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Many Meats and Many Milks? The Ontological Politics of a Proposed Post-animal Revolution

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ABSTRACT

Today plant-based alternatives to animal-agricultural products are made available or developed alongside 'cultured' meat, and products utilising genetic modification. To proponents, this signifies the emergence of 'cellular agriculture' as a food-production field or the possibility of a 'post-animal bioeconomy': a way to safely and sustainably produce animal products without animals. Drawing on previous work on ontological politics enables acknowledging how these novel objects unsettle animal products' ontological stability, thereby offering a practical case of how the world is multiply produced. An important emphasis within this tradition is the situated nature of reality-making practices. Consequently our analysis, focusing on different practices, sites and objects compared to influential studies of ontological politics, necessitates bringing in hitherto relatively unexplored political-economic relations and legal processes. As global processes and problem formulations, laboratories, and national or regional regulations come together to remake realities the ontological-political dynamics determining the fate of cellular agriculture or a post-animal bioeconomy becomes shaped by a combination of conflicts and budding collaborations between proponents of new technologies and established livestock interests. Understanding these dynamics requires tracing both how post-animal products reshape the world they are introduced into, and acknowledging the friction evident as reality-carrying objects leave their laboratories.

KEYWORDS

Meat; milk; biotechnology; ontological politics; food

In social studies of science it was the laboratory that was redescribed as a sociomaterial practice where reality is transformed and where new ways *of doing* reality are crafted. From there they are exported, not so much in the form of 'theory' but rather – or at least as much – in the shape of vaccinations, microchips, valves, combustion engines, telephones, genetically manipulated mice and other objects – objects that carry new realities, new ontologies, with them. (Mol, 1999, p. 75)

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1. Introduction

Alongside established debates on the ethics of animal agriculture (Singer, 1975; Stuart, 2007), we now see a high-profile debate on its environmental impacts. Depending on research design, widely circulated estimates for the proportion of global Green House Gas (GHG) emissions attributable to animal agriculture vary from 14.5% (Gerber *et al.*, 2013) via 18% (Steinfeld *et al.*, 2006) to a massive (if generally disputed) 51% (Goodland and Anhang, 2009). Animal agriculture's GHG emissions moreover continue to rise as global meat and dairy production continues to grow, with an expected doubling in meat production over the first half of the twenty-first century (Steinfeld *et al.*, 2006). Critics, however, claim that such prognoses problematically naturalise increased meat and dairy consumption and emphasise that environmental action must address animal agriculture (Weis, 2013). As a 2010 UN Environment Programme report argued, a 'substantial reduction of [agriculture's] impacts would only be possible with a substantial worldwide diet change, away from animal products' (UNEP, 2010, p. 82).

And indeed, during the last decade alternatives to livestock products have come to occupy an increasingly prominent place (Hancox, 2018). Lux Research notes that the compound annual growth rate of soy-based meat alternatives, at 5.1% 2005–2014 was twice that of meat, and more than three times that of seafood. Further, they estimate that 'alternative' protein sources could claim 33% of total protein consumption by 2054 (Lux, 2015). For 2016–2023, Businesswire anticipates an even higher compound annual growth rate, 6.7%, for meat substitutes (Businesswire, 2018). Meanwhile, the worldwide market for non-dairy milk grew from just over $6bn in 2009 to a projected $10bn for 2016, with non-dairy milk making up 24% of all new milk product sales in Europe, and 31% in North America (Bloomberg, 2015). In the USA, the sale of almond milk, today attracting more than twice the revenue of other milk substitutes, increased by 250% 2010–2015 (Nielsen, 2016).

Set against the high-profile critique of animal agriculture's environmental impacts and the increasingly pronounced market position of analogues we in this article centre on those actors who today make a case for analogues as superior alternatives to animal agriculture products or argue that products produced using plants, tissue engineering and/or genetic modification (GM) are identical to those conventionally produced. Proponents have labelled this shift a 'post-animal bioeconomy' or a turn towards 'cellular agriculture': a proposed food-production system utilising 'biotechnology to produce an abundance of animal products without animals in order to feed a growing population sustainably, safely, and affordably' (Datar *et al.*, 2016, p. 121, see also Datar, 2015, 2016; Mattick, 2018; Stephens *et al.*, 2018; Zassenhaus, 2017). In advocating the possibility of producing 'animal products without animals' the proponents of such a turn question what meat, milk, eggs, and other animal agriculture products are (and could

become). Meat is now understood as meat, regardless of whether it comes from livestock or cultured cells (Shapiro, 2018), while conventional livestock products are referred to as novel products' 'animal doubles' (Donaldson, 2016).

Focusing on the contemporary dynamic of cellular agriculture on the one hand and on conflicts arising as Swedish oat-drink producer Oatly presented their products as upgrades of dairy on the other, we take claims of identity, similarity and superiority as our starting point for exploring how companies today strive to lodge novel food products within categories hitherto denoting animal-derived products. Thus, we ask four interrelated questions: On what basis do proponents argue that novel products or prototypes are to be considered identical or superior to conventional animal agriculture products? Which barriers exist for these claims? How do producers and proponents of (so-called) post-animal products handle such barriers? And how are post-animal products using different production technologies placed alongside each other as advocates argue for a post-animal or cellular-agricultural turn?

In exploring these questions, we move between examples emphasising different technologies and between products produced by different companies. This is because it is not the technologies per se that are our prime interest. Rather, we want to explore an attempted reorganisation of contemporary food economies and ontologies. Destabilising established understandings of what food is (Jönsson, 2016; Stephens and Ruivenkamp, 2016), post-animal products 'carry new realities, new ontologies with them' (Mol, 1999, p. 75, see also Stephens, 2010, 2013; van der Weele and Driessen, 2013). Scrutinising how they are situated, argued for, contested, and made sense of consequently enables us to continue a discussion on ontological politics (see Mol, 1999, 2002, 2016; Law and Urry, 2004; Law, 2009, 2015).

In the following section, we anchor our stories about new food developments to recent work that, as part of the so-called ontological turn, explores the shifting nature of reality, particularly emphasising what politics signifies within this work. Thereafter we discuss different 'post-animal' developments in Section 3, before returning to the possibilities, uncertainties and antipathies generated through novel food developments in Sections 4–7. In the conclusion, we return to our four questions, summarise our account, and consider what our story means for further discussions on ontological politics.

2. On the Post-animal Bioeconomy and Ontological Politics as Analytical Perspective

Emerging from conversations at San Francisco biotechnology accelerator Indiebio, the notion of a 'post-animal bioeconomy' ties cellular-agricultural aspirations of 'decoupling animals from the supply chain with biotechnologies' (Datar *et al.*, 2016, p. 129) to the bioeconomy as a proposed key site of strategic investments and speculation (Cooper and Waldby, 2014, p. 6). But this framing

of cellular agriculture (in itself an ambiguous notion, see Stephens *et al.*, 2018) also connect to the bioeconomy as a 'polysemic and political […] neologism' (Pavone and Goven, 2017, p. 2) or 'multifaceted' notion (Bugge *et al.*, 2016) 'expected to imply the implementation and application of generic biotechnologies into several other sectors and domains […] redefine[ing] how these sectors operate and what they produce' (Bugge *et al.*, 2016, pp. 13–14). As framed in relation to cellular agriculture, 'bioeconomy' here comes to resemble what Pavone and Goven (2017, p. 3) label the 'bioeconomy as a biotechnological-innovation economy,' with 'bio' drawn from biotechnology. This version, emphasising technological innovation, is furthermore intimately entangled with how new technological objects carry new worlds (see Mol, 1999), making ontological politics a fruitful lens for our study.

This term, 'ontological politics,' most famously elaborated by Annemarie Mol (1999, 2002), indicates an acknowledgement that reality does not predate engagements. Rather, practices produce 'reality effects' (Mol, 1999) that remake how various interlinked realities are performed. As Law and Urry (2004, p. 397) summarise:

> The shift is from epistemology (where what is known depends on perspective) to ontology (what is known is also being *made* differently). It is a shift that moves us from a single world to the idea that the world is multiply produced in diverse and contested social and material relations. The implication is that there is no single 'world.'

Denying a distinction between epistemology and ontology, between how the world is known and a world known (see also Latour, 2008; Law, 2009), ontological politics thereby provides an opportunity to explore 'a link between the real, the conditions of possibilities we live with, and the political' (Mol, 1999, p. 86).

There is consequently no way of establishing a once-and-for-all, single, stable, reality around which politics and research revolve. Instead, multiple '*ontologies* are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices' (Mol, 2002, p. 6, emphasis in original). Mol (1999, p. 75) argues that if

> the term 'ontology' is combined with that of 'politics' then this suggests that the conditions of possibility are not given. That reality does not precede the mundane practices in which we interact with it, but is rather shaped within these practices. So the term *politics* works to underline this active mode, this process of shaping, and the fact that its character is both open and contested.

That reality is understood as 'both open and contested,' treated as 'historically, culturally and materially located,' and (therefore) 'multiple' (Mol, 1999, p. 75) does however not imply a caricature hyper-constructivism where *any* reality can be called into existence at a whim. Though relationally remade, 'the "real" is indeed real' (Law and Urry, 2004, p. 395). Rather than individual inventions, emphasis lies on assemblages (of humans and non-humans) 'together enact[ing] a set of practices that make a more or less precarious reality' (Law, 2009, p. 151).

2.1. Politics in Ontological Politics

A focus on reality (or rather realities) as relationally remade enables probing the constitution of political processes' foundations. But already a decade ago Braun (2008, p. 675) questioned how 'many times […] we need to be told that objects are "ontologically unstable"'? Rather than repeatedly asserting instability, the important issue to him was how claimed instability inform planning, policy and politics. The answer to this question, the relationship between ontology and politics in ontological politics, or within the so-called ontological turn at large, remains heavily debated (see for example Braun, 2014; Pellizzoni, 2015; Michael, 2016; Joronen and Häkli, 2017). Perhaps most importantly to our account of novel food technologies is a tension between accounts emphasising processes of deliberation and coexistence of different realities, and those emphasising conflicts.

Here Whatmore (2013) envisions responses built on shared understanding and deliberation to floods as 'moments of ontological disturbance,' while Mol (2002) accounts for how various versions of the disease atherosclerosis can co-exist within a Dutch hospital. But Pellizzoni (2015) instead criticises such focus on coexistence. Preferring a Rancièran (2001) notion of politics as about worlds colliding, he remarks that a Rancièran disagreement is:

> a fundamental divergence about the constitution of reality, its ontological status, hence about the matter of contention; a divergence which can only be precariously settled in favour of a certain amount of the 'world in common' – for ontological politics ontological pluralism does not necessarily entail antagonism or agonism, admitting instead pacific, even friendly compresence. (Pellizzoni, 2015, p. 77)

A focus on ontology-as-political does in other words not presuppose a particular understanding of politics as about conflicts *or* deliberations. But for this article, a starting point underscoring ontological-political conflicts seems pertinent, particularly in light of how conflicts are frequent when new food technologies are introduced (Freidberg, 2009). Far from co-existing with older products within a food system readily accommodating them, 'post-animal' products producers' strive to place products within a food system thereby remade. Peaceful, distributed, co-existence furthermore seems unobtainable considering how commodities (at least within a capitalist economy) colonise. Producers hope that the products *they* develop shall seize market shares at the expense of other commodities. This accentuates Law's (2009, p. 155) remark that even though reality is not destiny, reality can only be remade 'with great difficulty.'

2.2. Methodology

The article builds on work on the research environments and visions emerging around cultured meat and cellular agriculture by Erik Jönsson (see Jönsson, 2016, 2017). This research has entailed 21 expert interviews in the Netherlands, USA, and Sweden alongside observations at symposiums, conferences, and seminars.

Furthermore, the article builds on nine interviews with Oatly employees in Sweden, conducted by Ally McCrow-Young and Tobias Linné between October 2015 and April 2016 (see McCrow-Young, 2017). In writing this article, we have emphasised a prominent common theme within these research projects: how proponents and developers of so-called post-animal products argue for and make sense of their products (seemingly inescapably in relation to established livestock products), and the world proponents and developers argue that their products carry.

3. Introducing the Post-animal

Today the post-animal figures as both an unwanted abnormality (Stanescu and Twine, 2012), evident when critics berate how industrialised animal agriculture turn animals into mere meat or milk machines, and a promise that the solution to animal agriculture's brutality and unsustainability could be to push such tendencies to their 'logical conclusion' (Driessen and Korthals, 2012), creating *actual* milk or meat machines. The ambition to 'decoupl[e] animals from the supply chain with biotechnologies' that we introduced above is thus regarded as 'the next and logical step in an agricultural (r)evolution' (Datar *et al.*, 2016, pp. 129, 122).

Including also plant-based technologies Donaldson (2016) in her celebration of 'meat without animals' argue that producers are thereby 'creating products that envision a future more in tune with the entanglements of all planetary life,' with 'plant based and cultured meat, milk and eggs […] designed to surpass their animal doubles with higher nutrition content, less cost and a fraction of the energy inputs' (p. xvii). The post-animal-as-promise thus contain two entangled histories: one of the developments of increasingly technologically sophisticated plant-based products mimicking the taste and texture of alleged 'animal doubles,' and one of the prototypes striving to be bio-identical (i.e. indistinguishable at cellular or molecular scales). We here summarise these histories, and in Section 3.3 begin to underline their connections to ontological politics as analytical perspective.

3.1. Plant-based Analogues

During the twentieth and early twenty-first centuries, a number of plant-based products have been developed, with soybeans for long the most important raw material. 'Soybean meat' was developed as early in 1922 and more textured Fibrotein-based (spun soy protein fibres) products have been sold in the USA since the early 1960s (Shurtleff and Aoyagi, 2014). Other commodities are built on other kinds of raw materials, such as wheat (seitan) and oats. Partly unsettling the idea of alternatives as *plant*-based Quorn™, a product primarily prominent on the European market, is instead made from a strain of the *Fusarium Venenatum* microfungus. Not content with relying on existing plants, some

companies have furthermore begun to explore GM and synthetic biology (Rossi, 2017). Impossible Foods, for example, produces bleeding veggie-burgers by engineering genetically modified yeast to produce soy leghemoglobin, adding taste and colour to patties (Simon, 2017).

Also plant-based dairy analogues (at least as objects of everyday consumption) are primarily a twentieth-century phenomenon. The world's first soy dairy opened in Paris in 1910. But it was not until in 1966 that Cornell university researchers identified the enzyme giving soymilk its 'beany' flavour, subsequently developing a process to eliminate said flavour (Shurtleff and Aoyagi, 2013). As soymilk had long had a bad reputation in the Global North, this was a crucial step in making it palatable to a larger public (Fu, 2014).

For long considered a lesser alternative for dairy-intolerant consumers, plant milks have increasingly become regarded as capable of replacing cow's milk also for people able to digest dairy (Shurtleff and Aoyagi, 2013). Thus, plant milks have from the 1980s onwards become established as a more mainstream commodity in the Global North. This has also included the large-scale commercial introduction of a wide variety of milky plant beverages utilising raw materials such as almonds, rice, millet, oats, hazelnuts, and cashews. But importantly, alternatives' increased prominence also generates a sometimes rather self-confident stance among producers, aptly illustrated by a company that we will devote more space to below: Oatly. Producing oat-based dairy analogues, this company styled themselves as producing upgrades rather than alternatives.

3.2. Cultured Meat and Cellular Agriculture

Built on using tissue engineering technologies to culture muscle cells for human consumption, what is alternately called 'in vitro,' 'cultured' (Datar, 2016), or 'clean' (Friedrich, 2016) meat has been under development since the turn of the millennium, initially in the form of goldfish 'fillets' and artistic explorations (Benjaminson *et al.*, 2002; Catts and Zurr, 2014). No products are yet on the market, but as of March 2018, a handful research teams have presented prototypes (see Shapiro, 2018; Stephens *et al.*, 2018, for more detailed histories). In 2013, a Maastricht University team presented a cultured beef burger at a high-profile London tasting event. The following year, the Brooklyn-based company Modern Meadow served their first prototype, steak chips, at Google's Solve For X, while in 2016 Bay Area-based Memphis Meats displayed their first product, a meatball. The year thereafter, Japanese biohackers Shojinmeat held a small-scale taste test for cultured chicken liver cells. Illustrating contemporary entanglements of (particular) plant-based efforts and tissue engineering efforts, Just, Inc. (formerly Hampton Creek) in 2016 started researching cultured chicken under the name Project Jake, aiming for what its CEO Josh Tetrick has called 'a Manhattan project' (Shapiro, 2018, pp. 156–158). This project held a small-scale taste test for their first prototype chicken nuggets in 2017 (Just, 2017).

Meat-culturing has, as introduced above, moreover recently been accompanied by GM-based technologies within 'cellular agriculture' as a (perceived) 'way to harvest products like meat, milk, and eggs from cell cultures instead of actual livestock' (Zassenhaus, 2017, p. 66–67). Herein Perfect Day (formerly Muufri) strives to produce 'cow's milk without cows' (Kowitt, 2016a) through genetically modifying yeast to produce milk proteins and fatty acids. This company dates back to a project initiated for an Irish biotechnology accelerator in 2014. Meanwhile, Clara foods – using similar technologies to produce egg whites – was initiated for the aforementioned San Francisco-based biotechnology accelerator Indiebio the following year. At Indiebio, this company has since been followed by companies utilising GM to produce, for example, gelatine (Geltor, previously Gelzen) and rhino horn (Pembient).

3.3. Making Sense of the Post-animal

Though the products we account for in this article *could* be placed in a long history of alternatives and analogues (see for example Shurtleff and Aoyagi, 2013, 2014), we believe that this would be a mistake. First, the pronounced market position of increasingly technologically sophisticated alternatives (mentioned in the introduction) matters. Companies working with plant-based products, GM and/or tissue engineering have attracted considerable amounts of venture capital during the last years, 'injected like adrenalin into the heart of the assemblage, to kick start animal-free food's journey into becoming a market' (Mouat and Prince, 2018, p. 319, see also Jönsson, 2016). As we will return to (emerging *and* potential) inroads on the market for animal-agricultural products has engendered both intense conflicts and budding collaborations between proponents of new food technologies and conventional animal agriculture interests. Second, developers and proponents of many of these products do *not* consider them alternatives or analogues. Again, products are frequently regarded as the same substances as those previously produced by animals, albeit produced by new means (see Figures 1 and 2). This claim is, for example, evident in how New Harvest, a NGO that has since 2004 been a central organisation in communicating and coordinating cellular-agricultural research has utilised 'animal products without animals' as a prominent slogan (Datar *et al.*, 2016).

For cultured meat claims of being identical to conventionally produced meat were underscored already in the first estimate of products' environmental impacts. Therein Tumoisto and Teixeira de Mattos (2011, p. 6122) claimed that 'cultured meat consists of similar muscle tissue to conventionally produced meat, but only the production technique differs.' Meanwhile, the Good Food Institute, who have during the last few years become another influential organisation promoting cultured meat (by them labelled 'clean meat') and plant-based analogues assert that 'growing meat outside of an animal from a small cell

Figure 1. Perfect Day's 'animal-free milk.' Image credit: instagram.com/perfectdayfoods, reproduced with permission.

sample' results in '100-percent real meat, but without the antibiotic residues and bacterial contamination that come standard in conventional meat production' (Good Food Institute, n.d.).

What such assurances in essence underscore is precisely the emergence of a self-confidence stance among actors associated with particular new food-production technologies increasingly understood as versions *of* rather than alternatives *to* animal products. Thereby they carry 'new realities, new ontologies' (Mol, 1999), where also products made without animal inputs are animal products.

4. New Food Ontologies

As mentioned above, the introduction of increasingly sophisticated plant-based products alongside prototypes built on tissue engineering and other

Figure 2. Beyond Meat® packaging. Photo by author.

biotechnologies is by proponents and developers considered to not only reshape food markets, but also food ontologies (see also Stephens, 2013; Stephens and Ruivenkamp, 2016). Drawing on previous work on ontological politics will in this and the following sections enable us to study the introduction of these objects as a practical case of 'how the world is multiply produced in diverse and contested social and material relations' (Law and Urry, 2004, p. 397). Rather than forcing us to state whether novel biotechnical products are to be considered equivalents of animal-agricultural products this allows us to hone in on the very openness of the world in making as our research focus.

A prime example of how producers have actively striven to fuel ontological uncertainties is evident in how the company that later became Oatly named their first beverage 'Mill Milk,' thereby suggesting a different way to define milk. A similar attempted redefinition characterises Perfect Day's attempts to produce milk through synthesising fatty acids and proteins produced by genetically modified yeast. As a representative argued:

> I want the definition of milk to be based on its cultural significance, on the way people use it and interpret it, not on what's in it, necessarily. And the reason is obvious. I mean, soymilk is milk, almond milk is milk, cow's milk is milk. (Interview, Perfect Day representative, December 2014)

Resembling how Yates-Doerr (2015) or Sexton (2016) treat as meat that which people cook and eat as meat, this developer defines milk based on usage. 'Milk' is hence re-conceptualised as any substance that satisfactory adds milkiness. But milk not derived from mammary glands is simultaneously considered superior.

> Every problem with milk stems from the fact that it comes from inside an animal. And, when people drink milk, they're not drinking a glass of milk because they want a cow. They're drinking it because they want a glass of milk. And it's a shame that that glass of milk is embedded with inefficiencies. 70% of the cost of a glass of milk comes from the feed that we're giving the cow. And those cows are turning that feed, inefficiently, into milk protein. They're also producing body parts that we don't need, they're also producing methane gas that pollutes the atmosphere. (Interview, Perfect Day representative, December 2014)

Without having to deal with the animal's cumbersome corporeality, the argument goes, milk production could become more resource-efficient. But the invention of 'cow's milk without cows' is also regarded an upgrade to current plant-based alternatives in that it can 'answer environmental and animal welfare concerns without sacrificing the benefits of milk's chemical composition' (Kowitt, 2016b). Dairy is thus problematised in how perceived inefficiencies are underscored. But a perception of milk as a desirable, complete, source of nutrition is reasserted through the significance afforded to milk's composition (cf. DuPuis, 2002). In essence, embracing Law's (2009) adage that 'reality is not destiny' a reality where milk is derived from cows is thus denied. But a reality where milk is desired is not. Other producers, however, strive to make their products carry a reality where dairy is dethroned. Oatly thus goes further in their critique of milk, also questioning dairy's composition.

> … if you look upon the composition of our mothers' milk, it's completely different when it comes to the proportions of macronutrients. I think that says a lot. It's maybe three times more protein in cow's milk. So, cow's milk is definitely made for calves, whatever the milk industry says. It's a fact, right? When we observed this we thought, okay we should not copy cow's milk. It's not suitable. That was not an ideal copy. (Interview, Oatly representative, 2015)

Oatly thus dissociates their products from cow's milk, and cow's milk from 'our mothers' milk.' It is on this basis that Oatly presented their products as dairy upgrades, in the processes adopting slogans such as 'It looks like milk but isn't milk. It is made for humans (not baby cows)' and 'It's like milk, but made for humans.' But while raising Oatly's public profile, such slogans also provoked the Swedish Dairy Association (*Svensk Mjölk*).[1] Thereby what the press labelled a 'milk war' began, a conflict that we will return to.

Already Oatly's and Perfect Day's framing of their products illuminate how developers and proponents arguing for new food ontologies almost inescapably situate novel products and prototypes in relation to established animal-agricultural products and practices. Such a way of situating new products in relation to

established products and practices is similarly evident in the words of one activist expanding on whether cultured meat is natural (see also Welin and van der Weele, 2012):

> Based on whatever you say natural is, I would say that farming thousands of animals in the same room is not natural and feeding them things they wouldn't normally eat is not natural, and giving them tons of antibiotics is not natural. And by contrast, a cell dividing, I think, is very natural. And if we can make cells divide in a different environment, then it's up for you to decide if it's natural or not. But under the microscope I don't think that the meat itself is any different from what it would be from an animal, and it's just about whether cells divide within an animal versus outside. (New Harvest representative, June 2015)

How this activist thus ends up speaking about the (un)naturalness of animal agriculture in proposing cellular agriculture illustrates how novel and hypothetical post-animal products are perpetually presented in terms of what they are not, their 'non-stuff' (Sexton, 2016). As Mouat and Prince (2018, p. 319) rightly remark, animal agriculture 'occupies a complex relationship to animal-free food as both the source of its potential consumers and its essential constitutive outside.'

But the quotes throughout this section simultaneously exemplify how arguments for a 'post-animal bioeconomy' or post-animal products rely on different enactments of what animal agriculture products are. In arguing that being *treated* as milk turns substances into milk, Perfect Day's representative tie into a practice-centred understanding of objects' nature (Yates-Doerr, 2015; Sexton, 2016). But in the New Harvest representative's argument about the (un)naturalness of animal agriculture immediately above emphasis is instead on what *appears* identical under the microscope (i.e. on what is bio-identical). Partly echoing the emphasis on how Mol (1999, 2002) chronicled the various techniques through which diseases are diagnosed this theme, the practices through which realities are enacted as real, runs through all of our examples.

5. The Precariousness of Proposed Food Realities

The above section illustrated how developers and proponents through discursive *and* material interventions strive to enact new food realities, and in the process present animal agriculture as something to be escaped by technological means. Milk must in these enactments no longer come from mammary glands, nor must meat be muscle (cf. Fiddes, 1991). With a problem formulation partly centring on animal bodies as not quite good enough cellular agriculture promises to turn animal products, from parts of or produced by animal bodies, into more of an uninterrupted, controllable, flow. But so far our account risks resulting in merely marvelling at the prospect of new realities when novel food products are often met with resistance (see Freidberg, 2009), and when reality can indeed only be made with 'great difficulty' (Law, 2009, p. 55). That cultured

meat would be 'meat' is for example far from self-evident. This reality does not simply follow from the introduction of new technological objects (cf. Mol, 1999). As we will elaborate below it is rather a possible outcome of processes set in motion as these objects are produced.

As Stephens and Ruivenkamp (2016, p. 331) remark, cultured meat is permeated by an 'ontological ambiguity' that includes how it 'relates to existing classifications around food, science, and technology.' While both 'cultured' and 'conventional' meat is animal-derived, the production 'process is so different that it is possible to question whether [cultured meat] is meat at all' (Stephens and Ruivenkamp, 2016, p. 331). Kramer similarly comments that, rather than whether tissues should be labelled in vitro or cultured, it is 'the use of the word "meat" that we should really be interrogating.'

> How should we define meat? What are the boundaries that the definition of meat sits within? The flesh of an animal? Are muscle tissue and fat cells grown separately and processed together really meat? (Kramer, 2016, pp. 34–35)

To such questions we can add how accounts of cultured meat, if and when people agree that cultured meat is meat, frequently enacts 'meat' as category beyond cultural and religious connotations (such as halal or kosher) deeming particular animal tissues (in)edible (Jönsson, 2016). Hence, Cultured meat remains caught between a sense of uncertainty about both its present and future standing as an 'ontological object' (Stephens, 2010, 2013; van der Weele and Driessen, 2013; Mouat and Price, 2018), and the forces striving to determine what it is (Jönsson, 2016).

Thorny questions concerning the nature of meat furthermore appear also in environments where those gathered tend to savour the prospect of cultured meat. As researchers, developers, entrepreneurs, academic commentators, journalists, and a lone chef gathered for the 'First International Symposium on Cultured Meat' in Maastricht, 2015, the conference centre was adorned by letters half a story high spelling out '18–20 OKT SYMPOSIUM ON CULTURED MEAT.' But this symposium also included a presentation by Frank Vandendriessche from the Campofrio Food Group, focusing on the complexities of muscle tissue and European Union regulations defining what can be labelled meat. The generally techno-optimist presentations given at the symposium were thus haunted by a feeling that the tissue they describe *might* not currently count as meat, regardless of what letters half a story high declare. This uncertainty illuminates just how glaring the open nature of reality can be when new technologies are developed (Mol, 1999, see also Stephens *et al.*, 2018).

5.1. Ontological Politics and Legal Geographies

What Vandendriessche's symposium presentation furthermore underlined was the identity of meat or milk as about more than cultural significance understood

as popular perception. Beyond how *we* (authors or readers, producers or consumers) define such products lies the relative(!) ontological stability that legal definitions produce. As Viljanen (2009, p. 5, emphasis in original) remarks, legal concepts 'turn *real phenomena* into *legal categories*.' Legal frameworks offer authoritative definitions of what things are (i.e. what counts as meat or champagne, theft or aggravated assault).

Emphasising the law's ontological-political power furthers the discussion on ontological politics in two important ways. First, it underscores how courts enacts or counteracts realities. Rather than withering away (Mol, 2002, p. 6) or being remade through 'mundane practices' (Mol, 1999, p. 75), particular realities are given explicit state-led support. As Jasanoff (2016) comments, technology and law is thoroughly intertangled, and this has direct bearing for the role of courts in relation to the objects we account for in this article.

Underlining courts' ontological-political power hence contrasts with how Mol (2002, chap. 4) elaborates on how various versions of her studied disease are not drawn together into a single object partly because different 'sites' where versions of the disease are enacted could be kept apart. In the absence of a single place where everything comes together, she underscores the possibility of nonclosure. Conversely, with our studied objects different sites and different versions of objects sometimes cannot be held apart. A fundamental role for courts *is* to force things to come together precisely to achieve closure.

Second, acknowledging the role of legal practices allows emphasising the dynamics determining ontologies' geographical extension (or, in other words, what happens when objects leave their laboratories). As Gerber (2012, p. 3) points out a mix of global markets and national laws 'creates borders and concomitant tensions and conflicts.' In effect, then, law creates ontological-political territories with different definitions of what things are. Differently situated decision-makers approached by differently situated interest groups (re)create categories through which the world is segmented *within their jurisdictions*.

5.2. Enacting Animal Agriculture's Legal-Geographical Realities

This emphasis on where decision-makers have authority thereby reframe the question from on concerning whether products are equivalent, to one concerning *where* they are equivalent. Alongside practice-based, mosaic or topological, geographies where soybean meat (*De soya*) can be sold as meat at a market in Xela, Guatemala (Yates-Doerr, 2015), and assembled milk proteins and fatty acids count as milk among Bay Area (bio)techies a focus on legal geographies illuminate more territorially bound processes determining clear boundaries to what animal products *today* legally denote (Table 1, see also Devitt, 2017; Stephens *et al.*, 2018).

Table 1 enables underscoring how, in response to Oatly's enactment of oat-based products as dairy upgrades, *Svensk Mjölk* took recourse to EU regulation

Table 1. Legal definitions of meat and milk in the USA and the European Union.

Substance	Prominent 'post-animal' developments	US FDA definition	EU definition
Meat	Beyond Meat, Impossible Meat, Quorn™, Tofu- and soy-based products, cultured meat	'…the flesh of animals used as FOOD including the dressed flesh of cattle, swine, sheep, or goats and other edible animals, except fish, poultry, and wild game animals' (FDA, 2013)	The "edible parts," including blood, of Domestic ungulates, poultry, lagomorphs, wild game, farmed game, small wild game, large wild game. (EU 853/2004)
Milk	Soy milk, almond milk, Oatly, Perfect Day	'…the lacteal secretion, practically free from colostrum, obtained by the complete milking of one or more healthy cows' (FDA, 2018)	'…exclusively the normal mammary secretion obtained from one or more milkings without either addition thereto or extraction therefrom' (EU 1898/1987)
Eggs	No-egg, Just, Clara Foods	'No regulation shall be promulgated fixing and establishing a reasonable definition and standard of identity for the food commonly known as eggs' (FDA, 2018)	'…eggs in shell – other than broken, incubated or cooked eggs – that are produced by hens of the species *Gallus gallus* and are fit for direct human consumption or for the preparation of egg products' (EU 589/2008)

(see Marknadsdomstolen, 2015, p. 37). From *this* standpoint, enacting milk as stable object is not complicated at all. Oat-based drinks are neither milk, nor akin to milk.

Similarly, as post-animal products have attracted increased interest and venture capital, we encounter high-profile attempts by US animal agriculture interests to get law-makers to counteract new, and possible future, food products. In January 2017, Wisconsin Democrat senator Tammy Baldwin introduced the 'Defending Against Imitations and Replacements of Yogurt, milk, and cheese to Promote Regular Intake of Dairy Everyday Act' or 'DAIRY PRIDE Act' to US Congress. This bill aimed to require enforcement against 'misbranded' milk alternatives. Similarly, the US Cattlemen's Association in 2018 submitted a petition for rule-making to the USDA Food Safety and Inspection Service, asking for the imposition of beef and meat labelling requirements. As they argued:

> The labels of 'beef' or 'meat' should inform consumers that the product is derived naturally from animals as opposed to alternative proteins such as plants and insects or artificially grown in a laboratory. (United States Cattlemen's Association, 2018, p. 2)

In stating their case, the Cattlemen's Association relies on how animals figure in definitions of 'meat' and 'beef' set forth in dictionaries or federal statutes and regulations. The Cattlemen's Association thus appeal to the law as having produced a stable reality relatively unbothered by the kind of 'mundane practices' Mol (2002) focuses on as reality-making.

But that the Cattlemen's Association or Svensk Mjölk marshal established legal definitions does not imply that invoking established regulation ends discussions. Also legal realities are precariously enacted 'historically, culturally and

materially located' (Mol, 1999, p. 75). Otherwise, the US Cattlemen's Association would not have to *argue* their case. Or to put it in Viljanen's (2009, p. 15) terms, 'even legal concepts are enacted and performed in networks of complex associations, theories, convictions, things, intermediaries, actors and actants.' This, to him, underscores 'the fragility of the legal world.'

5.3. Conflicts or Collaborations?

Livestock sector interests have however not *only* protested novel food technologies. Some have invested in animal agriculture alternatives. In the summer of 2016 French dairy giant Danone purchased WhiteWave Foods, owner of plant-based beverage brands such as Silk® and Alpro® (Kowitt, 2016a). Later that fall, one of the world's largest meat processing companies, Tyson Foods, bought a share in Beyond Meat®, a company producing plant-based meat alternatives (Hanson, 2016). Meanwhile Cargill, a world-leading meat producer, were in 2017 among the companies investing $17 m in meat-culturers Memphis Meats, a company that also Tyson Foods has since invested in.

To some livestock sector interests the possible introduction of cultured meat signals an opportunity for animal agriculture industries to reinvent themselves. As Meatingplace editor Lisa M. Keefe (2016) remarked, 'meat companies might consider going along for the ride':

> Rather than make and distribute only animal-derived, meat-based products, processors might redefine themselves as makers and distributors of protein products – then create, or acquire, companies and brands related to protein, regardless of origin. (Keefe, 2016)

Similar to how New Zealand's Prime Minister's chief science advisor Sir Peter Gluckman labelled 'synthetic milks' both a 'existential risk' and an opportunity for the country (Grieveson, 2017), this signals that animal-derived products and their alternative replacements could form a unified protein-production sector, thereby ushering in a commercially motivated 'friendly compresence' (Pellizzoni, 2015) of realities where meat can be muscle, derived from tissue engineering, or plant-based. Turning divergence into business opportunities, cellular agriculture hence echoes what Goldstein (2018, p. 10) calls 'non-disruptive disruptions': 'technologies that can deliver "solutions" without actually changing much of what causes the underlying problems in the first place' (see also Metcalf, 2013).

6. Rendering Objects Political

For cellular-agricultural products striving for being bio-identical, we can (alongside early collaborations) only sense inklings of conflicts unfolding. But for Oatly, their claims of delivering dairy 'upgrades' generated a 14 months long battle between the company and dairy interests, and a settled court case. Zooming in on this conflict allows us to evaluate some of the possible effects of high-profile conflicts and thus on

what *might* await also for tissue-engineered and GM-based products, should a friendly compresence with animal agriculture prove unrealisable.

In a sense, this was a fight that Oatly lost. In November 2015 the Swedish Market Court ordered the company to abandon several of their high-profile slogans. Statements such as 'full of goodness,' and 'liquid goodness to keep your body fueled' were banned unless followed by defined health claims denoting benefits of consuming oat-based products. Labelling Oatly's cream substitute iMat 'not a substitute for cream. It's an upgrade' was forbidden both because this statement suggests that Oatly products have similar compositions to their alleged dairy precursors, and because they claimed superiority over them. Statements such as 'It looks like milk but isn't milk. It is made for humans (not baby cows)' and 'It's like milk, but made for humans' were simultaneously banned because they, according to the court, gave the impression that milk is unsuitable for humans. Thereby, the market court decided, Oatly's products were neither upgrades nor similar to dairy. In addition, this produced a peculiar 'reality effect' (Mol, 1999), asserting a kind of pre-Darwinian dominion where animals exist for human benefit. Milk is *made* for humans.

But although the court ruled in favour of the dairy industry, the story of Oatly is *also* one of a successful company. A few days before the Market Court's ruling Oatly's founder Richard Öste was named Southern Sweden's entrepreneur of the year. Meanwhile, the public relations campaign that Oatly initiated when sued, *Dålig stämning i kyldisken* (tense feelings in the fridge section) was in 2015 recognised with an award at the Swedish Association of Communication Agencies' competition for the communication industries. For this campaign Oatly devoted a section of their webpage to making court documents available, thereby turning conflict into marketing device.

The aftermath of the so-called milk war also illuminates traces of the 'fragility of the legal world' (Viljanen, 2009), appearing in how Oatly complied with the ruling in a way that mocked the decision. Through rebranding themselves 'The Oat losers' and adorning packages with a big 'Not Milk' logo they over-identified with the ruling in a way that paradoxically could be said to undermine the ontological stability it could create. Meanwhile, Oatly has after the ruling toyed with, rather than abandoned banned statements. Where they previously stated 'No milk. No soy. No badness,' packages now stated 'No milk. No soy. No … Eh … Whatever.' Through such humorous twists, the conflict can be kept alive also after the court formally settled matters.

Similarly, when the Swedish Market Court's decision was issued, a grassroots campaign to '#SupportOatly with forbidden truths' (*#BackaOatly med förbjudna sanningar*) was swiftly initiated. Oatly-supporters were, as part of this campaign, to spread phrases and messages banned by the Market Court on social media to 'turn this [ruling] into an advantage and show how absurd the ruling is. (authors' translation)' Under the #BackaOatly, #wownocow, and #itslikemilkbutmadeforhumans hashtags supporters spread images of food cooked using Oatly

products, images of Oatly's packaging, and the banned slogans. Oatly's standing as a food-political project was thus strengthened, with consumers taking an active stance for both the company's fate and their 'forbidden truths' (see https://www.facebook.com/events/124789427885596/?active_tab=highlights). Thereby the Oatly case became an opportunity for people to express and engage with their own form of politics, from veganism to environmentalism (McCrow-Young, 2017), using the conflict to playfully yet critically explore food production and politics (cf. Bradley and Hedrén, 2014).

But also before this, Oatly argued that being sued was beneficial, above all because the law-suit raised the profile of the brand (Dagens Industri, 2015). Framing Oatly as a political project, the company's lawyers already in the market course defence claimed that 'goodness,' rather than suggested health benefits, denoted 'ethical/moral/biblical goodness' (Marknadsdomstolen, 2015, p. 25, authors' translation). Downplaying the unreliability of goodness as health claim, the company thus turned the claim into one pertaining to morals and ethics. This points to a key facet of ontological politics, how the ontological, epistemological, and ethical are all intertwined in how new realities are enacted (Law, 2009, 2015).

7. On the Potential Undoing of the Post-animal Category

We have so far gone from describing attempts to enact new food ontologies through material and discursive practices, via regulatory practice as potentially threatening newly crafted objects from carrying proposed realities very far, to how conflicts can cause objects to mutate into more overtly politicised objects. So far, we have however treated post-animal food products as one coherent group. This might be too simplistic.

True, proponents often present the products discussed throughout this article as a coherent set of desirable animal agriculture replacements, a turn towards *a* post-animal bioeconomy in the singular (see Datar *et al.*, 2016; Zassenhaus, 2017). But other possible groupings instead enact differences. The assertion that cultured meat or biotechnologically 'brewed' milk would be bio-identical for example differs from plant-based alternatives, where taste and texture are instead what producers try to replicate by working with different raw materials compared to their alleged 'animal doubles' (Donaldson, 2016). Or, as Stephens *et al.* (2018, p. 157) discuss the matter, there is a difference between asserting that novel products are 'biologically equivalent' to livestock products, and asserting that they are 'viscerally equivalent.'

Despite such differences, products can none-the-less *form* a coherent category, if successfully tied together. Insisting on cultured meat, biotech milk, and (sometimes) plant-based products as part of cellular agriculture or a post-animal bioeconomy here contain three articulations – understood as 'connection[s] that can make a unity of two different elements, under certain

conditions[,] a linkage which is not necessary, determined, absolute and essential for all time' (Hall, 1996, p. 141).

First of all, cell-cultured products are articulated as on par with their animal-derived precursors. Cultured cells are meat, even if production processes and present textures differ from conventional meat production. Milk is milk, even if no dairy cows were ever involved in its production. This assertation, underscoring the equivalence between novel biotechnological objects and products of natural selection, is the arguably most important attempted ontological-political power exertion that we witness.

Second, through linking novel food technologies to previous GM in medicine and food production new products are inserted into a history of successful, safe, applications of GM. In presenting cellular agriculture New Harvest for example marshals the successful 1978 attempts to genetically modify bacteria to produce insulin alongside the 1990 FDA approval of genetically modified bacteria for producing rennet for cheese manufacturing (Datar *et al.*, 2016).

Third, cellular agriculture or a post-animal bioeconomy connects processes and products where arguments for such products have sometimes been premised on holding them apart (Stephens *et al.*, 2018). Cellular agriculture and a post-animal bioeconomy include both products where production processes are premised on GM, and non-GM products. But for cultured meat, earlier presentations have been premised on how it does *not* involve GM. In information material issued for the 2013 cultured beef burger Maastricht University (2013, p. 2) emphasised that the burger was 'fundamentally different to GM food. No genetic modification is involved in this process. Cultured Beef is normal beef; it consists of cow cells.' Rather than an articulation between GM-based and non-GM technologies, this underlines dissociation. Further complicating the picture several cultured meat laboratories are moreover today looking into the potential of modifying cells (Stephens *et al.*, 2018).

Similarly, while GM-based, plant-based and tissue-engineering-based technologies are frequently gathered together under the 'post-animal' moniker, tissue-engineering-based technologies are strictly speaking not 'post-animal.' At a minimum, an animal from which cells are biopsied is required. In addition, contemporary cell-culturing attempts utilise animal inputs: fetal bovine serum (Jönsson, 2016; Thieme, 2017). Alongside questions concerning whether cultured meat would be meat (Kramer, 2016; Stephens and Ruivenkamp, 2016), one can thus add whether cultured meat is currently (or even potentially) post-animal?

The uncertainty evident in these articulations is crucial. In dealing with a set of notions (post-animal, cellular agriculture, bioeconomy) identified as ambiguous and polysemic an important feature of the kind of reality novel objects (attempt to) carry is the wider processes and categories they become part of. Debates on how new 'post-animal' objects might fit together became pronounced at a session devoting half an hour to 'The Birth of Society' at the aforementioned 2015 Maastricht symposium. The intention was to utilise this time-

slot to found a scientific society for cultured meat production in order to strengthen the position of cultured meat research as a scientific field. The task to name the scientific society, and to thereby delimit the field, however, proved insurmountable. Though most of those assembled, through a quick hands-up, showed their support for *a* scientific society, what this society should be remained elusive.

Already early on, a researcher asked what such a society should even be called, with the immediate suggestion of 'tissue-engineering for food' not inclusive enough for some of those assembled. A more inclusive 'society for cellular agriculture' was suggested by one activist, who also questioned whether the society should not also include in vitro leather researchers. The broadening that a society for cellular agriculture moniker signals, was in turn questioned by one cultured meat researcher claiming there might not be a lot of parallels scientifically. The activist suggesting the society for cellular agriculture instead offered another delineation, arguing that 'having insects at the same conference as cultured meat is a distraction.' After a discussion spanning well over the thirty minutes allotted the proposed society remained unnamed, though the discussion ended with the session chair saying that he thought it would boil down to the name 'Cellular agriculture.' Two and a half years on no society is however founded.

In this discussion, the uncertainty of just what the people assembled for the three-day symposium were gathered around became prominent. Was this gathering primarily relevant to researchers exploring how to utilise tissue engineering to produce food, or part of a broader proposed turn towards 'cellular agriculture' or a 'post-animal bioeconomy?' And if the latter held, where should the line be drawn between food alternatives that are deemed part? As Stephens *et al.* (2018, p. 157) aptly summarise, there 'is still debate as to exactly how cellular agriculture should be defined, and which (proposed) products fit within or beyond this definition.' Perfect Day's biotechnology-based milk is frequently included, but not always Impossible Food's GM and plant-based burger. Insects are, according to the aforementioned activist, not to be included (well, they *are* animals, if also 'the Others of animals' [Kosek, 2011, p. 231]). But insect chips, called 'chirps,' were served at another 2015 workshop, the Edible Bioeconomy in San Francisco, where New Harvest was one of the organisers.

All these questions underscore how also the post-animal bioeconomy or cellular-agricultural field remain unstable, a 'precarious reality' (Law, 2009) only potentially in the making, as shot through with ontological ambiguities as cultured meat is (cf. Stephens and Ruivenkamp, 2016).

8. Conclusions

In this article, we have striven to make sense of the emergence of a cellular-agricultural sector or a 'post-animal bioeconomy' aided with an ontological-political

analytical lens taking seriously the way that new technological objects unsettle and produce realities. In line with Mol's (1999) emphasis on reality-carrying objects, we have found it useful to understand new 'post-animal' products as something that 'happens' to (and thereby remakes) the world rather than merely objects inserted into a pre-existing world (see also Latour, 2008). But as we elaborate on below we also take seriously how novel objects hardly carry their realities further without friction.

In the beginning of our text, we posed four interrelated questions. Returning to these illustrates what our account could mean for further discussions on ontological politics. The various ways that proponents and developers state their cases for their products or prototypes as identical or superior to conventional animal agriculture products illustrate some of the high-profile projects underway that propose that *many* different kinds of (so-called) post-animal products should count as meat, or milk proper. Conceptualising this in terms of ontological politics enables tracing this as an attempted ontological destabilisation where products built on novel technologies should take the place of, or at the very least be placed alongside, animal products. The (changing) nature of real milk, real meat, and so on, are at the heart of the ontological-political tensions and uncertainties that we see unfolding as new food-production technologies are developed. Through the promise of a post-animal bioeconomy, a teleological (if certainly not uncontested!) story is spun around new objects, regarded as carrying 'the next and logical step in an agricultural (r)evolution' (Datar *et al.*, 2016, p. 122).

Frequently, novel products and prototypes are in these attempts considered upgrades based in an understanding of animals as sub-optimal sources of animal products. This is, for example, evident in how a researcher at Perfect Day Foods lamented dairy cows feed conversion ratios, and the fact that they produced body parts that we do not need. Similarly underscoring perceived benefits of moving beyond the constraints posed by animal bodies within animal agriculture The Good Food Institute laude how producing meat in vitro would avoid antibiotic residues and bacterial contamination. But those representing plant-based technologies can go further in their critique of animal-derived products. As Oatly representatives argued, also animal products' composition is sub-optimal, with cows' milk for example significantly more protein-rich than human milk. Statements concerning milk's healthiness thus become ensnared in debates over new milk alternatives.

Beyond proposing a post-animal turn, these arguments however also illuminate important differences in how proponents and developers of new post-animal products present these. Some, such as Perfect Day, rely on a practice-based understanding of objects' nature (meat is what people treat as meat, milk is what people use as milk) (cf. Yates-Doerr, 2015), while others instead underscore that novel products should be bio-identical (cultured cells are indistinguishable from a living animal's cells).

However, as our account of various products show, neither claims of similarity nor of superiority go unanswered. Laboratories might export 'objects that carry new realities, new ontologies, with them' (Mol, 1999, p. 75). But as soon as objects leave laboratories they become ensnared in the myriad of processes together creating the extra-laboratory world (and thus by extension the laboratories, see Latour, 1987). What researchers and proponents refer to as real meat or real milk might never reach grocery shelves as 'meat' or 'milk.' Important barriers are here erected as established livestock industry interests invoke current regulations concerning animal products in the (futile) hope of finding a stable ontology (Viljanen, 2009).

How researchers, producers and proponents thereafter relate to such barriers is partly a question that we cannot yet answer at length. This is because we can only point to inklings of conflicts over animal products ontological standing, evident in recent US campaigns to bar novel products from branding themselves after animal-agricultural products. But the Oatly case in Sweden illustrates how even when losing high-profile court cases (thus being forced to abandon slogans previously positioning plant-based products as better versions of animal products) this need not be a fatal blow to a company. Rather, producers of novel products *can* marshal also losses to further raise their profile and restyle themselves as more explicitly political projects, while also consumers proved ready to take up the gauntlet.

However, also budding collaborations are evident between proponents of 'post-animal' and animal products, while a closer look at how post-animal products relate to each other illustrates potential tensions. Though plant-based, GM-based, and tissue-engineering-based attempts and products are frequently placed alongside each other as proponents argue for *a* post-animal bioeconomy such coherence is far from assured. Just as we see ways through which the ontological standing of animal products is destabilised, so we see the coherence of a cellular-agricultural or post-animal category questioned through ongoing discussions on how objects and technologies fit together within this proposed category.

In making sense of the many different twists and turns summarised in this conclusion, a focus on ontological politics continues to be valuable, particularly in underlining the fundamental openness of the world (and the categories subdividing and thereby remaking it). But we also believe that a focus on ontological politics does well in incorporating Braun's (2008) critique of how marvelling at multiplicity is not enough, and Pellizzoni's (2015) critique of assuming compresence. Though not exclusively about dissensions, in discussing ontological politics within the broader political economy of food (and research) our account underlines some of the conflicts spurred as laboratory-generated objects leave their laboratories.

That we advocate such a shift in emphasis is moreover in the spirit of previous work on ontological politics, with Mol's (2002, p. viii) detailed account of the

practices enacting atherosclerosis in a Dutch hospital deeply tied to the sites studied. What she called 'praxiography' was 'explicit about its local origins,' and a deliberate attempt to 'move philosophy away from formats that carry universalistic pretensions, but that in fact hide the locality to which they pertain.' That our account draws distinctively different conclusions than Mol's should therefore not be seen as a critique of her work. Rather, it follows naturally from how we scrutinise different practices, sites, and objects. Our work should complement her work through honing in on the socio-spatial nature of ontological-political dynamics when global processes and problem formulations, laboratories localisable in space, and national or regional regulations come together to continuously make and remake realities. In this process, we encounter a world (re)made through new food-production technologies that on the one hand forces us to question what particular products are, and on the other hand, help us to understand just how power-permeated the processes defining what objects are really can be.

Note

1. The Swedish Dairy Association has since dissolved, with The Federation of Swedish Farmers' milk branch *LRF Mjölk* and *Växa* taking over their activities.

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