered for meat or make the economies-of-scale method of meat production economically unviable. From a utilitarian perspective, the interests of a large number of individuals being saved (animals saved from suffering and untimely death, and the interests of humans wanting to save animals from that fate) justifies lesser harms committed against a smaller number of individuals. For instance, in Peter Singer’s preference utilitarian version of “animal liberation” (1975) animals’ interest in not being harmed justifies discontinuing the use of animals for food (to save a large number of animals from harm where humans can gain nourishment and gustatory pleasure from other foods) but not necessarily their use in medical testing (where harm caused to some number of animals would yield benefits to a larger number of humans and animals through improvements in medicine or medical procedures). In the case of cellular agriculture, one might extend this logic to cell donor animals: their interests in not being harmed would be outweighed by the potential benefit to a larger number of animals whose interests in not being harmed would be served by not being produced for food.

Versions of the above are the most common arguments for animal use in cellular agriculture production articulated by its proponents – including many who explicitly champion animals’ interests and rights (e.g., Pluhar, 2010). Here, the “animal liberation benefits” of cellular agriculture hinge on the fact that it “does not involve killing significant numbers of animals” (Stephens, 2013, p. 162).

None of this, of course, satisfies the ethical demands of abolitionism, since it involves individual and epistemic harms to animals, treating them as commodifiable and subject to instrumental relations. As such, the use of donor animals falls within the institutionalized interspecies relations that abolitionists seek to abolish. This is the fundamental contradiction of cellular agriculture’s need for animals: as a project of harm reduction, its promise is undeniable, but it is also antithetical to the project of animal liberation in the sense of removing animals from instrumental relations with humans, including as subjects of utilitarian accounting. The result, some fear, might be dystopic in the crafting of animal lives in thrall to the demands of their biotechnological uses

(Lance, 2020). More prosaically, cellular agriculture could simply end up using farmed animals as a steady source of reliable, standardized stem cells. For instance, the company Eat Just has sourced Wagyu beef stem cells from commercial Wagyu beef producers (Watson, 2018). From an abolitionist perspective, it does not matter if donor animals are raised on small-scale, “humane” farms or drawn from mass-produced, factory-farmed animals. The donor animal would still resemble the child abused so that the citizens of Omelas can live a worry-free life: an institutionalized cruelty undergirding an illusion of cruelty-free life.

Rather than suggesting that animal use can be cleanly squared with animal liberation, this article lays out how we might imagine an integration of donor animals into cellular agriculture value chains in a way that is premised not simply on minimizing aggregate harms, but actively maximizing individual animals’ welfare and on removing animals themselves from commodity circulation. Rather than making a strong case that animal use can be reconciled with the aim of total animal liberation, we argue instead that the utilitarian argument should be complemented with an ethics of care toward donor animals along with the ending of their commodity status. What would remain is a degree of instrumental relations, and it is to the nature of these relations that the next section turns.

### POST-MEAT FEEDLOT AS SANCTUARY?

Some of those planning a cultured meat future have already anticipated possible ways in which the replacement of slaughtered animals by donor animals might transform human relationships with the beings from whom meat is produced. For example, a proof-of-concept promotional video produced by cultured meat company Eat Just, Inc. shows a group of humans dining on cultured chicken nuggets at a backyard picnic table while Ian, the chicken whose cultured meat they are consuming, walks around in the grass at their feet. A voiceover narration from one of the diners explains: “It was an out of body experience to sit there and eat a chicken, but have the chicken that you’re eating running around in front of you. You don’t imagine doing something like that, but then you have this realization that we’ve figured out how life really works, and now we don’t need to cause death in order to create food. And we’re going to have to do it if we want to continue living on this planet” (Eat Just, Inc., 2017). Even more technofuturistic is the Japanese citizen science project Shojinmeat, which has created a series of illustrations to imag-

ine a post-food-animal world. In one of them, a single cow lives in a seemingly high-welfare, free-ranging fashion on a “farm in a downtown skyscraper,” inviting viewers to consider the prospect of post-rural, no-kill animal farming (Shojinmeat, 2020).

Taking the idea of cohabitating with one’s food even further, an entry in *The In Vitro Meat Cookbook* – a speculative culinary guide to the potential trajectories of cultured flesh – describes the “pig in the garden,” a thought experiment<sup>4</sup> about how humans might live with their meat source:

Pig in the Garden is a reminder that meat traditionally comes from living animals, and the stem cells for in vitro meat still do. Communities that pride themselves on a local, back-to-the-earth approach to food production may raise hogs in shared gardens or yards. Rather than slaughtering their pig, the neighborhood could use it as a living reservoir of stem cells to grow in vitro meat. A trained veterinarian sedates the pig and extracts the cells, which are then used to grow pork in a communal bioreactor. The pig itself could become a beloved ambassador of the community. Locals will stop by to give their neighborhood pig a scratch or bring it table scraps from home. (Next Nature Network, 2014, p. 55)

Writing about this hypothetical community pig and the promise cultured meat technology holds for beginning to repair “the relationship between humans and other beasts,” historian Ben Wurgaft invites us to imagine “that we have paid a visit to our neighborhood ‘pig in the backyard.’ Not just to say thank you for the roast pork, but also to share an apple with a fellow creature . . . and to remember that the uncompleted project of becoming what we might be starts with questions” (2019, p. 193–194). But before we can ask such questions, one of the most pressing questions the idea of humanely caring for – or even cohabitating with – donor animals raises is whether the utopian interspecies ethics imagined in these scenarios can exist at all.

The nascent structure of the cellular agriculture industry and a range of logistical hurdles make it unlikely that cultured meat production would be carried out in this way. Theoretically, affordable meat culturing technology that could be operated with minimal expertise by average consumers may someday be developed. This would make possible a democratized future of local small-scale or even home-based meat production as en-

visioned by the Shojinmeat Project (Albrecht, 2018). But the current trajectory of cultured meat research and development is concentrated on private firms developing proprietary technology with the hopes of capturing large shares of the meat market. Although cultured meat production is often compared to craft beer brewing, it is likely to be large scale and regionally centralized, with plants more resembling commercial brewing facilities than local boutique microbreweries, and the industry resembling the conventional meat industry more than the local farms of the alternative food movement's imaginaries. Furthermore, at least in the United States, food safety regulations under the Food and Drug Administration and the Department of Agriculture, which are expected to share jurisdiction over cultured meat development and production, would likely present a financial challenge for small "backyard" producers who want to sell their products commercially. Finally, as explained above, multiple donor animals – potentially multiple generations of donor animals – will be needed to produce meat at commercial scale. For all these reasons, a more systemic approach than that allowed by the backyard pig scenario will likely be required for supplying donor cells to the cultured meat industry – indeed something more akin to farms, albeit at an infinitesimally smaller scale than currently prevails.

Rather than happy backyard pigs, cows, and chickens, donor animals are perhaps better understood as a variation of what Thom van Dooren conceptualizes as "sacrificial surrogates." Van Dooren argues that captive whooping cranes used in species conservation efforts live a "sacrificial life" because it is a "life given, and not by one's own choice, for the good of others" (2014, p. 114). Like donor animals for cell culture, these cranes are not killed, but their lives are permanently subordinated to the goal of saving others. Some animal sanctuaries already treat certain animals as sacrificial surrogates. For example, sanctuaries that care for carnivores must accept that some animals need to die so that others may eat, such as mice or baby chicks used to feed birds of prey (Abrell, 2021a; Gillespie, 2018). Under such circumstances, "the sacrifice of some animals to foster the lives of others constitutes necro-care, a unique mode of care in which the death of certain individuals is an integral part of care for others" (Abrell, 2021a, p. 152). For cellular agriculture donor animals, however, the biopolitical regime of care is inverted – they would be kept alive so that millions of others need not be brought into existence at all.

The status of donor animals as sacrificial surrogates exposes a tension at the heart of mammalian and avian cellular agriculture: they afford the possibility of minimizing the commodification of animals while also ensuring that total animal liberation will remain impossible (as long as technology is not developed that makes donor animals obsolete). If the development of cellular agriculture technology could help dismantle or significantly curtail industrialized animal agriculture, and if donor animals are a necessary transitional step to a cellular agricultural industry that runs on immortalized cells, then the use of donor animals would constitute a justifiable harm from the utilitarian perspective – even if it perpetuates the exploitation of a small number of sacrificial surrogates. On balance, we accept these arguments but we argue that imposing this cost on donor animals is only acceptable, albeit still not ideal, if certain conditions are met.

The biopsy is central here. Claiming the right to take the biopsy implies the treatment of an animal as a commodity, as does keeping animals specifically for cell donation. Taking a sample is a commodifying action. Of course a cell sample can be taken from any animal, including animals conventionally produced on factory farms, and in such cases the marginal contribution of the biopsy to commodification is small (since animals have already been bred and are destined for slaughter). The question therefore becomes: is the way a donor animal is treated relevant to the ethics of obtaining a biopsy?

Evelyn Pluhar (2010) has attempted to sketch the contours of desirable donor animal treatment, writing that "If the animal tissue donors have lives appropriate for their species, are treated with concern, and allowed to die peacefully of old age, how are their rights being violated?" She argues that "noninvasive harvesting of a cell" could square the intrinsic and instrumental value of donor animals (p. 465). At issue, however, is not simply animal welfare – or a rehashing of the welfarism/abolitionism debate (cf. Francione & Garner, 2010) – but the nature of the system wherein animals are raised.

How might we construe the parameters of a relationship that is instrumental and yet to the extent possible cruelty-free, and one that is tied into commodity chains but exists as much as possible outside physical commodity circulation? What obligations do we have to animals whose cells we use and how might we best be able to discharge these obligations? Given the logistical hurdles of the most likely future incarnation of the cultured meat industry, how could we retain or even im-

prove on the humane aspirations of the “Pig in the Garden” model or of Pluhar’s broad parameters of donor animal treatment while meeting the practical demands of commercial-scale cultured meat production? Can we imagine a relationship to animals where their cells are commodities – or at least inputs in the production of commodities – while the animals themselves remain outside commodity circulation?

The answer is that the model for housing cell donor animals should not be farms in any traditional sense – not even the small, bucolic, “regenerative” farms of the progressive food imaginary – but rather animal sanctuaries. Animal sanctuaries are normally construed as “spaces for the care and rehabilitation of captive animals rescued from conditions of mistreatment and economic exploitation by humans” (Abrell, 2019, p. 109). Many sanctuaries cater specifically to animals rescued from the agricultural industry and “serve as experiments in alternative species relations that model possibilities for how humans might live” differently with other animals, reconfiguring the power dynamics of the dominant mode of human-animal relations in which animals are reared as agricultural resources (Abrell, 2019, p. 109).

Unlike farms, sanctuaries meet the physical and psychological needs of the animals in their care while providing them with safe habitats in which to live out their lives free from the violence, mistreatment, and instrumentalization that defined their daily lives prior to rescue. While sanctuaries are a form of captivity that imposes limits on animals’ autonomy – for example, most sanctuaries restrict animal reproduction to maximize the number of animals they can care for with finite space and resources – they endeavor to afford animals lives that are as free as possible under the unavoidable constraints of captivity (Jones 2014). Sanctuary animals have the opportunity to engage in a wide range of species-typical behavior denied to animals under other forms of captivity and especially in industrial agriculture (c.f. Abrell, 2021a; Blattner, Donaldson, & Wilcox, 2020; Donaldson & Kymlicka, 2015; Gillespie, 2018a, p. 119–144, 2018b). Crucially, sanctuaries are premised on removing animals from physical commodity circulation. They are sanctuaries from the market forces that would subject animals to a range of bio-, thanato-, and necropolitics between birth and slaughter, although their embeddedness in the broader capitalist economy limits their full disentanglement from the circuits of capital (Abrell, 2021a; c.f. Blanchette, 2015; Dutkiewicz, 2013; Holloway & Morris, 2007; Wadiwel 2002).

Given sanctuaries’ opposition to animal exploitation and commodification, the sanctuary model may seem antithetical to the project of keeping donor animals. Indeed, using sanctuary animals as donors would conflict with the ethos of care at most sanctuaries (Abrell, 2021a). This would prevent the use of most sanctuary animals as cell donors, but the sanctuary model nonetheless provides the only ethically acceptable framework for retaining a population of donor animals for any period of time. As such, dedicated sanctuaries for housing animals used as donors throughout their lives, including when they are no longer biologically viable as cell donors, would have to be constructed. As ecofeminist philosopher Lori Gruen has proposed for zoos, the sanctuary model of care can improve the conditions for animals that are already in captivity by ensuring that “animal well-being is the primary commitment” and that animals’ dignity is treated as paramount:

For zoos to become sanctuaries, in addition to providing the basic needs for well-being, including a healthy diet, clean air and water, and enough space, animals should be treated with dignity. The dignity of a captive is enhanced when that individual is provided with opportunities for choice about who to spend time with [and] captives must be provided with the ability to escape the gaze of others. [...] In captivity, we can respect the dignity of animals by allowing them to be seen only when they wish to be seen and recognize that their lives are theirs to live without our judgments or interference. (2016)

Just as for zoos, a sanctuary model should be the baseline for lifelong standards of care and living conditions for donor animals used in cellular agriculture. This includes at a minimum a varied, nutritionally complete, species-appropriate diet; complete veterinary care, including pain management if needed; clean, spacious shelters; ample outdoor space that matches as closely as possible species’ indigenous habitats; and social and psychological enrichment opportunities, including the ability to interact with conspecifics. Like Gruen emphasizes for zoos, human interference with donor animals should be kept to a minimum, other than necessary veterinary care and interactions initiated by the animals themselves, to afford as much independence and choice as possible. Animals’ status as donors will require at least some unavoidable interactions during cell collections (more on this below), but all cell biopsies should be collected pain-

lessly and take the minimal amount of tissue that technology will allow. Most importantly, animals would never be sold or slaughtered. Death should come naturally at the end of a full life or by euthanasia in case of injury or terminal illness, even and especially when animals are no longer required as cell donors.

Depending on whether technological innovation can eventually eliminate the need for donor animals, cellular agriculture companies may need a multi-generational, self-perpetuating population. This would raise additional considerations related to animal reproduction. Unlike in animal sanctuaries where animal reproduction is curtailed or prevented, the need to reproduce donor animals would afford them the opportunity to engage in an even wider array of species-typical behaviors than many of their sanctuary counterparts. While the rearing of young would no doubt provide animals enhanced opportunities for social and psychological enrichment (c.f. Gruen, 2011, p. 160), reproduction would still need to be limited to maintain the required donor population size without outstripping the available resources. Donor animals should also be allowed to initiate and engage in reproductive activities without human intervention beyond birthing assistance from veterinarians when complications necessitate it. Contraceptives or minimally invasive spaying and neutering should be provided to the extent necessary to prevent populations from overwhelming the carrying capacity of donor animal spaces.

In practice, these spaces should resemble sanctuaries for formerly farmed animals. Cows, chickens, pigs, turkeys, and any other donor species, would have ample space at least the size of the preferred daily ranges of their wild conspecific ancestors, in locations that are as close as possible to their preferred climate regions. These environments would be in a natural, undeveloped state with unaltered native foliage. Cows, for example, would be able to graze in open pastures and wander through wooded hillsides free from human interference. At the end of the day or in inclement weather, they would be free to return to a spacious, clean shelter where ample hay and clean water would always be available. The goal would be to create a space for donor animals where they could live like their wild forebearers, free from harm or exploitation while exercising their agency as free subjects of their own lives rather than being reduced to commodities under the hyper-efficiency of industrial animal agriculture (Blanchette, 2020).

Beyond the moral necessity of enabling donor animals to live the best captive lives possible, cellular agri-

culture companies might also owe the animals a financial debt. Donor animals' cells will be the source of future profit, and if they are not to be reduced to mere means of production, they should be compensated for their labor.<sup>5</sup> But how do you compensate animals who have no use for human money? To start, cellular agriculture companies must be financially responsible for the life-long care of their donor animals. Actual animal sanctuaries must contend with financial and spatial limitations that restrict their ability to meet all the standards outlined above (Abrell, 2021a). But cellular agriculture companies will be in a unique position to allocate portions of their capital to establish trust funds or endowments to ensure that these conditions are met for all donor animals. Indeed, enabling the flourishing of donor animals is a bare minimum prerequisite. Many companies are financially positioned to go even further by extending their support to already established animal sanctuaries. A one-for-one model such as that employed by business in other industries – for every pair of socks, glasses, or shoes purchased, a pair is donated to a person in need – is the least these companies could do, guaranteeing that for every donor animal they support, they would fully fund the care of another member of that species in sanctuary. Given the potential for astronomical profits should these companies prove successful in supplanting conventional animal agriculture, this issue of debt and payment deserves further consideration, but these steps provide a reasonable foundation on which to build.

Some critics of industrial meat production might argue that a preferable alternative from an ecological ethics perspective would be a regenerative farming model. However, unlike the sanctuary model, this would fail to facilitate the decommodification of animals or protect them from slaughter, even if it could (to more limited extents) improve animal welfare and ameliorate the ecological impacts of animal farming. Moreover, the sanctuary model would afford the same ecological benefits as a regenerative agriculture model as it would allow for the same physical interactions of donor animals with their environments.

Of course, none of this entails a full removal of animals from commodity circulation given that they will be required as cell donors. It may seem contradictory to suggest that the sanctuary model of donor animal life achieves the goal of decommodification if it is premised on denying animals bodily autonomy by exposing them to (unwanted) biopsies or other modes of cell removal. In other words, what does it mean to suggest animals

can be unalienable subjects while their cells remain alienable commodities? What we propose is a cleavage of the two, with animals acting as “boundary objects” (Maurer, 2006) between the market and non-market realms. Igor Kopytoff proposes what Arjun Appadurai terms a “processual model of commoditization” wherein “objects may be moved both into and out of the commodity state” (Appadurai, 1986, p. 16). We propose introducing this sort of schism into animal life itself, protecting individual animals from totalizing commodification (at least in the crude sense of having their conditions of life and death determined by the market) while upholding the limited human ability to extract cells in as painless, non-invasive, and infrequent a manner as possible.

This liminal state would satisfy the utilitarian argument in favor of cellular agriculture while respecting animals’ individual needs throughout their lives outside the circulation of animals themselves as property. Ideally, this would be accomplished by the animals being held by non-private-sector groups in trust, so that while companies might have claim to cells, they would have no claim to further interference or property claims to animals or their bodies. If our aim is to treat animals as “donors” (albeit unwilling ones) then they cannot be treated as mere things at the whims of the market because, as Rhoda Wilkie reminds us, the property status of animals “renders meaningless our claim that we reject the status of animals as things” (Wilkie, 2010, p. 121).

Our argument is, partially, a pragmatic one. Cellular agriculture technology will develop and it is entirely likely that its commercialization could rely on conventional farmed animals, or on animals raised in higher-welfare conditions but on commercial farms where they are treated as commodities and even sent to slaughter once they outlive prime age for cell extraction. While unlikely, one can also imagine, as does Stephanie Lance, drawing on the speculative fiction writing of Margaret Atwood, that cell donor animals might be kept in nightmarish conditions (hence our reference to the child in *Omelas* in Le Guin’s writing), reduced to mere bodies mined for commodifiable cells and biomaterials (Lance, 2020). The model we propose offers an alternative whereby cellular agriculture begins to change not simply how meat is produced, but how the political economy of interspecies relations is structured, with the quality of animal lives dictated by an ethical model rather than the market.

Donor animals kept under the exacting standards of optimal sanctuary care could live lives at least as fulfilling as any rescued farmed animal – potentially even better if

the donor animals chosen do not belong to industrialized breeds who face an array of chronic, debilitating, and painful conditions resulting from selective breeding that exclusively prioritized rapid growth or excessive egg or milk production. This model would also offer a foil to the meat industry’s treatment of animals by showing that animal “use” in meat production can be virtually cruelty-free. Currently, most conventional animal farming and slaughter operates under – and often flouts – minimal animal welfare protection statutes, and farmed animals are generally exempted from animal cruelty laws (Wolfson & Sullivan, 2004). The efficiency and profit motive of conventional meat production requires that animals’ welfare be sacrificed on the altar of cost-effectiveness, and even in smaller, ostensibly higher-welfare systems, animals are still slaughtered.

A sanctuary model for donor animal care would show through a tangible, comparative case that the cruelty inflicted upon animals in conventional production is unnecessary. This could serve as the impetus for humans changing their relationship to animals if they do not perceive their slaughter as necessary for food production (Heidemann et al., 2020). It could also, if used for promotional purposes, serve as a repudiation to the meat industry’s (often spurious) claims of raising “happy” animals “humanely,” (c.f. Animal Welfare Institute, 2014; Buller & Roe, 2012; Parker, 2013), and show that theoretically animals can be raised to extremely high welfare standards and not be slaughtered so that meat can be produced. Beyond challenging the meat industry’s representational practices, the contrast between a sanctuary-based animal care model and a farming model could provide a basis for legal initiatives aimed at changing animal welfare laws. It could be argued that if the cellular agriculture industry can raise donor animals to a certain standard of welfare, then so too should the meat industry – an impossible goal given that donor animals could not be slaughtered, which would constitute an existential challenge to the conventional meat industry.

## CONCLUSION

Cellular agriculture presents a promising avenue for reducing – if not outright eliminating – most forms of industrialized meat production. But as a technology, product, and potential solution to the problems posed by conventional animal agriculture, it is still in the process of its “(bio)capital[ist] formation” (Mouatt & Prince 2018, p. 2). The path the industry will take is still uncertain. But no matter how else it might develop – in terms of ownership, funding structures, value chains and

stakeholders, consumer acceptance, and so on – cellular agriculture that aims to recreate any commonly-eaten animal product other than fish at scale for a mass market will require the use of a significant number of donor animals. How such animals are treated, physically, legally, and conceptually, should be a key consideration for structuring the production process as the industry develops.

In this article we explored one of many potential ethical quandaries raised by cellular agriculture: the need (at least in the short-to-medium term) to rely on living animals as sources of cells for most mammalian and avian cellular agriculture products. While this cost is accepted in most mainstream discussions of cellular agriculture and is defensible from a pragmatic, utilitarian perspective, it presents a problem from an animal liberation standpoint in that it is not a system that completely frees animals from harm, no matter how that harm is outweighed by the benefits. To accept cellular agriculture's need for donor animals is to accept the instrumental interspecies relations that abolitionists seek to abolish. This is not simply another debate about whether the ends justify the means – about whether some animals should be sacrificed so that others are saved – but about whether cellular agriculture can lead to animal liberation in the sense of leading to a reimagining of interspecies relations and attendant changes to laws, social and political practices, and the institution of speciesism.

In this article, we have argued that under a very specific set of circumstances, the use of cell donor animals is ethically permissible if this can reduce the number of animals harmed in industrial meat production. While we recognize that this does not meet the requirements of an abolitionist animal rights position – namely the ethical claim that animals should not be harmed, subjected to instrumental relations, or treated as commodities – we argue that the ethical case for cellular agriculture is a convincing one. However, in order to protect donor animals as much as possible, including from being treated as commodities, we have suggested that they should be raised in sanctuary-like conditions. The basic conditions we have outlined include life-long care in maximum-welfare conditions along with protection from harm, sale, or slaughter. The conditions we propose would do much to minimize harm while guaranteeing that the moral costs of cellular agriculture are actively addressed. We suggest that a sanctuary model could remove animals from commodity circulation while still treating their cells, which should be extracted as painlessly as possible, as commodities. We believe that this

liminal space between the market and freedom, while not ideal from an animal liberation perspective, can fulfill many of our duties toward other animals without foreclosing the pursuit of cellular agriculture on ethical grounds, given that this technology, if successful, could save billions of animals from harm.

Since these costs cannot be fully mitigated no matter how well donor animals are treated, it is necessary to recognize that the benefits can never expiate the original injustice of retaining donor animals. Cellular agriculture's reliance on donor animals prevents it from achieving full animal liberation in that it fails to completely de-commodify animals or remove them from institutionalized instrumental relations. In this sense, it is not harmless to animals, at least at an ontological level. As eco-feminist philosopher Karen S. Emmerman observes about animal sanctuaries, such models of care risk giving the impression that the moral scales have been balanced: "Once an animal is in sanctuary . . . [w]e feel relief at seeing an end to her suffering and have a sense that things have gone well in the world" (2014, p. 229). Sanctuaries are "places where we get a glimpse of humans doing the very best kind of moral work . . . [but] even the very best kind of moral work is tainted in some sense . . . [when] life long captivity is the best we can offer animals" (Emmerman, 2014, p. 229). Similarly, even a robust sanctuary care model cannot remedy the harms inflicted on donor animals, and we should not mistake efforts to mitigate that harm with a moral remedy.

While the use of donor animals in sanctuary care may be morally justified as the far lesser harm compared to that of industrial animal agriculture and, crucially, as a tool precipitating the end of industrial animal agriculture, the practice would remain an open moral wound that cannot be healed until we eliminate the agricultural exploitation of animals altogether. We also expect that, as soon as animal cell lines can be effectively immortalized, that the sanctuary model we propose would be phased out, bringing us one step closer toward something like animal liberation.

## NOTES

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3 Some have construed this as part of a project of “total liberation” (White 2009; see also Pellow 2014, Dickstein et al 2020).

4 See also van der Weele and Driessen 2013.

5 For analyses of animals and labor see Coulter 2016, 2017; Blattner, Coulter, and Kymlicka 2019. On the role of animal labor specifically in the sanctuary context, see Donaldson and Kymlicka 2015.

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