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The Animal in Closed-loop Food Innovations: Mythologization, Technology and Relations

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The Animal in Closed-loop Food Innovations: Mythologization, Technology and Relations

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Abstract

This article focuses on human-nonhuman animal relations in the context of closed-loop food innovations. Drawing on Jacques Derrida's *The Animal That Therefore I Am* (1997) and Donna Haraway's *The Companion Species Manifesto* (2003) and *When Species Meet* (2008), I explore how these relations are constructed and mediated by technology. Closed-loop systems, designed to minimize waste through circular production systems, recently entered the food industry and were praised as climate-friendly solutions to its environmental impact. Focusing on narratives from three Swedish food-tech companies, this study analyses the companies' closed-loop food innovations as neoliberal "creation myths," invoking Derrida's reading of the naming of animals in the Biblical creation myth. I conclude that the narratives reveal how technological innovations are both idealized and mythologized in our time, while their violent implications for animals in food production remain unproblematized. Although the companies emphasized the sustainability benefits of their closed-loop innovations, the narratives did not include animal welfare, nor did they offer a new way of living with and relating to nature.

Relations between humans and nonhuman animals have been theorised across a spectrum of disciplines, spanning from the social sciences, humanities, to the natural sciences. Among the notable works is Jacques

Derrida's *The Animal That Therefore I Am* (1997), which approaches these relations through a philosophical lens. Derrida posits the animal as pivotal in the construction of humanity, as reflected in the book's title, which echoes René Descartes' famed assertion "Cogito, ergo sum" ("I think, therefore I am"). By substituting "think" with "animal," Derrida draws attention to the relational nature of humanity, highlighting its dependence on the construction of animal others. Other significant contributions in this realm are Donna Haraway's *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (2003) and *When Species Meet* (2008), which intertwine biological insights with cultural studies to explore the intricate ties between humans and non-human animals. Like Derrida, Haraway challenges notions of human exceptionalism, emphasising the interconnectedness and co-constitution of human and nonhuman lives.

Insights from Derrida and Haraway can be used to explore contemporary practices of farming and animal breeding, which seek to find new innovative ways for maintaining production rates while reducing the climate impact. With the increasing global temperatures and environmental catastrophes, several companies—especially new start-up businesses—have made battling climate change their trademark by developing innovations that promise to mitigate the climate impact. In the last decade, circular economies and closed-loop systems that have been expounding on the creation of a circular production chain with zero waste, have entered the field of climate-neutralising innovations. They have quickly come to be seen as key in the transition to sustainable production systems.¹

In Sweden, the concept of circularity has come to dominate both political and entrepreneurial discourses on food production. In 2020, the Ministry of the Environment,² led by a center-left government, presented a strategy on the transition towards circular economies, stating that "through entrepreneurship and innovation, based on circular material flows and business models, the development of a resource efficient, poison free, circular and bio based economy can be strengthened in the whole of the country" (6). In politics and research, little critical attention has been paid to how the introduction of high-tech circular solutions in food production affect animal welfare.³ Thus, in this article I want to contribute to the critical discussion on human and nonhuman animal relations by using the case of circular systems in food production. Combining Derrida and Haraway's work in the area, I explore how three Swedish food-tech companies narrate their businesses in response to climate challenges, how narratives draw on a mythologizing rhetoric, and how they shape human-animals-plants-technology relations.

I. Circular economies and closed loop food production

In the last decade, circular economies have started to be promoted as a climate-friendly alternative to linear economies. Although linear economies also build on relations between humans and nonhuman species, circularity increases the dependency between those included in circular economies. Therefore, Derrida and Haraway's approaches to relationality and interconnectedness can contribute to the understanding of relations within circular systems. In linear economies, goods are produced, used and discarded, whilst in circular economies, discarding is sought to be postponed or eliminated (Lofthouse & Prendeville 452; Oosting et al. 276) and all components in the system are viewed as resources (Olofsson & Mali 836). This idea includes maximising the different levels of usefulness that can be applied to a product; even before and after a product has served its main purpose, it might still be of use.

When referring to products made in or from recyclable materials, circular economies may exemplify circularity that is most familiar to people in general. Circularity in agriculture through composting is also a well-known case. In contrast, circular food systems that include farming have more recently been taken into practice and are therefore also less researched. Because of the world population increase, with an expanding middle class, there is high demand for meat, which has triggered the techno-science sector to explore more sustainable ways of producing meat (Jurgilevich et al. 4). Integrating animals into circular systems means that the animals are treated with the same logic as products in circular economies, namely, with the goal of minimising waste and making the most use of the animal as resource. Previous research has highlighted the surplus profit of animals, which extends beyond meat and dairy production. As Oosting et al. highlight, animals can provide cultural value that is also to be understood as a primary resource in circular economies:

Beyond food production, they have cultural and societal functions such as for dowry, and sacrifices during religious festivities; they have financial and insurance functions which are specifically important to the poor; they may provide regular small income to women and children in a household, and they may provide status (278).

Even though sustainability is commonly stressed when benefits of circular food systems are listed, and animals are not just seen as a resource in terms of meat, animal welfare is largely ignored in circular economy studies.

Arguing that animal welfare is even a “blind spot” in this field (154), Franck Meijboom et al. stress that this is destructive for both circular agriculture and the animals that are implicated in its economy. Notwithstanding the many benefits that result from minimising waste and producing food with little climate impact, animals trapped in close-loop systems might suffer from the changes in feed and housing that circularity often necessitates. The authors further claim that definitions of animal welfare in the EU, on which European farming practices are based, are problematic as they consider individual animals’ health rather than the collective health of animals. Animal welfare is largely approached in quantitative terms, measuring death rates or the use of antibiotics. When trade-offs between human and animal interests are needed—for example when the benefits of animal welfare are weighed against mitigating climate change—human interests prevail.

Until recently, vegetarianism or veganism was promoted as the most sustainable option for decreasing the human climate impact. Cattle has been identified as causing approximately half of the climate damage from the food industry, mainly because of the vast land use it requires and the methane gases that cows produce. Teea Kortetmäki and Markku Oksanen argue that we have seen a shift in arguments for veganism, from animal-centred arguments to human-centred ones, the latter focusing either on the climate or the health-related benefits of a plant-based diet (730). Although this shift may at first have had the effect of convincing more people into becoming vegan or vegetarian, it has also led to the marginalisation of animal welfare in food debates. The emergence of technological innovations and solutions to decrease the climate impact of animals in the food industry, has debilitated the animal welfare cause. As Hugo Reinert noted, when researching the logic behind the so-called sacrifice zones—land areas that are subjected to extraction to the extent that they become unlivable—extractivism and the destruction of ecology are legitimised by the argument that they serve the “*larger good*” (604). Recently, this larger good has taken the form of “green” and “sustainable” industries, which makes it even harder to argue against such a cause (Cambou 315; Tornel 3). A similar logic is to be found in sustainable food production. For example, ecological meat production often tries to combine the idea about eating animals with the idea of animal welfare. In this context, animals are constructed simultaneously as production units for consumption, and as subjects with a moral status (Velandar 12). The idea of making sacrifices for a larger good gives rise to questions about how much certain sacrifices “hurt,” and this is largely determined by the extent to which animals can be considered as moral subjects. In this regard, marine animal

species are often considered a less problematic sacrifice. For example, the Ethical Vetting in Sweden (2023) allows for experiments on invertebrates such as crayfish without ethical testing in Sweden, and when counting the number of fish killed yearly in commercial fishing, estimations are made in terms of weight and not in numbers (Wadiwel 196). This has also motivated the extreme increase in aquaponics and other forms of fish farming in the last 30 years, making this industry bigger than the farming of meat cows. This largely determines whether closed loop systems are used primarily as part of producing cattle feed, or if the animals are integrated into the systems, as is the case with fish in aquaponics systems. Drawing from Derrida and Haraway's perspectives on multi species connections, animal ethics and their structural consequences also affect the level of cross-species-dependency in circular systems. Thus, the adoption of circular systems calls for a thorough investigation of what these new ways of locating and exploiting animals in food productions means for the construction of human-nonhuman animal relations.

II. Human-animal relations in closed-loop food innovations

The analytical framework builds on Derrida's work on animality and otherness, as well as on Haraway's writings on tangled species and compounds. Scrolling through the three web sites in a very early phase of the study, I was struck by the rhetoric, and how it tended to almost mythologise the innovation, using words that were dramatic and sometimes even biblical. This inspired me to turn to Derrida's reading of the biblical creation myth in *The animal that therefore I am* (1997), in order to see what can be found if we read the companies' narratives about their innovations as contemporary and neoliberal creation myths. I thus acknowledge that the innovation is an idealised creation on the companies' web sites and, as we have seen, in Swedish political strategies; what is created is a small world, a universe with its own pace, logic and cycle.

When unpacking the biblical creation myth, Derrida pays specific attention to the positioning of humans and animals in the narratives, which is the focus of the analysis I pursue in this article. When God created the world, he first made organisms, nature and animals, and then he made Adam who was assigned the task of naming the animals, which had already been inhabiting the earth before he was created. Adam "immediately receives the order to subject the animals to him" and naming the animals thus becomes a

symbolic act of dominance (15). As Derrida notes, man can be described to be *after* the animal in two senses; he arrives after the animals, which are then named after him (17). This echoes the doubleness in the French title of *The animal that therefore I am—L' animal que donc je suis*—where *je suis* can mean both “I am” and “I follow,” indicating how man’s identity depends on the following of and, thus, the relating to animals (3).

Derrida thus rigorously deconstructs the symbolic significance of the human task of naming all animals, which subtends the distinct division between humans and their animal others and predetermines what humans *do* to animals, as well as to other humans. It is an approach that focuses neither on regulations nor on actions, but rather on how our treatment of animals affects what it means to be human.⁴ This symbolic task defines the way human beings perceive, understand and act upon the world as a mainly anthropocentric one. When analysing the creation myths of the companies mentioned above, I will thus focus on the naming of animals because it symptomatically reveals the relationship between humans and animals in the world at large.

Realising just how central technology was to the narratives in the company web sites, I decided to approach these small universes as being consolidate not only by human-animal relationships, but by a complex compound of technology, humans, animals, and plants. In *The Companion Species Manifesto* (2003), where Haraway theorises the close relationship between humans and dogs, she expounds on the transformative effect of critically revising the shared history of various species—as in the case of humans and dogs—that is mandated by the parallel and overlapping evolution of the species. She coins the term companion species, which works as an umbrella concept for humans, animals and plants that have evolved side by side. The term can also include compounds between technology and organic species, and species mediated by technology. In *When Species Meet* (2008), Haraway writes that relationships between species need to be understood as located in technoculture; species can be “‘educated’ through their intra-actions within historically situated technology” (281).

Haraway uses the terms *companionship* and *entanglement* to theorise relationships between species. In this article, I engage entanglement more closely primarily because the animals in the companies’ creation narratives are not seen as companions,⁵ but rather as resources. In both Derrida and Haraway’s works, the authors turn to animals that are pets and are often perceived as loved companions (in Derrida’s case the cat, and in Haraway’s the dog), which largely facilitates their arguments in the sense the human-

animal boundaries can be more clearly transgressed and the connections perceived than in the case of, let's say, a fish. Anders Johansson discusses this point in "About the right to question the human. Derrida and the animals"⁶ (2011). While Derrida reflects on what happens when we see the animal—in his example, a cat—as someone who is not just being seen by us, but who looks back, Johansson suggests that we replace the cat with a fish on the bottom of a trawler (180). Speaking with Derrida and Johansson, can we imagine the fish looking back, and what happens with us when we see ourselves being seen by the fish?

Tracing the genealogy of the concept of technology, Jean-Luc Nancy (19) acknowledged how Aristotle imagined automatization as a divine sense of production, where neither slaves nor masters are needed. No one will have to give orders for the machinery to run, and no one will need to be ordered to perform certain tasks. However, if linked to the example of animal industries, automatization also comes with the possibility to *not be seen*, to let technology perform tasks that are unscrupulous or would possibly give rise to ethical concerns. To dig deeper into this good-trick of technology in animal production, this article will use the example of the three newly founded, Swedish-based food-tech companies Agtira, Volta Greentech and Johanna's stadsodlingar [Johanna's urban gardens], all specialising in circular innovations.

Agtira is in Härnösand, a small coastal town in northern Sweden, and specialises in aquaponics, a circular technique where greenhouses and salmon tanks are connected and share the same circulating water. The water, fertilised by salmon faeces, is transported to the vegetable plants in the greenhouses, and then the water is cleaned and returned to the salmon tanks. Initially, only vegetables were aimed for food production, yet recently the salmons are—just like vegetables—sold in local food chains. Agtira's business has expanded rapidly in northern Sweden and greenhouses and fish tanks have been established in parking lots outside food chains in several towns. Volta Greentech's innovation also centres on creating an on-land environment for marine species. In a lab environment in the Karolinska Institute in Stockholm, the company has created a factory where seaweed is being cultivated. The water that is used in the factory circulates and cleans itself with the help of AI technology. When fed to cows as a food supplement, the cows will produce less methane gas. Finally, Johanna's is a Stockholm-based food-tech company focused on creating circular food systems, including both aquaponics and animal feed, yet in this case the feed are insects and mussels who are also integrated into the closed-loop system. The vegetables are sold to local

restaurants, while salmons, mussels and insects are only used as manure (salmons) or feed for the fish (mussels and insects). All three enterprises' innovations have received vast attention in Swedish media, where the angle has been exclusively positive.

The three companies were selected based on size and how renowned they are. Besides being visible in Swedish media, they have been granted research funding from the national research council Vinnova, focused on sustainable innovations. Considering Agtira and Volta Greentech, the text material was extracted from the companies' web sites in a one-year period, ranging from September 2022-September 2023, while Johanna's web site was added to the study in September 2023. Initially, my intention was not to analyse changes over time in the web sites, yet going through the web sites at different occasions made me notice how the web sites' design changed over the year I visited them.

In their different ways, the web sites all give a futuristic impression. When entering Agtira and Volta Greentech's web sites,⁷ one is met by a stylistic aesthetics with moving pictures, pedagogic illustrations and big letters forming words such as "redefining" and "reducing". When starting to analyse the web sites in 2022, Agtira's site had a blue font with swimming salmons, but a month later it changed: from blue to bright pink with a futuristic greenhouse with a car parked outside of it. During the process of writing the article, the website changed two more times. First it changed to an aesthetic that displayed greenhouses from above in a snowy landscape, with a wavy pattern in the left corner of the picture. It then changed again to a more neutral design with only a few pictures. Regarding the content, the website has gone from highlighting the aquaponics to instead focus predominantly on the cultivation of vegetables. This change may reflect Agtira's journey from a start-up business to becoming an established company on the Swedish food market. However, besides mirroring the company's development, the shifting website design could also be read as a search for the best way to market the company's business, a process in which emphasising and downplaying certain activities plays a role.⁸

When I started analysing Volta Greentech's web site, it featured black and white retro photos from demonstrations, photos of cows and photos of a lab environment. Currently, the retro photos from demonstrations have been removed, while photos of cows, seaweed and lab environments remain on the web site. The two sites, including their different appearances during the past year, both communicate freshness and revolution.

Johanna's web site⁹, which was added to the study at a later stage and thus cannot be analysed regarding changes over time, is more straight forward and less stylised. Still, like the other web sites, it features drawn illustrations of loops and headers such as "The food production of the future."

In *A Cyborg Manifesto* (1985), Haraway stressed that the industrial revolution brought about a mechanisation of human lives, which meant that machines and technology became deeply rooted in what it means to be human. As a digital visitor of the companies' web sites, I get the feeling that we are about to witness a historic change of the same magnitude: one that, through AI, will change our understanding of what it means to produce food. The pictures on the web sites seem to suggest that we will soon be wondering how food production ever took place outside the lab environment. This is an approach that fundamentally alters human-animal relations, as it does not rely on cross-species entanglements. Although lab production of food *could* decrease the exploitation of animals (as have been suggested for example in the case of lab grown meat) it removes elements of human-animal interaction that traditional farming practices includes. Thus, whether good or bad, the introduction of AI and lab environments into food production affect the interconnectedness between human and animals; how animals are named and thought of, and how humans see themselves in relation to animals. This will be explored in the following section, where Derrida's concept of secular theology, which he develops in "Faith and knowledge" (1998), is used to draw attention to how the companies' innovations were described in a theological or biblical rhetoric, where the staff, technology and animals are differently positioned and connected.

III. On a world-changing mission

Although animals, plants and lab environments dominate the web sites, the staff also play an important role in constructing the innovation's trademark. In all sites, the staff was described as highly competent and driven by a calling to do good. Johanna's company describes their staff as "experienced and unique"¹⁰ and Volta Greentech describes it as a group of "humans dedicating their actions and their love for technology to saving and preserving our only home, planet earth."¹¹ Further, Volta Greentech depicts their male founder delivering a speech on their web site, with the words "Next brilliant in tech" behind him, and Johanna's had a picture of the staff standing in a cone with the female staff closest to the camera.

In Volta Greentech's web site, "Our mission" was one of the clickable categories appearing on the top of the site. When following the link in September 2022, the slideshow of demonstrations, cows and lab tubes was showing together with the text: "Reducing methane emissions from cows. On a mission to battle global warming by making cows fart and burp less methane gas, using seaweed."¹² The use of the words *mission* and *battle* creates connotations about a symbolic binary between good and evil, wherein the Volta Greentech team is identified with the good (the heroes) in the narrative and global warming appears as the evil threat. Under the heading "The Volta mindset: Simple means, massive impact," the company develops what they perceive as their driving force:

We know from experience that any challenge, no matter how big it is, can be broken down into small and manageable pieces. We also know that nothing is more powerful than a will so strong that it will stake even its existence for its fulfillment. Having a team of people with that mindset can take on any challenge, no matter how big it is. This is how we create a massive impact—one cow at a time.¹³

Phrases such as "nothing is more powerful than a will so strong," and "can take on any challenge, no matter how big it is" further create an aura of heroism, with the claim that the team will "stake even its existence for its [the cause] fulfillment" serving as the ultimate indicator of nobleness. Although Volta Greentech appears to be referring to the existence of the company, the rhetoric draws on common popular cultural narratives of heroes that are ready to risk their lives for the common good. The use of the word "human" in the definition of the team as "humans committed to change" strengthens the impression that it is the *human* good that will defeat the evil. The evil, namely, climate change, appears as a destructive force disconnected from human actions. The fact that cows are coupled with climate impact position them as both the problem and the solution. Similar to Velander's (214) findings when researching ecological meat production, there is no debate on the very phenomenon of cow breeding for milk and meat production here—their location in the production is unquestioned.

Following Derrida's reading of the naming of animals in the biblical creation myth, there are similarities to be found in how animals are positioned as absolute others in the companies' epic narratives of innovation and salvation. However, the biblical creation myth features fragments of togetherness that the companies' "innovation myths" lack: while humans and animals are both positioned in nature in the biblical creation myth, humans

are positioned at the opposite end of nature in the companies' narratives—they are in a divine position from where they can manoeuvre nature. In this context, climate change is not positioned as a threat to humans and animals equally; instead, it only appears as a threat to humans, while animals are described as products that can be used in ways that are more or less destructive in terms of global warming.

Like Volta Greentech's presentation of their team, Agtira takes on an anthropocentric approach to humans, animals and nature in their specification of their mission to "redefine local food." Also drawing on the metaphor of revolution, the company writes under the heading "Revolution and innovation in food production":

One of the biggest challenges the world will be facing in the future is the production of food. Water scarcity and climate change are global problems that have a major impact on people and their lives. This calls for significant changes to the way food is produced in the future, and we are at the forefront of this development...We have come the furthest and are a driving force for this development. It is our belief that our innovation and smart systems will play a key role in the development of sustainably produced food.

In the quote, which has now been removed from the company's web site, "the world" is aligned with "people and their lives." Words such as "at the forefront" and "a driving force" serve a similar purpose as the terminology that Volta Greentech uses, and positions Agtira as the *good force*. Humans are positioned as the victims of climate change, rather than as the cause. Derrida's focus on the naming of animals and its significance in the cosmogonic narrative of an anthropocentric universe, reveals the meaning of the disavowal of animals in this rhetoric. Humans, because they are associated with reason, inhabit a unique subject position as "subjects of reason, morality, and the law" and the being or not being of the earth thus rely upon human action (92). In this context, animals are thought of as things—things that, with Olofsson and Mali's words (836), are turned into resources in a production chain. Although this production chain is labelled as sustainable, Agtira's outlining of their mission does not seem to include animal welfare. This echoes the findings of Meijboom et al.'s (153) previous study of animal welfare in "sustainable" food production using circular systems. Sustainability is in this case solely linked to the life quality of people, which are positioned as the ones affected by climate change.

Discussing how nature is commonly feminised, Milstein and Dickinson (510) stressed that such gendering contribute to androcentric worldviews and can be used for greenwashing purposes. Such tendencies could be found in Johanna's web site, where the cause of sustainability was emphasised with the company's display of the female staff, and the use of a female name in their label. Supposedly, the use of women—who are commonly constructed as both altruistic and cyclical—may add to the trademark of *doing good* and preserving the planet. Drawing from Haraway (*A Cyborg Manifesto* 151), I argue that the mobilisation and appropriation of femininity in the company's branding can be seen as a gender formation where women are used to present the company as the good player. However, it is noteworthy that this was not the case with the two other companies. Volta Greentech had many pictures of their staff, only displaying young men, and Agtira did not use pictures of their staff other than in the "Co-worker" section.

The positioning and gendering of the staff could partly be traced to how the companies framed themselves. Although they were all using high-tech solutions in new methods of gardening and fish farming, the companies differed in the sense that they could describe themselves as primarily a food-tech company (in Volta Greentech and Agtira's case), or as an urban garden company (in Johanna's case). This illustrates how the companies' descriptions of their activities are central to understanding the creation myths that they constructed around their innovations, and I will thus dig a little deeper into this matter.

As we have seen, activities could be performed by humans (e.g. the company's staff), but they could also be described to be performed by technological systems, often presented as *smart systems* built on artificial intelligence. In Agtira's and Johanna's aquaponics, activities took place in the simultaneous and closed-loop production of vegetables and salmon meat. In Johanna's case, insects and mussels were also integrated in the loop to work as feed for the salmons. In Volta Greentech's seaweed production, activities took place in on land water labs where cattle food was produced from seaweed. While Agtira's and Johanna's food production included both plants and animals, Volta Greentech's production only included animals indirectly, as only the seaweed was produced by the company. On their web site, the company describes their business in the following way:

Volta Greentech is developing a scalable, sustainable, and automated land-based red seaweed cultivation system—tailored for the selected species of red seaweed that are crucial ingredients in our

product. A land-based factory enables optimization of temperature, light, and nutrients to maximize the red seaweed's growth rate while ensuring a high and standardized quality of the feed supplement.¹⁴

In this outlining of the seaweed production, technology is highly visible in the description of activities. This is also true for how Johanna's describes their business on their website. Under the heading 'Automatised and data driven production,' the company writes: "Living food factories with fish, bacterial cultures, vegetables and insects who work in symbiosis, in industrial scale. All systems are data driven and automatized with state-of-the-art-technology."¹⁵

Notably, none of the two companies mention human work force; instead, activities seem to be performed by either an "automated land-based (...) cultivation system," "land-based factory" or "living food factories." Volta Greentech highlights how the seawater that is being used is "recirculated in the system" and Johanna's describes how their systems are "data driven and automated." In Agtira's business description—which has changed since the data collection was carried out—the company highlights technology and circularity, writing that they can enable the cultivation of fish and vegetables on rooftops in urban areas with little available space.

All companies emphasised the fact that their innovations transfer former sea-based productions onto land. While Volta Greentech and Johanna's mention cows and salmons, Agtira's description of the cultivation that takes place within their business includes few signs of salmons (the company almost exclusively talk about cucumbers, vegetables or simply "food"). When listing their products, Johanna's only mentions vegetables, which they clarify in the following way: "Today we deliver vegetables of top quality for selected restaurants in the Stockholm area. We do breed fish, but the volumes in the pilot facility are not yet big enough to be delivered to clients."¹⁶

As they also state on the home page on their site, "the fish is predominantly part of the nutrient cycle of our system. But it is of course also possible to eat!" Thus, although it might change in the future, the salmons are currently not linked to the activity of meat production, but only work as manure. Again, this strengthens the findings of Meijboom and others (153), who stress that animal welfare is not a priority in circular production. Using Derrida's perspective on the naming of animals—and how this act illustrates humans' power and domination over animals—I would like to make a case for how fish are being named as food, yet they are used as manure. This resonates

with the point made by Johansson when reflecting on the fact that the fish is rarely seen as a feeling subject (180). The process of transforming a living animal into food already requires a deep *othering* of animals, however; the process of naming animals as food, yet not using them as food but only as manure for vegetables is a form of othering that transgresses that which we normally see in meat production—this form, I would argue, is unique for the closed-loop production of food. From the perspective of Derrida's (55) metaphor of *following* the animal, to be after it, using fish as manure in vegetable production means that a new form of human-animal relation is created. Here, the vegetable production that follows the salmon's swimming, eating and defecating in on land water tanks creates a kind of human-animal relation that we have not seen before, and that reshapes human identity.

Besides this, the cited excerpts reveal how adjectives such as “intelligent” and “smart,” always refer to technology, and not to the living species as such. Drawing from Haraway in *A Cyborg Manifesto*, I argue that the production of food is turned into an organic-technological compound where human activities and agency are hard to distinguish from the activities and agency of technological systems and factories. In *The Gift of Death* (1995), Derrida explores the ethical implications of responsibility—a concept that transcends conventional moral frameworks and confronts ambiguities of human existence. Although Derrida's initial use of the concept did not involve animals, other critics, for example Nicole Anderson (1), have proved its relevance for exploring human-animal interconnectedness. In the case of the close-looped systems that the companies offer as salvation, human responsibility is linked to the climate, and not animals.

The companies highlight how the innovations can contribute to mitigating climate change and facilitate food production in areas that are already struck by a heated climate. However, the solutions that the companies offer to climate change are also limited. On the one hand, their innovations are to have as little effect as possible on the climate and on the other hand they are to adapt to a reality where climate change is already happening. Therefore, although striving to develop climate-neutral options for food production, the land-based solutions that the companies offer also profit from climate change. Developing food production alternatives suited for a warmer climate does not have to be the opposite of battling climate change (Meijboom et al. 153); yet, in any case, it does not support the revolutionary rhetoric that all three companies use on their web sites.

IV. Innovations for salvation

Finally, I will pay attention to how the companies have described the impact of their innovations, which was also an important building block in the narratives. As we have seen, all companies emphasise the impact of their innovations as groundbreaking, and the word *saving* is commonly used on the web sites to highlight the positive climate impact of the said innovations. The web sites all give the impression that the change (or the revolution) is about to come, and that we are here to witness it. In Agtira's site, the company states that "old truths are not valid anymore, new ways of agriculture and distributing our food need to be created—fast."¹⁷ Using a rhetoric that draws on secular theology, Volta Greentech describes their product as a *miracle*. Although they explain how the production takes place in land-based factories, it is still portrayed as natural as the seaweed production is described as "a miracle from the bottom of the ocean."

Thus, by focusing on the potential of their commodities to save the planet, the enterprises balance between highlighting their high-tech solutions and emphasising that the cyclical systems they create are natural. Under the header "Learning from 70.000 plants," Johanna's writes that the cultivation of a large number of plants have taught them how to "design the steps that takes us to full-scale production and a scalable, replicable system." In Agtira's website, an interview with the CEO is shared under the header "Modern technology in harmony with natural cycles," where the CEO is quoted saying: "We have taken a natural cycle and industrialized it with the help of modern technology. Few things in the world are as advanced as a natural cycle, which means that you need modern technology to do it."¹⁸

Haraway's theorisation of compounds explains how the salvation that the companies offer is a fusion between nature and technology: a fully constructed AI manoeuvred replica of a so-called natural cycle. The difference is that it is a smaller cycle, within whose orbit the companies force together elements that are distant in real life; these cycles are not to be found anywhere in nature, in other words. In no place on earth can cows be found to eat seaweed of their own accord; nor are plants naturally fertilised with water containing salmon faeces. This places humans as the dominating agents and proprietors of small universes with an "architectonic desire" that is unique to their environment (Derrida, *Rogues* 120). Humans get to redefine nature in a new and encompassing manner in order to improve the living terms for us. Derrida's deconstruction of the Bible's creation myth casts light on how the artificial universes that the companies create are acts that go far beyond

naming and exploitation; these universes are repealing natural relations and introduce new ones. Plants and animals—all transformed into resources in the closed loops—are treated more similarly than ever before. Humans, on the other hand, are being assigned a unique subject position, as they are located outside, and in control over, cyclical systems.

In Volta Greentech's web site, there is a picture of a package of meat in a food store's cooling disk, the package having an illustration of a cow with seaweed in its mouth. The tag on the package says: "Your new meat" and "From cows that emit less methane."¹⁹ None of the three food-tech companies I have studied offer a salvation that includes moving away from large scale meat and dairy production. Instead, they offer possibilities that make it possible to avoid adjusting, and limiting our lifestyle, a lifestyle that today builds on large-scale meat consumption. Similar to Velanders's findings (213), the companies do not suggest that we produce less, change our consumption habits or eat less meat. The "blind spot" of animal welfare that Kortetmäki and Oksanen (730) notice when studying the rhetoric of the climate debate is painfully visible in the rhetoric used on the websites of Volta Greentech, Agtira and Johanna. Returning to Derrida's question about what happens if we, as humans, try to see ourselves from the animal viewpoint, we might need to ask ourselves: Who are we to lock animals into closed-loop systems? And, more importantly: is our salvation that requires bringing salmons onto roof tops and reducing them to manure, really worthy the name of salvation?

V. Concluding remarks: Tracing the animal, tracing human agency

Following the animal could mean to trace it: to follow its footprints on the ground or—as in the cases that this study focuses on—its faeces and gases. With the help of technology, these traces could be erased; by ceasing to exist or by being transformed into a resource. This is the promise of the three food-tech companies—all using circular technology in new food innovations—that have been the focus of this article. By looking for the animal in the companies' narrations of their innovations, I have explored how human and nonhuman animal relations appear in the narratives and how they are mediated by technology.

The way that the narratives are structured suggests that technological innovations are idealised and mythologized in our time. Drawing on a secular theological terminology, the companies narrated their innovations as unique and revolutionary in battling climate change. In these narratives, two

compounds were to be found. The first is a fusion of human and technological activities, making it hard to trace agency and responsibility to human actions. The other is the fusion of techno-nature that the cyclical systems the companies create constitutes. The systems were described as natural yet could only be created with the help of technology.

The companies' construction of closed loops, where water, vegetables and sometimes fish, shellfish and insects are integrated, rearrange the relations between humans, animals, plants and technology. Naming animals similarly to plants (as 'food' or as being 'cultivated') and solely using them in activities that have previously been associated with plants or animal biproducts (such as being used only as manure and not for food production) suggest the need to start questioning the impact of what could be called a *plantification* of animals. Clearly, fish are positioned as closer to plants than to other animals (human or non-human), which means that animals are objectified on a whole other level than we have seen before. Although all companies highlight the benefits of closed-loop systems in terms of sustainability, they did not include animal welfare or a new way of living (more in pace) with nature.

Digging deeper into the consequences of this extensive objectification, following the animal could also mean to metaphorically look for traces of an animal that is "seeking to find or seeking to escape" (Derrida, *The Animal* 55). There is little escape for animals in food production, and especially so in the new automated circular systems that animals are captivated in. When Nancy quoted Aristotle in expressing the belief that automation would come with the erasing of slaves and masters, he recalled a past where the violence of technology had not yet played out. It is hard to imagine a deeper slavery than that of animals in closed loops. Thus, following the animal into these circular systems, where we do not even need to bother about eye contact, inevitably reshapes human identity. The animal becomes an entity without the power of the gaze that can be used in meat and vegetable production alike, diffusing the general boundaries between animals and vegetables.

Although the companies draw on revolutionary symbolism in both text and pictures, their innovations cannot be understood as revolutionary; neither do they offer any real alternative to our current way of living that would do more than neutralise the human climate impact. As the companies partly adjust to the new warmer and drier climate, they are also capable of profiting from climate change. Derrida's reflection on the division between humans and nonhuman others painfully illustrates just how important this distinction is for legitimising the use of animals in artificial closed-loop food production

systems. As traces of animals in food production are being erased with the help of AI and smart systems, so is human agency and any sense of responsibility and reason. Following this approach, this article is an attempt to renarrate closed-loop food systems by illuminating the violent footprints that *are* left in this form of food productions—footprints that fundamentally alter human-animal relations and redefine what it means to be human.

Notes

- ¹ Examples are Azar Mahmoud Gondabi et al. (2021) and Herwig Winkler (2011).
- ² After the political shift in 2022, resulting in a conservative-led government, the Ministry of the Environment was replaced with the newly established Ministry of Climate and Enterprise.
- ³ With some important exceptions, particularly Meijboom et al. (2021) and Meijboom et al. (2023).
- ⁴ Critics such as Martha Nussbaum have argued that Derrida's deconstructionist approach fails to provide a solid foundation for ethical considerations regarding animals, and that it overlooks the need for concrete ethical principles to guide our treatment of animals.
- ⁵ Critics such as for example Nicole Anderson, Cary Wolfe and Matthew Calarco have argued that the focus on companionship and entanglement risks overlooking the distinct being of animals (Anderson and Calarco), and the material differences and power dynamics between humans and other species (Wolfe). In this article, while using the concept of entanglement, I also acknowledge the relevance of paying attention to the relation between animal autonomy (or lack of it) and human dominance in the analysis.
- ⁶ Swedish title: *Om rätten att ifrågasätta människan. Derrida och djuren.*
- ⁷ Agtira's web site: www.agtira.com; Volta Greentech's web site www.voltagreentech.com.
- ⁸ Inevitably, the websites in this article will change over time, and website references may go outdated. I have tried to preempt this as far as possible by going through the website links regularly during the process of writing and editing the article.
- ⁹ Johanna's web site: www.johannas.org.
- ¹⁰ See www.johannas.org/om-oss.
- ¹¹ See www.voltagreentech.com/about.

¹² See www.voltagreentech.com.

¹³ See www.voltagreentech.com/about.

¹⁴ See www.voltagreentech.com/production.

¹⁵ See www.johannas.org.

¹⁶ See www.johannas.org/produkter.

¹⁷ See www.agtira.com/om-oss.

¹⁸ See www.agtira.com/2021/06/21/modern-teknik-i-harmoni-med-naturliga-kretslopp.

¹⁹ See [Volta Greentech partners up to revolutionize the meat industry in Sweden | Techarenanews](https://www.techarenanews.com/volta-greentech-partners-up-to-revolutionize-the-meat-industry-in-sweden).

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