

Cultivated Meat: A New Lifeworld for Human Beings

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Abstract: Several reports indicate that industrial animal agriculture significantly contributes to environmental pollution, resources depletion and the suffering of billions of animals. With the rising global demand for animal protein, partly driven by changing diets in countries like China and India, there is an increasing interest in more sustainable and humane alternatives. In this context, cultivated meat has emerged as one of the most promising food technologies for mitigating the impact of conventional meat production. In the first two paragraphs, the article briefly describes what is cultivated meat and what impact it may have on the environment and non-human animal wellbeing as well as the technical and socio-economic challenges it poses. In the third paragraph, it succinctly examines some positions from the ethical debate, with particular attention to Singer's consequentialism and Francione's abolitionist approach. Francione's negative conclusions closely align with certain versions of virtue ethics. Paragraphs 4 and 5 will examine two such positions, specifically those of Carlo Alvaro and Ben Bramble, which have significantly influenced reflections in the field. In paragraph 6, contrasting the pessimistic views of Alvaro and Bramble, the article will present cultivated meat as a new opportunity for reshaping the human lifeworld. The final paragraph will discuss five key elements associated with cultivated meat and its moral implications.

Keywords: cultivated meat, virtue ethics, transnaturalism, Humanistic technorealism

1. *A General Overview*

The global population has surpassed 8 billion, with an estimated annual increase of 81 million people. The United Nations projects a rise to 9.8 billion by 2050, according to the FAO's "Future of Food and Agriculture" report (2022). This growth coincides with a significant increase in meat consumption, particularly driven by changing diets in countries like China (Wang 2022) and India (Mohan *et al.* 2022); over the past fifty years, meat production has tripled to more than 340 million tonnes annually (Ritchie *et al.* 2019; González 2020). In this context, the environmental, animal welfare, and health impacts of meat consumption are significant (Salter 2018).

In response, organizations such as the UN emphasize sustainable development and advocate for eco-friendlier dietary habits. They propose strategies to reduce the environmental footprint of food, particularly meat production. These strategies include reducing meat consumption, adopting plant-protein-based diets, utilizing new food sources like insects (Milani *et al.* 2022), and exploring innovative production methods such as precision fermentation and cultivated meat (IPCC, ch. 5). Cultivated meat, authorized in regions like Singapore, represents a promising solution for tackling environmental and ethical¹ concerns related to traditional meat production. This method involves growing meat from animal² cells (harvested through a harmless biopsy) in a bioreactor, bypassing conventional farming and slaughtering processes (Bhat *et al.* 2019; Bodiou *et al.* 2020). As technology advances, scaling up to industrial production becomes more feasible.

Cultivated meat may offer multiple advantages. Firstly, it could significantly reduce the number of animals harmed. Only a few animals are needed to produce a substantial amount of meat, eliminating the need for the extensive procedures required in traditional livestock farming (Bertero *et al.* 2023). This includes avoiding practices such as crowding large numbers of animals into confined spaces, limiting their behavioral repertoire, and implementing procedures like tail docking or beak trimming. Additionally, cultivated meat can be tailored for nutritional enhancement and safety (Mancini *et al.* 2022), and it can be free from many contaminants found in conventional meat products. It also has the potential to replicate various types of meat, offering new culinary options while reducing the environmental impact of livestock farming. Moreover, this technology is not only beneficial for terrestrial purposes but could also support long-term space missions and extraterrestrial colonization (Chodkowska *et al.* 2022).

In what follows, I will briefly examine the technical and socio-economic concerns regarding cultivated meat (§ 2) and some ethical views supporting or contrasting the use of this food technology (§ 3). Then I will go in depth with the analysis of Ben Bramble's and Carlo Alvaro's perspectives based on the centrality of notions such as virtue, moral character and human flourishing, scrutinizing the reasons they present for opposing the introduction of cultivated meat.

In the last two paragraphs, I will present reasons for supporting cultivated meat by examining how this technology could foster new opportunities for a renewed lifeworld and counteract the negative aspects of conventional meat

¹ In general, I will use the terms ethics, moral, ethical, and morality interchangeably, though I will primarily use ethics to refer to matters related to human behavior, the impact of human actions, and the philosophical reflection on those actions.

² In this article I will use animals and non-human animals interchangeably.

production and consumption. I will also discuss five key elements associated with cultivated meat and its moral implications.

2. *Feasibility and Socio-Economic Issues*

It is impossible to thoroughly analyze all the objections raised against cultivated meat. However, we can categorize them into three main types: (1) technical objections, (2) socio-economic objections, and (3) moral objections (Lo Sapio 2022). The technical objections focus on two primary concerns: 1) cultivated meat might be less sustainable than many believe, and 2) current technology does not yet permit the production of cultivated meat on an industrial scale or, if it does, it cannot be produced at a competitive price.

The socio-economic objections, on the other hand, concern the potential loss of jobs in the traditional animal agriculture sector and the possible impoverishment of gastronomic cultures in regions that are closely tied to and identified by their meat products.

Some studies indicate that cultivated meat would not be as sustainable as imagined (Risner *et al.*, 2023). The production process, for instance, would release more CO₂ into the atmosphere than that associated with industrial beef production, and industrial-scale production would generate considerable environmental damage (Lynch *et al.* 2019). It is impossible to provide definitive answers to empirical questions. However, it is important to note that cultivated meat was developed to impact the market broadly, not to remain a niche product. Its goal is to mitigate the negative effects of the current food system on the environment, human health, and animal welfare. Therefore, those involved in the cultivated meat sector aim to produce something significantly more sustainable than conventional meat at a comparable price (Chen *et al.* 2022). Otherwise, the entire project would fail. While socio-economic objections raise valid concerns, they should not serve as reasons to oppose this new technology.

Regarding the potential loss of jobs, it should be emphasized that all significant socio-economic transformations can impact specific employment sectors (da Silva *et al.* 2022). Historically, the labor market has undergone profound changes with the introduction of new technologies and tools. It is crucial to ensure that workers in the meat industry are not left in dire straits during this transition phase. They should be supported with state aid programs to help them adapt and find new opportunities.

On the other hand, although the preservation of gastronomic cultures has unquestionable cultural value, it cannot be a compelling reason to ban or discourage the introduction of a product that would benefit the environment, animal welfare, and human health.

It is important to notice that, apart from the arguments considered so far, it is possible to raise ethical concerns against the production and consumption of cultivated meat. Although these concerns are not always given the consideration they deserve in public debate, they are influential because they provide principled reasons against cultivated meat. In the following paragraphs, I will focus on the ethical aspects of cultivated meat. I will briefly address the consequentialist and abolitionist approaches and then delve more deeply into how a virtue ethics approach may challenge the introduction of this innovative food technology.

3. *The ethical debate: Cultivated Meat Between Consequentialism, Abolitionism and Virtue Ethics*

Many authors have grappled with cultivated meat based on different approaches. Usually, the consequentialist approach, and especially utilitarianism, offers an excellent basis to support this technology (Fernandez 2023). Savulescu and Schaefer published one of the first philosophical papers on the subject in 2014, examining possible objections to the use of cultivated meat and highlighting the potential of the new technology. Singer, for his part, while having yet to dedicate a specific work to the topic, did devote some thoughts, for instance, in *Animal Liberation Now* (2023). He states that if cultivated meat and other meat alternatives can compete with conventional meat in terms of taste, texture, and price, they could play a crucial role in promoting ethical eating on a global scale. A concept he also reiterates in some popular articles and interviews (Singer 2013, 2021, 2023b).

If based on a welfarist approach, such as Singer's, the introduction of cultivated meat may be an appropriate strategy to mitigate the impact of industrial animal agriculture; the situation for the so-called abolitionists appears to be more problematic. If Regan had never explicitly expressed himself on the matter, things are different for Gary Francione who gave a negative assessment of cultivated meat, for example in *Why veganism matters* stating that "in any event, cultured meat involves the institutionalized exploitation of animals. It perpetuates the idea that animals are food. Moreover, cultured meat will likely not replace traditional meat; it will just supplement the supply, given that the projected increased demand for meat will exceed the capacity to raise whole animals" (Francione 2020: 153). The most significant criticism, however, has been made based on virtue ethics³.

³ Although, as will become evident in the following paragraphs, there may be points of overlap in the conclusions of Alvaro, Bramble, and Francione, their starting points differ significantly. Alvaro and Bramble focus on the moral character of those who would consume cultivated meat, essentially addressing the question: what kind of person would want to eat cultivated meat? In contrast, Fran-

This approach is particularly interesting because it would point out that although the effects of the introduction of cultivated meat might be beneficial for non-human animals, human health, and the environment, this technology might be immoral because it would not convey adequate human flourishing. Virtue ethics, unlike the utilitarian and deontological approaches, places the character of the moral agent at the center.

Indeed, although the notion of ‘human flourishing’ is present, to a greater or lesser extent, in all forms of normative ethics, from consequentialism (in particular, utilitarianism) to deontological theory, it is in virtue ethics that it assumes a central position, together with the notions of moral character, virtue and vices.

Of course, there are different theoretical options within the realm of virtue ethics. However, despite the peculiarities of each view, recurring underlying patterns can be identified. Whether it is a eudaimonist, agent-based, exemplarist, target-centered, or Platonistic approach, the key terms of virtue ethics remain the same: *aretè* (excellence or virtue), *phronesis* (practical wisdom), and *eudaimonia* (happiness or human flourishing).

Opting to consume cultivated meat, rather than undertaking a journey of self-improvement through deliberate dietary modifications, is unlikely to nurture the character traits traditionally associated with virtue or the pursuit of personal excellence. This approach bypasses the opportunity to cultivate practical wisdom, which is the nuanced ability to discern and respond appropriately to various situations. Practical wisdom involves a deep understanding of context, ethical considerations, and the implications of one’s actions. By choosing cultivated meat over intentional dietary discipline, one misses out on the valuable process of refining judgment, self-control, and moral insight – essential components of character development and the attainment of true excellence.

4. *Ben Bramble and what kind of people we want to be*

In the text *Against Flesh*, Ben Bramble points out that we *should not* promote cultivated meat for the same reasons that *we should not encourage the consumption of* human meat and the consumption of meat from slaughtered animals. Bramble’s argument is built around two key elements: 1) the feeling of disgust that we feel even at *the idea of* eating human meat and that *some people* feel even at the idea of eating meat from slaughtered animals (or from animals that died of natural causes); 2) the recognition of relevant factors that

cione emphasizes the characteristics of non-human animals, arguing that sentience alone is sufficient to confer full moral status on non-human animals. This position rejects any instrumental use of animals, leaving no room in an abolitionist perspective for gradualist approaches or compromise solutions aimed at increasing animal welfare.

make the body of a human being and, similarly, the body of an animal *what de facto* allows a human being or an animal to do the kinds of things they do. In Bramble's words, "the role our bodies play in all the valuable (and disvaluable) experiences of our lives" (Bramble 2023:118). Such recognition is why we do not eat human meat and would not eat it even if it was offered to us by its "owner". One of the possible objections that could be raised to Bramble's argument is that if we *are to* pay particular respect to the body, as it is intimately tied to our *personal identity*, then we would be entitled to eat the flesh of a fetus, as it has no particular connection with its own body. Similarly, since meat cultivated with the cell donor animal has no specific connection, we should have no compunction whatsoever when eating it. However, Bramble advances a counter-argument by pointing out that "it is not necessary that the dead body in question was the body of an actual self. It is enough that it is the same sort of stuff that embodied selves come in" (Bramble 2023: 120)

According to Bramble, this objection can also be applied to cultivated meat in the sense that even if it is cells and not a whole body, it is enough that it is the same sort of stuff that embodied selves come in. So, suppose we want to be the kind of people who recognize, based on adequate information, what the body is to an animal. In that case, we should not even consume cultivated meat because, in fact, it does not allow us to change our character in a way that makes it *repulsive* to the possibility of *eating meat*.

Bramble's argument, however, does not seem convincing to me for a number of reasons. First, Bramble dwells too little on the nature of feelings of disgust and repulsion, which can sometimes provide us with cues concerning actions to perform or not to perform but which often need to be subjected to critical scrutiny as to whether the cues are cogent or not. Bramble's proposal seems to take little account of the role of reason in character *formation* and more of the role of feelings and what *seems to be natural*. That there is this more or less explicit reference to nature, we ascertain from the very words of Bramble, who states, speaking of feelings of disgust and repugnance, that "these feelings of disgust are not something I have tried to cultivate or achieve. They have come naturally, as I have come better to understand the richness of animals' mental lives, the value (and disvalue) possible in them, and the role of their bodies in all this value".

Second, and on this, one can agree with Bramble, the recognition of the importance of the body to an animal's life story *should* prompt us to place such a value on it that we should be prevented from *doing what we want with it*, and in the worst scenario subvert its primary function, transforming it from a *medium of the* animal's experience of the world to an *object to be consumed for the satisfaction of human desires*. However, such recognition suggests we should not deprive ourselves of the opportunities offered by cultivated meat since the

bodily integrity of the animal would be preserved by this technique. Moreover, it should be pointed out that the introduction of cultivated meat technology may well temper our character. While it is true that to build virtuous character, *we should not want to be* the kind of people who *disrespectfully* eat the (body parts of) animals, we might nevertheless *want to be* the kind of people who eat meat *only if* it comes from *cellular cultivation* (or from sci-fi techniques such as *creatio ex nihilo* of pieces of meat). Bramble's example that the people who would eat cultivated meat would be the same people who, if that kind of meat produced by that kind of technology were no longer available, would resume eating conventional meat does not take into account at all what I mentioned earlier. I may have built my character so that *I am willing to eat meat only if cultivated*.

What Bramble does not otherwise take into account in his analysis is a more articulated phenomenology of potential consumers: there is the vegetarian (or vegan) who would not eat cultivated meat in any case; however, there is also the vegetarian who would like to eat meat again if it were obtained through cellular agriculture technology; then there are the meat eaters who would like to stop eating meat but (slaves to a palate that compels them to compulsive consumption) because of weakness of will cannot. Finally, there are the occasional meat eaters and the meat eaters who, in any case, would continue eating conventional meat in favor of cultivated meat. In the face of this multifaceted picture, it serves little purpose to say that we *should want to be the kind of people who do not wish to eat the kind of things comparable to an animal's body* because 1) there are multiple pathways to self-perfection, and reducing them to a single standard constitutes a stretch concerning people's concrete moral lives (in addition to suggesting an *over-performing* model that at best could be read in terms of super-erogatory); 2) it provides a misrepresentation of what cultivated meat is, in particular, because it obscures that the origin of this product represents a *morally relevant difference* that cannot be erased by the fact that the finished product is *equivalent* to the conventional one (with the understanding that this is not even entirely true). It is precisely the origin of the product and the conditions surrounding the origin that makes it possible, at least according to most projections, to drastically cut down land and water consumption and greenhouse gas emissions, avoid the use of hormones and antibiotics, and save the lives of billions of animals.

Between the scenario Bramble proposes – the world leader giving a public speech in which he announces that he will take measures against meat consumption because he has realized the true extent (in moral terms) of killing animals and eating their meat – and the implementation of a technology that, having overcome a number of technical hurdles, could be deployed on the market within a handful of years, the second seems more realistic. Indulging

in the hope that the first scenario will come true could even convey character traits to be disfavored because it would lead to an attitude prone to reverie and poor confrontation with reality.

Ultimately, even in Bramble's position, the idea seems to emerge that cultivated meat might discourage *genuine* self-transformation of the individual *by dealing with* technical rather than *spiritual* change. However, separating the two risks makes us lose sight of the fact that technical change and spiritual change are part of a seamless single movement. *To think* that change lies only in technology opens the door to technological determinism, a *technological fix* that is counterproductive to an effective understanding of the specific human situation, but also to think that change lies only in spirit puts one in the form of *neo-Luddism* that is counterproductive to an effective understanding of the specific human situation.

5. *Alvaro and Virtue Ethics*

Among the proponents of the ethical model based on virtue and character development is Carlo Alvaro, who develops his thoughts in a slightly different direction than Bramble. Alvaro emphasizes how a possible consumer reaction to the message of promoting cultivated meat as a sustainable product would be to develop indulgent attitudes towards meat consumption, which should, on the contrary, be discouraged.

In other words, Alvaro insists on the risk of increasing the number of people who see meat-based eating as permissible, developing indulgent attitudes towards this type of consumption. To support his reflection, he also recalls the words of one of the founding fathers of cultivated meat technology, Mark Post, who stated, "Quite frankly, vegetarians should remain vegetarians; that's better for the environment than cultured beef".

Indeed, Alvaro argues that what matters in a morally connoted action is not so much (or at least not only) the impact this action produces but what character traits it conveys. Certain actions, by their very nature, have the potential to foster self-improvement in human character while simultaneously discouraging traits typically regarded as vices. These actions promote the development of virtues such as discipline, patience, and empathy, encouraging individuals to strive for personal growth and moral integrity. At the same time, they help to diminish undesirable traits like laziness, impulsiveness, and selfishness. By engaging in such actions, individuals can refine their character, cultivating habits that contribute to a more virtuous and balanced life.

Alvaro describes a truly virtuous person, echoing some of the analyses Aristotle presented in the *Nicomachean Ethics*, as one who possesses the most

important of all virtues, namely magnanimity or greatness of mind. Indeed, such a person possesses the virtues of courage, temperance, generosity, fortitude, and justice. The magnanimous person then 'is not too concerned about material goods, and they would give up their possessions or even their life for the sake of honor without any sense of loss' (Alvaro 2022: 788). It is endowed with self-control and a strong will and can modify its diet to benefit itself and the environment. Thus, since a critical character trait of the virtuous individual is temperance and the temperate individual has a rational and harmonious approach to appetite and food pleasures, they are not particularly attached to a specific type of diet because it is the one that generates the most pleasure.

If consumers, therefore, commit to adopting, in some way, the principles of virtue ethics, they are likely to internalize temperance and justice by choosing options that reflect these values.

Although the author himself is aware that it could be subject to various criticisms, Alvaro's reflection nevertheless presents a problematic element that could be more helpful for comparison with actual consumption scenarios.

Alvaro starts by observing that many meat eaters would not give up their carnivorous diet in favor of cultivated meat since the latter is seen as unnatural and arouses disgust and disapproval. He goes on to state that since many consumers find cultivated meat unnatural and unappealing and that encouraging the consumption of this product does not convey any human flourishing, it would be preferable to encourage a switch to veg diets rather than invest in a technology that, from the point of view of virtue and character ethics, appears problematic.

Alvaro's reflection, however, seems to underestimate the role that technology can play in fostering forms of self-improvement and the importance of having multiple options available to pursue morally appreciable results since there is no single form of consumer and especially the transition from an omnivorous diet to a veg diet entails a symbolic investment and a gestalt leap in terms of adherence to a specific life-world that is difficult to implement. Cultivated meat, in this sense, could help certain types of consumers to embark on the path of symbolic reinvestment through a medium that is not entirely different from the one habitually used (indeed, in many respects, it is superimposable) and, at the same time, not altogether superimposable either (in aspects that are not irrelevant). In addition, Alvaro's reflection appears to be too crushed on an anthropocentric perspective in that to focus on the character of the moral agent; he underestimates a vital component of the entire discourse, namely the suffering of non-human animals that could be significantly mitigated through the use of cultivated meat.

6. *Cell-Based Lifeworld*

In a 2013 paper, Van der Weele and Driessen Clemens showed a possible direction for thinking about a cell-based life-world. In the view of the two authors, cultivated meat over and above consumption concerns could convey new possible scenarios of existence for humans, new models of morality, and new forms of interaction with non-human animals.

The two authors argue that although ‘new technology and new morality’ (in terms of attitudes and behavioral patterns) are often presented as ‘opposite roads to social change’ (Weele *et al.* 2013), de facto, they are not. They contrast the idea of the techno-moral dichotomy with the notion that new technology often functions as a tool for change that produces new scenarios that convey transformations in attitudes and behavioral patterns.

Among these is the idea of the ‘pig in the backyard.’ In the words of the two authors, “In the future we might all have a pig in our backyard or in our local community, from which some stem cells are taken every few weeks to grow our meat, either in a machine on our kitchen sink or in a local factory [...]. It typically takes the form of pigs or cows in urban farms or backyards, held as pets and serving as donors of muscle stem cells” (Weele 2013).

This scenario would entail reshaping our patterns of interaction with some of the non-human animals currently employed in intensive livestock farms, transforming them into companion animals with whom we can share our life-worlds. On the one hand, such scenarios allow us to train our character to be open, respect others, recognize diversity, and strive for shared living spaces. On the other hand, such scenarios would be less likely in a life-world in which everyone turned to vegetarianism. In such a case, in fact, it would be more likely that animals would be considered irreducible alterities to be respected through a principle of non-interference that would, however, deprive both non-human animals and humans of opportunities for interaction and thus of reciprocal enrichment and flourishing of their life-worlds. Indeed, it makes sense to imagine that in a scenario in which everyone was a vegan, there would be a number of character traits that would not be solicited, such as those associated with virtues generally held to be valuable. On the other hand, such characteristics would play a role in a futuristic scenario in which cultivated meat was widely available. Such scenarios may also respond to concerns that see the use of technology as a possible (further) form of consumer alienation from food.

7. *Conclusions*

In this last section, I point out the five elements that I believe can be associated with cultivated meat concerning the moral consequences of the spread of such a product.

Alienation and Food Technologies

It is not the food that produces consumer alienation concerning the product consumed but the devices, strategies, and procedures put in place by the actors involved in the food industry who, in certain circumstances, consider it preferable to obscure the processes behind food production. The case of cultivated meat, although market dynamics remain a risk that should not be underestimated and against which we must remain vigilant, presents a profile that is at least partly different from that of conventional meat, whose production processes are deliberately occulted to conceal the suffering of animals on intensive farms (Joy 2020). This difference stems from the fact that research on this food, at least up to now, is supported and promoted by start-ups (Mosa Meat, Cellular Agriculture Europe, Meatable, Bruno Cell, etc.) and organizations (Good Food Institute, Italian Complementary Proteins Alliance, etc.) that make the realization of a better world and respect for the welfare of non-human animals central goals of their activities.

It is clear, and indeed highly probable, that these organizations, especially in the case of start-ups, are also interested in making profits from this new sector of production. However, it is equally clear that this motivation 1) does not preclude the possibility that there are also ethically based reasons; 2) even if profit is one of the motivations, this does not exclude that the result is ethically commendable (as in the case of vaccine production, which is carried out by multinational companies intending to maximize their profits, but whose result is still ethically commendable insofar as it benefits billions of people).

In any case, the moral profile that underpins the world of alternative proteins and, thus, of cultivated meat cannot be approached, let alone superimposed, on that of industrial animal agriculture, whose *primary* objective cannot be animal welfare or sustainability but the maximization of profit, pursued even at the expense of the environment and human health, let alone the welfare of non-human animals. Suppose the genesis of the enterprise that underpins the production of cultivated meat has a moral profile. In that case, it is unlikely that the actors involved in this sector intend, in any way, to camouflage the mechanisms that underpin production since it is precisely these mechanisms that provide the product with a moral profile. It is in the interest of the produc-

ers of cultivated meat to make the steps in the production chain clear so that the risk of promoting consumer alienation is minimal. Although this is a very technologically sophisticated product, the relationship with the consumer may be more transparent, not based on forms of cover-up and self-deception necessary to perpetuate the industrial animal agriculture system.

Indeed, it is in the interest of conventional meat producers to render the way meat is produced opaque, because awareness of how meat is produced and how the non-human animals involved in the process are treated could have an impact on consumption. On the contrary, it is in the interest of producers of cultivated meat to make the whole process transparent and understandable because knowing how cultivated meat is produced could incentivize its use by those consumers who wish to adopt more ethical ways of eating.

Humanistic Techno-Realism

Recent studies have delved into the psychological underpinnings that may lead a significant segment of potential consumers to resist cellular agriculture and cultivated meat (Wilks *et al.* 2021). A prominent finding is the role that perceptions of artificiality or unnaturalness, coupled with feelings of fear and disgust, play in this resistance. The significance of these findings extends beyond mere consumer preferences, impacting ethical and philosophical debates. As highlighted by Simona Stano in her latest work (2023), the discourse around clean eating primarily oscillates between the dichotomies of organic versus genetically modified and naturally derived versus lab-created foods. These discussions underscore the profound influence of nature-centric narratives on moral evaluations.

Opposing nature and culture, nature and technology generate a narrative favoring a pure and uncontaminated nature. However, cultivated meat, like other products that have become popular in recent years, for example, in the medical field (think of synthetic embryos or synthetic organisms produced by the Craig Venter Institute), increasingly prompts us to take note that technologies are increasingly shaping our existences and that this process is partly (and hopefully) non-reversible. This is not to indulge in forms of technological determinism but to take note that our species builds its survival strategies through technology and that in the face of the most recent advances, we have two options: 1) passively undergo these transformations, finding ourselves inserted in new worlds-of-life whose implications we will not fully understand, or 2) accompany these transformations with appropriate paths of scientific, cognitive and emotional literacy to equip ourselves with the tools to understand the new phenomena and stay within the change consciously by profitably

exploiting the opportunities (and knowing how to distinguish concrete risks from imaginary or overestimated ones). It is, therefore, a matter of adopting a form of humanistic technorealism. Technorealism is the sense of having a realistic and pragmatic perspective on technology that sees the latter as an essential and structuring part of the evolution of the human species without embracing uncritical technophobic or techno-enthusiastic positions. On the other hand, however, 'humanistic' in the sense of not forgetting that technical transformations primarily impact the structuring of our identity and the construction of the life-worlds that characterize us.

Virtue Ethics

Cultivated meat can promote the development of virtuous character traits and foster paths of self-improvement in human beings. In this sense, it can be seen as a technology of the self that may allow us to reshape our behavioral patterns and persistence strategies in novel and positive ways.

It can give us a tool to confirm that vegans' and vegetarians' objections to meat consumption are, at their core, correct; to provide those who no longer eat meat for ethical reasons a way to enrich their dietary options and restore certain dietary practices; to give those who would like not to eat meat but are unable to due to weakness of will an extra tool to support their path of self-improvement and transformation. Finally, it would provide a robust tool to affirm that those who wish to continue eating conventional meat despite the existence of an alternative product that reproduces the basic taste and texture of conventional meat while avoiding the suffering associated with that product are acting in a morally unjustifiable manner because they are motivated by futile self-interests alone.

Instrumentalism and Relationalism

Cultivated meat is not merely a technical solution aimed at addressing the sustainability issues associated with conventional meat production. While it is true that this innovative approach can significantly reduce the environmental impact, such as lowering greenhouse gas emissions, reducing water usage, and minimizing land exploitation, viewing it purely through an instrumentalist lens fails to capture its broader significance and potential.

Adopting a relationalist (see Umbrello 2024) perspective allows us to appreciate cultivated meat as a transformative technology that goes beyond solving ecological problems. It fundamentally reshapes our lifeworld, altering the way we produce and consume food. This new form of meat production offers the

possibility of creating novel pathways for hybridization, where traditional agricultural practices can intersect with cutting-edge biotechnological advancements. This fusion can lead to a more sustainable and ethical food system, addressing not only environmental concerns but also animal welfare issues.

Furthermore, cultivated meat has the potential to foster deeper connections with the external environment. As consumers become more aware of the origins and impacts of their food choices, this technology can promote a more conscientious and informed relationship with the natural world. By embracing cultivated meat, individuals and communities can engage in a more responsible form of consumption that supports ecological balance and biodiversity.

Transnaturality

Although cultivated meat demands advanced technological and scientific expertise, achieving widespread distribution could allow us to restore natural living conditions for the non-human animals involved, specifically those donating the cells needed for this process. By respecting and promoting the natural behaviors of non-human animals, we can provide them with the means to lead lives that are more in line with their species-specific traits. The apparent paradox of cultivated meat lies in the fact that using highly advanced technology can foster a more appropriate relationship with non-human animals. In essence, this creates a new intersection between nature and technology, demonstrating that these two realms are not mutually exclusive (Sebeok 1972).

New technologies often demonstrate the continuity between nature and technology, as well as nature and culture. Cultivated meat exemplifies what I refer to as meta-natural and meta-technical (transnatural) objects (or naturally artefactual). This category includes artificial embryos, synthetic bacteria, and organoids. These objects are created using technical methods but, once completed, they are virtually indistinguishable from their natural counterparts, such as embryos, bacteria, and organs. While the classification of these objects is a subject for ontological research, it is also important to consider the ethical implications I have outlined in the preceding paragraphs.

Naturally artefactual objects help us move beyond the rigid dichotomy between natural and artificial, and natural and technical, which still influences how we perceive reality. Cultivated meat exemplifies this concept. Although produced through industrial processes and advanced biotechnology, it respects the behavioral patterns of donor animals, avoiding practices that disrupt their natural rhythms and physical structures. It can be antibiotic-free and, as previously mentioned, promote new forms of human-animal relationships, thereby reducing the objectification inherent in industrial animal agriculture. Thus, a technology that might traditionally be viewed as less natural actually fosters

a more balanced relationship with nature, effectively pushing us beyond the natural/artificial divide.

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